PRESSURE MANIFOLD, 25% REDUCTION - INFILTRATOR CHAMBER SEPTIC SYSTEM FOR SUBSURFACE WASTEWATER DISPOSAL AT THE FARMS AMENITY SITE IREDELL, NORTH CAROLINA

Prepared for:
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December 17, 2003



Copy: Mr. Brady Freeman, R.S.
Iredell County Health Dept.

Ms. Susan Foster
Crescent Resources, Inc.

Paul G. Penninger, LSS

The Farms Amenity Site Septic System Design

The proposed septic system will serve the amenity complex for The Farms subdivision. This is a Crescent Resources, Inc. residential subdivision off Brawley School Road. There will be approximately 460 four-bedroom homes in this subdivision. In August 2003, we discussed the primary features of the amenity site with you and reviewed the water use records from The Harbour subdivision in an effort to determine a reasonable design flow for the Farms amenity site.

We discussed that trying to tie the design flow to a per lot basis made the most sense. Over the period we monitored the Harbour, the average water use at the amenity site per lot was 0.5 gpd/lot with a range of .03 to 2.99 gpd/lot. In recent conversations, you recommended 3 gpd/lot for the design of The Farms amenity site. This reflects a 1380 gpd design flow for The Farms amenity site. If flows are similar to The Harbour, the system will be over designed, but this number is probably reasonable given there are more proposed amenities at The Farms vs. The Harbour. The extras are basically more tennis courts, a soccer field, a horseshoe pit, and a proposed full time staff member. It is our understanding that the Amenity site is being constructed for the use of the residents of The Farms subdivision and their guests only.

The site plan shows a restroom near the proposed soccer field. We have discussed in the past whether to design a separate system for this restroom or to incorporate the effluent into one system. You have indicated that you would like to have one larger drainfield if possible. We have designed one drainfield to dispose of the wastewater generated at the soccer field restrooms and the pool area. We designed a septic tank and pump tank at the soccer field restroom to pump that effluent to the larger pump tank at the pool area. This is shown on the attached site plan.

Toney C. Jacobs and Associates, Inc. have dug and described backhoe pits in the primary and repair areas of the proposed system. We have also flagged the primary system, which has been located by the surveyor. Attached are the site plan showing the system layout and pit locations. Also attached are the details and specifications necessary to install the proposed system. Tri-County Wastewater (TCWW) will be the certified operator for the proposed system. Any requirements of TCWW that are greater than those in this plan or required by the county should be discussed with Mr. Tim Bannister of TCWW.

A condition of the Authorization to Construct should be an onsite meeting with the installer, TCWW, Toney C. Jacobs and Associates and the County Environmental Health Department Staff prior to installation to review the system location and components.

The Farms Amenity Site Septic System Specifications and Design

Design Flow:

3 gpd/lot

3 gpd * approx. 460 lots = 1380 gpd design flow

LTAR:
0.3 gpd/ft^2

Type and length of trenches:
Proposing 25% reduction, Infiltrator chambers for primary and repair system

1380 gpd / (0.3 gpd/ft^2 * 3 ft) = 1533.3 ft of conv. trench required

1533.3 * 0.75 = 1150 ft of 25% reduction, Infiltrator chambers required

-install trenches approximately 24 in. deep

-install observation port in each trench, down 2/3 length of trench

Septic Tank Size
Volume Required = 1.17Q + 500

Volume Required = 1.17*1380 + 500 = 2114.6 gal for minimum septic tank size—use 2500 gal septic tank

Pump Tank Size
minimum of 2114.6 gal --- use 2500 gal pump tank

Pressure Manifold Design
-system will use 8 trenches 144 ft. long.

-pressure manifold will use one 1/2 inch SCH 80 PVC tap per trench for a total of 8 taps

-at 2 ft of head pressure, the flow per tap will be 5.5 gpm

-total flow required for the pressure manifold = 8 taps * 5.5 gpm/tap = 44 gpm

- use 4 in. SCH 80 barrel on pressure manifold (see diagram)

Repair Area

- use 1150 ft. of 25% reduction system for proposes repair
- approx. 1630 ft. of repair has been shown on site plan

SUMMARY OF SYSTEM SPECIFICATIONS AND PUMP REQUIREMENTS FOR THE AMENITY SYSTEM

(pump requirement calculations based on engineers proposed final grades of the amenity site and should be field verified prior to installation by septic installer)

Daily design flow:	1380 gpd.
Septic tank size:	2500 gal. (2 compartments)
Pumping tank size:	2500 gal.
Effluent loading rate:	0.3 gpd/ft^2
Total length and diameter of supply pipe:	approx. 680 ft. 3" SCH 40 PVC)
Number and length of laterals:	8@ 144 ft. dosed by a pressure manifold (use 25% reduction trench - Infiltrator chambers)
Pressure Manifold:	use 8 taps at 1/2 in. SCH 80 PVC (flow is 5.5 gpm/tap at 2 ft. head pressure)
Flow rate through the system:	44 gpm
Elevation head:	approx. 23'
Pressure head:	2.0'
Friction head:	approx. 4.6'
20% contingency	5.9'
Total head:	35.5'
Pump requirements:	44 gpm at 36' of head; use Goulds WE 07H pump or equivalent with compatible electrical
Dosing volume:	500 gal. – 2.76 doses/day at design flow
Depth of water pumped per dose:	calculated to specific tank by measure or dealer engineering specifications (1 cubic ft. of water equals 7.48 gal.)
Pump run per dose:	approx. 11 min
Check valve:	Yes
Siphon break hole:	Yes

SPECIFICATION AND REQUIREMENTS TO PUMP EFFLUENT FROM BALL FIELD RESTROOMS TO THE MAIN AMENITY PUMP TANK

(pump requirement calculations based on engineers proposed final grades of the amenity site and should be field verified prior to installation by septic installer)

Septic tank size:	1000 gal. (2 compartments)
Pumping tank size:	1000 gal. minimum
Total length and diameter of supply pipe:	approx. 700 ft. (2" SCH 40 PVC-- use 4 in. SCH 40 PVC for last 15 ft.)
Flow rate through the system:	20 gpm
Elevation head:	approx. 8' - pumping downhill
Friction head:	approx. 5'
20% contingency	3'
Total head:	16'
Pump requirements:	20 gpm at 16' of head; use Goulds WE03M pump or equivalent with compatible electrical
Dosing volume:	160 gal.
Depth of water pumped per dose:	calculated to specific tank by measure or dealer engineering specifications (1 cubic ft. of water equals 7.48 gal.)
Pump run per dose:	approx. 8 min
Check valve:	Yes
Siphon break hole:	Yes

LIST OF ATTACHMENTS

1. SITE PLAN
2. PUMP CURVE
3. MANIFOLD DETAIL
4. TRENCH DETAIL
5. PIT LOCATIONS
6. SOIL NOTES

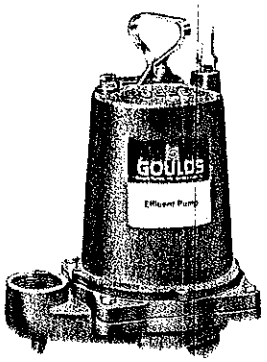
GOULDS PUMPS

Submersible Effluent Pump

MODEL

3885

PROSURANCE AVAILABLE FOR RESIDENTIAL APPLICATIONS.



APPLICATIONS

Specifically designed for the following uses:

- Homes
- Farms
- Trailer courts
- Motels
- Schools
- Hospitals
- Industry
- Effluent systems

SPECIFICATIONS

Pump

- Solids handling capabilities: ¾" maximum.
- Discharge size: 2" NPT.
- Capacities: up to 140 GPM.
- Total heads: up to 128 feet TDH.
- Temperature: 104°F (40°C) continuous 140°F (60°C) intermittent.
- See order numbers on reverse side for specific HP, voltage, phase and RPM's available.

FEATURES

■ **Impeller:** Cast iron, semi-open, non-clog with pump-out vanes for mechanical seal protection. Balanced for smooth operation. Silicon bronze impeller available as an option.

■ **Casing:** Cast iron volute type for maximum efficiency. 2" NPT discharge.

■ **Mechanical Seal: SILICON CARBIDE VS. SILICON CARBIDE** sealing faces. Stainless steel metal parts, BUNA-N elastomers.

■ **Shaft:** Corrosion-resistant, stainless steel. Threaded design. Locknut on three phase models to guard against component damage on accidental reverse rotation.

■ **Fasteners:** 300 series stainless steel.

■ Capable of running dry without damage to components.

■ Designed for continuous operation when fully submerged.

MOTORS

■ Fully submerged in high-grade turbine oil for lubrication and efficient heat transfer.

■ **Class B insulation.**

Single phase:

- Built-in overload with automatic reset.
- All single phase models feature capacitor start motors for maximum starting torque.
- ⅓ and ½ HP – 16/3 SJTOW with 115 V or 230 V three prong plug.
- ¾-2 HP – 14/3 STOW with bare leads.

Three phase:

- Overload protection must be provided in starter unit.
- ½-2 HP – 14/4 STOW with bare leads.

■ **Designed for Continuous Operation:** Pump ratings are within the motor manufacturer's recommended working limits, can be operated continuously without damage.

■ **Bearings:** Upper and lower heavy duty ball bearing construction.

■ **Power Cable:** Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. 20 foot standard with optional lengths available.

■ **O-ring:** Assures positive sealing against contaminants and oil leakage.

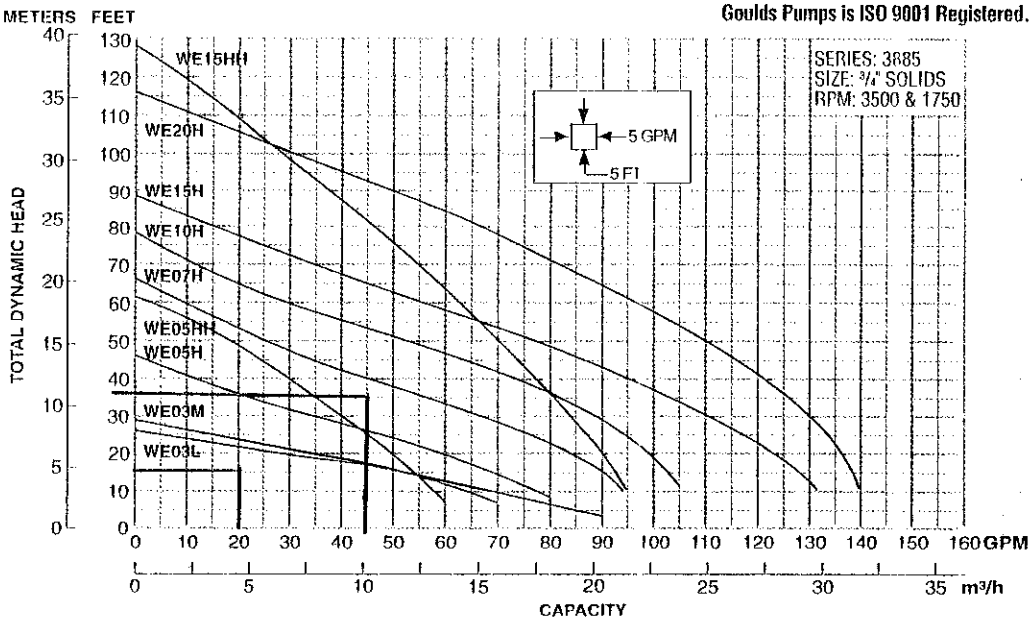
■ Consult factory for information on CSA listed models.

AGENCY LISTINGS

Canadian Standards Association File #LR38549

Underwriters Laboratories File #83318

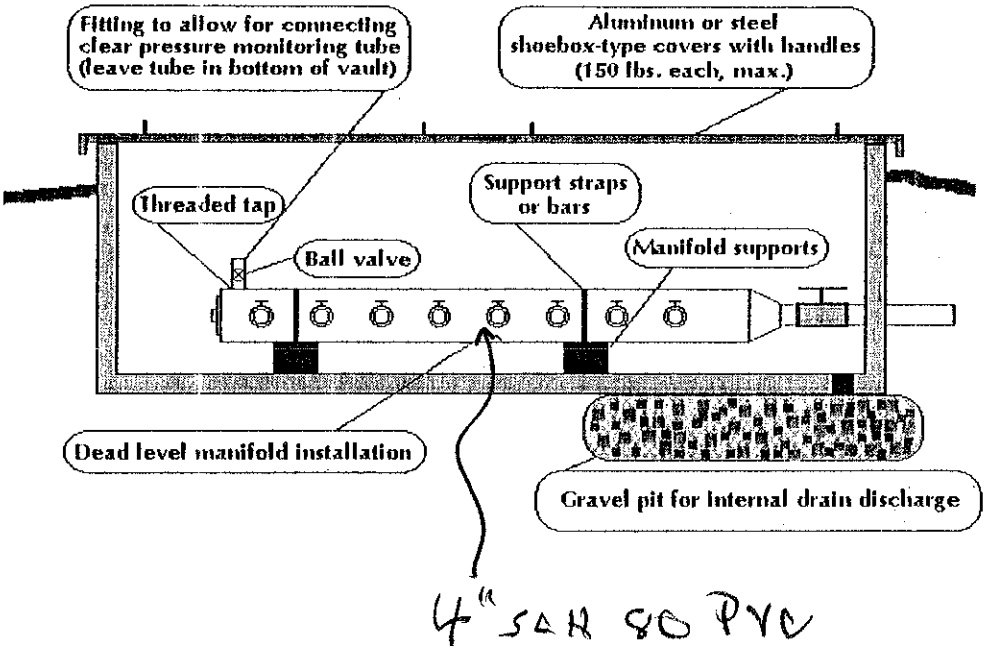
Goulds Pumps is ISO 9001 Registered.



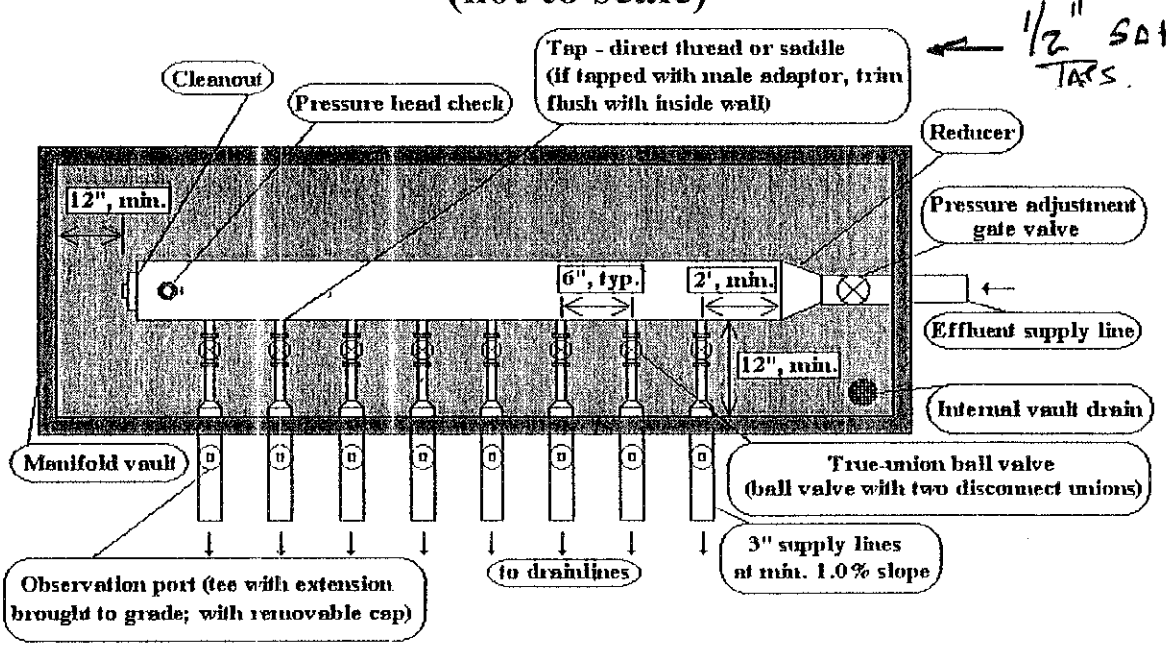
Goulds Pumps

ITT Industries

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Effective January, 1999
B3885



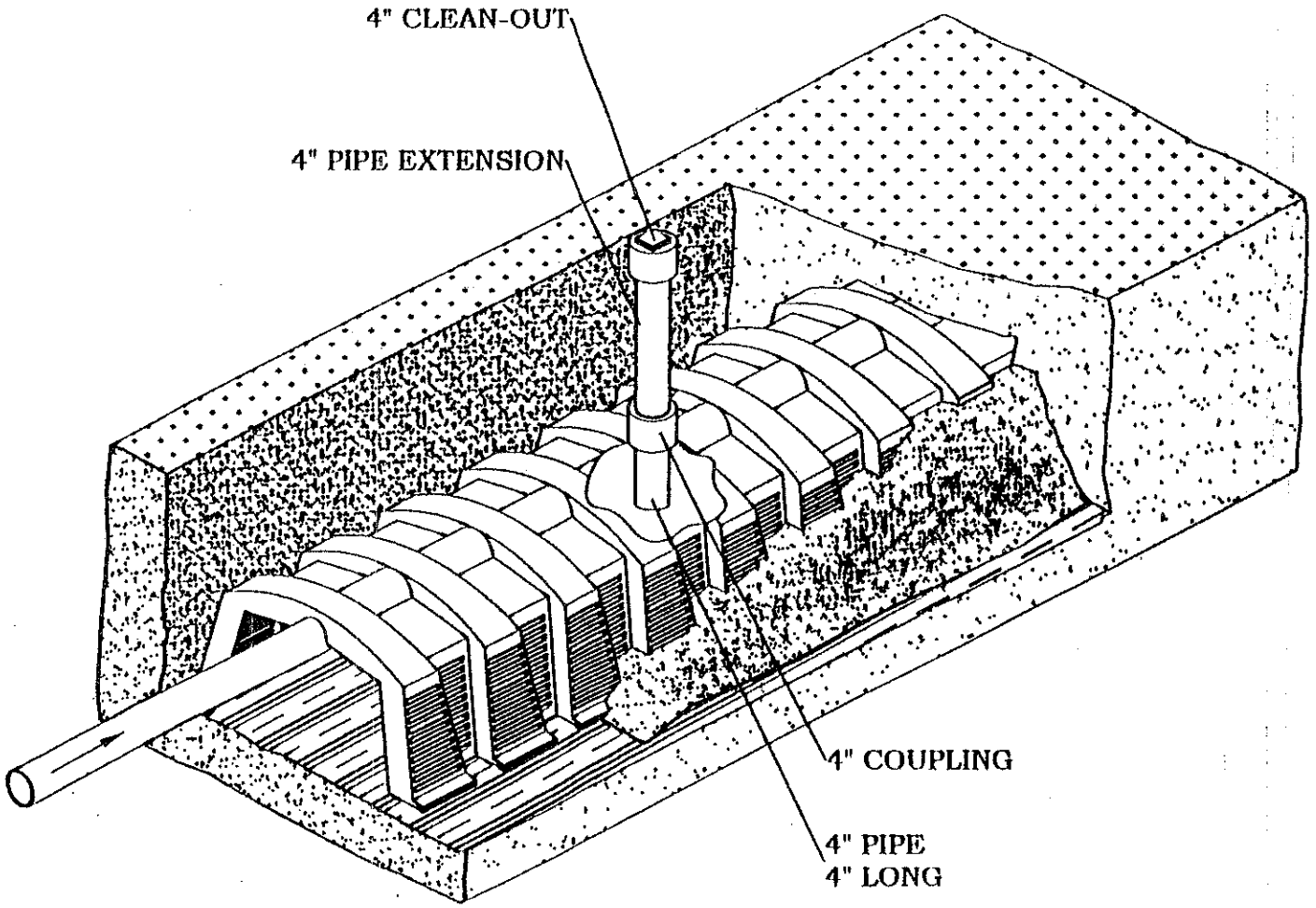
Profile View of Pressure Manifold for Sloping Site Installation (not to scale)

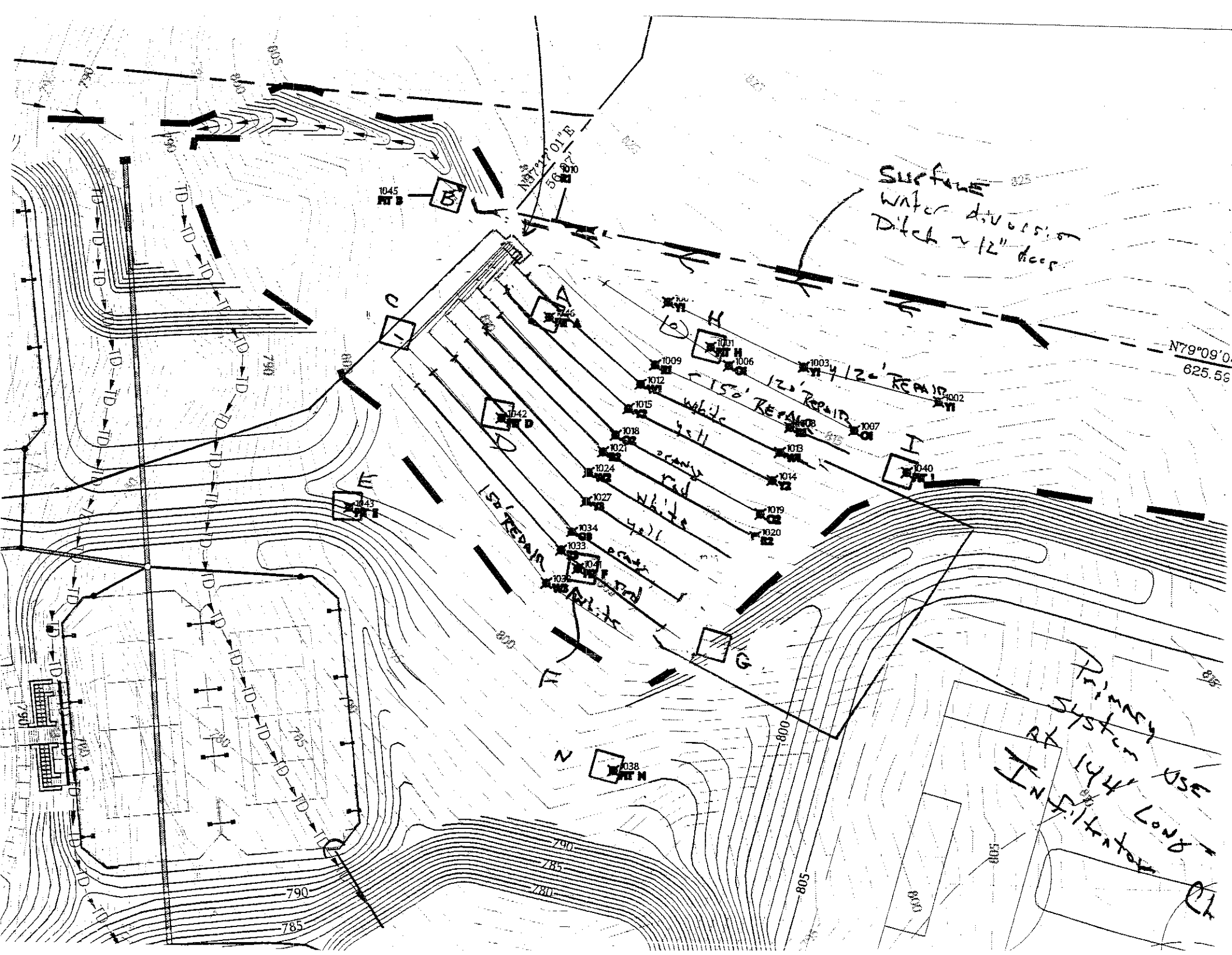


TRENCH AND OBSERVATION PORT DETAIL

(modified from TOWN Tile Point Inst. manual)

DETAIL 43




Surface water diversion Ditch ~12" deep
N79°09'0
625.59
12" REPAIR
150' REPAIR
12" REPAIR
150' REPAIR
Primary System At 144' Long Infiltrator
N37°29'01"E
565.97
790
785
780
805
800
795

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1533.3 * 0.75 = 1150 ft of 25% reduction, Infiltrator chambers required

-install trenches approximately 24 in. deep

-install observation port in each trench, down 2/3 length of trench

Septic Tank Size
Volume Required = 1.17Q + 500

Volume Required = 1.17*1380 + 500 = 2114.6 gal for minimum septic tank size—use 2500 gal septic tank

Pump Tank Size
minimum of 2114.6 gal --- use 2500 gal pump tank

Pressure Manifold Design
-system will use 8 trenches 144 ft. long.

-pressure manifold will use one 1/2 inch SCH 80 PVC tap per trench for a total of 8 taps

-at 2 ft of head pressure, the flow per tap will be 5.5 gpm

-total flow required for the pressure manifold = 8 taps * 5.5 gpm/tap = 44 gpm

- use 4 in. SCH 80 barrel on pressure manifold (see diagram)

Repair Area

- use 1150 ft. of 25% reduction system for proposes repair
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Friction head:	approx. 4.6'
20% contingency	5.9'
Total head:	35.5'
Pump requirements:	44 gpm at 36' of head; use Goulds WE 07H pump or equivalent with compatible electrical
Dosing volume:	500 gal. – 2.76 doses/day at design flow
Depth of water pumped per dose:	calculated to specific tank by measure or dealer engineering specifications (1 cubic ft. of water equals 7.48 gal.)
Pump run per dose:	approx. 11 min
Check valve:	Yes
Siphon break hole:	Yes

SPECIFICATION AND REQUIREMENTS TO PUMP EFFLUENT FROM BALL FIELD RESTROOMS TO THE MAIN AMENITY PUMP TANK

(pump requirement calculations based on engineers proposed final grades of the amenity site and should be field verified prior to installation by septic installer)

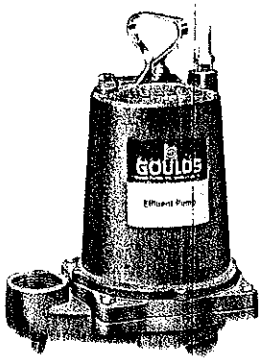
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2. PUMP CURVE
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GOULDS PUMPS

Submersible Effluent Pump



MODEL

3885

PROSURANCE AVAILABLE FOR RESIDENTIAL APPLICATIONS.

APPLICATIONS

Specifically designed for the following uses:

- Homes
- Farms
- Trailer courts
- Motels
- Schools
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- Effluent systems

SPECIFICATIONS

Pump

- Solids handling capabilities: ¾" maximum.
- Discharge size: 2" NPT.
- Capacities: up to 140 GPM.
- Total heads: up to 128 feet TDH.
- Temperature: 104°F (40°C) continuous 140°F (60°C) intermittent.
- See order numbers on reverse side for specific HP, voltage, phase and RPM's available.

FEATURES

■ **Impeller:** Cast iron, semi-open, non-clog with pump-out vanes for mechanical seal protection. Balanced for smooth operation. Silicon bronze impeller available as an option.

■ **Casing:** Cast iron volute type for maximum efficiency. 2" NPT discharge.

■ **Mechanical Seal: SILICON CARBIDE VS. SILICON CARBIDE** sealing faces. Stainless steel metal parts, BUNA-N elastomers.

■ **Shaft:** Corrosion-resistant, stainless steel. Threaded design. Locknut on three phase models to guard against component damage on accidental reverse rotation.

■ **Fasteners:** 300 series stainless steel.

■ Capable of running dry without damage to components.

■ Designed for continuous operation when fully submerged.

MOTORS

■ Fully submerged in high-grade turbine oil for lubrication and efficient heat transfer.

■ **Class B insulation.**

Single phase:

- Built-in overload with automatic reset.
- All single phase models feature capacitor start motors for maximum starting torque.
- ⅓ and ½ HP – 16/3 SJTOW with 115 V or 230 V three prong plug.
- ¾-2 HP – 14/3 STOW with bare leads.

Three phase:

- Overload protection must be provided in starter unit.
- ½-2 HP – 14/4 STOW with bare leads.

■ **Designed for Continuous Operation:** Pump ratings are within the motor manufacturer's recommended working limits, can be operated continuously without damage.

■ **Bearings:** Upper and lower heavy duty ball bearing construction.

■ **Power Cable:** Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. 20 foot standard with optional lengths available.

■ **O-ring:** Assures positive sealing against contaminants and oil leakage.

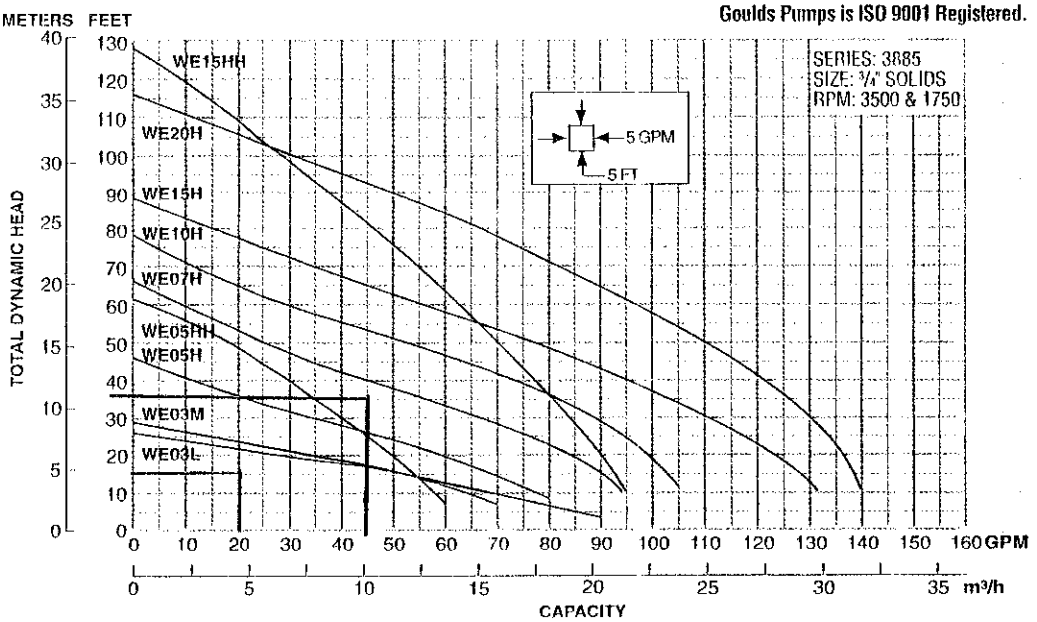
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AGENCY LISTINGS

Canadian Standards Association File #LR38549

Underwriters Laboratories File #83318

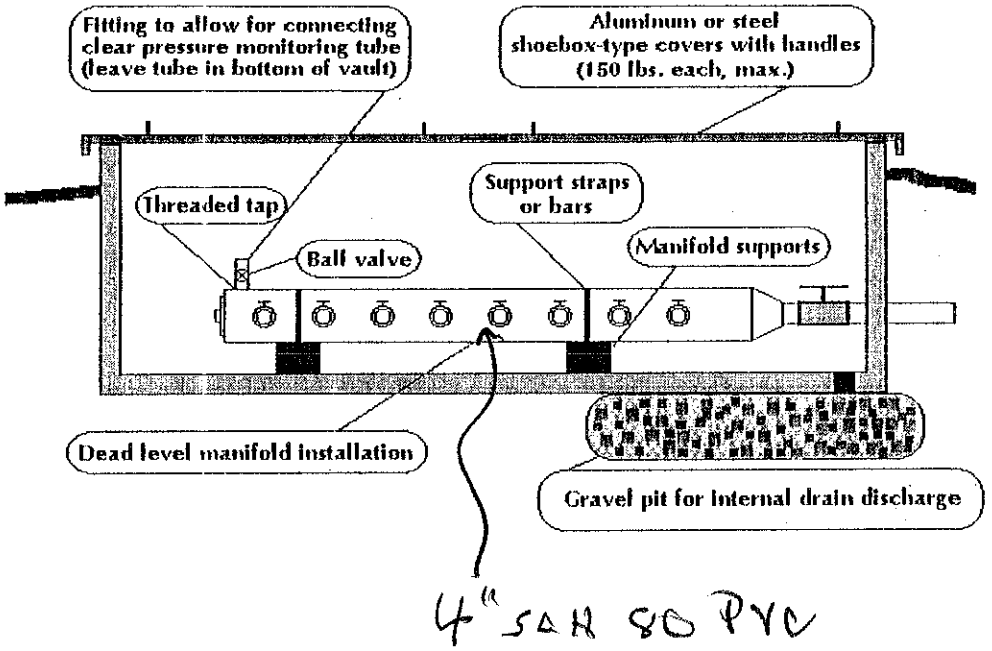
Goulds Pumps is ISO 9001 Registered.



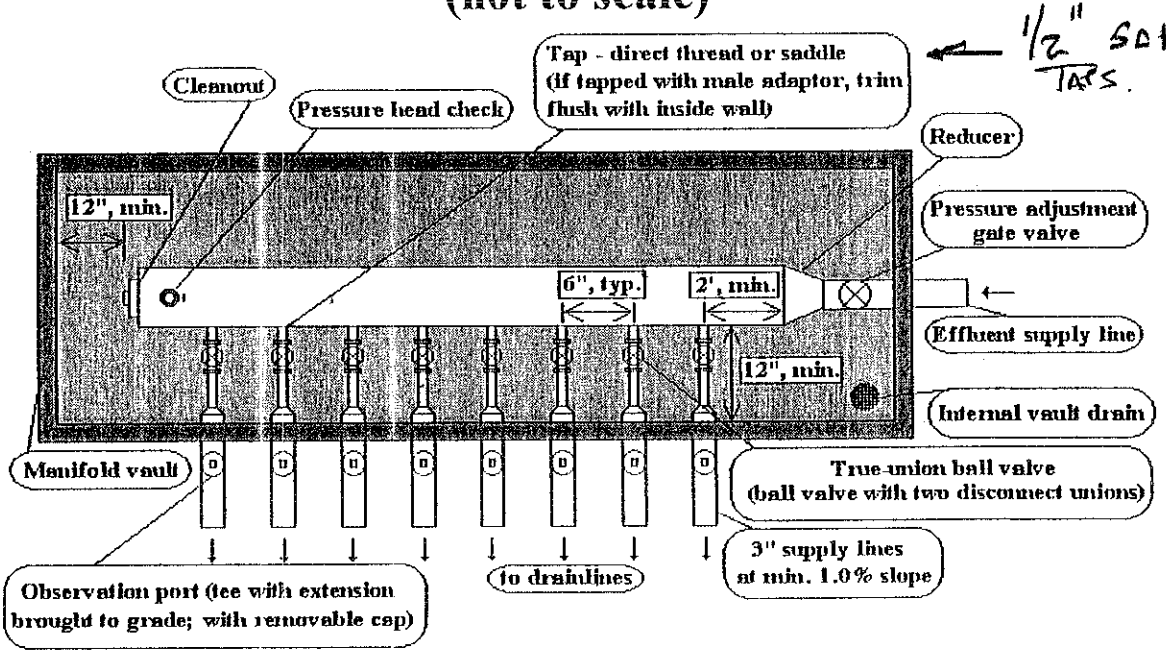
Goulds Pumps

ITT Industries

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B3885



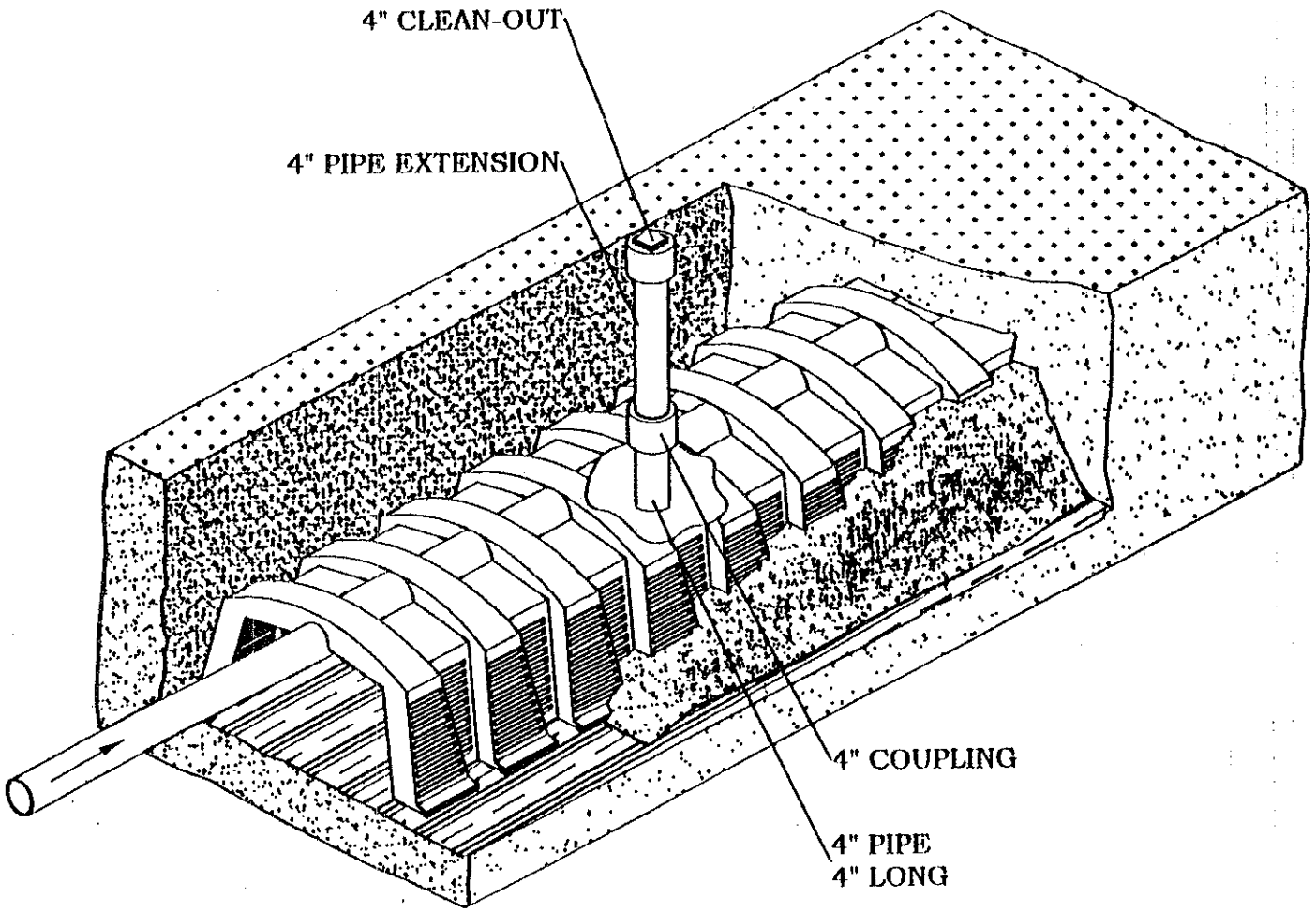
Profile View of Pressure Manifold for Sloping Site Installation (not to scale)



TRENCH AND OBSERVATION PORT DETAIL

(modified from TOWN Tile Point Inst manual)

DETAIL 43



N87°17'01"E
563.90'
N76°09'
625.56
790
785
800
805
810