

**MONTEZUMA COUNTY**  
**PERMIT TO INSTALL NON-MUNICIPAL**  
**SEWAGE DISPOSAL**

Date 4/15, 1990

Fee Paid \$ 45.00

Type Installation: Septic Tank ( ) Privy ( ) Other ( )

Owner: Timothy R. Bell

Address: 18556 Hwy 160

Permission hereby given for installation of above as set forth in application and specification attached.

Director, County Health Department

By Michael J. Peterson  
(Director) (Deputy)

Final inspection 4/23/90 Michael J. Peterson  
Date Officer

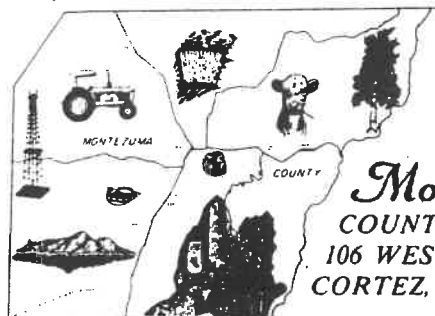
**TO OWNER:** Leave entire sewage-disposal system uncovered for final inspection. The Health Officer shall assume no responsibility in case of failure or inadequacy of a sewage-disposal system beyond consulting in good faith with the property owner or representative. Malfunctions may be due to improper maintenance and usage, high ground water table, soil compaction, and other factors.

**This permit is to remain in full force and effect for one (1) year from date, unless revoked for non-compliance.**

MESA VERDE PRESS  
Cortez, CO  
(303) 565 4616

18656

Telephone:  
(303) 565-3056



**Montezuma County Health Department**  
COUNTY ANNEX BUILDING  
106 WEST NORTH STREET  
CORTEZ, COLORADO 81321-3189

Permit Fee = \$45.00

## SEPTIC SYSTEM APPLICATION

OWNER/APPLICANT Janice E. Bell Phone \_\_\_\_\_  
 \*Property Address 18656 Hwy 145 Dolores City/Town Dolores, Co.  
 Mailing Address P.O. Box 178  
 Contractor Lee Duran  
 Is permit for: (X) New Installation ( ) Alteration ( ) Repair ( ) Other  
 Location of Proposed Facility: Subdivision Name River Acres Subd. Lot # 1  
 If not subdivision, enter Variance Resolution Number: \_\_\_\_\_ Lot Size 6.46 Acre  
 ( ) Commercial (X) Residential Number of: Bedrooms 2 People 2

( ) Garbage Disposal ( ) Washing Machine ( ) Dishwasher

Source & Type of Water Supply: ( ) Well ( ) Spring ( ) Rural Other CISTERN

PLOT PLAN AND DESIGN FEATURES: Include by measured distance location of well, spring, potable water supply lines, cisterns, buildings, property lines, subsoil drains, lake, water course, stream, dry gulch and show location of proposed system by direction and distance from dwelling or other fixed reference objects, and additional submissions in support of this application, such as data, plans, specifications, statements and commitments.



## GROUND CONDITIONS:

Depth of Bedrock: Sealed Depth of Ground Water Table: \_\_\_\_\_

Percent Ground Slope: \_\_\_\_\_

## SOIL PERCOLATION TEST RESULTS:

Minutes \_\_\_\_\_ per inch in hole No. 1

Minutes \_\_\_\_\_ per inch in hole No. 2

Minutes \_\_\_\_\_ per inch in hole No. 3

Minutes \_\_\_\_\_ per inch in hole No. 4

DISTANCE TO NEAREST COMMUNITY SEWER SYSTEM? 2 miles

Was an effort made to connect to community system? No

Janice E. Bell, 18656 Hwy 145, Dolores, CO 81321-3189

Applicant acknowledges that the completeness of the application is conditional upon such further mandatory and additional tests and reports as may be required by the local health department to be made and furnished by the applicant for the purpose of evaluating the application; and the issuance of the permit is subject to such terms and conditions as deemed necessary to insure compliance with rules and regulations adopted under Article 10, Title 25, CRS 1973, as amended. The undersigned hereby certifies that all statements made, information and reports submitted herewith and required to be submitted by the applicant are true and correct to the best of his/her knowledge and are designed to be relied on by the local department of health in evaluating the purpose for issuing the permit. I further understand that any falsification or misrepresentation may result in the denial or revocation of any permit granted based upon the application.

**NOTE:** The issuance of a permit does not constitute assumption by the Department or its employees of liability for the failure of any sewage disposal system.

SIGNATURE: \_\_\_\_\_

*James C. Bell*

(TO BE COMPLETED BY COUNTY SANITARIAN)

TYPE OF INDIVIDUAL SEWAGE DISPOSAL SYSTEM PROPOSED:

☒ Septic Tank

☐ Aeration Plant

☐ Other

A. Tank Capacity 1000 Gallons

B. Inside Dimension \_\_\_\_\_

C. Material Used \_\_\_\_\_

TYPE OF EFFLUENT DISPOSAL \_\_\_\_\_

A. Absorption Area \_\_\_\_\_

B. Type and size of pipe \_\_\_\_\_

C. Distribution: Number of Lines \_\_\_\_\_

Width \_\_\_\_\_

Depth \_\_\_\_\_

This system shall be constructed in accordance with the above specifications and shall comply with the Colorado State and Montezuma County regulations governing sewage disposal systems, subject to the issuance of a permit, and to final inspection before back filling.

PRELIMINARY APPROVAL BY *MPR* DATE 9/18/90

FINAL APPROVAL BY *MPR* DATE 9/23/90

Montezuma County Assessor  
Parcel Info



PID 535912300028  
Owner MCCABE, VANCE  
Address 1 BOX 444  
Address 2 -----  
Address 3 DOLORES, CO  
Zip 81323  
Acres 21.00  
Tax District 42031  
Zone AR ES  
Road Number 18656  
Road Name STATE HWY 145  
Prop\_desc\_1 PARCEL: 5359-123-00-028 SITUS: 18656 STATE HWY 145 B463 P291 B555 P9  
Prop\_desc\_2 95 B734 P887 R/475350 & R/479388 R/481527 SECT,TWN,RNG:12-37-15 TRAC  
Prop\_desc\_3 T:SW DESC: 21.47A SUB:RIVER ACRES





rg consulting engineers, inc.

denver • grand junction • trinidad • durango

October 8, 2002

Mr. Mitchell Periman  
Montezuma County Health Department  
109 West Main Street, Room 305  
Cortez, Colorado 81321

**RE: Proposed Individual Sewage Disposal System Design  
18656 Highway 145, Dolores, Colorado  
King Residence**

Dear Mr. Periman:

The purpose of this letter is to provide you with an individual sewage disposal system (ISDS) design for the property referenced above. The ISDS design will utilize a conventional septic tank for primary treatment of domestic sewage, a recirculating packed-bed filter for advanced treatment and a pressure-dosed, mounded soil absorption bed for final treatment and discharge of the septic tank effluent. The proposed ISDS design presented here conforms to the regulations set forth in the Colorado Department of Public Health and Environment (CDPHE) *Guidelines on Individual Sewage Disposal Systems (Revised 1994)*.

#### **Site Conditions**

The 6.5-acre property is located in the River Acres subdivision of Montezuma County approximately two miles east of the Town of Dolores. The owner, Wayne King, recently purchased the property which includes an existing four-bedroom residence. The dwelling is situated between Highway 145 and the Dolores River, as shown on the attached site plan. The ground surface in the vicinity of the dwelling and proposed ISDS is relatively flat. The native vegetation consists primarily of water tolerant grasses, cottonwood trees and willows. Access to the building site is provided by a private driveway from Highway 145.

#### **Description of On-Site Soils**

I observed the native soil profile in shallow test pits excavated in the vicinity of the proposed treatment tank and soil absorption bed during a site visit conducted on September 20, 2002. The soil profile consists of undifferentiated sand, gravel and

cobble that extends to an unknown depth below ground surface. The seasonal high ground water level occurs at a depth of 24 inches below ground surface.

In order to provide a minimum of 48 inches of suitable soil between the soil absorption surface and the seasonal high ground water level, soil will be imported to the site in order to construct a mounded soil absorption bed. I have assumed a soil percolation rate of 5 minutes per inch (min/in) for the imported sandy soil that will be used to construct the bed.

Soil percolation rates given in minutes per inch (min/in) can be converted to a hydraulic loading rate (*HLR*) in the units of gallons per square foot per day (gal/ft<sup>2</sup>/d) in the following manner:

1. Make valid assumptions regarding the testing procedure described in the CDPHE ISDS Guidelines, such as:
  - ▶ The test hole diameter is 6 inches;
  - ▶ The depth of water in the test hole is 6 inches; and
  - ▶ The drop in the water level is one inch.
2. Calculate the volume of water absorbed into the bottom and side wall of the test hole during the test period and convert to gallons.
3. Calculate the bottom and side wall area of the test hole (the absorption area) and convert to square feet.
4. Convert the time (in minutes) of the measured percolation rate to days.
5. Calculate the hydraulic loading rate (*HLR*) by dividing the volume of water absorbed (in gallons) by the absorption area (in square feet) multiplied by the time (in days).

I have used the procedure described above to convert the assumed percolation rate of 5 min/in to a *HLR* of 35.5 gal/ft<sup>2</sup>/d. For design purposes, I have conservatively assumed a *HLR* of 3.5 gal/ft<sup>2</sup>/d for the soil at this site.

### **Design Criteria**

The proposed ISDS is being designed to treat domestic wastewater from an existing four-bedroom residence that was constructed with permanently installed low-flow plumbing fixtures. The potable water supply for the dwelling is provided by a well located on the property.

The average daily wastewater flow ( $Q_{avg}$ ) from the dwelling is based on maximum occupancy (two persons per bedroom) and an average daily wastewater flowrate of 75 gallons/person/day. The maximum daily flow ( $Q_{max}$ ) for design purposes is 150 percent of  $Q_{avg}$ . The values for  $Q_{avg}$  and  $Q_{max}$  are calculated in the following manner:

$$Q_{avg} = (2 \text{ persons/bedroom})(4 \text{ bedrooms})(75 \text{ gallons/person/day})$$
$$Q_{avg} = \underline{600 \text{ gallons per day (gpd)}}$$

$$Q_{max} = (1.5)(Q_{avg})$$
$$Q_{max} = (1.5)(600 \text{ gpd})$$
$$Q_{max} = \underline{900 \text{ gpd}}$$

Since permanent low-flow plumbing fixtures will be installed in the dwelling, I have reduced the design flow ( $Q_{des}$ ) by 20 percent in the following manner:

$$Q_{des} = (0.8)(Q_{max})$$
$$Q_{des} = (0.8)(900 \text{ gpd})$$
$$Q_{des} = \underline{720 \text{ gpd}}$$

All wastewater generated inside the dwelling will be treated in a conventional 2-compartment septic tank having a minimum capacity of 1,500 gallons. Assuming a design flow of 720 gpd, the 1,500-gallon capacity tank will provide approximately 50 hours of detention time, which is greater than the 30 hours of detention time required by the CDPHE ISDS regulations.

Advanced treatment of the septic tank effluent will be provided by an AdvanTex™-AX (model AX20) treatment system manufactured by Orenco Systems, Incorporated. The AdvanTex™ treatment system functions in the same manner as a recirculating sand filter, however the filter media consists of an engineered textile material that is far more efficient than sand. Effluent from the treatment unit generally exceeds "secondary" treatment standards for total suspended solids (TSS) and biochemical oxygen demand (BOD<sub>5</sub>).

Final treatment and discharge of effluent from the filter unit will be accomplished through the process of subsurface soil absorption. Since the wastewater generated in the dwelling will receive advanced treatment, the long term rate of absorption will be much greater than that of a conventional septic tank and leach field system. For design purposes, I have assumed a hydraulic loading rate ( $HLR$ ) of 3.5 gallons per square foot per day (gal/ft<sup>2</sup>/d) for the imported sandy soil that will be placed in the mounded soil absorption bed.

The minimum absorption area ( $A$ ) required to accommodate the design flow ( $Q_{des}$ ) is calculated using the assumed hydraulic loading rate ( $HLR$ ) for the imported sandy soil that will be used in the mounded soil absorption bed. The absorption area required for final treatment and discharge of the filtered effluent is calculated in the following manner:

$$\begin{aligned} A &= (Q_{des}) \div (HLR) \\ A &= (720 \text{ gpd}) \div (3.5 \text{ gal/ft}^2/\text{d}) \\ A &= \underline{206 \text{ ft}^2} \end{aligned}$$

I have designed the soil absorption surface of the mounded soil absorption bed to have a minimum of 450 square feet with 217 square feet directly under the Infiltrator® chambers, which should safely accommodate final treatment and discharge of the design flow.

### **Proposed ISDS**

The proposed ISDS will consist of a treatment tank, a recirculating packed-bed filter advanced treatment system, a lift station consisting of a basin equipped with an effluent pump, and a pressure-dosed, mounded soil absorption bed. The materials and methods of construction are described here and shown in the attached drawings.

The existing 1,000-gallon septic tank (vault) shall be abandoned in place and a new treatment tank shall be installed in the location shown on the attached drawings. The existing sewer piping shall be modified such that all wastewater from the dwelling will flow to the new treatment tank and not to the existing tank.

The treatment tank shall have a capacity of 1,500 gallons, shall be constructed and installed in accordance with the CDPHE ISDS regulations and shall be installed in the approximate location shown on the attached site plan.

A two-way clean out fitting, if one does not already exist, shall be installed on the sewer line between the dwelling and the new treatment tank. All new buried system piping between the dwelling and the treatment tank shall consist of 4-inch diameter PVC (Sch. 40).

The recirculating packed-bed filter treatment system shall be an AdvanTex™-AX (model AX20) manufactured by Orenco Systems, Incorporated. The system shall be installed in strict accordance with the manufacturer's instructions. A two-year monitoring and maintenance agreement shall be included as part of the complete system package.



The lift station shall consist of a 140-gallon PVC pump basin equipped with an effluent pump and covered opening for access. An Orenco ½-horsepower, 115-volt submersible effluent pump shall be installed in the basin. The pump shall be controlled by two liquid level float switches and a timer. The float switches and timer shall be adjusted to facilitate dosing the mounded soil absorption bed ten to twenty times per day (approximately 40 gallons per dose).

The lift station shall be equipped with a high water alarm consisting of a float switch connected to a visible and audible alarm. The high water alarm shall be installed on an electrical circuit separate from that of the effluent pump.

A level surface of native soil having minimum dimensions of fifty (50) feet long by nine (9) feet wide shall be constructed to form the base of the mounded soil absorption bed in the approximate location shown on the attached drawings. The native soil surface shall be scarified and any vegetation shall be removed from the level surface as well as the area surrounding the bed where embankments will be constructed.

The mounded soil absorption bed shall have a total base area of approximately 900 square feet and shall be constructed in accordance with the attached drawings. The level surface of native soil shall be covered with clean sand to a minimum depth of twenty-four (24) inches. The top of the sand layer shall be level. Materials such as "reject sand" or "crusher fines" generated by local gravel crushing operations may be used in the mounded soil absorption bed upon approval of the Engineer.

Standard Infiltrator® chambers shall be installed on the level surface of imported sand in the configuration shown on the attached drawings. The Infiltrator® chambers shall be installed in two rows of seven (7) chambers each (14 chambers total). Each row of Infiltrator® chambers shall be installed with closed end plates attached to both ends per the manufacturer's instructions.

The discharge piping between the effluent pump and the soil absorption bed shall consist of 1¼-inch diameter PVC (Sch. 40). The discharge piping shall be installed with a positive grade to facilitate drainage of effluent back toward the pump basin to prevent the line from freezing.

The discharge piping will tee into a 1¼-inch diameter PVC (Sch. 40) header pipe near the inlet end of the soil absorption bed. One-inch diameter PVC (Sch. 40) lateral distribution piping shall be installed inside each row of Infiltrator® chambers. Each lateral pipe shall extend throughout the entire length each row as shown on the attached drawings and shall be suspended from the tops of the Infiltrator® chambers using plastic cable ties.

The pressure distribution lateral pipes shall be capped at the terminal ends and perforated throughout the 44-foot length inside the Infiltrator® chambers. The perforations shall be 1/8-inch diameter located in the top of the pipe slightly off of the center line with a spacing of one hole every 10 inches (0.83 linear feet) on center. Two additional holes shall be located on the bottom of each lateral pipe, one at each end, to allow drainage after each dose. Splash plates shall be attached to each closed end plate per the manufacturer's instructions directly below each of the downward-facing holes.

Embankments of native soil shall be constructed around the entire mounded soil absorption bed to contain the sand and Infiltrator® chambers. The finished embankment slopes shall not be steeper than 3H:1V.

A final cover of native soil shall be placed to a minimum depth of 10 inches over the tops of the Infiltrator® chambers. The area around the mounded soil absorption bed shall be graded to divert runoff from rain and melting snow away from the bed.

### **Installation and Certification**

Installation of the treatment tank, mounded soil absorption bed and associated piping will be performed by Allmon Dirtworks of Cortez, an experienced system installer in Montezuma County. I met with Dave Allmon at the site to discuss the design and construction of the system. Installation of the advanced treatment equipment and lift station will be performed by Mark Quesenbery of Durango, who is authorized by the manufacturer to install the AdvanTex™ treatment systems. I reserve the right to make minor modifications to this system design as needed to accommodate unforeseen conditions encountered during construction. After construction is completed, I will provide you with a letter certifying that the system was installed as described in this letter and the attached drawings.

### **Summary**

I have proposed a design for an individual sewage disposal system for the King residence located at 18656 Highway 145 in the River Acres subdivision, approximately two miles east of the Town of Dolores, Montezuma County, Colorado. The system design utilizes a conventional two-chamber septic tank for primary treatment of domestic sewage, a recirculating packed-bed filter for advanced treatment and a pressure-dosed, mounded soil absorption bed for final treatment and discharge of the filtered effluent. The proposed system design conforms to the regulations set forth in the Colorado State Board of Health *Guidelines on Individual Sewage Disposal Systems*.

Mr. Mitchell Periman  
October 8, 2002  
Page 7

Please contact me at (970) 247-0500 if you have any questions or comments regarding this system design.

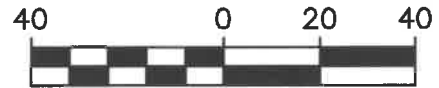
Sincerely,  
RG CONSULTING ENGINEERS, INC.



Michael Hannigan, P.E.  
Durango Office Manager

Attachments: Construction Drawings

cc: Wayne King, Owner  
Mark Quesenbery, Hague Quality Water  
Jason Allen, SCG Enterprises, Inc.



SCALE: 1"=40'

TRACT I  
6.48 ACRES

RIVER ACRES SUBDIVISION

MOUNDED SOIL  
ABSORPTION BED

TREATMENT TANK  
W/PUMP VAULT

DRIVEWAY

EXISTING DWELLING

DOLORES RIVER

KING - ISDS

SITE PLAN



rg consulting engineers, inc.

1201 main ave. • suite D • durango, colorado 81301  
(970) 247-0500

OWNER: WAYNE KING

DATE: 03/10/02

PROJ: 0593.0001

LOCATION: TRACT 20 RIVER ACRES SUBD.

DRAWN BY: CEK

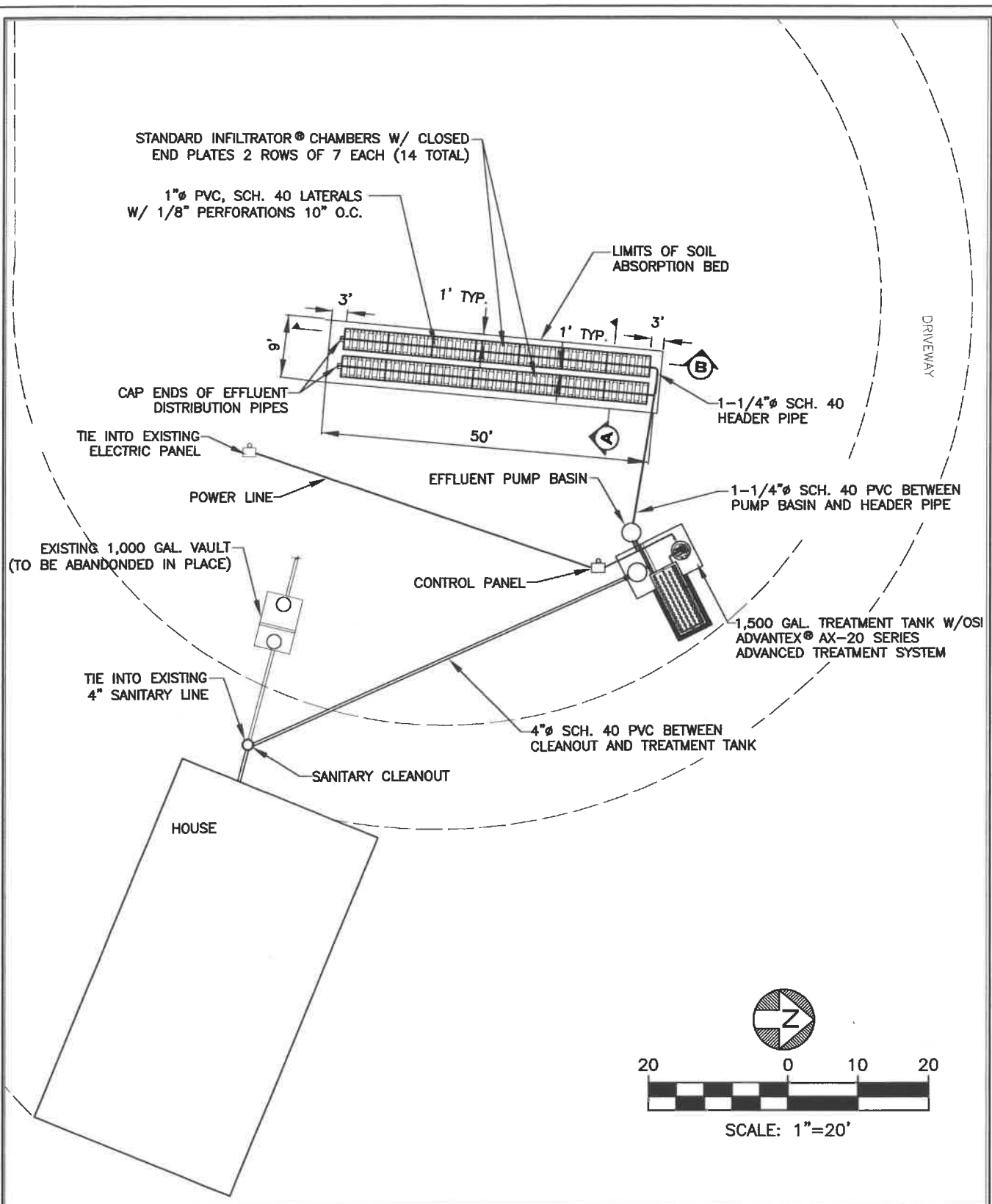
DOLORES, COLORADO

CHK. BY: MH

MONTEZUMA COUNTY

SHT. 1 OF 4

DWG PATH: C:\PROJECTS-ISDS\KING KING-2.DWG USER: CEK PLOT DATE: 03/10/02



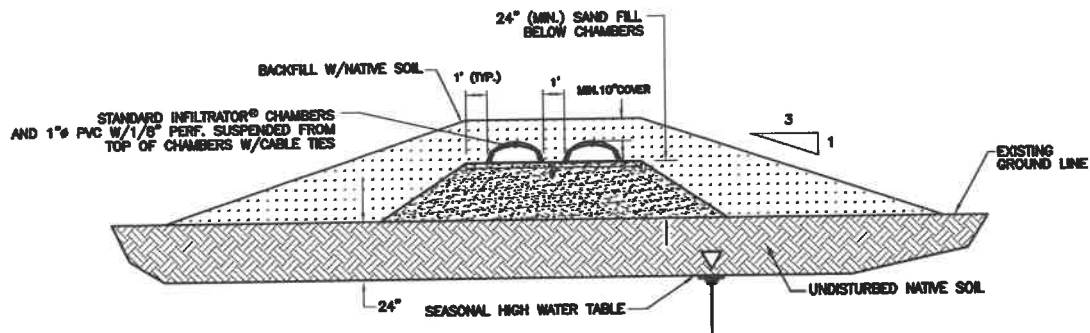
**rg consulting engineers, inc.**

1201 main ave. • suite D • durango, colorado 81301  
(970) 247-0500

## KING - ISDS

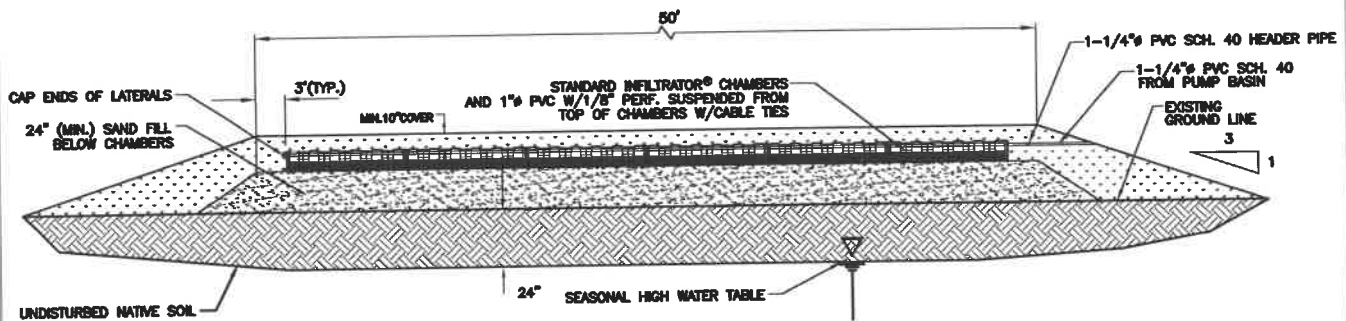
### SITE PLAN

OWNER:	WAYNE KING	DATE:	03/10/02	PROJ:	0593.0001
LOCATION:	TRACT 20 RIVER ACRES SUBD.			DRAWN BY:	CEK
	DOLORES, COLORADO			CHK. BY:	MH
	MONTEZUMA COUNTY			SHT.	2 OF 4



### SECTION A

N.T.S



### SECTION B

N.T.S

#### CONSTRUCTION NOTES

1. EXCAVATE AND CREATE LEVEL SURFACE TO CONSTRUCT BED

DWG PATH: G:\PROJECTS-SDS\KING-KING-3.DWG USER: CEK PLOT DATE: 10/04/02



**rg consulting engineers, inc.**

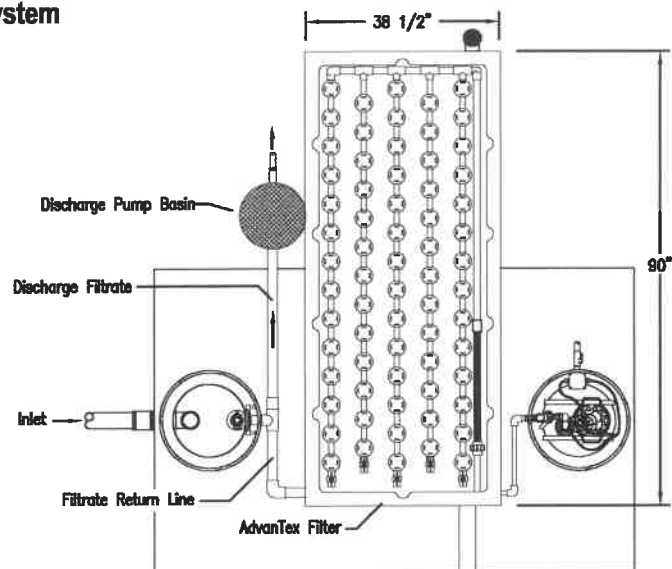
1201 main ave. • suite D • durango, colorado 81301  
(970) 247-0500

## KING - ISDS

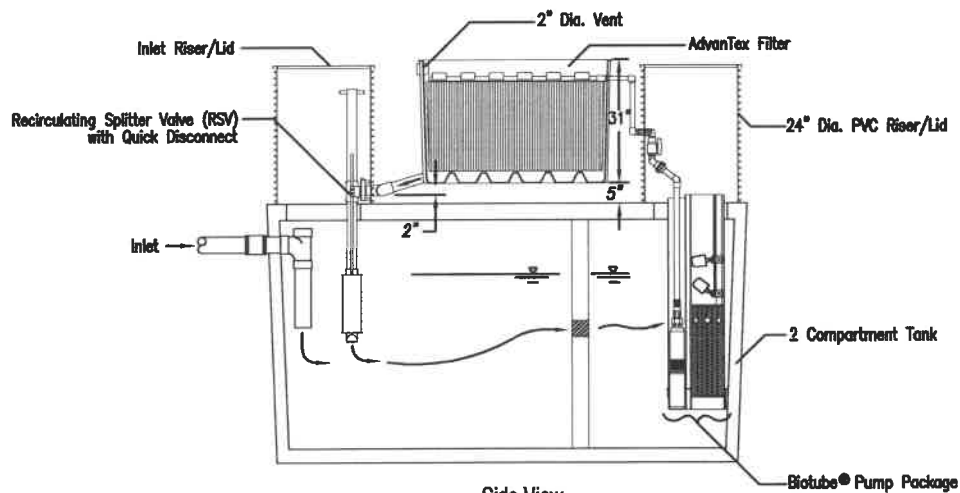
### SOIL ABSORPTION BED SECTIONS

OWNER: WAYNE KING	DATE: 10/08/02	PROJ: 0593.0001
LOCATION: TRACT 20 RIVER ACRES SUBD.		DRAWN BY: CEK
DOLORES, COLORADO		CHK. BY: MH
MONTEZUMA COUNTY		SHT. 3 OF 4

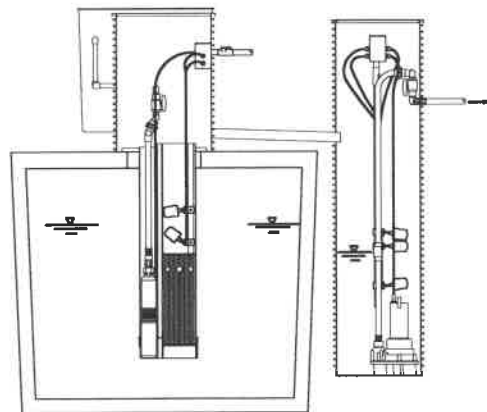
# **AdvanTex™ Treatment System** AX 20 Series - Mode 3b



Top View



Side View



End View

**KING - ISDS**

**ADVANTEX DETAIL**



**rg consulting engineers, inc.**

1201 main ave. • suite D • durango, colorado 81301  
(970) 247-0500

OWNER: WAYNE KING	DATE: 03/10/02	PROJ: 0593.0001
LOCATION: TRACT 20 RIVER ACRES SUBD.		DRAWN BY: CEK
DOLORES, COLORADO		CHK. BY: MH
MONTEZUMA COUNTY		SHT. 4 OF 4



rg consulting engineers, inc.

denver • grand junction • trinidad • durango

March 28, 2003

Mr. Mitchell Periman  
Montezuma County Health Department  
109 West Main Street, Room 305  
Cortez, Colorado 81321

**RE: Certification of Individual Sewage Disposal System Installation  
18656 Highway 145, Dolores, Colorado  
King Residence**

Dear Mr. Periman:

The purpose of this letter is to certify that the individual sewage disposal system for the address referenced above was installed in accordance with the design specifications and drawings that I submitted to your office by letter, dated October 8, 2002.

The treatment tank, soil absorption trenches and system piping were installed by Allmon Dirtworks of Cortez and the Orenco Systems, Inc. AdvanTex™ advanced treatment system was installed by Mark Quesenbery of Durango. I inspected the system installation on October 17, 2002. Construction of the system is now complete. I hereby certify that the ISDS installed at the King residence, located at 18656 Highway 145, approximately two miles east of the Town of Dolores, Montezuma County, Colorado was done so in accordance with the design specifications and drawings referenced above.

Sincerely,  
RG CONSULTING ENGINEERS, INC.

Michael Hannigan, P.E.  
Durango Office Manager

cc: Wayne King, Owner

