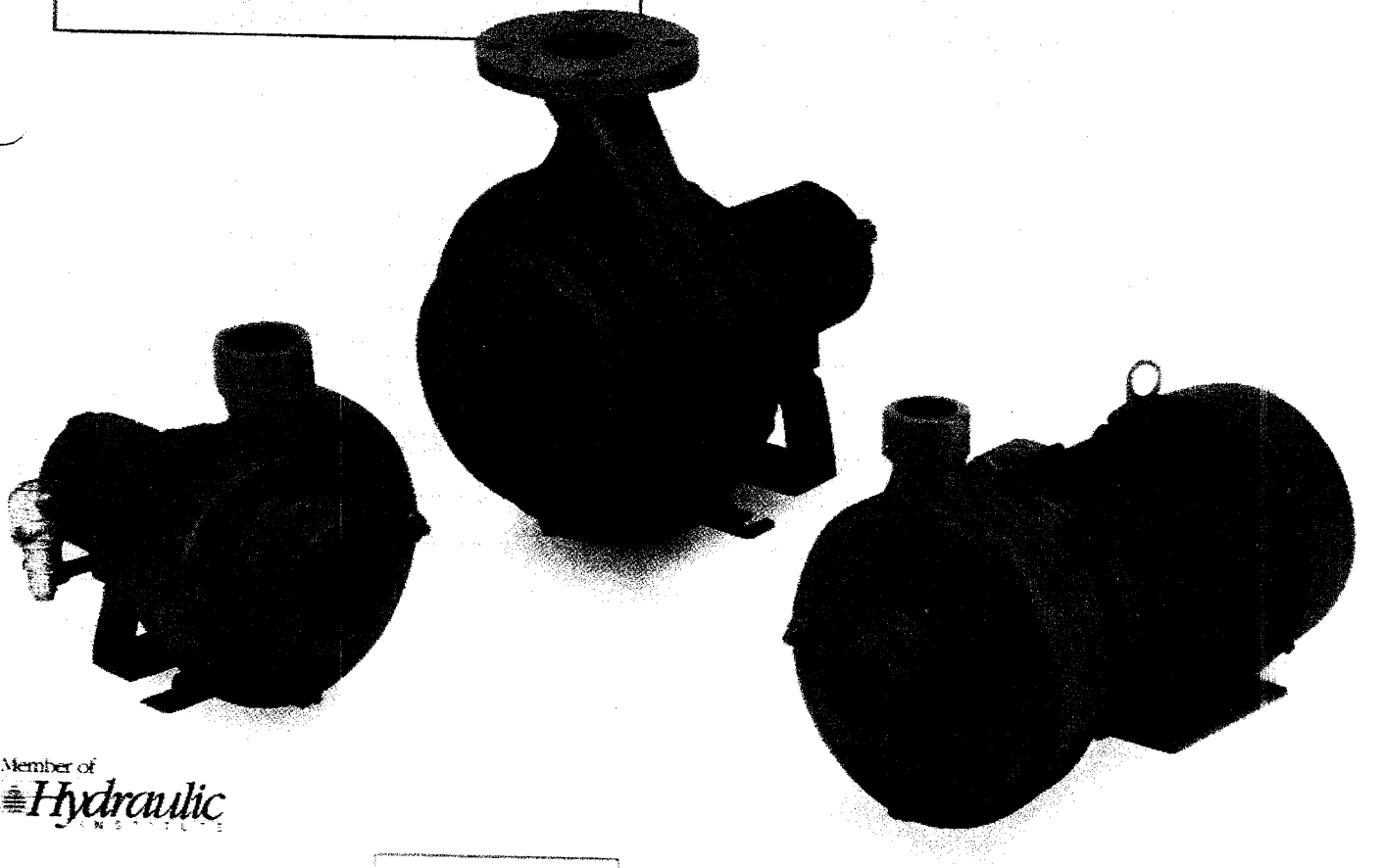
3020/3120 Series

End-Suction Pumps

- Frame-mounted and close-coupled
- Enclosded and semi-enclosed impeller
- Capacities to 4,000 GPM
- Heads to 780 feet



Member of Hydraulic Institute

CRANE **DEMING® PUMPS**

A Crane Co. Company

Introducting Deming 3020/3120 Series End-Suction Centrifugal Pumps

Crane Deming offers an exciting, new design in end-suction centrifugal pumps for continuous operation in generate industrial, OEM and HVAC service. They come in frame-mounted (Models 3021 and 3121) and close coupled (Models 3022 and 3122) designs and in 30 sizes from 1" to 8.

The new Series 3020/3120 pump features a hydraulically balanced, computer-designed, enclosed and semi-enclosed impeller to ensure the highest hydraulic efficiency available in the pump industry. Maximum interchangeability of parts allows for reduced parts inventories. Other features include a rugged, one-piece casting for suction head and casing; back pull-out design for ease of maintenance; regreaseable bearings; and a two-year warranty against defects in materials and workmanship.

Industrial and HVAC users like Series 3020/3120 end-suction pumps because they provide continuous service with essentially no maintenance. OEM users like them because of their reliability, low maintenance and compact design.

More than a century of research, engineering and manufacturing experience stands behind your selection of a Deming end-suction centrifugal pump. It will prove to be a wise choice.

SERIES 3020/3120 CONSTRUCTION FEATURES

STANDARD

- All-iron construction
- Back pull-out design
- John Crane Type 21 single seal, Code BF1C1
- Regreaseable bearings designed for 3-year minimum B-10 life
- Liquid-end interchangeability from close-coupled to frame-mounted designs
- Machine-registered fits for positive structural alignment
- Stainless steel shaft sleeve
- Built for continuous service and maximum reliability
- Standard NPT threaded connections and 125# ASA flanges above 3" discharge

OPTIONAL

- Bronze fitted constuction
- Stainless-steel fitted construction
- Seals available for a variety of liquid-handling applications
- Casings rotatable to match various piping installations
- OSHA coupling guards (standard con factory-assembled units)
- Certified test reports (witnessed or nonwitnessed)
- Steel base plates
- Standard, flexible or spacer drive couplings

DESIGN FEATURES MODEL 3122

1. **Liquid end** Top centerline back pull-out design allows disassembly without disturbing the suction and/or discharge piping. Two-piece construction.

2. **Casing** Suction head and casing one-piece easing. Top centerline discharge connection. Rotated at 45-degree intervals through 360 degrees. 316 stainless steel casing wearing rings are standard.

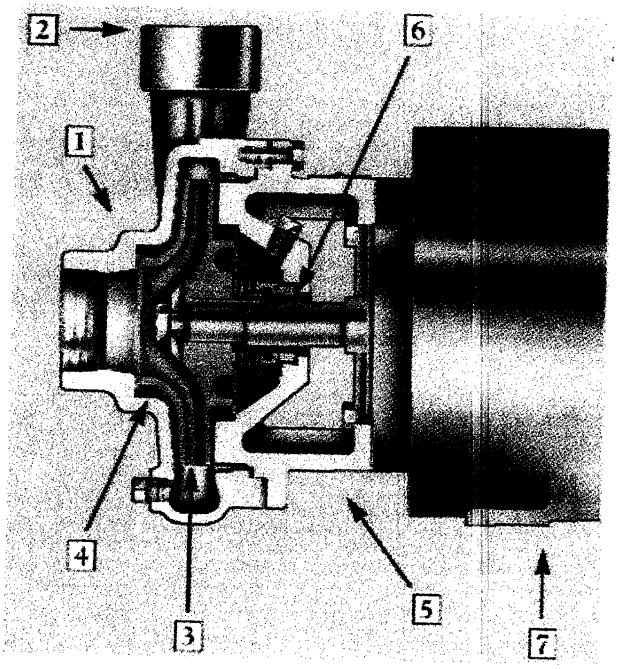
3. **Impeller** Enclosed type statically and hydraulically balanced for optimum performance. Straight bore design for interchangeability on both frame and close-coupled designs.

4. **Impeller wearing rings** are optional on enclosed impeller.

5. **Adapter assembly** Combination motor/frame support and seal housing.

6. **Shaft Sleeve** Hooked style for maximum drive and 316 stainless steel for serviceability.

7. **Motor** Close-coupled 3M Frame.



TBD

MECHANICAL DATA 2B

Casing	Suction	4	3	3	4	6	2	2	3	4
	Discharge	3	2 1/2	2	3	4	1	1 1/2	2	3
	Casing Wall Thickness	5/16	3/8	5/16	7/16	7/16	3/8	3/8	3/8	1/2
	Max. Working Pressure P.S.L	← See Pressure Chart →								
Shaft	Diameter at Coupling End	← 1 1/8 →								
	Diameter Under Sleeve	← 1 3/8 →								
	Diameter of Sleeve O.D.	← 1 5/8 →								
	Diameter at Impeller	← 1 1/4 →								
	Pump Weight Model 3121	139	142	144	157	155	131	135	164	171

DIMENSIONS IN INCHES

*Enclosed Impeller Design

Pump and Max. HP Wt.

MECHANICAL DATA 3B

	Size								
Casing	Suction	4	5	6	8	3	3	4	6
	Discharge	3	4	4	6	1 1/2	2	3	4
	Casing Wall Thickness	1/2	7/16	7/16	5/8	1/2	9/16	1/2	9/16
	Max. Working Pressure P.S.I.	← See Pressure Chart →							
Impeller									
Shaft	Diameter at Coupling End	← 1 1/8 →							
	Diameter Under Sleeve	← 1 3/8 →							
	Diameter of Sleeve O.D.	← 1 5/8 →							
	Diameter at Impeller	← 1 1/4 →							
Bearings									
	Pump Weight Model 3121	197	212	238	326	202	215	231	284

DIMENSIONS IN INCHES *Enclosed Impeller Design Pump and Max. HP Wt.

MECHANICAL DATA 4B

	Size										
Casing	Suction	5	6	8	3	3	4	6	4	6	8	10
	Discharge	4	4	6	1 1/2	2	3	4	3	4	6	8
	Casing Wall Thickness	7/16	7/16	5/8	1/2	9/16	1/2	9/16	9/16	5/8	19/32	9/32
	Max. Working Pressure P.S.I.	← See Pressure Chart →										
Impeller												
Shaft	Diameter at Coupling End	← 1 5/8 →										
	Diameter Under Sleeve	← 1 7/8 →										
	Diameter of Sleeve O.D.	← 2 1/8 →										
	Diameter at Impeller	← 1 5/8 →										
Bearings												
	Pump Weight Model 3121	244	270	358	234	247	263	316	305	335	405	490

DIMENSIONS IN INCHES *Enclosed Impeller Design Pump and Max. HP Wt.

MECHANICAL DATA 5B

Casing	Suction	8	10	8	10
	Discharge	6	8	6	8
	Casing Wall Thickness	19/32	11/16	21/32	3/4
	Max. Working Pressure P.S.I.	← See Pressure Chart →			
Impeller	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Shaft	Diameter at Coupling End	← 2 3/8 →			
	Diameter Under Sleeve	← 2 1/2 →			
	Diameter of Sleeve O.D.	← 2 3/4 →			
	Diameter at Impeller	← 2 →			
Bearings	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Pump Weight Model 3021	615	659	664	778
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

DIMENSIONS IN INCHES

*Enclosed Impeller Design — Pump and Max. HP Wt.

TYPICAL ARCHITECTS/ENGINEERS SPECIFICATIONS

GENERAL: The contractor shall furnish and install as shown on the plans, (qty) Crane Deming (Horizontal Frame Mounted) (Close Coupled) series 3020/3120 Size ( ) Centrifugal pump(s) as herein specified. The pump(s) shall be rated for continuous service and of (All Iron), (St. Stl. fitted), (Bronze fitted) construction for the following operating conditions. Each pump shall be capable of delivering _____GPM of (Liquid) against feet total head.

The following characteristics of the liquid to be pumped are:

LIQUID HANDLED _____ SPECIFIC GRAVITY _____

TEMPERATURE _____ VISCOSITY OF LIQUID AT PUMPING TEMPERATURE_____

NPSHA _____

MODEL 3021/3121 HORIZONTAL FRAME MOUNTED: The design requires a 4140 steel shaft sized for a maximum deflection of .002 at the seal faces with the pump running (at_____) (under_____) maximum load conditions. The bearings shall be (grease) (oil) lubricated having a 3 year minimum life (AFBMA B10) under the maximum load conditions and protected from outside contamination by oil seals. The shaft and bearings are to be encased in a cast iron ASTM-A48 Class 30 frame and the thrust bearing housing is to be of a micrometer adjustment design. The Model 3021/3121 pump and motor will be mounted on a common (fabricated steel with drip rim) (steel) baseplate. Pumps are to be coupled to the driver by means of an approved (spacer) (non-spacer) type coupling with an OSHA approved coupling guard. NOTE: Add any additional facts concerning the nature of the liquid or installation which might affect the pump construction, application or operation.

MODEL 3022/3122 CLOSE COUPLED:

The pump is to be coupled directly to a Nema JM Frame_____HP_____Phase_____ Hertz_____Voltage RPM Enclosure motors. The adapter to the casing is to be one piece cast iron construction capable of mounting a John Crane Type 21 mechanical seal. The standard seal construction is carbon vs. ceramic faces, stainless steel hardware with buna elastomers: various other face materials and elastomers are available, depending on the medium being pumped. The maximum operating temperature is 2250 F.

CONSTRUCTION DETAILS

CASING: Casing shall be of close-grained ASTM-A48 Class 30 Cast Iron with a minimum tensile strength of 30,000 PSI. The casing shall be vertically split with centerline discharge and back pull-out design, capable of standing hydrostatic test pressures of 1-1/2 times maximum working pressure. All assembly points shall be of machine register fit to assure proper pump alignment. The casing shall also have a tapped and plugged drain connection available for any of the eight (8) rotatable casing discharge positions.

CASING CONNECTION: The threaded and flanged casing nozzles shall conform to ANSI NPT and B16.I specifications with a minimum 125 PSI ratings, all flanged nozzle connections shall be standard flat face.

CASING WEARING RINGS: Casing wearing rings of 316 st. stl. material for service and easily replaceable design shall be provided as standard both in front and rear of the impeller.

IMPELLER: The impeller shall be of the (enclosed) (semi-enclosed) single suction type of (cast iron) (bronze) (316 stainless steel) both statically and hydraulically balanced for maximum efficiency and smooth operation. Holes shall be provided through the impeller hub to keep positive pressure on the mechanical seal and balance axial thrust loads. Impeller shall be positioned and securely locked to the shaft by use of a key, hex head impeller nut and washer. Models using 3121/3122 are of the enclosed impeller design, whereas Models 3021/3022 will be semi-enclosed impellers.

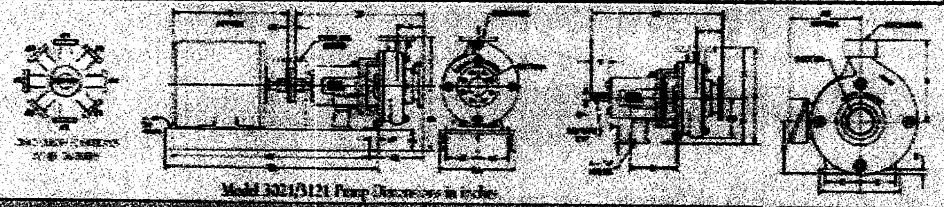
IMPELLER WEARING RINGS (Optional): Impeller rings of 316 st. stl. material shall be securely mounted on the impeller hubs to provide for renewable clearances. Impeller wearing rings are available on enclosed impeller designs only.

SHAFT SLEEVE: The sleeve shall be of the renewable type in 316 stainless steel and completely cover the shaft in the seal area. Sleeve shall be locked in place to prevent axial movement and sealed with a gasket between it and the impeller.

CASING/SEAL (HOUSING) HEAD ADAPTER: The adapter shall be one piece integrally cast with the seal head to mount on either a close coupled 3M motor or the appropriate frame assembly. The design of this chamber shall have a machine register fit on both ends to maintain positive alignment from casing to (frame) (close-coupled motor). The design shall incorporate an open seal chamber to allow maximum flushing action at the mechanical seal faces.

WARNING: Coupling guards must be used to avoid serious injury to operating personnel.

APPROXIMATE DIMENSIONS



Model 3121/3121 Pump Dimensions in inches

Model 3122 Pump Dimensions in inches

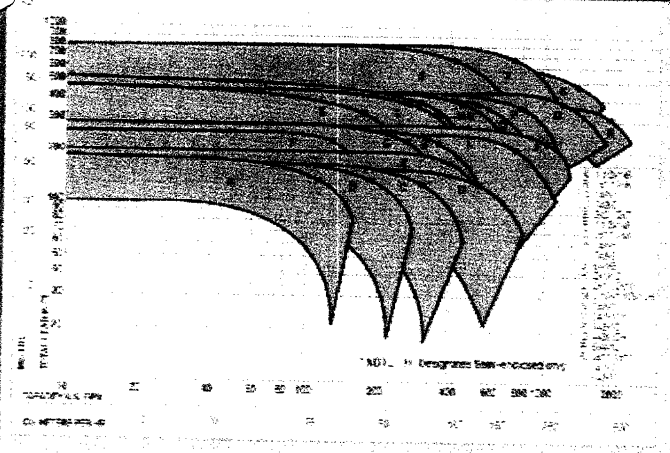
Model 3121/3121 Base Dimensions in inches

Model 3122 Motor Dimensions in inches

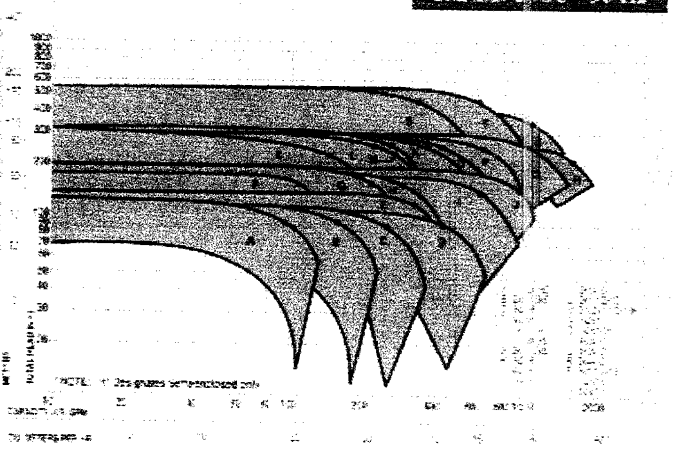
Dimensions on this page are for estimating purposes only. Certified dimension prints are available from your local Crane Deming distributor or the factory.

Series 3020/3120 Composite Performance Curves

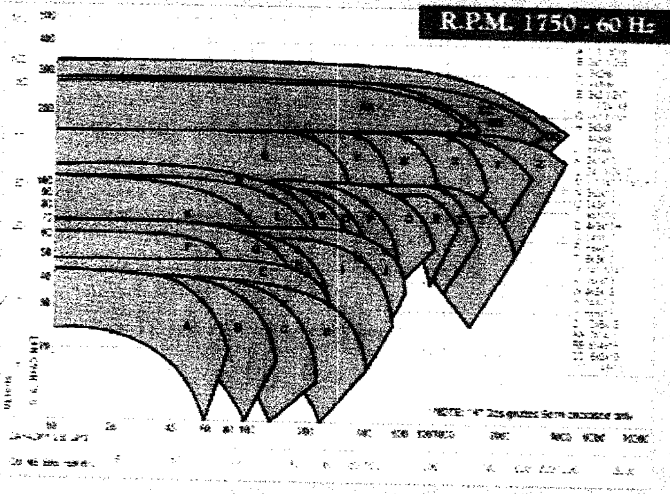
R.P.M. 3550 - 60 Hz



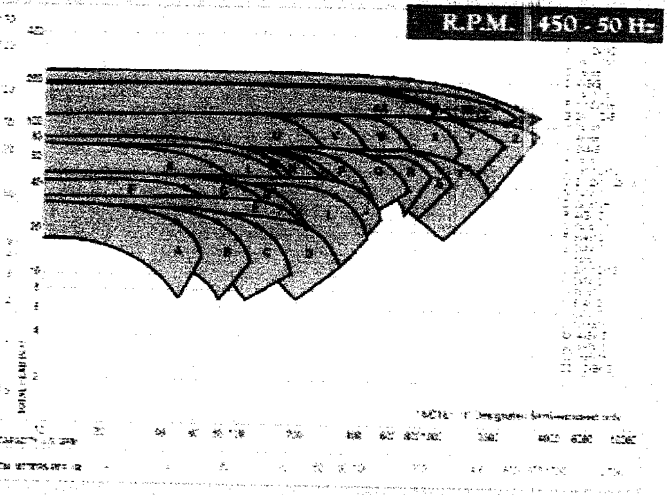
R.P.M. 2950 - 50 Hz



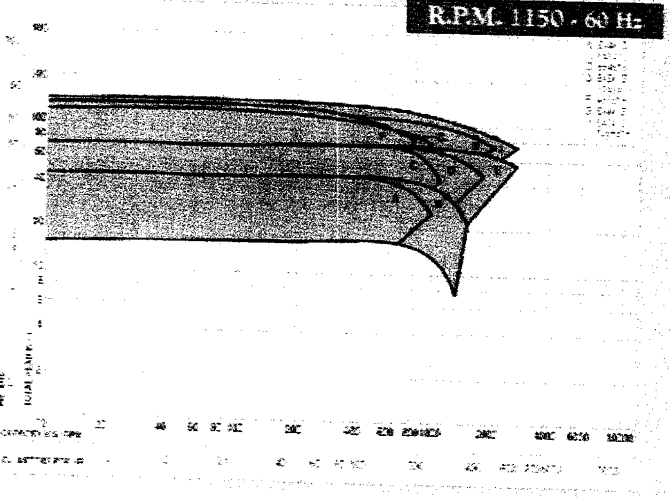
R.P.M. 1750 - 60 Hz



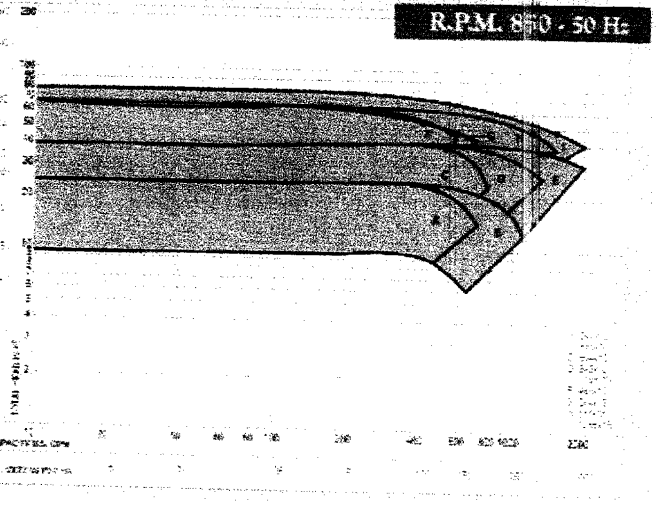
R.P.M. 1450 - 50 Hz

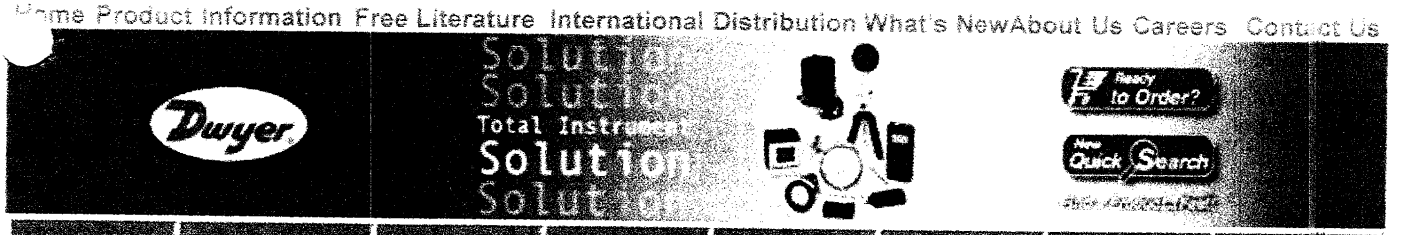


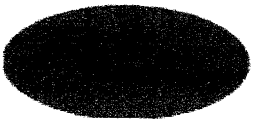
R.P.M. 1150 - 60 Hz



R.P.M. 850 - 50 Hz



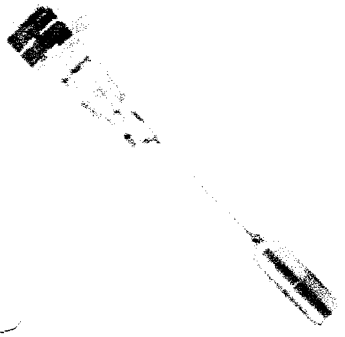




Series L4

Flotect® Float Switch

Magnetically Operted Switch, Leak Proof Body, Explosion-proof



SPECIFICATIONS

Service: Liquids compatible with wetted materials.

Wetted Materials:

Float and Rod: 316SS.

Body: Brass or ~~316SS standard~~.

Magnet Keeper: 430SS standard, ~~316SS or Nickel optio~~nal.

Temperature Limits: 4 to 275°F (-20 to 135°C) standard. MT high temperature option 400°F (205°C), (MT option not UL, CSA, ATEX or SAA).

Pressure Limit: Brass body 1000 psig (69 bar), 316SS body 2000 psig (138 bar) . Standard float rated 100 psig (6.9 bar). For other floats see options on "Options/Accessories" page.

Enclosure Rating: Weatherproof and explosion-proof. Listed with UL and CSA for Class I, Groups C and D; Class II, Groups E, F, and G. ATEX CE 0344 II 2 G EEx d IIB T6 -20°C≤Tamb≤75°C, EC-Type Certificate No: KEMA 03 ATEX 2383. SAA: Exd II C T6 (T amb=60°C). IP66 C1 I, Zone I. Also FM approved.

Switch Type: SPDT snap switch standard, DPDT snap switch optional.

Electrical Rating: UL, FM, ATEX and SAA models: 10A @ 125/250 VAC. CSA models: 5A @ 125/250 VAC; 5A res., 3A ind. @ 30 VDC. MV option: 1A @ 125 VAC; 1A res., .5A ind. @ 30 VDC. MT option: 5A @ 125/250 VAC. (MT and MV options not UL, CSA, FM, ATEX or SAA.).

Electrical Connection: UL and CSA models: 16 AWG, 6" (152 mm) long. ATEX and SAA units: terminal block.

Process Connection: 1-1/2" male NPT standard, 2-1/2" male NPT required for optional floats.

Mounting Orientation: Horizontal installation standard, optional vertical top mount.

Weight: 4 lb 9 oz (2.07 kg).

Dead Band: 3/4" (19 mm) for standard float.

Specific Gravity: 0.7 minimum with standard float. For other floats see options on "Options/Accessories" page.

Agency Approvals: UL, CSA, FM, CE and ATEX.

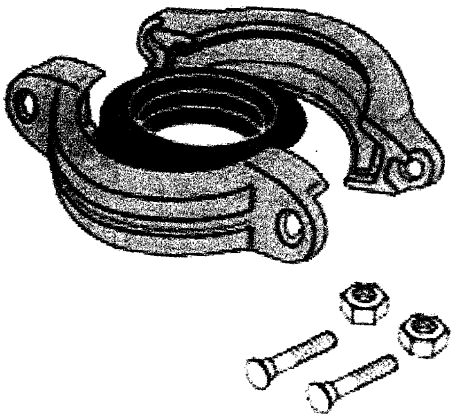
COUPLINGS

Grinnell® Mechanical Piping Products are designed for grooved end pipe and are available in nominal sizes of $1^1/_4$" (32mm) to 24" (600mm).

The Grinnell Coupling design provides several economical advantages when compared to welded or flanged systems. They also provide a universal means for the connection of pipe, fittings and pipe system components.

Grinnell Couplings and Gaskets permit the selection of suitable combinations for specific applications.

Field modifications are easily accommodated with Grinnell Mechanical Piping Products as the couplings can be easily rotated, eliminated and/or added to facilitate the necessary modification.



MATERIAL SPECIFICATIONS

The applicable material specifications for ductile iron, galvanizing and rubber gaskets apply:

Ductile Iron Housing Specifications

- ASTM A-536 - Standard Specification for Ductile Iron Castings Grade 65-45-12
- Tensile Strength, minimum psi-65,000 (MPa-448)
- Yield Strength, minimum psi-45,000 (MPa-310)
- Elongation in 2" (50mm), minimum 12%
- ASTM A-153 - Standard Specification for Hot Dip Galvanizing

Gasket Specifications

Grade "E" EPDM gaskets have a green color code identification and conform to ASTM D-2000 for service temperatures from -30°F (-34°C) to 230°F (110°C). They are recommended for hot water not to exceed 230°F (110°C), plus a variety of dilute acids, oil free air and many chemical services. They are not recommended for petroleum services.

Grade "T" Nitrile gaskets have an orange color code identification and conform to ASTM D-2000 for service temperatures from -20°F (-29°C) to 180°F (82°C). They are recommended for petroleum products, vegetable oils, mineral oils, and air with oil vapors.

Bolt / Nut Specifications

Carbon steel oval neck bolts and nuts are heat treated and conform to the physical properties of ASTM A-183 with a minimum tensile strength of 110,000psi (758,422 kPa). Bolts and nuts are Zinc electroplated to ASTM B633.

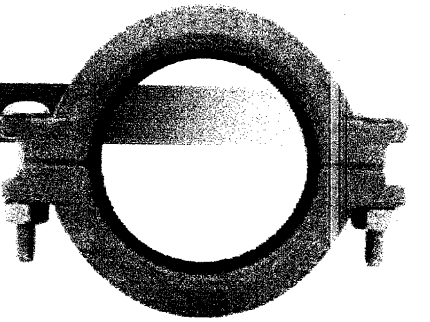
Gold color coded metric bolts conforming to the physical properties of ASTM F568M are available upon request. Contact Tyco Fire & Building Products.

Coatings

- Orange - non lead (standard)
- RAL Red - non lead (optional)
- Hot Dipped Zinc Galvanized (optional)

COUPLINGS

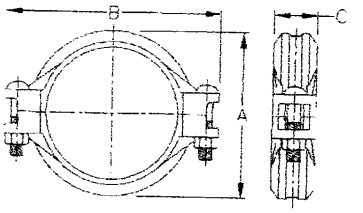
Figure 772 Rigid Coupling - Patented



The Figure 772 Rigid Coupling is capable of pressures up to 750 psig (51.7 Bar) and provides a rigid joint by firmly gripping along the circumference of the pipe grooves.

Figure 772 Rigid Couplings are a proven dependable method of joining pipe and are an economical alternative to welding, threading, or flanges and can be used on a variety of pipe and wall thicknesses.

The Figure 772 Rigid Coupling in sizes $1^1/_4$" (42.4mm) to 4" (114.3mm) have an Anti-Rotational Feature of "gripping teeth" along the coupling keys that make it suited for installations where the likelihood of rotation is greatest.



For Fire Protection Pressure Rating and Listing / Approval information contact Tyco Fire & Building Products.

Nominal Size Inches / mm	Pipe OD Inches / mm	Max.† Pressures psi / Bar	Max. End† End Load Lbs. / kN	Max. End*‡ Gap Inches / mm	Nominal Dimensions A Inches / mm	B Inches / mm	C Inches / mm	Coupling Bolts Qty	Size Inches / mm	Approx. Weight Lbs. / Kg
1¼ / 32	1.660 / 42.4	750 / 51.7	1,623.2 / 7.22	0.06 / 1.5	2.75 / 69.9	4.38 / 111.3	1.81 / 46.0	2	⅜x2¼ / M10x57	1.0 / 0.5
1½ / 40	1.900 / 48.3	750 / 51.7	2,126.5 / 9.46	0.08 / 2.0	3.00 / 76.2	4.62 / 117.3	1.81 / 46.0	2	⅜x2¼ / M10x57	1.0 / 0.5
2 / 50	2.375 / 60.3	750 / 51.7	3,322.6 / 14.75	0.13 / 3.3	3.41 / 86.6	5.12 / 130.0	1.88 / 47.8	2	⅜x2¼ / M10x57	1.5 / 0.7
2½ / 65	2.875 / 73.0	750 / 51.7	4,868.9 / 21.66	0.13 / 3.3	3.91 / 99.3	5.63 / 143.0	1.88 / 47.5	2	⅜x2¼ / M10x57	2.5 / 1.1
	3.000 / 76.1	750 / 51.7	5,301.4 / 23.58	0.13 / 3.3	4.19 / 106.4	5.72 / 145.3	2.00 / 50.8	2	M10x57	2.6 / 1.2
3 / 80	3.500 / 88.9	750 / 51.7	7,215.8 / 32.10	0.13 / 3.3	4.63 / 117.6	6.25 / 158.8	1.88 / 47.5	2	⅜x2¼ / M10x57	2.6 / 1.2
4 / 100	4.500 / 114.3	750 / 51.7	11,928.2 / 53.06	0.19 / 4.8	5.81 / 147.6	7.50 / 190.5	1.97 / 50.0	2	⅜x2¼ / M10x57	3.5 / 1.6
	5.500 / 139.7	750 / 51.7	17,818.7 / 79.26	0.19 / 4.8	7.02 / 178.3	9.72 / 246.9	2.06 / 52.3	2	M16x83	7.5 / 3.4
5 / 125	5.563 / 141.3	750 / 51.7	18,229.3 / 81.09	0.19 / 4.8	7.09 / 180.1	9.71 / 246.6	2.04 / 51.8	2	⅝x3¼ / M16x83	7.5 / 3.4
	6.500 / 165.1	700 / 48.2	23,228.2 / 103.18	0.19 / 4.8	8.09 / 205.5	10.53 / 267.5	2.13 / 54.1	2	M16x83	7.6 / 3.4
6 / 150	6.625 / 168.3	700 / 48.2	24,130.1 / 107.34	0.19 / 4.8	8.09 / 205.5	10.53 / 267.5	2.13 / 54.1	2	⅝x3¼ / M16x83	7.6 / 3.4
8 / 200	8.625 / 219.1	600 / 41.4	35,055.8 / 155.94	0.19 / 4.8	10.56 / 268.2	13.56 / 344.4	2.62 / 66.5	2	¾x4¾ / M20x121	18.0 / 8.2
10 / 250	10.750 / 273.0	500 / 34.5	45,381.3 / 201.87	0.13 / 3.3	12.84 / 326.1	16.41 / 416.8	2.62 / 66.5	2	1x6½ / M24x165	24.6 / 11.2
12 / 300	12.750 / 323.9	400 / 27.6	51,070.5 / 227.17	0.13 / 3.3	15.41 / 391.4	18.84 / 478.5	2.62 / 66.5	2	1x6½ / M24x165	42.0 / 19.1

† Maximum pressure and end load are total from all loads based on standard weight steel pipe. Pressure ratings and end loads may differ on other pipe materials and/or wall thickness. Contact Tyco Fire & Building Products for details.

* Maximum available gap between pipe ends. minimum gap = 0.

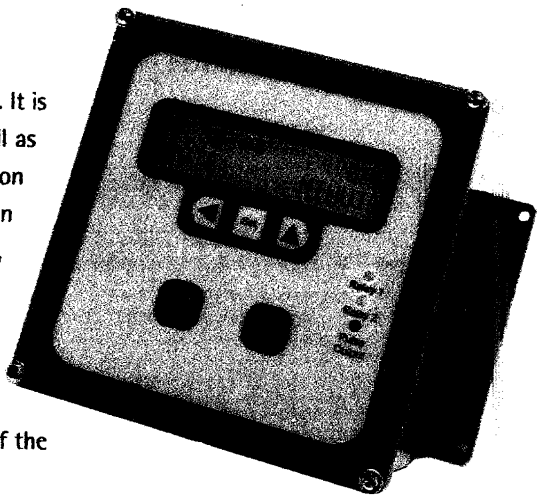
‡ Maximum end gap is for cut grooved standard weight pipe. Values for roll grooved pipe will be ½ that of cut grooved.

Please refer to General Notes on page 2.2

FT520
BATCH FLOW PROCESSOR SPECIFICATIONS

SeaMetrics

GENERAL INFORMATION



The FT520 is a batching flow processor with additional output features. It is designed for use with SeaMetrics flow meters and flow sensors, as well as other units which have frequency output proportional to flow. In addition to batch function, the FT520 indicates flow rate and accumulated total in large digits on an easily-read backlit display. Units are user selectable, and range from milliliters per second to million gallons per day.

Batch output is controlled by two relays. The main relay starts and stops the batch as set. The auxiliary "prewarn" relay can be used to operate a second valve, in order to have a staged shut off at the end of the batch, for maximum accuracy.

Analog output (4-20 mA, 0-10 VDC, 0-5 VDC) is included for applications requiring it, such as flow rate logging. Two individually programmable pulse outputs are also standard, and can be used, for example, to provide proportional chemical feed with a pulse-responsive metering pump.

SPECIFICATIONS

POWER
- 115 VAC, 50/60 Hz, 12-24 VDC (220 VDC optional)

TEMPERATURE
- 32° - 130° F (0° - 55° C)

ENCLOSURE
- Precision cast aluminum, NEMA 4X

BATCH OUTPUTS
- Two form C SPDT relay, 115 VAC 5A max

MAX PULSE OUTPUT
- 100 mA at 60 VDC

MEMORY TYPE
- Non-volatile EEPROM auto-backup

SENSOR POWER
- 12VDC, 10 mA

DISPLAY
- **Totalizer** = 8 digit
- **Rate** = 5 digit

UNITS
- **Volume** = Gallons, cubic feet, cubic meters, liters, million gallons
- **Time** = Seconds, minutes, hours, days

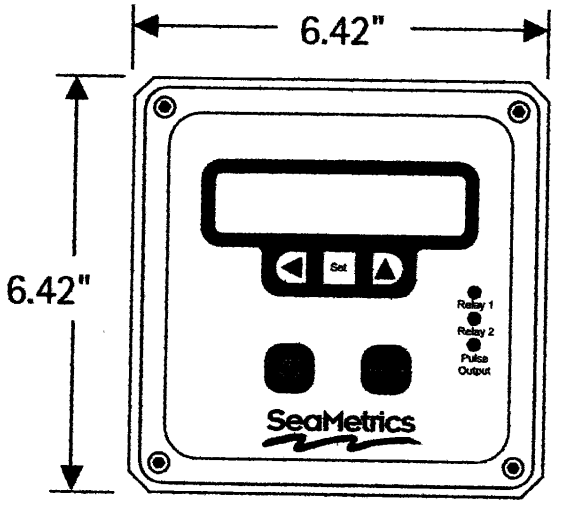
ANALOG OUTPUT
- 4-20 mA, 0-10 VDC, opto-isolated

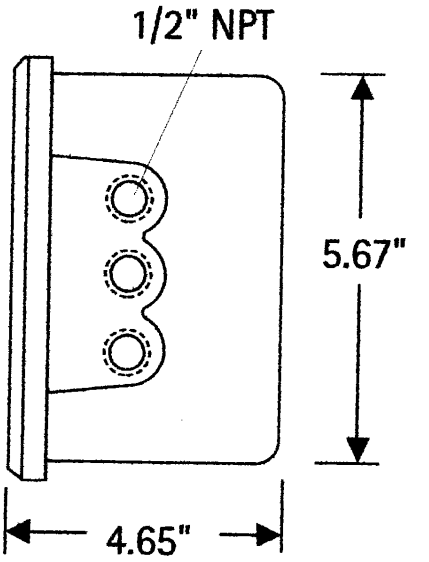
SENSOR INPUT
- Open collector current sink, ESD protected

MAX INPUT FREQUENCY
- 1,000 Hz

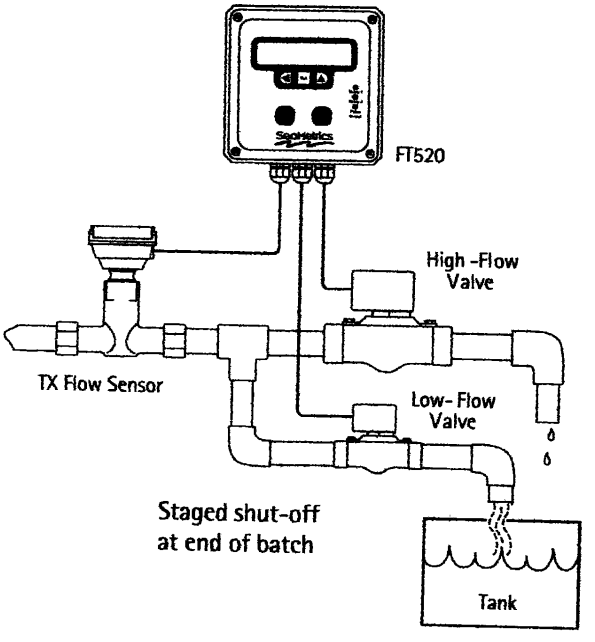
FT 520 BATCH FLOW PROCESSOR
Specifications

DIMENSIONS

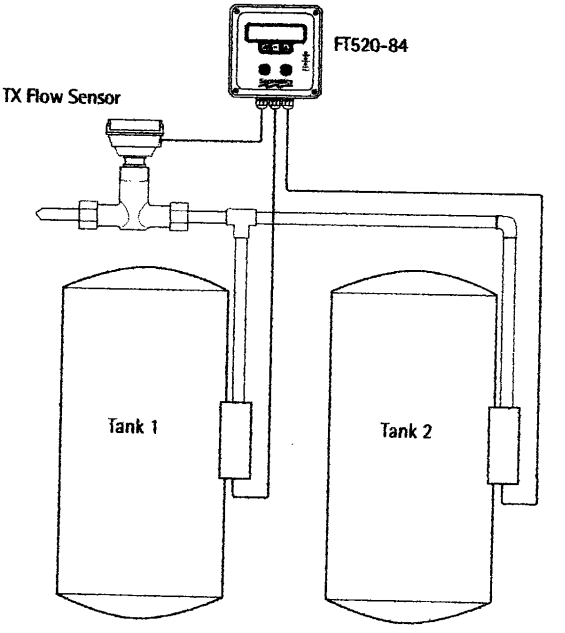




TYPICAL DUAL FLOW BATCH APPLICATION



ALTERNATING TANKS APPLICATION



HOW TO ORDER

FT520 BATCH FLOW PROCESSOR

Option Codes: 84 Regeneration control
86 Alarm relay control

FT520 - _____

SeaMetrics

19026 72ND AVE SOUTH, KENT, WA 98032 USA
(P) 253.872.0284 (F) 253.872.0285
WWW.SEAMETRICS.COM 1.800.975.8153

SeaMetrics

EX80-SERIES
Electromagnetic Flow Sensor

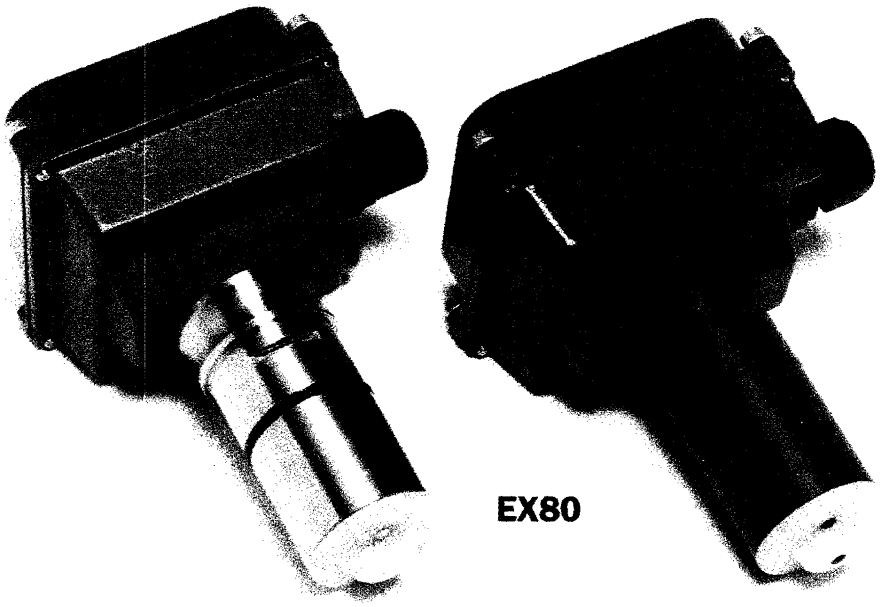
ISO 9001:2000 CERTIFIED

APPLICATIONS

- Conductive fluids
- Small pipe applications (1-10")
- Industrial processes
- Chemical metering pumps
- Fertigation

FEATURES

- No moving parts
- Economical
- Durable
- Easy to install
- Easy to maintain



EX80

GENERAL INFORMATION

EX80-Series insertion electromagnetic flowmeters are designed for use with conductive liquids in 1-10" pipe. They are highly suitable for difficult applications with changing viscosities and pulsating flows such as air-driven diaphragm pumps. With no moving parts, these meters can be used in "dirty" applications where debris would foul a mechanical meter. A choice of materials (stainless steel, brass, and PVC) allows the meter to adapt to a range of temperature, pressure, and corrosive environments.

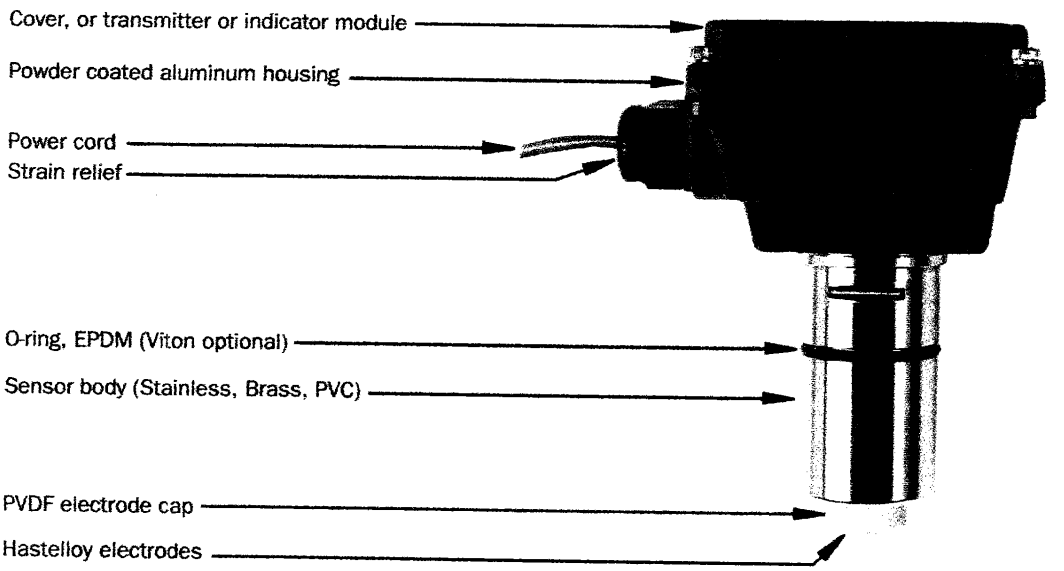
Designed for modularity and versatility, the EX80-Series has a current-sinking pulse output that can be combined with the appropriate transmitter or indicator for the application. For analog output and display of rate and total, an FT420 can be used. For analog only, the A055 can be mounted directly onto the meter. The PD10 can be used to divide the pulse for pacing chemical metering pumps. The DL75 (data logger) and FT520 (batching flow processor) are also compatible. If the EX80-Series meter is being used with a programmable controller, the output signal can be fed direct, with no other conditioning required.

The EX80-Series fixed depth insertion meters require special fittings. Factory installation in the fitting ensures correct depth placement in the pipe. The EX80-Series meter can be ordered in a full power model when a source of electricity is available, or in a low power model that can run on an external battery with solar panel.

SeaMetrics

EX80-SERIES
Electromagnetic Flow Sensor

FEATURES



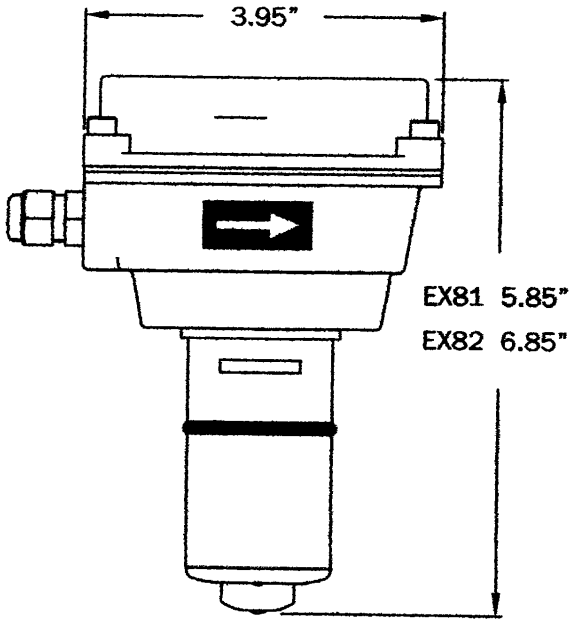
SPECIFICATIONS

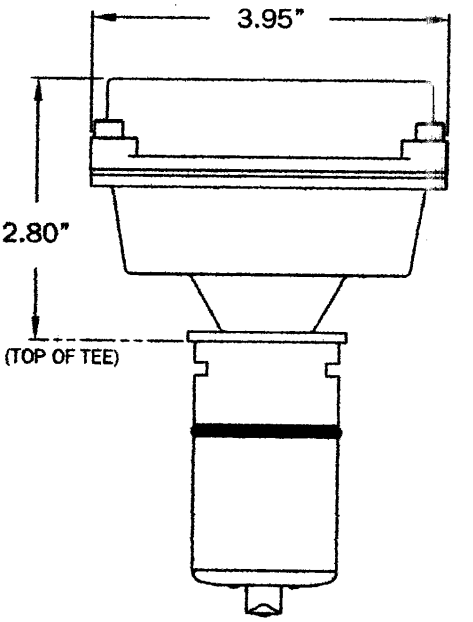
Power	**Full Power**	12 - 24 Vdc, 250 mA
	Low Power	12 - 24 Vdc, 40 mA
Flow Range		0.2 - 20 ft/sec (.06 - 6.09 m/sec)
Temperature	**Ambient Temp**	0° - 180° F (-17° - 82° C)
	Fluid Temp : Brass/SS	32° - 200° F (0° - 93° C)
	Fluid Temp: PVC	32° - 130° F (0° - 55° C) @ 0 psi
Pressure	**Brass/SS**	200 psi (13.8 bar)
	PVC	150 psi (10 bar) @ 75° F
Minimum Conductivity		20 microSiemens/cm
Materials	**Mechanical**	316 SS/Brass/PVC
	Electrodes	Hastelloy
	Housing	Cast powder-coated aluminum
	Electrode Cap	PVDF (Kynar)
	O-Ring	EPDM standard (Viton optional)
Calibration Accuracy		1% of full scale
Output		Square wave pulse, opto isolated, 550 Hz @ 20 ft/sec
Empty Pipe Detection		Software, defaults to zero flow

SeaMetrics

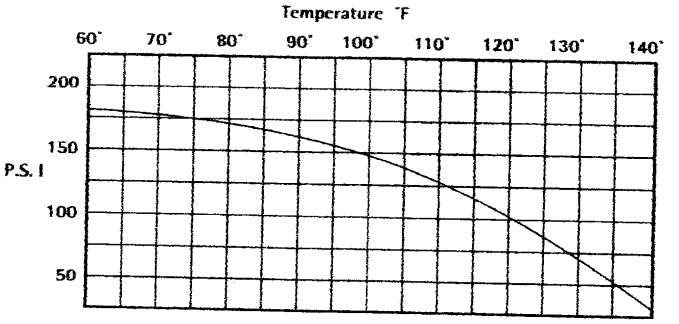
EX80-SERIES
Electromagnetic Flow Sensor

DIMENSIONS





PVC WORKING PRESSURE VS. TEMPERATURE



FLOW RANGE (in GPM)

	1"	1-1/2"	2"	3"	4"	6"	8"	10"
Min	.50	1.1	2	4.5	8	18	31	49
Max	50	110	196	440	783	1763	3133	4895

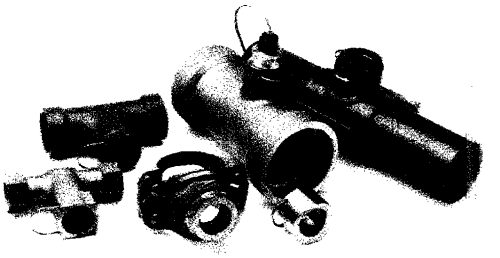
SeaMetrics

EX80-SERIES
Electromagnetic Flow Sensor

EX80-COMPATIBLE FITTINGS

	Tee	Saddle	Weld/Braze	Sweat Tee
Bronze	1-4"	3-4"	3-10"	1-4"
PVC	1-2"	3-8"	x	x
Polypro	x	3-8"	x	x
Stainless Steel	1-2"	x	3-10"	x
Carbon Steel	1-2"	x	3-10"	x
Ductile Iron	x	3-10"	x	x

Variety of Fittings



HOW TO ORDER

MODEL	MATERIAL	OPTIONS	FITTINGS
1" - 3" pipe = **EX81**	PVC = **P**	Reverse flow output = **-15**	Select from chart above (fitting type, and material)
4" - 10" pipe = **EX82**	Brass = **B**	Immersible = **-40**	
	316 Stainless = **S**	Low power = **-50**	
		Viton O-ring = **-125**	

ACCESSORIES

Rate and Total Indicator = **FT420**
Blind 4-20 mA Converter = **AO55**
Data Logger = **DL75**
Extra Cable (specify length) = **31010**
Pulse Divider = **PD10**
Power Converter, Plug-In, 115 Vac, 24 Vdc = **PC3**
Dual Power Supply, 115 Vac, 12/24 Vdc = **PC42**
Solar Panel Kit, 5 Watt = **RSP5**

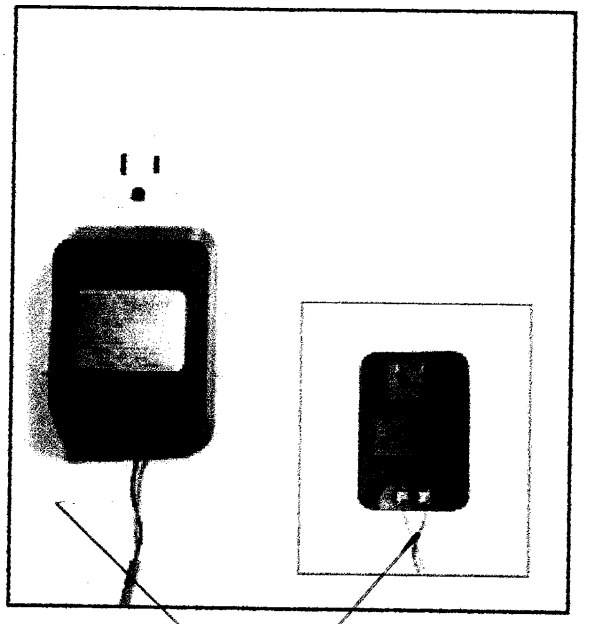
CONTACT YOUR SUPPLIER

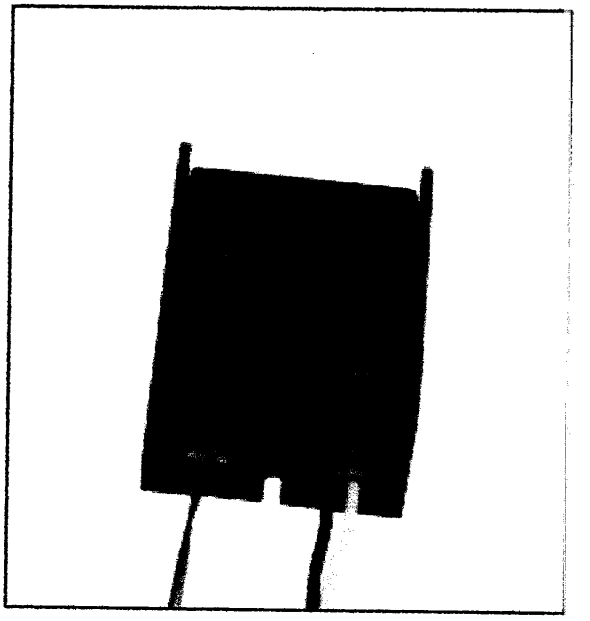
SeaMetrics Incorporated • 19026 72nd Avenue South • Kent, Washington 98032 • USA
(P) 253.872.0284 • (F) 253.872.0285 • 1.800.975.8153 • www.seametrics.com

LT-11791-E
10/11/06

SeaMetrics

PC1 and PC2 Power Supply Specifications & Instructions





PC1 Power Supply

Description

The PC1 is designed as a convenient 12VDC power supply for use with a 115 VAC outlet. Terminals allow user connection of wiring on the low-voltage side. Since this is an unregulated power supply, actual voltage may be as high as 16 VDC, depending on load.

Specifications

Input Power	115VAC/60Hz
Output Voltage/Current	11.4-12.6VDC@100mA 15.4VDC@No Load
Regulation	Unregulated
Screw Terminal Size	18 AWG
Dimensions	81 x 56 x 49mm (3.19"l x 2.20"w x 1.93"h)
Operating Temp.	0-60°C
Safety Agency Approvals	UL1310 UL tested and approved to CSA C22.2 #223

PC2 Power Supply

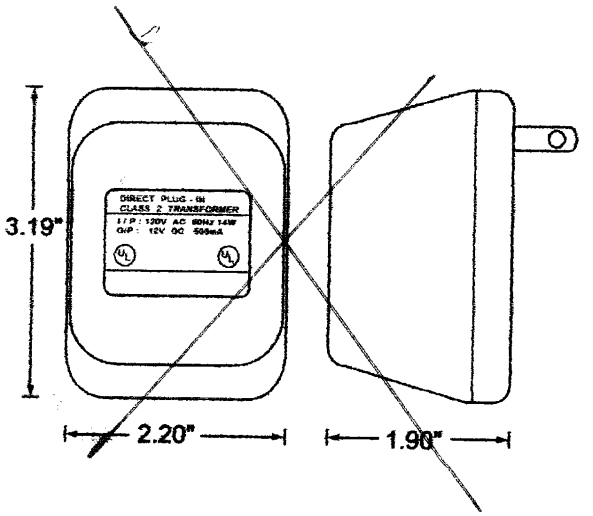
Description

The PC2 is a terminal-by-terminal supply, designed for use in the protected environment of a panel or enclosure. This compact unit is regulated at 24 VDC, and is well-suited for powering a 4-20 mA loop.

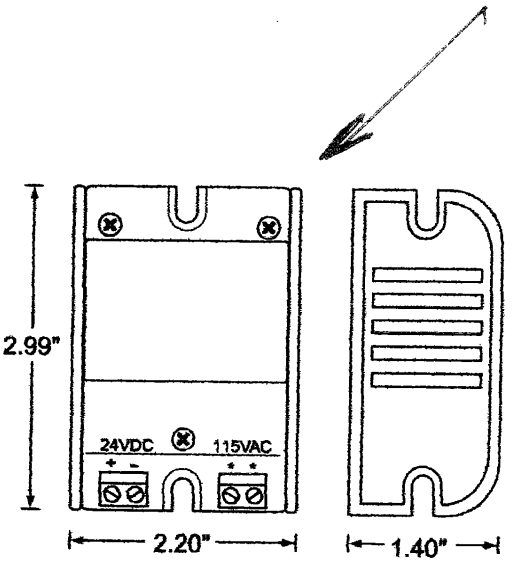
Specifications

Input Power	115VAC/60Hz (External fuse recommended)
Output Voltage/Current	24VDC +/-1.0VDC@100mA
Regulation	+/-1.0% (line and load)
Ripple and Noise	1mV RMS
Screw Terminal Size	18 AWG
Dimensions	76 x 56 x 35.5mm (2.99"l x 2.20"w x 1.40"h)
Operating Temp.	0-60°C

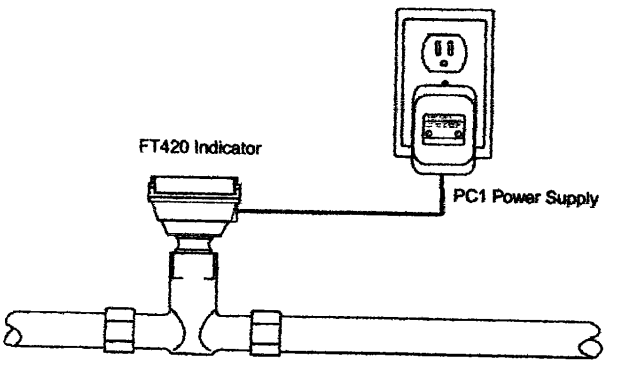
PC1 Dimensions



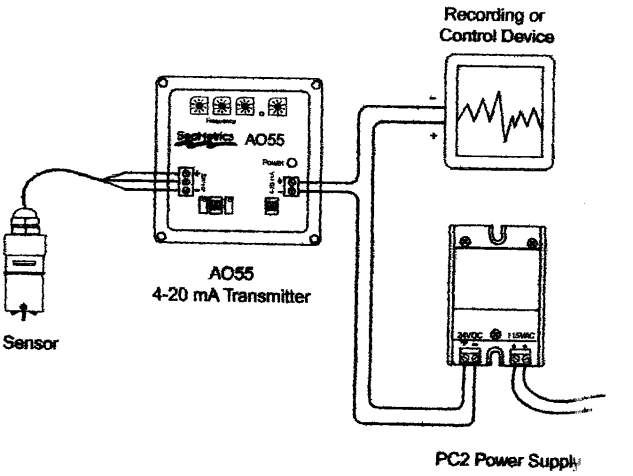
PC2 Dimensions



PC1 Application Diagram



PC2 Application Diagram



SeaMetrics

20419 80th Ave. So., Kent, WA 98032 USA
Phone: 253-872-0284 Fax: 253-872-0285
www.seametrics.com 1-800-975-8153

SeaMetrics Series 80 Flowmeter Fittings

To Order Fittings Specify Model #, Size Code and Option Code

1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"
-050	-075	-100	-150	-200	-300	-400	-600	-800

Tee Fittings for IP81 Paddlewheel Sensors: 1/2" to 4"

Size Code

Model No.	Material/Style	-050	-075	-100	-150	-200	-300	-400
MF81T-P	PVC /male stub	•	•	•	•	•	Note 1	Note 1
MF81TC-B	Bronze/female sweat (for copper tube)	•	•	•	•	•	•	•
MF81T-B	Bronze/female thread	•	•	•	•	•	•	•
MF81T-S	304SS/female thread	•	•	•	•	•		
MF81T-C	Carb-Steel/female thread	•	•	•	•	•		

Note 1: Use MF82S-P with Option -16

Tee Fittings for TX81 Turbine Sensors: 1" to 4"

Model No.	Material/Style	-100	-150	-200	-300	-400
TF81T-P	PVC /male stub	•	•	•	Note1	Note 1
TF81TC-B	Bronze/female sweat (for copper tube)		•	•	•	•
TF81T-B	Bronze/female thread		•	•	•	•
TF81T-S	304SS/female thread		•	•		
TF81T-C	Carb Steel/female thread		•	•		

Note 1: Use MF82S-P with Option -16

Option	Description
-14	All 316 SS (MF/TF81T-S only)
-17	304 SS flanges (MF/TF81T-S only)

Saddle Fittings for IP or TX 80-Series: 3" to 8"

Model No.	Material	-300	-400	-600	-800
MF82S-P	PVC (Note 2)	•	•	•	•
MF82S-F	Ductile Iron	•	•	•	•
MF82S-Y	Polypro	•	•	•	•
MF82S-B	Bronze	•	•		

Note 2: PVC saddles are supplied with Buna-N o-rings only. For chemical service the o-ring must be removed and the saddle must be glued onto the pipe with PVC cement used as directed.

Option	Description
-16	Installed on 16" long pipe stub (PVC only)

Weld/Braze Fittings for IP or TX 80-Series: 3" to 8"

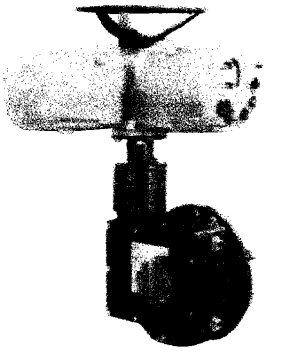
Model No.	Material	-300	-400	-600	-800
MF82W-B	Bronze	•	•	•	•
MF82W-C	Carb Steel	•	•	•	•
MF82W-S	316 SS	•	•	•	•

Actuators and Controls Overview

tyco / Flow Control

Electric Actuators

Biffi ICON2000 Multi-Turn and F01-2000 Quarter-Turn

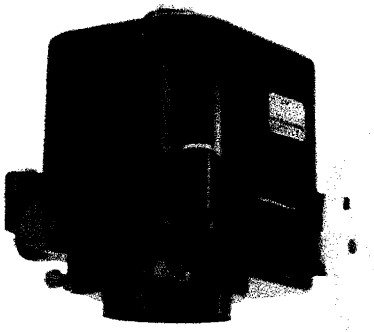


- ICON control system offers non-intrusive calibration via the local push buttons or a digital bus system without the use of a hand held device.
- Prompts the user via a local "yes/no" user-friendly display.
- Back-lit LED display for position percentages and text messages.
- Self-diagnostics via an array of sensors. Simplifies field troubleshooting.
- Standard features include timer, ESD relay, monitor relay, phase protection/correction.
- 40 digital I/O (inputs/outputs) for control, diagnostics, and status.

Output Torque: F01-2000 Quarter-Turn – 1300 to 5300 in. lb.
Multi-Turn Worm Gear Combination – Up to 830,000 in. lb.

For more information request data sheet: BIFMC-0476-US (F01)
BIFMC-0477-US (ICON2000)

Keystone Figure 777 Electric Actuator



- Permanently lubricated, completely self-locking, epicyclic gear train with minimum running gear components eliminates the need for motor brakes, declutch levers or latches to switch modes from manual to electric operation.
- Enclosures available with F.M. or C.S.A. approval.
- Thermal overload switch protects the motor.
- Automatically engageable/disengageable hand wheel permits manual operation with motor in fused condition and also allows simultaneous manual/electrical operation without adverse effect to actuator.
- Hard anodized aluminum, epoxy-coated base and cover housing provides maximum corrosion protection.
- The Model 777 is available with complete network solutions for AS-Interface, DeviceNet, Profibus, ModBus, Foundation Fieldbus, and Lonworks.

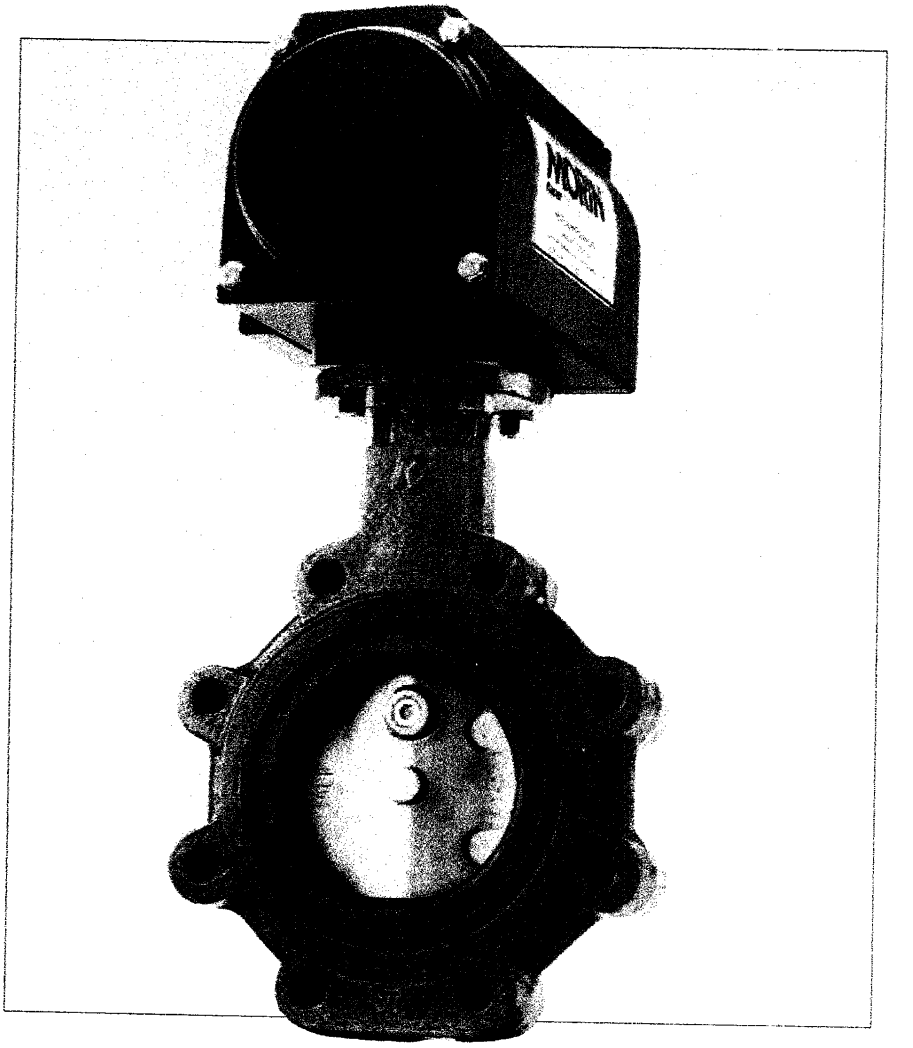
Torque Range: up to 15,100 lb. in.

Available Voltages:
120 VAC, 1 phase 60/50 hertz
~~220 VAC, 1 phase 60/50 hertz (EPI-3~~ to EPI-151)
~~208 VAC, 3 phase 60/50 hertz~~
220 VAC, 3 phase 60/50 hertz
440 VAC, 3 phase 60/50 hertz
575 VAC, 3 phase 60 hertz (EPI-6 to EPI-151)
12 VDC
24 VDC (EPI-3 to EPI-36)

For more information request data sheet KEYMC-0001-US

KEYSTONE

Resilient Seated Butterfly Valve
Sizes 2 thru 12-inch to 250 psi



Features and Benefits

- Molded-in resilient seat provides bubble-tight shutoff to 250 psi.
- Offered in two body styles: wafer and lug. The lugged body is drilled and tapped for isolation and removal of downstream piping at full rated pressure.
- Round, polished disc and hub edge provides 360 degree concentric seating, minimum flow restriction, lower torques and longer seat life.
- Upper and lower inboard bronze bearings ensure longer service life with low operating torques.
- Thru-stem design provides high strength and positive disc control with standardized end connection for operator interchangeability.
- Extended neck allows adequate clearance for flanges and insulation.
- Bi-directional, self-adjusting stem seal, located in the upper journal, is suitable for vacuum and pressure while also preventing external contamination of the stem area.
- Heavy-duty corrosion resistant top bushing, located in the upper journal, absorbs actuator side thrust.
- Cast-in top plate is an integral part of the body and is standardized to allow direct mounting of all Tyco actuators.
- Each valve is factory tested to 110 percent of specified pressure rating.

General Application

Heating, ventilation, air conditioning and general industrial services.

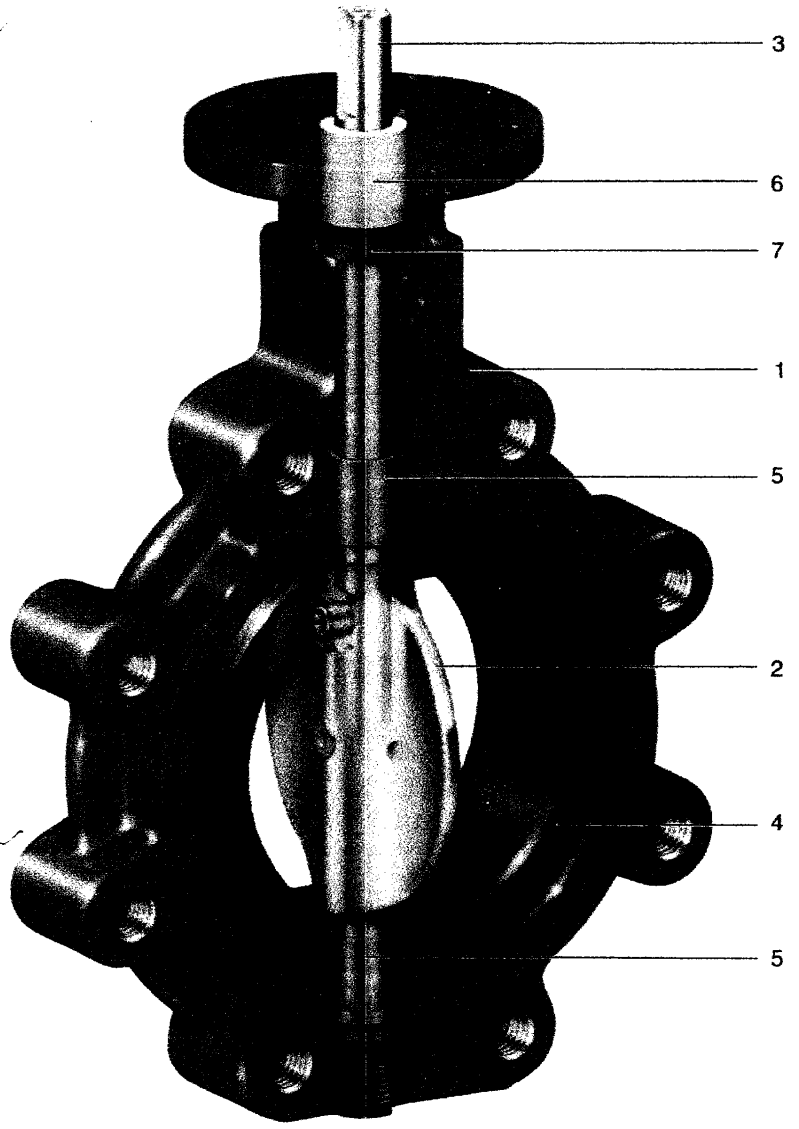
Technical Data

Size Range	:	2 thru12-inch wafer and lug style
Pressure Rating	:	250 psi bi-directional shutoff. Lugged body style is rated for 250 psi bi-directional dead-end service with downstream piping removed.

tyco / Flow Control

Total Flow Control Solutions™

Materials



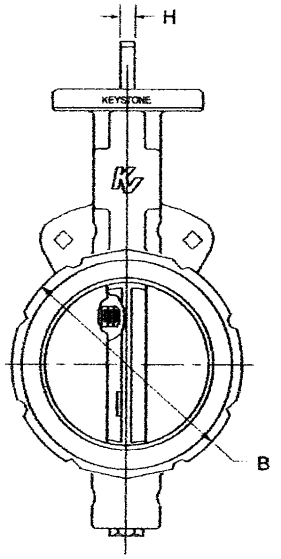
Part	Material	Material Standards
1 Body	Cast iron	ASTM-A 126 Class B
2 Disc	~~Aluminum bronze~~	~~ASTM-B 148 UNS C95200 Grade A~~
	316 SS	ASTM-A 743 CF8M
3 Stem	416 SS	ASTM-A 582 UNS S41600
4 Molded-in liner	EPDM	
	~~NBR~~	
5 Inboard bearings	Bronze	
6 Upper bushing	Polyester	
7 Upper stem seal	NBR	

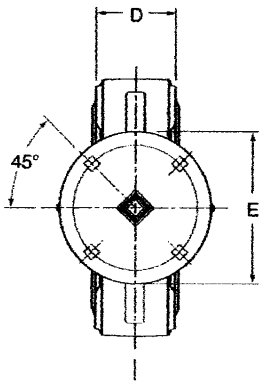
Size (in)	Size [mm]	10°	20°	30°	40°	50°	60°	70°	80°	90°
2	50	0	1.3	5	14	26	40	52	59	60
2½	65	0	1.4	6	21	44	74	107	138	150
3	80	0	1.5	8	29	67	115	175	234	262
4	100	1	15	48	107	196	318	463	589	647
5	125	3	32	99	206	362	579	832	1,045	1,141
6	150	4	47	145	295	510	810	1,160	1,450	1,580
8	200	6	84	239	450	751	1,190	1,754	2,385	2,892
10	250	9	133	360	652	1,064	1,683	2,524	3,596	4,593
12	300	12	192	509	899	1,449	2,288	3,470	5,085	6,682

C_v is the valve flow capacity expressed as the flow rate of 60°F water, in US gallons per minute, which produces a 1 psi pressure drop across the valve.

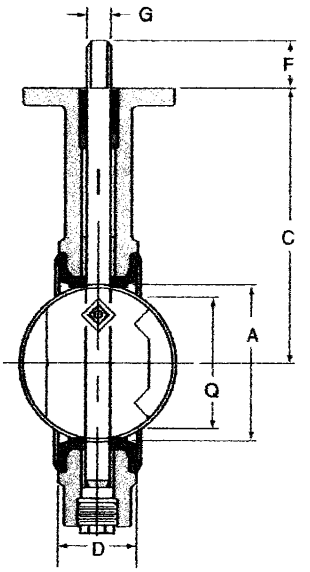
Dimensions

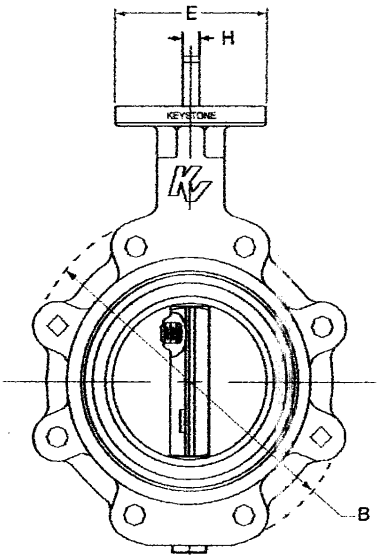
221 Wafer





222 Lug





Size	A	B	C	D	Q	E	F	G	H	Key	Top Plate Drilling Bolt Circle	No. Holes	Hole Diam.	Weight (lbs.)	Adapt. Code
2	2 1/16	4 1/8	5 5/16	1 11/16	1 3/8	4	1 1/4	9/16	3/8	N/A	3 1/4	4	7/16	7.7	BAB
2 1/2	2 9/16	4 5/8	5 15/16	1 13/16	2	4	1 1/4	9/16	3/8	N/A	3 1/4	4	7/16	8.8	BAB
3	3 1/16	5 3/16	6 5/16	1 13/16	2 5/8	4	1 1/4	9/16	3/8	N/A	3 1/4	4	7/16	10.2	BAB
4	4 1/16	6 3/8	7 1/8	2 1/16	3 11/16	4	1 1/4	5/8	7/16	N/A	3 1/4	4	7/16	16.9	BAC
5	5 1/16	7 3/8	7 11/16	2 1/4	4 3/4	4	1 1/4	3/4	1/2	N/A	3 1/4	4	7/16	19.9	BAD
6	5 13/16	8 1/2	8 5/16	2 1/4	5 9/16	4	1 1/4	3/4	1/2	N/A	3 1/4	4	7/16	25.3	BAD
8	7 13/16	10 11/16	9 1/2	2 3/8	7 3/4	6	1 1/4	7/8	5/8	N/A	5	4	9/16	40.5	CAE
10	9 13/16	13	10 7/8	2 11/16	9 3/4	6	2	1 1/8	N/A	1/4 x 1/4	5	4	9/16	61.1	CAF
12	11 13/16	14 13/16	12 1/4	3 1/8	11 3/4	6	2	1 1/8	N/A	1/4 x 1/4	5	4	9/16	82.7	CAF

Size	A	B	C	D	Q	E	F	G	H	Key	Top Plate Drilling Bolt Circle	No. Holes	Hole Diam.	Tapped Lug Data Bolt Circle	No. Holes	Tap	Weight (lbs.)	Adapt. Code
2	2 1/16	4 3/4	5 5/16	1 11/16	1 3/8	4	1 1/4	9/16	3/8	N/A	3 1/4	4	7/16	4 3/4	4	5/8-11 UNC-2B	9.0	BAB
2 1/2	2 9/16	5 1/4	5 15/16	1 13/16	2	4	1 1/4	9/16	3/8	N/A	3 1/4	4	7/16	5 1/2	4	5/8-11 UNC-2B	10.5	BAB
3	3 1/16	5 13/16	6 5/16	1 13/16	2 5/8	4	1 1/4	9/16	3/8	N/A	3 1/4	4	7/16	6	4	5/8-11 UNC-2B	11.9	BAB
4	4 1/16	7	7 1/8	2 1/16	3 11/16	4	1 1/4	5/8	7/16	N/A	3 1/4	4	7/16	7 1/2	8	5/8-11 UNC-2B	21.4	BAC
5	5 11/16	8 1/8	7 11/16	2 1/4	4 3/4	4	1 1/4	3/4	1/2	N/A	3 1/4	4	7/16	8 1/2	8	3/4-10 UNC-2B	25.7	BAD
6	5 13/16	9 1/4	8 5/16	2 1/4	5 9/16	4	1 1/4	3/4	1/2	N/A	3 1/4	4	7/16	9 1/2	8	3/4-10 UNC-2B	31.0	BAD
8	7 13/16	11 7/16	9 1/2	2 3/8	7 3/4	6	1 1/4	7/8	5/8	N/A	5	4	9/16	11 3/4	8	3/4-10 UNC-2B	48.0	CAE
10	9 13/16	13 7/8	10 7/8	2 11/16	9 3/4	6	2	1 1/8	N/A	1/4 x 1/4	5	4	9/16	14 1/4	12	7/8-9 UNC-2B	75.8	CAF
12	11 13/16	15 11/16	12 1/4	3 1/8	11 3/4	6	2	1 1/8	N/A	1/4 x 1/4	5	4	9/16	17	12	7/8-9 UNC-2B	106.5	CAF

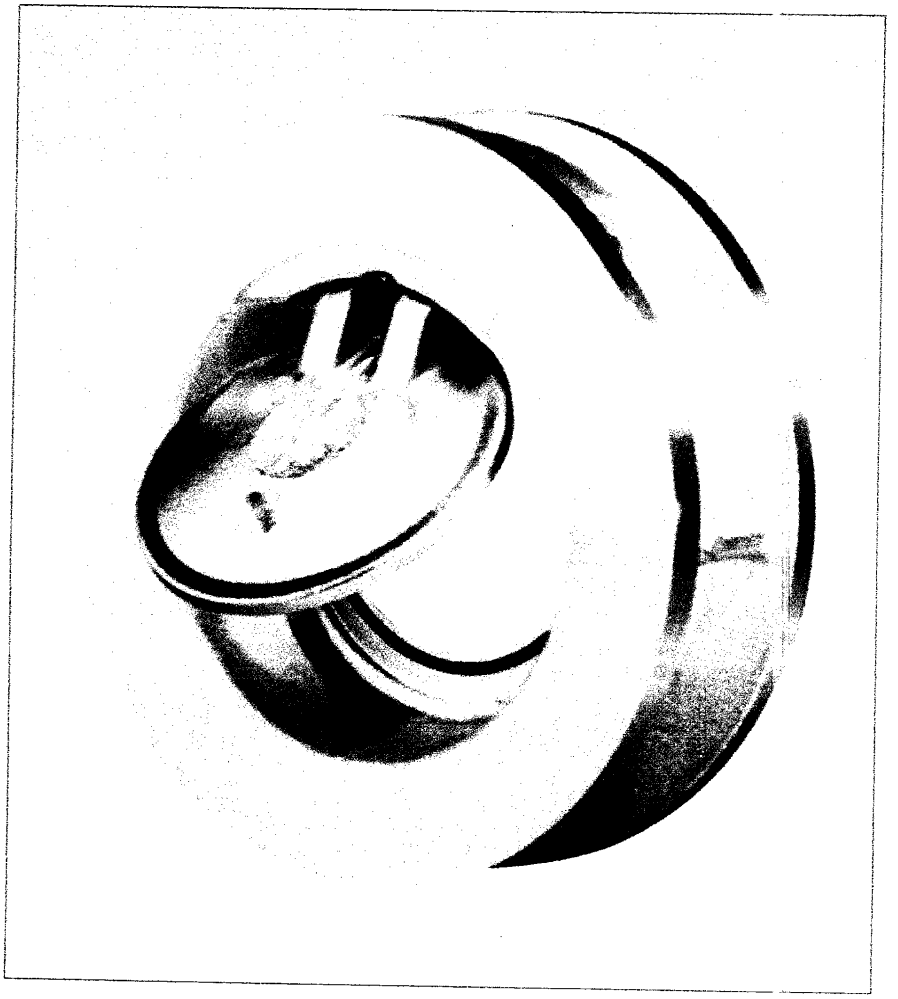
'Q' dimension is the minimum allowable pipe or flange inside diameter at the centered body face to protect the disc sealing edge against damage when opening the valve.

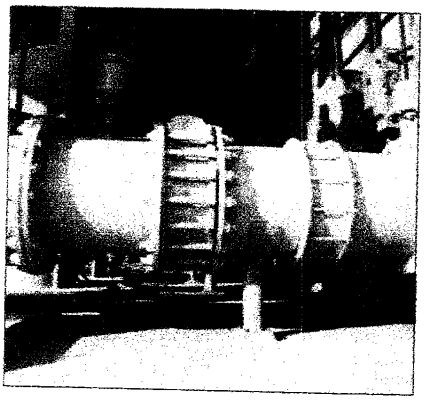
PRINCE

Prince Wafer Swing Check Valves
Sizes 2" thru 36"

Features and Benefits

- Minimizes piping support with the compact wafer style body. The Prince wafer check valves are two to three times lighter than traditional full-bodied check valves.
- To meet special applications and service conditions, Prince valves can be offered with many different options, such as: silicone-free cleaning, oxygen-cleaning, vertical service, left-hand operation, levers, weights and cushions.
- For media containing fibrous matter or caustics, Prince offers an external spring (Figure 813 and Figure 815) which eliminates the spring from the flow path. This will prohibit the possibility of fiber wrapping around the spring or chemical attack of the spring.
- Maintenance is minimal with the field replaceable O-ring seat available in all styles and sizes.





Applications

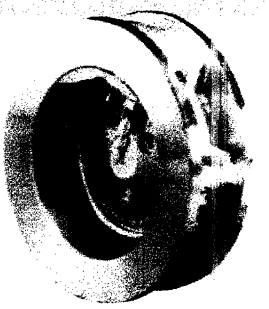
The Prince Wafer Check Valve is used to stop flow reversal in chemical refineries, ammonia compressors, waste water treatment plants, HVAC systems and most other industrial applications.

Technical Data

Size Range	: 2" thru 36"
Pressure Rating	: 150 - 740 psi
ANSI Flange Rating	: 125 - 300

tyco / Flow Control

Total Flow Control Solutions™



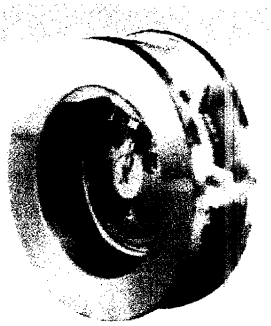
General The check valve shall be a wafer style (flangeless) swing check design utilizing a torsional spring to assist in faster closure. The valve must be capable of gravity closure should the loss of spring tension occur when system back pressure is present. Valves with discs hinged in a line crossing the valve diameter, or with center posts, are unacceptable.

Body/Seat The body shall be of the one-piece construction and shall possess a machined dovetail groove for a polymer seal. The seal shall not be vulcanized to facilitate seat retention, and shall be field replaceable. The seal shall provide positive shut-off at both low and high pressure.

Disc The valve shall utilize a one-piece disc/arm assembly. The disc shall completely cover the seal when in the closed position to provide positive seal regardless of disc orientation.

Disc/Stem Connection The stem shall possess a double "D" design that when mated to the corresponding disc/arm assembly bore provides positive connection.

The valve shall be F809 as manufactured by Tyco Valves & Controls.



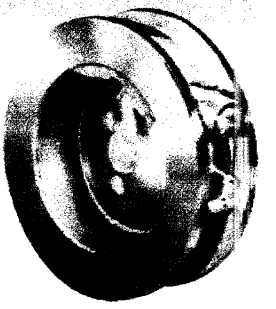
General The check valve shall be a wafer style (flangeless) swing check design utilizing a torsional spring to assist in faster closure. The valve must be capable of gravity closure should the loss of spring tension occur when system back pressure is present. Valves with discs hinged in a line crossing the valve diameter, or with center posts, are unacceptable.

Body/Seat The body shall be of one-piece construction and shall (1) possess a machined dovetail groove for elastomer and polymer seals, or (2) possess an integral metal seat machined into the body when metal-to-metal seats are required. The resilient seals shall not be vulcanized to facilitate seat retention. The resilient seals shall be field replaceable. The resilient seals shall provide positive shut-off at both low and high pressure.

Disc The valve shall utilize a one-piece disc/arm assembly. The disc shall completely cover the seal when in the closed position to provide positive seal regardless of disc orientation.

Disc/Stem Connection The stem shall possess a double "D" design that when mated to the corresponding disc/arm assembly bore provided positive connection.

The valve shall be F810 as manufactured by Tyco Valves & Controls.



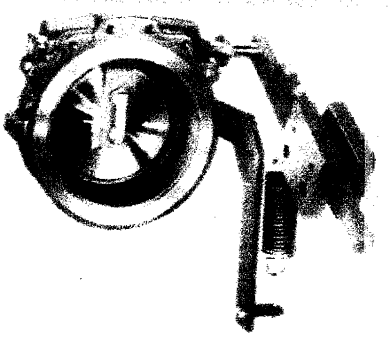
General The check valve shall be a wafer style (flangeless) swing check design utilizing a torsional spring to assist in faster closure. The valve must be capable of gravity closure should the loss of spring tension occur when system back pressure is present. Valves with discs hinged in a line crossing the valve diameter, or with center posts, are unacceptable. The valve shall have capability to add lever and/or weight for back-flush capabilities. The lever and/or weight assembly to be field installable. The external spring, lever and weight must be field adjustable.

Body/Seat The body shall be of one-piece construction and shall (1) possess a machined dovetail groove for elastomer and polymer seals, or (2) possess an integral metal seat machined into the body when metal-to-metal seats are required. The resilient seals shall not be vulcanized to facilitate seal retention. The resilient seals shall be field replaceable. The resilient seals shall provide positive shut-off at both low and high pressure.

Disc The valve shall utilize a one-piece disc/arm assembly. The disc shall completely cover the seal when in the closed position to provide positive seal regardless of disc orientation.

Bushing and Disc/Stem Connection The valve shall possess (2) stainless steel or bronze bushings to provide support and alignment to the disc/arm and stem. The stem shall possess a double "D" design that when mated to the corresponding disc/arm assembly bore provides positive connection.

The valve shall be F813 as manufactured by Tyco Valves & Controls.



General The check valve shall be a semi-lug, swing check design utilizing a tension spring to assist in faster closure. The valve must be capable of gravity closure should the loss of spring tension occur when system back pressure is present. The valve shall have the capability of adding an adjustable hydraulic cushion for those applications that require damping systems. The external spring (and the damping cushion) must be field adjustable.

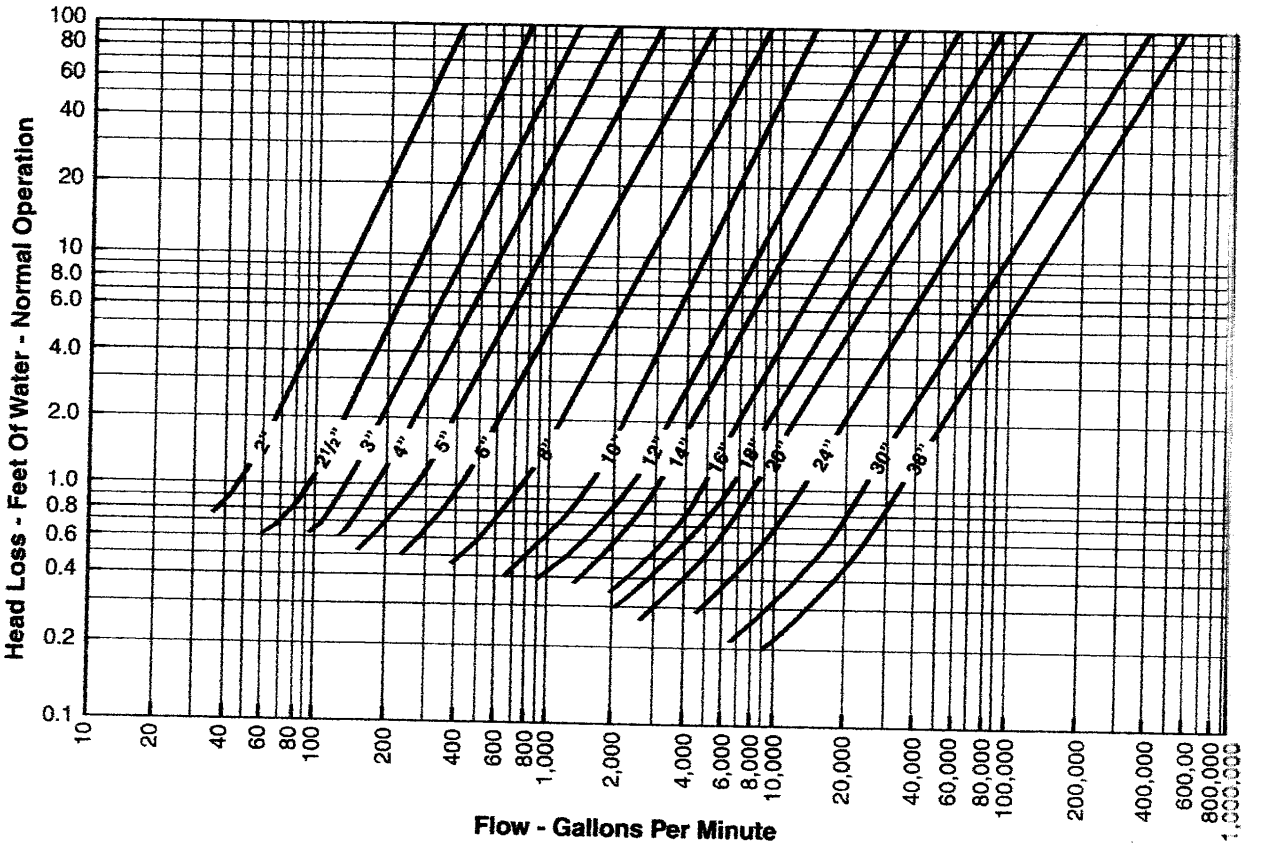
Body/Seat The body shall be of one-piece construction and shall (1) possess a machined dovetail groove for elastomer and polymer seals, or (2) possess a stainless steel or nickel aluminum bronze seat ring. The metal seat ring shall have a machined dovetail groove to mechanically retain the elastomer seal. No vulcanized bonding or chemical bonding is permitted to facilitate seat retention. The seals shall be field replaceable. The elastomer seals to provide positive shut-off at both low and high pressure.

Disc The disc shall completely cover the seat ring/seal when in the closed position to provide positive seal regardless of disc orientation.

The valve shall be F815 as manufactured by Tyco Valves & Controls.

Series	ANSI Flange Rating	Pressure Rating (psi)	Size (in.)	Body Material	Disc/Arm	Seat	Spring	Outside Hardware
Figure 809	300	740	2"-6"	Carbon Steel	316 SS	TFE Neoprene	316 SS (Std.) Inconel® 750	N/A
Figure 810	125	150	2"-12"	Cast Iron	316 SS	BUNA-N (Std.) EPDM Fluoroelastomer TFE Metal-to-metal	316 SS (Std.) 2-5 inch 17-7 PH SS (Std.) 6-12 inch Inconel® 750	N/A
	150	285	2"-12"	Carbon Steel 316 SS	316 SS	BUNA-N (Std.) EPDM Fluoroelastomer TFE Metal-to-metal	316 SS (Std.) 2-5 inch 17-7 PH SS (Std.) 6-12 inch Inconel® 750	N/A
Figure 813	125	150	2"-12"	Cast Iron	316 SS	BUNA-N (Std.) EPDM Fluoroelastomer TFE Metal-to-metal	316 SS (Std.) Inconel® 750	• 2 Pos Adjustable Spring (Std.) • Lever • Adjustable Weight
	150	285	2"-12"	Carbon Steel 316 SS	316 SS	BUNA-N (Std.) EPDM Fluoroelastomer TFE Metal-to-metal	316 SS (Std.) Inconel® 750	• 2 Pos Adjustable Spring (Std.) • Lever • Adjustable Weight
Figure 815	125	150	12"-36"	Cast Iron	316 SS	BUNA-N (Std.) EPDM Fluoroelastomer Ni-AB 316 SS	Carbon St. (Std.) 316 SS	• Adjustable Spring • Lever • Adjustable Wt. (Std.) • Hydraulic Cushion • Limit Switch
	150	230	12"-20"	Carbon Steel 316 SS	316 SS	BUNA-N (Std.) EPDM Fluoroelastomer Ni-AB 316 SS	Carbon St. (Std.) 316 SS	• Adjustable Spring • Lever • Adjustable Wt. (Std.) • Hydraulic Cushion • Limit Switch
	150	150	24"-36"	Carbon Steel 316 SS	316 SS	BUNA-N (Std.) EPDM Fluoroelastomer Ni-AB	Carbon St. (Std.) 316 SS	• Adjustable Spring • Lever • Adjustable Wt. (Std.) • Hydraulic Cushion • Limit Switch

1. Left hand versions available on all external spring models for horizontal service.
2. Not for use in pulsating or reciprocating services.



1. Curves are for water at 60°F.
2. Feet of water x 0.4335 = psi
3. Use curves for estimating purposes only. Performance is based upon ideal inlet and outlet conditions with no springs or weights.

All valves equal approximately 0.5 psi without lever/weight or cushion. For valves with lever/weight or cushion, contact factory.

Pressure Drop psi	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"
0.1	85	235	275	360	525	855	1,555	2,875	4,710	5,200	8,565	11,700	16,000	30,600	47,750	77,100
0.2	120	330	390	510	745	1,210	2,200	4,050	6,650	7,350	12,110	16,500	22,550	43,500	67,500	109,000

Size	2"	2½"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"
C_v	70	190	225	295	430	700	1,270	2,350	3,850	4,250	7,000	9,550	13,000	25,000	39,000	63,000

$$\text{Pressure Drop} = \text{S.G.} \left(\frac{Q_L}{C_V} \right)^2$$

Where:

Q_L = Flow in gallons per minute
S.G. = Specific Gravity of Liquid
C_V = Valve flow coefficient from table

Note: 30 fps is the nominal maximum allowable velocity for liquids.

$$\text{Pressure Drop} = \frac{Q_g^2 \, GT}{512 \, P_1 \, C_v^2}$$

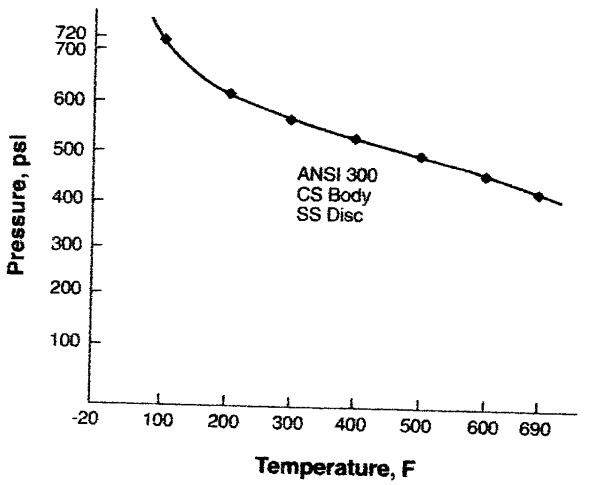
Where:

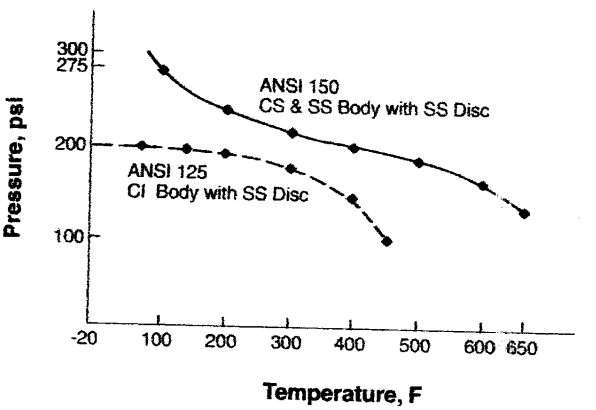
Q_g = Flow in standard cubic feet per minute
P_1 = Upstream pressure absolute (psi + 14.7)
G = Specific Gravity of Gas
T = Temperature (Rankin) (°F + 460°)
C_v = Valve flow coefficient from table

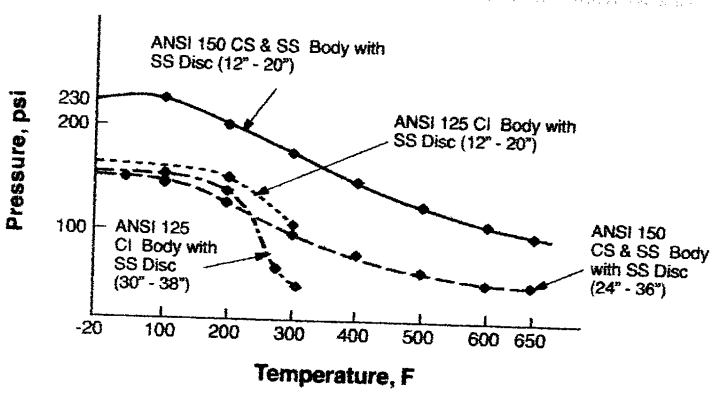
Note: 120 fps is the nominal maximum velocity for gases.

Where valve construction consists of more than one material, the effective service range of the valve is the same as that of the most restrictive material in the valve.

Size – Temperature – Pressure Ratings

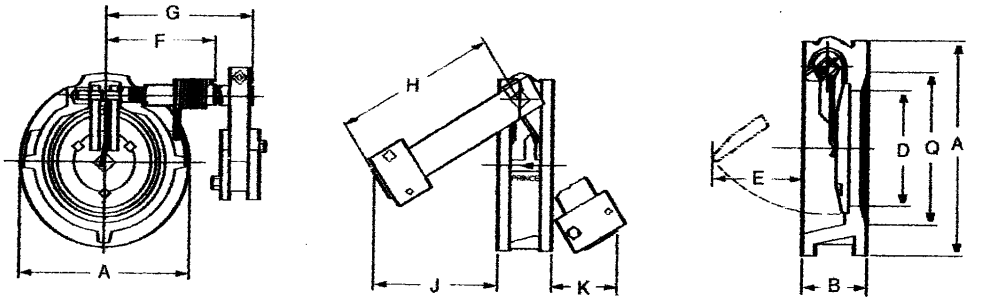






NBR	0 – 212°F
EPDM	-40 – 250°F
FKM	-40 – 400°F
TFE	-40 – 300°F
Metal	Refer to Temperature/Pressure Rating Charts

Figure 813 (with Optional Lever and Weight) Sizes 2" thru 12"

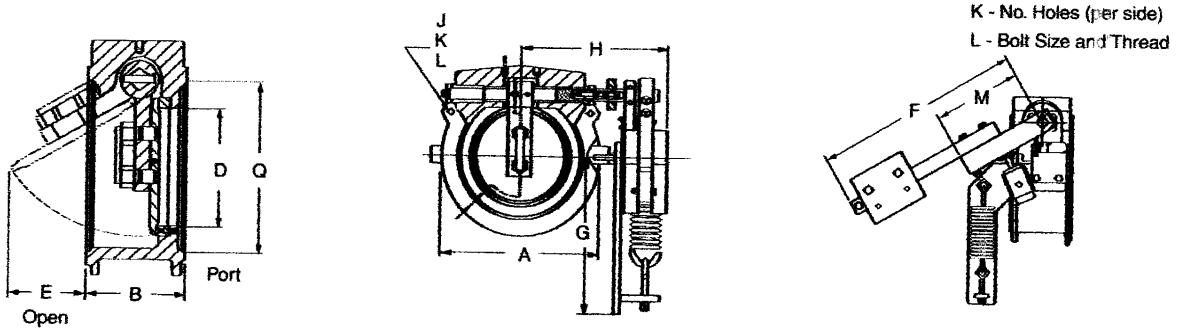


Size	A	B	Q[1]	D	E	F	G	H	J	K	Wt. (lbs.)
2	4 1/8	1 3/4	2 1/16	1 17/32	13/16	3 1/16	4 23/32	6 1/2	5 5/32	2 21/32	5
2 1/2	4 7/8	1 7/8	2 15/32	1 17/32	1 1/16	3 5/16	5 7/32	7 1/2	5 7/8	3 3/32	6
3	5 3/8	2	3 1/16	2 1/16	1 5/8	3 1/2	5 11/16	8 1/2	6 13/16	3 5/8	9
4	6 7/8	2 1/4	4 1/32	3 1/32	2 1/4	3 1/4	6 13/32	8 1/2	6 3/4	3 13/32	13
5	7 3/4	2 1/2	5 1/32	3 7/8	3	5 15/32	7 7/32	8 3/8	6 19/32	3 1/2	19
6	8 3/4	2 3/4	6 1/16	4 3/4	3 25/32	5 29/32	7 3/4	8 3/8	6 21/32	3 1/4	24
8	11	2 15/16	7 31/32	6 7/16	4 5/8	6 31/32	9 5/32	9 3/8	7 7/16	3 5/8	32
10	13 3/8	3 1/8	10	7 5/8	6 7/16	5 5/16	10 13/32	13 3/8	8 1/16	4 3/16	60
12	16 1/8	3 1/2	12	9 1/2	8 1/8	6 1/4	12 7/32	12	9 3/8	4 11/16	87

1. The Q dimension is the minimum pipe or companion flange inside diameter for proper valve operation.

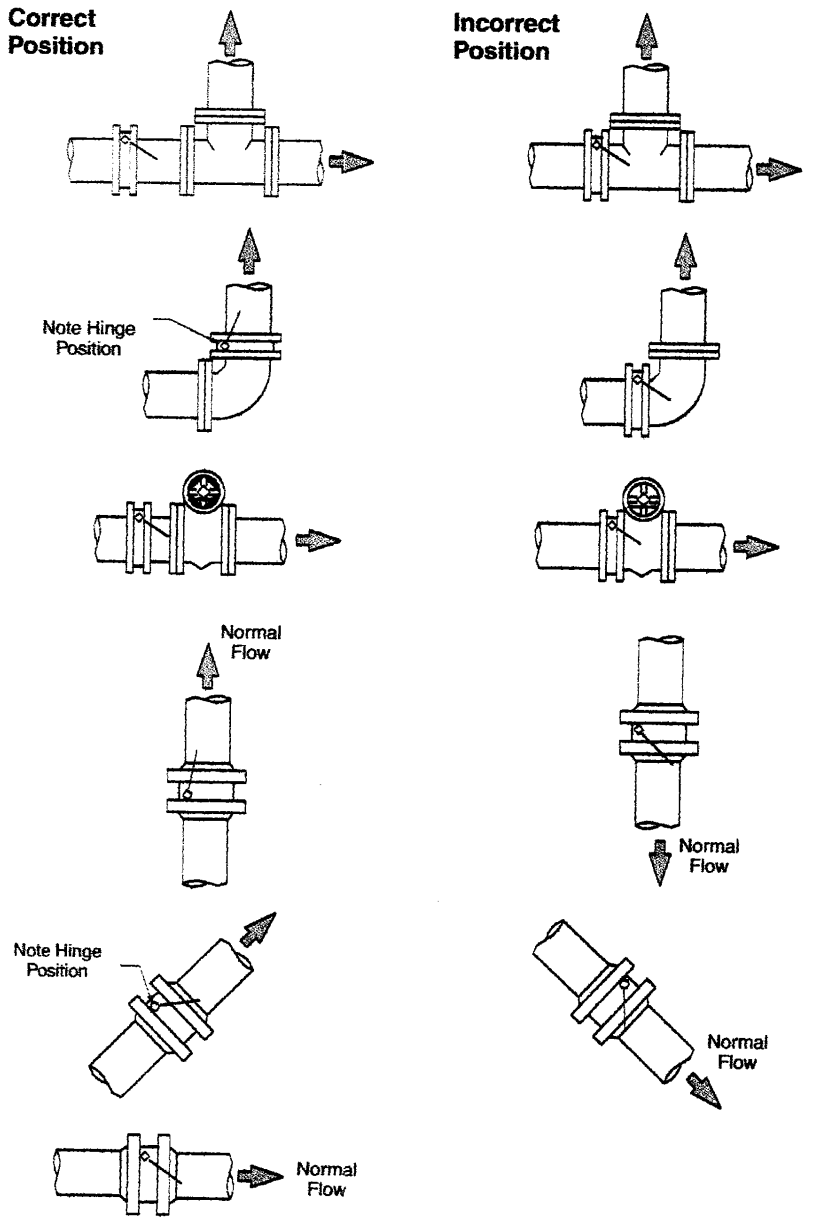
Figure 815 (with Optional Cushion) Sizes 12" thru 36"

J - B. C. Diameter
K - No. Holes (per side)
L - Bolt Size and Thread



Size	A	B	Q[1]	D	E	F	G	H	J	K	L	M	Wt. (lbs.)
12	16	4 3/4	12	9 1/2	7 7/32	18	7 1/2	15 3/4	17	4	7/8 - 9	4 5/8	212
14	17 5/8	7 3/4	13 1/4	10 3/16	6 3/4	30	20 7/32	17 1/4	18 3/4	4	1 - 8	12 3/4	350
16	20 1/8	8 3/4	15 1/4	11 3/16	7 31/32	30	19 5/32	18 5/8	21 1/4	6	1 - 8	12 3/4	410
18	21 1/2	8 3/4	17 1/4	12 11/16	9 3/8	30	18 3/16	19 3/8	22 3/4	4	1 1/8 - 7	12 3/4	450
20	23 5/8	9 3/4	19 1/4	15	11 7/16	30	17 1/4	20 1/2	25	6	1 1/8 - 7	14	775
24	28	9 3/4	23 1/4	18 1/2	15	30	16	22 3/4	29 1/2	6	1 1/4 - 7	14	925
30	34 1/2	9 3/4	30	23 1/2	19 7/32	30	26	26 3/4	36	8	1 1/4 - 7	14	1225
36	41 1/8	14 1/2	35	28	19 7/16	40	23 7/16	38 15/16	42 3/4	8	1 1/2 - 6	20 1/8	2100

1. The Q dimension is the minimum pipe or companion flange inside diameter for proper valve operation.



ANSI CLASS 300

Size (in.)	Diameter of Bolt Circle	No. of Bolts	Bolt Thread
2	5	8	5/8 - 11
3	6 5/8	8	3/4 - 10
4	7 7/8	8	3/4 - 10
5	9 1/4	8	3/4 - 10
6	10 5/8	12	3/4 - 10
8	13	12	7/8 - 9
10	15	16	1 - 8
12	18	16	1 1/8 - 7

ANSI CLASS 125/150

Size (in.)	Diameter of Bolt Circle	No. of Bolts	Bolt Thread
2	4 3/4	4	5/8 - 11
2 1/2	5 1/2	4	5/8 - 11
3	6	4	5/8 - 11
4	7 1/2	8	5/8 - 11
5	8 1/2	8	3/4 - 10
6	9 1/2	8	3/4 - 10
8	11 3/4	8	3/4 - 10
10	14 1/4	12	7/8 - 9
12	17	12	7/8 - 9
14	18 3/4	12	1 - 8
16	21 1/4	16	1 - 8
18	22 3/4	16	1 3/4 - 7
20	25	20	1 3/4 - 7
24	29 1/2	20	1 1/4 - 7
30[1]	36	28	1 1/4 - 7
36[1]	42 3/4	32	1 1/2 - 6

1. ANSI Class 125 Only

1. Position the check valve to promote smooth flow.
2. Allow clearance for disc movement.
3. Install the valve in horizontal or upward flow for proper valve closure.

Caution: Do not use with reciprocating compressors, or in other pulsating services.

V-SERIES

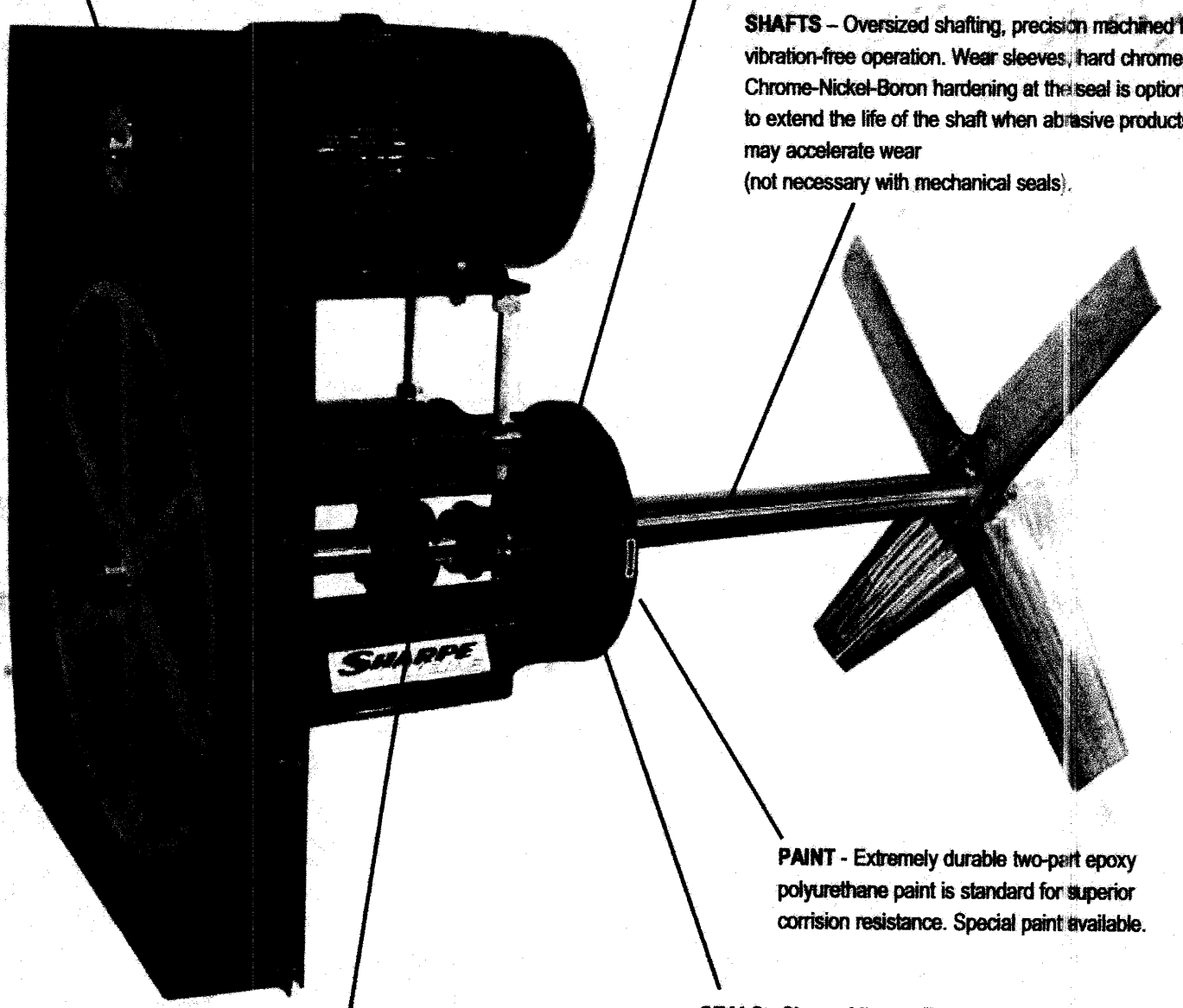
Side Entry Mixers

MIXERS

BELT DRIVES – The Sharpe V-Belt drive is designed for easy maintenance and long life, with a minimum 1.5 service factor on all models. Standard 3V, 5V or 8V sheaves are used, complete with premium "QD" style bushings for a more dependable drive that is easier to maintain.

HOUSINGS – The Sharpe V-SERIES housings are designed to be the strongest available, fabricated from steel and oversize for easy maintenance and durability (Look at the competition, and you will find brittle castings and limited space for maintenance). The housing is precision line bored for perfect alignment and quality. We learned from experience that hinged motor mounts tend to work loose and rattle over time, so Sharpe's motor mount is designed for simple adjustment using four oversize studs to tighten the belts.

SHAFTS – Oversized shafting, precision machined for vibration-free operation. Wear sleeves, hard chrome, or Chrome-Nickel-Boron hardening at the seal is optional to extend the life of the shaft when abrasive products may accelerate wear
(not necessary with mechanical seals).



PAINT - Extremely durable two-part epoxy polyurethane paint is standard for superior corrision resistance. Special paint available.

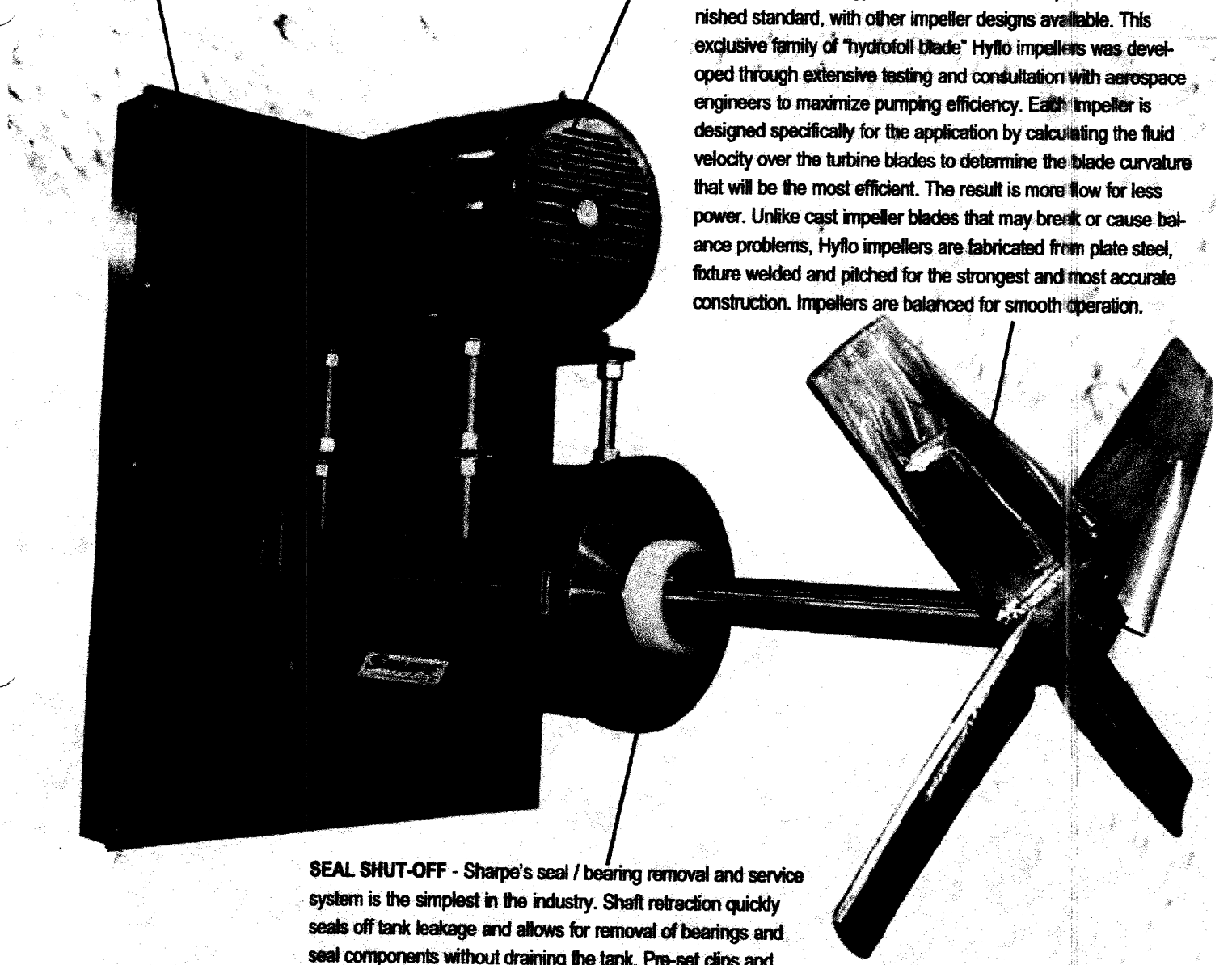
SEALS - Sharpe Mixers offers seals to meet every requirement. The traditional packed gland is available in many configurations and can be supplied with flushing fittings or force-fed lubricators. Mechanical seals in single, double and split designs are also available for positive leak-free operation, including the seal preferred at your plant.

BEARINGS – Heavy-Duty piloted dual tapered-roller bearings provide higher radial and thrust carrying capacities for longer trouble-free life. These quality bearings are stocked worldwide and come complete with their own piloted housings and integral oil seals. The bearings simply bolt in place on the mixer (unlike many competitors' designs that require specially trained personnel to adjust the preload on the bearings' taper-lock bushings). The same size bearing is used front and rear to reduce spare parts requirements.

GUARDS – The Sharpe V-Belt guards are built with ample clearance and ventilation for belt cooling, and to allow changes in ratio if required. All Sharpe guards are fabricated from steel for durability.

MOTORS- From 1.5 to 300 horsepower motors are available in NEMA and metric frames. TEFC furnished standard; Chem-Duty Explosion-Proof and other enclosures optional.

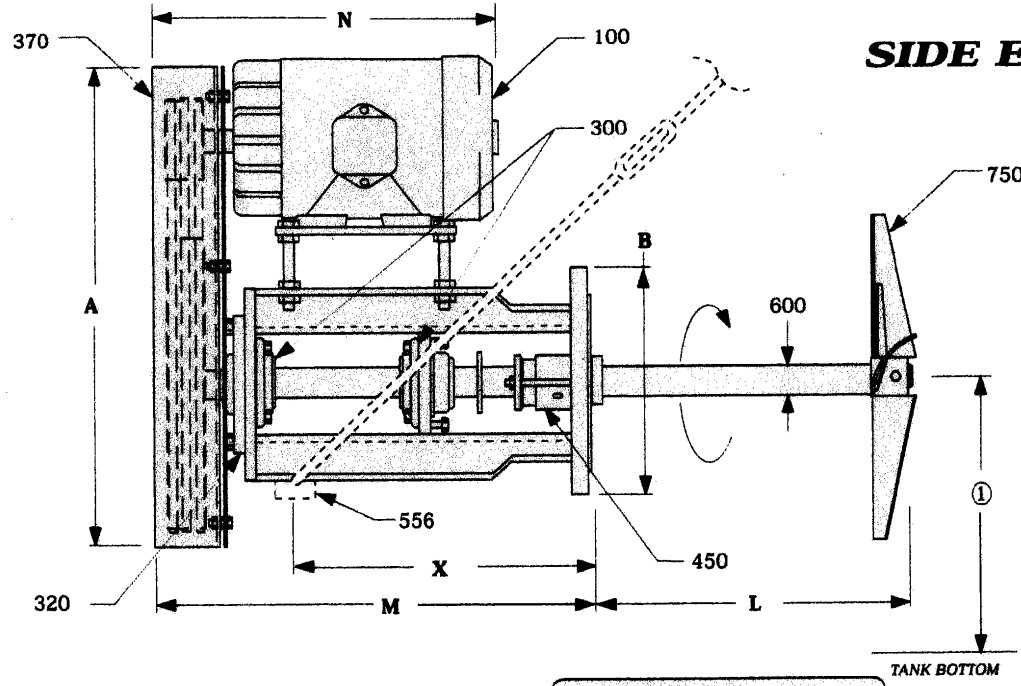
IMPELLERS – Energy efficient HYFLO 218 impellers are furnished standard, with other impeller designs available. This exclusive family of "hydrofoil blade" Hyflo impellers was developed through extensive testing and consultation with aerospace engineers to maximize pumping efficiency. Each impeller is designed specifically for the application by calculating the fluid velocity over the turbine blades to determine the blade curvature that will be the most efficient. The result is more flow for less power. Unlike cast impeller blades that may break or cause balance problems, Hyflo impellers are fabricated from plate steel, fixture welded and pitched for the strongest and most accurate construction. Impellers are balanced for smooth operation.



SEAL SHUT-OFF - Sharpe's seal / bearing removal and service system is the simplest in the industry. Shaft retraction quickly seals off tank leakage and allows for removal of bearings and seal components without draining the tank. Pre-set clips and registered collars properly set the position of bearings and seals without special adjustment.

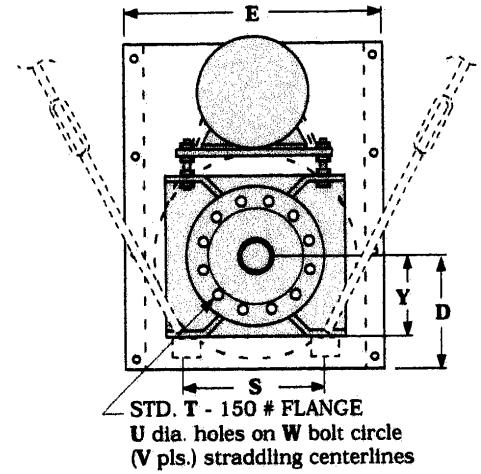
MAINTENANCE – The primary goal when developing the Sharpe V-SERIES mixer line was to make the mixers simple and easy to maintain. All access areas are large and open for servicing. The grease fittings for the bearings and lube ports for the seals are reached from one obvious location. All seal parts, shaft bearings and belt drive components on the mixer are replaceable without removing the mixer or draining the tank. Shaft retraction (to shut off tank leakage during seal or bearing removal) is the simplest in the industry, by loosening one bearing and tightening two jacking screws, all located in plain sight and easily accessible. Tank shut-off for repacking the stuffing gland can be done without disturbing the belt drive. To service mixer bearings, a collar is supplied to hold the shaft in position during bearing removal. Assembly points include jacking screws to make disassembly an easy task even after years of demanding service.

Dimensions are for reference. Use certified prints for construction. Drawing not to scale. Dimensions in inch



SIDE ENTRY

MOUNTING DETAIL



100 - MOTOR
300 - SHAFT BEARINGS: PILOTED FLANGE
TYPE: DODGE TYPE 'E'
320 - REMOVABLE BEARING PLATE
370 - BELT DRIVE①
371 - BELTS①
372 - MOTOR SHEAVE ①
373 - DRIVEN SHEAVE ①
450 - HIGH PRESSURE SEAL①
556 - OUTBOARD SUPPORT ②
600 - SHAFT①
750 - HYFLO II IMPELLER①

①Impeller(s), shaft and other details are dependent on specific application and will be described in the Quotation/Data Sheet.

② Items are optional and will be described in the Quotation/Data Sheet if provided.

③Basic weight shown in lbs.

MOTOR DIM'S

HP *	NEMA FRAME	'N'	WT*
1.5-2	145T	15.8	50
5	184T	17.6	87
7.5	213T	21.3	190
10	215T	21.3	195
15	254T	24.9	280
20	256T	24.9	345
30	286T	28.3	455
40	324T	32.2	580
50	326T	32.2	634
75	365T	34.6	850
100	405T	38.3	1160
125	444T	44.2	1430
150	445T	44.2	1750

FLANGE DIMENSIONS

T	6	8	10	12	14	16
B	11	13.5	16	19	21	23.5
U	.88	.88	1	1	1.13	1.13
V	8	8	12	12	12	16
W	9.5	11.75	14.25	17	18.75	21.25

OVERALL DIMENSIONS

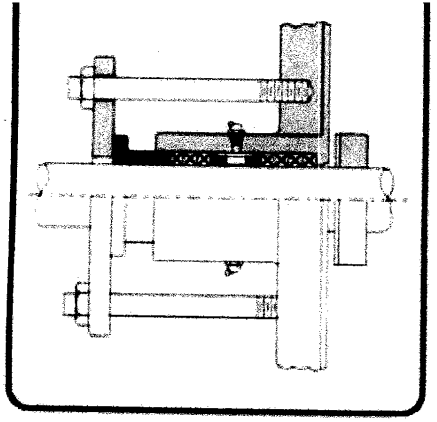
	V15	V20	V25	V30	V35	V40	V50	V60
A	29	35	39	55	55	73	73	
D	11.0	14	14	20.3	21	27	28	
E	25	30.5	31	43.5	43	56	56	
L	20	22	24	27	32	38	42	
M	26.8	30	32	37	43	45	58	
Q	2	2	2	2	2	3	3	
S	9.5	10	12	13.8	16	16	21.5	
T	6	8	10	12	12	12	16	
X	18.5	21.9	22.5	25.8	31	31	39	
Y	6.25	5.88	7.75	9.0	10	10	11	
③ WT	385	593	1391	2137	2925	3536	4495	

V - SERIES *BELT DRIVE* HIGH PRESSURE SEAL FOOT MOTOR

DWG NO.: S4404

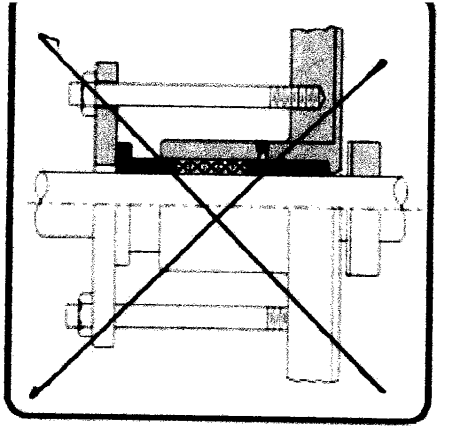
CAD# SVS/mod/sleg/remo-S REV.10 - 5/03 MSM

SHARPE MIXERS P.O. BOX 3906 SEATTLE, WA 98124 FAX (206) 767-9170 (206) 767-5660

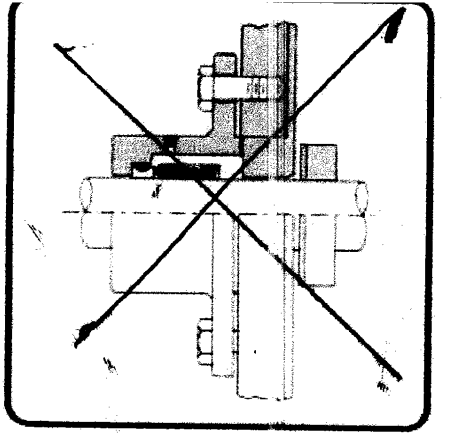


STANDARD 7- RING HIGH-PRESSURE STUFFING GLAND

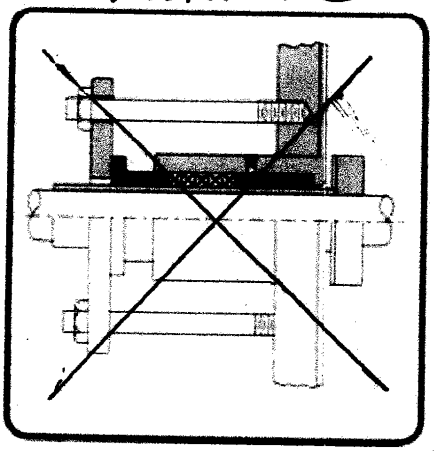
GRAPHITE



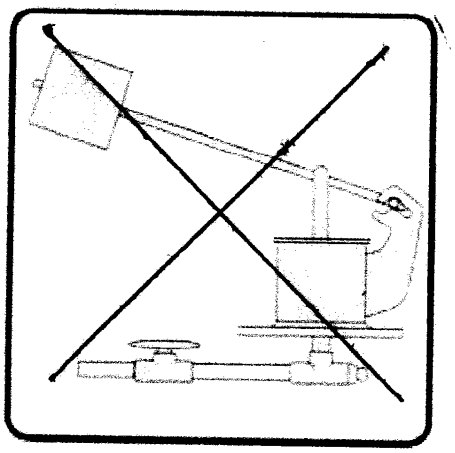
PAPER STOCK 5-RING STUFFING GLAND WITH THROTTLE BUSHING



ALL STYLES AND TYPES OF MECHANICAL SEALS ARE AVAILABLE



CHROME, FLAMESPRAYED OR SLEEVED SHAFT HARDENING AVAILABLE



SPRING AND WEIGHT-LOADED LUBRICATORS AND ROTOMETERS

The unique modular construction and many options available mean that a Sharpe V-Series mixer can be built to meet your exact requirements. A wide range of shaft sizes, speeds, seal designs, impeller styles and mounting arrangements are available, as well as alloy construction from SS316 to Titanium and Hastelloy. Unique designs have been developed for specific applications such as asphalt storage, high-density paper stock and flue gas desulfurization.

MADE IN USA

Applications

- FOOD AND BEVERAGE
- ASPHALT & PETROLEUM
- PULP AND PAPER
- PETROLEUM
- FLUE GAS DESULFURIZATION
- CHEMICAL
- MUNICIPAL
- WASTE TREATMENT
- MINING

Sharpe Mixers' strength originates from the teamwork and energy of our people - experienced and innovative employees dedicated to providing exactly what our customers demand: superior equipment, excellent service and timely delivery at a competitive price.

SHARPE

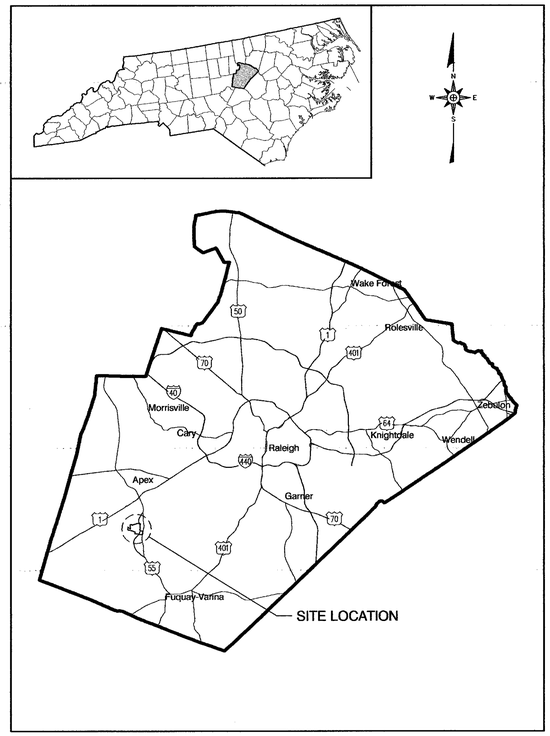
P.O. Box 3986 Seattle, WA 98124
Tel: 800-237-6015 • Fax: 800-467-2670
Internet: http://www.sharpemixers.com

WAKE COUNTY DISPOSAL, LLC
WAKE COUNTY, NORTH CAROLINA

SOUTH WAKE MSW LANDFILL
PHASE 1A
CONSTRUCTION DRAWINGS

MARCH 2007
REVISED: JANUARY 2008

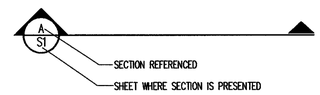
NO.	DATE	REVISION
8	1/10/08	RECORD ISSUE
7	10/4/07	REVISIONS PER DESIGN MODIFICATION NO. 5
6	8/17/07	REVISIONS PER DESIGN MODIFICATION NO. 3
5	6/15/07	REFER TO REVISED DRAWINGS
4	5/21/07	REVISIONS PER DESIGN MODIFICATION NO. 2; UPDATED TOPOGRAPHY
3	5/7/07	REVISIONS PER DESIGN MODIFICATION NO. 1
2	3/07	ISSUED FOR CONSTRUCTION
1	2/12/07	REFER TO REVISED DRAWINGS



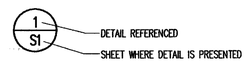
SITE LOCATION MAP
NOT TO SCALE

SHEET NO.	DRAWING NO.	DRAWING TITLE	REVISION NO.
1		TITLE – COVER SHEET	1 2 3 4 5 6 7 8
2	S1	EXISTING SITE CONDITIONS	2 4 8
3	S2	SITE DEVELOPMENT PLAN	2 3 4 5 8
4	S3	SUBGRADE GRADING AND DRAINAGE PLAN	1 2 3 4 6 8
5	S4	COMPOSITE LINER GRADING PLAN	1 2 3 4 8
6	S5	PROTECTIVE COVER GRADING PLAN	1 2 3 4 8
7	S6	LEACHATE FORCE MAIN PLAN AND PROFILE	1 2 4 6 8
8	S7	LEACHATE STORAGE TANK LAYOUT	1 2 4 8
9	X1	ENGINEERING CROSS SECTIONS (SHEET 1 OF 2)	2 4 8
10	X2	ENGINEERING CROSS SECTIONS (SHEET 2 OF 2)	2 4 8
11	L1	LINER AND BERM DETAILS (SHEET 1 OF 3)	2 8
12	L2	LINER AND BERM DETAILS (SHEET 2 OF 3)	2 8
13	L3	LINER AND BERM DETAILS (SHEET 3 OF 3)	2 8
14	LM1	LEACHATE MANAGEMENT SYSTEM DETAILS (SHEET 1 OF 4)	2 8
15	LM2	LEACHATE MANAGEMENT SYSTEM DETAILS (SHEET 2 OF 4)	2 8
16	LM3	LEACHATE MANAGEMENT SYSTEM DETAILS (SHEET 3 OF 4)	2 8
17	LM4	LEACHATE MANAGEMENT SYSTEM DETAILS (SHEET 4 OF 4)	2 8
18	R1	ACCESS ROAD PLAN AND PROFILE (SHEET 1 OF 2)	1 2 3 4 8
19	R2	ACCESS ROAD PLAN AND PROFILE (SHEET 2 OF 2)	2 4 8
20	R3	PERIMETER BERM ACCESS ROAD PLAN AND PROFILE	1 2 4 8
21	R4	ROADWAY AND MISCELLANEOUS DETAILS	2 8
22	EC1	EROSION AND SEDIMENTATION CONTROL DETAILS (SHEET 1 OF 3)	1 2 3 8
23	EC2	EROSION AND SEDIMENTATION CONTROL DETAILS (SHEET 2 OF 3)	1 2 3 4 6 8
24	EC3	EROSION AND SEDIMENTATION CONTROL DETAILS (SHEET 3 OF 3)	2 8

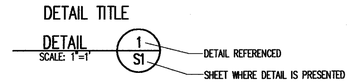
STANDARD SECTION LOCATION (SHEET AND DETAIL)



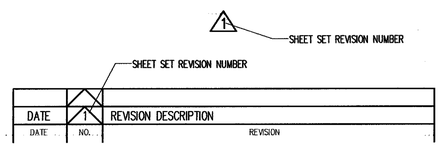
STANDARD DETAIL CALLOUT



STANDARD DETAIL TITLE AND CALLOUT



STANDARD REVISION CALLOUT (SHEET AND DETAIL)



RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave.
Raleigh, N.C. 27603
www.rsgengineers.com
ph: 919-828-0577
fax: 919-828-3899

NORTH CAROLINA PROFESSIONAL SEAL 023002 ENGINEER STACEY A. SMITH

RECORD ISSUE
NOT FOR CONSTRUCTION

FILE NAME
WAKE-D0108

G:\CAD\Wake County\South Wake Landfill\Southwake 05-1\record issue\sheets\WAKE-D0108.dwg - 1/10/2008 3:35 PM

EXISTING SCALE HOUSE
EXISTING TRANSFER STATION
SITE ENTRANCE
OLD SMITHFIELD ROAD
CLOSED FELTONSVILLE LANDFILL
EXISTING MULTI-MATERIAL FACILITY
EXISTING SOIL STOCKPILE
EXISTING OUTFALL
EXISTING SEDIMENT POND NO. 2
EXISTING DROP INLET/CULVERT (TYP.)
ACCESS GATE
OLD HOLLY SPRINGS APEX ROAD
EXISTING OUTFALL
EXISTING SEDIMENT POND NO. 1
EXISTING TOWN OF HOLLY SPRINGS (OAK HALL) PUMPING STATION
EXISTING SEWER LINE
EXISTING OVERHEAD POWERLINES
ACCESS GATE
EASTON STREET
HWY 55 BYPASS
WELL CLUSTER
WELL CLUSTER B
WELL CLUSTER C
B-1 (1993)
B-2 (1993)
B-3 (1993)
B-4 (1993)
B-5 (1993)

E 2041000 E 2042000 E 2043000 E 2044000 E 2045000 E 2046000 E 2047000 E 2048000
N 704000 N 703000 N 702000 N 701000 N 700000 N 699000 N 698000

N W E S

0 300' 600' 900'

LEGEND

- 150 — EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- CONSTRUCTION LIMITS
- EXISTING BORROW AREAS
- OHE — OVERHEAD POWERLINE (SEE REFERENCE 4)
- S — EXISTING SEWER LINE (SEE REFERENCE 4)
- ABANDONED MONITORING WELL/PIEZOMETER
- EXISTING MONITORING WELL/PIEZOMETER
- EXISTING SOIL BORING (EMA / WESTINGHOUSE)
- TEST PIT LOCATION
- WETLANDS AND STREAMS (SEE REFERENCE 3)

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.
3. THE WETLAND AND STREAM DELINEATIONS PRESENTED ON THIS DRAWING WERE PROVIDED TO GNRA BY HAZEN & SAWYER.
4. EXISTING POWERLINE AND SEWER LINE LOCATIONS FROM DRAWING ENTITLED "APPLICATION FOR DEPARTMENT OF ARMY PERMIT, EXISTING SITE CONDITIONS", DRAWING NO. WL-1, PREPARED BY HAZEN & SAWYER, REVISED 9/06. EXISTING SEWER LINE LOCATIONS WEST OF OAK HALL PUMPING STATION PROVIDED BY SPAULDING AND NORRIS.

NO.	DATE	REVISION
8	1/10/08	RECORD ISSUE
4	5/21/07	UPDATED TOPOGRAPHY
1	3/07	ISSUED FOR CONSTRUCTION

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025012 STACEY A. BESSER

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
EXISTING CONDITIONS

DESIGNED BY: P.K.S.	DRAWN BY: C.T.J.
CHECKED BY:	PROJECT NO.: SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-00109	
SHEET NO. 2	DRAWING NO. S1

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-00109.dwg - 11/29/2007 12:14 PM

EXISTING SCALE HOUSE
EXISTING TRANSFER STATION
SITE ENTRANCE
OLD SMITHFIELD ROAD
CLOSED FELTONSVILLE LANDFILL
EXISTING MULTI-MATERIAL FACILITY
SCALES/SCALEHOUSE
ENTRANCE ROAD (N.I.C.)
EXISTING SOIL STOCKPILE
EXISTING OUTFALL
EXISTING RISER 2 / BARREL MODIFICATION EC1
EXISTING SEDIMENT POND NO. 2
ACCESS GATE
EXISTING DROP INLET/CULVERT
PHASE 1 ACCESS ROAD
LEACHATE STORAGE TANK FACILITY (SEE DRAWING S8)
3" FORCE MAIN
EXISTING RISER 2 / BARREL MODIFICATION EC1
EXISTING OUTFALL
PHASE 1A LIMIT OF LINER (26.2 AC)
EXISTING SEDIMENT POND NO. 1
LIMITS OF CONSTRUCTION
EXISTING TOWN OF HOLLY SPRINGS (OAK HALL) PUMPING STATION
EXISTING OVERHEAD POWERLINES
EXISTING SEWER LINE
EASTON STREET
HWY 55 BYPASS
OLD HOLLY SPRINGS APEX ROAD
WELL CLUSTER
WELL CLUSTER B
WELL CLUSTER C

0 300' 600' 900'

LEGEND

- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- LIMITS OF CONSTRUCTION
- PHASE 1A LIMIT OF LINER
- PROPOSED 10' CONTOUR (SEE NOTE 1)
- PROPOSED 2' CONTOUR
- OHE — OVERHEAD POWERLINE (SEE REFERENCE 4)
- S — EXISTING SEWER LINE (SEE REFERENCE 4)
- ABANDONED MONITORING WELL/PIEZOMETER
- EXISTING MONITORING WELL/PIEZOMETER
- PROPOSED MONITORING WELL
- PROPOSED METHANE MONITORING PROBE
- EXISTING CONTROL POINT (SEE TABLE)
- TEST PIT LOCATION
- SURFACE WATER MONITORING POINT
- WETLANDS AND STREAMS (SEE REFERENCE 3)
- STRUCTURAL FILL (GRADE TO DRAIN)
- LEACHATE TRANSMISSION MANHOLE

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.
3. THE WETLAND AND STREAM DELINEATIONS PRESENTED ON THIS DRAWING WERE PROVIDED TO GNRA BY HAZEN & SAWYER.
4. EXISTING POWERLINE AND SEWER LINE LOCATIONS FROM DRAWING ENTITLED "APPLICATION FOR DEPARTMENT OF ARMY PERMIT, EXISTING SITE CONDITIONS", DRAWING NO. WL-1, PREPARED BY HAZEN & SAWYER, REVISED 9/06. EXISTING SEWER LINE LOCATIONS WEST OF OAK HALL PUMPING STATION PROVIDED BY SPAULDING AND NORRIS.

NO.	DATE	REVISION
2	3/07	ISSUED FOR CONSTRUCTION
3	5/7/07	REVISIONS PER DESIGN MODIFICATION NO. 1
4	5/21/07	REVISIONS PER DESIGN MODIFICATION NO. 2; UPDATED TOPOGRAPHY
5	6/15/07	ADDED FORCE MAIN
6	1/10/08	RECORD ISSUE

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

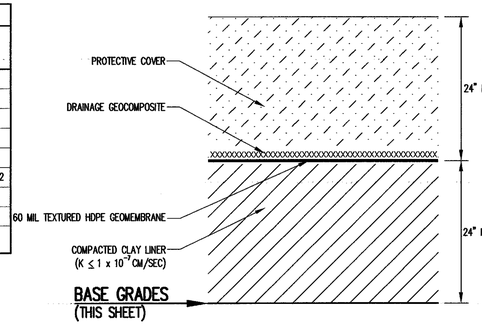
DRAWING TITLE:
SITE DEVELOPMENT PLAN

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
TJK	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-D0110	
SHEET NO.	DRAWING NO.
3	S2

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0110.dwg - 11/29/2007 1:55 PM

CULVERT SCHEDULE							
NO.	NO. OF PIPES	SIZE/TYPE	LENGTH (FEET)	SLOPE (%)	INV. IN (FEET)	INV. OUT (FEET)	REMARKS
C-1	1	24" RCP W/FES (CLASS III)	81	5.1	311.9	307.8	INLET IN DI-1
C-2	1	36" RCP W/FES (CLASS III)	188	2.3	286.1	281.7	INLET IN DI-2
C-2A	1	36" RCP W/FES (CLASS III)	192	2.5	286.6	281.1	INLET IN DI-2A
C-3	1	24" RCP (CLASS III)	39	3.6	288.2	286.8	INLET IN DI-3; OUTLET IN DI-2A
C-3A	1	36" RCP (CLASS III)	40	4.0	289.4	289.2	INLET IN DI-3A; OUTLET IN JUNCTION BOX 1
C-3B	1	36" RCP (CLASS III)	72	4.0	287.7	284.7	INLET IN JUNCTION BOX 1; OUTLET IN JUNCTION BOX 2
C-3C	1	36" RCP W/FES (CLASS III)	147	2.0	284.5	281.6	INLET JUNCTION BOX 2
C-A	1	42" RCP W/FES (BOTH ENDS) (CLASS III)	118	5.0	306.9	300.1	INLET IN TEMP. BASIN A

NOTE: 1. PROVIDE 1 FOOT MIN. COVER OVER ALL CULVERTS UNLESS OTHERWISE APPROVED BY THE ENGINEER.



TYPICAL LINER AND LEACHATE COLLECTION SYSTEM CROSS SECTION
NOT TO SCALE

RECORD ISSUE
NOT FOR CONSTRUCTION

7 EC1 TEMPORARY GRAVEL CONSTRUCTION ENTRANCE / EXIT

STRUCTURAL FILL (TYP.) (GRADE TO DRAIN)

PHASE 1A LIMIT OF LINER (26.2 AC)

PERIMETER BERM 2 L1

1 L3 FUTURE PHASE 2 TIE-IN

RIP RAP OUTLET PROTECTION (TYP.) 4 EC1

DRAINAGE CHANNEL (TYP.) 5 EC1

5 EC2 DROP INLET (TYP.)

LIMITS OF CONSTRUCTION

2 L2 INTERMEDIATE BERM

SEDIMENT POND NO. 1 (EXISTING)

EXISTING 3"ø FORCE MAIN CLEANOUT

EXISTING 3"ø FORCE MAIN

1 EC3 TEMPORARY SEDIMENT BASIN A

3 EC2 TEMPORARY SEDIMENT TRAP (TYP.)

4 EC2 SILT FENCE (TYP.)

1 EC3 TEMPORARY SEDIMENT BASIN B

6 EC1 DIVERSION BERM (TYP.)

REPAIR EXISTING RIPRAP APRON FOLLOWING PIPE INSTALLATION

JUNCTION BOX (TYP.) 6 EC2

CENTER OF SUMP
N: 700094.00
E: 2043748.51
ELEV. 287.0'

EXISTING SEWER LINE

EXISTING SEWER LINE EASEMENT

EXISTING TOWN OF HOLLY SPRINGS (OAK HALL) PUMPING STATION

EXISTING TOWN OF HOLLY SPRINGS CONCRETE MANHOLE (SEE NOTE 3)

PROPOSED 12"ø SANITARY SEWER PIPE

30' PUBLIC UTILITY EASEMENT (TYP.)

SANITARY SEWER OUTFALL FROM FOREST SPRINGS DEVELOPMENT

LEGEND

- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- LIMITS OF CONSTRUCTION
- PHASE 1A LIMIT OF LINER
- EXISTING SEWER LINE (SEE REFERENCE 4)
- PROPOSED 10' CONTOUR (SEE NOTE 1)
- PROPOSED 2' CONTOUR
- DRAINAGE CHANNEL
- DIVERSION BERM
- SILT FENCE
- CULVERT/DROP INLET
- DC-1 DRAINAGE CHANNEL NO.
- DI-1 DROP INLET NO.
- C-1 CULVERT NO.
- RD1-7 ROCK DAM NO.
- STRUCTURAL FILL (GRADE TO DRAIN)
- LEACHATE MANHOLE
- ABANDONED MONITORING WELL/PIEZOMETER
- EXISTING MONITORING WELL/PIEZOMETER
- PROPOSED MONITORING WELL
- PROPOSED METHANE MONITORING PROBE
- EXISTING CONTROL POINT
- EXISTING SOIL BORING (EMA / WESTINGHOUSE)
- TEST PIT LOCATION
- CONTROL POINT (SEE TABLE DRAWING V1)
- WETLANDS AND STREAMS (SEE REFERENCE 3)
- F EXISTING SANITARY FORCE MAIN (SEE REFERENCE 5)

GENERAL EROSION AND SEDIMENTATION CONTROL NOTES

1. ALL EROSION AND SEDIMENTATION CONTROL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL AS WELL AS APPLICABLE REGULATIONS.
2. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE ESTABLISHED PRIOR TO, OR AS SOON AS PRACTICAL THEREAFTER, ANY LAND CLEARING OR CONSTRUCTION ACTIVITIES MAY BEGIN.
3. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CONSTRUCTED ACCORDING TO THE CONTRACT DRAWINGS AND SPECIFICATIONS.
4. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AT LEAST ONCE EVERY SEVEN CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT OF GREATER THAN 0.5 INCHES OF RAIN PER 24 HOUR PERIOD AND APPROPRIATE MAINTENANCE CONDUCTED. MAINTENANCE SHALL INCLUDE, BUT NOT BE LIMITED TO:
   A. THE REMOVAL AND SATISFACTORY DISPOSAL OF TRAPPED OR DEPOSITED SEDIMENTS FROM BASINS, TRAPS, BARRIERS, FILTERS, AND/OR DRAINAGE FEATURES/DEVICES;
   B. REPLACEMENT OF FILTER FABRICS USED FOR SILT FENCES UPON LOSS OF EFFICIENCY; AND
   C. REPLACEMENT OF ANY OTHER COMPONENTS WHICH ARE DAMAGED OR CANNOT SERVE THE INTENDED USE.
5. THE CONTRACTOR SHALL PROVIDE TEMPORARY OR PERMANENT GROUND COVER (OR OTHER ACCEPTABLE MEASURES) ADEQUATE TO RESTRAIN EROSION ON ERODIBLE SLOPES OR OTHER AREAS WITHIN 21 CALENDAR DAYS FOLLOWING COMPLETION OF ANY PHASE OF GRADING. THE CONTRACTOR SHALL PROVIDE PERMANENT GROUND COVER FOR ALL DISTURBED AREAS WITHIN 15 WORKING DAYS OR 90 CALENDER DAYS (WHICHEVER IS SHORTER) FOLLOWING THE COMPLETION OF CONSTRUCTION.

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.
3. THE WETLAND AND STREAM DELINEATIONS PRESENTED ON THIS DRAWING WERE PROVIDED TO ONRA BY HAZEN & SAWYER.
4. EXISTING POWERLINE AND SEWER LINE LOCATIONS FROM DRAWING ENTITLED "APPLICATION FOR DEPARTMENT OF ARMY PERMIT, EXISTING SITE CONDITIONS", DRAWING NO. WL-1, PREPARED BY HAZEN & SAWYER, REVISED 9/06. EXISTING SEWER LINE LOCATIONS WEST OF OAK HALL PUMPING STATION PROVIDED BY SPAULDING AND NORRIS.
5. EXISTING 3" FORCE MAIN LOCATION FROM DRAWING SET ENTITLED "WATER AND SEWER CONTRACT FOR THE WAKE COUNTY FIREARMS EDUCATION AND RECREATION CENTER HOLLY SPRINGS, NC", DRAWING NO. S-1 & S-2, PREPARED BY CDM, REVISED 9/98. EXISTING 3" FORCE MAIN CLEANOUT LOCATION FROM FIELD SURVEY DATED 6/11/07 BY SURVEYING SOLUTIONS, P.C.

NOTES

1. GRADES SHOWN WITHIN THE PHASE 1A LIMIT OF LINER REPRESENT TOP OF SUBGRADE.
2. EXISTING MONITORING WELLS/PIEZOMETERS WITHIN CONTRACT LIMITS WILL BE ABANDONED BY OWNER.
3. TIE-IN TO EXISTING MANHOLE WILL BE CORED AND A BOOT ADDED TO PROVIDE WATER TIGHT SEAL. EXISTING MANHOLE SHALL BE COATED WITH A BITUMINOUS OR COAL TAR EPOXY COATING ON THE INTERIOR, WITH A MINIMUM TOTAL DRY FILM OF 10 MILS.

0 100' 200' 300'

REVISION			
NO.	DATE	REVISION	
8	1/10/08	RECORD ISSUE	
6	8/17/07	REVISIONS PER DESIGN MODIFICATION NO. 3	
4	5/21/07	UPDATED TOPOGRAPHY	
3	5/7/07	REVISIONS PER DESIGN MODIFICATION NO. 1	
2	3/07	ISSUED FOR CONSTRUCTION	
1	2/12/07	REVISED DRAINAGE PLAN AND CULVERT SCHEDULE	

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

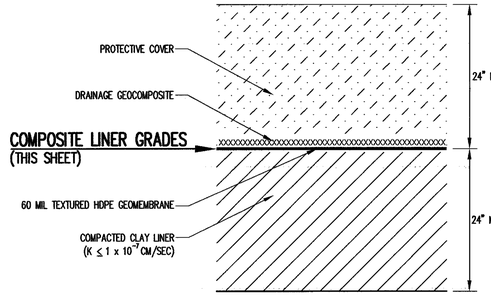
PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
SUBGRADE GRADING AND DRAINAGE PLAN

DESIGNED BY: P.K.S.	DRAWN BY: C.T.J.
CHECKED BY:	PROJECT NO.: SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0111	
SHEET NO. 4	DRAWING NO. S3

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0111.dwg - 12/17/2007 1:37 PM

RECORD ISSUE
NOT FOR CONSTRUCTION



TYPICAL LINER AND LEACHATE COLLECTION SYSTEM CROSS SECTION
NOT TO SCALE

NO.	DATE	REVISION
6	1/10/08	RECORD ISSUE
4	5/21/07	UPDATED TOPOGRAPHY
3	5/7/07	REVISIONS PER DESIGN MODIFICATION NO. 1
2	3/07	ISSUED FOR CONSTRUCTION
1	2/12/07	REVISED LEACHATE FORCE MAIN PIPING

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023002 STACEY A. SMITH

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
COMPOSITE LINER GRADING PLAN

DESIGNED BY: P.K.S.	DRAWN BY: C.T.J.
CHECKED BY: S.A.S.	PROJECT NO.: SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0112	
SHEET NO. 5	DRAWING NO. S4

LEGEND

- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- LIMITS OF CONSTRUCTION
- PHASE 1A LIMIT OF LINER
- EXISTING SEWER LINE (SEE REFERENCE 4)
- PROPOSED 10' CONTOUR (SEE NOTE 1)
- PROPOSED 2' CONTOUR
- LEACHATE COLLECTION PIPING (SOLID) (SEE NOTE 3)
- LEACHATE COLLECTION PIPING (PERFORATED) AND GRAVEL COLUMNS (SEE NOTE 3)
- LEACHATE COLLECTION CLEANOUT (SEE NOTE 3)
- LEACHATE FORCE MAIN (INFLUENT)
- LEACHATE FORCE MAIN (EFFLUENT)
- CELL DIVIDER BERM
- EXISTING CONTROL POINT
- PROPOSED MONITORING WELL
- PROPOSED METHANE MONITORING PROBE
- CONTROL POINT (SEE TABLE DRAWING V1)
- STRUCTURAL FILL (GRADE TO DRAIN)
- LEACHATE MANHOLE

NOTES

1. GRADES SHOWN WITHIN THE PHASE 1A LIMIT OF LINER REPRESENT TOP OF SOIL LINER.
2. REFER TO DETAILS FOR PROPER TIE IN OF LINER SYSTEM AND PROTECTIVE COVER AROUND THE PERIMETER OF PHASE 1A.
3. HEADER PIPES AND ASSOCIATED CLEANOUTS ARE 8"ø. LATERAL PIPES AND ASSOCIATED CLEANOUTS ARE 6"ø.

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC. BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.
3. THE WETLAND AND STREAM DELINEATIONS PRESENTED ON THIS DRAWING WERE PROVIDED TO GNRA BY HAZEN & SAWYER.
4. EXISTING POWERLINE AND SEWER LINE LOCATIONS FROM DRAWING ENTITLED "APPLICATION FOR DEPARTMENT OF ARMY PERMIT, EXISTING SITE CONDITIONS", DRAWING NO. WL-1, PREPARED BY HAZEN & SAWYER, REVISED 9/06. EXISTING SEWER LINE LOCATIONS WEST OF OAK HALL PUMPING STATION PROVIDED BY SPAULDING AND NORRIS.

0 100' 200' 300'

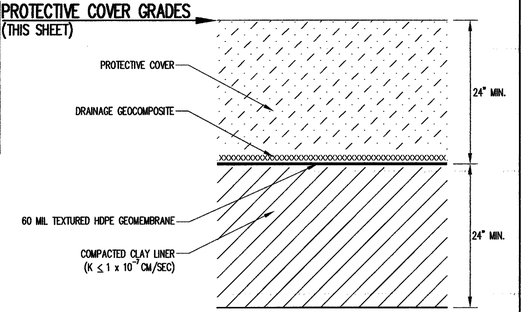
LEACHATE STORAGE TANK FACILITY (SEE DRAWING S7) (NOT IN CONTRACT)
STRUCTURAL FILL (TYP.) (GRADE TO DRAIN)
PHASE 1A LIMIT OF LINER (26.2 AC)
FUTURE PHASE 2 TIE-IN
LIMITS OF CONSTRUCTION
INTERMEDIATE BERM
PERIMETER BERM
LEACHATE FORCE MAIN (INFLUENT & EFFLUENT)
SEDIMENT POND NO. 1 (EXISTING)
LEACHATE COLLECTION PIPE CLEANOUT (TYP.)
LEACHATE COLLECTION SUMP
EXISTING SEWER LINE
EXISTING TOWN OF HOLLY SPRINGS (OAK HALL) PUMPING STATION
OBSCURE
N 701000
N 700000
E 2044000
E 2045000

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0112.dwg - 11/29/2007 5:38 PM

CULVERT SCHEDULE							
NO.	NO. OF PIPES	SIZE/TYPE	LENGTH (FEET)	SLOPE (%)	INV. IN (FEET)	INV. OUT (FEET)	REMARKS
C-B	2	24" RCP (CLASS III)	122	0.9	288.1	287.0	------
C-C	1	18" RCP (CLASS III)	66	0.6	295.9	295.5	------
C-D	1	24" RCP (CLASS III)	42	0.7	310.3	310.0	INLET IN DI-A

NOTE: 1. PROVIDE 1 FOOT MIN. COVER OVER ALL CULVERTS UNLESS OTHERWISE APPROVED BY THE ENGINEER.

PROTECTIVE COVER GRADES (THIS SHEET)



TYPICAL LINER AND LEACHATE COLLECTION SYSTEM CROSS SECTIONS
NOT TO SCALE

NO.	DATE	REVISION
6	1/10/08	RECORD ISSUE
5	5/21/07	UPDATED TOPOGRAPHY
4	5/7/07	REVISIONS PER DESIGN MODIFICATION NO. 1
3	3/07	ISSUED FOR CONSTRUCTION
2	2/12/07	REVISED LEACHATE FORCE MAIN PIPING
1		

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023002 CHRISTOPHER A. KLING

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
PROTECTIVE COVER GRADING PLAN

DESIGNED BY: P.K.S.	DRAWN BY: C.T.J.
CHECKED BY: CAK	PROJECT NO.: SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0113	
SHEET NO. 6	DRAWING NO. S5

RECORD ISSUE
NOT FOR CONSTRUCTION

LEGEND
- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- LIMITS OF CONSTRUCTION
- PHASE 1A LIMIT OF LINER
- S — EXISTING SEWER LINE (SEE REFERENCE 4)
- PROPOSED 10' CONTOUR (SEE NOTE 1)
- PROPOSED 2' CONTOUR
- FM — LEACHATE FORCE MAIN (INFLUENT)
- LEACHATE FORCE MAIN (EFFLUENT)
- DRAINAGE CHANNEL
- DB — CELL DIVIDER BERM
- CULVERT
- DC-1 — DRAINAGE CHANNEL NO.
- DI-1 — DROP INLET NO.
- C-1 — CULVERT NO.
- EXISTING CONTROL POINT
- PROPOSED MONITORING WELL
- PROPOSED METHANE MONITORING PROBE
- STRUCTURAL FILL (GRADE TO DRAIN)
- LEACHATE MANHOLE

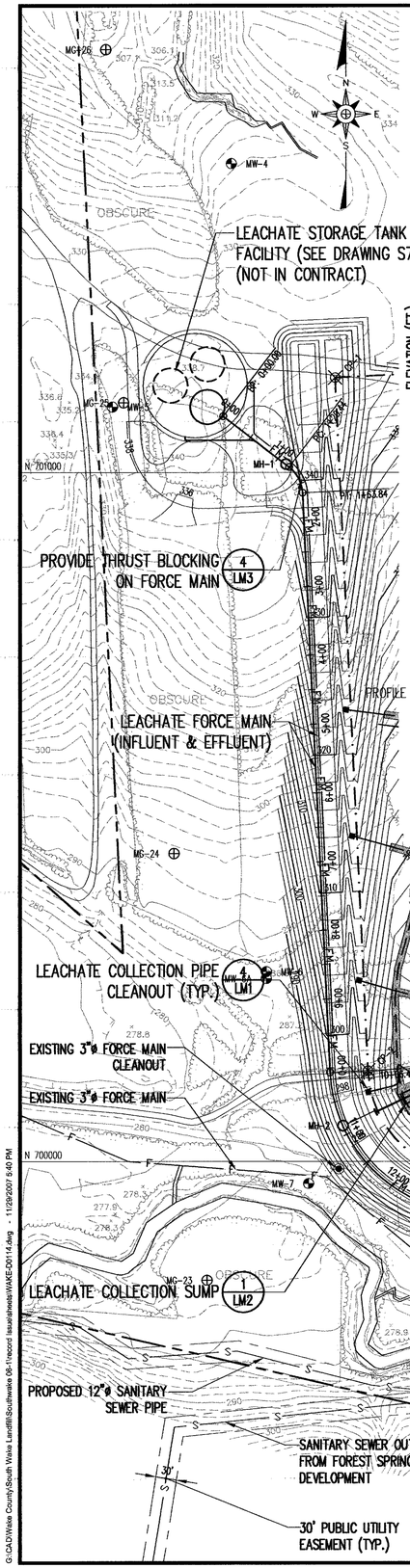
NOTES
1. GRADES SHOWN WITHIN THE PHASE 1A LIMIT OF LINER REPRESENT TOP OF PROTECTIVE COVER.
2. REFER TO DETAILS FOR PROPER TIE IN OF LINER SYSTEM AND PROTECTIVE COVER AROUND THE PERIMETER OF PHASE 1A.

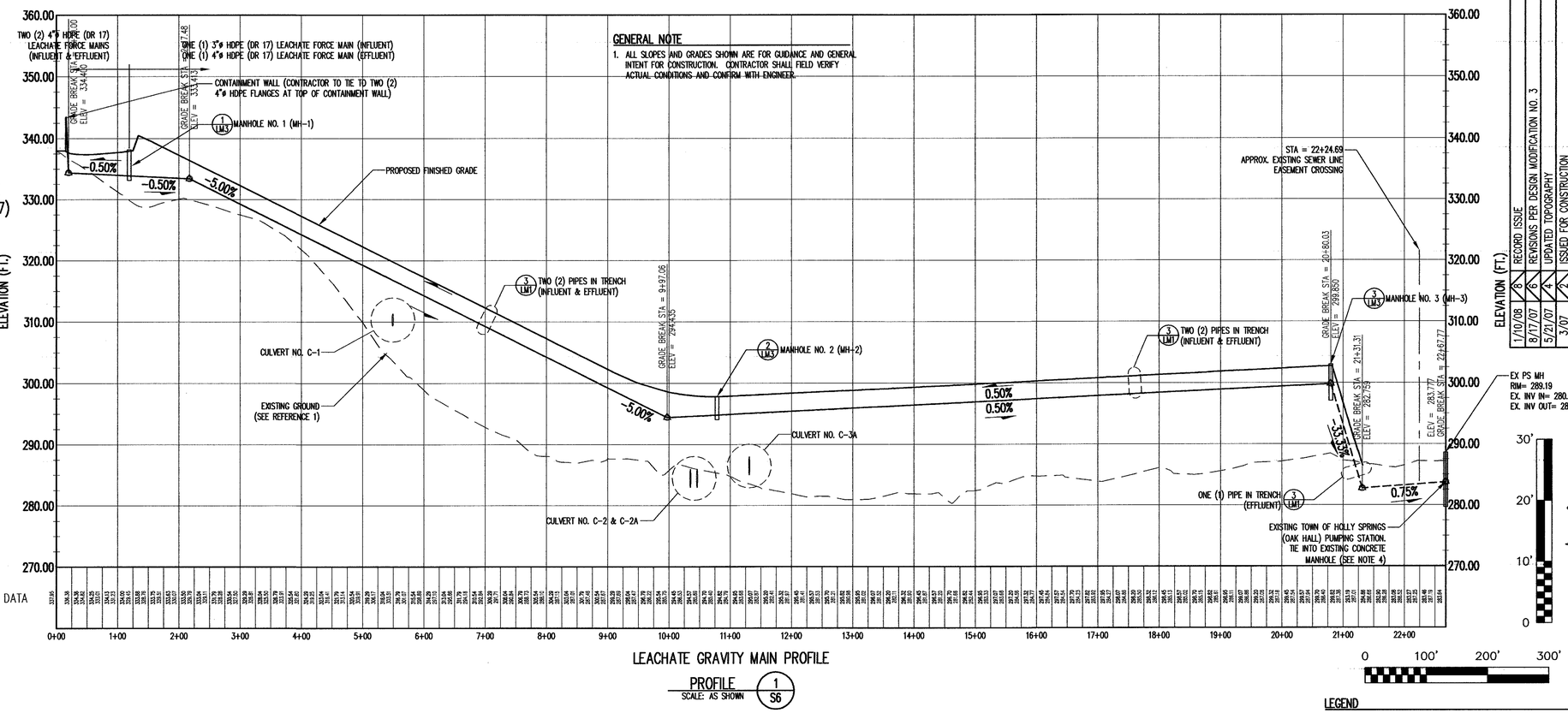
REFERENCES
1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.
3. THE WETLAND AND STREAM DELINEATIONS PRESENTED ON THIS DRAWING WERE PROVIDED TO GNRA BY HAZEN & SAWYER.
4. EXISTING POWERLINE AND SEWER LINE LOCATIONS FROM DRAWING ENTITLED "APPLICATION FOR DEPARTMENT OF ARMY PERMIT, EXISTING SITE CONDITIONS", DRAWING NO. WL-1, PREPARED BY HAZEN & SAWYER, REVISED 9/06. EXISTING SEWER LINE LOCATIONS WEST OF OAK HALL PUMPING STATION PROVIDED BY SPAULDING AND NORRIS.

0 100' 200' 300'

STRUCTURAL FILL (TYP.) (GRADE TO DRAIN)
TEMPORARY CELL BOUNDARY BERM
PHASE 1A LIMIT OF LINER (26.2 AC)
PHASE 1 ACCESS ROAD
SERVICE ROAD
PERIMETER BERM
LEACHATE FORCE MAIN (INFLUENT & EFFLUENT)
SEDIMENT POND NO. 1 (EXISTING)
50' WIDE ACCESS RAMP AND CULVERT
PERIMETER ACCESS ROAD
FUTURE PHASE 2 TIE-IN
LIMITS OF CONSTRUCTION
INTERMEDIATE BERM
FILTER BERM
RIP RAP OUTLET PROTECTION (TYP.)
EXISTING TOWN OF HOLLY SPRINGS (OAK HALL) PUMPING STATION
EXISTING SEWER LINE

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0113.dwg - 12/17/2007 1:38 PM





LEACHATE GRAVITY MAIN PROFILE

PROFILE SCALE: AS SHOWN 1 S6

0 100' 200' 300'

GENERAL NOTE

1. ALL SLOPES AND GRADES SHOWN ARE FOR GUIDANCE AND GENERAL INTENT FOR CONSTRUCTION. CONTRACTOR SHALL FIELD VERIFY ACTUAL CONDITIONS AND CONFIRM WITH ENGINEER.

LEGEND

- 150 — EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- PHASE 1A LIMIT OF LINER
- S — SEWER LINE (SEE REFERENCE 4)
- F — EXISTING FORCE MAIN
- 300 — PROPOSED 10' CONTOUR (SEE NOTE 1)
- PROPOSED 2' CONTOUR
- LEACHATE COLLECTION PIPING (SOLID) (SEE NOTE 3)
- LEACHATE COLLECTION PIPING (PERFORATED) AND GRAVEL COLUMNS (SEE NOTE 3)
- LEACHATE COLLECTION CLEANOUT (SEE NOTE 3)
- FM — LEACHATE FORCE MAIN (INFLUENT)
- LEACHATE FORCE MAIN (EFFLUENT)
- F — EXISTING SANITARY FORCE MAIN (SEE REFERENCE 5)
- EXISTING CONTROL POINT
- STRUCTURAL FILL (GRADE TO DRAIN)

RECORD ISSUE
NOT FOR CONSTRUCTION

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.
3. THE WETLAND AND STREAM DELINEATIONS PRESENTED ON THIS DRAWING WERE PROVIDED TO GNRA BY HAZEN & SAWYER.
4. EXISTING POWERLINE AND SEWER LINE LOCATIONS FROM DRAWING ENTITLED "APPLICATION FOR DEPARTMENT OF ARMY PERMIT, EXISTING SITE CONDITIONS", DRAWING NO. WL-1, PREPARED BY HAZEN & SAWYER, REVISED 9/06. PROPOSED 12" SEWER LINE AND EXISTING SEWER LINE LOCATIONS WEST OF OAK HALL PUMPING STATION PROVIDED BY SPAULDING AND NORRIS.
5. EXISTING 3" FORCE MAIN LOCATION FROM DRAWING SET ENTITLED "WATER AND SEWER CONTRACT FOR THE WAKE COUNTY FIREARMS EDUCATION AND RECREATION CENTER HOLLY SPRINGS, NC", DRAWING NO. S-1 & S-2, PREPARED BY CDM, REVISED 9/98. EXISTING 3" FORCE MAIN CLEANOUT LOCATION FROM FIELD SURVEY DATED 6/11/07 BY SURVEYING SOLUTIONS, P.C.

0 100' 200' 300'

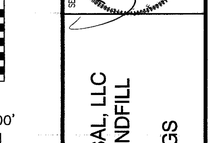
NOTES

1. GRADES SHOWN WITHIN THE PHASE 1A LIMIT OF LINER REPRESENT TOP OF SOIL LINER.
2. REFER TO DETAILS FOR PROPER TIE IN OF LINER SYSTEM AND PROTECTIVE COVER AROUND THE PERIMETER OF PHASE 1A.
3. HEADER PIPES AND ASSOCIATED CLEANOUTS ARE 8"ø. LATERAL PIPES AND ASSOCIATED CLEANOUTS ARE 6"ø.
4. TIE-IN TO EXISTING MANHOLE WILL BE CORED AND A BOOT ADDED TO PROVIDE WATER TIGHT SEAL. EXISTING MANHOLE SHALL BE COATED WITH A BITUMINOUS OR COAL TAR EPOXY COATING ON THE INTERIOR, WITH A MINIMUM TOTAL DRY FILM OF 10 MILS.

ELEVATION (FT.)	NO.	DATE	REVISION
	8	1/10/08	RECORD ISSUE
	6	8/17/07	REVISIONS PER DESIGN MODIFICATION NO. 3
	4	5/21/07	UPDATED TOPOGRAPHY
	2	3/07	ISSUED FOR CONSTRUCTION
	1	2/12/07	REVISED LEACHATE FORCE MAIN LOCATION

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL



PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
LEACHATE FORCE MAIN PLAN AND PROFILE

DESIGNED BY:	DRAWN BY:
S.A.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
kp	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-D0114	
SHEET NO.	DRAWING NO.
7	S6

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0114.dwg - 11/29/2007 5:40 PM

RECORD ISSUE
NOT FOR CONSTRUCTION

LIMITS OF CONSTRUCTION 15' OUTSIDE OF CONTAINMENT WALL (CONTRACTOR TO PREPARE SUBGRADE FOR TANKS AT APPROX. ELEV 338)

1/R4 ALL WEATHER ACCESS (WIDTH VARIES)

SECONDARY CONTAINMENT TANK (NOT IN CONTRACT)

BOLLARD (TYP.)

500,000 GALLON LEACHATE STORAGE TANK (NOT IN CONTRACT)

LIMIT OF LINER (TYP.)

FUTURE TANK

3'x3'x3' SUMP (TYP. OF 2)

2/LM4 STORMWATER REMOVAL VALVE BOX

8" CROSSOVER NOZZLE - PLUGGED

FUTURE TANK

8"ø D.I. OR HDPE PIPE

MG-25

MW-5

1/LM4 AIR RELEASE VALVE (INFLUENT PIPING)

TRANSFER PUMP 4/LM4

1/LM4 CONTRACTOR SHALL MAKE CONNECTION TO 2 - 4"ø HDPE FLANGE FITTINGS AT THIS LOCATION (PROVIDED BY OTHERS)

6" OVERFLOW (TYP.)

4"ø HDPE (DR 17) LEACHATE FORCE MAIN PIPE (INFLUENT)

SIDE ENTRY MIXER

BLOWER 3/LM4

4"ø HDPE (DR 17) LEACHATE FORCE MAIN PIPE (EFFLUENT)

MH-1

MANHOLE NO 1 1/LM3

CHAIN LINK FENCE AND GATES (2) 2/R4

3"ø HDPE (DR 17) LEACHATE FORCE MAIN PIPE (INFLUENT)

CONCRETE HEADWALL

RIP RAP APRON

4"ø HDPE (DR 17) LEACHATE FORCE MAIN PIPE (EFFLUENT)

ALL WEATHER ACCESS 1/R4

3/LM1

N 701000

LEGEND

- 150 — EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- 300 — PROPOSED 10' CONTOUR (SEE NOTE 1)
- PROPOSED 2' CONTOUR
- FM — LEACHATE FORCE MAIN (INFLUENT)
- LEACHATE FORCE MAIN (EFFLUENT)
- LEACHATE MANHOLE
- PROPOSED MONITORING WELL
- PROPOSED METHANE MONITORING PROBE
- GENERAL LIMITS OF WORK BY TANK CONTRACTOR

NOTES

1. ALL PIPING TO BE SCHEDULE 10, 304 STAINLESS STEEL CONFORMING TO ASTM A-403 AND ASTM A-312.
2. ALL PIPING WELDING TO BE BY TUNGSTEN INERT GAS (TIG) METHOD WITH FUSED ROOT AND CAP WITH 308 STAINLESS STEEL FILLER ROD. USE ONLY NEW CARBON STEEL UNCONTAMINATED GRINDING WHEELS AND BRUSHES.
3. CARE IS TO BE TAKEN TO PREVENT CARBON STEEL CONTAMINATION AND RUST ON ALL STAINLESS STEEL. CONTRACTOR TO REMOVE ALL RUST USING ACID CLEANING AND PASSIVATION.
4. STAINLESS STEEL ADJUSTABLE PIPE SUPPORTS SHALL BE USED AND SPACED NOT MORE THAN 15 FEET APART.
5. ALL FLANGES WILL BE STUB UP ENDS WITH STAINLESS STEEL BACK UP FLANGES.
6. ALL FLANGE GASKETS WILL BE 1/8" THICK NEOPRENE OR BUNA N.
7. ALL BOLTS NOT PROTRUDING INSIDE THE TANKS WILL BE ZINC PLATED CARBON STEEL.
8. ALL BOLTS, NUTS AND WASHERS INSIDE TANKS A AND B SHALL BE 18-8 STAINLESS STEEL OR 304 STAINLESS STEEL.
9. TANK A AND B SHALL BE FURNISHED WITH TWO HEAVY DUTY FLOAT LEVEL SWITCHES PER TANK WHICH WILL BE MOUNTED TO THE TANK SIDE WALLS AND WILL BE LOCATED BY THE ENGINEER.
10. TANK CONTRACTOR TO SUPPLY 4" BUTTERFLY VALVE, 4" TYPE A CAM-LOC FITTING BOTH ENDS OF PIPING, AND 4" HOSE WITH FEMALE CAM-LOC FITTINGS.
11. BUTTERFLY VALVES TO BE 150 LB., FULL LUG, CAST IRON BODY, EPDM OR BUNA SEATS WITH STAINLESS STEEL DISC AND SHAFT.
12. TANK SUPPLIER SHALL FURNISH A 50 FEET LONG, 3" LOAD OUT HOSE WITH CAM-LOC FITTINGS AND BALL VALVE LOCATED AT TRUCK LOAD OUT END.
13. SEE DETAIL 1/LM4 FOR TYPICAL PIPING DETAILS.

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.

0 20' 40' 60'

NO.	DATE	REVISION
8	1/10/08	RECORD ISSUE
4	5/21/07	UPDATED TOPOGRAPHY
3	3/07	ISSUED FOR CONSTRUCTION
2	2/12/07	REVISED TANK LAYOUT AND LEACHATE FORCE MAIN PIPE LOCATIONS
1		

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

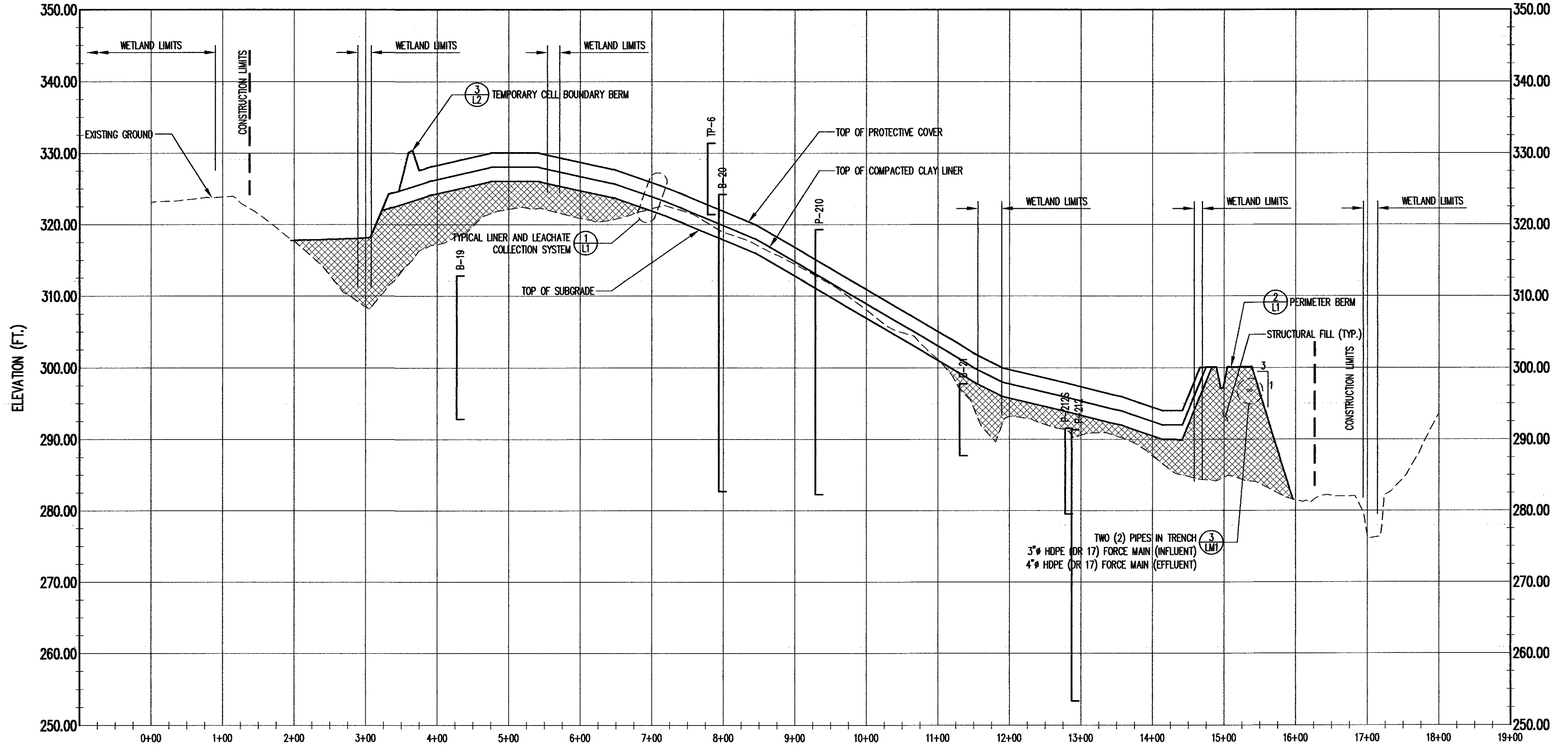
PROFESSIONAL ENGINEER SEAL 023002 STACEY A. SMITH

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
LEACHATE STORAGE TANK LAYOUT

DESIGNED BY: P.K.S.	DRAWN BY: C.T.J.
CHECKED BY: TAS	PROJECT NO.: SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0115	
SHEET NO. 8	DRAWING NO. S7

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0115.dwg - 11/29/2007 5:51 PM



SECTION AA

SECTION AS SHOWN — AA / X1

LEGEND

- EXISTING GROUND (SEE REFERENCE 1)
- FINISHED GRADE
- STRUCTURAL FILL

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.

30' 20' 10' 0

0 100' 200' 300'

RECORD ISSUE
NOT FOR CONSTRUCTION

NO.	DATE	REVISION
8	1/10/08	RECORD ISSUE
4	5/21/07	UPDATED TOPOGRAPHY
2	3/07	ISSUED FOR CONSTRUCTION

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

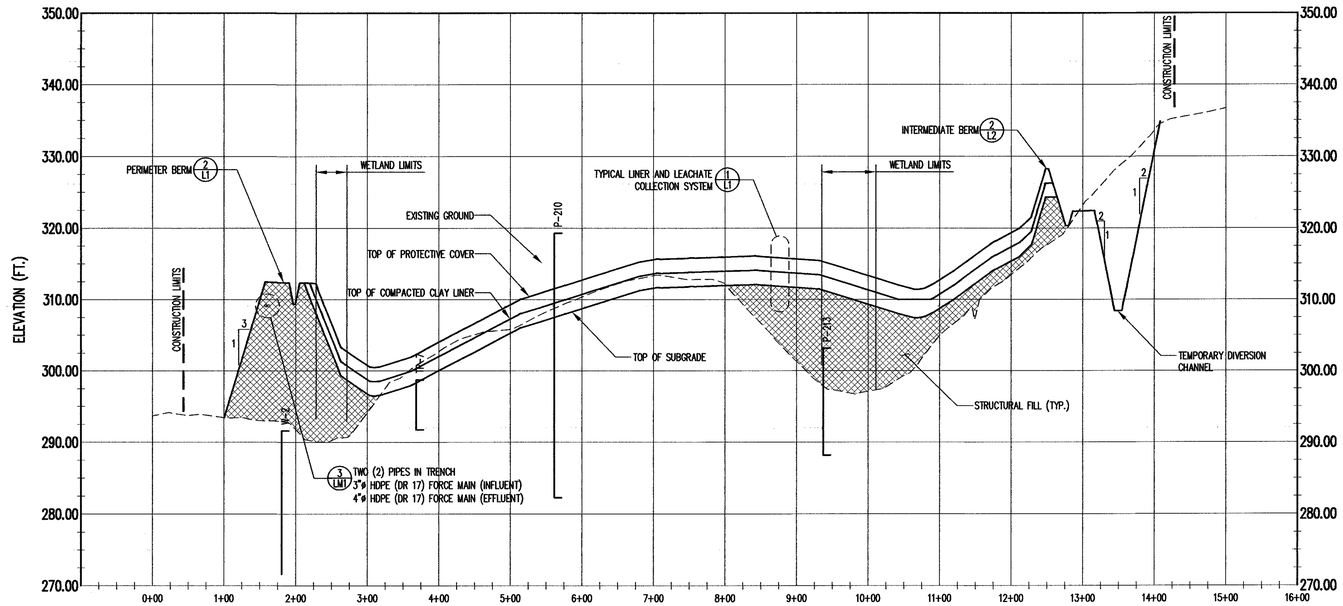
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023002 TRACEY A. STEELMAN

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
ENGINEERING CROSS SECTIONS
(SHEET 1 OF 2)

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-D0116	
SHEET NO.	DRAWING NO.
9	X1

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0116.dwg - 1/13/2007 8:34 AM



SECTION BB

SECTION AS SHOWN — BB / X2

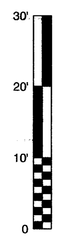
RECORD ISSUE
NOT FOR CONSTRUCTION

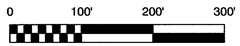
LEGEND

- EXISTING GROUND (SEE REFERENCE 1)
- FINISHED GRADE
- STRUCTURAL FILL

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.





NO.	DATE	REVISION
8	1/10/08	RECORD ISSUE
4	5/21/07	UPDATED TOPOGRAPHY
2	3/07	ISSUED FOR CONSTRUCTION

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave.
Raleigh, N.C. 27603
ph: 919-828-0577
fax: 919-828-3899
www.rsgengineers.com

SEAL

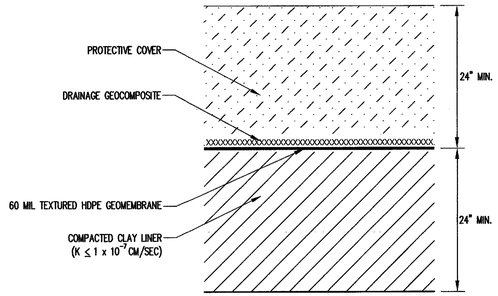
PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
ENGINEERING CROSS SECTIONS
(SHEET 2 OF 2)

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
SM	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-00117	
SHEET NO.	DRAWING NO.
10	X2

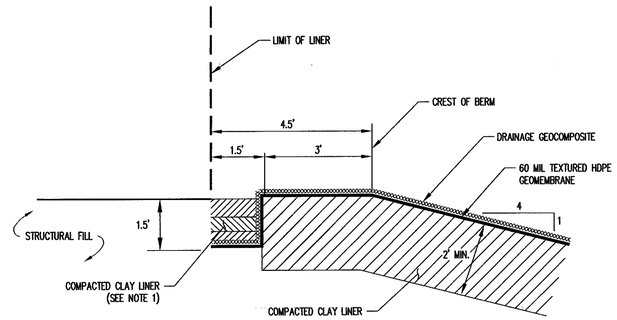
G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-00117.dwg - 11/30/2007 8:36 AM

RECORD ISSUE
NOT FOR CONSTRUCTION



TYPICAL LINER AND LEACHATE COLLECTION SYSTEM CROSS SECTIONS

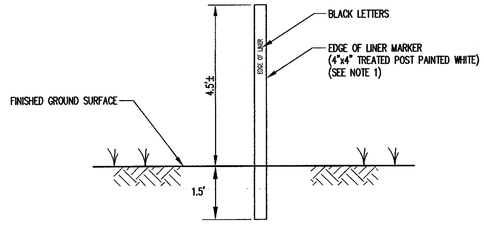
DETAIL SCALE: 1" = 1' — 1 / L1



NOTES:
1. BACKFILL ANCHOR TRENCH IN 6"-DEEP LIFTS.
2. SOME LAYERS NOT SHOW FOR CLARITY.

ANCHOR TRENCH

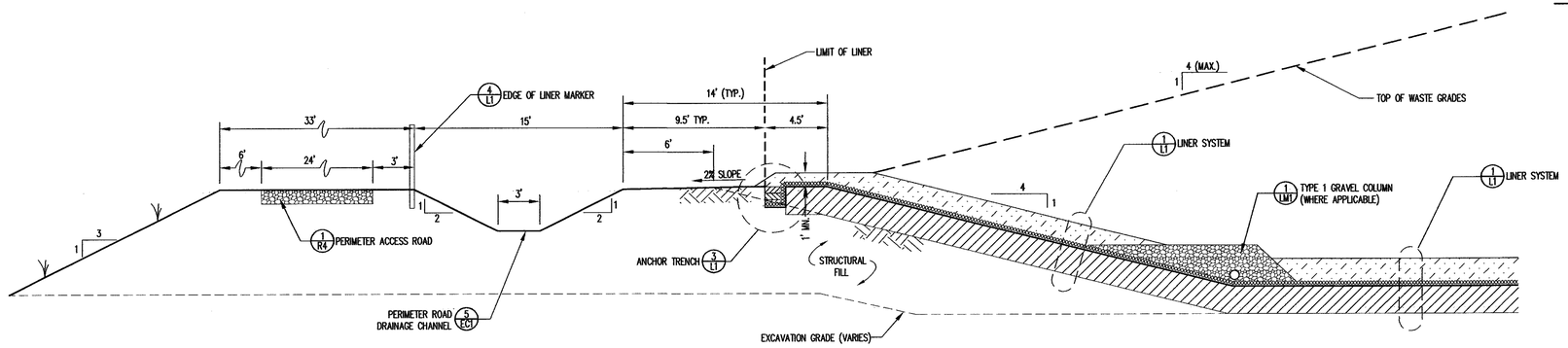
DETAIL SCALE: 1" = 2' — 3 / L1



NOTES:
1. PLACE EDGE OF LINER MARKERS EVERY 100' ON-CENTER AND AT BREAK POINTS.

EDGE OF LINER MARKER

DETAIL NOT TO SCALE — 4 / L1



PERIMETER BERM CROSS SECTION (TYP.)

DETAIL SCALE: 1" = 5' — 2 / L1

NO.	DATE	REVISION
2	3/07	ISSUED FOR CONSTRUCTION
8	1/10/08	RECORD ISSUE

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

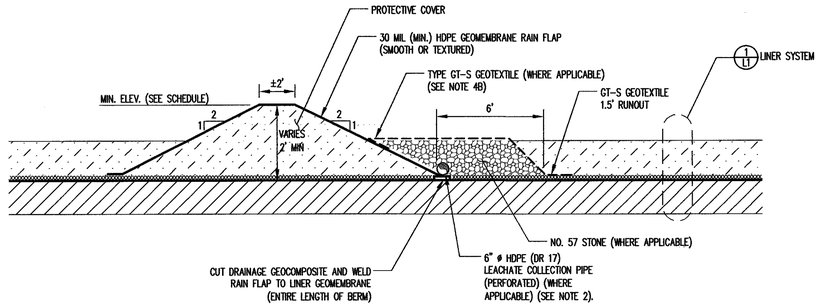
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023012 PACEY A. FLINN

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
LINER AND BERM DETAILS
(SHEET 1 OF 3)

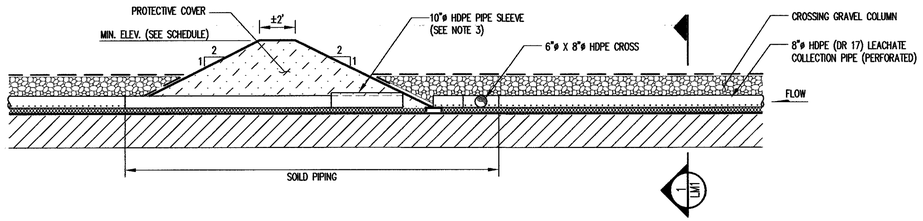
DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-D0118	
SHEET NO.	DRAWING NO.
11	L1

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0118.dwg - 1/11/2008 4:07 PM



TYPICAL

CELL DIVIDER BERM SCHEDULE	
BERM	MIN. ELEV.
CELL 1/2	298.0
CELL 1/3	312.0
CELL 2/3	314.0

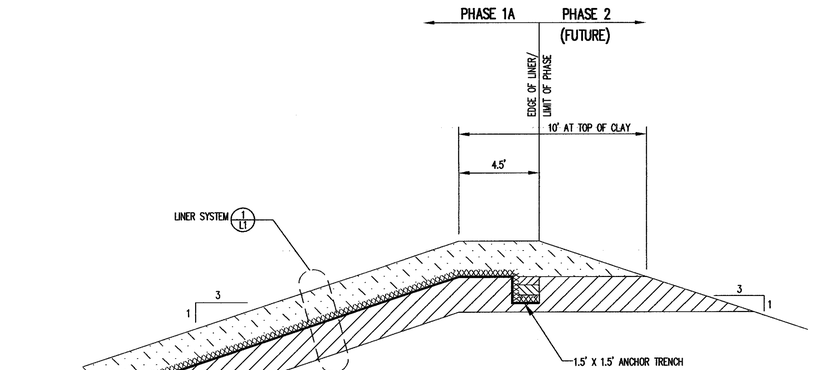


LOW END OF CELLS AT CROSSING PIPING

CELL DIVIDER BERM

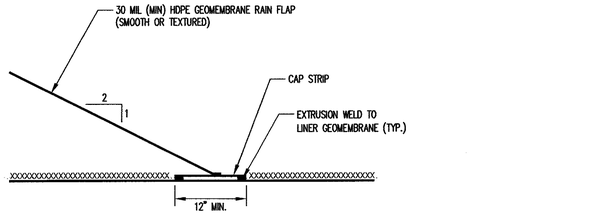
DETAIL 1 / L2
NOT TO SCALE

NOTES:
1. SEE DETAIL 2/LM1 FOR PIPE PERFORATIONS.
2. SHIFT HDPE PIPE OVER AS REQUIRED TO CONNECT WITH HDPE CROSS AT LOW END OF EACH CELL.
3. CUT AND CAP 8"ø HDPE PIPE WITHIN PROTECTIVE COVER BERM AND INSTALL 10"ø SOLID HDPE (DR17) PIPE SLEEVE AROUND 8"ø PIPE. PIPE SLEEVE MUST BE LONG ENOUGH TO CONNECT 8"ø PIPE WITH 12" MIN. OVERLAP ON EACH END.
4. OPERATIONS:
A. PLUG AND CHAIN SHALL BE REMOVED WHEN ACTIVATING A CELL.
B. THE EXPOSED TYPE GT-S GEOTEXTILE SHALL BE REMOVED PRIOR TO THE PLACEMENT OF WASTE OVER THAT PORTION OF THE GRAVEL COLUMN.

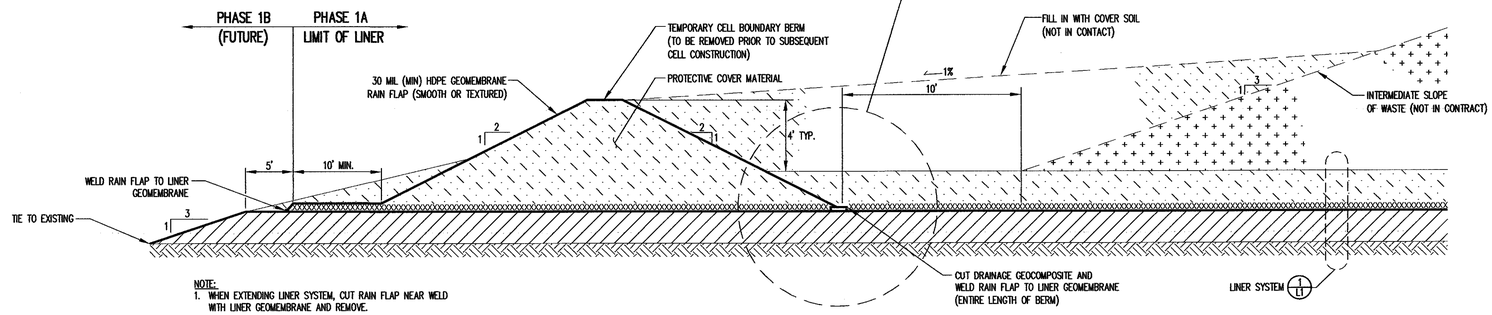


PHASE 1- PHASE 2 INTERMEDIATE BERM

DETAIL 2 / L2
NOT TO SCALE



LINER CONNECTION DETAIL
NOT TO SCALE



NOTE:
1. WHEN EXTENDING LINER SYSTEM, CUT RAIN FLAP NEAR WELD WITH LINER GEOMEMBRANE AND REMOVE.

PHASE 1A TEMPORARY LINER TERMINATION (TYP)

DETAIL 3 / L2
NOT TO SCALE

RECORD ISSUE
NOT FOR CONSTRUCTION

NO.	DATE	REVISION
2	3/07	ISSUED FOR CONSTRUCTION
1	1/10/08	RECORD ISSUE

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

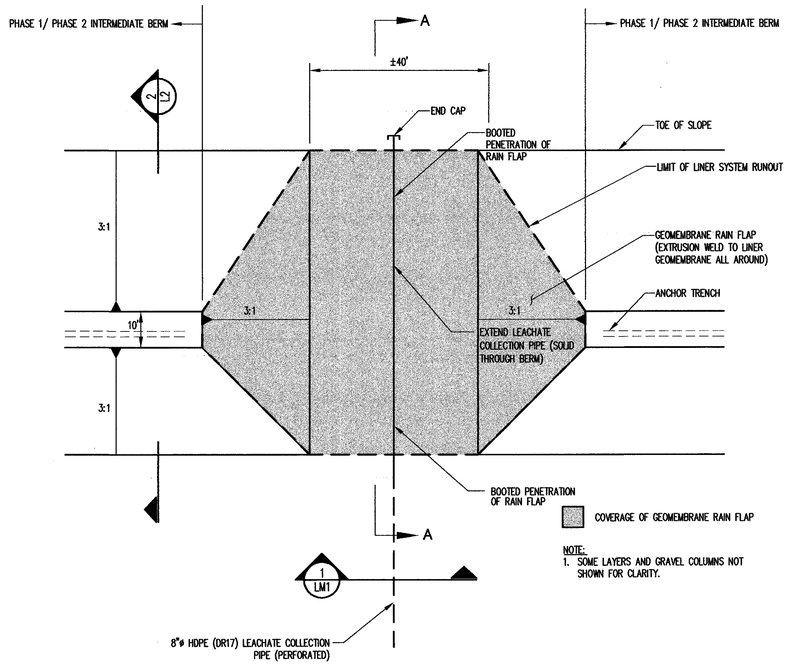
SEAL 023002 ENGINEER STACEY A. SMITH NORTH CAROLINA PROFESSIONAL

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

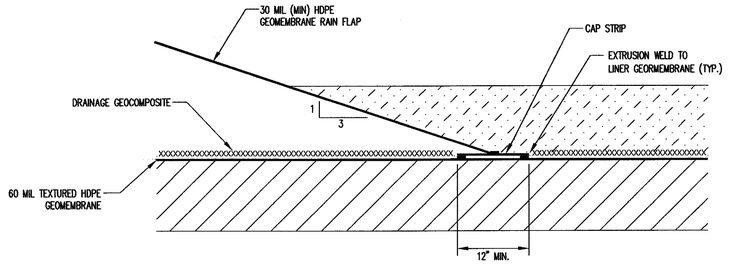
DRAWING TITLE:
LINER AND BERM DETAILS
(SHEET 2 OF 3)

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
S.A.S.	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-D0119	
SHEET NO.	DRAWING NO.
12	L2

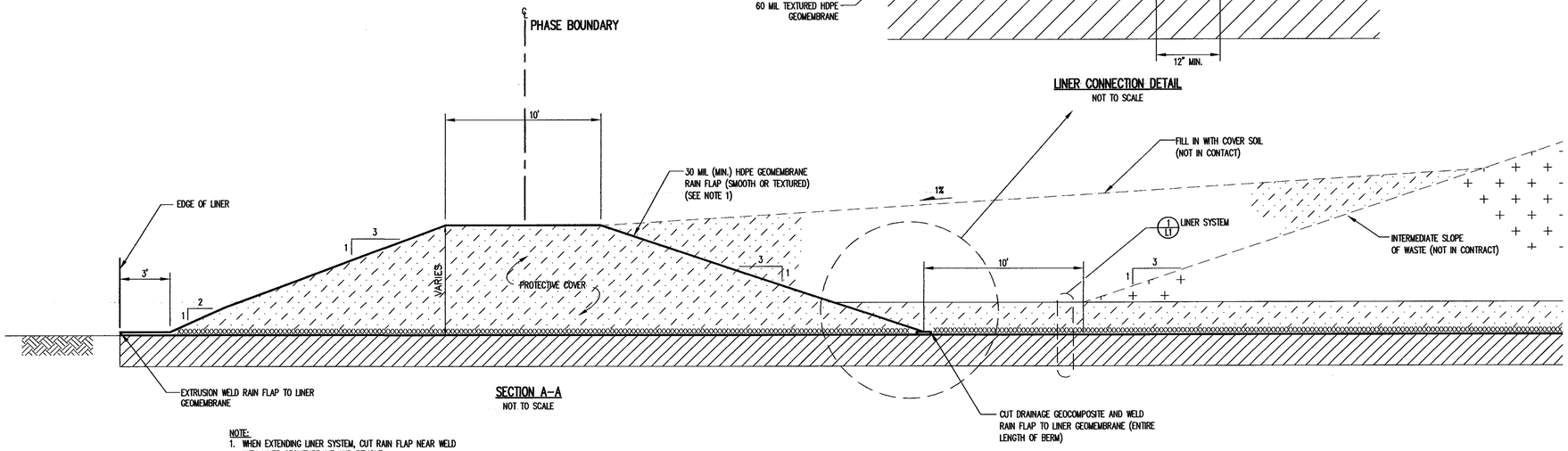
G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0119.dwg - 11/30/2007 9:25 AM



PLAN VIEW
SCALE: 1" = 20'



LINER CONNECTION DETAIL
NOT TO SCALE



SECTION A–A
NOT TO SCALE

NOTE:
1. WHEN EXTENDING LINER SYSTEM, CUT RAIN FLAP NEAR WELD WITH LINER GEOMEMBRANE AND REMOVE.

FUTURE PHASE 2 TIE IN – LEACHATE PIPING AND GEOMEMBRANE FLAP

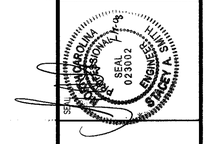
DETAIL AS SHOWN — 1 / L3

RECORD ISSUE
NOT FOR CONSTRUCTION

NO.	DATE	REVISION
2	3/07	ISSUED FOR CONSTRUCTION
3	1/10/08	RECORD ISSUE

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL



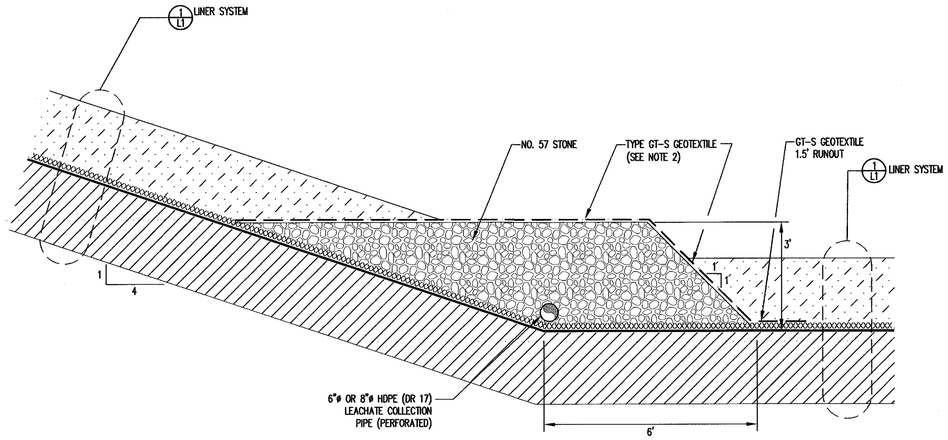
PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
LINER AND BERM DETAILS
(SHEET 3 OF 3)

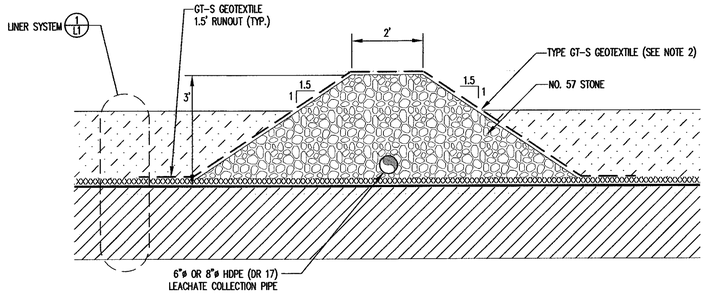
DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
SAS	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME:	
WAKE-D0120	
SHEET NO.	DRAWING NO.
13	L3

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0120.dwg - 11/30/2007 8:32 AM

RECORD ISSUE
NOT FOR CONSTRUCTION



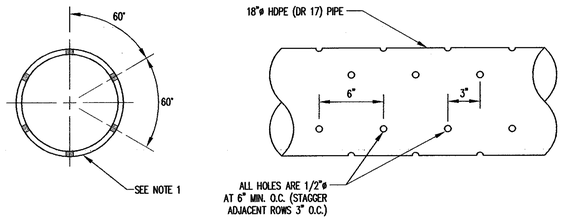
TYPE 1



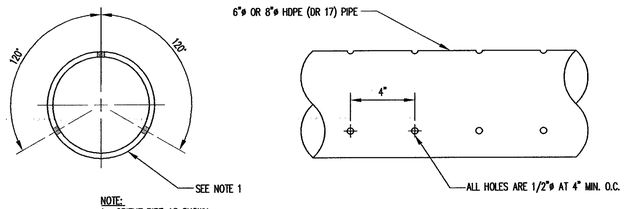
TYPE 2

NOTES:
1. SEE DETAIL 2/LM1 FOR PIPE PERFORATIONS.
2. OPERATIONS:
THE EXPOSED TYPE GT-S GEOTEXTILE SHALL BE REMOVED PRIOR TO THE PLACEMENT OF WASTE OVER THAT PORTION OF THE GRAVEL COLUMN.

GRAVEL COLUMN CROSS SECTIONS
DETAIL 1/LM1
NOT TO SCALE



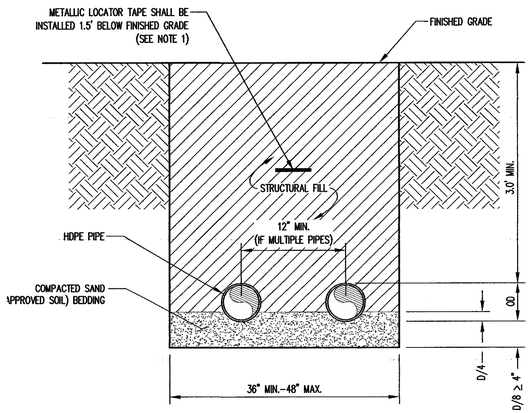
SIDE RISERS



NOTE:
1. ORIENT PIPE AS SHOWN.

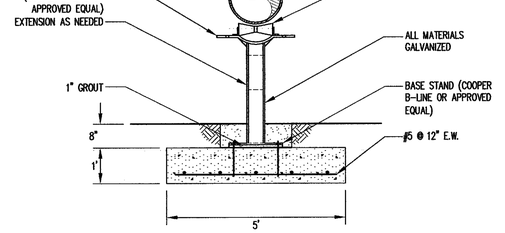
LEACHATE COLLECTION PIPING

HDPE PIPE PERFORATIONS
DETAIL 2/LM1
NOT TO SCALE

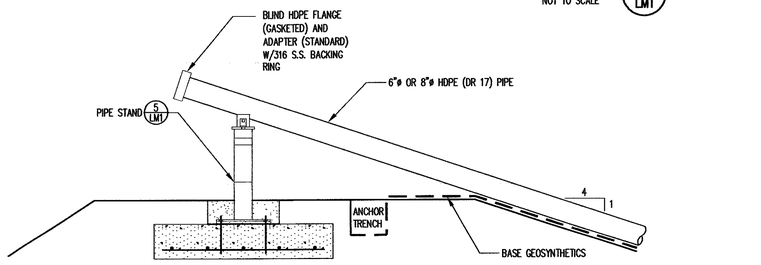


NOTE:
1. ALTERNATIVELY USE ANOTHER APPROVED LOCATOR DEVICE.

HDPE PIPE BEDDING
DETAIL 3/LM1
NOT TO SCALE



PIPE STAND
DETAIL 5/LM1
NOT TO SCALE



NOTE:
1. SOME LAYERS NOT SHOWN FOR CLARITY.
2. AN ALTERNATE SUPPORT MAY BE ALLOWED IF APPROVED BY THE ENGINEER.
3. CLEANOUT LOCATION SHALL BE AS SHOWN AND PROVIDE CLEAR ACCESS FROM PERIMITER CHANNEL AND FROM ANCHOR TRENCH. FINAL LOCATIONS SHALL BE FIELD VERIFIED AND APPROVED BY THE OWNER.

LEACHATE COLLECTION CLEANOUT
DETAIL 4/LM1
NOT TO SCALE

NO.	DATE	REVISION
2	3/07	ISSUED FOR CONSTRUCTION
3	1/10/08	RECORD ISSUE

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023002 STACEY K. SMITH

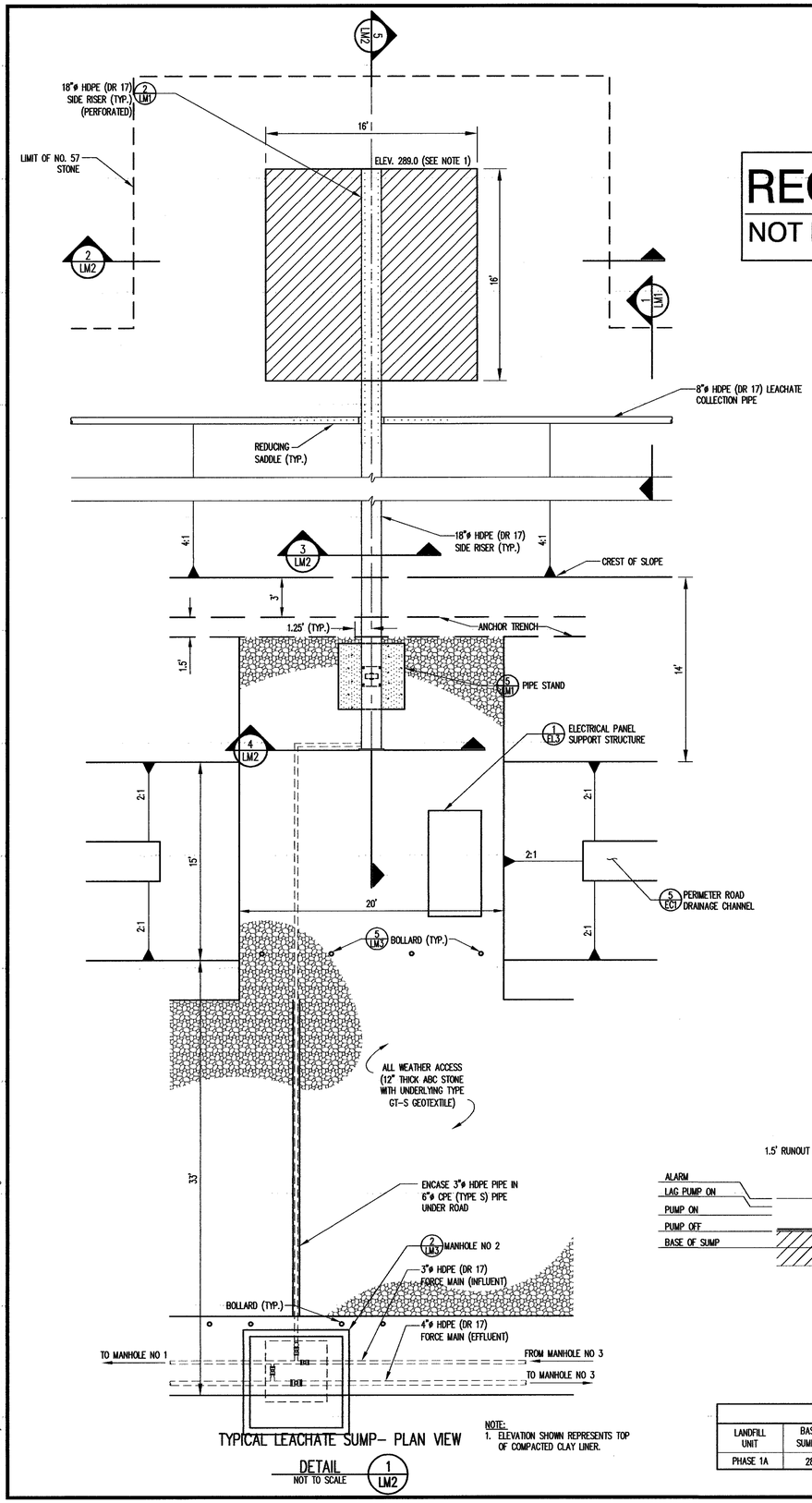
PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
LEACHATE MANAGEMENT
SYSTEM DETAILS
(SHEET 1 OF 4)

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-D0121	
SHEET NO.	DRAWING NO.
14	LM1

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheet\WAKE-D0121.dwg - 11/30/2007 8:43 AM

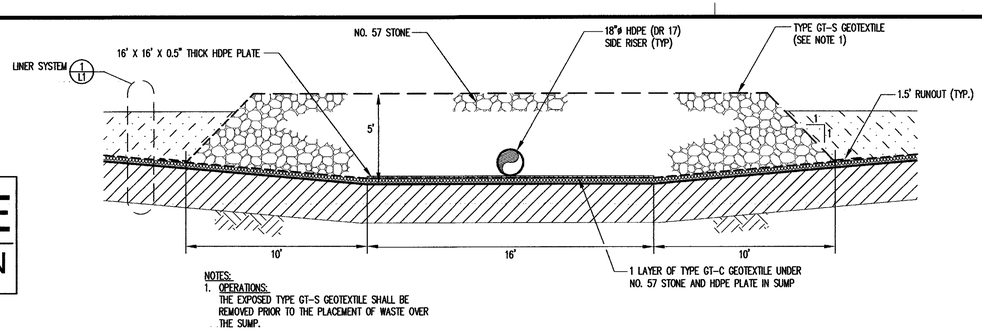
RECORD ISSUE
NOT FOR CONSTRUCTION



TYPICAL LEACHATE SUMP– PLAN VIEW

DETAIL 1 LM2 NOT TO SCALE

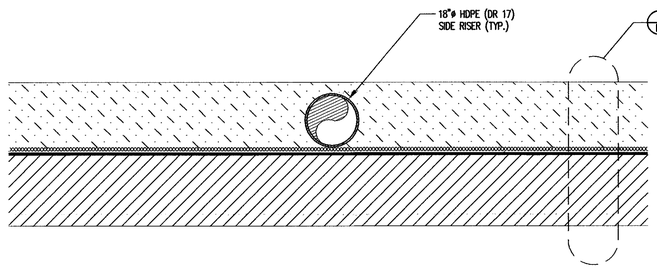
NOTE:
1. ELEVATION SHOWN REPRESENTS TOP OF COMPACTED CLAY LINER.



NOTES:
1. OPERATIONS:
THE EXPOSED TYPE GT-S GEOTEXTILE SHALL BE REMOVED PRIOR TO THE PLACEMENT OF WASTE OVER THE SUMP.

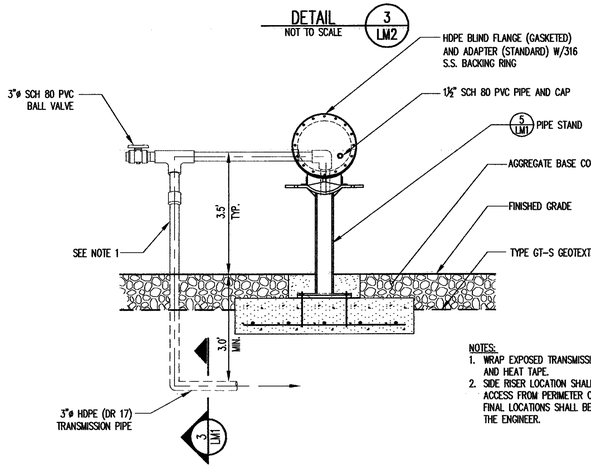
LEACHATE SUMP – TYPICAL CROSS SECTION

DETAIL 2 LM2 NOT TO SCALE



LEACHATE SUMP – TYPICAL CROSS SECTION OF SIDE RISER PIPES ON SLOPE

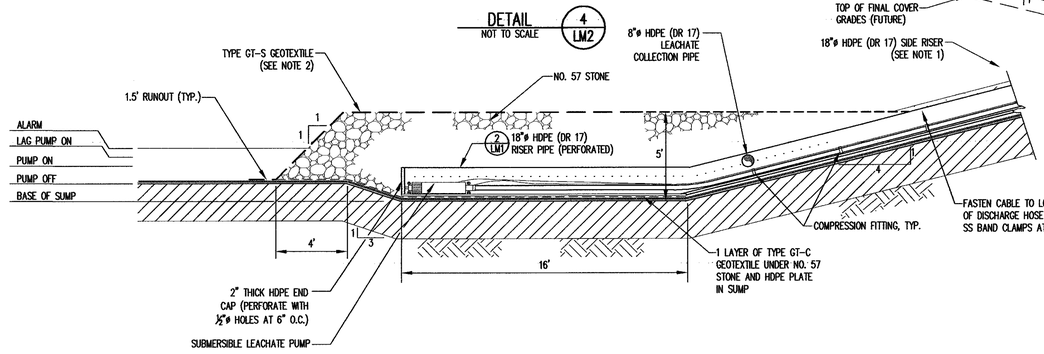
DETAIL 3 LM2 NOT TO SCALE



NOTES:
1. WRAP EXPOSED TRANSMISSION PIPE AND FITTINGS WITH INSULATION AND HEAT TAPE.
2. SIDE RISER LOCATION SHALL BE AS SHOWN AND PROVIDE CLEAN ACCESS FROM PERIMETER CHANNEL AND FROM ANCHOR TRENCH. FINAL LOCATIONS SHALL BE FIELD VERIFIED AND APPROVED BY THE ENGINEER.

SIDE RISER – FRONT VIEW

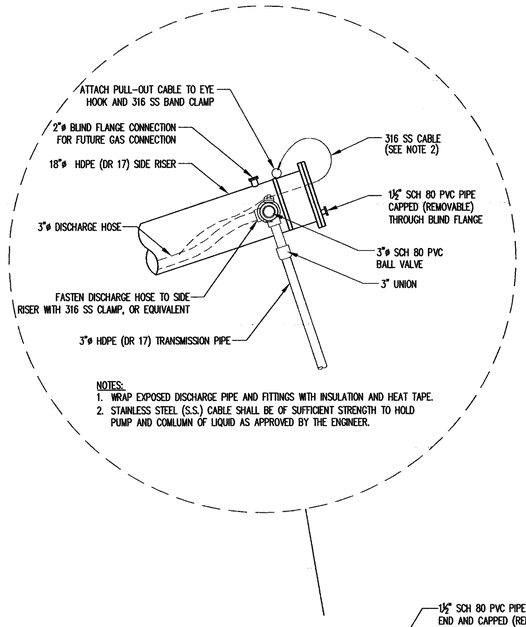
DETAIL 4 LM2 NOT TO SCALE



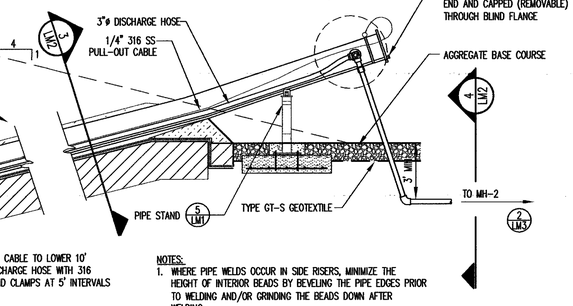
SUMP SCHEDULE					
LANDFILL UNIT	BASE OF SUMP (EL.)	PUMP OFF (EL.)	PUMP ON (EL.)	LAG PUMP ON (EL.)	ALARM (EL.)
PHASE 1A	289.0'	290.0'	291.0'	291.5'	292.0'

LEACHATE SUMP – SECTION THROUGH LEACHATE COLLECTION SIDE RISER

DETAIL 5 LM2 NOT TO SCALE



NOTES:
1. WRAP EXPOSED DISCHARGE PIPE AND FITTINGS WITH INSULATION AND HEAT TAPE.
2. STAINLESS STEEL (S.S.) CABLE SHALL BE OF SUFFICIENT STRENGTH TO HOLD PUMP AND COMLUMN OF LIQUID AS APPROVED BY THE ENGINEER.



NOTES:
1. WHERE PIPE WELDS OCCUR IN SIDE RISERS, MINIMIZE THE HEIGHT OF INTERIOR BEADS BY BEVELING THE PIPE EDGES PRIOR TO WELDING AND/OR GRINDING THE BEADS DOWN AFTER WELDING.
2. OPERATIONS:
THE EXPOSED TYPE GT-S GEOTEXTILE SHALL BE REMOVED PRIOR TO THE PLACEMENT OF WASTE OVER THE SUMP.

REVISION			
NO.	DATE		
2	3/07	ISSUED FOR CONSTRUCTION	
8	1/10/08	RECORD ISSUE	

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

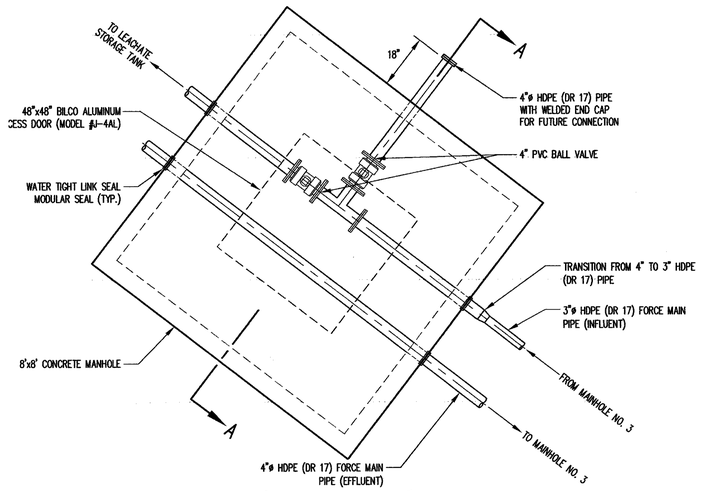
SEAL 023002 ENGINEER STACEY A. HUMPHREY NORTH CAROLINA PROFESSIONAL

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

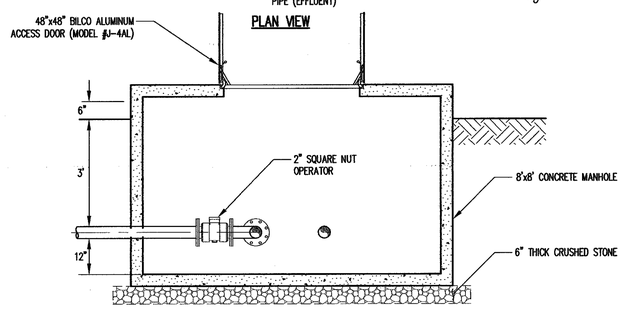
DRAWING TITLE:
LEACHATE MANAGEMENT SYSTEM DETAILS (SHEET 2 OF 4)

DESIGNED BY: S.A.S.	DRAWN BY: C.T.J.
CHECKED BY: S.A.S.	PROJECT NO.: SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0122	
SHEET NO. 15	DRAWING NO. LM2

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0122.dwg - 11/20/2007 10:40 AM



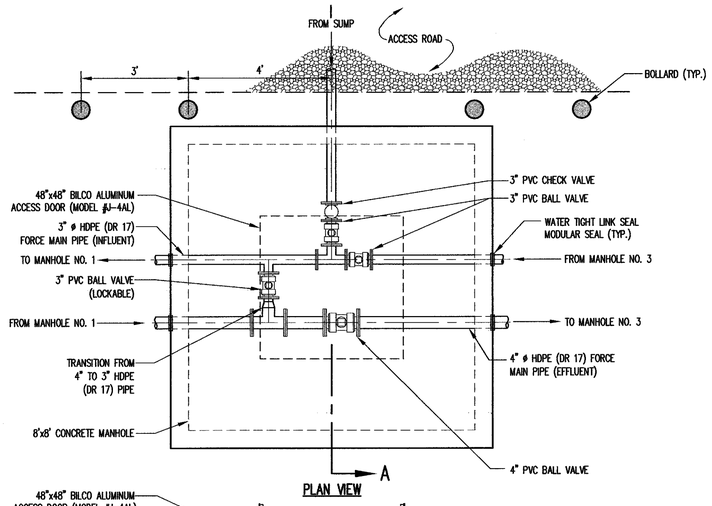
PLAN VIEW



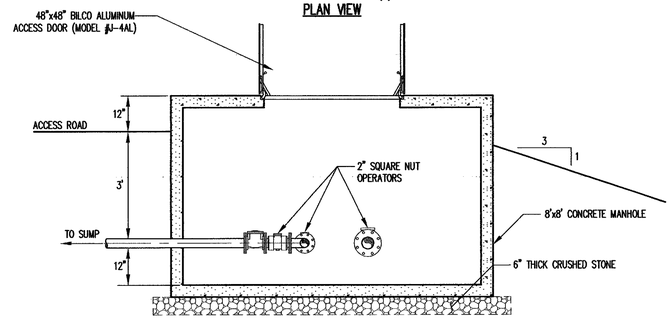
SECTION A-A

MANHOLE NO 1

DETAIL 1 LM3 — NOT TO SCALE



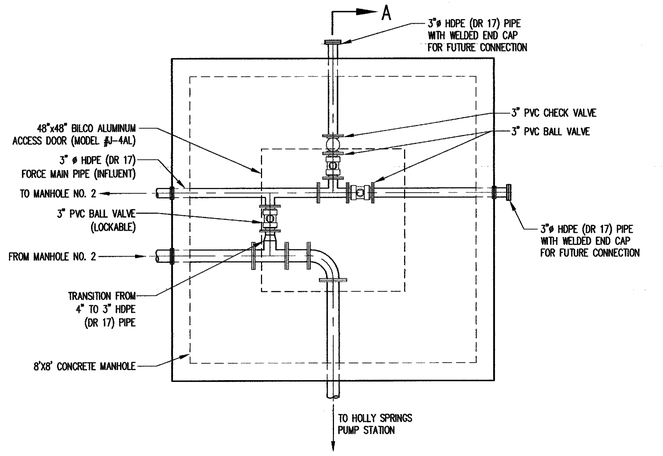
PLAN VIEW



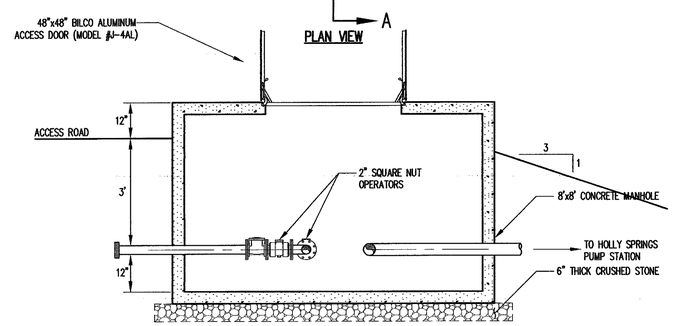
SECTION A-A

MANHOLE NO 2

DETAIL 2 LM3 — NOT TO SCALE



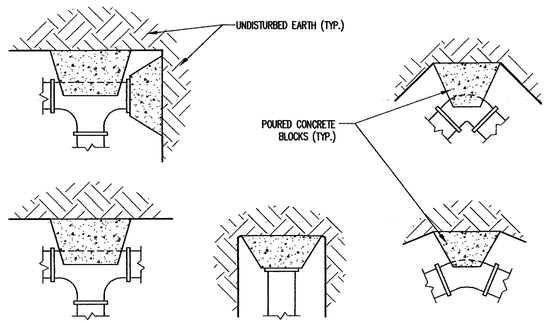
PLAN VIEW



SECTION A-A

MANHOLE NO 3

DETAIL 3 LM3 — NOT TO SCALE



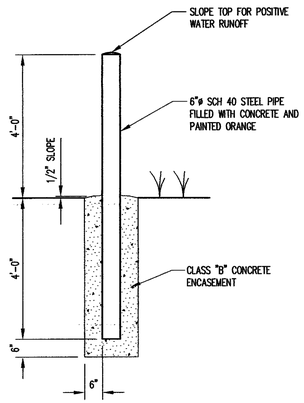
NOTES:
1. THESE DETAILS ARE FOR BOTH VERTICALLY AND HORIZONTALLY LAID PIPE.
2. POURED IN PLACE CONCRETE SHALL BE CLASS B.
3. LEAVE JOINTS CLEAR OF CONCRETE FOR EASY ACCESS.
4. POLYETHYLENE SHALL BE WRAPPED AROUND FITTINGS WHERE CONCRETE BLOCKING WILL EVENTUALLY BE REMOVED.
5. THE CRITICAL CONDITION OF UNDISTURBED EARTH IS ANTICIPATED TO BE SILTY SAND.
6. FITTING FACTORS:
   - 90° – 1.41
   - PLUG – 1.00
   - 45° – 0.77
   - 22 1/2° – 0.39
   - 11 1/4° – 0.20

REQUIRED AREA OF BLOCK FACE EARTH BEARING (B) SHALL BE FIGURED AS FOLLOWS WHERE:
- B = AREA OF BLOCK FACE ($FT.^2$)
- A = AREA OF PIPE DIA. IN SQ. IN.
- P = DESIGN WORKING PRESS, PSI.
- C = FITTING FACTOR

$$B = \frac{P \cdot A \cdot C}{2000}$$

THRUST BLOCKS

DETAIL 4 LM3 — NOT TO SCALE



BOLLARD

DETAIL 5 LM3 — NOT TO SCALE

RECORD ISSUE
NOT FOR CONSTRUCTION

NO.	DATE	REVISION
2	3/07	ISSUED FOR CONSTRUCTION
8	1/10/08	RECORD ISSUE

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

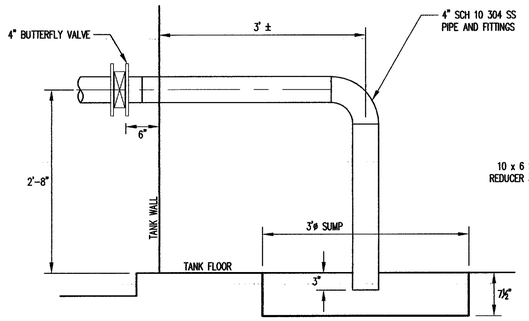
PROFESSIONAL ENGINEER SEAL 023002 STACEY A. SMITH

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

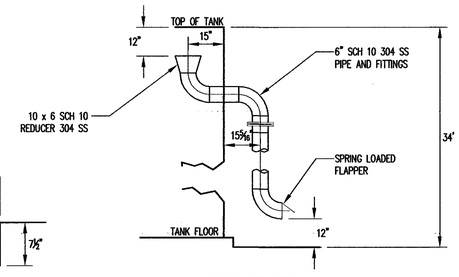
DRAWING TITLE:
LEACHATE MANAGEMENT SYSTEM DETAILS (SHEET 3 OF 4)

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-D0123	
SHEET NO.	DRAWING NO.
16	LM3

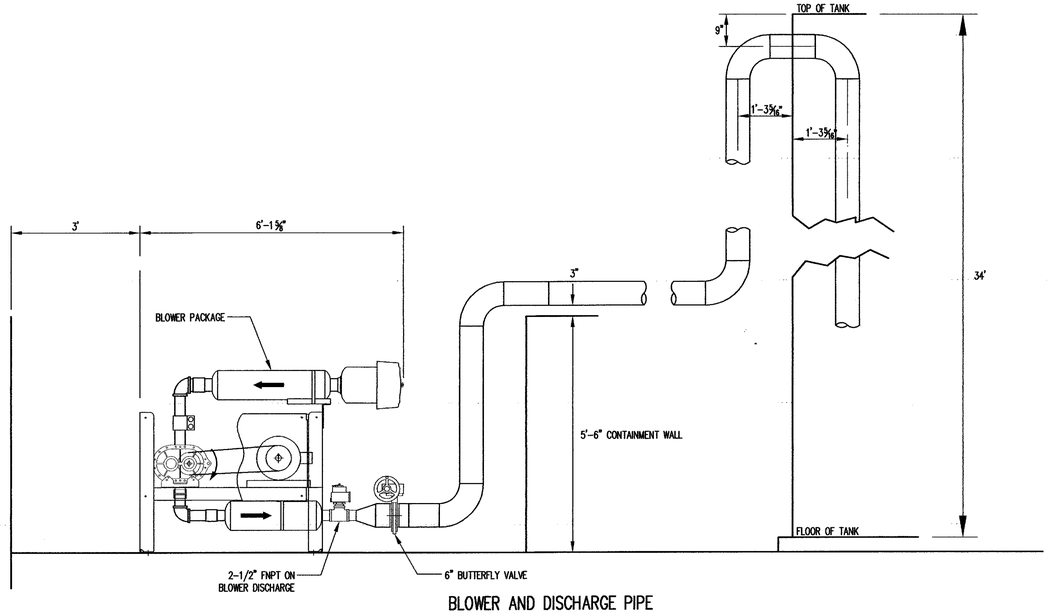
G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0123.dwg – 11/30/2007 1:08 PM



PUMP SUCTION IN TANK

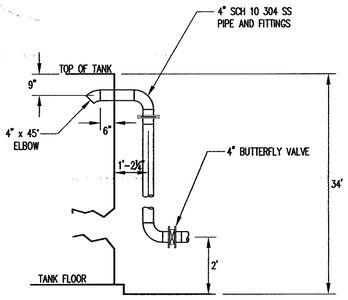


OVERFLOW DETAIL

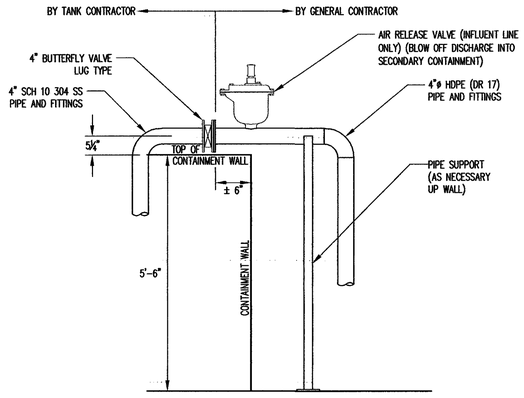


BLOWER AND DISCHARGE PIPE

DETAIL 3 / LM4 — NOT TO SCALE



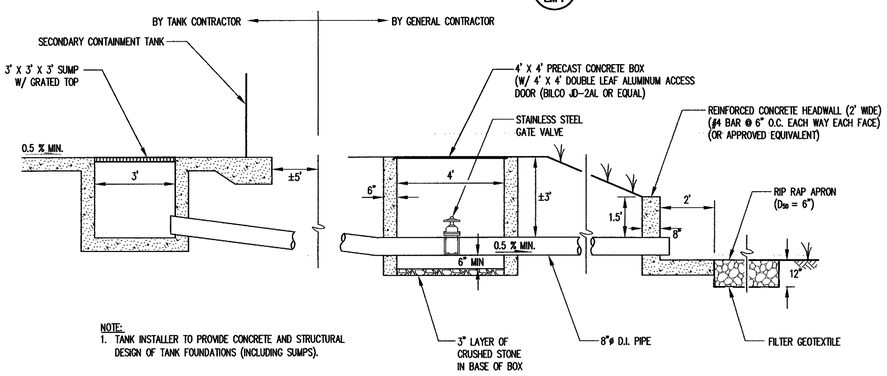
INFLUENT DETAIL



PIPE OVER SECONDARY TANK

TYPICAL PIPING DETAILS

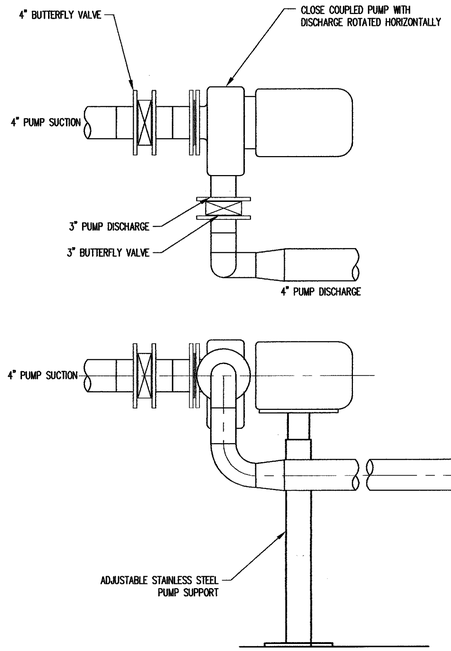
DETAIL 1 / LM4 — NOT TO SCALE



NOTE:
1. TANK INSTALLER TO PROVIDE CONCRETE AND STRUCTURAL DESIGN OF TANK FOUNDATIONS (INCLUDING SUMPS).

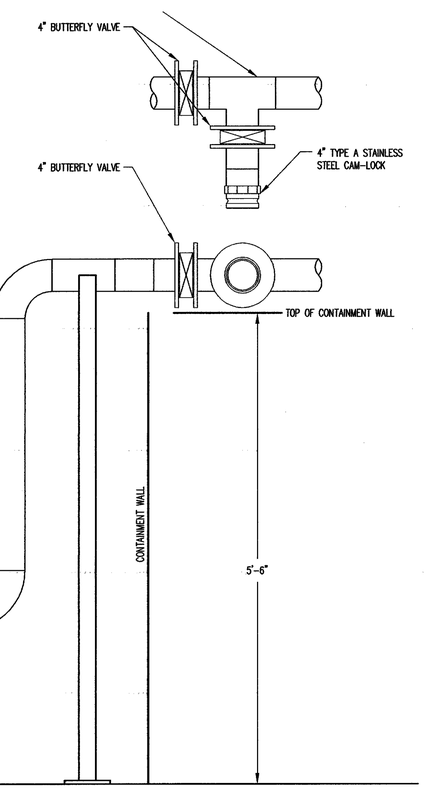
STORMWATER REMOVAL SYSTEM

DETAIL 2 / LM4 — NOT TO SCALE



TRANSFER PUMP

DETAIL 4 / LM4 — NOT TO SCALE



TRUCK LOADING POINT DISCHARGE

RECORD ISSUE
NOT FOR CONSTRUCTION

NO.	DATE	REVISION
2	3/07	ISSUED FOR CONSTRUCTION
8	1/10/08	RECORD ISSUE

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

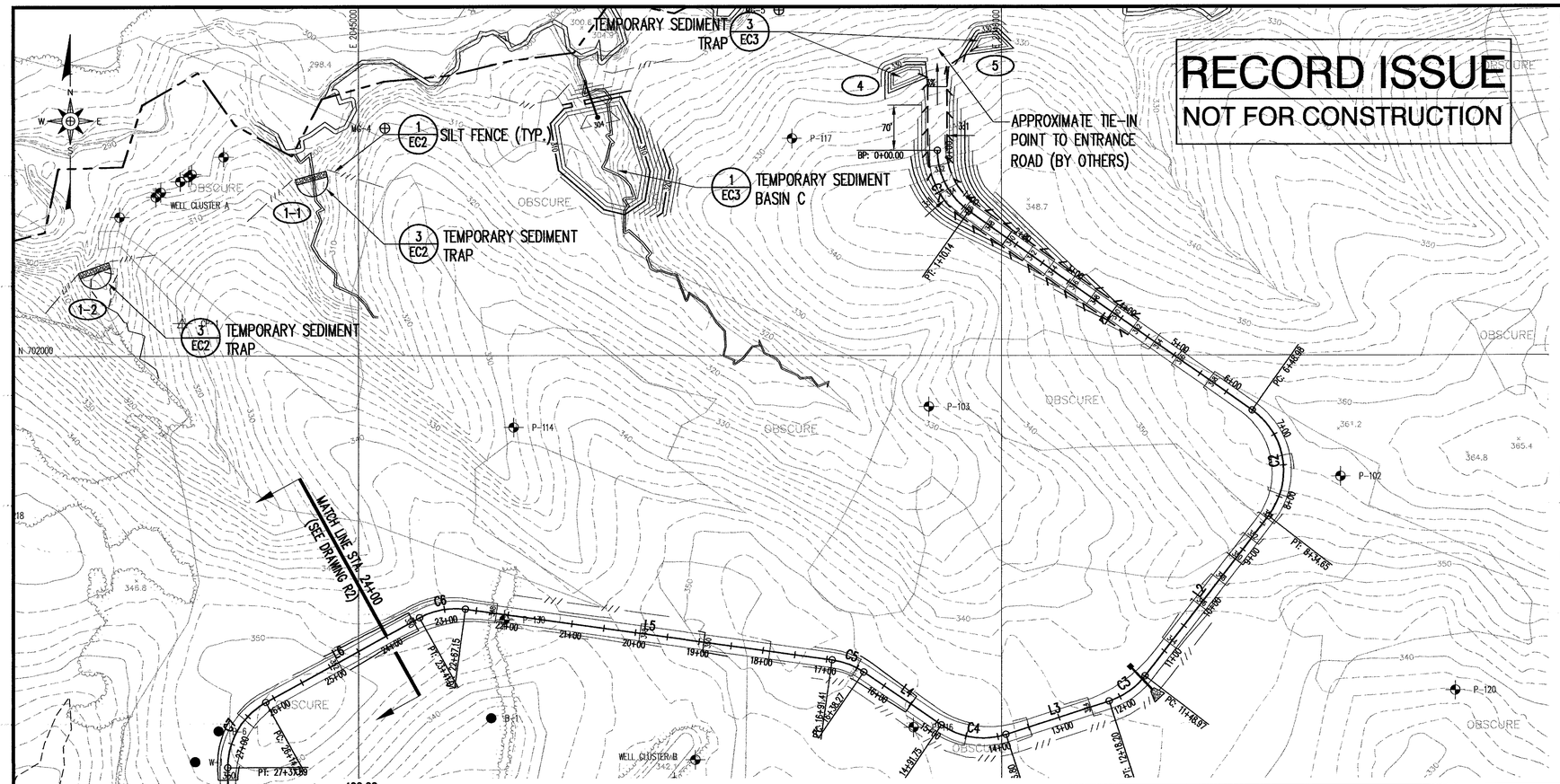
PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD ISSUE

DRAWING TITLE:
LEACHATE MANAGEMENT SYSTEM DETAILS (SHEET 4 OF 4)

DESIGNED BY:	DRAWN BY:
S.A.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
JH	SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0124	
SHEET NO. 17	DRAWING NO. LM4

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0124.dwg - 1/11/2008 4:28 PM

RECORD ISSUE
NOT FOR CONSTRUCTION



LEGEND

- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- LIMITS OF CONSTRUCTION
- PHASE 1A LIMIT OF LINER
- EXISTING SEWER LINE (SEE REFERENCE 4)
- PROPOSED 10' CONTOUR (SEE NOTE 1)
- PROPOSED 2' CONTOUR
- SILT FENCE
- TEMPORARY SEDIMENT TRAP NO.
- ABANDONED MONITORING WELL/PIEZOMETER
- EXISTING MONITORING WELL/PIEZOMETER
- EXISTING CONTROL POINT
- EXISTING SOIL BORING (EMA / WESTINGHOUSE)
- PROPOSED MONITORING WELL
- PROPOSED METHANE MONITORING PROBE

NOTES

1. GRADES SHOWN WITHIN THE PHASE 1A LIMIT OF LINER REPRESENT TOP OF PROTECTIVE COVER.
2. REFER TO DETAILS FOR PROPER TIE IN OF LINER SYSTEM AND PROTECTIVE COVER AROUND THE PERIMETER OF PHASE 1A.

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.
3. THE WETLAND AND STREAM DELINEATIONS PRESENTED ON THIS DRAWING WERE PROVIDED TO GNRA BY HAZEN & SAWYER.
4. EXISTING POWERLINE AND SEWER LINE LOCATIONS FROM DRAWING ENTITLED "APPLICATION FOR DEPARTMENT OF ARMY PERMIT, EXISTING SITE CONDITIONS", DRAWING NO. WL-1, PREPARED BY HAZEN & SAWYER, REVISED 9/06. EXISTING SEWER LINE LOCATIONS WEST OF OAK HALL PUMPING STATION PROVIDED BY SPAULDING AND NORRIS.

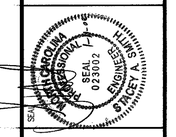
0 100' 200' 300'

30' 20' 10' 0'

NO.	DATE	REVISION
8	1/10/08	RECORD ISSUE
7	5/21/07	UPDATED TOPOGRAPHY; REVISED ROAD PROFILE
6	5/7/07	REVISIONS PER DESIGN MODIFICATION NO. 1
5	3/07	ISSUED FOR CONSTRUCTION
4	2/12/07	ADJUSTED TIE-IN ELEVATION OF ACCESS ROAD PER CDM PLANS

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

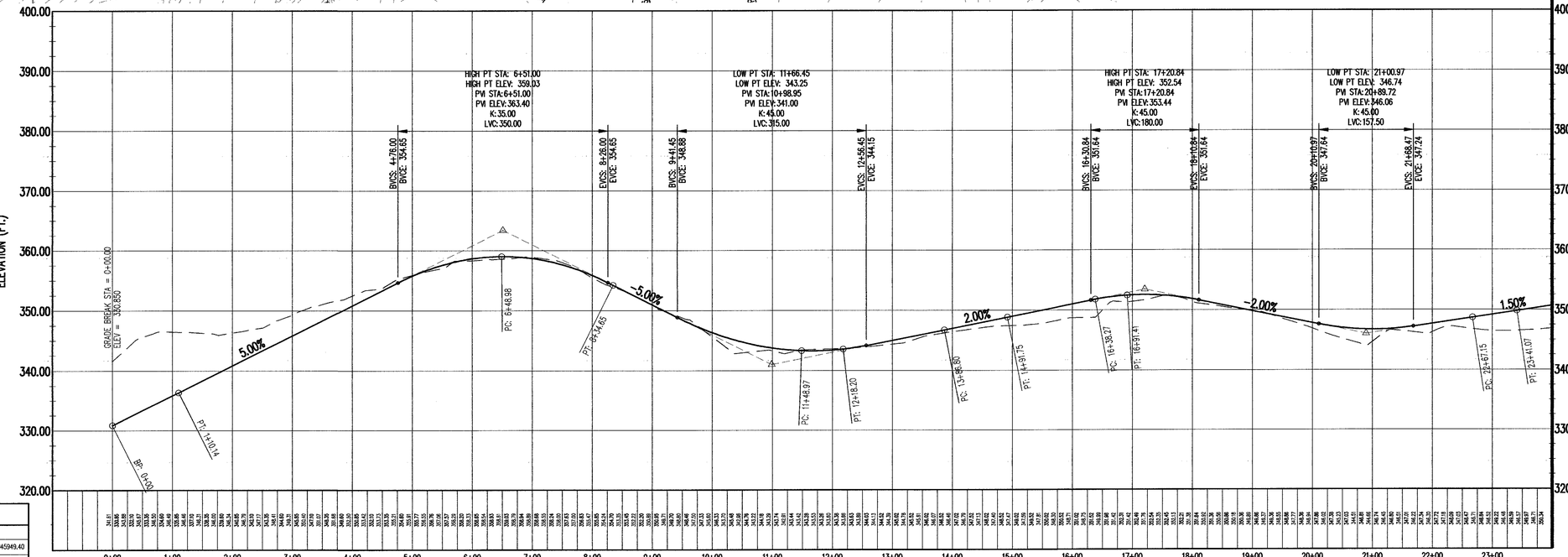


PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
ACCESS ROAD
PLAN AND PROFILE
(SHEET 1 OF 2)

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
JP.	SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0125	
SHEET NO. 18	DRAWING NO. R1

MATCH LINE STA. 24+00 (SEE DRAWING R2)

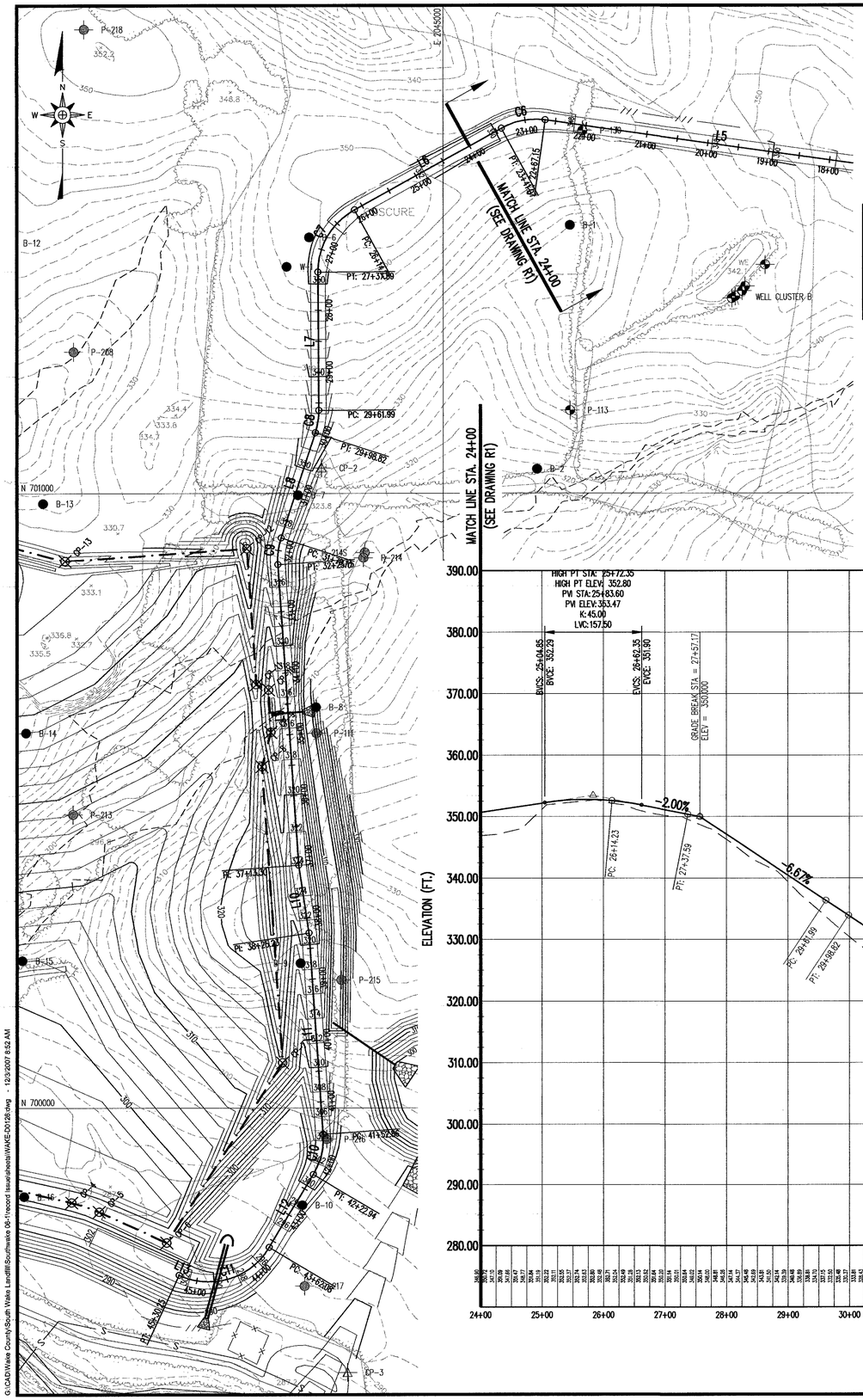


ACCESS ROAD PROFILE (1 / R1)
SCALE: AS SHOWN

ALIGNMENT LINE DATA				
NO.	LENGTH	DIRECTION	START POINT	END POINT
L1	538.84	S54° 52' 19.34"E	N: 702224.52, E: 2045949.40	N: 701914.47, E: 2046390.10
L2	314.32	S37° 38' 02.38"W	N: 701750.19, E: 2046415.00	N: 701501.27, E: 2046223.08
L3	168.61	S72° 07' 33.57"W	N: 701462.05, E: 2046167.30	N: 701410.30, E: 2046006.83
L4	146.51	N55° 35' 02.65"W	N: 701424.88, E: 2045906.54	N: 701507.68, E: 2045785.67
L5	575.74	N82° 03' 50.15"W	N: 701526.71, E: 2045736.55	N: 701606.20, E: 2045166.33
L6	273.17	S61° 06' 29.14"W	N: 701592.99, E: 2045094.89	N: 701461.01, E: 2044855.73

ALIGNMENT CURVE DATA					
CURVE NO.	RADIUS	LENGTH	CHORD DIRECTION	START POINT	END POINT
C1	115.00	110.14	S27° 26' 09.67"E	N: 702318.57, E: 2045900.57	N: 702224.52, E: 2045949.40
C2	115.00	185.67	S8° 37' 08.48"E	N: 701914.47, E: 2046390.10	N: 701750.19, E: 2046415.00
C3	115.00	69.23	S54° 52' 47.98"W	N: 701501.27, E: 2046223.08	N: 701462.05, E: 2046167.30
C4	115.00	104.95	N81° 45' 44.54"W	N: 701410.30, E: 2046006.83	N: 701424.88, E: 2045906.54
C5	115.00	53.15	N68° 49' 26.40"W	N: 701507.68, E: 2045785.67	N: 701526.71, E: 2045736.55
C6	115.00	73.92	S79° 31' 19.49"W	N: 701606.20, E: 2045166.33	N: 701592.99, E: 2045094.89

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0125.dwg - 12/3/2007 8:33 AM



ALIGNMENT LINE DATA				
NO.	LENGTH	DIRECTION	START POINT	END POINT
L6	273.17	S61° 06' 29.14"W	N: 701592.99, E: 2045094.89	N: 701461.01, E: 2044855.73
L7	224.40	S17° 20' 55.09"E	N: 701359.62, E: 2044796.29	N: 701135.23, E: 2044797.66
L8	180.29	S18° 00' 01.27"W	N: 701098.99, E: 2044792.03	N: 700927.53, E: 2044736.32
L9	490.15	S3° 56' 42.65"E	N: 700884.08, E: 2044730.96	N: 700395.09, E: 2044764.68
L10	111.93	S8° 39' 43.85"E	N: 700395.09, E: 2044764.68	N: 700284.44, E: 2044781.54
L11	327.63	S3° 57' 04.68"E	N: 700284.44, E: 2044781.54	N: 699957.58, E: 2044804.12
L12	139.14	S30° 57' 48.78"W	N: 699890.49, E: 2044788.00	N: 699771.18, E: 2044716.42
L13	0.41	N65° 15' 07.00"W	N: 699725.91, E: 2044569.66	N: 699726.08, E: 2044569.29

ALIGNMENT CURVE DATA					
CURVE NO.	RADIUS	LENGTH	CHORD DIRECTION	START POINT	END POINT
C7	115.00	123.35	S30° 22' 47.02"W	N: 701461.01, E: 2044855.73	N: 701359.62, E: 2044796.29
C8	115.00	36.83	S8° 49' 33.09"W	N: 701135.23, E: 2044797.66	N: 701098.99, E: 2044792.03
C9	115.00	44.05	S7° 01' 39.31"W	N: 700927.53, E: 2044736.32	N: 700884.08, E: 2044730.96
C10	115.00	70.08	S13° 30' 22.05"W	N: 699957.58, E: 2044804.12	N: 699890.49, E: 2044788.00
C11	115.00	168.17	S72° 51' 20.89"W	N: 699771.18, E: 2044716.42	N: 699725.91, E: 2044569.66

LEGEND

- EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- LIMITS OF CONSTRUCTION
- PHASE 1A LIMIT OF LINER
- EXISTING SEWER LINE (SEE REFERENCE 4)
- PROPOSED 10' CONTOUR (SEE NOTE 1)
- PROPOSED 2' CONTOUR
- SILT FENCE
- ABANDONED MONITORING WELL/PIEZOMETER
- EXISTING MONITORING WELL/PIEZOMETER
- EXISTING CONTROL POINT
- EXISTING SOIL BORING (EMA / WESTINGHOUSE)
- PROPOSED MONITORING WELL
- PROPOSED METHANE MONITORING PROBE

0 100' 200' 300'

30' 20' 10' 0

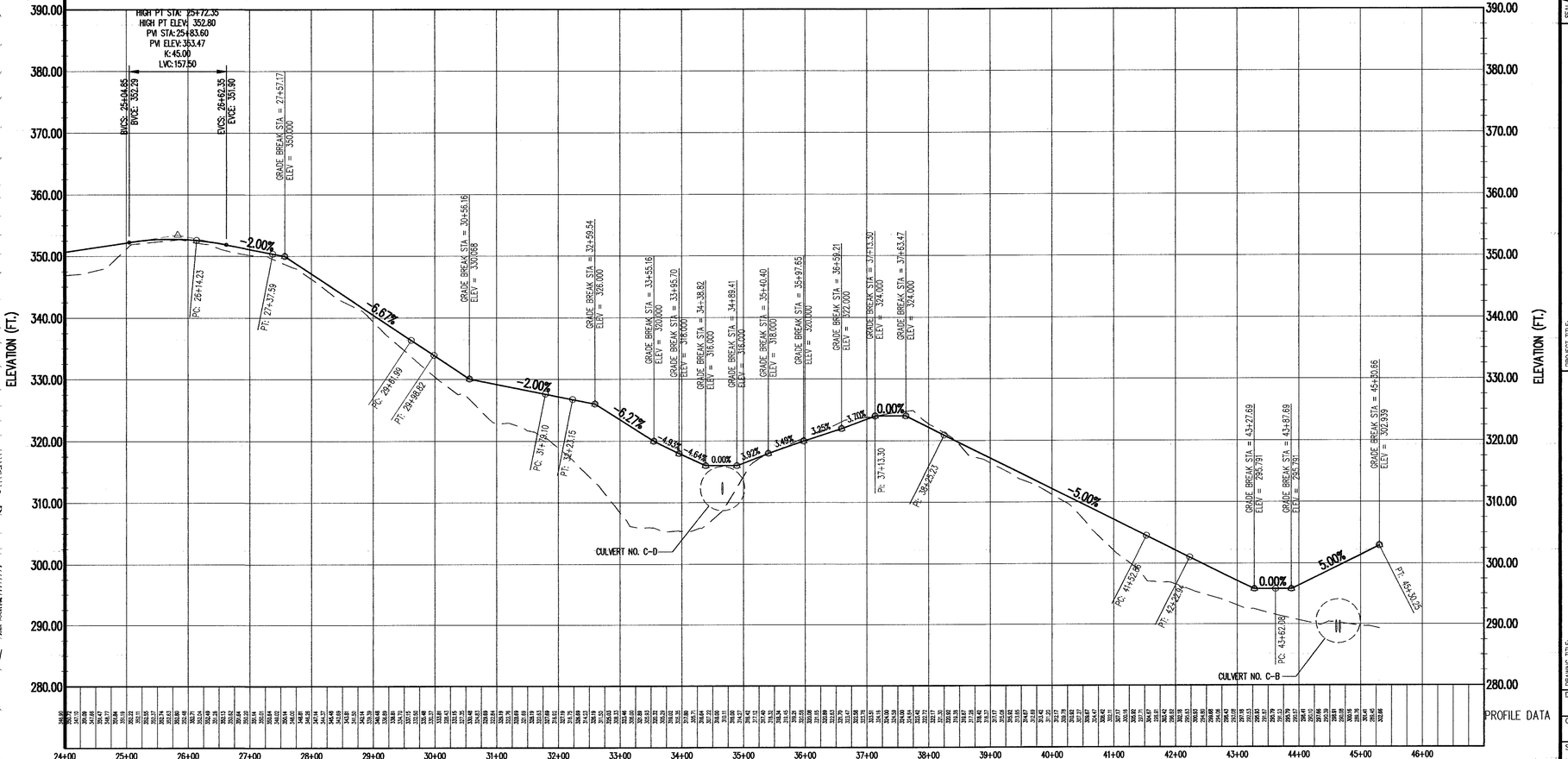
NOTES

1. GRADES SHOWN WITHIN THE PHASE 1A LIMIT OF LINER REPRESENT TOP OF PROTECTIVE COVER.
2. REFER TO DETAILS FOR PROPER TIE IN OF LINER SYSTEM AND PROTECTIVE COVER AROUND THE PERIMETER OF PHASE 1A.

REFERENCES

1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.
3. THE WETLAND AND STREAM DELINEATIONS PRESENTED ON THIS DRAWING WERE PROVIDED TO CWRA BY HAZEN & SAWYER.
4. EXISTING POWERLINE AND SEWER LINE LOCATIONS FROM DRAWING ENTITLED "APPLICATION FOR DEPARTMENT OF ARMY PERMIT, EXISTING SITE CONDITIONS", DRAWING NO. WL-1, PREPARED BY HAZEN & SAWYER, REVISED 9/06. EXISTING SEWER LINE LOCATIONS WEST OF OAK HALL PUMPING STATION PROVIDED BY SPAULDING AND NORRIS.

RECORD ISSUE
NOT FOR CONSTRUCTION



PROFILE
SCALE: AS SHOWN
2
R2

NO.	DATE	REVISION
8	1/10/08	RECORD ISSUE
4	5/21/07	UPDATED TOPOGRAPHY; REVISED ROAD PROFILE
2	3/07	ISSUED FOR CONSTRUCTION

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

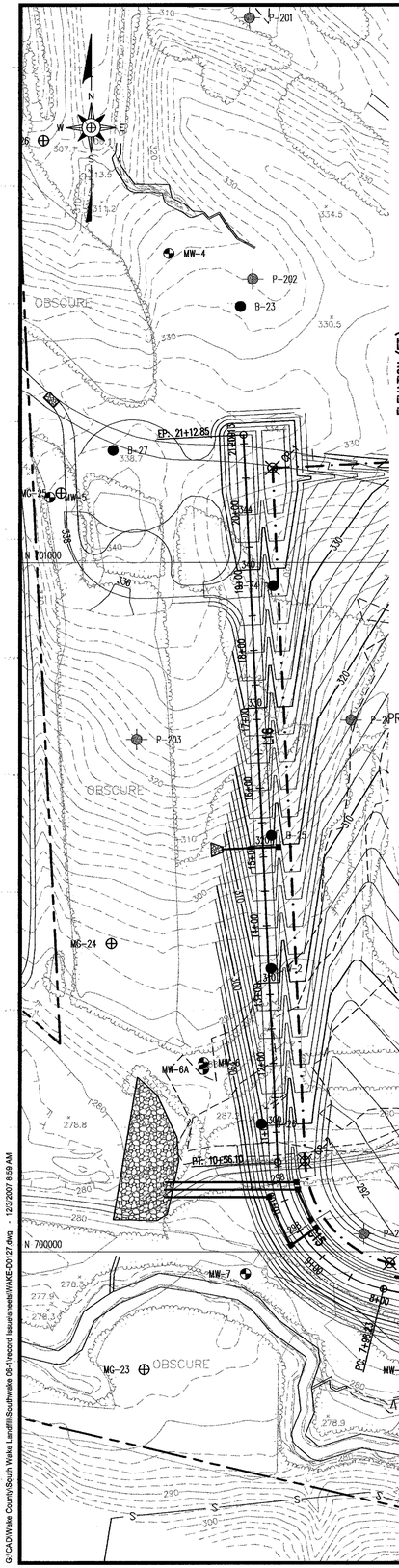
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 023002 STACEY A. NORMAN 1-10-08

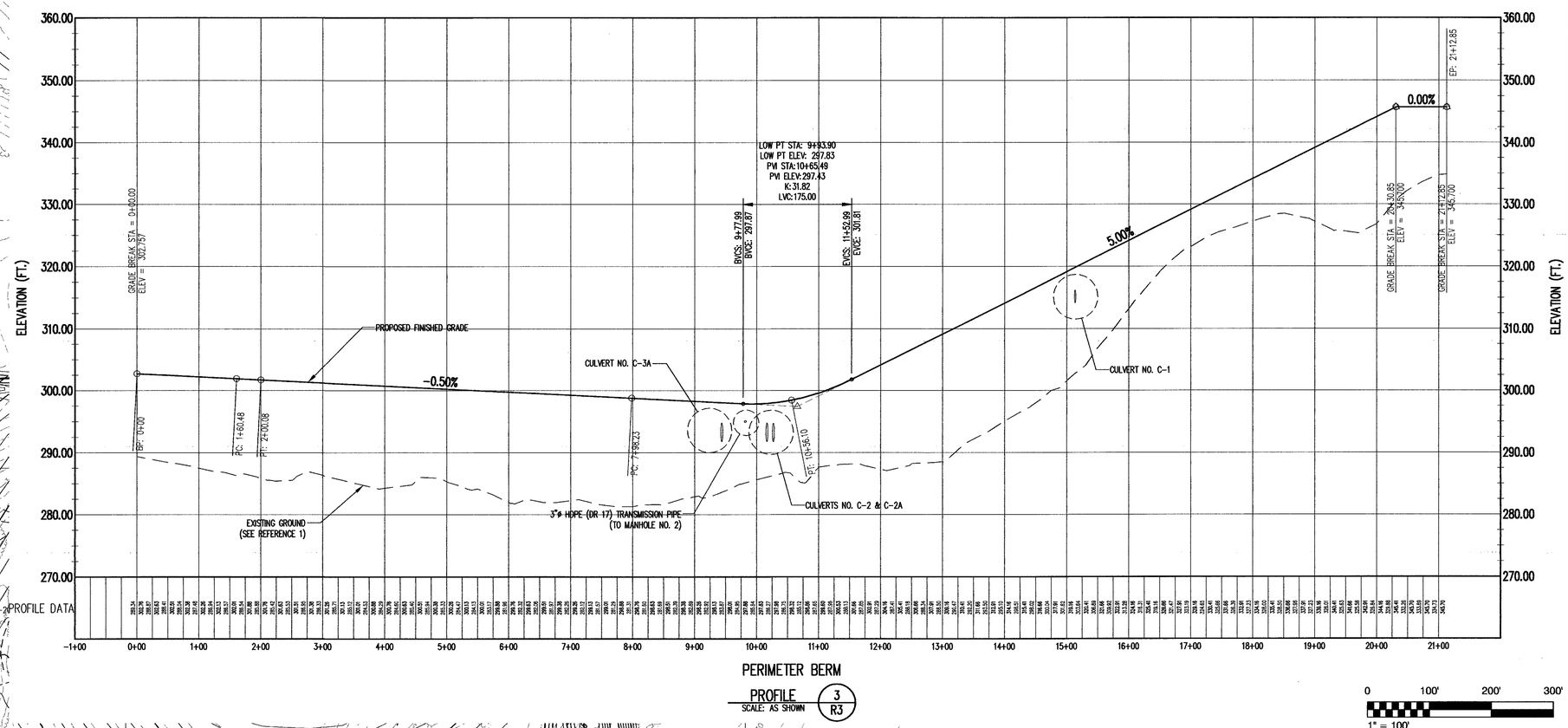
PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
ACCESS ROAD
PLAN AND PROFILE
(SHEET 2 OF 2)

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
S.N.	SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0126	
SHEET NO.: 19	DRAWING NO.: R2

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0126.dwg - 12/3/2007 8:52 AM





ALIGNMENT LINE DATA				
NO.	LENGTH	DIRECTION	START POINT	END POINT
L14	160.48	N65° 15' 07.00"W	N:699726.08, E:2044569.29	N:699793.26, E:2044423.55
L15	598.16	N76° 35' 43.08"W	N:699806.18, E:2044386.19	N:699944.85, E:2043804.33
L16	1056.74	N2° 4.5' 15.15"W	N:700129.91, E:2043650.92	N:701185.46, E:2043600.76

ALIGNMENT CURVE DATA					
CURVE NO.	RADIUS	LENGTH	CHORD DIRECTION	START POINT	END POINT
C14	200.00	39.60	N70° 55' 25.04"W	N:699793.26, E:2044423.55	N:699806.18, E:2044386.19
C15	200.00	257.87	N39° 39' 29.11"W	N:699944.85, E:2043804.33	N:700129.91, E:2043650.92

LEGEND

- 150 — EXISTING 10' CONTOUR (SEE REFERENCE 1)
- EXISTING 2' CONTOUR
- APPROXIMATE PROPERTY LINE (SEE REFERENCE 2)
- LIMITS OF CONSTRUCTION
- PHASE 1A LIMIT OF LINER
- S — EXISTING SEWER LINE (SEE REFERENCE 4)
- 300 — PROPOSED 10' CONTOUR (SEE NOTE 1)
- PROPOSED 2' CONTOUR
- ABANDONED MONITORING WELL/PIEZOMETER
- EXISTING MONITORING WELL/PIEZOMETER
- EXISTING CONTROL POINT
- EXISTING SOIL BORING (EMA / WESTINGHOUSE)
- PROPOSED MONITORING WELL
- PROPOSED METHANE MONITORING PROBE

RECORD ISSUE
NOT FOR CONSTRUCTION

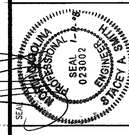
NOTES
1. GRADES SHOWN WITHIN THE PHASE 1A LIMIT OF LINER REPRESENT TOP OF PROTECTIVE COVER.
2. REFER TO DETAILS FOR PROPER TIE IN OF LINER SYSTEM AND PROTECTIVE COVER AROUND THE PERIMETER OF PHASE 1A.

REFERENCES
1. EXISTING TOPOGRAPHY FROM AERIAL PHOTOGRAPHY DATED FEBRUARY 15, 2007, PERFORMED BY GEODATA CORPORATION, ZEBULON, NC, BASED ON STATE PLANE COORDINATE SYSTEM NAD 83, AND VERTICAL DATUM NAVD 88. REMAINING EXISTING TOPOGRAPHY PROVIDED BY PIEDMONT AERIAL SURVEYS, OCTOBER 1991.
2. PROPERTY LINE SURVEY PROVIDED BY WAKE COUNTY, DECEMBER 1996.
3. THE WETLAND AND STREAM DELINEATIONS PRESENTED ON THIS DRAWING WERE PROVIDED TO GNRA BY HAZEN & SAWYER.
4. EXISTING POWERLINE AND SEWER LINE LOCATIONS FROM DRAWING ENTITLED "APPLICATION FOR DEPARTMENT OF ARMY PERMIT, EXISTING SITE CONDITIONS", DRAWING NO. WL-1, PREPARED BY HAZEN & SAWYER, REVISED 9/06. EXISTING SEWER LINE LOCATIONS WEST OF OAK HALL PUMPING STATION PROVIDED BY SPAULDING AND NORRIS.

ELEVATION (FT.)	NO.	REVISION
1/10/08	5	RECORD ISSUE
5/21/07	4	UPDATED TOPOGRAPHY
3/07	3	ISSUED FOR CONSTRUCTION
2/12/07	1	REVISED CULVERT LOCATIONS IN PLAN & PROFILE
DATE	NO.	REVISION

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

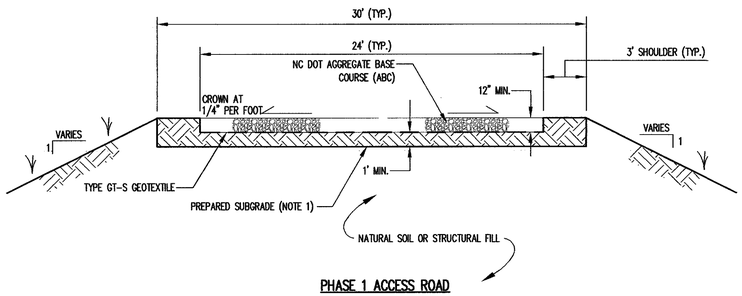


PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

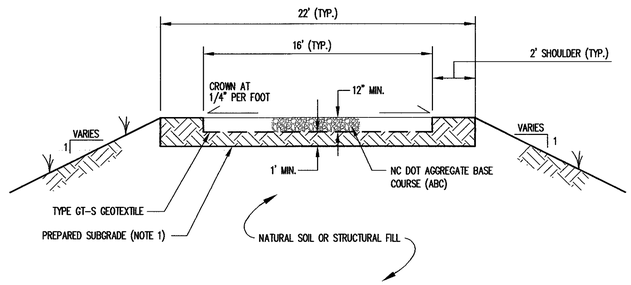
DRAWING TITLE:
PERIMETER BERM ACCESS ROAD
PLAN AND PROFILE

DESIGNED BY: P.K.S.	DRAWN BY: C.T.J.
CHECKED BY: SAS	PROJECT NO.: SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0127	
SHEET NO. 20	DRAWING NO. R3

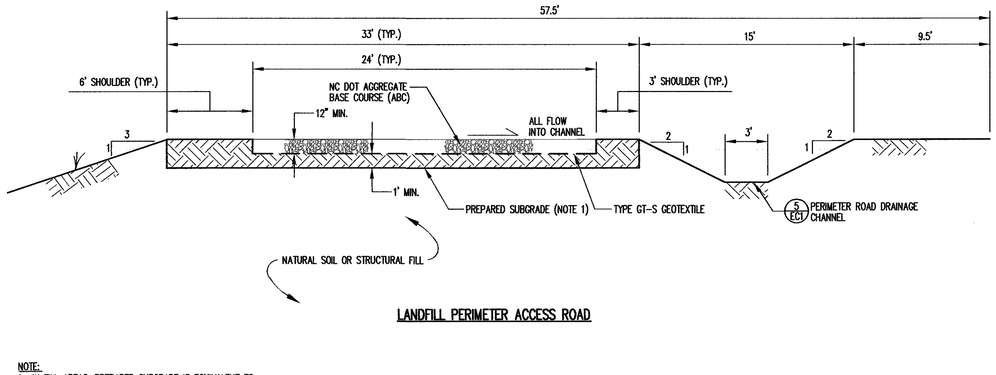
G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0127.dwg - 12/3/2007 8:59 AM



PHASE 1 ACCESS ROAD



SERVICE ROAD – SINGLE LANE

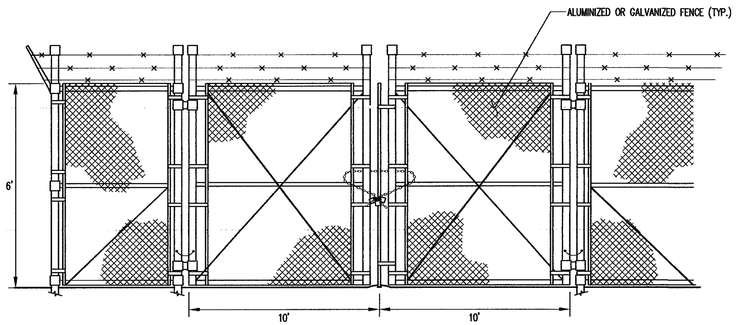


LANDFILL PERIMETER ACCESS ROAD

NOTE:
1. IN FILL AREAS, PREPARED SUBGRADE IS EQUIVALENT TO STRUCTURAL FILL. FOR CUT AREAS REMOVE AND REPLACE WITH STRUCTURAL FILL (SEE PROJECT SPECIFICATIONS.)

TYPICAL ROADWAY CROSS SECTIONS

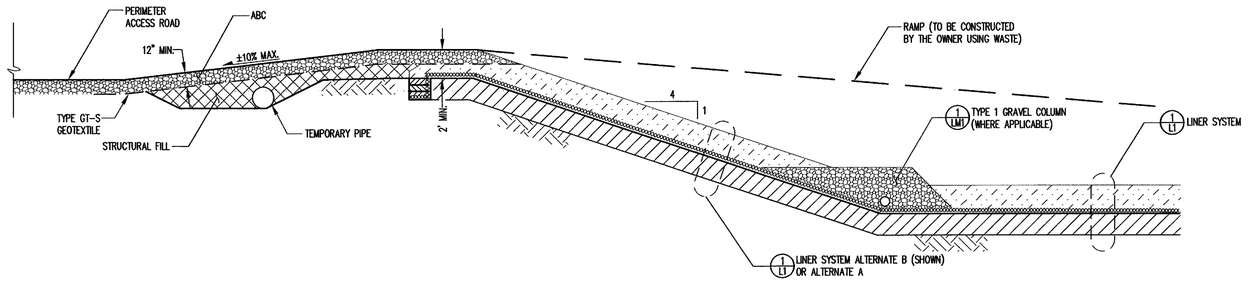
DETAIL 1 / R4 — NOT TO SCALE



NOTE:
1. SPACING BETWEEN POSTS SHALL BE A MAXIMUM OF 10 FEET.

CHAIN LINK FENCE

DETAIL 2 / R4 — NOT TO SCALE



ACCESS RAMP

DETAIL 3 / R4 — NOT TO SCALE

NO.	DATE	REVISION
2	3/07	ISSUED FOR CONSTRUCTION
1	1/10/08	RECORD ISSUE

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

SEAL 023002 ENGINEER STACEY A. LUNDY NORTH CAROLINA PROFESSIONAL

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
ROADWAY AND MISCELLANEOUS DETAILS

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
SD	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-D0128	
SHEET NO.	DRAWING NO.
21	R4

RECORD ISSUE
NOT FOR CONSTRUCTION

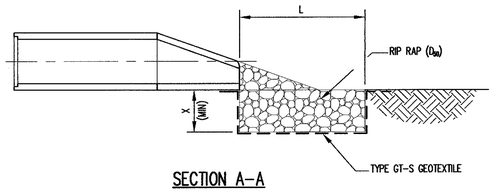
G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0128.dwg - 12/3/2007 8:17 AM

NOT USED

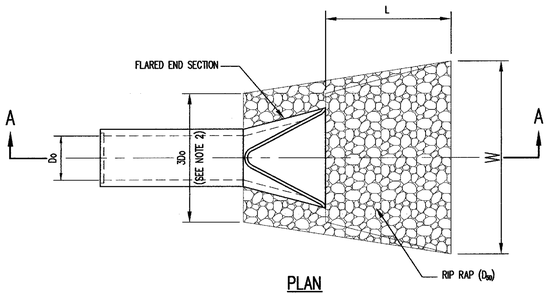
DETAIL 1 / EC1
NOT TO SCALE

NOT USED

DETAIL 3 / EC1
NOT TO SCALE



SECTION A-A



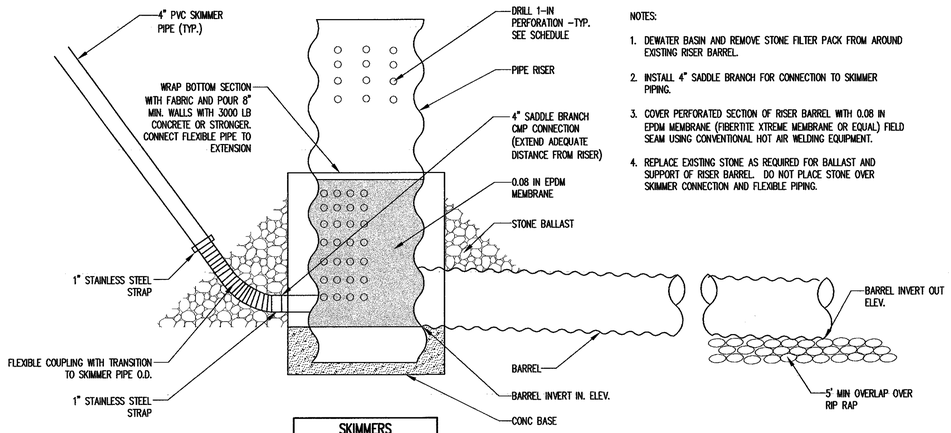
PLAN

NOTES:
1. D_{50} REFERS TO THE MINIMUM REQUIRED AVERAGE STONE SIZE.
2. FOR MORE THAN ONE PIPE, EXTEND RIP RAP 1.0' MIN. BEYOND OUTSIDE EDGES OF PIPES.

RIP RAP OUTLET PROTECTION

DETAIL 4 / EC1
NOT TO SCALE

RIP RAP OUTLET PROTECTION SCHEDULE					
PIPE	D_o	L	W	X	D_{50}
TEMP. BASIN A BARREL	36"	30'	33'	24"	12"
C-1	24"	12'	14'	24"	6"
C-A	42"	34'	41'	24"	12"
C-B	24" (2)	24'	28'	24"	6"
C-D	24"	8'	10'	24"	6"



NOTES:
1. DEWATER BASIN AND REMOVE STONE FILTER PACK FROM AROUND EXISTING RISER BARREL.
2. INSTALL 4" SADDLE BRANCH FOR CONNECTION TO SKIMMER PIPING.
3. COVER PERFORATED SECTION OF RISER BARREL WITH 0.08 IN EPDM MEMBRANE (FIBERTITE XTREME MEMBRANE OR EQUAL) FIELD SEAM USING CONVENTIONAL HOT AIR WELDING EQUIPMENT.
4. REPLACE EXISTING STONE AS REQUIRED FOR BALLAST AND SUPPORT OF RISER BARREL. DO NOT PLACE STONE OVER SKIMMER CONNECTION AND FLEXIBLE PIPING.

SKIMMERS	
BASIN	ORIFICE SIZE (IN.)
1	3
2	1 1/2

NOTE: LOCATE ORIFICE AT SKIMMER UNIT CONNECTION TO SKIMMER PIPE

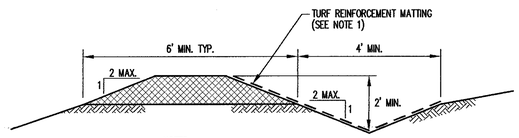
PERFORATIONS			
DIAMETER (IN.)	SPACING (IN.)	PERFORATIONS PER ROW (EACH)	NUMBER OF ROWS
1	3.0	15	4

EXISTING RISER BARREL MODIFICATION

DETAIL 2 / EC1
NOT TO SCALE

DRAINAGE CHANNEL SCHEDULE						
DRAINAGE CHANNEL NO.	LINING	B	D	M	D_{50}	X
PERIMETER ROAD DRAINAGE CHANNEL	TRM*	3.0'	3.0'	2	–	–
TEMP. BASIN A DISCHARGE CHANNEL	TRM	30.0'	1.0'	2	–	–
DC-A	ECB**	10.0'	2.0'	2	–	–
DC-B	ECB	10.0'	2.0'	2	–	–
DC-1	ECB	3.0'	2.0'	3	–	–
DC-2	TRM	10.0'	2.0'	3	–	–

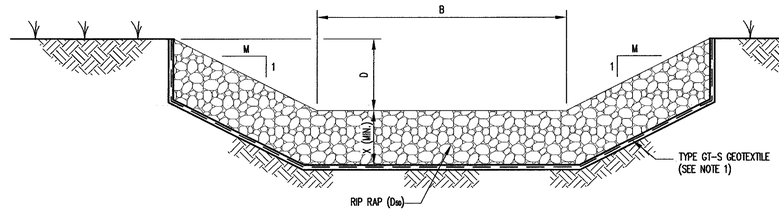
*TRM – TURF REINFORCEMENT MATTING
**ECB – EROSION CONTROL BLANKET
NOTE: ALL CHANNELS SHALL HAVE A MINIMUM SLOPE OF 0.5%



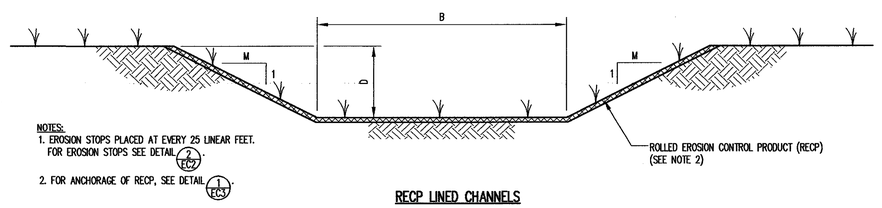
NOTES:
1. SEE DETAIL 1/EC1 FOR RECP INSTALLATION DETAILS.

DIVERSION CHANNEL

DETAIL 6 / EC1
NOT TO SCALE



RIP RAP LINED CHANNELS

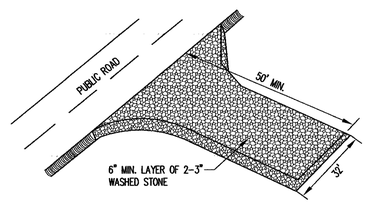


NOTES:
1. EROSION STOPS PLACED AT EVERY 25 LINEAR FEET. FOR EROSION STOPS SEE DETAIL 2/EC1.
2. FOR ANCHORAGE OF RECP, SEE DETAIL 1/EC1.

RECP LINED CHANNELS

DRAINAGE CHANNEL DETAILS

DETAIL 5 / EC1
NOT TO SCALE



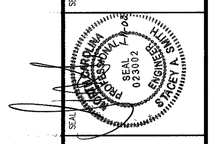
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE - EXIT

DETAIL 7 / EC1
NOT TO SCALE

REVISION			
NO.	DATE		
8	1/10/08	RECORD ISSUE	
3	5/7/07	REVISIONS PER DESIGN MODIFICATION NO. 1	
2	3/07	ISSUED FOR CONSTRUCTION	
1	2/12/06	REVISED DETAILS 1/EC1 & 4/EC1	

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL



PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

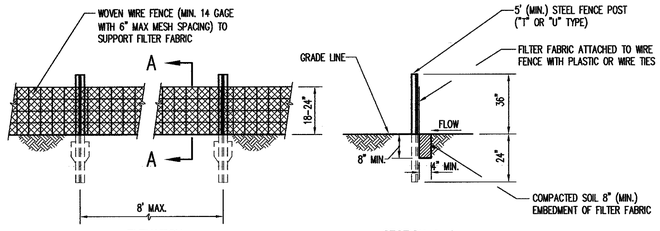
DRAWING TITLE:
EROSION AND SEDIMENTATION CONTROL DETAILS (SHEET 1 OF 3)

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
PKS	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-D0129	
SHEET NO.	DRAWING NO.
22	EC1

RECORD ISSUE
NOT FOR CONSTRUCTION

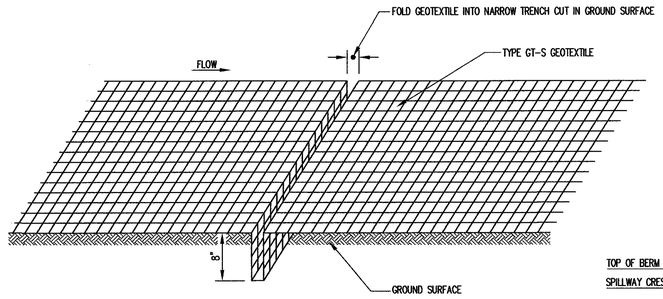
G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0129.dwg - 12/3/2007 10:28 AM

RECORD ISSUE
NOT FOR CONSTRUCTION



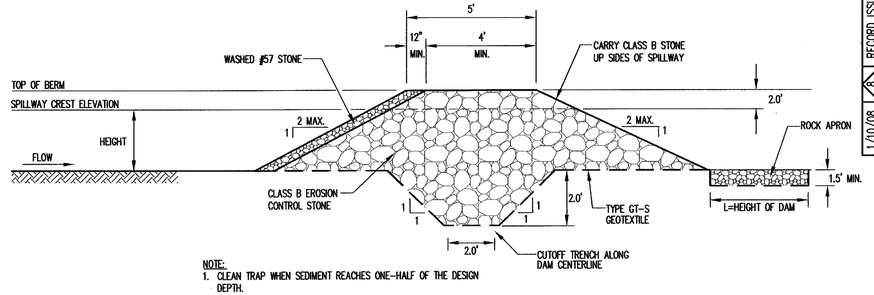
SILT FENCE

DETAIL 1 EC2 — NOT TO SCALE



EROSION STOP DETAIL

DETAIL 2 EC2 — NOT TO SCALE

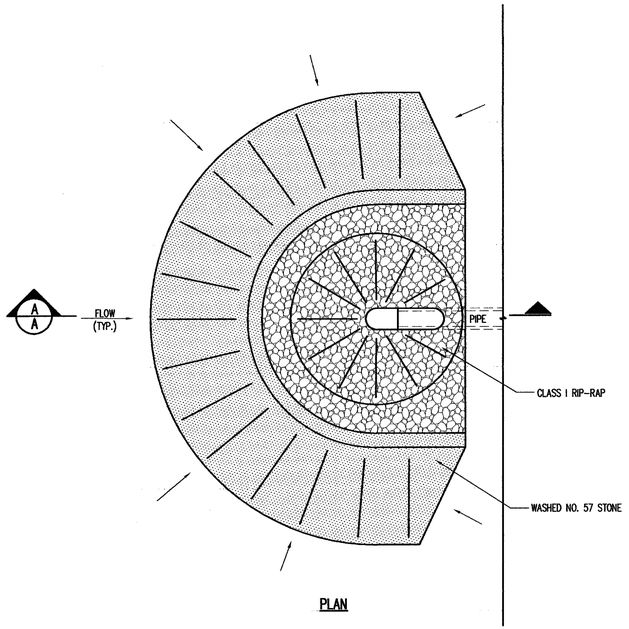


NOTE:
1. CLEAN TRAP WHEN SEDIMENT REACHES ONE-HALF OF THE DESIGN DEPTH.

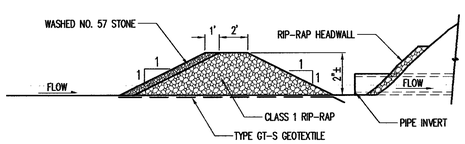
ROCK DAM SCHEDULE		
ROCK DAM	HEIGHT	WEIR LENGTH
1-2	6.0'	32'
1-6	3.5'	12'
1-7	3.5'	14'

ROCK DAM

DETAIL 3 EC2 — NOT TO SCALE



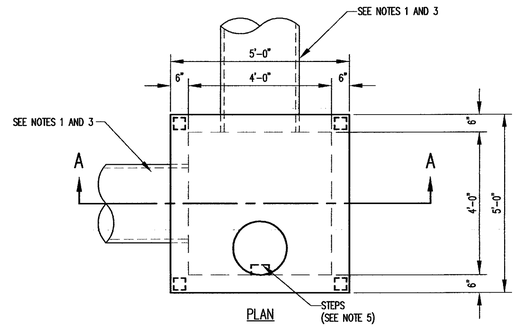
PLAN



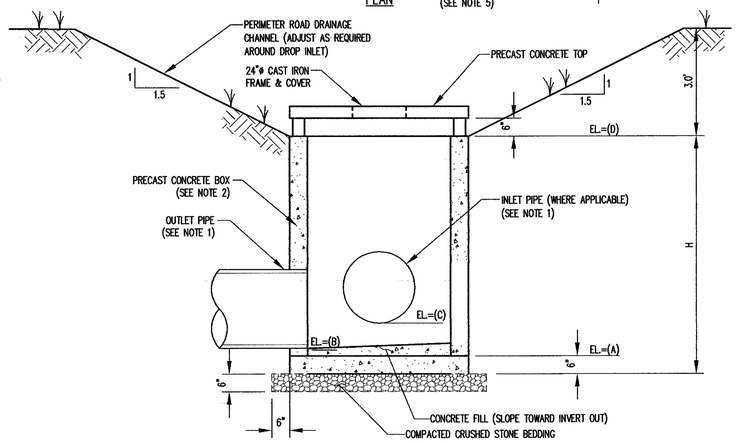
SECTION A-A

FILTER BERM

DETAIL 4 EC2 — NOT TO SCALE



PLAN



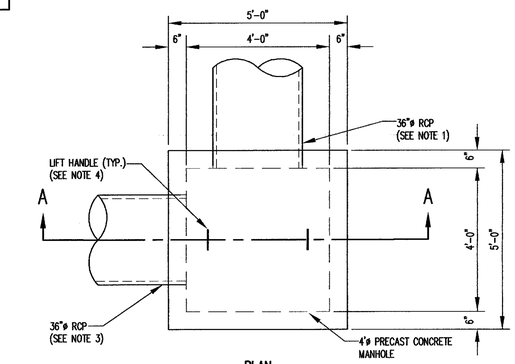
SECTION A-A

DROP INLET SCHEDULE					
DROP INLET	A (FEET)	B (FEET)	C (FEET)	D (FEET)	H (FEET)
1	311.5	311.9	N/A	317.0	6.0
2	285.5	286.1	N/A	296.0	10.0
2A	285.5	286.6	286.8	296.2	9.8
3	287.5	288.2	N/A	296.2	7.9
3A	290.5	289.4	N/A	296.0	5.0
A	310.0	310.3	N/A	313.8	4.3

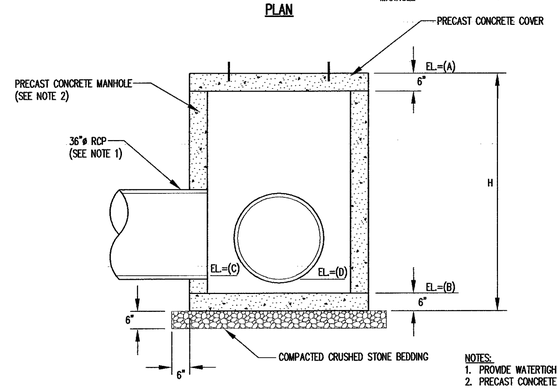
NOTES:
1. PROVIDE WATERTIGHT JOINTS ON ALL PIPING.
2. PRECAST CONCRETE BOXES SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:
   A. CONCRETE: COMPRESSIVE STRENGTH 4000 PSI
   B. REINFORCING: ASTM A-615, GRADE 60
   C. MEETS H-20 LOADING.
3. PIPES MAY BE ORIENTED DIFFERENTLY WITH RESPECT TO THE THE CHANNEL THAN DISPLAYED HERE. SEE DRAWING EC1 FOR PROPER ORIENTATION.
4. THE CONTRACTOR SHALL PROVIDE ADEQUATE PROTECTION FROM SEDIMENTATION FOR ALL DROP INLETS USING GRAVEL AND WIRE MESH FILTERS OR OTHER METHOD AS APPROVED BY THE ENGINEER.
5. PROVIDE STEPS FOR DROP INLETS WITH H>4.5'. STEPS SHALL HAVE A 16" SPACING THE FULL HEIGHT OF THE DROP INLET. START FIRST STEP 6" BELOW TOP.

DROP INLET

DETAIL 5 EC2 — NOT TO SCALE



PLAN



SECTION A-A

JUNCTION BOX SCHEDULE					
JUNCTION BOX	A	B	C	D	H
1	296.4'	285.4'	285.9'	286.0'	11.1'
2	296.4'	282.4'	282.9'	283.0'	14.1'

NOTES:
1. PROVIDE WATERTIGHT JOINTS ON ALL PIPING.
2. PRECAST CONCRETE MANHOLE AND COVER SHALL COMFORM TO THE FOLLOWING REQUIREMENTS:
   A. CONCRETE: COMPRESSIVE STRENGTH 4000 PSI
   B. REINFORCING: ASTM A-615, GRADE 60
   C. MEETS H-20 LOADING.
3. PIPES MAY BE ORIENTED DIFFERENTLY WITH RESPECT TO EACH OTHER THAN DISPLAYED HERE. SEE DRAWING S3 FOR PROPER ORIENTATION.
4. LIFT HANDLES SHALL BE AS RECOMMENDED BY THE JUNCTION BOX MANUFACTURER.

JUNCTION BOX

DETAIL 6 EC2 — NOT TO SCALE

NO.	REVISION	DATE
8	RECORD ISSUE	1/10/08
6	REVISED DETAIL 5/EC2	8/17/07
2	ISSUED FOR CONSTRUCTION	3/07
1	REVISED DETAIL 5/EC2; ADDED DETAIL 6/EC2	2/12/07

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577 fax: 919-828-3899
www.rsgengineers.com

SEAL

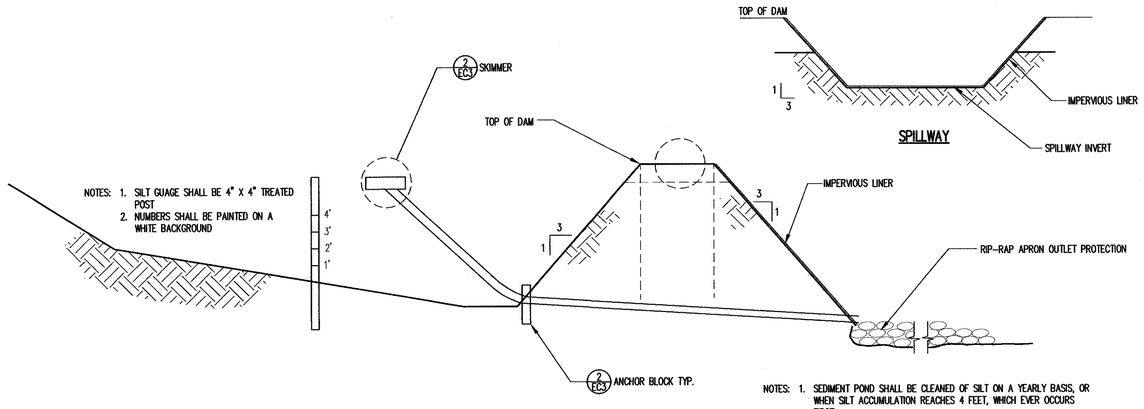
SEAL 023092 ENGINEER STACEY A. SMITH NORTH CAROLINA PROFESSIONAL

PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
EROSION AND SEDIMENTATION CONTROL DETAILS (SHEET 2 OF 3)

DESIGNED BY:	DRAWN BY:
P.K.S.	C.T.J.
CHECKED BY:	PROJECT NO.:
SmS	SOUTHWAKE 06-1
SCALE:	DATE:
AS SHOWN	JAN. 2007
FILE NAME	
WAKE-00130	
SHEET NO.	DRAWING NO.
23	EC2

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-00130.dwg - 12/17/2007 1:36 PM

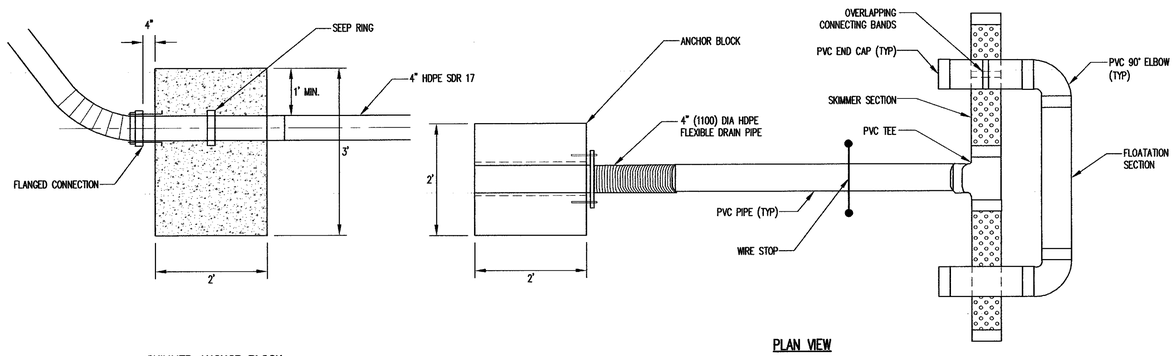


NOTES:
1. SEDIMENT POND SHALL BE CLEANED OF SILT ON A YEARLY BASIS, OR WHEN SILT ACCUMULATION REACHES 4 FEET, WHICH EVER OCCURS FIRST.
2. ALL FILL MATERIAL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY.

REFERENCE: "WAKE COUNTY EROSOIN AND SEDIMENTATION CONTROL PLAN FOR THE SOUTH WAKE LANDFILL", PREPARED BY OLVER, INC., DATED APRIL 2007.

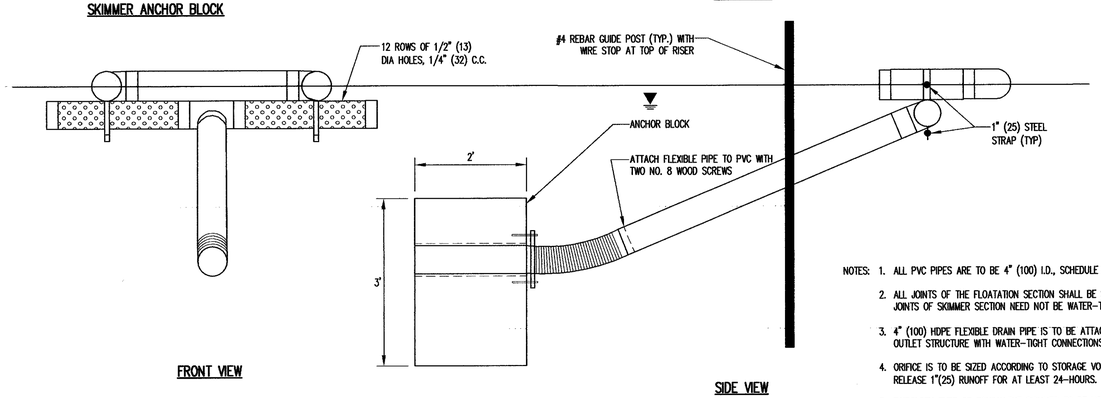
TEMPORARY SEDIMENT BASIN CROSS SECTION

DETAIL 1/EC3 — NOT TO SCALE



SKIMMER ANCHOR BLOCK

PLAN VIEW



FRONT VIEW

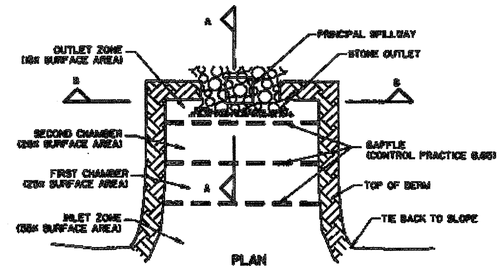
SIDE VIEW

TEMPORARY SKIMMER SEDIMENT BASIN				
BASIN	BOTTOM ELEVATION (FT.)	TOP OF BERM ELEVATION (FT.)	EMERGENCY SPILLWAY ELEVATION (10-YR STORM) (FT.)	SKIMMER SIZE (IN.)
A	300.00	310.00	308.00	8
B	282.00	286.00	284.00	3
C	304.00	310.00	308.00	4

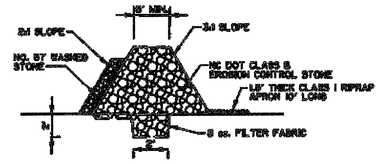
NOTES:
1. ALL PVC PIPES ARE TO BE 4" (100) I.D., SCHEDULE 40.
2. ALL JOINTS OF THE FLOATATION SECTION SHALL BE SOLVENT WELDED. JOINTS OF SKIMMER SECTION NEED NOT BE WATER-TIGHT.
3. 4" (100) HDPE FLEXIBLE DRAIN PIPE IS TO BE ATTACHED TO THE POND OUTLET STRUCTURE WITH WATER-TIGHT CONNECTIONS.
4. ORIFICE IS TO BE SIZED ACCORDING TO STORAGE VOLUME AND TO SLOWLY RELEASE 1"(25) RUNOFF FOR AT LEAST 24-HOURS. SEE SCHEDULE.
5. FAIRCLOTH TYPE OR EQUIVALENT SKIMMER TO BE USED.

SKIMMER

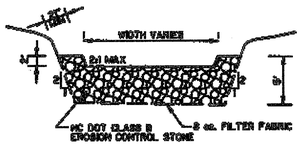
DETAIL 2/EC3 — NOT TO SCALE



PLAN



CROSS SECTION A



CROSS SECTION B

SEDIMENT TRAP NO.	DEPTH OF POOL (FT)	SURFACE AREA (FT²)	WEIR LENGTH (FT)	WEIR WIDTH (FT)	EMBANKMENT HEIGHT (FT)	BOTTOM WIDTH (FT)
1	4.0	2,480	8	5	4.0	5
2	3.0	1,120	4	5	3.0	5
3	3.5	616	4	5	3.5	5
4	3.0	545	4	5	3.0	5
5	3.0	545	4	5	3.0	5

NOTE: ONLY SEDIMENT TRAP NOS. 4 AND 5 ARE SHOWN IN THIS PLAN SET.

TEMPORARY SEDIMENT TRAP

DETAIL 3/EC3 — NOT TO SCALE

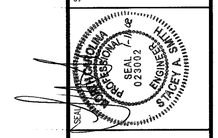
REFERENCE: TEMPORARY SEDIMENT TRAP DETAIL FROM DRAWING ENTITLED "EROSION AND SEDIMENT CONTROL DETAILS", SHEET NO. CD-4 FROM THE SOUTH WAKE SOLID WASTE MANAGEMENT FACILITY ENTRANCE FACILITIES CONSTRUCTION DRAWINGS, PREPARED BY CDM, DATED MARCH 2007.

RECORD ISSUE
NOT FOR CONSTRUCTION

NO.	DATE	REVISION
8	1/10/08	RECORD ISSUE
4	5/21/07	REVISIONS PER DESIGN MODIFICATION NO.2
3	5/7/07	ADDED SHEET; REVISIONS PER DESIGN MODIFICATION NO. 1

RICHARDSON SMITH GARDNER & ASSOCIATES
14 N. Boylan Ave. Raleigh, N.C. 27603
ph: 919-828-0577
fax: 919-828-3899
www.rsgengineers.com

SEAL



PROJECT TITLE:
WAKE COUNTY DISPOSAL, LLC
SOUTH WAKE MSW LANDFILL
PHASE 1A
RECORD DRAWINGS

DRAWING TITLE:
EROSION AND SEDIMENTATION CONTROL DETAILS
(SHEET 3 OF 3)

DESIGNED BY: S.A.S.	DRAWN BY: C.T.J.
CHECKED BY: SAS	PROJECT NO.: SOUTHWAKE 06-1
SCALE: AS SHOWN	DATE: JAN. 2007
FILE NAME: WAKE-D0131	
SHEET NO. 24	DRAWING NO. EC3

G:\CAD\Wake County\South Wake Landfill\Southwake 06-1\record issue\sheets\WAKE-D0131.dwg - 1/3/2008 4:18 PM

MEMORANDUM

To: File

From: Donna J. Wilson

Subject: South Wake MSW Landfill CQA Report, Replaced pages

Date: January 22, 2008

This report contains modified pages submitted in January 2008 in response to comments. The following is a list of the replaced pages:

Table 6 – replaced January 8, 2008
Appendix O – Record Drawings – submitted January 14, 2008
Page 14 – replaced January 22, 2008
Appendix K.5 – submitted January 22, 2008
Signed report cover sheet – submitted January 22, 2008

RICHARDSON SMITH GARDNER & ASSOCIATES
Engineering and Geological Services

January 21, 2008

Ms. Donna Wilson
Environmental Engineer II
NC DENR - Division of Waste Management
401 Oberlin Road, Suite 150
Raleigh, NC 27605

Re: Construction Quality Assurance Report - Project Certification
South Wake MSW Landfill
(Solid Waste Permit No. 92-22)
Holly Springs, North Carolina

Dear Ms. Wilson:

On Behalf of Wake County, Richardson Smith Gardner & Associates (RSGA) would like to complete the Construction Quality Assurance Report for the construction of Phase 1A of the above referenced facility by submitting final pump system startup and the project certification as previously noted in our correspondence dated December 13, 2007.

Therefore, please find the signed and sealed certification as referenced in Section 15.0 of the report and the pump system startup worksheet attached. Please also note that the Record Drawings, referenced as Appendix O, were provided at the pre-operative meeting on January 14, 2008. We intend this information to complete all necessary documentation for issuance of the Permit to Operate of Phase 1A. We are prepared to promptly respond to any questions or concerns. Should you have any questions or require clarification, please contact me at (919) 828-0577 ext. 127 or by email at stacey@rsgengineers.com.

Sincerely,
Richardson Smith Gardner & Associates, Inc.

Stacey A. Smith, P.E.
Project Manager

Att.
Cc: Ed Mussler III, P.E., NCDENR (cover letter)
Bradley Bailey, NCDENR (cover letter)
Dan LaMontagne, P.E., Wake County Environmental Services
David Pepper, Waste Industries USA, Inc.
Ben Habets, Wake County Disposal, LLC (cover letter)
File

H:\Projects\South Wake\SOUTHWAKE-07-1 (Cell Construction)\CQA\Transmittal1-21-08.wpd