APPENDIX K

DEWATERING PLAN AND

SEDIMENT REMOVAL PLAN

Proactive by Design

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

530 Broadway
Providence, RI 02909
401.421.4140
www.gza.com

Technical Memorandum

Project: Dewatering Calculations – Mashapaug Cove
Textron Inc. Former Gorham Manufacturing
Providence, Rhode Island

Date: August 6, 2015

Job #: 34126.00

Prepared by: Anthony Urbano, P.E., David Carchedi, P. E.
GZA GeoEnvironmental, Inc.
530 Broadway, Providence, Rhode Island

Prepared for: Charter Environmental Inc.
500 Harrison Avenue, Suite 4R, Boston, Massachusetts

GZA reviewed the August 6, 2015 Dewatering Plan prepared by Charter Environmental Inc. for the Textron Former Gorham Manufacturing Site, Phase II, III, and Parcel C Cap in Providence, Rhode Island. A copy of that Dewatering Plan is provided in Attachment 1. The following calculations are provided to support the Dewatering Plan.

Control of Water from the Existing Storm Water Detention Basin

We understand that details of the invert elevation of the 12-inch pipe discharging from the existing detention basin are not available. In addition, the design flow rates in the 12-inch pipe for various rain storm events are also not available. Based on inspection of topographic grades shown on the figure provided in Attachment 2, the bottom of the storm water detention basin is around elevation 53 feet; and, the grade at the downstream manhole (where the 12-inch downstream discharge pipe will be blocked) is around elevation 55 feet. Therefore, the plugging of the 12-inch pipe may allow up to 2 feet of storm water to accumulate in the basin (before seepage at the grade of the downstream manhole begins).

The 4-inch pump that will be installed in the downstream manhole (upgradient of the 12-inch plug) has a capacity of 450 gallons per minute (gpm). Flow rate calculations are provided in Attachment 3. We assume that this pump will is capable of meeting the peak storm water flow rate, or that the depth of storm water in the detention basin will be less than 2 feet. If these assumptions are not correct, then the design will have to be modified.

Inner Cove Dewatering – Initial Drawdown to 1 foot of Cove Bottom

The estimated volume of water in the inner cove is about 2,200,000 gallons. The time to pump down that volume of water using a 3,000 gpm pump is about 11 hours. Calculations are provided in Attachment 3. We note that during pumping operations, Charter personnel should observe the water discharged to Mashapaug Outer Cove. The pump operations should be immediately stopped if the turbidity levels outside the turbidity curtain show a visible change.

Proactive by Design

Inner Cove Dewatering – Dewatering to Cove Bottom

The flow rates from each of the 1 horsepower (Hp) pumps discharging to the 20,000 gallon frac tank at elevation 45 feet and the associated 400 feet of 2-inch discharge hose is about 45 gpm. The flow rates from each of the 1 Hp pumps and associated 150 feet of 2-inch discharge hose is about 55 gpm. See calculations provided in Attachment 3. Multiple pumps will be required to handle the dewatering of the bottom 1 foot of water in the bottom of the cove. The transfer pump from the 20,000 gallon frac tank to the infiltration area has the capacity to pump 2,200 gpm. See the calculations that are provided in Attachment 3.

Inner Cove Dewatering – Construction Dewatering

The subsurface conditions in the inner cove can be generally described as about 2 to 4 feet of soft or loose, organic silt, peat, or sand with organics (pond bottom deposits) underlain by outwash deposits. We note that in some areas the pond deposits and peat may be more than 4 feet deep (particularly in the southeast portion of the cove). The underlying outwash deposits are primarily comprised of sand and gravelly sand with some areas interbedded with silt, clay, or just sandy silt (without sand or gravelly sand strata). The boring logs of explorations drilled within the cove and a plan depicting the boring locations are provided in Attachment 4.

GZA estimates the groundwater flow rate into the cove to be about 150 gpm. Our calculations, provided in Attachment 3, are based on the assumption that the hydraulic conductivity of the aquifer is 50 feet per day, and the saturated thickness of the aquifer is about 20 feet. Note that actual flow rates may be more or less than this estimate.

Assuming the aquifer hydraulic conductivity is 50 feet per day, the saturated thickness is 20 feet, and the drawdown in the extraction well is 5 feet, then the estimated flow rate from each sump pit is about 35 gpm (see calculations provided in Attachment 3). Note that the actual flow rates may be more or less than this estimate depending on the actual subsurface conditions encountered at each sump pit. We note that the sump pits should be installed within the underlying sand a gravelly sand strata, when present at the sump pit location. In addition, Mirafi 140N non-woven filter fabric or equivalent should separate the native soils from the ¾-inch crushed stone that surrounds the culvert pipe. The distance between the sump pits and the number of sump pits should be adjusted to achieve the desired drawdown of the groundwater table (to allow a stable bottom for the removal of the 1 to 2 feet of sediments from the bottom of the cove).

Infiltration Basin

The infiltration basin will be located northeast of the cove at the location shown on the figure provided in Attachment 2. The subsurface conditions in the area of the infiltration basin can be generally described as about 2 feet of silty topsoil and subsoil underlain by sand and gravelly sand to a depth of 16 to 18 feet. Silty fine sand was encountered beneath the sand and gravelly sand strata to depths of 24 to 32 feet below grade. The logs of borings drilled in the area of the infiltration basin and a plan depicting the boring locations are provided in Attachment 5.

Proactive by Design

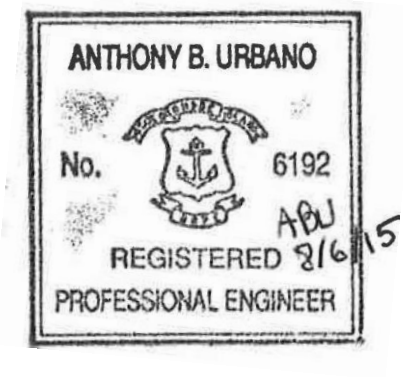
The bottom of the infiltration basin should be located beneath the fine grained topsoil and subsoil. The infiltration area will be approximately 150 feet long and 150 feet wide. Assuming a flow rate of 150 gpm, the minimum hydraulic conductivity of the infiltration bed would need to be 1.3 feet per day. The sand and gravelly sand strata is anticipated to have a significantly higher vertical hydraulic conductivity than the 1.3 feet per day. However, if the discharge water is turbid, then the silt and/or clay will tend to accumulate in the bottom of the basin and thereby decrease the vertical hydraulic conductivity. Therefore, it may be necessary to occasionally remove this silty buildup on the bottom of the infiltration basin.

The potential for a significant groundwater mound to develop beneath the infiltration area was also evaluated using a flow rate of 150 gpm. Our calculations, provided in Attachment 3, suggest that the groundwater mound may approach the ground surface within the infiltration area, depending on the actual flow rates and actual subsurface conditions beneath the infiltration area. The actual groundwater mound may have to be further evaluated once the system is in operation.

In order to minimize silting of the bottom of the infiltration area, the initial third of the infiltration basin will be both an infiltration area and a sediment trap.

Attachments:	Attachment 1:	Dewatering Plan
	Attachment 2:	Drawing No. C-101
	Attachment 3:	Calculations
	Attachment 4:	Boring Logs and Boring Locations within Cove
	Attachment 5:	Boring Logs and Boring Locations near Infiltration Area

Reviewed by: Thomas E. Billups, P.E.



J:\ENV\34126.ABU\REPORT\34126.00 Dewatering Design Calculations.DOCX

Proactive by Design

ATTACHMENT 1

DEWATERING PLAN

Plan Title: Dewatering Plan

Project Title: Textron Former Gorham Manufacturing Site
Phase II, III, and Parcel C Cap
Providence, RI

Prepared For: Textron, Inc.
40 Westminster Street
Providence, RI 02908

Prepared By: Charter Contracting Company, LLC
500 Harrison Avenue, Suite 4R
Boston, MA 02118
Phone: 857-246-6800

Contract No: PO# 153436

Charter No.: 2-1244

Date: August 6, 2015

Revision No.: 00

Paul J. Leofanti Jr., Project Manager
Telephone: 857-246-6812

Date

Date

Date

This page left blank intentionally for double-sided printing.

TABLE OF CONTENTS

ATTACHMENTS

This page left blank intentionally for double-sided printing.

1. INTRODUCTION

This Dewatering Plan describes the personnel, procedures, inspections, and controls to be implemented during construction of Phase II, III, and the Parcel C Cap at Textron's former Gorham manufacturing facility in Providence, RI. The plan provides the mechanisms to ensure that activities associated with the Dewatering Plan are accomplished in accordance with contract specifications, drawings, procedures, and manufactures recommendations.

2. CONTROL OF WATER FROM THE EXISTING INFILTRATION BASIN

An existing infiltration basin located outside our limits of work and directly south of Phase III has a 12" outlet pipe that discharges into the Inner Cove. Prior to dewatering the Inner Cove this flow will need to be diverted. There is a manhole structure located outside of the infiltration basin where the 12" outlet pipe passes thru. Using a 12" pipe plug we will block this 12" outlet pipe within the manhole to stop the flow of water. A 4" electric pump will be placed in the manhole to pump water that would have normally discharged thru the blocked 12" outlet pipe. Power for this pump will be by a portable 65kw generator located near the cove. Daily observation of the water level will occur by Charter's site superintendent. The pump will be operated as required to maintain a normal level of water in the infiltration basin. Discharge will occur into the Mashapaug Outer Cove between the Portadam (temporary dam) and turbidity curtain. Scour protection will be accomplished by the previously installed sealing sheet of the Portadam system. Treatment of this discharge water is not required as it has already been considered treated within the confines of the infiltration basin. A drawing of this dewatering system is included as **Attachment 1**. A specification sheet on the 4" electric pump is included as **Attachment 2.**

3. INNER COVE DEWATERING

Dewatering of the Inner Cove will be accomplished in three stages. They are as follows:

1. Initial drawdown to within 1' of the cove bottom
2. Dewatering to cove bottom
3. Construction dewatering

These stages are further discussed below.

3.1. Initial Drawdown to 1' of the Cove Bottom

After the installation of the Portadam between the Inner and Outer Coves, initial dewatering of the Inner Cove will take place. This initial dewatering will lower the water from its current elevation (elevation 39) to approximately 1' from the bottom. The calculated volume of water in this initial drawdown is close to 2,000,000 gallons. One 12" x 8" diesel pump will be used to perform this initial drawdown. This pump will be located at the northeast corner of the Inner Cove. A containment berm will be used around the pump to protect against any spills and allow refueling (if needed) to take place. The intake / suction end will extend out towards the deep part of the cove behind the Portadam. Floats will be used to keep the suction end of the hose off the cove bottom and near the surface of the water to avoid disturbance of the sediment. An intake

screen will be used to protect wildlife. Discharge will occur into the Mashapaug Outer Cove between the temporary dam and turbidity curtain. Scour protection will be accomplished by the previously installed sealing sheet of the Portadam system. Floats will also be used to prevent the discharge hose from lying on the bottom. A drawing of this dewatering system is included as **Attachment 5**. A specification sheet on the 12" x 8" diesel pump is included as **Attachment 6.**

This initial drawdown will begin immediately upon completion of the Portadam system. Our rate of pumping will be around 3000 GPM. At this rate it should take approximately 11 hours to complete the initial drawdown. We expect this to start at the end of the second day of Portadam installation once the sealing sheet is installed. Pumping will be continuous through the night into the next morning. Charter will have a crew on site at all times to monitor the pumping. Charter personnel will observe the water discharged to the Mashapaug Outer Cove. The pump operations will be immediately stopped if the turbidity levels show a visible change.

Towards the end of this stage, we expect to have a smaller pool of water 1'-2' deep located within the deepest area of the Inner Cove (where the bottom contours are elev. 37 to elev. 36) At this point the 12" x 8" pump will be turned off and we will begin to perform the Aquatic Wildlife Management Plan. This will be performed with the assistance of the ESS Group, a full service environment consulting & engineering service firm located in East Providence. The aquatic wildlife will be captured within this smaller pool of water utilizing noise makers and hand held nets and then released into the Outer Cove and / or Pond.

3.2. Dewatering to Cove Bottom

Once the Aquatic Wildlife Management Plan has been completed, the remaining water in the cove will be pumped out. This will be accomplished with using 2" electric pumps **(Attachment 3)**. These pumps will be placed on crushed stone or a steel plate to minimized turbidity. Power for the pumps will be supplied by a 50 KV generator located in or around the cove area. The generator will be placed on timber crane mats and will have spill containment around it. Fueling of this generator will take place by a fuel truck. These pumps will be placed by hand where needed to remove the final 1' of water. Discharge hoses from the 2" pumps will empty into a 20,000 gallon frac tank located near the bottom of the haul road at approximately elevation 40. This collected water would then be pumped to the infiltration basin by a 6" electric pump. This pump will handle the 25' elevation change and 350' discharge length. The infiltration basin is further discussed in Paragraph 4.

3.3. Construction Dewatering

Dewatering during cove excavation and backfill will be accomplished by local sump pumps. These sumps will be constructed utilizing filter fabric (Mirafi 140N non-woven filter fabric or equivalent), ¾" crushed stone, and perforated 24" HDPE pipe (similar to RISESCH Section six pump intake protection). Sumps will generally be 5' deep (embedded into gravelly sand strata when present) and located as needed throughout the cove as construction progresses. See **Attachment 7**. Pumps will be set on a minimum 12" of stone to minimize sediment discharge. Along the backside of the Portadam a continuous sump of stone and fabric may be required to control seepage under the Portadam. Pumping will be accomplished with 2" electric pumps **(Attachment 3)**. Power for the pumps will be supplied by a 50 KV generator(s) located in or around the cove area. The generator(s) will be placed on timber crane mats and will have spill containment around

them. Fueling of the generator(s) will take place by a fuel truck. Discharge hoses from the 2" pumps will empty into a 20,000 gallon frac tank located near the bottom of the haul road at approximately elevation 40. This collected water would then be pumped to the infiltration basin by a 6" electric pump **(Attachment 4)**. This pump will handle the 25' elevation change and 350' discharge length. Flow rates of the pumps will vary on ground conditions and weather. The infiltration basin is further discussed below.

4. INFILTRATION BASIN

In the upland area of Phase III we will be constructing an infiltration basin to handle dewatering discharge during the final dewatering to the cove bottom and during construction dewatering. We will construct the infiltration basin on the north end of phase III. Approximate size of the infiltration basin will be 150' x 150'. It will be constructed by performing a 1'-2' cut into the existing surface of the site across the 150' x 150' footprint. This excavated material (approximately 800 CY) will be used to construct a perimeter berm 1' – 2' high. This will help prepare the existing ground for better infiltration and allow added storage capacity if required. A stone pad will be constructed at the location of the pump hose discharge to prevent scouring of the soil. The initial third of the infiltration basin will be a combined infiltration area and sediment trap. A 12" tall crushed stone barrier will separate the two areas. Mirafi 140N non-woven filter fabric (or equivalent) will be situated vertically in the center of the stone barrier. Silt fence will be placed several feet from the outside edge of berm along its perimeter. The volume of water within the infiltration basin will be monitored by Charter's on site superintendent. Pumping operations will stop when the water level rises 6" above original grade. A drawing of the infiltration basin is included as **Attachment 7**.

5. REMOVAL AND RESTORATION

Once dewatering operations are complete, all pumps, hoses, timber mats, spill containment, generators, etc. will be removed from the Inner Cove area. The Inner cove will then be refilled according to the Dewatering plan. The infiltration basin area in Phase III will be re-graded to subgrade so cap construction can begin.

6. PLAN ACKNOWLEDGEMENT

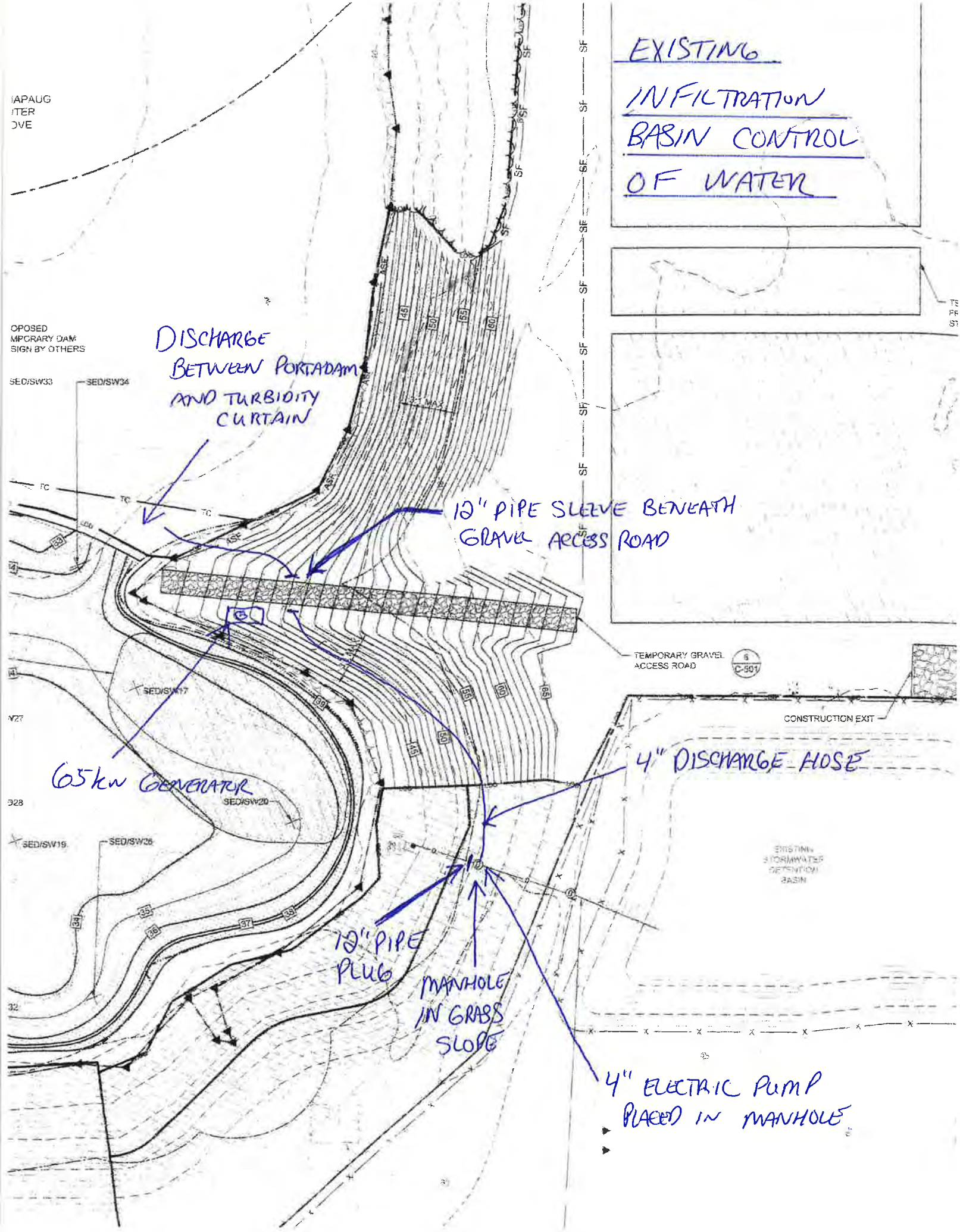
By their signature, the following undersigned certify that this Plan has been read, or otherwise communicated to them. They further certify that they understand this Plan and will follow its procedures during work on this project.

Name	Company	Date

ATTACHMENT 1

Existing Infiltration Basin Control of Water Sketch

This page left blank intentionally for double-sided printing.


EXISTING
INFILTRATION
BASIN CONTROL
OF WATER
DISCHARGE
BETWEEN PORTADAM
AND TURBIDITY
CURTAIN
12" PIPE SLEEVE BENEATH
GRAVEL ACCESS ROAD
65kw GENERATOR
4" DISCHARGE HOSE
12" PIPE
PLUG
MANHOLE
IN GRASS
SLOPE
4" ELECTRIC PUMP
PLACED IN MANHOLE
TEMPORARY GRAVEL
ACCESS ROAD
CONSTRUCTION EXIT
EXISTING
STORMWATER
DETENTION
BASIN
SED/SW33
SED/SW34
SED/SW17
SED/SW20
SED/SW19
SED/SW28
OPOSED
MPORARY DAM
SIGN BY OTHERS

This page left blank intentionally for double-sided printing.

ATTACHMENT 2

Manufacturers Literature – 4" electric pump

This page left blank intentionally for double-sided printing.

FLYGT

PERFORMANCE CURVE

PRODUCT	TYPE
BS2640.180	MT

DATE	PROJECT	CURVE NO	ISSUE
2008-12-02	CHARTER ENVIRONMENTAL	63-228-00-4130	4

	1/1-LOAD	3/4-LOAD	1/2-LOAD
POWER FACTOR	0.89	0.84	0.74
EFFICIENCY	86.0 %	87.0 %	86.0 %
MOTOR DATA	---	---	---

RATED POWER	8.85	hp
STARTING CURRENT ...	83	A
RATED CURRENT ...	11	A
RATED SPEED	3495	rpm
TOT.MOM.OF INERTIA ...	0.010	kgm2
NO. OF BLADES	2	

IMPELLER DIAMETER: 131 mm

MOTOR #	STATOR	REV
15-14-2BB	04YSER	10

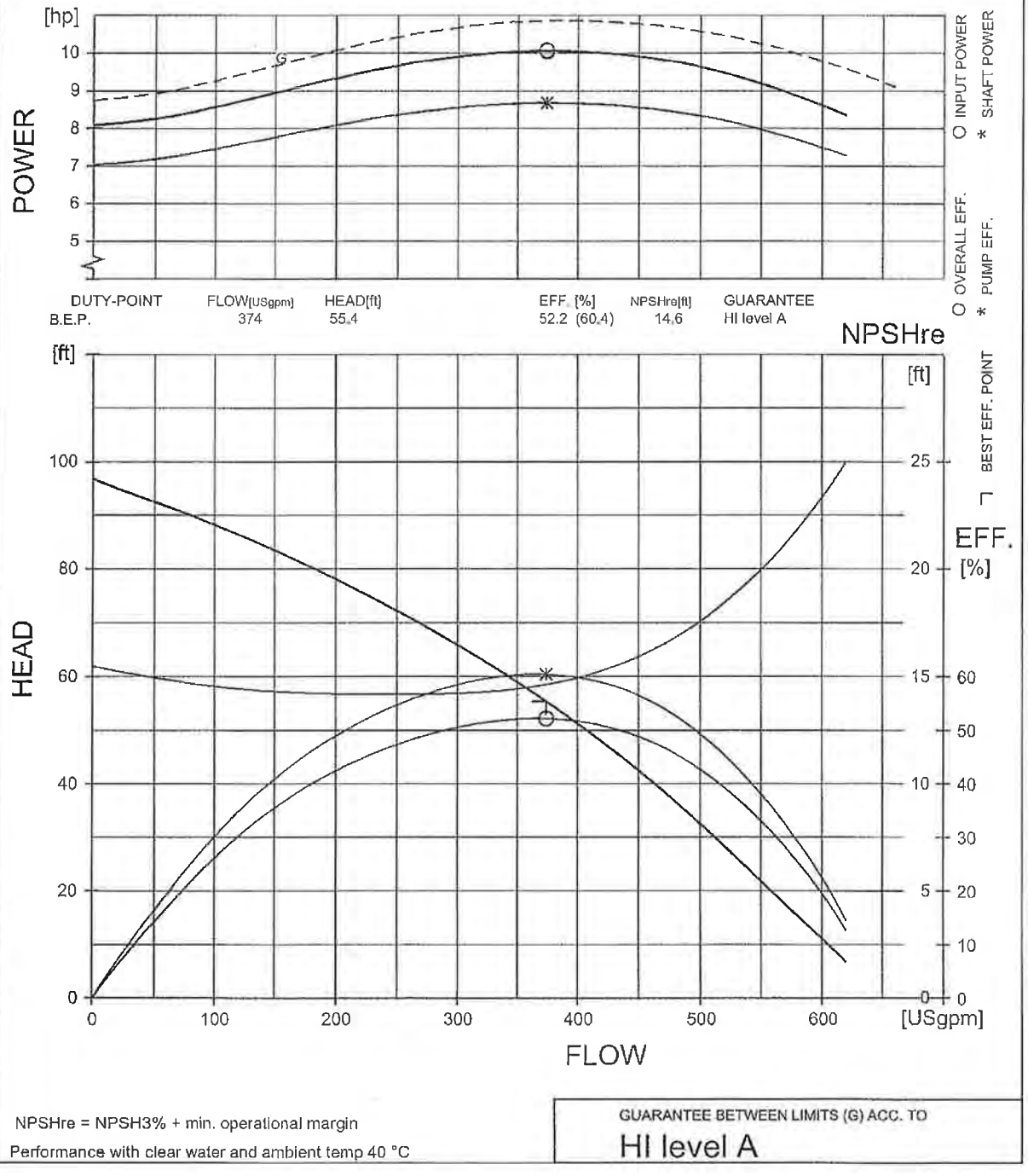
FREQ.	PHASES	VOLTAGE	POLES
60 Hz	3	460 V	2

GEARTYPE	RATIO
---	---

COMMENTS

INLET/OUTLET: -/ 4 inch

IMP. THROUGHLET: ---



	FLOW[USgpm]	HEAD[ft]	EFF. [%]	NPSHre[ft]	GUARANTEE
DUTY-POINT					
B.E.P.	374	55.4	52.2 (60.4)	14.6	HI level A

FLYPS3.1.6.3 (20060531)

NPSHre = NPSH3% + min. operational margin

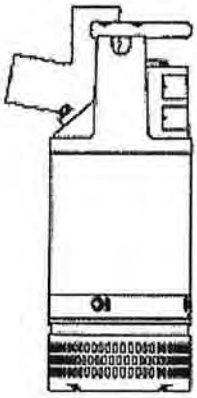
Performance with clear water and ambient temp 40 °C

GUARANTEE BETWEEN LIMITS (G) ACC. TO

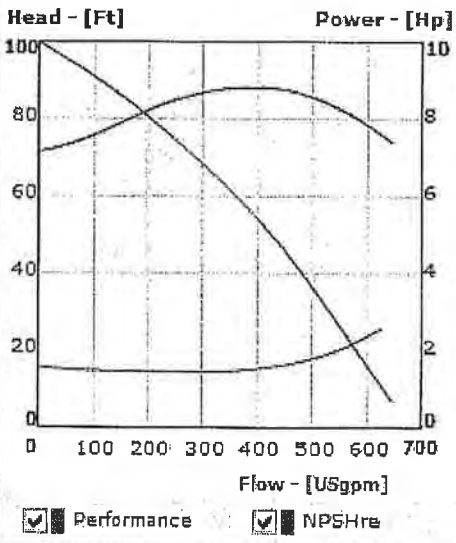
HI level A

PRODUCT: BS 2640 MT

Product picture



Curves ⊕ Enlarge



Pump Data

Curve id: 63-228-00-4130 Impeller: 228 Poles: 2 - pole Motor: 15-14-2BB Frequency: 60 Hz

Motor Data

Rated output power Hp (kW)	Ø	Nominal voltage (V)	Full load current (A)	Locked rotor current (A)	Locked rotor kVA	Locked rotor code letter kVA/Hp	Poles/rpm
8.8 (6.6)	3	460	11	83	66	J	2/3495
8.8 (6.6)	3	230	22	166	66	J	2/3495

Pump motor Hp	Efficiency			Power factor		
	100% load	75% load	50% load	100% load	75% load	50% load
8.9	86	87	86	0.89	0.84	0.74

Cable Data

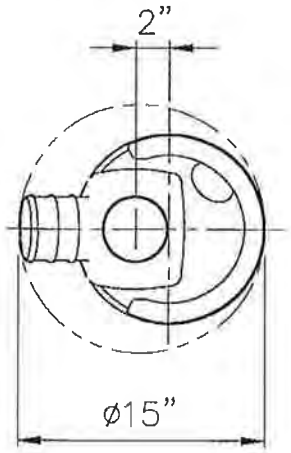
HP	Cables	Volts	Max. length (Ft)	Cable size/Nominal OD.	Conductors (In one cable)	Type	Part number
8.8	1	230 460	150 615	#10/3-2-1-GC 0.84"-(21.3mm)	(3) 10 AWG (PWR) (2) 12 AWG (CTRL) (1) 10 AWG (GND) (1) 12 AWG (GC)	STD	942106

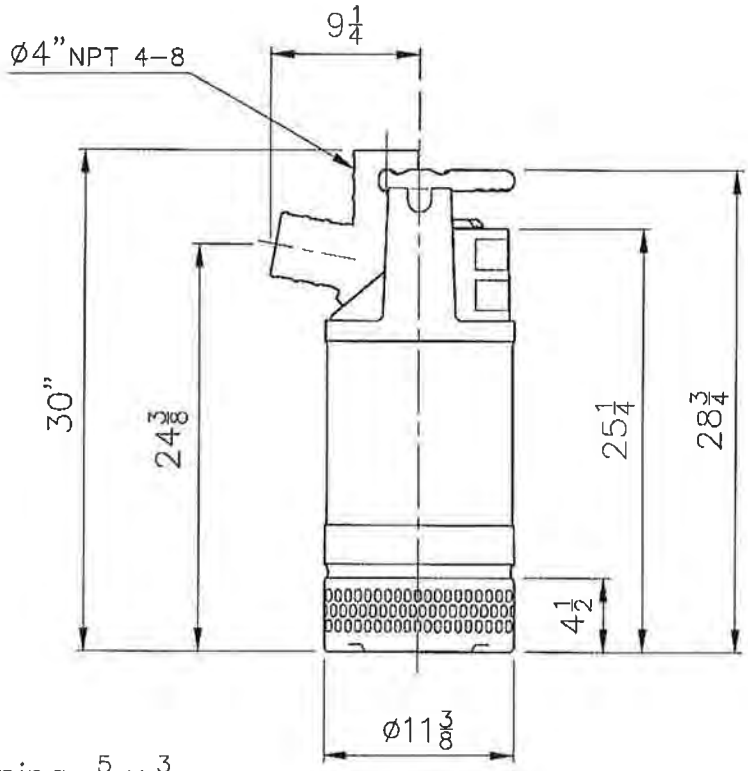
Available Outlet Size

Outlet Male Thread	4"
Outlet Hose	4"
Outlet Quick Coupling	4"

Warm Liquid Data

Rtd. Amb. Temp.	Rtd. Curr.(1)	Rtd. Curr.(2)	De-rated Shaft Power
70° C / 158° F	9.5 A	19 A	7.6 Hp





Screen opening $\frac{5}{16} \times \frac{3}{4}$

Weight (lbs)
Total
115

PLYMOUTH AUTOCAD DRAWING	Denomination: Dimensional drwg BS,KS 2640.080,180 MT ø4"	Drawn by: KST	Checked by: Ken	Date: 080403
		Scale:		Reg no.
		7051500		3

This page left blank intentionally for double-sided printing.

ATTACHMENT 3

Manufacturers Literature – 2" electric pump (LB-800-60)

This page left blank intentionally for double-sided printing.

TSURUMI PUMP

LB-800/LBT-800
SEMI-VORTEX - DEWATERING PUMP

SPECIFICATIONS

FEATURES

1. Semi-vortex, urethane rubber impeller, urethane front & rear ware plates and ethylene propylene rubber casing increases wear resistance when pumpage contains abrasive particles.

2. Double inside mechanical seals with silicon carbide faces, (both top and bottom) running in an oil filled chamber and further protected by a lip seal running against a replaceable, 304 stainless steel shaft sleeve, provides for the most durable seal design available.

3. Highly efficient, continuous duty air filled, copper wound motor with class B, insulation minimizes the cost of operation.

4. Built in thermal protector prevents motor failure due to- overloading or accidental run -dry conditions.

5. Double shielded, permanently lubricated, high temperature C3 ball bearings, extend operational life.

6. Top discharge, flow-thru design enables operation at low water levels for extended periods.

APPLICATIONS

1. Residential, commercial, industrial wastewater and construction site drainage.

2. Effluent transfer.

3. Decorative waterfalls and fountains.

4. Raw water supply from rivers or lakes..

OIL LIFTER EQUIPPED

SPECIFICATIONS

Discharge Size	2" Npt (50 mm)
Horsepower Range	1 Hp. (.75 Kw)
Performance Range Capacity	10 ~ 82 Gpm. (.037 ~ .31 m^3/min)
Head	7 ~ 59 Ft. (2.1 ~ 17.9 m)
Maximum water temperature	104^0 F. (40^0 C.)
Materials of Construction	
Casing	Ethylene Propylene Rubber
Impeller	Urethane Rubber
Shaft	403 Stainless Steel
Motor Frame	Aluminum alloy
Fasteners	304 Stainless Steel
Mechanical Seal	Silicon Carbide/Silicon Carbide
Elastomers	NBR (Nitril Buna Rubber)
Impeller Type	Semi-vortex, solids handling.
Solids Handling Capability	Screen opening
Bearings	Pre-lubricated, Double Shielded C3
Motor Nomenclature	
Type, Speed, Hz.	Air Filled, 3600 Rpm, 60 Hz.
Voltage, Phase	115/230 V., 1 Phase 230/460/575 V. 3 Phase (LBT-800)
Insulation	Class E
Accessories	Submersible Power Cable 50' (9.75 m)
Operational Mode	Manual

STANDARD

OPTIONS

Length as Required, (97' Max)

*See Technical Data section for details.

TSURUMI PUMP

LB SERIES
SEMI-VORTEX - DEWATERING PUMP

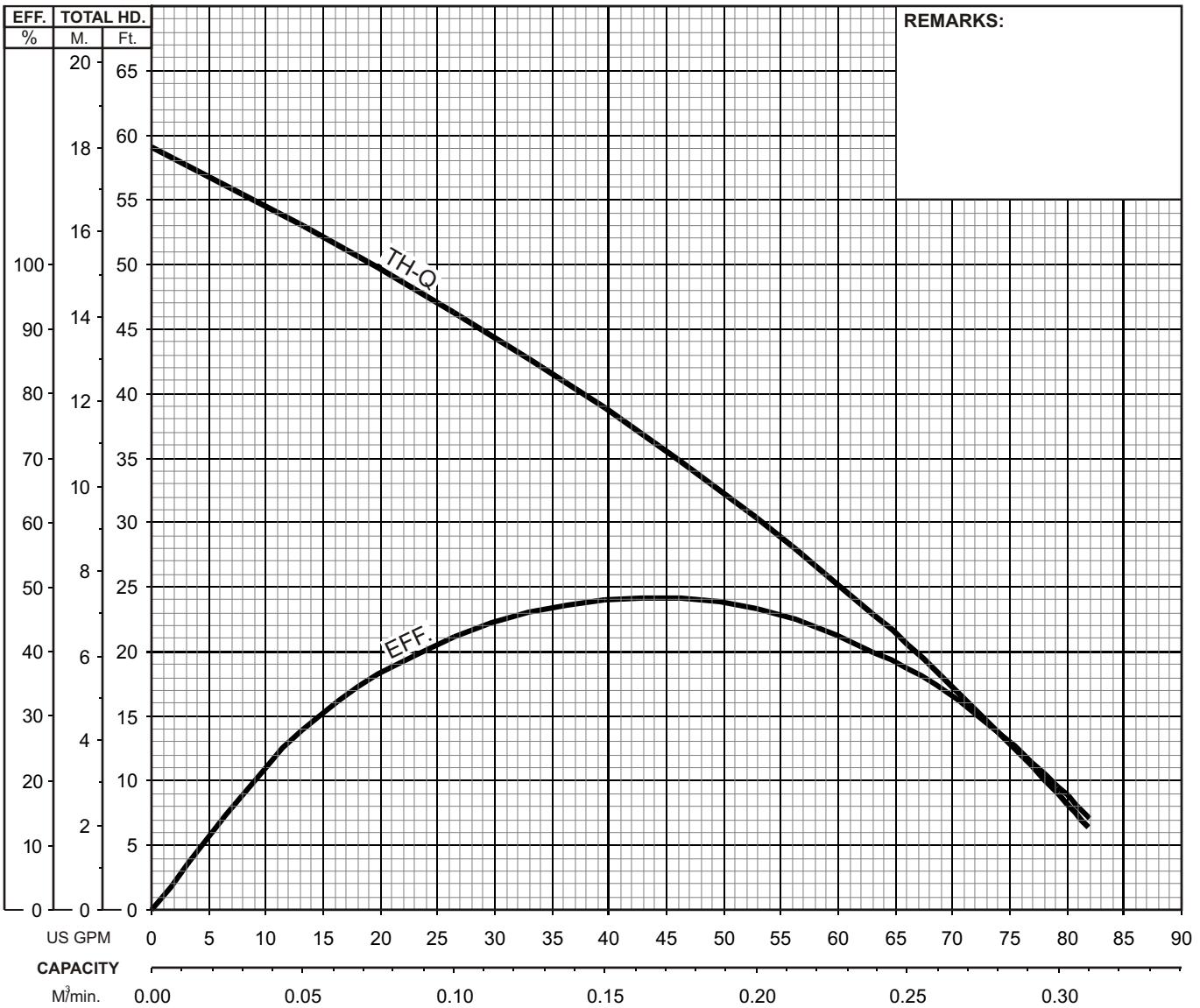
PERFORMANCE CURVE

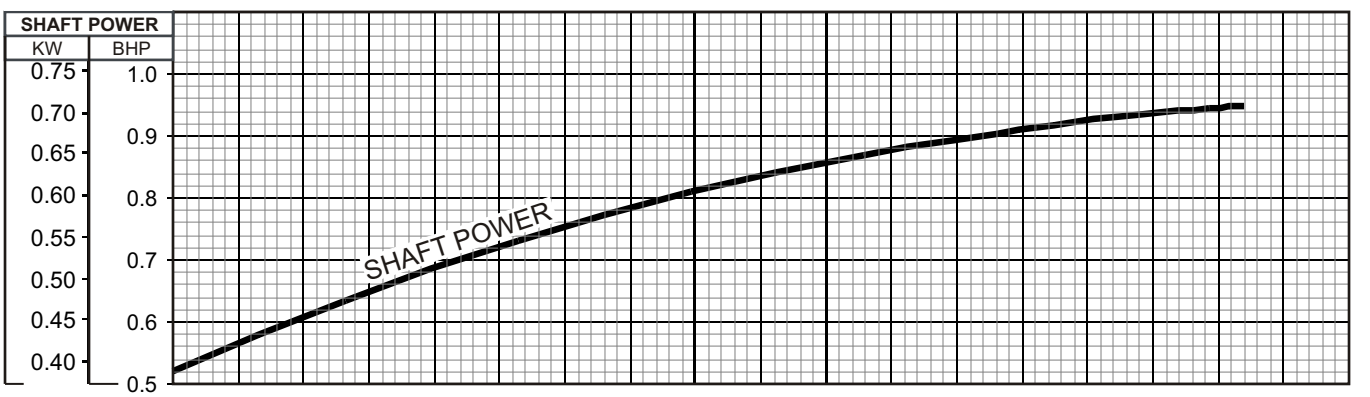
MODEL	BORE	HP	KW	RPM	SOLIDS DIA	LIQUID	SG.	VISCOSITY	TEMP.
LB-800-60	2"/50mm	1	0.75	3330	0.236"/6mm	Water	1.0	1.81 CST	60°F

PUMP TYPE	PHASE	VOLTAGE	AMPERAGE	HZ	STARTING METHOD	INS. CLASS
Semi-Vortex - Dewatering Pump	Single	110/115/220/230	10.8/10.3 / 5.7/5.5	60	Capacitor Start	E

CURVE No.	DATE	PHASE	VOLTAGE	AMPERAGE	HZ	STARTING METHOD	INS. CLASS
-	-	-	-	-	-	-	-

REMARKS:



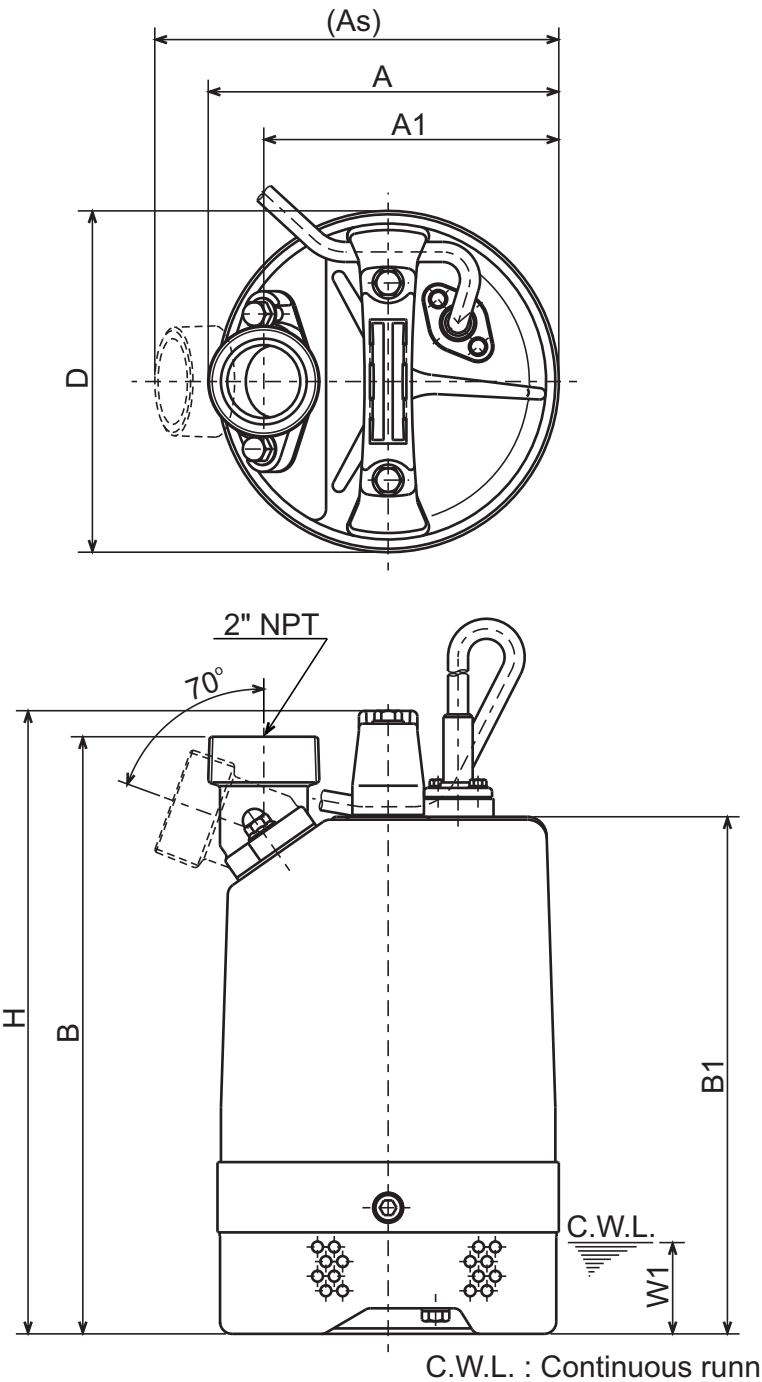


TSURUMI PUMP

LB - SERIES
SEMI-VORTEX - DEWATERING PUMP

DIMENSIONS

LB-800-61
LBT-800-61



C.W.L. : Continuous running Water Level

DIMENSIONS:USCS (Inch)

Model	HP	NOM. SIZE	Pump & Motor							C.W.L.	Wt.
			A	As	A1	B	B1	D	H	W1	(lbs.)
LB-800-61	1	2"	7 9/16	8 11/16	6 3/8	12 7/8	11 1/8	7 3/8	13 7/16	2	29
LBT-800-61	1	2"	7 9/16	8 11/16	6 3/8	12 7/8	11 1/8	8 3/4	13 7/16	6 3/4	28

DIMENSIONS:METRIC (mm)

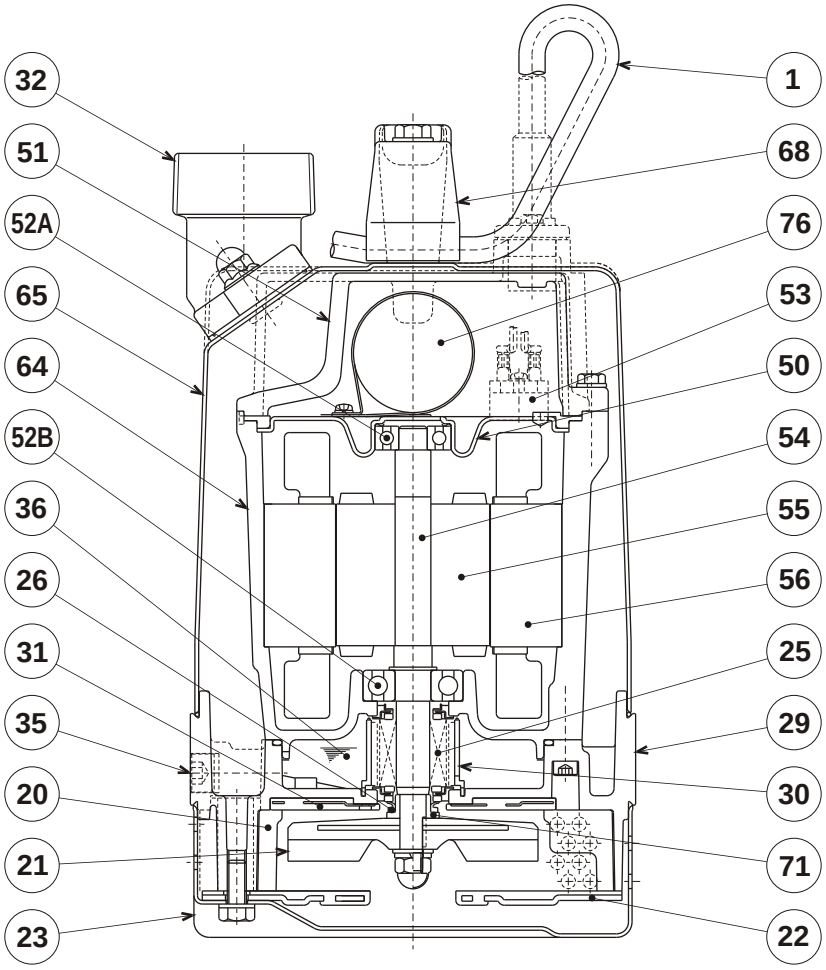
Model	kW	NOM. SIZE	Pump & Motor							C.W.L.	Wt.
			A	As	A1	B	B1	D	H	W1	(kg)
LB-800-61	0.75	50	192	221	162	327	283	187	341	50	13.2
LBT-800-61	0.75	50	192	221	162	327	283	223	341	170	12.8

TSURUMI PUMP

LB-800-60
SEMI-VORTEX - DEWATERING PUMP

SECTIONAL VIEW

LB-800-60



ITEM#	DESCRIPTION	MAIN MATERIAL / NOTE	ASTM, AISI CODE	RELATED DIN CODE	Q'TY
1	Power Cable	PVC Sheath AWG14/3-32ft			1
20	Pump Casing	Butadiene Rubber + Natural Rubber			1
21	Impeller	Urethane Rubber			1
22	Suction Cover	Urethane Rubber+Carbon Steel	(A109 Class 91)	(1624-87 St 2,3,4)	1
23	Suction Strainer	Carbon Steel	A109 Class 91	1624-87 St 2,3,4	1
25	Mechanical Seal	Silicon Carbide / W-14VL			1
26	V-Ring	Nitrile Butadiene Rubber			1
29	Oil Casing	Aluminum Alloy Die Casting	B85 , A383	N/A (BS Code LM 2)	1
30	Oil Lifter	ABS Resin			1
31	Wearing Plate	Urethane Rubber			1
32	Discharge Connection	Aluminum Alloy Die Casting / NPT 2"	B85 , A383	N/A (BS Code LM 2)	1
35	Oil Plug	Stainless Steel	AISI 304	17440 X5 CrNi 18-9	1
36	Lubricant	Turbine Oil ISO VG32 or SAE 10W/20W			
50	Motor Bracket	Carbon Steel	A109 Class 91	1624-87 St 2,3,4	1
51	Motor Head Cover	Aluminum Alloy Die Casting	B85 , A383	N/A (BS Code LM 2)	1
52A	Upper Bearing	#6201ZZC3			1
52B	Lower Bearing	#6302ZZC3			1
53	Motor Protector				1
54	Shaft	Stainless Steel	AISI 403	17440 X15 Cr 13	1
55	Rotor				1
56	Stator				1
64	Motor Housing	Aluminum Alloy Die Casting	B85 , A383	N/A (BS Code LM 2)	1
65	Outer Cover	Carbon Steel	A109 Class 91	1624-87 St 2,3,4	1
68	Handle	ABS Resin			1
71	Shaft Sleeve	Stainless Steel	AISI 304	17440 X5 CrNi 18-9	1
76	Capacitor				1

TSURUMI PUMP	LB - 800 SEMI- VORTEX DEWATERING PUMP	SAMPLE SPECIFICATIONS

1. SCOPE OF SUPPLY -

Furnish and install TSURUMI Model LB-800, Submersible Pump(s). Each unit shall be capable of delivering GPM at Feet TDH. The pump(s) shall be designed to pump waste water, without damage during operation. The pump(s) shall be designed so that the shaft power required (BHP)/(KW) shall not exceed the motor rated output throughout the entire operating range of the pump performance curve. Pump(s) shall be of the top flow through design.

2. MATERIALS OF CONSTRUCTION -

Construction of major parts of the pumping unit(s) shall be as follows: Pump casing shall be synthetic rubber. Motor frame shall be aluminum alloy casting. Internal and external surfaces coming into contact with the pumpage shall be protected by a fused polymer coating. All exposed fasteners shall be stainless steel. All units shall be furnished with 2“ NPT discharge connector. Impellers shall be of the multi-vane, Urethane, Semi-vortex solids handling design and shall be slip fit to the shaft. The motor shaft shall be machined to provide a positive drive of the impeller.

3. MECHANICAL SEAL -

All units shall be furnished with a dual inside mechanical shaft seal located completely out of the pumpage, running in a separate oil filled chamber and further protected by a V ring, running against a 304 stainless steel shaft sleeve. Mechanical seals shall rated to preclude the incursion of water up to 42.6 PSI. (98.4 Ft.) submergence. Units shall have silicon carbide mechanical seal faces. Mechanical seal hardware shall be stainless steel.

4. MOTOR-

The pump motor(s) shall be 1 Hp., .75 Kw., ____ V., 60 Hz. __ Phase and shall be NEMA MG-1, Design Type B equivalent. Motor(s) shall be rated at ___ full load amps. Motor(s) shall have a 1.15 service factor and shall be rated for 20 starts per hour. Motor(s) shall be air filled, copper wound, class B insulated with built in thermal protection. Motor shaft shall be 403 stainless steel and shall be supported by two permanently lubricated, high temperature ball bearings. Bearings on all units shall be single row, double shielded, C3, deep groove type ball bearing. Motors shall be suitable variable speed applications, utilizing a properly sized variable frequency drive.

5. POWER CABLE AND CABLE ENTRANCE -

The pump power cable shall be suitable for submersible pump applications. The cable entrance shall incorporate built in strain relief, a one piece, three way mechanical compression seal with a fatigue reducing cable step. The cable entrance assembly shall contain an anti-wicking block to eliminate Water incursion into the motor due to capillary wicking should the power cable be accidentally damaged..

This page left blank intentionally for double-sided printing.

ATTACHMENT 4

Manufacturers Literature – 6” electric pump (DV150e)

This page left blank intentionally for double-sided printing.

Electric Trash Pump

DV150E

Overview:

The 6” suction x 6” discharge self-priming centrifugal DV150E electric trash and sewage pump provides up to a maximum of 2,200 gallons per minute pumping and up to 95 feet of head. This pump is usually mounted on a skid and features the standard PowerPrime Clean Prime Venturi priming system which allows it to run continuously, unattended and even run dry.

Features:

- Continuous self-priming
- Runs dry unattended
- Compressor fitted to operate the air-ejector priming system
- 3 vane, 316 stainless steel, 10.8” impeller
- Suction lift up to 28ft.
- Hot Dip Galvanized Open Skids with fork lift tubes
- Four corner bolt down angles
- Stainless steel and CD4MCu pump end options
- TEFC hostile duty dual voltage (230/460V) motor
- Fitted 480 volt control panels are equipped with motor protection
- Panels are equipped with terminal blocks for remote float switches

Specs:

Maximum Flow	2,200 GPM
Maximum Head	95 feet
Pump Size	6” x 6”
Maximum Solids Handling	3 inches
Dry weight	
Footprint	

Accessories:

- Spillguard
- Variable Frequency Drive

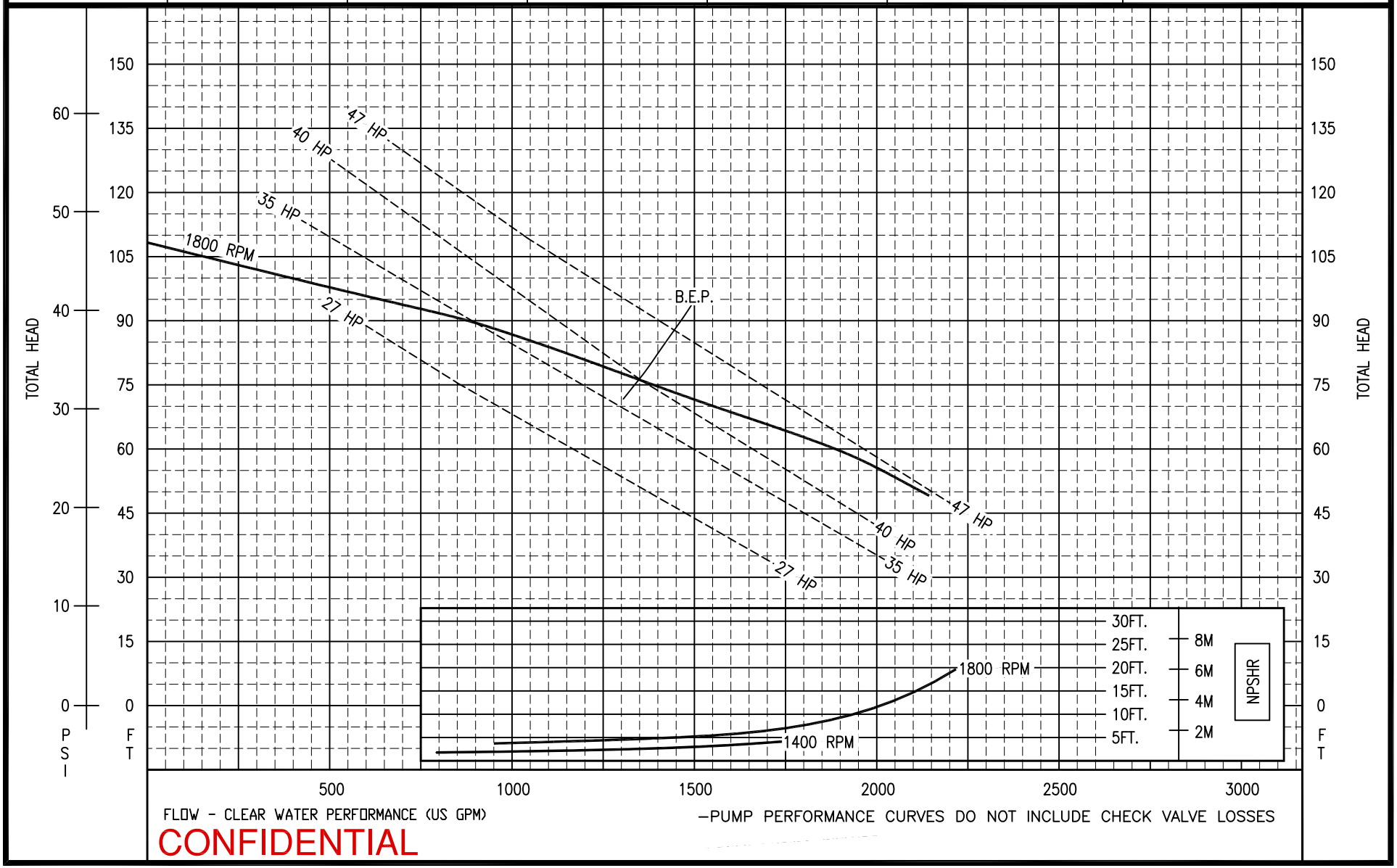
Liquid Ingenuity®
800-742-7246
rainforrent.com

Rain For Rent

CURVE: 01-0133-02-32

PUMP : DV-150e

SUCTION	DISCHARGE	MAX. SPHERE	IMPELLER	IMPELLER	IMPELLER & WEAR RINGS
6"	6"	3"	3 VANE	10.8"	316 S/S

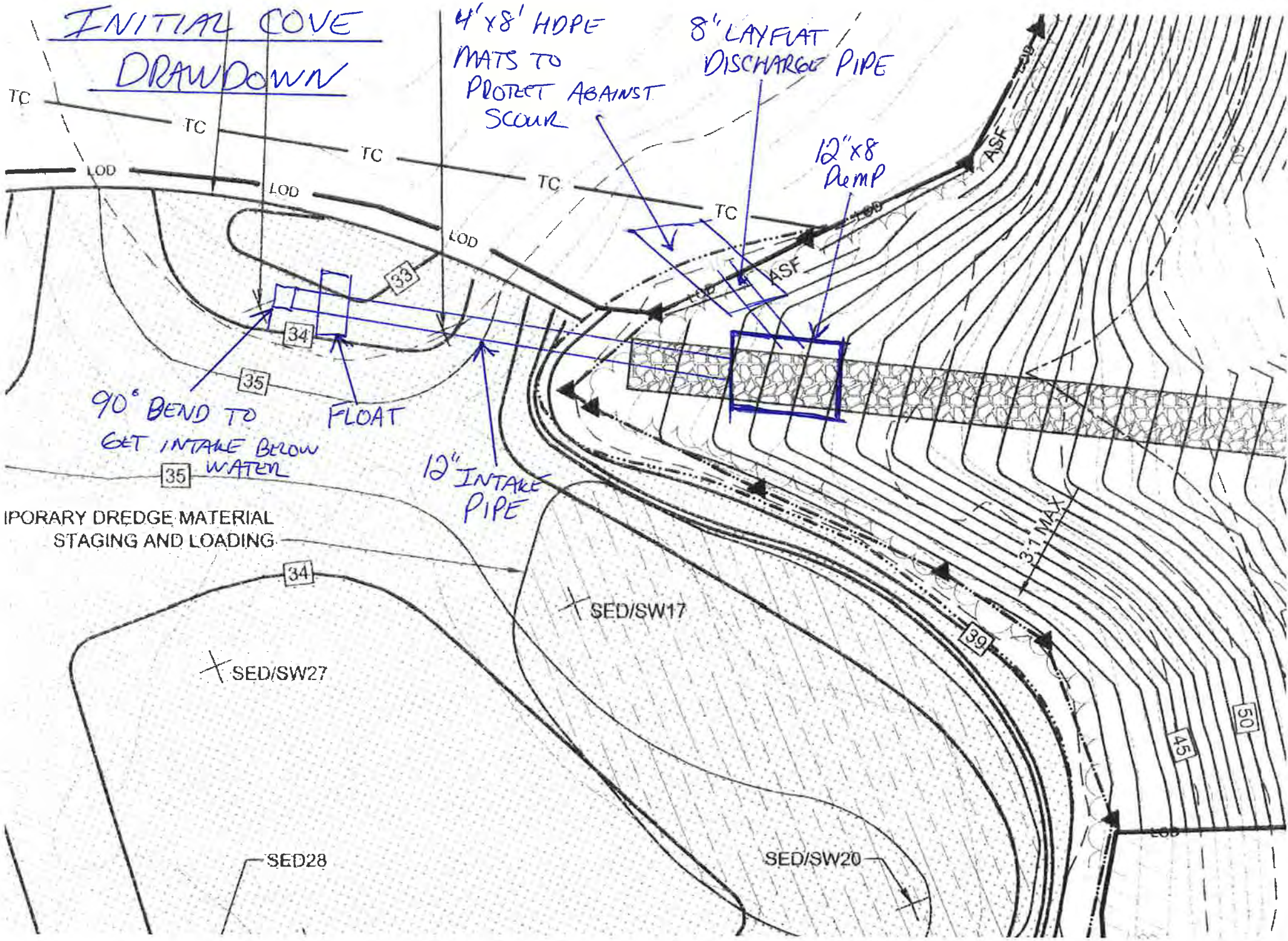


CONFIDENTIAL

ATTACHMENT 5

Pump configuration for initial cove drawdown to within 1' of bottom

This page left blank intentionally for double-sided printing.


INITIAL COVE DRAWDOWN
4'x8' HDPE MATS TO PROTECT AGAINST SCOUR
8" LAYFLAT DISCHARGE PIPE
12"x8 Ramp
TC
TC
TC
TC
TC
LOD
LOD
LOD
LOD
LOD
LOD
ASF
ASF
33
34
35
35
90° BEND TO GET INTAKE BELOW WATER
FLOAT
12" INTAKE PIPE
IPORARY DREDGE MATERIAL
STAGING AND LOADING
34
SED/SW27
SED/SW17
39
3:1 MAX
50
45
SED28
SED/SW20

This page left blank intentionally for double-sided printing.

ATTACHMENT 6

Manufacturers Literature – 12” diesel pump (DV 200c)

This page left blank intentionally for double-sided printing.

Model

DV200c

PowerPrime Pumps

DV200c Overview:

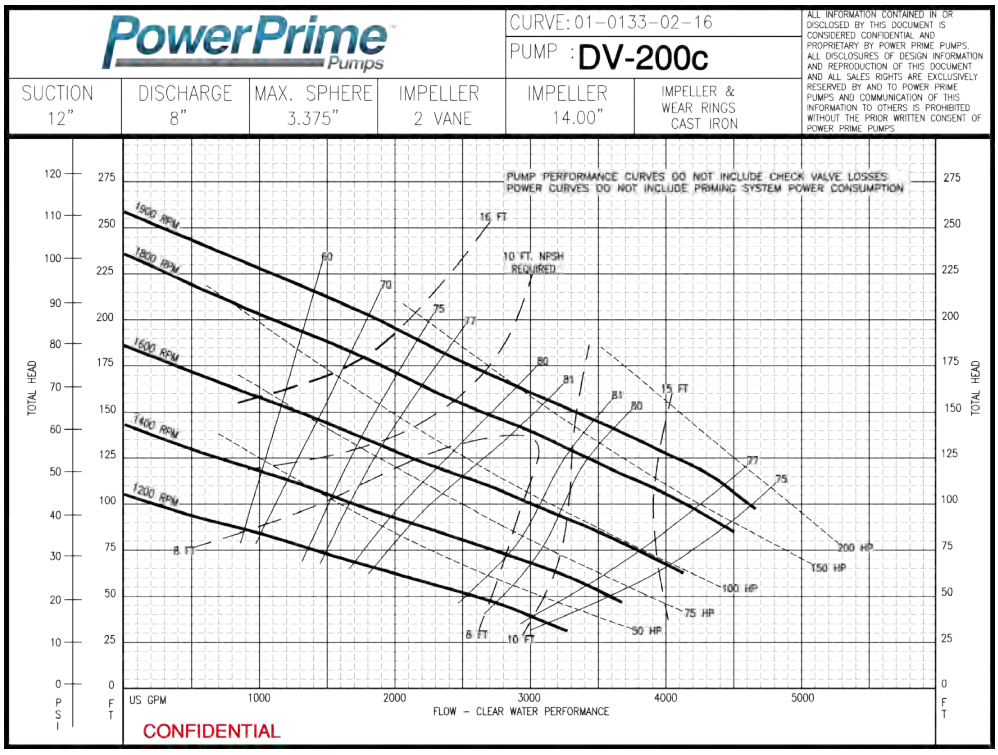
The 12 inch (304.8mm) DV200c Clean Prime™ is an extremely robust pump unit, capable of flow rates to 4600 GPM, total dynamic heads to 260 feet (79.2M), and solids handling capabilities up to 3.375 inches (85.7mm) in diameter. The DV200c also features the Power Prime™ Pumps high pressure Tungsten vs. Silicon Carbide mechanical seal that allows for indefinite dry running, ideal for intermittent flow applications as well as our proprietary Clean Prime™ self-priming system that mitigates any product blow by in the venture priming system while maintaining suction lift capabilities of up to 28 feet. All of these features come standard on a highly maneuverable galvanized compact skid for convenient use.

Standard Features:

- Hot Dip Galvanized Trailers and Skids
  - Radiator Enclosure
- John Deere Emissions Certified Engine
- Electric Brakes with Safety Breakaway
- Locking Battery Box

Optional DOT LED lights
Optional Floats

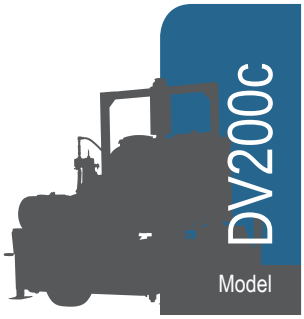
Pump Performance Curve:



Pump Features:

- Solids-handling capabilities to 3.375" diameter maximum
- Continuous self-priming
- Runs dry unattended
- Suction lift up to 28 ft.
- Auto-start capable control panel

Optional CD4MCu
Optional Ductile Iron

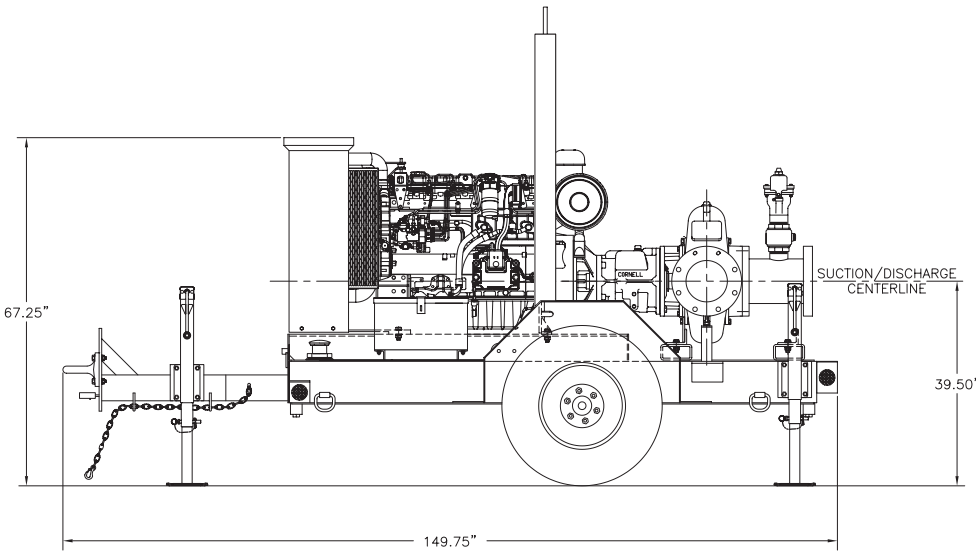


Model

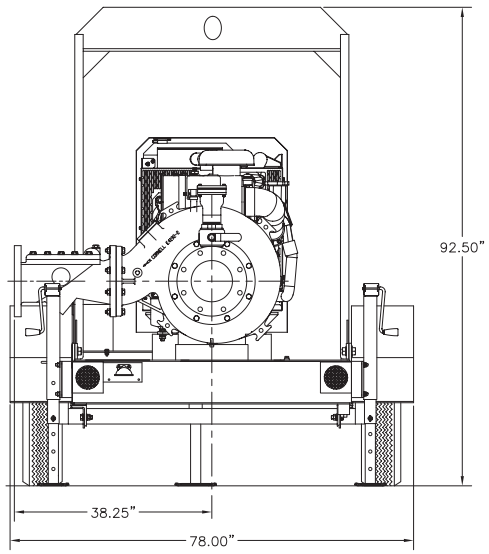
DV200c

PowerPrime Pumps

Dimensions:



REAR VIEW



SIDE VIEW

Standard Model Specifications:

Pump:

- Pump Size: 12"x6" AISI 150# flanges standard
- Suction Cover: ASTM A48 class 30 gray iron
- Wear Ring: ASTM A48 class 30 gray iron
- Volute Casing: ASTM A48 class 30 gray iron
- Back Plate: ASTM A48 class 30 gray iron
- Mechanical Seal: Tungsten vs silicon carbide seal faces
  Viton elastomers, 300 series stainless steel hardware and spring, seal system designed for dry running
- Impeller: Enclosed type, two port, non-clog, with 3" spherical solids handling capability ASTM A48 class 30 gray iron
- Bearing Housing: ASTM A48 class 30 gray iron

Engine:

- Model: 6068HFC94 iT4
- 200 intermittent horsepower @ 2400
- Six cylinder, six cycle, water cooled diesel engine
- Governor: Electronic
- Lubrication: Force feed

PowerPrime Pumps

powerprime.com

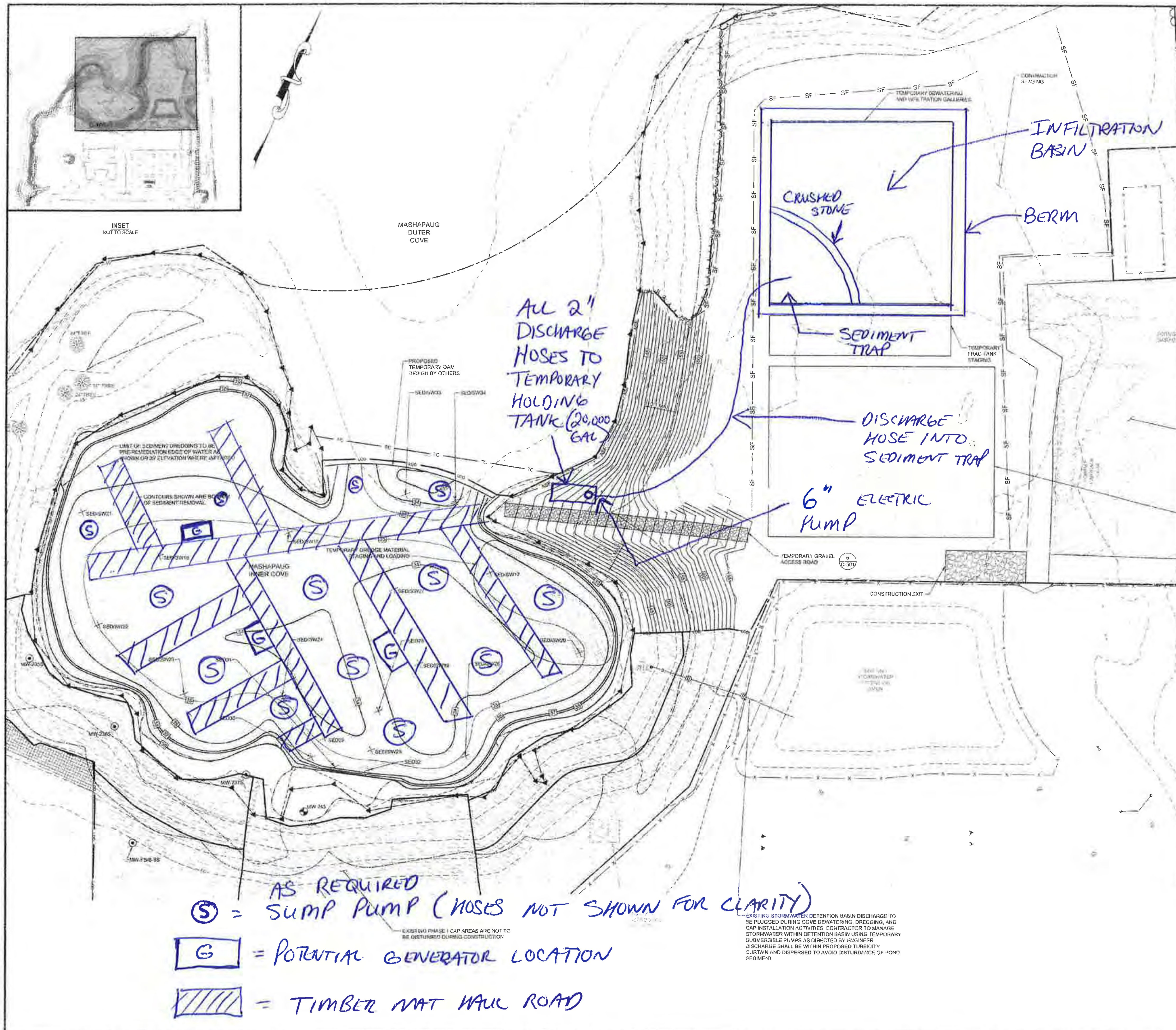
P.O. Box 2248
Bakersfield, CA 93303

800.647.7246
sales@powerprime.com

ATTACHMENT 7

General Pump Layout and Infiltration Basin Information

This page left blank intentionally for double-sided printing.



NOTES

1. CONTRACTOR MUST MANAGE DEWATERING RATES WITH AVAILABLE INFILTRATION AREA TO PREVENT EXCESSIVE PONDING OR OVERFLOW.
2. FRAC TANKS MAY BE USED TO PROVIDE ADDITIONAL STORAGE TO BALANCE INFILTRATION RATES DURING TIMES OF PEAK WATER GENERATION.
3. DURING CONSTRUCTION, ADDITIONAL DEWATERING TREATMENT MAY BE REQUIRED TO MEET TOTAL SUSPENDED SOLIDS AND TOTAL PETROLEUM HYDROCARBON LIMITATIONS UNDER TEMPORARY DISCHARGE PERMIT.
4. CONFIGURATION OF INFILTRATION GALLERIES, FRAC TANKS AND MATERIAL PROCESSING AREA MAY BE ADJUSTED BASED UPON ENGINEER APPROVED CONTRACTOR PLANS.
5. SEE SHEET 1 FOR PLAN REFERENCES.
6. SEE SHEET 1 FOR LEGEND AND NOTES.

TABLE 1: KEY SEDIMENT ELEVATIONS AND FINISH GRADES

Point #	Description	Northing	Easting	Existing Elev.[2]	Bottom Elev. of Removal	Finish Grade Elev. of Sand Cap	Bottom Elev. of Organic Material[1]
520	SED29	259774	347006	36.6	34.6	35.6	<32.6
515	SED/SW26	259807	347125	36.8	35.3	36.3	35.27
523	SED32	259763	347053	37.3	35.5	36.5	34.8
518	SED/SW34	260010	347029	34.9	33.9	34.9	33.9
513	SED/SW24	259794	346957	36.5	34.5	35.5	32.5
521	SED30	259754	347002	37.6	35.6	36.6	31.1
516	SED/SW27	259918	347010	35.8	33.8	34.8	33.5
519	SED28	259814	347040	36.6	34.6	35.6	<31.1
514	SED/SW25	259780	347048	36.5	34.5	35.5	<31.45
522	SED31	259754	347024	37.5	35.5	36.5	34.6
517	SED/SW33	259999	346987	34.6	33.6	34.6	33.6
505	SED/SW16	259929	346906	36.8	34.8	35.8	34.7
506	SED/SW17	259964	347082	36.6	35.6	36.6	36.1
507	SED/SW18	259867	346811	36.5	34.5	35.5	32.3
508	SED/SW19	259866	347056	35.9	33.9	34.9	31.3
509	SED/SW20	259930	347182	36.7	34.7	35.7	<34.2
510	SED/SW21	259876	346733	36.9	35.6	36.6	35.6
511	SED/SW22	259790	346785	36.8	34.8	35.8	33.8
512	SED/SW23	259763	346878	36.8	34.8	35.8	34.8

NOTES:

1. BOTTOM ELEVATION OF ORGANIC MATERIAL IS BASED ON THE EXISTING SEDIMENT BORING LOGS PROVIDED IN THE CONTRACT DOCUMENTS.
2. EXISTING ELEVATIONS ARE INTERPOLATED BASED UPON THE 2011 BATHYMETRIC SURVEY COMPLETED BY TG&B MARINE. ACTUAL ELEVATIONS AT THESE LOCATIONS WILL VARY FROM THOSE PROVIDED ON THIS TABLE AND THE CONTRACTOR SHALL VERIFY ALL ELEVATIONS, AND SUBMIT TO ENGINEER, PRIOR TO CONDUCTING THE WORK.

ISSUED FOR CONSTRUCTION

amec foster wheeler
AMEC FOSTER WHEELER
ENVIRONMENT & INFRASTRUCTURE, INC.
271 MILL ROAD
CHELMSFORD, MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.AMECFW.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED BY	APPROVED
1	06/24/2015	ISSUED FOR CONSTRUCTION	DAA	RJB
0	06/11/2015	ISSUED FOR BID	DAA	RJB
A	04/24/2015	ISSUED FOR CLIENT REVIEW	DAA	RJB

PROJECT: TEXTRON, INC.
PHASE II, III, AND PARCEL C CAP
FORMER GORHAM MANUFACTURING SITE
PROVIDENCE, RI

TITLE: TEMPORARY DEWATERING, EXCAVATION AND MATERIAL STAGING PLAN

CLIENT: TEXTRON

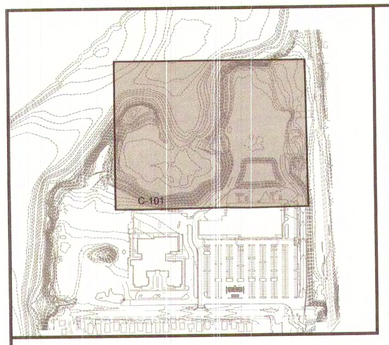
ROBERT J. BUKOWSKI
No. 9217
REGISTERED PROFESSIONAL ENGINEER CIVIL
6/24/15

DESIGNED BY: DAA	DRAWN BY: DED
CHECKED BY: TO	SCALE: AS SHOWN
PROJECT NUMBER: 3652140032	
DRAWING NUMBER: C-101	
SHEET NUMBER: 6 OF 14	

Proactive by Design

ATTACHMENT 2

DRAWING NO. C-101



INSET
NOT TO SCALE

MASHAPAUG
OUTER
COVE

MASHAPAUG
INNER COVE

NOTES:

1. CONTRACTOR MUST MANAGE DEWATERING RATES WITH AVAILABLE INFILTRATION AREA TO PREVENT EXCESSIVE PONDING OR OVERFLOW.
2. FRAC TANKS MAY BE USED TO PROVIDE ADDITIONAL STORAGE TO BALANCE INFILTRATION RATES DURING TIMES OF PEAK WATER GENERATION.
3. DURING CONSTRUCTION, ADDITIONAL DEWATERING TREATMENT MAY BE REQUIRED TO MEET TOTAL SUSPENDED SOLIDS AND TOTAL PETROLEUM HYDROCARBON LIMITATIONS UNDER TEMPORARY DISCHARGE PERMIT.
4. CONFIGURATION OF INFILTRATION GALLERIES, FRAC TANKS AND MATERIAL PROCESSING AREA MAY BE ADJUSTED BASED UPON ENGINEER APPROVED CONTRACTOR PLANS.
5. SEE SHEET 1 FOR PLAN REFERENCES.
6. SEE SHEET 1 FOR LEGEND AND NOTES.

TABLE 1: KEY SEDIMENT ELEVATIONS AND FINISH GRADES

Point #	Description	Northing	Easting	Existing Elev.[2]	Bottom Elev. of Removal	Finish Grade Elev. of Sand Cap	Bottom Elev. of Organic Material[1]
520	SED29	259774	347006	36.6	34.6	35.6	<32.6
515	SED/SW26	259807	347125	36.8	35.3	36.3	35.27
523	SED32	259763	347053	37.3	35.5	36.5	34.8
518	SED/SW34	260010	347029	34.9	33.9	34.9	33.9
513	SED/SW24	259794	346957	36.5	34.5	35.5	32.5
521	SED30	259754	347002	37.6	35.6	36.6	31.1
516	SED/SW27	259918	347010	35.8	33.8	34.8	33.5
519	SED28	259814	347040	36.6	34.6	35.6	<31.1
514	SED/SW25	259780	347048	36.5	34.5	35.5	<31.45
522	SED31	259754	347024	37.5	35.5	36.5	34.6
517	SED/SW33	259999	346987	34.6	33.6	34.6	33.6
505	SED/SW16	259929	346906	36.8	34.8	35.8	34.7
506	SED/SW17	259964	347082	36.6	35.6	36.6	36.1
507	SED/SW18	259867	346811	36.5	34.5	35.5	32.3
508	SED/SW19	259866	347056	35.9	33.9	34.9	31.3
509	SED/SW20	259930	347182	36.7	34.7	35.7	<34.2
510	SED/SW21	259876	346733	36.9	35.6	36.6	35.6
511	SED/SW22	259790	346785	36.8	34.8	35.8	33.8
512	SED/SW23	259763	346878	36.8	34.8	35.8	34.8

NOTES:
1. BOTTOM ELEVATION OF ORGANIC MATERIAL IS BASED ON THE EXISTING SEDIMENT BORING LOGS PROVIDED IN THE CONTRACT DOCUMENTS.
2. EXISTING ELEVATIONS ARE INTERPOLATED BASED UPON THE 2011 BATHYMETRIC SURVEY COMPLETED BY TG&B MARINE. ACTUAL ELEVATIONS AT THESE LOCATIONS WILL VARY FROM THOSE PROVIDED ON THIS TABLE AND THE CONTRACTOR SHALL VERIFY ALL ELEVATIONS, AND SUBMIT TO ENGINEER, PRIOR TO CONDUCTING THE WORK.

0' 20' 40' 60'
1" = 40'

ISSUED FOR BID

amec foster wheeler

AMEC FOSTER WHEELER
ENVIRONMENT & INFRASTRUCTURE, INC.
271 MILL ROAD
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-9090
FAX: (978) 692-6633
WEB: WWW.AMECFW.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED BY	APPROVED
0	05/11/2015	ISSUED FOR BID	DAA	RJB
A	04/24/2015	ISSUED FOR CLIENT REVIEW	DAA	RJB

PROJECT:
TEXTRON, INC.
PHASE II, III, AND PARCEL C CAP
FORMER GORHAM MANUFACTURING SITE
PROVIDENCE, RI

TITLE:
TEMPORARY DEWATERING, EXCAVATION AND MATERIAL STAGING PLAN

CLIENT:
TEXTRON

SEAL:
ROBERT J. BUKOWSKI
No. 9217
REGISTERED PROFESSIONAL ENGINEER
CIVIL
5/11/15

DESIGNED BY: DAA	DRAWN BY: DED
CHECKED BY: TD	SCALE: AS SHOWN
PROJECT NUMBER: 3652140032	
DRAWING NUMBER: C-101	
SHEET NUMBER: 6 OF 14	

U:\- CAD Projects\Textron\Textron RAWP and 404 Permit\3652140032\2017\0 CADD\7.1 A Bid Set\Sheet\6 - 3652140032.01 - C-101.DWG - 3652140032.01 - C-101 - May. 11, 2015 3:24pm - dana.dampsey

Proactive by Design

ATTACHMENT 3

CALCULATIONS

GZA
GeoEnvironmental, Inc.
530 Broadway
Providence, RI 02909
(401) 421-4140
Fax (401) 751-8613
http://www.gza.com

Engineers and Scientists

JOB Mashapaug Inner Cove
SHEET NO. 1 OF 8
CALCULATED BY ABU DATE 8/5/15
CHECKED BY TEB DATE 8/6/15
SCALE 34126.00

Control of Water from Existing Stormwater Detention Basin

Lengh of 4" discharge pipe = 250 feet

Flow Rate @ 10 feet of head = 600 gpm (from pump curve)

4" pipe Headloss @ 450 gpm = 10.5 feet/100 feet discharge hose

10.5 feet × 2.5 = 26 feet

26 feet + 10 feet = 36 feet head = 480 gpm ✓ (from pump curve)

Say flow rate = 450 gpm (capacity of transfer pump with discharge hose)

Inner Cove Dewatering - Initial Drawdown to 1 foot of Cove Bottom

Cove Area (elevation 38.8 to 36.8 feet)
≈ 440 ft by 260 ft = 114,400 ft² = 855,000 gallons/ft

855,000 gallons/ft × 2.0 ft = 1,710,000 gallons

Cove Area (elevation 36.8 to 35.8)
≈ 200 ft by 200 ft = 40,000 ft² = 299,000 gallons/ft

1,710,000 gallons + 299,000 gallons = **2,009,000 gallons** (Water in Cove)

Pump lift elev 47 - 36 = 11 feet

Flow Rate ≈ 3,000 gpm (from pump curve)

GZA
GeoEnvironmental, Inc.
530 Broadway
Providence, RI 02909
(401) 421-4140
Fax (401) 751-8613
http://www.gza.com

Engineers and Scientists

JOB Mashapaug Inner Cove
SHEET NO. 2 OF 8
CALCULATED BY ABU DATE 8/5/15
CHECKED BY TEB DATE 8/6/15
SCALE 34126.00

3,000 gpm = 180,000 gallons/hour

2,009,000 gallons / 180,000 gallons/hour

= approximately 11 hours (estimated time to dewater pond)

Inner Cove Dewatering - Dewatering to Cove Bottom

Leygh of 2" discharge pipe = 400 feet

Grade @ 20,000 gallon frac tank = 45 feet
height of 20,000 gallon frac tank = 8 feet
Elevation of Bottom of Pond = 35 feet

45 + 8 = 53 feet - 35 feet = 18 feet of head

Flow rate @ 18 feet of head = 68 gpm

2" pipe Head loss @ 45 gpm = 4.3 feet/100 ft discharge hose

4.3 feet x 4.0 = 17.2 feet
17.2 feet + 18 feet = 35 feet head = 45 gpm (from pump curve)

Say 45 gpm with 400 feet of 2" pipe

(Capacity of Sump Pump with 400' of 2" discharge hose)

GZA
GeoEnvironmental, Inc.
530 Broadway
Providence, RI 02909
(401) 421-4140
Fax (401) 751-8613
http://www.gza.com

Engineers and Scientists

JOB Mashapaug Inner Cove
SHEET NO. 3 OF 8
CALCULATED BY ABU DATE 8/15/15
CHECKED BY TEB DATE 8/16/15
SCALE 34126.00

Lengh of 2" discharge pipe = 150 feet

2" pipe headloss @ 55 gpm = 6.3 feet/100' hose

6.3 feet x 1.5 = 9.5 feet

9.5 feet + 18 ft = 27.5 feet head = 55 gpm (from pump curve)

Say 55 gpm with 150 feet of 2" pipe

(Capacity of Sump Pump with 150' of 2" discharge hose)

Transfer Pump from 20,000 gallon frac tank to Infiltration Area

Grade at Frac Tank = 45 feet
Grade at Infiltration Area = 66 feet

66 - 45 = 21 feet head

Distance of 6" pipe = 350 feet

6" pipe headloss @ 2,200 gpm = 5.7 feet/100' hose

5.7 feet x 3.5 = 20 feet

20 feet + 21 feet = 41 feet Q = 2,200 gpm (from pump curve)

Say flow rate = 2,200 gpm

(Capacity of transfer pump with 350' of 6" discharge hose

GZA GeoEnvironmental Inc.
530 Broadway Providence
Rhode Island 02903
(401) 421-4140

Project Name: Dewatering Mashapaug Inner Cove
Providence, Rhode Island

Date: August 5, 2015
Sheet 4 of 8
By: ABU

Job Number: 34126.00

checked TEB 8/16/15

Estimate Radius of Influence a Pumping Well

A. NAVFAC Manual P-418 Page 150

$C := 3$ Constant 3 for flow to a single well
1.5 to 2 for a line of wells

$H := 30$ Ambient saturated thickness in feet

$Hw := 24$ Saturated thickness at the pumping well in feet

Assume a hydraulic Conductivity of 50 Feet/Day

$k := 176$ Hydraulic conductivity *expressed in 10^-4 cm/sec*

$$R := C \cdot (H - Hw) \cdot \sqrt{k}$$

$R = 239$ Radius of Influence in feet

GZA Geoenvironmental Inc.

530 Broadway Providence
Rhode Island 02903
(401) 421-4140

Project Dewatering Mashapaug Inner Cove
Providence, Rhode Island

File No. 34126.00

Date: August 5, 2015
Sheet 5 of 8
By: ABU

Estimate steady state flow to a well extracting ground water from
a water table aquifer,

$H := 20$ Static head from bottom of aquifer (Ft)

$hw := 16$ Depth of water in a fully penetrating extraction well (Ft)

$k := 50$ Hydraulic Conductivity (Ft/Day)

$R := 440$ Radius, or cone of influance (Ft/Day) (200' + 239')

$Rw := 200$ Radius of extraction well (Ft) (equivalent radius of cove)

Qw Ground water extraction rate (Cubic Ft/Day)

$$Qw := \frac{\pi \cdot k \cdot \left(H^2 - hw^2\right)}{\ln\left(\frac{R}{Rw}\right)}$$ Theim-Dupuit Equation[1]

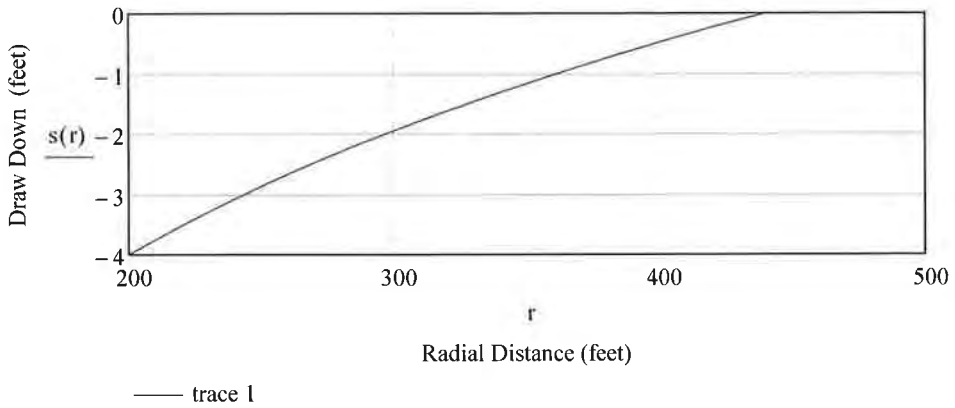
$Qw = 2.869 \times 10^4$ Cubic Ft/Day $\quad Qgpm := Qw \cdot \frac{7.5}{1440}$ $\quad Qgpm = 149.42$ GPM

Say Q = 150 gpm

$r := Rw, 13 .. R$

$$s(r) := -(H - hw) + \frac{Qw \cdot \ln\left(\frac{r}{Rw}\right)}{\pi \cdot k \cdot (H + hw)}$$

Distance Drawdown at Steady State Conditions



1. Ground Water Manual, U.S. Department of the Interior,
Revised edition 1981, P.30

Estimate Transmissivity from Specific Capacity Data

$R := 1$ Radius of Well (FT.)

$S := .15$ Storage Coefficient, *Assumed*

$t := \frac{1440}{1440}$ Pumping Duration (Days.)

$T := 100$ Transmissivity (GPD/FT) *Initial Guess*

$Qp := 35$ Pumping Rate (GPM)

$s := 5$ Drawdown (FT.)

$\frac{Qp}{s} = 7$ Specific Capcity (GPM/FT)

$$aT := root\left(\frac{Qp}{s} - \frac{T}{264 \cdot \log\left(\frac{0.3 \cdot T \cdot t}{R^2 \cdot S}\right)}, T\right)$$

$T := aT$

$T = 7743$ Computed Transmissivity (GPD/ Ft)

$Tft := \frac{T}{7.48}$

$Tft = 1035$ Computed Transmissivity (Sq.ft./Day)

K = 50 ft/day, thickness = 20 feet = 1,000 ft²/day ✓

$tt := 1, 2 .. 1440$ Pumping Duration (min)

$$Q(tt) := \frac{T}{264 \cdot \log\left(\frac{T \cdot tt}{2693 \cdot R^2 \cdot S}\right) - 65.5}$$ Specific Capicity(GPM/FT)

1 Groundwater and Wells
Fletcher Driscoll Johnson Divison 1986

2 Groundwater Resource Evaluation
William C. Walton Mc-Graw-hill 1970

GZA
GeoEnvironmental, Inc.
530 Broadway
Providence, RI 02909
(401) 421-4140
Fax (401) 751-8613
http://www.gza.com

Engineers and Scientists

JOB Madrapaug Inner Cove
SHEET NO. 7 OF 8
CALCULATED BY ABU DATE 8/5/15
CHECKED BY TEB DATE 8/6/15
SCALE 34126.00

Infiltration Basin

Flow Rate = 150 gpm = 216,000 gallons/day × 7.47
= 28,916 ft^3/day

Infiltration Area = 150 feet by 150 feet

$K_{vertical}$ = Q/Area = $\frac{28,916\ ft^3/day}{150ft \times 150ft}$

$K_{vertical}$ = 1.3 feet/day

(Minimum vertical hydraulic conductivity of recharge area with vertical hydraulic gradient of 1.0 ft/ft (i.e. vertical gravity drainage)

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

34126.00

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Input Values

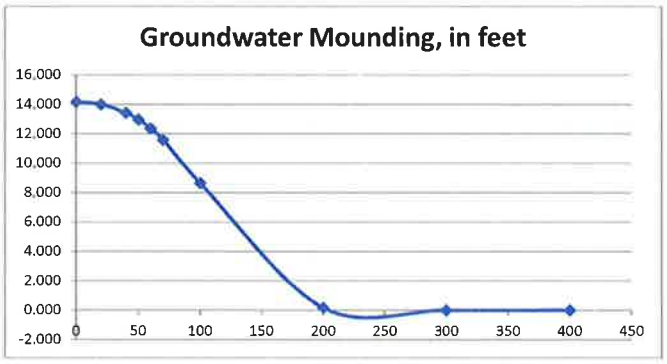
1.2900	*R*	**Recharge (infiltration) rate (feet/day)**
0.150	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
50.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
75.000	x	**1/2 length of basin (x direction, in feet)**
75.000	y	**1/2 width of basin (y direction, in feet)**
5.000	t	**duration of infiltration period (days)**
1.000	hi(0)	**initial thickness of saturated zone (feet)**

15.194	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
14.194	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Q = 150 gpm

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
14.194	0
14.012	20
13.438	40
12.978	50
12.378	60
11.601	70
8.645	100
0.180	200
0.015	300
0.014	400

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Distance between bottom of infiltration area and top of silty sand = 17-2 = 15 feet
Potential Groundwater Mound in Recharge Area = 14 feet
close

Proactive by Design

ATTACHMENT 4

BORING LOGS AND BORING LOCATIONS WITHIN COVE

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	SED16	Page 1 of 1	
Project Name:	Gorham	Geologist:	Phil Muller
Date Started:	6-22-06	Drilling Company:	Aqua Survey
Date Completed:	6-22-06	Drilling Method:	Vibracore
Total Depth:	8.5	Depth of Water:	
Comments:	recovery = 5.6		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
	Black, SILT, ~~sand~~ some organics		0.2		SED1601 @ 0-1' (1315)
2.1	Grey/Brown med. to coarse SAND, some Gravel		0.3		SED1603 @ 2.5-3' ~~(1315)~~ pm. 1330
	↑ more gravel				
5.1	V. dense ~~fine SAND~~ and SILT, grey, some sand		0.2		
5.6					

P:\W1-ADMIN\FORMS\Field Forms\sediment core log blank xls

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED17 Page 1 of 1

Project Name: Gorham	Geologist: Phil Muller pm
Date Started: 6.22.06	Drilling Company: Aqua Survey
Date Completed: 6.22.06	Drilling Method: Vibracore
Total Depth: 8.5'	Depth of Water:
Comments: recovery = 5.7	

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0.5	Black SILT and Organics, soft	~~2~~ pm	0.2		
	Grey med. to coarse				SED1701 @ 6"-12" (0915)
2.6	SAND, little Black soft clay	~~0.4~~ pm	0.4		
	Grey med. to coarse SAND, trace fine Gravel				
3.8					SED1704 @ 3-3.8' (0930)
	Brown med to coarse SAND, trace Gravel		0.2		

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	SED 18	Page 1 of 1	
Project Name:	Gorham	Geologist:	Phil Muller
Date Started:	6.22.06	Drilling Company:	Aqua Survey
Date Completed:	6.22.06	Drilling Method:	Vibra core
Total Depth:	8.5'	Depth of Water:	
Comments:	recovery = 5.5		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
	Black SILT, some organic, sheen (organic) on ponding water	~~0.2~~ pm	0.2		SED 1801 @ 0-1' (~~1410~~) pm (1400)
3.5	tan CLAY and Organic		0.2		SED1804 @ 3.5-4'
4.2	grey SILT, some fine pr ~~SAND~~, dense Sand		0.3		(1420)
5.5					

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	SED 19	Page 1 of 1	
Project Name:	Gorham	Geologist:	Phil Muller
Date Started:	6-22-06	Drilling Company:	6-22-06
Date Completed:	6-22-06	Drilling Method:	Vibracore
Total Depth:	8.5	Depth of Water:	
Comments:	recovery = 6.6		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
	Black SILT, some organic, organic odor		0.2		SED1901 @ 0-1' (1435) PM
1.7	Black SILT and		5.0 PM		
	Organics Decomposing wood Peat-like		5.0		SED 1903 @ 2-3' (1450)
			2.2		
4.6	Grey CLAY, some Silt and				
5.1	Sand, soft orange stained med. to coarse SAND		1.5		
6.6					

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED20		Page 1 of 1	
Project Name: Gorham	Geologist: Phil Miller		
Date Started: 6.22.06	Drilling Company: Aqua Survey		
Date Completed: 6.22.06	Drilling Method: Vibra Core		
Total Depth: 8.5	Depth of Water:		
Comments: recovery = 7.2'			

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
1	Black SAND and SILT Some Organics, Leaf litter top 2"				
	Black SILT, Some Organics organic odor	~~0.2~~ pm	0.2		SED2001 @ 6"-12" (0840)
2	Black, Soft clay				
	Black, SILT and Organics				
3	decomposing sticks, brands, little clay, slight organic odor		c.2		
	Tan/olive CLAY, Some	~~0.2~~ pm	c.2		SED2003 @ 2.5'-3'
4	organics, slight odor				(~~1855~~) pm 0855
5					
6					
7					

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED21 Page 1 of 1

Project Name: Gorham	Geologist: Phil Muller
Date Started: 6.22.06	Drilling Company: Aqua Survey
Date Completed: 6.22.06	Drilling Method: Vibra Core
Total Depth: 8.5	Depth of Water:
Comments: recovery = 5.5	

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
	Black / Grey fine to coarse SAND, some Black Silt, some organics		0.2		SED2101 @ 0-1' (1500)
1.3	Brown / Grey med. to coarse SAND, some Gravel				
	little Organics		0.2		SED2103 @ 2.5.3' (1510)
3.5	Grey CLAY, med. dense, some fine Sand				
3.8					
	Grey med. to coarse SAND, some tan staining		0.1		
5.3					

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED 22			Page 1 of 1
Project Name: GORHAM		**Geologist:** TCH	
Date Started: 6 22 06		**Drilling Company:** Myers Survey	
Date Completed: 6 22 06		**Drilling Method:** VIBRACORE	
Total Depth: 8.5		**Depth of Water:**	
Comments: recovery =			

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
1	Black organic mat'l		<1.0		SED-22 01 0-1' (1700)
2	Brown to Dark Brown silt and organic mat'l		<1.0		
3	Dark Brown silt and organics to Brown/tan sand fine and coarse.		<1.0		SED 2203 @ 2-3 1710
4	3.8 → ~~4 fine dark brown deposit~~ ~~Recent~~ P- tan CLAY and organic soft		<1.0		
5	Grey sand to fine sand and silt		<1.0		
6	Grey silt and clay, dense grading up to grey - some coarse sand (fine sand @ 5.5) (5.8 - coarse sand)	tan stained tendrils	<1.0		
	6.3				

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED 23 Page 1 of 1

Project Name: Gorham Geologist: TRH

Date Started: 6 22 06 Drilling Company: Aqua Survey

Date Completed: 6 22 06 Drilling Method: Vibracore

Total Depth: ~~6~~ 8.5 Depth of Water:

Comments: Recovery 4.5

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
1	0-1' fine sand Brown TAN TRACE Gravel		<1.0 ppm		SED 23-01 ~~6"~~ pw 0-1'
2	Firm Sand and silt TAN 1.5→2 Sand becomes more coarse TRACE organics				pw 1530
3	TAN COARSE SAND Subangular more Fines present toward 3'		<1.0 ppm		SED 2303 @ 2-3' (1540)
4	Fine and coarse sand becoming more greyish in tone				
4.5	SAME as above w/more Subangular gravel present		<1.0 ppm		

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED 24		**Page** 1 **of** 1	
Project Name: Gorham		**Geologist:** TRH	
Date Started: 6 22 06		**Drilling Company:** Sea Survey	
Date Completed: SAME		**Drilling Method:** Vibracore	
Total Depth: 6.5		**Depth of Water:**	
Comments: Recovery 6'			

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 Inches	Sample ID
1	DARK Organic MAT.I SOME SILT.		<1.0		SED 24 01 @ 1635 0-1'
2	DARK Organic MAT.I SOME TAN indiscernible SILT (black)		<1.0		
3	DARK organic MAT.I SOME TAN SILT		<1.0		SED 24 02 2-3' 1650
4	TAN SILT WITH TRACE organics.		<1.0		
5	TAN SILT changing over TO grey sand (coarse) and grey SILT. WHITE silt or clay		<1.0		
6	COARSE and Fine grey Sand sub-Round.				

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED25		Page 1 of 1	
Project Name: Gorham	Geologist: Phil Muller		
Date Started: 6.22.06	Drilling Company: Aqua Survey		
Date Completed: 6.22.06	Drilling Method: Vibracore		
Total Depth: 8.5	Depth of Water:		
Comments: recovery = 7.1'			

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
1	Black SILT, some organic soft organic odor		0.2		SED2501 @ 0-1' (1845)
1.6 / 2			1.1		
3	Black SILT and Organic (Peat-like) soft		0.5		SED2503 @ 2.5-3' (1853)
4				Sampled 6.23.06	SED2503D (1005) SED2503MS (1010) SED2503MSD (1015)
5	Olive CLAY and Organic soft				
6					
7				Sampled 6.23.06	SED2507 @ 6-7' (1030) SED2507D (1035) SED2507MS (1040) SED2507MSD (1050)

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED 26 Page 1 of 1

Project Name: Gorham Geologist: Phil Muller

Date Started: 6.22.06 Drilling Company: Arva Survey

Date Completed: 6.22.06 Drilling Method: Vibra core

Total Depth: Depth of Water:

Comments: recovery = 6.9

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
1	Black, med. to coarse SAND and mix of shells, ~~coarse debris (1") pm~~ and (angular particles) slag particles like particles ~~most likely~~ organic, + Gravel-like size particles pm		0.2		SED2601 @ 0-1' (1810)
2	2 Clinker-like pieces - 2" size (placed in jar for further analysis) Black fine to coarse SAND				SED2602 @ 1.5-2 (1820)
3	2.4 Black SILT, some Organics				
4	3.3 Peat, red/brown, little black silt				
5					SED2605 @ 4-5' (1830) (PAH, METALS only)
6					
7					

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	SED27	Page 1 of 1	
Project Name:	Gorham	**Geologist:**	Phil Muller
Date Started:	6.22.06	**Drilling Company:**	AQUA Survey
Date Completed:	6.22.06	**Drilling Method:**	Vibracore
Total Depth:	8.5	**Depth of Water:**	
Comments:	recovery = 4.5		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
	Black SILT, Some Organic, organic odor, soft				SED2701 @ 0-1' (1735)
1.4	Black SILT and Organic decaying vegetation peat-like		0.5		
2.3	Med. to coarse, gray		1.2		SED2703 @2.5-3' (1746)
3.4	SAND, some Gravel little organic Grey, med. to coarse		0.4		
4.5	SAND, little Gravel				

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location:	SED 28	Page ___ of ___	
Project Name:	Gorham	Geologist:	Phil Muller
Date Started:	6-21-06	Drilling Company:	Aqua Survey
Date Completed:	6-21-06	Drilling Method:	Vibra Core
Total Depth:	8-5'	Depth of Water:	
Comments:	Recovery = 5.7'		

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
1	Black Silt and Organic, Organic — Peat. Organic odor Soft		0		SED 2801 @ 6" - 12"
1.7	Small branch @ 2.2'		0		
2	Black Peat/organic, Some Silt Branches, decayed wood		0		SED 2803 @ 2.5-3.0'
3					
4	Olive/Tan Silt and Clay, Soft, Some Organic		0		
5					
6					
7					

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED29		Page 1 of 1	
Project Name: Gorham	Geologist: Phil Muller		
Date Started: 6.21.06	Drilling Company: Aqua Survey		
Date Completed: 6.21.06	Drilling Method: Vibracore		
Total Depth: 8.5'	Depth of Water:		
Comments: recovery = 7.2'			

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
1	Black SILT, soft and organic organic odor		0		SED 2901 @ 6" - 12"
2					
2.9	Black Peat/organic Some Silt slight organic odor		0		
3					
4	Olive/tan SILT and CLAY, Some Organic Soft		0		SED 2904 @ 3 - 4'
5	slight organic odor				
6					
7					

7.2

P:\W1-ADMIN\FORMS\Field Forms\sediment core log blank.xls

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED-30		Page 1 of 1	
Project Name: Gorham	Geologist: Phil Muller		
Date Started: 6-21-06	Drilling Company: Aqua Survey		
Date Completed:	Drilling Method: Vibra Core		
Total Depth: 8.5'	Depth of Water:		
Comments: recovery = 7.2'			

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
1	.2" ~~Leave~~ Leaf Litter (pm) Black SILT and Organic		0		SED3001 @ 0.5'-1'
1.7'	Some Sand, little fine Gravel, Organic odor little leaf litter				
2					
3	Black SILT and Organic 1 piece of Slag Slight organic odor		0		
3.6'					
4					SED3004 3.6' to 4.6'
5	Tan SILT and CLAY Soft, ~~Late~~ Some organic (pm)		0		
6					
7	Grey med. to course SAND (pm) mixed w/ olive soft CLAY		0		

MACTEC

Mark Padover
Henry Jenkinson

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED 31			Page 1 of 1
Project Name: Gorham		**Geologist:** Phil Muller	
Date Started: 6.21.06		**Drilling Company:** Aqua Survey	
Date Completed: 6.21.06		**Drilling Method:** Vibracore	
Total Depth: ~~6'~~ 8.5'		**Depth of Water:**	
Comments: recovery = 6.8'			

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
1	0.3 organic leaf litter Black SILT and Organic some slag (1 chunk or piece) @ 1.5', some	—	< 1.0 ppm 1.9 ppm @ 0.7'	—	SED3101 @ 6" – 12" deep
2	leaf litter				
3	2.9				
4	3.6 Dk. brown, med. to coarse SAND, little fine Gravel	—	1 – 2 ppm 1.6 ppm @ 3.3'	—	SED3104 @ 3 – 3.6' deep
5	Grey fine to coarse SAND, little fine Gravel some ~~brown~~ golden SAND	—	< 1 ppm	—	
6	little black Sand speckles little grey clay lenses		1.9 ppm @ 5.2'		
7	4" grey + orange CLAY, some fine Sand				

Notes: No petroleum odor, some organic odor 0 – 2.9'

MACTEC

Sediment Core Log

MACTEC
107 Audubon Road
Wakefield, MA

Boring Location: SED 32			Page 1 of 1
Project Name: Gorham		**Geologist:** Phil Muller	
Date Started: 6·21·06		**Drilling Company:** Aqua Survey	
Date Completed: 6·21·06		**Drilling Method:** Vibra core	
Total Depth:		**Depth of Water:**	
Comments: recovery = 5.6'			

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
	2" Leaf litter				
little	grey fine to med SAND ~~some~~ organic				
	ppm odor, not petroleum or organic (not recognizable)		0.2		SED3201 @ 6" – 12"
1					
1.1					
1.4	Black f. to coarse SAND some red particles (probably Sand) or shells, some organics				
	Black SILT and Organics				
2	piece of Stag		0.5		
	Soft				
2.5					
	Grey + orange stained				
3	med fine to ~~med~~ coarse SAND ppm ppm				SED3204
	not well sorted		0		@ ~~2.5~~ 3.5 – 4' 1m
4					
5					
6					

amec

Soil Boring Log

AMEC Environment & Infrastructure
107 Audubon Road
Wakefield, MA

Boring Location: SED · 33	Page 1 of 1
Project Name: Textron. Gorham	Geologist: DLC
Project Number: 36501102 22	Drilling Company: TG+B
Date Completed: 12-19-11	Drilling Method: vibracore
Total Depth: 37.41	Depth to Water: /
Comments: /	

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0.1 0	: Mostly brown. tan, poorly graded, coarse med sand, some gravel	1.0/09	0.1 4.2 52.3	/	SED-33-01 Dioxins/Furans PP-13 metals AVS: SEM. TOC, grain size, Pb isoto @ 14:00
	0-6.6: Mostly dark brown. brown. tan, poorly graded, coarse-med sand. wet, some gravel	8.0/6.6	0.5 1.1 0.2 0.3	/	SED-33-18 TOC, % solids, grain size @ 14:15
8					

amec

Soil Boring Log

AMEC Environment & Infrastructure
107 Audubon Road
Wakefield, MA

Boring Location: SED-SB 34	Page 1 of 1
Project Name: Textron Gorham	Geologist: MC
Project Number: 3650110222	Drilling Company: TG+B
Date Completed: 12.20	Drilling Method: Direct Push
Total Depth: 4 ft 7"	Depth to Water: /
Comments: Lack of recovery on 0-8' due to loose urban fill	

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0	0-1: Mostly brown-dark brown coarse sand, some med sand, some gravel / cobble	1.0/1.0	0.2 0.4 0.7	/	SED-SB-01 (D2) 34 Diesel/Furnace. PP-13 metals. AVS: SEM. TOC. grain size, % solids @ 10:50
1					
2	0-1.5 Mostly same as above, but brick frags / urban fill	(D2) 0.0/1.5	<0.1 <0.1 0.2	/	SED-SB-18 (D2) 34 TOC. % solids, grain @ 11:00 size
3					
4					
5					
6					
7					
8					

amec

Soil Boring Log

AMEC Environment & Infrastructure
107 Audubon Road
Wakefield, MA

Boring Location: SED-49	Page 1 of 1
Project Name: Textron, Gorham	**Geologist:** DLC
Project Number: 36501110222	**Drilling Company:** TC+B
Date Completed: 12-13-11	**Drilling Method:** 4" vibracore
Total Depth: 8.0'	**Depth to Water:** /
Comments:	

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0	0-3.3 Mostly dark brown, loose, organic silt, some roots/ leaves, saturated no odor	8.0/7.8	<0.1	/	SED-49-08 for % solids, grain size, TOC @ 11:30
	3.3-5.2: Brown, tan med sand, somewhat graded, wet no odor				
	5.2-8.2: same as above, tan, coarse grained				
8					

amec

Soil Boring Log

AMEC Environment & Infrastructure
107 Audubon Road
Wakefield, MA

Boring Location: SED-50	Page 1 of 1
Project Name: Textron, Gorham	Geologist: DLC
Project Number: 36501102 22	Drilling Company: TG + B
Date Completed: 12-13-11	Drilling Method: Vibracore
Total Depth: 8.0'	Depth to Water: /
Comments: /	

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0	0-3.5: Mostly dark brown organic silt, some leaves, some roots, saturated, loose, no odor	8.0/7.1	<0.1	/	SED-50-08 for TOC, grain size @ 10:30
	3.5-7.1: Mostly tan-brown coarse grained sand, poorly graded, wet, no odor				
8	End of boring: 8.0'				

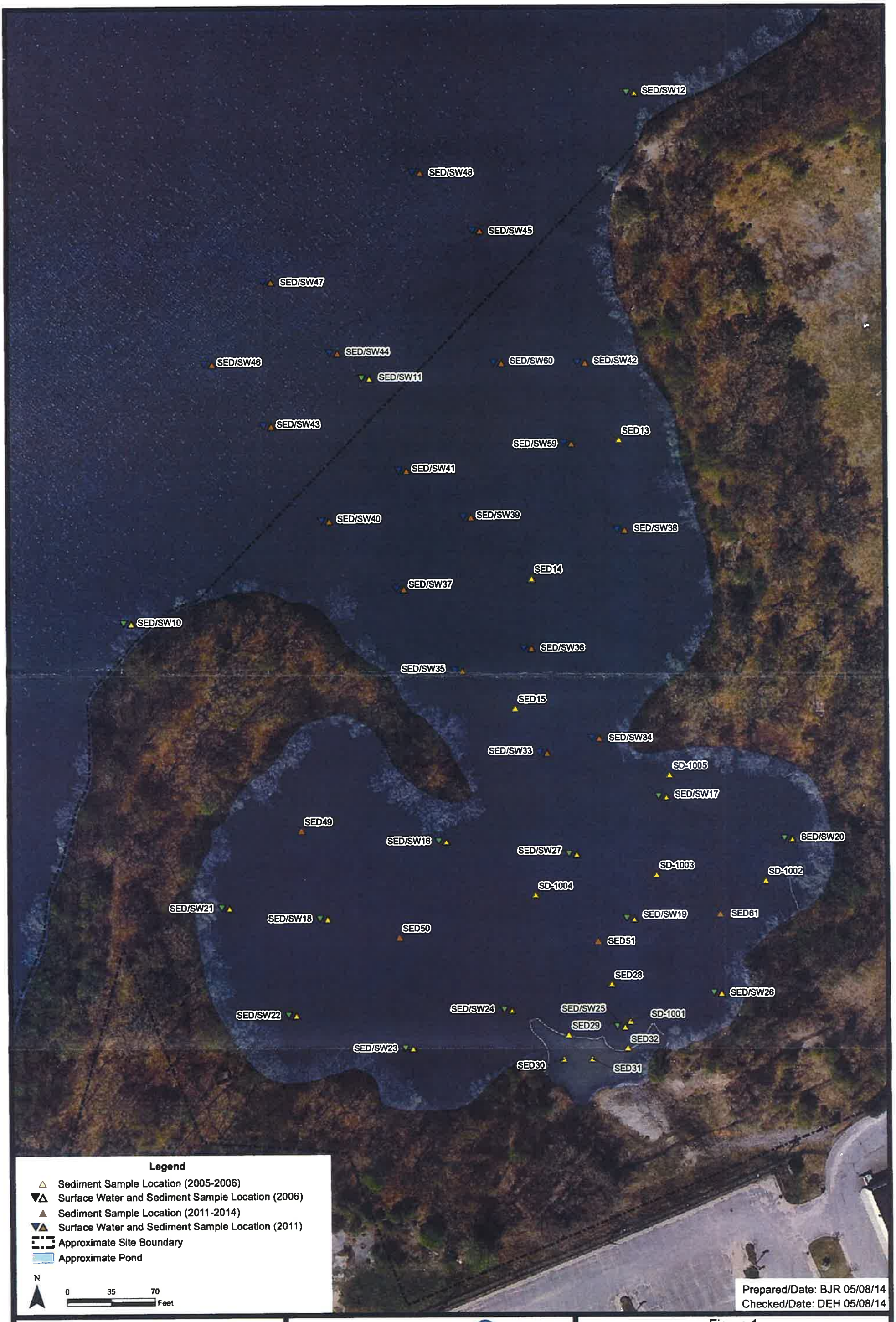
amec

Soil Boring Log

AMEC Environment & Infrastructure
107 Audubon Road
Wakefield, MA

Boring Location: SBD - SD 51	Page 1 of 1
Project Name: Textron Gorham	Geologist: DLC
Project Number: 3650110222	Drilling Company: TC & B
Date Completed: 12-13-11	Drilling Method: vibracore
Total Depth: 8'	Depth to Water: /
Comments: /	

Depth (feet)	Stratigraphy Description	Penetration/ Recovery (feet)	Headspace (ppm)	Blows/ 6 inches	Sample ID
0	0-2.0: Mostly dark brown, loose, organic silt, some roots, leaves, saturated no odor	8.0 / 5.5	20.1 0.1 0.5		SBD-S1-0.0 for: grain size, %o solids, TOC @ 12:10
	2.0-5.5: Mostly brown, tan med. coarse sand, some fines, band of darker material from 3.8-4.0, wet, no odor		1.0 1.9 0.9 1.0		
8			0.3 0.4		



333 Adelaide Avenue Site
Providence, Rhode Island

amec

Figure 1
Inner and Outer Cove Locations

Document: P:\old_Wakefield_Data\projects\TEXTRON\GORHAM\GIS\MapDocuments\SIR 2012\Cove_Investigation_11x17P.mxd PDF: P:\old_Wakefield_Data\projects\3652130034 - Textron Sediment Samp. Inner Cove\3.0 Field and Site Characterization\3.8 GIS\Inner and Outer Cove Locations.pdf 5/8/2014 2:29 PM brian

Proactive by Design

ATTACHMENT 5

BORING LOGS AND BORING LOCATIONS NEAR INFILTRATION AREA

ENVIRONMENTAL DRILLING. INC.

(508) 355-6144
RR 2, WHEELWRIGHT ROAD, BOX 188
BARRE, MASSACHUSETTS 01005

Client Hunter, Inc. Date 3-31-89 Job No. 89-0327

Location Gorham Mills, Providence, RI

BORING NO. B19/MW-M | Ground Elev. - | Date Start 3-31-89 | Date Complete 3-31-89 | Drilling Foreman Stone | Eng./Hydrol. Geologist Stone

DEPTH	Sample No.	Sample Depth (ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	1'-4'	off auger			3'	F-M sand, tr. of assorted fill
5	2	5'-7'	4-4-6-5			8'	M. dense, dry, F-M sand
10	3	10'-12'	5-9-9-11			18'	M. dense, dry, F-sand, tr. of inorganic silt
20	5	20'-22'	11-14-14-16			24'	M. dense, moist, F-sand, some inorganic silt
25	6	25'-26'	7-7			26'	M. dense, wet, F-sand, some inorganic silt, F-M gravel
	6A	26'-27'	7-9				
30	7	30'-32'	4-5-6-6				M. dense, wet, F-M sand
35	8	35'-37'	0-0-3-4			37'	* End of boring 37' * Well point 34'6" * Water at completion 25' * Top of screen 19'6" * Top of sand 17' * Bentonite seal 15'-17'
40							

Type of Boring Casing Size: Hollow Stem Auger Size:

Proportion Percentages
Trace 0 to 10%
Some 10 to 40%
And 40 to 50%

Granular Soils (blows per ft.)
0 to 4 Very Loose
4 to 10 Loose
10 to 30 Medium Dense
30 to 50 Dense
Over 50 Very Dense

Cohesive Soils (blows per ft.)
0 to 2 Very Soft
2 to 4 Soft
4 to 8 Medium Stiff
8 to 15 Stiff
15 to 30 Very Stiff
Over 30 Hard

Standard penetration test (SPT) = 140# hammer falling 30"
Blows are per 6" taken with an 18" long x 2" O.D. x 1 3/8" I.D. split spoon sampler unless otherwise noted.

The terms and percentages used to describe soil and or rock are based on visual identification of the retrieved samples. ■ Moisture content indicated may be affected by time of year and water added during the drilling process. ■ Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. ■ The stratification lines represent the approximate boundaries between soil types, the actual transitions may be gradual. ■

(508) 355-6144

ENVIRONMENTAL DRILLING. INC.

RR 2, WHEELWRIGHT ROAD, BOX 188
BARRE, MASSACHUSETTS 01005

Client Hunter, Inc. Date Job No. 89-0327

Location Gorham Mills, Providence, RI

BORING NO. B21/MW-0 | Ground Elev. | Date Start | Date Complete | Drilling Foreman Stone | Eng./Hydrol. Geologist Stone

DEPTH	Sample No.	Sample Depth (ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
						3'	F-M sand, tr. of assorted fill
5							M. dense, dry to wet, F-M sand
10	1	10'-12'	7-8-9-9				
15						16'	
20	2	20'-22'	6-6-5-6				M. dense, wet, F-sand, some inorganic silt
25							
30	3	30'-32'	5-7-7-6			32'	
35							* End of boring 32' * Well point 29'6" * Water at completion 16' * Top of screen 14'6" * Top of sand 12' * Bentonite seal 10'-12'
40							

Type of Boring Casing Size: Hollow Stem Auger Size:

Proportion Percentages
Trace 0 to 10%
Some 10 to 40%
And 40 to 50%

Granular Soils (blows per ft.)
0 to 4 Very Loose
4 to 10 Loose
10 to 30 Medium Dense
30 to 50 Dense
Over 50 Very Dense

Cohesive Soils (blows per ft.)
0 to 2 Very Soft
2 to 4 Soft
4 to 8 Medium Stiff
8 to 15 Stiff
15 to 30 Very Stiff
Over 30 Hard

Standard penetration test (SPT) = 140# hammer falling 30"
Blows are per 6" taken with an 18" long x 2" O.D. x 1 3/8" I.D. split spoon sampler unless otherwise noted.

The terms and percentages used to describe soil and or rock are based on visual identification of the retrieved samples. ■ Moisture content indicated may be affected by time of year and water added during the drilling process. ■ Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when

TEST PIT LOG

PROJECT:	Gorham Manufacturing Redevelopment	JGI INSPECTOR:	TEST PIT NO: JTP-2
LOCATION:	Providence, Rhode Island	Tim Carney	LOCATION: See Sketch
PROJECT NO.:	C98597	WEATHER:	
DATE:	April 1, 1999	50's, Cloudy	SURFACE EL: unknown

EXCAVATION EQUIPMENT:		GROUNDWATER OBSERVATIONS	
CONTRACTOR:	Clean Harbors, Inc.	DATE / TIME	DEPTH / NOTES
OPERATOR:	Dave Turner	4/1/99 none observed	
MAKE:	Caterpillar	MODEL: 235B	
CAPACITY:	1 yd	REACH: 20 ft	

Depth (ft.)	Stratum Change	SOIL DESCRIPTION	Boulder Size/Count	Notes
1	0.9'	TOPSOIL.		
2	2.0'	Brown, medium to fine SAND, little Silt, trace Gravel, and Roots. (Subsoil)		
3		White/light brown, alternating 6-8 inch layers of medium to fine SAND, trace Gravel to coarse to fine SAND, little Gravel.		
4				
5				
6				
7				
8				
9				
10				
11				
12		(Outwash)		
13		Exploration terminated - 12.0'.		
14				
15				
16				

NOTES:

PIT DIMENSIONS:

Length:	Width:	Depth:
13.0'	6.0'	12.0'

REMARKS: The stratification lines represent the approximate boundary between soil types and the transition may be gradual. Water level readings have been made in the test pits at times under conditions stated on the test pit logs. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time measurements were made.

Proportions Used: trace (0-10%), little (10-20%), some (20-35%), and (35-50%)

JAWORSKI GEOTECH, INC.

HUNTER, INC.	TEST PIT LOG	NO: TP-34	SH 1/1

PROJECT Gorham Mill Facility Site Assessment NO: 89-632.02

LOCATION Adelaide Ave. and Downing Street Providence, RI DATE 3/27/89

CONTRACTOR / OPERATOR / EQUIPMENT J.E. Chase, Inc. Bruce Forg John Deere 710B

ELEVATION _____ COMPLETION DEPTH 9.0' WATER LEVEL No Ground Water

LOGGED BY Alton Day Stone / Joel Curatolo REMARKS _____

ELEV	DEPTH (FEET)	CLASSIFICATION / DESCRIPTION
	0	FILL — ASPHALT COVERING BROWN SAND AND COBBLES
		COARSER AND FINER SAND FOUND IN LAYERS
		LIGHT TAN COARSE TO FINE SAND, TRACE SILT, LITTLE to MEDIUM TO FINE (+) GRAVEL
	5	
		DRY
		BOH 9.0'
	10	
		NOTE: - BUILDING DEBRIS FOUND IN NORTH END OF PIT, MAY BE BURIED WALL OR FOUNDATION.
	15	

HUNTER, INC.	TEST PIT LOG	NO: TP-35	SH 1/1

PROJECT Gorham Mill Facility Site Assessment NO: 89-632.02

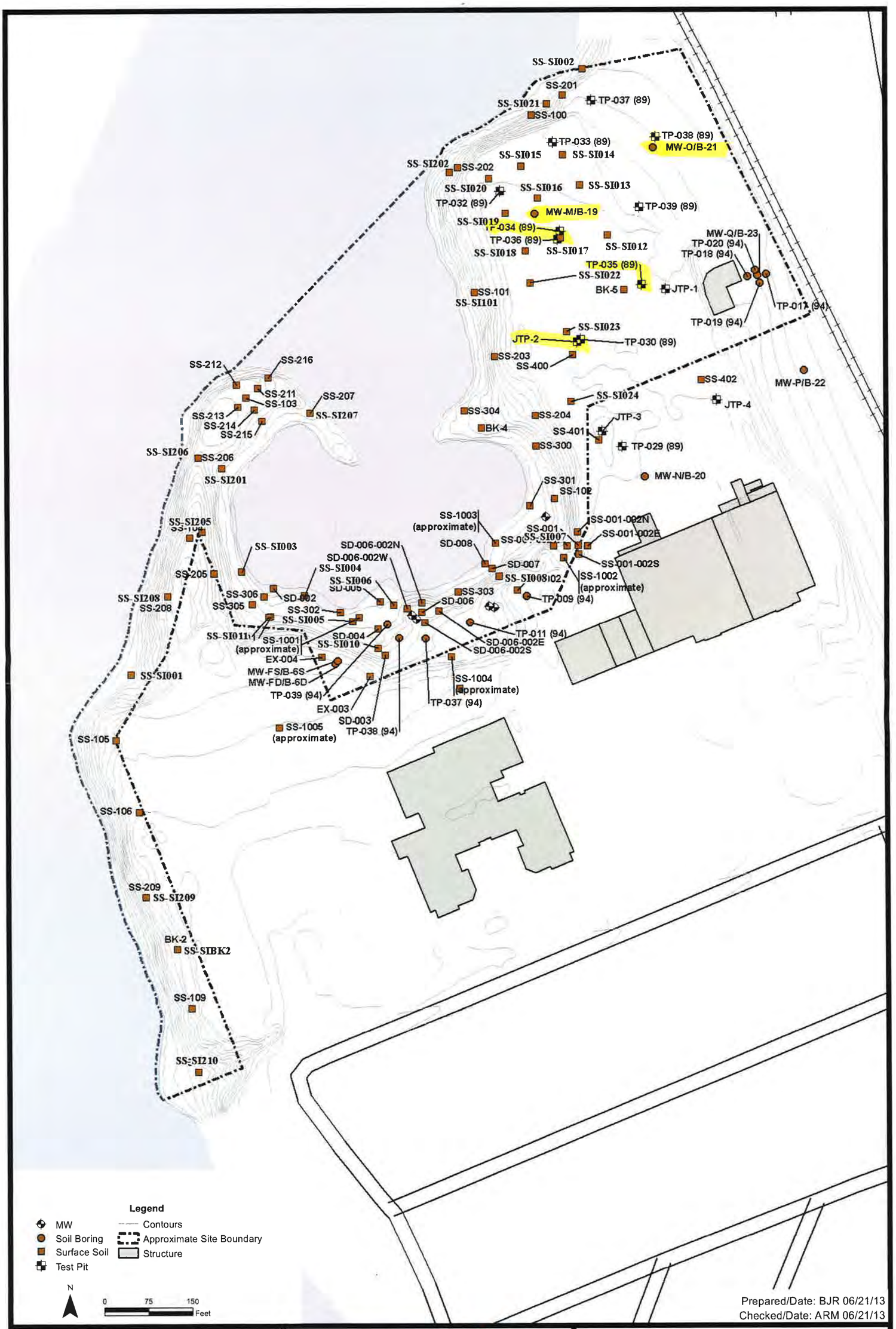
LOCATION Adelaide Ave. and Downing Street Providence, RI DATE 3/27/89

CONTRACTOR / OPERATOR / EQUIPMENT J.E. Chase, Inc. Bruce Forg John Deere 710B

ELEVATION _____ COMPLETION DEPTH 10.0 WATER LEVEL No Ground Water

LOGGED BY Alton Day Stone / Joel Curatolo REMARKS _____

ELEV	DEPTH (FEET)	CLASSIFICATION / DESCRIPTION
	0	DARK BROWN - BLACK SOD + SAND
		BROWN - YELLOW SAND AND SILT
	5	LIGHT TAN COARSE TO FINE SAND, TRACE SILT, LITTLE (+) MEDIUM TO FINE (+) GRAVEL. LAYERS COARSE SAND + GRAVEL
		6'
		MEDIUM TO FINE SAND
		8'
		COARSE SAND
	10	DRY
		BOH 10.0'
	15	



333 Adelaide Avenue Site
Providence, Rhode Island

amec

Summary of 1994-2007 Soil Investigation Locations

Project 3650-11-0222 Figure 3.1

Document: P:\old_Wakefield_Data\projects\TEXTRON\GORHAM\GIS\MapDocuments\SIR 2012\SI_Report_11x17P.mxd PDF: P:\old_Wakefield_Data\projects\3650110222 - Textron - Gorham Cove\4.0 Project Deliverables\4.1 Reports\SIR\FIGURES\Figure 3.1 Summary of 1994 2007 Soil Investigations.pdf

Charter

Plan Title:	Sediment Removal Plan
Project Title:	Textron Former Gorham Manufacturing Site Phase II, III, and Parcel C Cap Providence, RI
Prepared For:	Textron, Inc. 40 Westminster Street Providence, RI 02908
Prepared By:	Charter Contracting Company, LLC 500 Harrison Avenue, Suite 4R Boston, MA 02118 Phone: 857-246-6800
Contract No:	PO# 153436
Charter No.:	2-1244
Date:	January 18, 2016
Revision No.:	01

Paul J. Leofanti Jr., Project Manager
Telephone: 857-246-6812

1/18/16
Date

Date

Date

This page left blank intentionally for double-sided printing.

TABLE OF CONTENTS

ATTACHMENTS

This page left blank intentionally for double-sided printing.

1. INTRODUCTION

This Sediment Removal Plan describes the personnel, procedures, inspections, and controls to be implemented during construction of the Phase II, III, and the Parcel C Cap at Textron's former Gorham manufacturing facility in Providence, RI. The plan provides the mechanisms to ensure that activities associated with the Sediment Removal Plan are accomplished in accordance with contract specifications, drawings, and procedures.

2. OVERVIEW OF SEDIMENT REMOVAL, PROCESSING, AND CONSOLIDATION

After the Inner Cove is dewatered, Charter will begin sediment excavation of the inner cove, sediment processing in the phase III upland area, and sediment rehandling to the sediment consolidation area.

2.1. Access

Access into and out of the cove will be via the gravel haul road previously built between Phase III upland and the edge of cove. Access within the limits of the cove will be accomplished using 4'x 16' timber mats to create timber mat haul roads. A diagram of the proposed haul road layout is included in **Attachment 1**. The timber mat haul road location may vary as needed. If conditions warrant (dry and stable ground) timber mats may not be needed in some locations of the cove. In this case equipment would be directly on the cove bottom.

2.2. Equipment and labor

Equipment for the sediment removal, processing, and consolidation will consist of 2 track excavators (standard reach and / or long reach), 2 off road dump trucks, 1 front end loader, 1 track dozer, 1 vibratory roller, 1 water truck, and a disc harrow (to aid in sediment drying / processing). Labor will consist of operators for the above mentioned equipment along with 2-3 laborers on the ground assisting.

2.3. Work hours

Extended hours of operation are anticipated. Work may take place up to 10 hours a day (7:00 am till 5:00 PM). If approved by RIDEM, working on Saturdays is also anticipated.

2.4. SMU's / Pre and post removal survey

In lieu of predetermined sediment management units (SMU's), we propose to make each days excavation its own SMU. These SMU's would be designated by a letter (Day 1 = A, Day 2 = B, etc.). Prior to sediment removal Charter will complete a pre removal survey (phase 1 as built) of the area to verify existing grades. A grid system will be used with a frequency of 10-15 feet. Survey points will be labeled with the SMU designation and a number (A1, A2, A3, etc.). Existing condition data will be given to AMEC for analysis. Any major differences will be noted prior to moving forward with excavation. Once excavation is completed at the end of the day a post removal survey (phase 2 as built) will be performed. This data will also be given to AMEC. On a weekly basis we will prepare a Weekly Sediment Removal Report (**Attachment 3**). Final survey documentation is discussed below in Section 2.6 Cove Cap.

2.5. Excavation, processing, and consolidation

Excavation of the cove sediment will be performed by excavators into off road trucks. The off road trucks will haul the sediment to the processing area using the timber mat and gravel haul roads. Sediment will then be dump into the designated processing area located in the Phase III upland. The processing area is further described in **Section 3**. Equipment will be used to spread the sediment material out to aid in drying. Once the sediment is sufficiently dry, it will be loaded back in the off road trucks and transported to the sediment consolidation area. Sediment will be placed in layers not more than 12 inches (prior to compaction) and compacted using heavy compaction equipment (vibratory roller). Excavated sediments will be compacted to at least 93% of the maximum dry density as determined by the standard proctor test when placed within 20 feet laterally of the face of slope. Otherwise, sediments will be compacted to 90% of the maximum dry density. Testing will occur at a frequency of 1 compaction test for every 8,000 sf but no less than 3 tests per lift.

2.6. Cove cap

Once the targeted removal depths are achieved, and verified with AMEC, capping of the cove will begin. Inner cove capping will consist of the placement of a 10% organic soil mix as specified in section 02300-2.05-A. The 10% organic soil will be delivered and stockpiled in the Phase III upland. We will rehandle it from this stockpile to the inner cove using a loader and off road trucks. Excavators will place the 10% organic soil to the proposed grades. The targeted cap thickness is 1 foot and will have an averaged placed thickness between .7 and 1.3 feet. There is no compaction requirement for the 10% organic soil. Once placement is complete Charter will complete an as built survey (phase 3 as built) of the area. A grid system will be used with a frequency of 10-15 feet. Upon refilling the Inner Cove with water, a spot check of the cap will be done (phase 4 as built) to confirm grades. This will consist of taking 8 shots at specific survey points from the phase 3 as built to confirm the cap thickness is within the 0.7-1.3 foot range.

2.7. Sediment removal and cap construction coordination

Sediment removal and cove cap placement operations will occur intermittently with each other. Our plan is to excavate sediment for several days and then place the cove cap for several days in the recently excavated area. This will allow time for this sediment to dry in the sediment processing area and get relocated to the consolidation area before continuing sediment removal. This process will be repeated until all work is complete.

2.8. Perimeter and fringe wetland work

The work along the perimeter and fringe wetlands abutting the inner cove will occur while the access and equipment are in place to perform the cove sediment removal and cap construction. Similar to the 10% organic soil mix, the 20% organic soil mix will be delivered and stockpiled in the Phase III upland. We will rehandle it from this stockpile to the inner cove using a loader and off road trucks. Excavators will assist laborers in hand placing the 20% organic soil to the proposed thickness of 12”.

2.9. Duration

We anticipate the process of sediment excavation, sediment processing, sediment consolidation, cove cap installation, fringe cap installation, and perimeter cap installation to take 2 months.

3. SEDIMENT PROCESSING AREA

In the upland area of Phase III we will be constructing the sediment processing area to handle the dumping and processing of cove sediment. We will construct the sediment processing area on the south end of phase III. Approximate size of the sediment processing area will be 200' x 200'. It will be constructed by performing a 1' cut into the existing surface of the site across the 200' x 200' footprint. This excavated material (approximately 1,500 CY) will be used to construct a perimeter berm 1'-2' high. This will help prepare the existing ground for better infiltration and allow added storage capacity if required. Silt fence will be placed several feet from the outside edge of berm along its perimeter.

Rows of excavated sediment material, approximately 15' wide, will be created to allow access for equipment to process and eventually load the semi dried sediment to the sediment disposal area. The disc harrow will be used to help process and dry the sediment. Drying rates will vary depending on the level of water within the sediment when excavated and weather conditions.

Once sediment processing and consolidation operations are complete, the area will be graded to subgrade and cap construction will begin as called for on the construction drawings. A drawing of the sediment processing area is included as **Attachment 2**.

4. SEDIMENT AMENDMENT

To further dry the sediment for final consolidation we will amend the semi dried sediment with Lime Kiln Dust (LKD). A typical data sheet has been included as **Attachment 4**. Due to availability of LKD several sources may be used. These could include sources in Massachusetts, Pennsylvania, and Canada. To determine a mixing percentage several trail batches at various percentages (i.e.: 2%, 4%, and 6%) will be mixed, compacted, and density tested.

Once a targeted percentage is determined, the LKD will be delivered in bulk and dumped on the ground next to the semi dried sediment. Mixing will be performed with an excavator bucket. The amended sediment will be allowed to "react" for a period of time (usually 24 hours) before being placed and compacted in its final location. Compaction testing will be performed as specified.

5. SOLID WASTE REMOVAL

During sediment removal, processing, and placement within the consolidation area, if solid waste in encountered it will be segregated and disposed of properly off site.

6. DECONTAMINATION OF EQUIPMENT

Once sediment removal, processing, and consolidation are complete, any equipment used will be decontaminated. Equipment decontamination will be per the job HASP and will generally consist of pressure washing the equipment.

7. PLAN ACKNOWLEDGEMENT

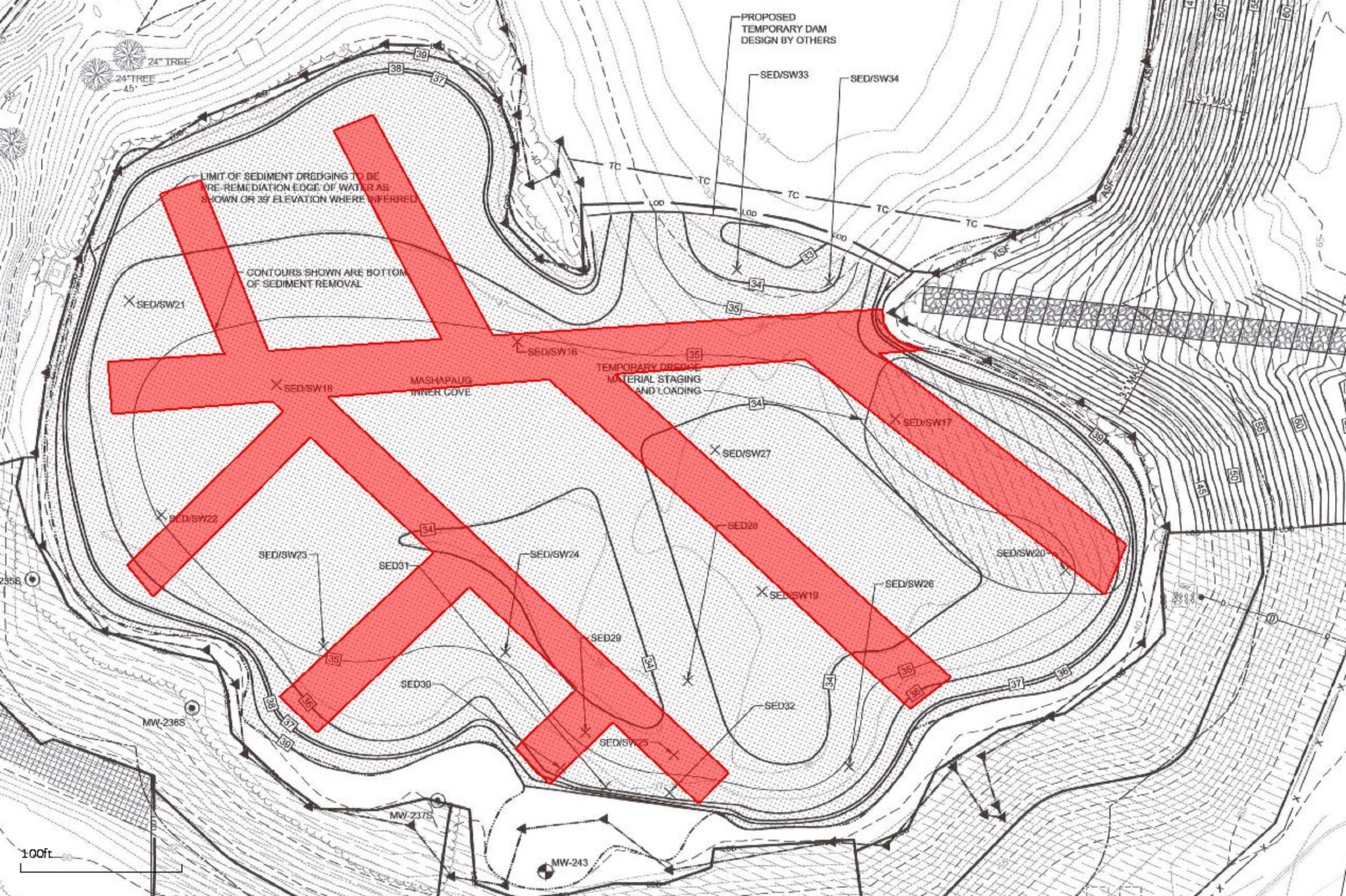
By their signature, the following undersigned certify that this Plan has been read, or otherwise communicated to them. They further certify that they understand this Plan and will follow its procedures during work on this project.

Name	Company	Date

ATTACHMENT 1

Inner cove haul road layout

This page left blank intentionally for double-sided printing.


PROPOSED
TEMPORARY DAM
DESIGN BY OTHERS
SED/SW33
SED/SW34
LIMIT OF SEDIMENT DREDGING TO BE
PRE-REMEDIATION EDGE OF WATER AS
SHOWN OR 39' ELEVATION WHERE INFERRED
CONTOURS SHOWN ARE BOTTOM
OF SEDIMENT REMOVAL
SED/SW21
SED/SW16
SED/SW18
MASHAPAUG
INNER COVE
TEMPORARY DREDGE
MATERIAL STAGING
AND LOADING
SED/SW17
SED/SW27
SED/SW22
SED28
SED/SW23
SED31
SED/SW24
SED/SW20
SED/SW19
SED/SW26
SED29
SED30
SED32
SED/SW25
MW-236S
MW-237S
MW-243
24" TREE
24"TREE
45"
TC
100
ASF
100ft

This page left blank intentionally for double-sided printing.

ATTACHMENT 2

Sediment processing area layout

This page left blank intentionally for double-sided printing.

NOTES:

1. CONTRACTOR MUST MANAGE DEWATERING RATES WITH AVAILABLE INFILTRATION AREA TO PREVENT EXCESSIVE PONDING OR OVERFLOW.
2. FRAC TANKS MAY BE USED TO PROVIDE ADDITIONAL STORAGE TO BALANCE INFILTRATION RATES DURING TIMES OF PEAK WATER GENERATION.
3. DURING CONSTRUCTION, ADDITIONAL DEWATERING TREATMENT MAY BE REQUIRED TO MEET TOTAL SUSPENDED SOLIDS AND TOTAL PETROLEUM HYDROCARBON LIMITATIONS UNDER TEMPORARY DISCHARGE PERMIT.
4. CONFIGURATION OF INFILTRATION GALLERIES, FRAC TANKS AND MATERIAL PROCESSING AREA MAY BE ADJUSTED BASED UPON ENGINEER APPROVED CONTRACTOR PLANS.
5. SEE SHEET 1 FOR PLAN REFERENCES.
6. SEE SHEET 1 FOR LEGEND AND NOTES.

TABLE 1: KEY SEDIMENT ELEVATIONS AND FINISH GRADES

Point #	Description	Northing	Easting	Existing Elev.[2]	Bottom Elev. of Removal	Finish Grade Elev. of Sand Cap	Bottom Elev. of Organic Material[1]
520	SED29	259774	347006	36.6	34.6	35.6	<32.6
515	SED/SW26	259807	347125	36.8	35.3	36.3	35.27
523	SED32	259763	347053	37.3	35.5	36.5	34.8
518	SED/SW34	260010	347029	34.9	33.9	34.9	33.9
513	SED/SW24	259794	346957	36.5	34.5	35.5	32.5
521	SED30	259754	347002	37.6	35.6	36.6	31.1
516	SED/SW27	259918	347010	35.8	33.8	34.8	33.5
519	SED28	259814	347040	36.6	34.6	35.6	<31.1
514	SED/SW25	259780	347048	36.5	34.5	35.5	<31.45
522	SED31	259754	347024	37.5	35.5	36.5	34.6
517	SED/SW33	259999	346987	34.6	33.6	34.6	33.6
505	SED/SW16	259929	346906	36.8	34.8	35.8	34.7
506	SED/SW17	259964	347082	36.6	35.6	36.6	36.1
507	SED/SW18	259867	346811	36.5	34.5	35.5	32.3
508	SED/SW19	259866	347056	35.9	33.9	34.9	31.3
509	SED/SW20	259930	347182	36.7	34.7	35.7	<34.2
510	SED/SW21	259876	346733	36.9	35.6	36.6	35.6
511	SED/SW22	259790	346785	36.8	34.8	35.8	33.8
512	SED/SW23	259763	346878	36.8	34.8	35.8	34.8

NOTES:
1. BOTTOM ELEVATION OF ORGANIC MATERIAL IS BASED ON THE EXISTING SEDIMENT BORING LOGS PROVIDED IN THE CONTRACT DOCUMENTS.
2. EXISTING ELEVATIONS ARE INTERPOLATED BASED UPON THE 2011 BATHYMETRIC SURVEY COMPLETED BY TG&B MARINE. ACTUAL ELEVATIONS AT THESE LOCATIONS WILL VARY FROM THOSE PROVIDED ON THIS TABLE AND THE CONTRACTOR SHALL VERIFY ALL ELEVATIONS, AND SUBMIT TO ENGINEER, PRIOR TO CONDUCTING THE WORK.

1" = 40'

ISSUED FOR CONSTRUCTION

amec foster wheeler
AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE, INC.
271 MILL ROAD
CHELMSFORD MASSACHUSETTS 01824
TELEPHONE: (978) 692-3090
FAX: (978) 692-6033
WEB: WWW.AMECFW.COM

REVISION	DATE	ISSUE / REVISION DESCRIPTION	ISSUED BY	APPROVED
1	06/24/2015	ISSUED FOR CONSTRUCTION	DAA	RJB
0	05/11/2015	ISSUED FOR BID	DAA	RJB
A	04/24/2015	ISSUED FOR CLIENT REVIEW	DAA	RJB

PROJECT: TEXTRON, INC. PHASE II, III, AND PARCEL C CAP FORMER GORHAM MANUFACTURING SITE PROVIDENCE, RI

TITLE: TEMPORARY DEWATERING, EXCAVATION AND MATERIAL STAGING PLAN

CLIENT: TEXTRON

ROBERT J. BUKOWSKI
No. 9217
REGISTERED PROFESSIONAL ENGINEER
CIVIL
6/24/15

DESIGNED BY: DAA	DRAWN BY: DED
CHECKED BY: TD	SCALE: AS SHOWN
PROJECT NUMBER: 3692140032	
DRAWING NUMBER: C-101	
SHEET NUMBER: 6 OF 14	

This page left blank intentionally for double-sided printing.

ATTACHMENT 3

Weekly sediment removal report

This page left blank intentionally for double-sided printing.

WEEKLY SEDIMENT REMOVAL REPORT
TEXTRON PROVIDENCE

DAY:	MON	TUE	WED	THUR	FRI	SAT
DATE:						
# OF LOADS:						
AVERAGE DEPTH:						

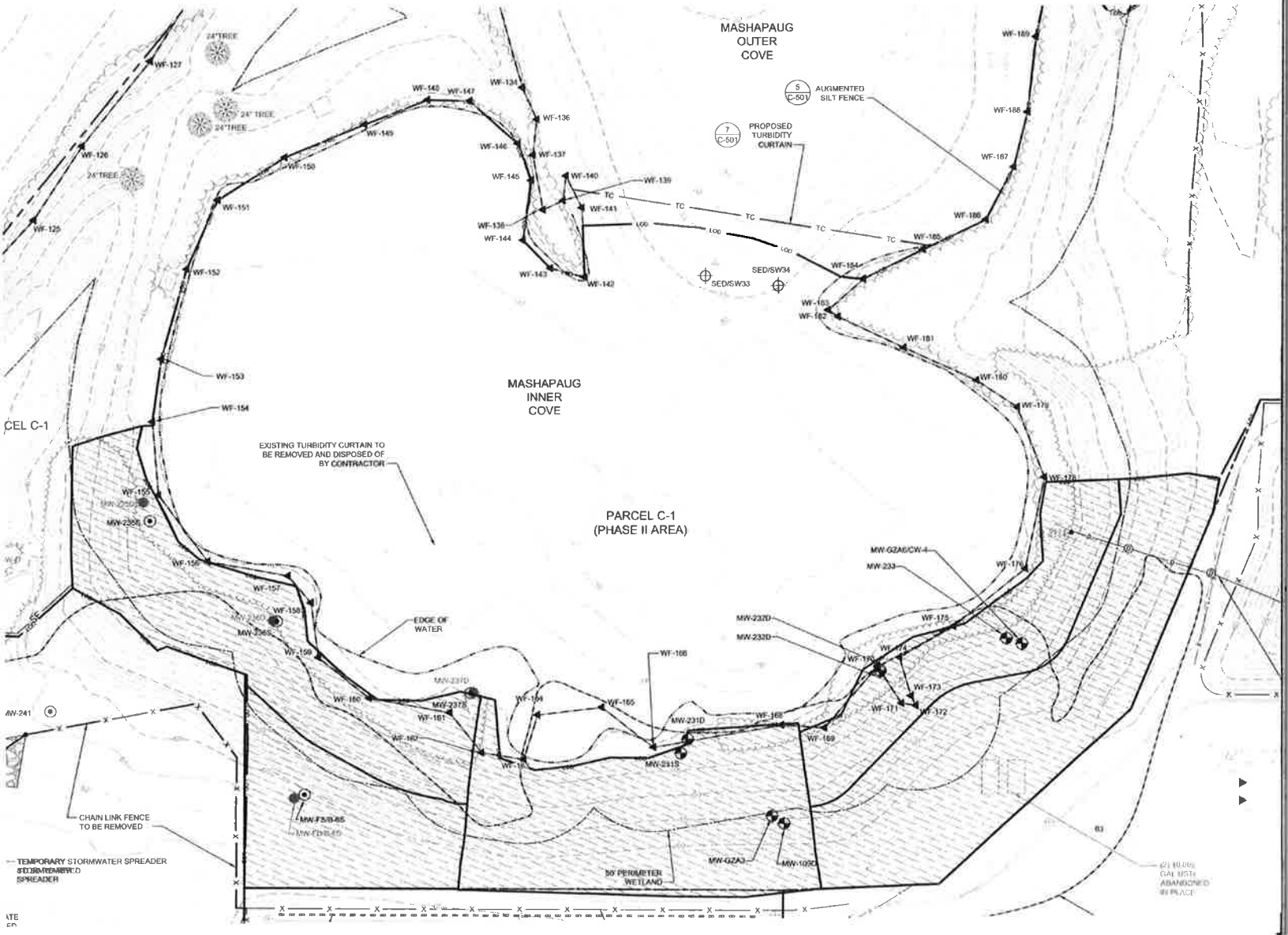
UNEXPECTED CONDITIONS ENCOUNTERED (IF ANY): _____

_____

_____

_____

LOCATION OF WORK THIS WEEK (IDENTIFY BELOW):



This page left blank intentionally for double-sided printing.

ATTACHMENT 4

Lime Kiln Dust (LKD) Data

This page left blank intentionally for double-sided printing.

Specialty MINERALS

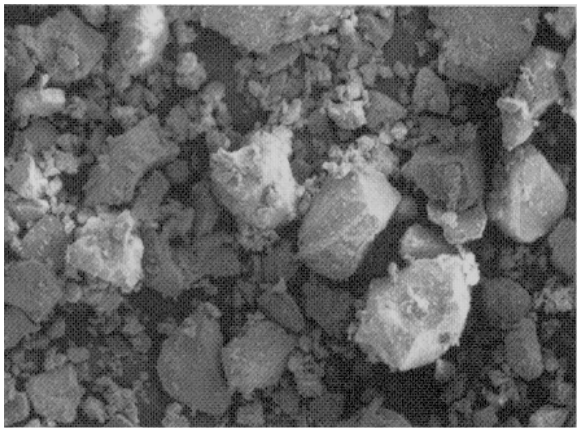
- GCC
- Talc
- PCC for Paper
- Specialty PCC

ECO-CAL® LKD (Adams, MA)

Calcium Carbonate Co-Product Series

Specialty Minerals' ECO-CAL® LKD is a co-product generated during the calcination of calcite ore mined in Adams, MA. ECO-CAL® LKD, commonly referred to as lime kiln dust (LKD), can be used in a myriad of applications (see below) as well as a lime replacement.

- cement
- waste sludge treatment - municipal, paper mills, heavy metals, pathogen treatment
- waste water treatment
- pH stabilization of sludge and ash
- acid neutralization
- soil stabilization
- flue gas desulfurization
- landfill capping
- agriculture (soil treatment)

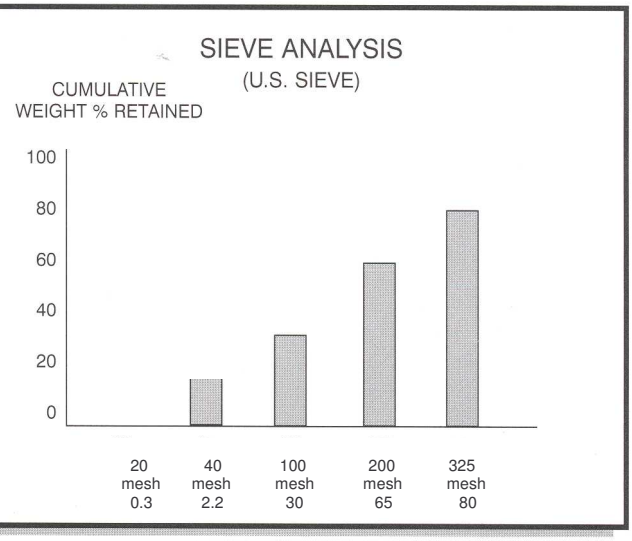


Typical Properties

Specific Gravity	2.7
Dry Brightness (Hunter Y, Rd value)	74
Bulk Density (pounds/ft³) poured	75-80
(pounds/ft³) tapped	95-100

Chemical Composition (typical)

Calcium Carbonate	$CaCO_3$	61%
Total Calcium Oxide	CaO	56%
Available Calcium Oxide	CaO	27%
Magnesium Oxide	MgO	1%
Moisture (% weight loss @ 110° C)	H_2O	<0.1%
Loss on Ignition L.O.I.		26
Total Alkali Content		89%
Total Neutralizing Value		109%



Sales Offices
Bethlehem, PA 1-610-997-8394
Adams, MA (800) 225-1156
www.mineralstech.com

2440 Dayton Xenia Rd, Suite D
Beavercreek, OH 45434
888-431-0218
www.mintekresources.com

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Section 1. Identification

Product Name	Distributor	Telephone
Calciment®	Mintek Resources, Inc.	937-431-0218 Office
	PO Box 340187	937-431-1305 Fax
	Beavercreek, OH 45434	800-424-9300 CHEMTREC

Chemical Name
Calcium Oxide, Calcium Carbonate, Calcium Hydroxide

Uses
Soil Stabilization, De-Watering, Solidification, Fixation, Neutralization, Desulphurization, Agriculture, Cement

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture


GHS03 Exclamation Mark


GHS05 Corrosion

Signal word Danger

Hazard-determining components of labeling
Calcium Oxide, Calcium Carbonate, Calcium Hydroxide

Hazard Statements
H303 May be harmful if swallowed
H315 Causes skin irritation
H319 Causes serious eye irritation
H335 May cause respiratory irritation

Precautionary statements
P101 If medical advice is needed, have product container or label at hand

P102	Keep out of reach of children
P280	Wear protective gloves, clothing, eye protection
P281	Use personal protective equipment as required
P284	Wear respiratory protection

Section 3. Composition				
Component	**Formula**	**% Wt.**	**CAS No.**	**PEL**
Calcium Carbonate	$CaCO_3$	0-30	1317-65-3	10 mg/m^3
Calcium Oxide	CaO	20-80	1305-78-8	2 mg/m^3
Calcium Hydroxide	$Ca(OH)_2$	0-10	1305-78-8	5 mg/m^3
Calcium Magnesium Carbonate	$CaMg(CO_3)_2$	0-30	16389-88-1	10 mg/m^3
Crystalline Silica Quartz	SiO_2	0-10	14808-60-7	0.1 mg/m^3 respirable
Aluminum Oxide	Al_2O_3	0-15	1344-28-1	10 mg/m^3
Ferric Oxide	Fe_2O_3	0-5	1309-37-1	15 mg/m^3
Magnesium Oxide	MgO	0-60	1309-48-4	5 mg/m^3
Sulfur	SO_3	0-10	7704-34-9	10 mg/m^3

SECTION 4. First-Aid Measures

Effects:

Inhalation: **Acute:** Irritation, sore throat, cough, sneezing. **Chronic:** Persistent coughing and breathing problems. Long-term exposure to silica can cause a chronic lung disorder, silicosis.

Eyes: **Acute:** Severe irritation, intense tearing, burns. **Chronic:** Possible blindness when exposure is prolonged.

Skin: **Acute:** Removes natural skin oils, blotches, itching and superficial burns in case of sweating. **Chronic:** No known effects.

Ingestion: **Acute:** Sore throat, stomach aches, cramps, diarrhea, vomiting. **Chronic:** No known effects.

Treatments:

Inhalation: Move victim to fresh air. Seek medical attention if necessary. If breathing has stopped, give artificial respiration.

Eyes: Immediately flush eyes with large amounts of water for at least 15 minutes. Pull back the eyelid to make sure all the lime dust has been washed out. Seek medical attention immediately. Do not rub eyes.

Skin: Flush exposed area with large amounts of water. Seek medical attention immediately.

Ingestion: Give large quantities of water or fruit juice. Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing.

SECTION 5. Fire-Fighting Measures

Flash Point: Non-flammable

Autoignition Temperature: Non-flammable

Inflammability Limits: None, Non combustible solid, but will support combustion by liberation of oxygen

Explosion Risk: None by itself, but heat produced by reaction with strong acids can generate steam and pressure

Hazardous Combustion Products: Decomposes to produce calcium oxide (CaO), which can react with water to produce steam and pressure

Extinguishing Media: Use dry chemical fire extinguisher. Do not use water or halogenated compounds, except that large amounts of water may be used to deluge small quantities of lime kiln dust. Use appropriate extinguishing media for surrounding fire conditions.

Fire Fighting Instructions: Keep personnel away from and upwind of fire. Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (self-contained breathing apparatus.

SECTION 6. Accidental Release Measures

Individual and collective precautions: Avoid creating conditions which release dust – use mechanical vacuums to remove dust from work spaces.

Avoid inhalation of Dust: Wear respiratory protection – minimum NIOSH N-95 Dust Mask.

Cleaning methods (Leaks & Spills): Use personal protective equipment (eyes, skin and inhalation, see Section 8). Use dry methods (vacuuming, sweeping) to collect spilled materials. Avoid generating dust. For large spills, evacuate area downwind of clean-up area operations to minimize dust exposure. For small spills, store spilled materials in dry, sealed plastic or metal containers. Dust residue on surfaces may be washed with water.

Precautions for the protection of the environment: May not be released into surface waters without controls (increases pH).

Waste Disposal: Dispose according to federal, provincial/state and local environmental regulations.

SECTION 7. Handling and Storage

Handling: In open air or in ventilated places, avoid skin and eye contact, avoid creating airborne dust.

Storage: Store in dry places sheltered from humidity. Keep away from acids. Keep out of reach of children.

SECTION 8. Exposure Controls/Personal Protection

Exposure Limits:

Calcium Carbonate: 15 mg/m^3 (total dust), 5 mg/m^3 (respirable) (OSHA); 10 mg/m^3 (ACGIH, O. Reg. 833);
Calcium oxide: 5 mg/m^3 (OSHA); 2 mg/m^3 (ACGIH, O. Reg. 833);
Calcium Magnesium Carbonate: 10 mg/m^3 (ACGIH, OSHA)
Calcium Magnesium Oxide: 2 mg/m^3 (ACGIH, OSHA)
Magnesium Carbonate: 15 mg/m^3 (total dust), 5 mg/m^3 (respirable) (OSHA); 5 mg/m^3 (ACGIH, O. Reg. 833); 10 mg/m^3 (ACGIH, O. Reg. 833);
Calcium Hydroxide: mg/m^3 (total dust), 5 mg/m^3 (respirable) (OSHA); 5 mg/m^3 (ACGIH, O. Reg. 833)
Magnesium oxide: 15 mg/m^3 (OSHA); 10 mg/m^3 (ACGIH, O. Reg. 833)
Silica (crystalline quartz): 2.5 mg/m^3 (total dust), 0.8 mg/m^3 (respirable) (OSHA); 0.5 mg/m^3 (respirable – ACGIH); 0.1 mg/m^3 (O. Reg. 845)

Engineering Controls: Use ventilation and dust collection to control exposure to below applicable limits.

Respiratory Protection:	Wear NIOSH N-95 Dust Mask.
Eye Protection:	Eye protection (chemical goggles, safety glasses and/or face shield) should be worn where there is a risk of lime exposure. Contact lenses should not be work when working with lime products.
Hand Protection:	Use clean dry gloves.
Skin Protection:	Cover body with suitable clothes (long sleeves shirts and trousers). Use over the angle waterproof caustic resistant footwear.

SECTION 9. Physical and Chemical Properties

Appearance:	Solid, white/tan/gray powder
Odor:	Odorless
Odor Threshold:	NA
pH:	12.4 pH graduated solution at 25º C
Melting Point:	1410º C
Boiling Point:	1565º C
Flash Point:	NA
Evaporation Rate:	NA
Flammability:	NA
Upper/Lower Flammability	NA
Vapor Pressure (+tº)	Non volatile.
Vapor Density (air=ml):	Non volatile.
Relative Density:	720-1130 kg/ m^3
Solubility in Water:	0.100 – 1.125g/100g – reactive with water to product $Ca(OH)_2$ with large amounts of heat
Partition coefficient:	NA
Auto-Ignition Temperature:	NA
Decomposition Temperature:	580ºC
Viscosity:	NA

SECTION 10. Stability and Reactivity

Stability:	Stable products, not very soluble.
Decomposition temperature:	580ºC, forms calcium oxide (CaO) and water.
Reactivity:	Reacts with acids to form calcium salts while generating heat. Reacts with carbon dioxide in air to form calcium carbonate.
Conditions to avoid:	Vicinity of incompatible materials.
Incompatible materials:	Acids; reactive fluoridated, brominated or phosphorous compounds; aluminum (may form hydrogen gas), reactive powdered metals; organic acid anhydrides; nitro-organic compounds; interhalogenated compounds.
Hazardous decomposition products:	Calcium oxide (CaO).

SECTION 11. Toxicological Information

Toxicity:	LD_{50} oral (rat) for calcium hydroxide is 7340 mg/kg. This product is not listed by MSA, OSHA, or IARC as a carcinogen, but this product may contain crystalline silica, which has been classified by IARC as (Group 1) carcinogenic to humans when inhaled in the form of quartz or cristobalite. No reported Carcinogenicity, Reproductive Effects, Teratogenicity or Mutagenicity.
Exposure Limits:	Refer to Section 8.
Irritancy:	Can cause severe irritation of eyes, skin, respiratory tract and gastrointestinal tract.
Chronic Exposure:	Inhalation of silica can cause a chronic lung disorder, silicosis.

SECTION 12. Ecological Information

Alkaline substance that increases pH to 12.4 in a saturated water solution at 25ºC.
Calcium hydroxide gradually reacts with CO_2 in air to form calcium carbonate ($CaCO_3$).
Calcium carbonate is ecologically neutral.
Uncontrolled spillage in surface waters should be avoided since the increase pH could be detrimental to fish.
Harmful to aquatic life in high concentration.

SECTION 13. Disposal Considerations

Dispose according to federal, provincial/state and local environmental regulations.

SECTION 14. Transportation Information

Classification: TDG: Not listed for ground transportation
HMR: Not listed for ground transportation

TDG: Transportation of Dangerous Goods Regulation (Canada)
HMR: Hazardous Materials Regulation (USA)

SECTION 15. Regulatory Information

Symbol:

WHMIS Rating
D2A, E

NFPA RATING
HEALTH-3 SPECIFIC HAZARD – ALK FLASH POINTS-0 REACTIVITY-1

HMIS RATING
HEALTH-2 SPECIFIC HAZARD – ALK FLASH POINTS-0 REACTIVITY-1

SECTION 16. Other Information

Original Prepared: 05/13/13
Revision Date: 07/15/13
Revision #: 0

Calciment can be removed from vehicles using rags dampened with dilute vinegar. After applying dilute vinegar, vehicles (especially chrome surfaces) must be washed with water.

The information contained herein is believed to be accurate and reliable as of the date hereof. However, Mintek Resources, Inc. makes no representation, warranty or guarantee as to results or as to the information's accuracy, reliability or completeness. Mintek has no liability for any loss or damage that may result from use of the information. Each user is responsible to review this information, satisfy itself as to the information's suitability and completeness, and circulate the information to its employees, customers and other appropriate third parties.