Robert J. Huston, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Jeffrey A. Saitas, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

September 3, 1999

Mr. William Borchers
Oakwood Estates, Inc.
251 South Seguin Street
New Braunfels, TX 78130

Re: EDWARDS AQUIFER, Comal County
PROJECT: Oakwood Estates, Project number 1298.00, Located approximately south of SH 337, and north and east of Elmwood Drive, New Braunfels, Texas
TYPE: Request for Approval of Water Pollution Abatement Plan (WPAP); 30 Texas Administrative Code (TAC) §213.5(b); Edwards Aquifer Protection Program

Dear Mr. Borchers:

The Texas Natural Resource Conservation Commission (TNRCC) has completed its review of the WPAP application for the referenced project that was submitted by Paul Schroeder, P.E. of Alamo Consulting Engineering and Surveying on behalf of Oakwood Estates, Inc. to the San Antonio Regional Office on May 25, 1999. Final review of the WPAP submittal was completed after additional material was received on August 18, 1999, August 26, 1999, and September 1, 1999. The WPAP proposed in the application is in general compliance with 30 TAC § 213.5(b); therefore, approval of the plan is hereby granted subject to applicable state rules and the conditions in this approval letter. *This approval expires two (2) years from the date of this approval unless, prior to the expiration date, construction has commenced on the project or an extension of time has been requested.*

PROJECT DESCRIPTION

The proposed residential project will occupy 102.5 acres with single-family residential units and curbed and paved streets. Project wastewater will be disposed of by conveyance to the Gruene Treatment Plant owned by New Braunfels Utilities. The proposed impervious cover for the development is approximately 44.2 acres (43%). The site is located within the City of New Braunfels, and must conform with applicable codes and requirements of the City of New Braunfels.

GEOLOGY ON SITE

According to the geologic assessment included with the submittal, fourteen possibly sensitive features discovered on the site include fractured rock zones, closed depressions, solution cavities, and man made disturbances.

The San Antonio Regional Office site inspection of July 12, 1999, revealed two additional geologic features:

1. Fractured rock/closed depression 6' x 4' x 1' with infilling of uncompacted organic particles. Assessed as sensitive. Located approximately 150' south of Williams Way (east-west section) and 200' east of Williams Way (north-south section), & 100' northwest of cul-de-sac of Bonnie Bend Road.

2. Fractured rock 8' diameter with no infilling. Assessed as sensitive. Located in proposed Hannah Hill Road approximately 480' northeast of intersection with Sydney Bend Road.

3. Other geologic features associated with Oakwood Estates Unit 14 sewage collection system (Project #1285) were observed and noted in the site inspection report for that project.

Abundant construction debris was observed on the 4.82 acre tract within the property, located on the northeast side of the 102.5 acre tract.

A second site inspection was conducted on August 11, 1999, with an investigator from the San Antonio Region's Municipal Solid Waste (MSW) program to evaluate site for compliance with 30 TAC Chapter 330. The assessment of the site was that there were minor amounts of MSW, intermixed with abundant recyclable industrial equipment and construction material.

GEOLOGY DOWNGRADIENT OF SITE

According to the geologic assessment included with the submittal, loose rock in the stream bed could possibly contribute to recharge and therefore be considered sensitive. The rock is thought to be a degraded dam or velocity dissipating feature.

PERMANENT POLLUTION ABATEMENT MEASURES

The following measure will be taken to prevent pollution of stormwater originating on-site or up-gradient from the project site and potentially flowing across and off the site after construction:

Energy dissipation blocks will be placed as shown on the plan sheet received by the TNRCC on August 26, 1999.

The measures listed in the table below will be taken to prevent pollutants from entering 14 possibly sensitive geologic or manmade features identified in the geologic assessment while maintaining or enhancing the quantity of water entering the recharge features.

#	Feature #	Feature type	Abatement Measures
1	S-4	Solution Cavity	Filled with gravel and covered with impermeable clay.
2	S-5	Solution Cavity	Filled with gravel and covered with impermeable clay.
3	S-6	Solution Cavity	Filled with gravel and covered with impermeable clay, covered by future street.
4	S-7	Fractured rock	Located in "Out-Tract". No measures proposed.
5	S-8	Fractured rock	Located in "Out-Tract". No measures proposed.
6	S-9	Closed depressions associated with fault	Filled with gravel and covered with impermeable clay, covered by future street.
7	S-10	Manmade (pipe)	Pipe will be cut back to a depth of 1 foot and capped or removed, which is to be determined upon excavation.
8	S-12	Manmade (sewer manhole)	No measures proposed.
9	S-13	Manmade (excavation)	No measures proposed.
10	S-14	Closed depressions	Located within future drainage easement, no measures proposed.
11	S-15	Solution Cavity	Filled with gravel and covered with impermeable clay.
12	S-16	Collapse feature	Located within future drainage easement, no measures proposed.
13	S-17	Manmade (sewer manhole)	No measures proposed.
14	S-18	Manmade (sewer manhole)	No measures proposed.
15	S-20	Fractured rock/closed depression	Platted "no build" easement & owner notification.
16	S-21	Fractured rock	Filled with gravel and covered with impermeable clay, covered by future street.

SPECIAL CONDITIONS

1. If any potential sensitive features are encountered during construction, a geologist shall evaluate the significance of the features. The evaluation shall include representative photographs and a description of the feature forwarded to the San Antonio office. Construction in the vicinity of the features may only continue with written approval from the TNRCC.

2. Placement of hydrocarbon or hazardous substance storage facilities regulated pursuant to 213.5(d) and 213.5(e), requires submittal of all appropriate applications with appropriate fees and must receive prior approval from the TNRCC.

3. The temporary and permanent best management practices (BMPs) for the proposed project have been reviewed by the Commission's staff. As presented to the TNRCC, the BMPs were designed by a Texas Licensed Professional Engineer to be in accordance with the requirements of 30 TAC §213.5(b). Therefore, based on the Texas Licensed Professional Engineer's certification of compliance, the planning materials for construction of the proposed pollution abatement measures are hereby approved.

4. The solid waste on this site must be disposed of properly at an authorized facility. Copies of disposal records shall be submitted to the San Antonio regional office of the TNRCC within 14 days of disposal.

STANDARD CONDITIONS

1. During the course of regulated activities related to this project, the applicant or his agent shall comply with all applicable provisions of 30 TAC Chapter 213, Edwards Aquifer. The applicant shall remain responsible for the provisions and conditions of this approval until such responsibility is legally transferred to another person or entity, upon which that person or entity shall assume responsibility for all provisions and conditions of this approval.

2. Any modification to the activities described in the referenced WPAP application following the date of approval may require the submittal of a WPAP to amend this approval, including the payment of appropriate fees and all information necessary for its review and approval.

3. Prior to commencing any regulated activity, the applicant or his agent must notify the San Antonio Regional Office in writing of the date on which the regulated activity will begin.

4. The applicant or his agent shall record this WPAP approval in the county deed records within 30 days of receiving this notice of approval. Proof of deed recordation shall be submitted

to the San Antonio Regional Office prior to commencing construction. A suggested format that you may use to deed record the approved WPAP is enclosed.

5. All contractors conducting regulated activities at the project location shall be provided a copy of this notice of approval. At least one complete copy of the approved WPAP and this notice of approval shall be maintained at the project location until all regulated activities are completed.

6. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved WPAP, must be installed prior to construction and maintained during construction. Temporary E&S controls may be removed when vegetation is established and the construction area is stabilized. If a water quality pond is proposed, it shall be used as a sedimentation basin during construction. The TNRCC may monitor stormwater discharges from the site to evaluate the adequacy of temporary E&S control measures. Additional controls may be necessary if excessive solids are being discharged from the site.

7. If any significant recharge feature [sensitive feature] is discovered during construction, all regulated activities near the feature must be suspended immediately. The applicant or his agent must immediately notify the San Antonio Regional Office of the discovery of the feature. Regulated activities near the feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the feature and the aquifer from potential adverse impacts to water quality.

8. At project locations where construction is initiated and abandoned, or not completed, the site shall be returned to a condition such that the aquifer is protected from potential contamination.

9. Approval of the design of the sewage collection system for this proposed project shall be obtained from the TNRCC prior to commencement of construction of any sewage collection system.

10. Any abandoned wells found during construction shall be plugged in accordance with 16 TAC §76 or an equivalent method, as approved by the Executive Director.

    Any drill holes resulting from core sampling on-site or down-gradient of the site shall be plugged with native soil, from the bottom of the hole to the top of the hole, so as to not allow water or contaminants to enter the subsurface environment.

11. Pursuant to §26.136 of the Texas Water Code, any violations of the requirements in 30 TAC §213 may result in administrative penalties.

Should clarification of this letter be desired or if we may be of any other assistance, please contact John Mauser of our San Antonio Regional office at 210/403-4024. Please reference project number 1298.

Sincerely,

Jeffrey A. Saitas, P.E.
Executive Director
Texas Natural Resource Conservation Commission

JAS/JKM/eg

Enclosure: Deed Recordation Affidavit

cc: Paul A. Schroeder PE, ACES
Harry Bennett, City of New Braunfels
Tom Hornseth, Comal County
John Bohuslav, TXDOT
Greg Ellis, Edwards Aquifer Authority
TNRCC Field Operations, Austin

Robert J. Huston, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Jeffrey A. Saitas, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

March 9, 2000

RECEIVED
MAR 13 2000
COUNTY ENGINEER

Mr. William Borchers
Oakwood Estates, Inc.
251 S. Seguin St.
New Braunfels, TX 78130

Re: EDWARDS AQUIFER, Comal County
PROJECT: Oakwood Estates, Unit 14, Project number: 1285.01
TYPE: Solution Feature/Sensitive Feature; 30 Texas Administrative Code (TAC) §213.5(f)(2); Edwards Aquifer Protection Program

Dear Mr. Borchers:

The Texas Natural Resource Conservation Commission (TNRCC) received a plan which addresses protection of solution features encountered during construction of the above referenced project. It was submitted on behalf of Oakwood Estates, Inc. by Alamo Consulting Engineering & Surveying, Inc. and received by the San Antonio office on March 2, 2000. Feature locations and assessments are outlined in Table I below. Final review was completed on March 6, 2000.

TABLE I

Type of Solution Feature	Line	Station	Case*
Cave	A	0 + 50	3
Cave	A	0 + 50	3
Cave	A	0 + 50	2
Cave	A	0 + 50	2
Cave	A	6 + 15	2
Cave	A	6 + 15	2
Cave	A	11 + 65 (Lateral)	3
Cave	A	11 + 65 (Lateral)	3
Cave	A	12 + 00	3
* See TABLE II (enclosed)			

The San Antonio office did conduct a site investigation on March 6, 2000. The field investigator agrees with the case assessment. Based on the information provided, and it's certification by Paul Schroeder, P.E., your protection plan is approved with the following conditions:

1. The location of the solution feature shall be shown on the "as-built" plans.

2. Any concrete or concrete encasement shall meet or exceed New Bruanfels Utilities (NBU) specifications for minimum thickness and compression strength.

Should clarification of this letter be desired or if we may be of any other assistance, please contact Anne Marie Callery of our San Antonio Regional office at 210/403-4075. Please reference project number 1285.01.

Sincerely,

Bobby D. Caldwell
Water Program Manager
San Antonio Regional Office
Texas Natural Resource Conservation Commission

BDC/amc

Enclosure: Table II (Minimum Standards for Closing Solution Features in Sewer Line Trenches)

cc: Paul Schroeder, P.E., Alamo Consulting Engineering & Surveying, Inc.
Greg Ellis, Edwards Aquifer Authority
Tom Hornseth, Comal County
Harry Bennett, City of New Braunfels
Mike Shands, City of New Braunfels
TNRCC Field Operations, Austin

TABLE II				
EDWARDS AQUIFER PROTECTION PROGRAM - TNRCC **Minimum Protective Standards for Sewer Line and Storm Sewer Trenches** (from Edwards Aquifer Guidance Document 96.004, Effective 8/11/98)				
Case	Description	Concern	Treatment	Notification/Approval
1	Sensitive feature is less than or equal to six (6) inches in all directions and is located above the embedment of the pipe. All rock within and surrounding the feature is sound.	Not environmental nor pipe integrity	No abatement required.	None required.
2	Sensitive feature is either larger than six (6) inches in at least one direction or is located within the level of the pipe embedment. No portion of the sensitive feature may intersect the plane of trench floor. All rock within and surrounding the feature is sound.	Environmental	The sensitive feature shall be filled with concrete. Gravel to "fist sized" rock or sacks of gravel may be placed in feature prior to placement of the concrete as long as a minimum of eighteen (18) inches of concrete is used to close the feature. minimum).	Requires notification and prior **written** approval from TNRCC.
3	Sensitive feature intersects the plane of the trench floor is less than four (4) feet in any direction. All rock within and surrounding the feature is sound.	Environmental	Sensitive feature shall be filled with concrete. Gravel to "fist sized" rock or sacks of gravel may be placed in feature prior to placement of concrete at least eighteen (18) inches of concrete is used to close the feature. The sewer line or storm sewer lines shall be concrete encased for width of the sensitive feature plus a minimum of five (5) feet on either end. The encasement shall provide a minimum of six (6) inches of concrete on all sides of the pipe and shall have a compression strength of at least two thousand five hundred (2,500) psi (28-day strength). The concrete may be steel reinforced.	Requires notification and prior **written** approval from TNRCC.
4	Sensitive feature intersects the plane of the trench floor and any opening in trench floor is greater than four (4) feet in any direction or the trench floor is unstable.	Environmental & Structural	Requires an engineered resolution at least as protective as Case 3 above. Additional protective measures, including rerouting of line, may be required.	Requires notification and prior **written** approval from TNRCC.

All plans submitted to the TNRCC regional office shall have a signed and dated seal of a Texas licensed Professional Engineer. All plans will be reviewed on a case-by-case basis and additional protective measures or additional information may be required.

Robert J. Huston, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
John M. Baker, *Commissioner*
Jeffrey A. Saitas, *Executive Director*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

March 9, 2000

RECEIVED
MAR 13 2000
COUNTY ENGINEER

Mr. William Borchers
Oakwood Estates, Inc.
251 S. Seguin St.
New Braunfels, TX 78130

Re: EDWARDS AQUIFER, Comal County
PROJECT: Oakwood Estates, Unit 14, Project number: 1285.02
TYPE: Solution Feature/Sensitive Feature; 30 Texas Administrative Code (TAC) §213.5(f)(2); Edwards Aquifer Protection Program

Dear Mr. Borchers:

The Texas Natural Resource Conservation Commission (TNRCC) received a plan which addresses protection of solution features encountered during construction of the above referenced project. It was submitted on behalf of Oakwood Estates, Inc. by Alamo Consulting Engineering & Surveying, Inc. and received by the San Antonio office on March 7, 2000. Feature locations and assessments are outlined in Table I below. Final review was completed on March 7, 2000.

TABLE I

Type of Solution Feature	Line	Station	Case*
Cave	A	0 + 50	3
Cave	A	6 + 35 (Lateral)	4
* See TABLE II (enclosed)			

The San Antonio office did conduct a site investigation on March 6, 2000. The field investigator agrees with the case assessment. The plan submitted by Paul Schroeder, P.E. has been reviewed and was found to conform to the treatment outlined for this case in Table II (enclosure).

The engineered resolution submitted for this situation include the following protective measures:

1. See enclosed closure plan

Based on the information provided, and it's certification by Paul Schroeder, P.E., your protection plan is approved with the following conditions:

1. The location of the solution feature shall be shown on the "as-built" plans.

2. Any concrete or concrete encasement shall meet or exceed New Braunfels Utilities (NBU) specifications for minimum thickness and compression strength.

3. Any steel reinforced concrete shall be with #4 Rebar, placed as shown on your plan.

Should clarification of this letter be desired or if we may be of any other assistance, please contact Anne Marie Callery of our San Antonio Regional office at 210/403-4075. Please reference project number 1285.02.

Sincerely,

Bobby D. Caldwell

Bobby D. Caldwell
Water Program Manager
San Antonio Regional Office
Texas Natural Resource Conservation Commission

BDC/AMC/eg

Enclosure: Table II (Minimum Standards for Closing Solution Features in Sewer Line Trenches)
Cave Closure Plan

cc: Paul Schroeder, P.E., Alamo Consulting Engineering & Surveying, Inc.
Greg Ellis, Edwards Aquifer Authority
Tom Hornseth, Comal County
Harry Bennett, City of New Braunfels
Mike Shands, City of New Braunfels
TNRCC Field Operations, Austin

TABLE II				
EDWARDS AQUIFER PROTECTION PROGRAM - TNRCC **Minimum Protective Standards for Sewer Line and Storm Sewer Trenches** (from Edwards Aquifer Guidance Document 96.004, Effective 8/11/98)				
Case	Description	Concern	Treatment	Notification/Approval
1	Sensitive feature is less than or equal to six (6) inches in all directions and is located above the embedment of the pipe. All rock within and surrounding the feature is sound.	Not environmental nor pipe integrity	No abatement required.	None required.
2	Sensitive feature is either larger than six (6) inches in at least one direction or is located within the level of the pipe embedment. No portion of the sensitive feature may intersect the plane of trench floor. All rock within and surrounding the feature is sound.	Environmental	The sensitive feature shall be filled with concrete. Gravel to "fist sized" rock or sacks of gravel may be placed in feature prior to placement of the concrete as long as a minimum of eighteen (18) inches of concrete is used to close the feature. minimum).	Requires notification and prior written approval from TNRCC.
3	Sensitive feature intersects the plane of the trench floor is less than four (4) feet in any direction. All rock within and surrounding the feature is sound.	Environmental	Sensitive feature shall be filled with concrete. Gravel to "fist sized" rock or sacks of gravel may be placed in feature prior to placement of concrete at least eighteen (18) inches of concrete is used to close the feature. The sewer line or storm sewer lines shall be concrete encased for width of the sensitive feature plus a minimum of five (5) feet on either end. The encasement shall provide a minimum of six (6) inches of concrete on all sides of the pipe and shall have a compression strength of at least two thousand five hundred (2,500) psi (28-day strength). The concrete may be steel reinforced.	Requires notification and prior written approval from TNRCC.
4	Sensitive feature intersects the plane of the trench floor and any opening in trench floor is greater than four (4) feet in any direction or the trench floor is unstable.	Environmental & Structural	Requires an engineered resolution at least as protective as Case 3 above. Additional protective measures, including rerouting of line, may be required.	Requires notification and prior written approval from TNRCC.

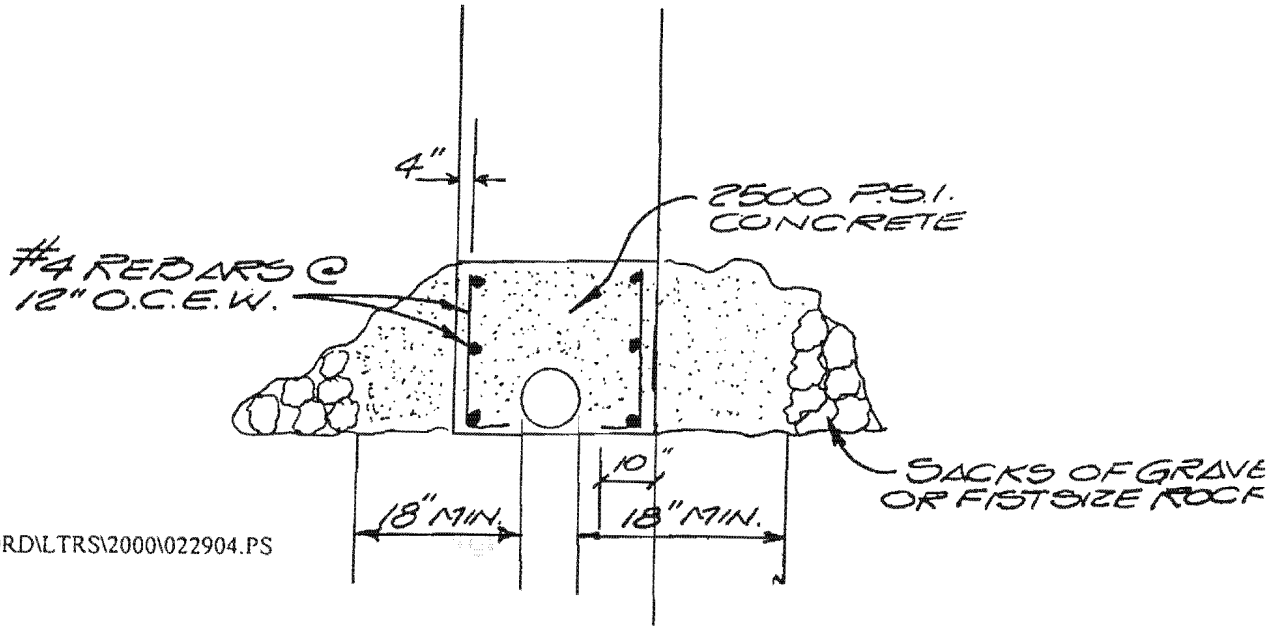
All plans submitted to the TNRCC regional office shall have a signed and dated seal of a Texas licensed Professional Engineer. All plans will be reviewed on a case-by-case basis and additional protective measures or additional information may be required.

ATTACHMENT 3

Proposed Protection Measures

Feature A1-5 located at 0+50 on line "A" shall be filled with flowable fill concrete.

Feature A2-3 will require concrete encasement as shown below for a distance of five (5') feet either side of the feature.



DOC:F:\WORD\LTRS\2000\022904.PS

TNRCC corresp

ALAMO CONSULTING ENGINEERING & SURVEYING, INC.
140 HEIMER RD., SUITE 617 SAN ANTONIO, TX 78232
PHONE: (210) 828-0691
FAX NO.: (210) 824-3055

RECEIVED
MAR 9 2000
COUNTY ENGINEER

March 6, 2000

Ms. Ann Marie Callery
T.N.R.C.C.
140 Heimer Road, Suite 360
San Antonio, TX 78232

RE: Oakwood Estates Unit 14, S.C.S.

Dear Ms. Callery:

Please find attached the Solution Feature Discovery Notification Form and required attachments. These are supplemental to the March 1, 2000 submittal, based on field observation this date. Your speedy attention to this matter would be greatly appreciated.

If additional information on this subject is required, please contact this office.

Sincerely,

ALAMO CONSULTING ENGINEERING & SURVEYING, INC.

Paul A. Schroeder, P.E., R.P.L.S.

STATE OF TEXAS
PAUL A. SCHROEDER
57564
REGISTERED PROFESSIONAL ENGINEER

RECEIVED
MAR 7 2000
SAN ANTONIO

CC: Mr. William Borchers, Oakwood Estates, Inc.-with attachments
Mr. Troy Hargroder, DuMor - with attachments
Mr. S. Craig Holmig, Holmig Engineering & Surveying - with attachments
Mr. Jeff Neathery, Neathery Environmental Services - with attachments
Job File No. 87500.00

DOC:F:\WORD\LTRS\2000\022901.PS

SOLUTION FEATURE DISCOVERY NOTIFICATION FORM
EDWARDS AQUIFER PROTECTION PROGRAM
For Regulated Activities on the Edwards Aquifer Recharge Zone and Transition Zone
and Relating to 30 TAC 213.5(f)(2) Effective June 1, 1999

When reporting a solution feature encountered during construction activities please provide the following information:

Project Name:	OAKWOOD ESTATES U-14	**Project ID #:**	
Project Type:	**WPAP** **SCS** **UST** **AST**	**Approval Date:**	WPAP-9/3/99 SCS-7/30/99
Project Location:	LOOP 337, APPROX 1 1/4 MILES N.E. OF HWY 46 NEW BRAUNFELS, TEXAS	**Approval Dates/ID#'s of any Modifications:**	
Date Feature(s) Discovered:	MARCH 6, 2000	**Date TNRCC Notified:**	3/6/00
Holder of Approved Plan:	MR. WILLIAM BORCHERS OAKWOOD ESTATES, INC.	**Solution Feature Plan Submitted By:**	PAUL A. SCHROEDER P.E., R.P.L.S.
Contact:	MR. WILLIAM BORCHERS	**Title:**	DIRECTOR OF ENG.
Title:		**Company:**	
Mailing Address:	251 S. SEGUIN ST. NEW BRAUNFELS, TX 78130	**Mailing Address:**	140 HEIMER, STE. 617 SAN ANTONIO, TX 78232
Phone:	(830)609-0918	**Phone:**	(210)828-0691
Fax:	(830)625-8045	**Fax:**	(210)824-3055

Feature No.	Feature Dimensions	Location of Feature (Reference features related to a SCS by Line and Station)	Case*/ Sensitivity**
A1-5	8" x 1'	Line A Sta. 0+50	3/S
A2-3	2'x2'x10'	Line A Sta. 6+35 (Lateral)	4/S

* per TNRCC Guidance Document 96.004
** per Geologic Assessment Table

1. Plan, profile, cross section sketches, and photos for each feature are found as **ATTACHMENT 1**.
2. Geologic Assessment Table (if applicable) is found as **ATTACHMENT 2**.
3. Drawings and narrative descriptions of the proposed protection measures are found as **ATTACHMENT 3**.

   If the discovery is related to a sewage collection system, a Texas Registered Professional Engineer is required to submit the protection plan.
4. Submitted by: _____, Date: March 6, 2000

   Printed name: PAUL A. SCHROEDER, P.E., R.P.L.S.

ACES JOB NO. 87500.00

ATTACHMENT 1

Plan, Profile, Cross Sections and Sketches (4 pages)

No Photo available

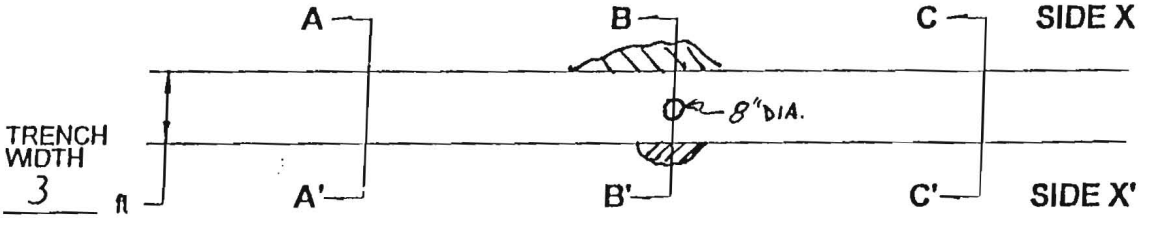
EAPP - Solution Cavity Form

☑ Sewage Collection System
☐ Water Line
☐ Other _____

PROJECT: Oakwood Estates Unit-14

DATE OF FIND: 1/11/00 DATE TNRCC NOTIFIED: _____

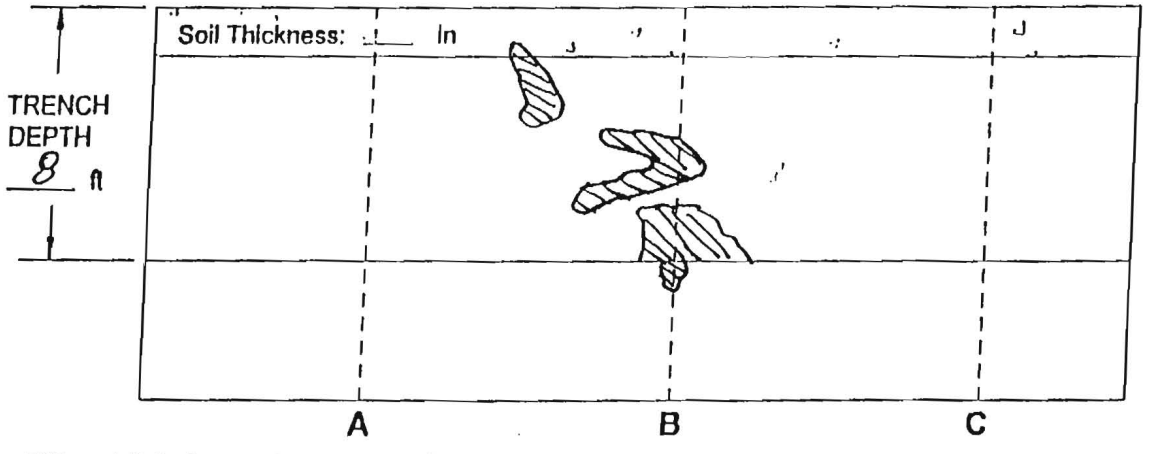
Plan View:



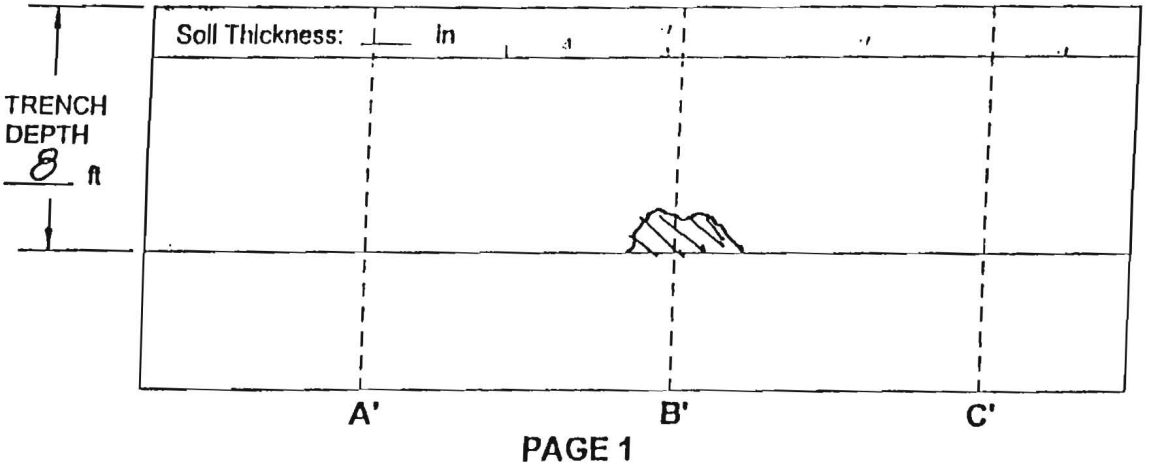
LINE: A STATION ____ + ____ 0 + 50 ____ + ____

Downgradient ← POROSITY ZONE → Upgradient

Profile (Side X): North Wall



Profile (Side X'): South Wall



Features 1→4 (A1)

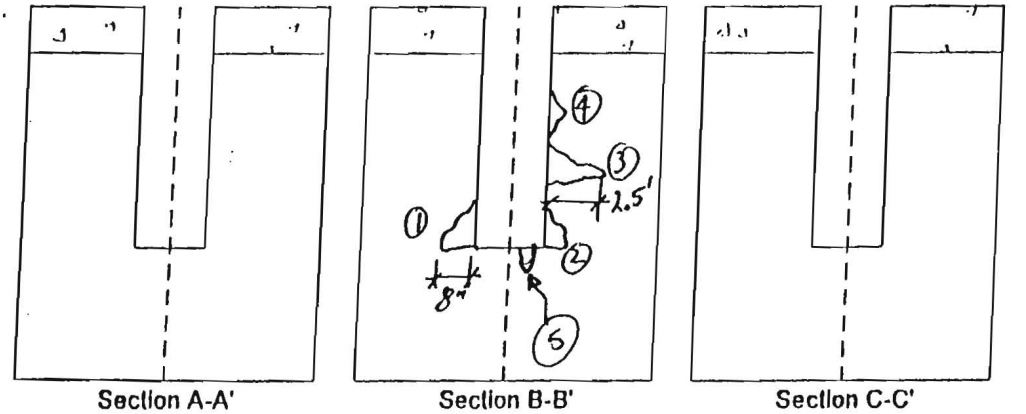
Sewage Collection System

Solution Cavity Form
TNRCC - EAPP

Notes:

- Include dimensioning
- Include illustrative pictures for complex features
- Attach additional pages if necessary.
- Identify case of feature (EAGD 96.004)

Cross-Section View:



Section A-A' Section B-B' Section C-C'

Line	Station	Feature	Case	Sensitivity
A	0+50	A1-1	3	possible sensitive
		A1-2	3	possible Sensitive
		A1-3	2	not sensitive
		A1-4	2	not sensitive
Added 3/6/00 PGS		A1-5	3	Sensitive

Notes:

Jeffrey S. Neathery

Printed Name of Geologist

Signature of Geologist

3/1/00

Date

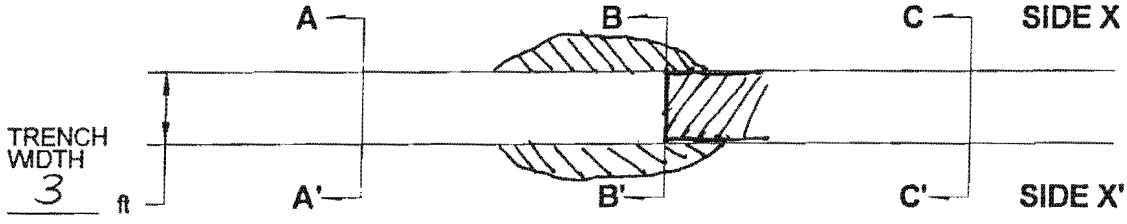
EAPP - Solution Cavity Form

☑ Sewage Collection System
☐ Water Line
☐ Other _____

PROJECT: Oakwood Estates Unit-14

DATE OF FIND: 3-6-00 DATE TNRCC NOTIFIED: 3-6-00

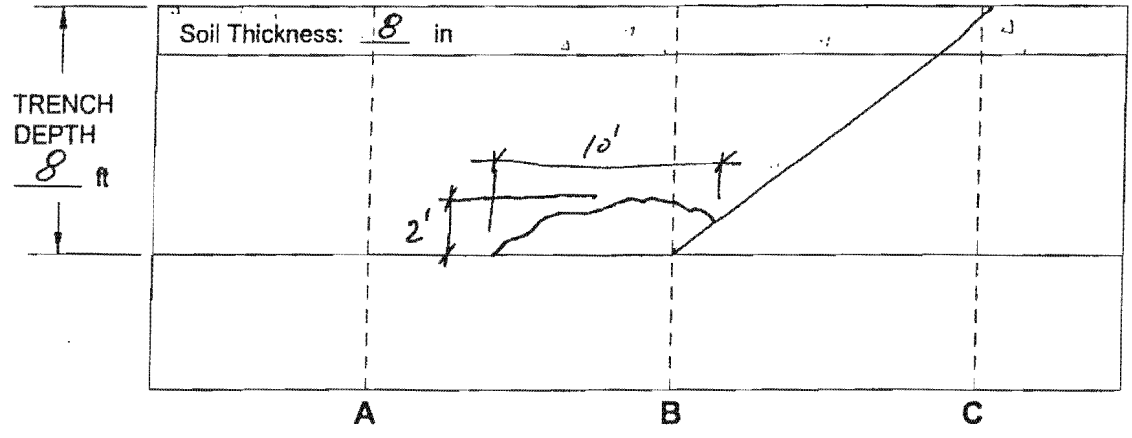
Plan View:



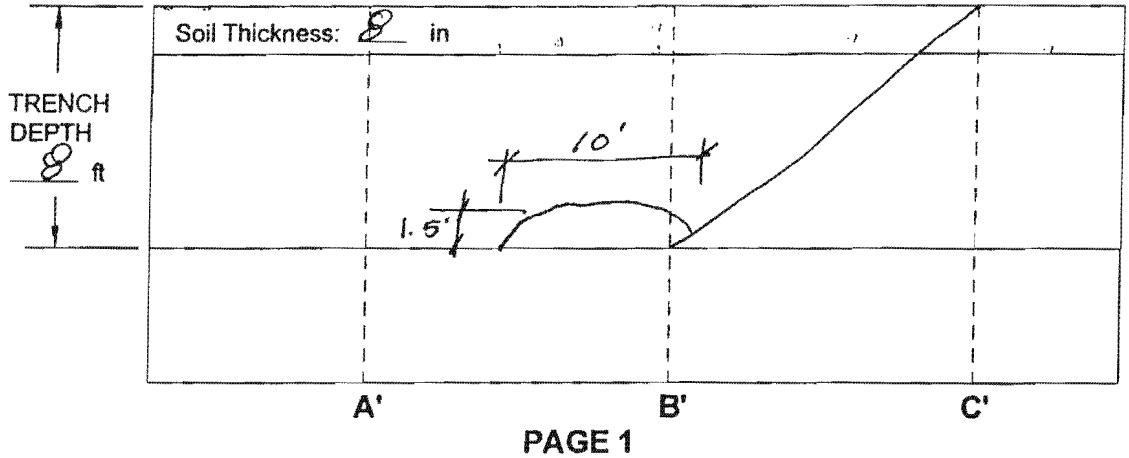
LINE: ____ STATION ____ + ____ 6 + 35 (Lateral) ____ + ____

Downgradient ← POROSITY ZONE → Upgradient

Profile (Side X):



Profile (Side X'):



A2-3

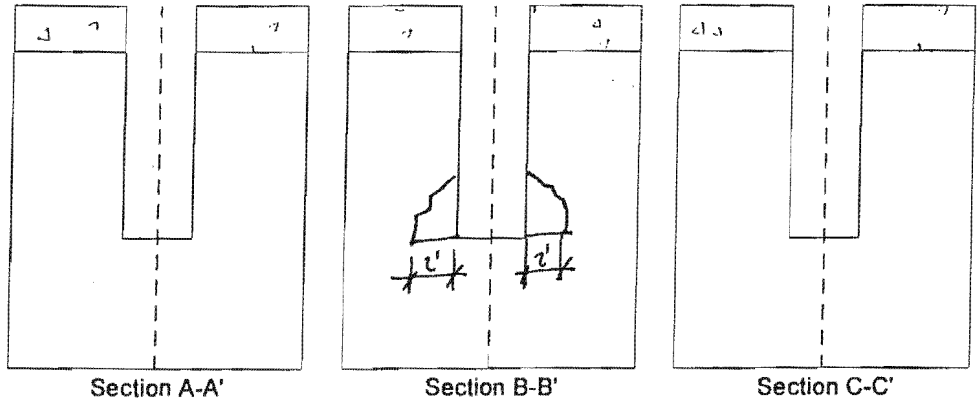
Sewage Collection System

Solution Cavity Form
TNRCC - EAPP

Notes:

- Include dimensioning
- Include illustrative pictures for complex features
- Attach additional pages if necessary.
- Identify case of feature (EAGD 96.004)

Cross-Section View:



Section A-A' Section B-B' Section C-C'

Line	Station	Feature	Case	Sensitivity
A	6+35 Lateral	A2-3	4	Sensitive

Notes:

Paul A. Schroeder

Printed Name of ~~Geologist~~ Engr.

Signature of ~~Geologist~~ Engr. 3/6/00

Date

A2-3

ATTACHMENT 2

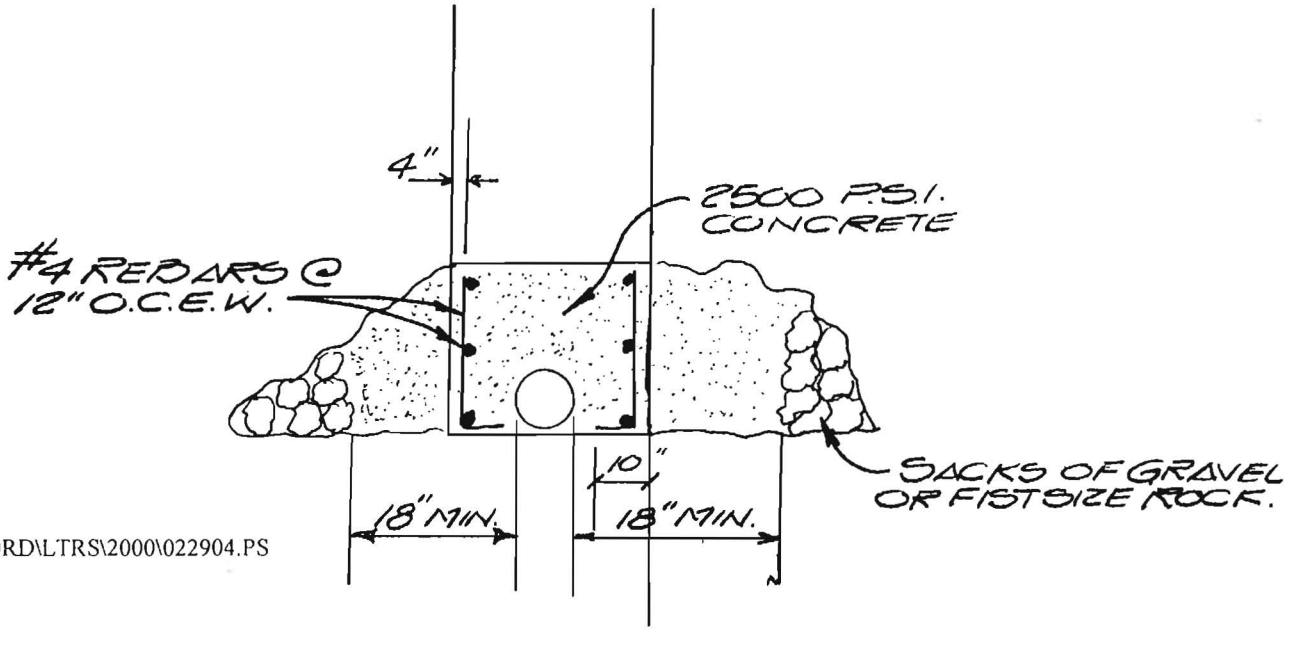
Geologic Assessment Table (Not Applicable)

ATTACHMENT 3

Proposed Protection Measures

Feature A1-5 located at 0+50 on line "A" shall be filled with flowable fill concrete.

Feature A2-3 will require concrete encasement as shown below for a distance of five (5') feet either side of the feature.



DOC:F:\WORD\LTRS\2000\022904.PS

TNRCC corresp

ALAMO CONSULTING ENGINEERING & SURVEYING, INC.
140 HEIMER RD., SUITE 617 SAN ANTONIO, TX 78232
PHONE: (210) 828-0691
FAX NO.: (210) 824-3055

RECEIVED
MAR 2 2000
SAN ANTONIO

RECEIVED
MAR 9 2000
COUNTY ENGINEER

March 1, 2000

Ms. Ann Marie Callery
T.N.R.C.C.
140 Heimer Road, Suite 360
San Antonio, TX 78232

RE: Oakwood Estates Unit 14, S.C.S.

Dear Ms. Callery:

Please find attached the Solution Feature Discovery Notification Form and required attachments. This replaces the submittal of February 29, 2000. Your speedy attention to this matter would be greatly appreciated.

If additional information on this subject is required, please contact this office.

Sincerely,

ALAMO CONSULTING ENGINEERING & SURVEYING, INC.

Paul A. Schroeder, P.E., R.P.L.S.

CC: Mr. William Borchers, Oakwood Estates, Inc.-with attachments
Mr. Troy Hargroder, DuMor - with attachments
Mr. S. Craig Holmig, Holmig Engineering & Surveying - with attachments
Mr. Jeff Neathery, Neathery Environmental Services - with attachments
Job File No. 87500.00

DOC:F:\WORD\LTRS\2000\022901.PS

SOLUTION FEATURE DISCOVERY NOTIFICATION FORM
EDWARDS AQUIFER PROTECTION PROGRAM
For Regulated Activities on the Edwards Aquifer Recharge Zone and Transition Zone
and Relating to 30 TAC 213.5(f)(2) Effective June 1, 1999

When reporting a solution feature encountered during construction activities please provide the following information:

Project Name:	OAKWOOD ESTATES U-14	**Project ID #:**	
Project Type:	WPAP SCS UST AST	**Approval Date:**	WPAP-9/3/99 SCS-7/30/9
Project Location:	LOOP 337, APPROX 1 1/4 MILES N.E. OF HWY 46 NEW BRAUNFELS, TX	**Approval Dates/ID#'s of any Modifications:**	
Date Feature(s) Discovered:	JANUARY 11, 2000	**Date TNRCC Notified:**	
Holder of Approved Plan:	MR. WILLIAM BORCHERS OAKWOOD ESTATES, INC.	**Solution Feature Plan Submitted By:**	PAUL A. SCHROEDER, P.E., R.P.L.S.
Contact:	MR. WILLIAM BORCHERS	**Title:**	DIRECTOR OF ENG.
Title:		**Company:**	ALAMO CONSULTING ENG. & SURVEYING, INC.
Mailing Address:	251 S. SEGUIN ST. NEW BRAUNFELS, TX 78130	**Mailing Address:**	140 HEIMER, STE. 617 SAN ANTONIO, TX 78232
Phone:	(830)609-0918	**Phone:**	(210)828-0691
Fax:	(830)625-8045	**Fax:**	(210)824-3055

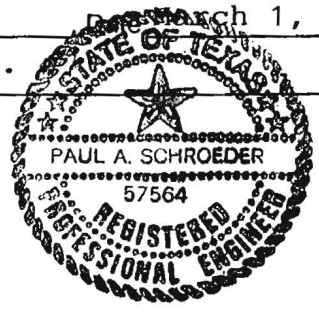
Feature No.	Feature Dimensions	Location of Feature (Reference features related to a SCS by Line and Station)	Case*/ Sensitivity**
A1	8" to 2.5'	Line A Sta. 0+50	2&3/PS/NS
A2	2'x2'x13'	Line A Sta. 6+15	2/NS
A3	8"x2'x7'	Line A Sta. 11+65 (Lateral)	3/PS
A4	8"x3'	Line A Sta. 12+00	3/S

* per TNRCC Guidance Document 96.004 S=Sensitive, NS=Not Sensitive, PS=Possibly Sensitive
** per Geologic Assessment Table

1. Plan, profile, cross section sketches, and photos for each feature are found as **ATTACHMENT 1.**
2. Geologic Assessment Table (if applicable) is found as **ATTACHMENT 2.**
3. Drawings and narrative descriptions of the proposed protection measures are found as **ATTACHMENT 3.**

   If the discovery is related to a sewage collection system, a Texas Registered Professional Engineer is required to submit the protection plan.
4. Submitted by: _____ Date: March 1, 2000

   Printed name: PAUL A. SCHROEDER, P.E., R.P.L.S.



ACES JOB NO. 87500

ATTACHMENT 1

Plan, Profile, Cross Sections, Sketches and Photos (8 pages)

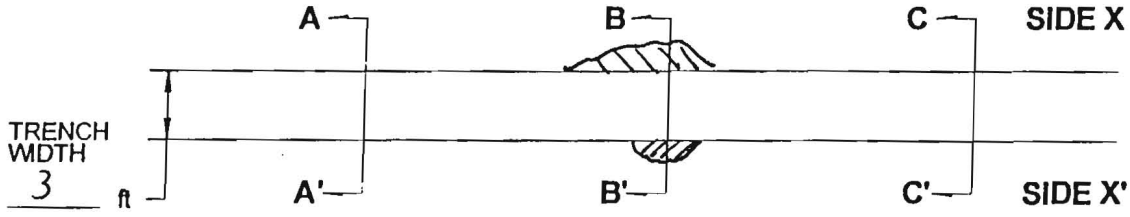
EAPP - Solution Cavity Form

☑ Sewage Collection System
☐ Water Line
☐ Other _____

PROJECT: Oakwood Estates

DATE OF FIND: 1/11/00 DATE TNRCC NOTIFIED: _____

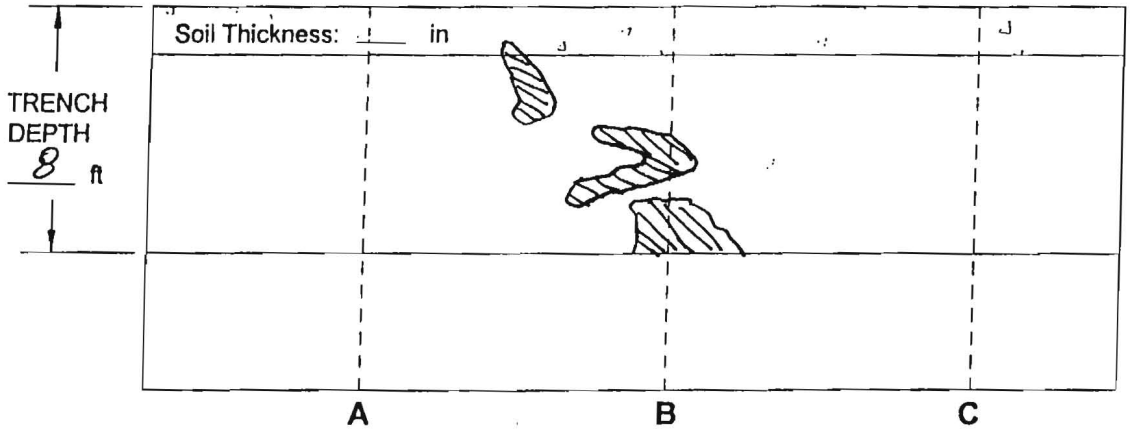
Plan View:



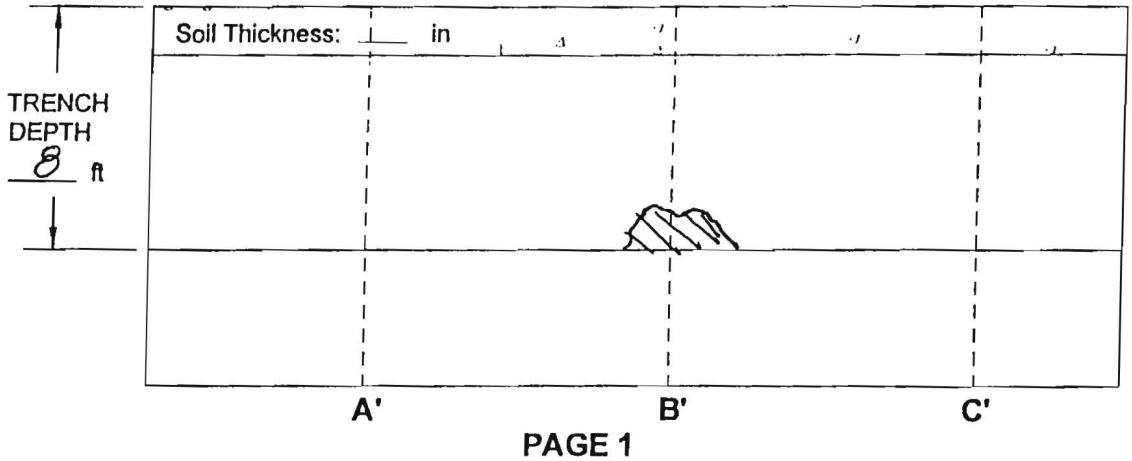
LINE: A STATION ____ + ____ 0 + 50 ____ + ____

Downgradient ← POROSITY ZONE → Upgradient

Profile (Side X): North Wall



Profile (Side X'): South Wall



Features 1→4 (A1)

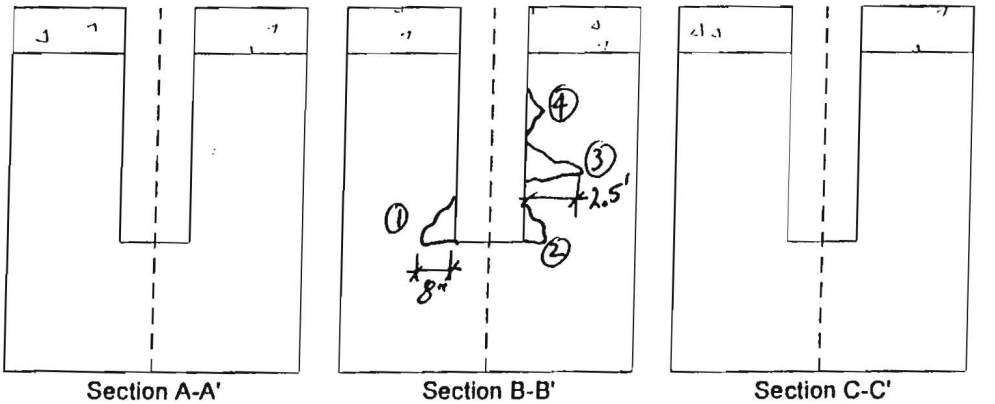
Sewage Collection System

Solution Cavity Form
TNRCC - EAPP

Notes:

- Include dimensioning
- Include illustrative pictures for complex features
- Attach additional pages if necessary.
- Identify case of feature (EAGD 96.004)

Cross-Section View:



Section A-A' Section B-B' Section C-C'

Line	Station	Feature	Case	Sensitivity
A	0+50	A1-1	3	possible sensitive
		A1-2	3	possible Sensitive
		A1-3	2	not sensitive
		A1-4	2	not sensitive

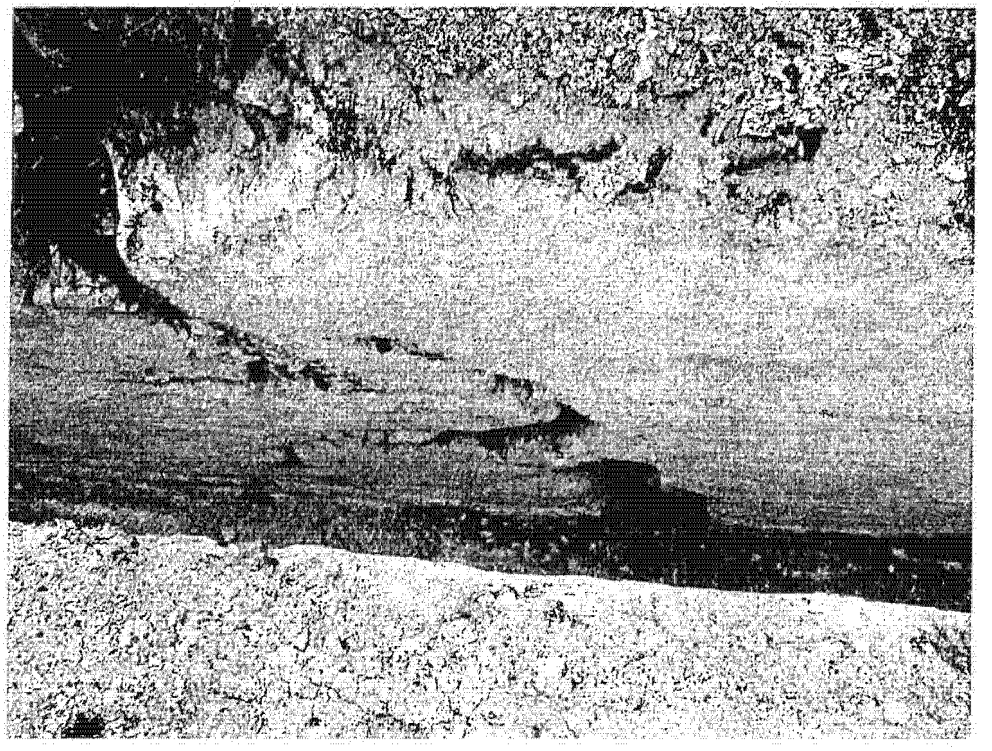
Notes:

Jeffrey S. Neathery
Printed Name of Geologist

Signature of Geologist

3/1/00
Date

(A1)



Photograph 7: A view of the feature on Line A (south wall).

Photograph 8: A view into the feature on Line A (south wall).

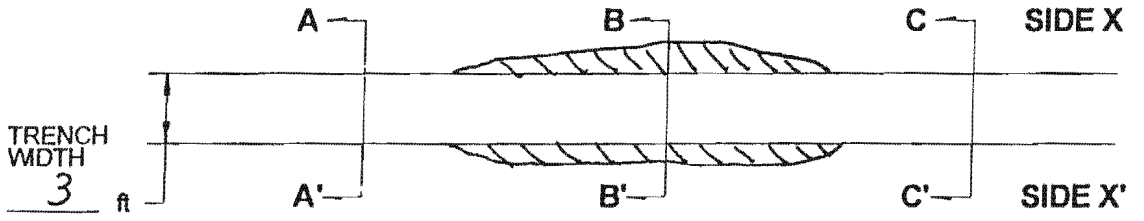
EAPP - Solution Cavity Form

☑ Sewage Collection System
☐ Water Line
☐ Other _____

PROJECT: Oakwood Estates Unit-14

DATE OF FIND: 1/11/00 DATE TNRCC NOTIFIED: _____

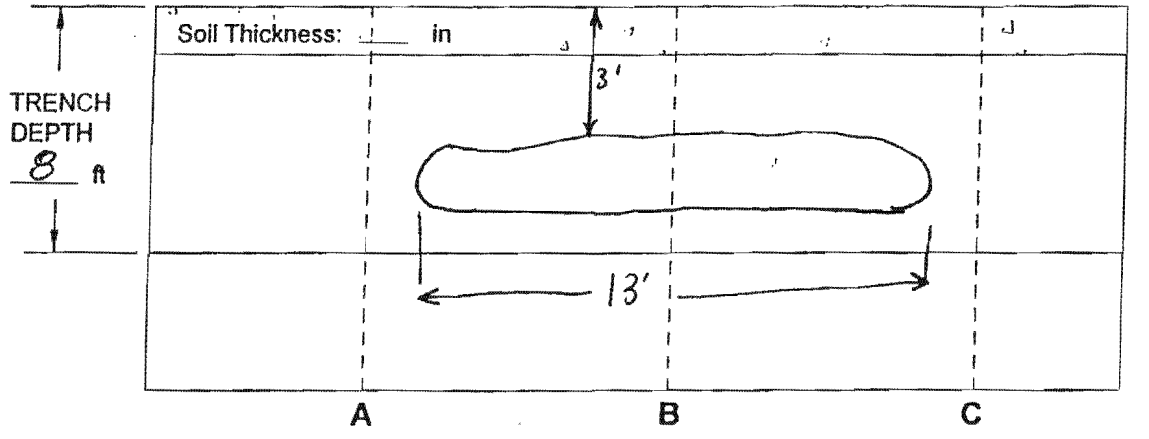
Plan View:



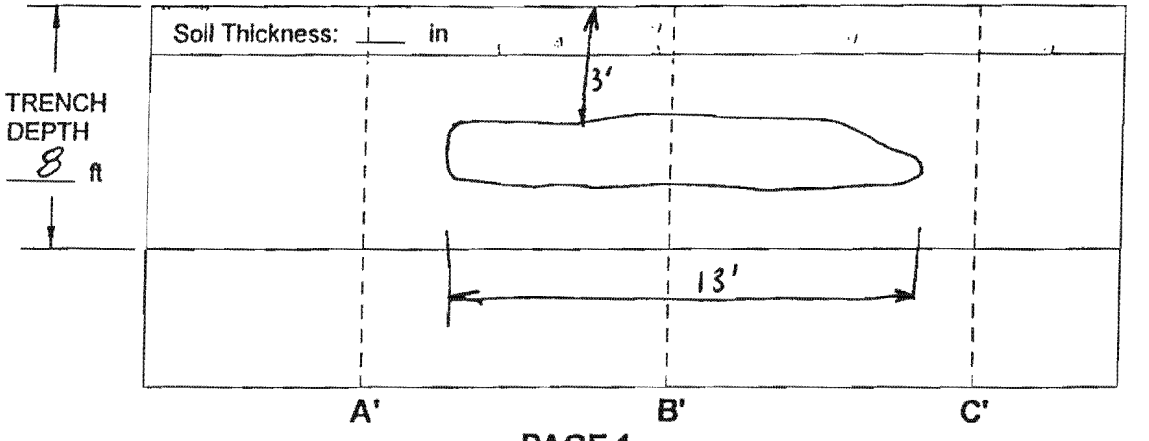
LINE: A STATION ____ + ____ 6 + 15 ____ + ____

Downgradient ← POROSITY ZONE → Upgradient

Profile (Side X):



Profile (Side X'):



(A2)

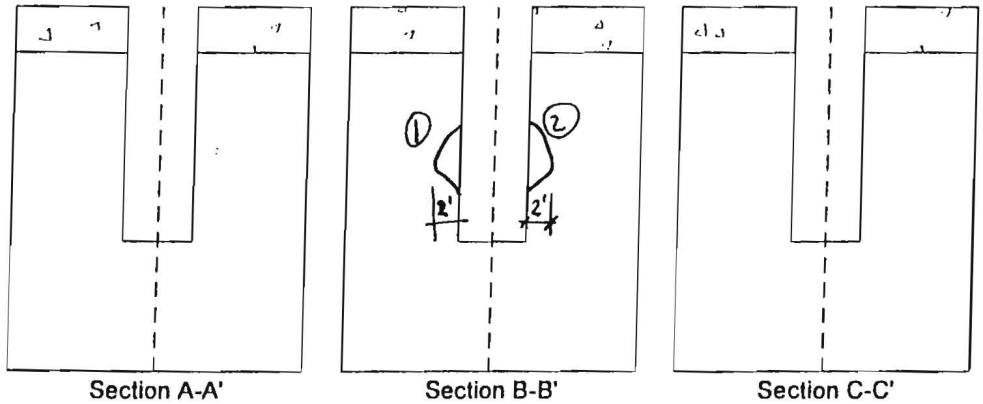
Sewage Collection System

Solution Cavity Form
TNRCC - EAPP

Notes:

- Include dimensioning
- Include illustrative pictures for complex features
- Attach additional pages if necessary.
- Identify case of feature (EAGD 96.004)

Cross-Section View:



Section A-A' Section B-B' Section C-C'

Line	Station	Feature	Case	Sensitivity
A	6+15	A2-1	2	not sensitive
		A2-2	2	not sensitive

Notes:

Jeffrey S. Neathery

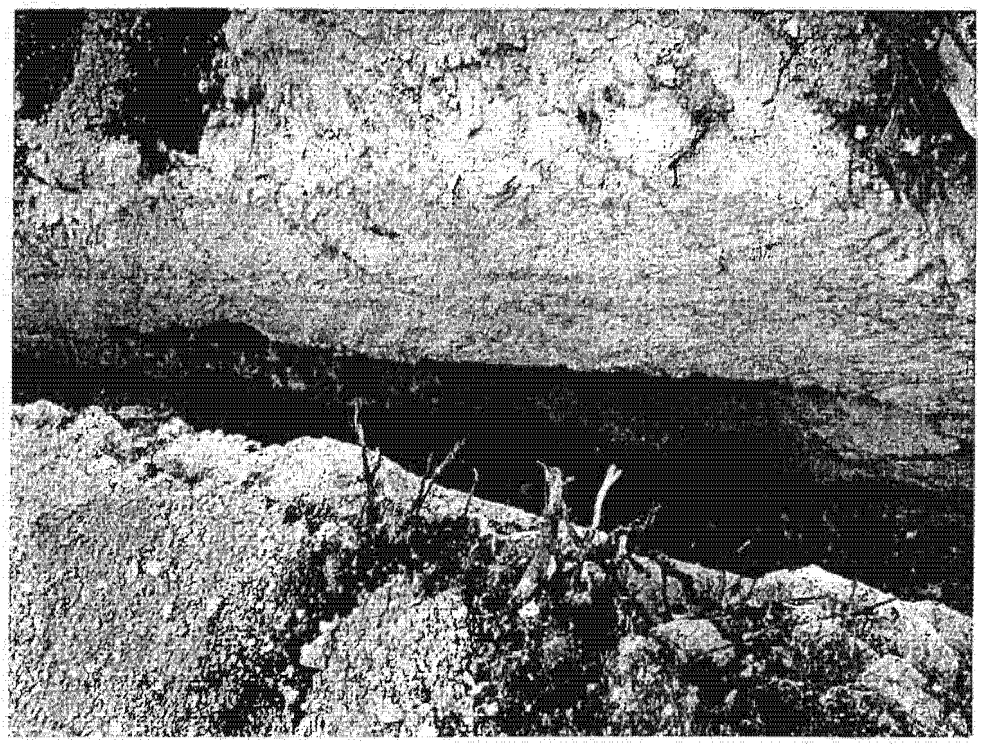
Printed Name of Geologist

Signature of Geologist

3/1/00

Date

(A2)



Photograph 3: A view of the feature on Line A at 6+15.

Photograph 4: view of the feature on Line A at 6+15 (opposite wall)

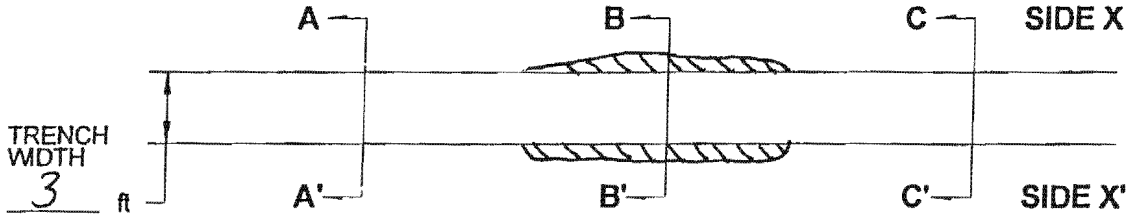
EAPP - Solution Cavity Form

☑ Sewage Collection System
☐ Water Line
☐ Other _____

PROJECT: Oakwood Estates Unit-14

DATE OF FIND: 1/11/00 DATE TNRCC NOTIFIED: _____

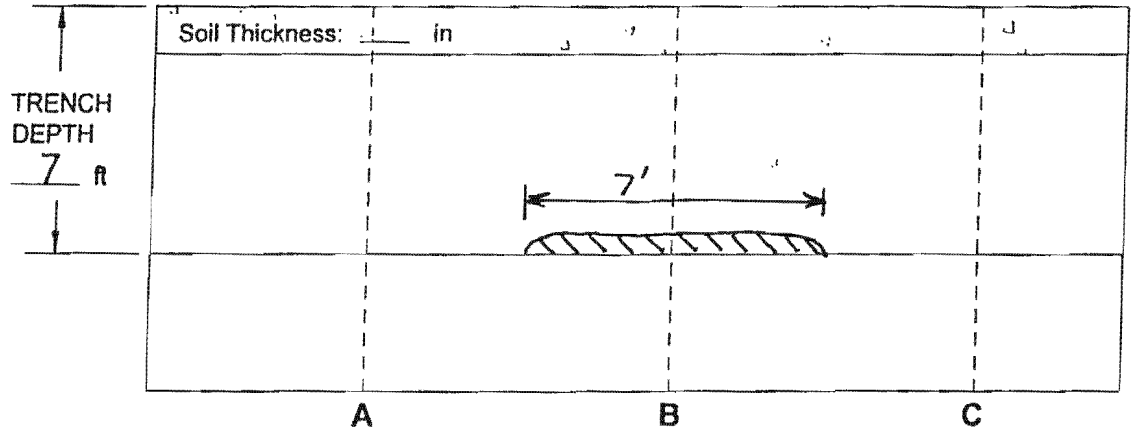
Plan View:



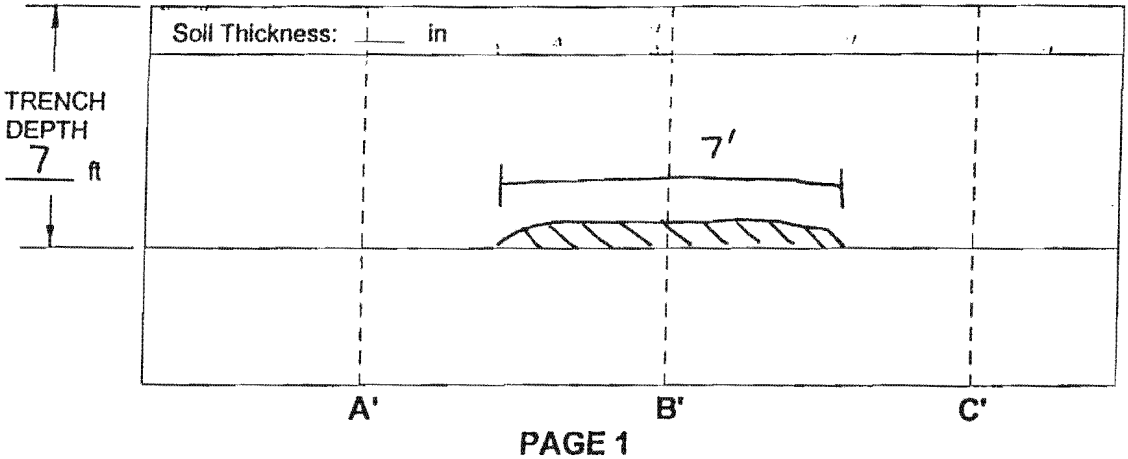
LINE: A (Lateral) STATION ____ + ____ 11 + 65 ____ + ____

Downgradient — POROSITY ZONE — Upgradient

Profile (Side X):



Profile (Side X'):



(A 3)

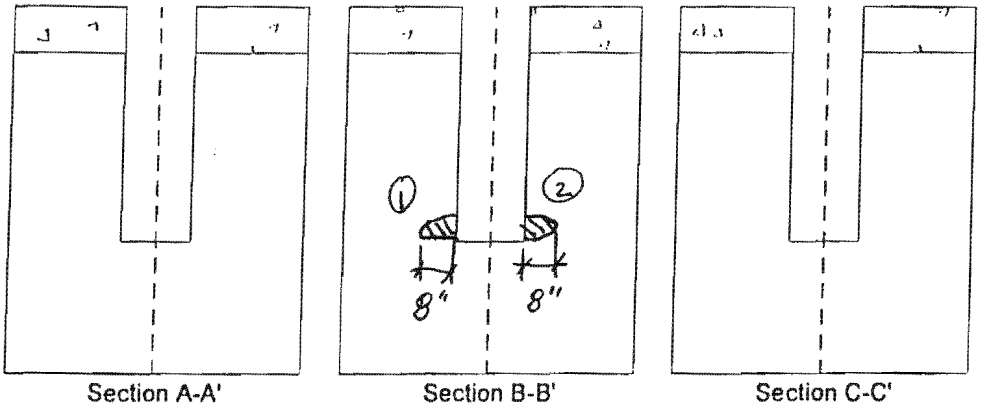
Sewage Collection System

Solution Cavity Form
TNRCC - EAPP

Notes:

- Include dimensioning
- Include illustrative pictures for complex features
- Attach additional pages if necessary.
- Identify case of feature (EAGD 96.004)

Cross-Section View:



Section A-A' Section B-B' Section C-C'

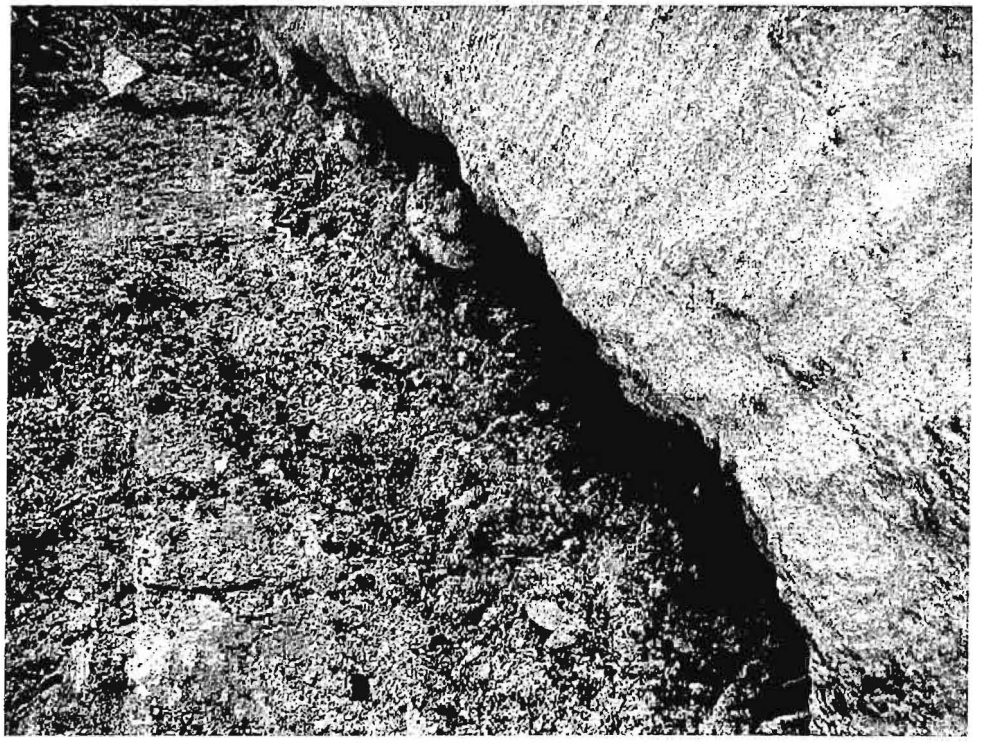
Line	Station	Feature	Case	Sensitivity
A (Lateral)	11+65	A3-1	3	possibly sensitive
		A3-2	3	possibly sensitive

Notes:

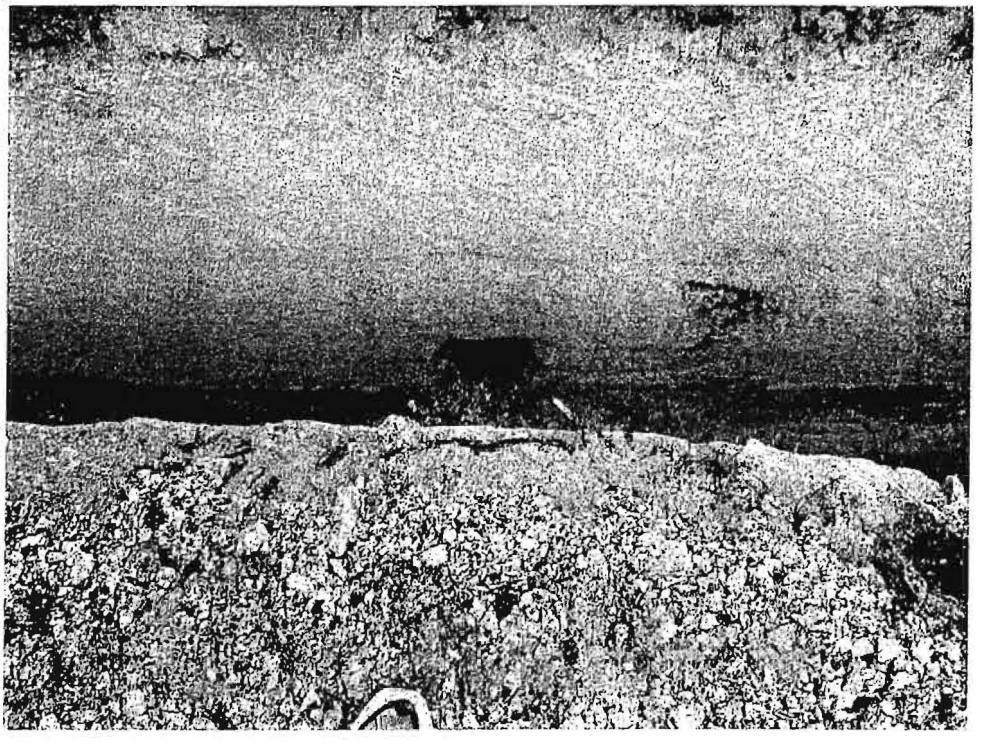
Jeffrey S. Neathery
Printed Name of Geologist

Signature of Geologist

3/1/00
Date



Photograph 5: A view of the feature on a lateral off Line A at 11+65.



Photograph 6: A view into the feature on Line A (north wall).

Neathery Environmental Services 900 NE Loop 410, Suite D-315 San Antonio, Texas 78209	**PHOTOGRAPHS** Oakwood Estates Subdivision New Braunfels, Texas	Project No: 99-017 Appendix A (cont)

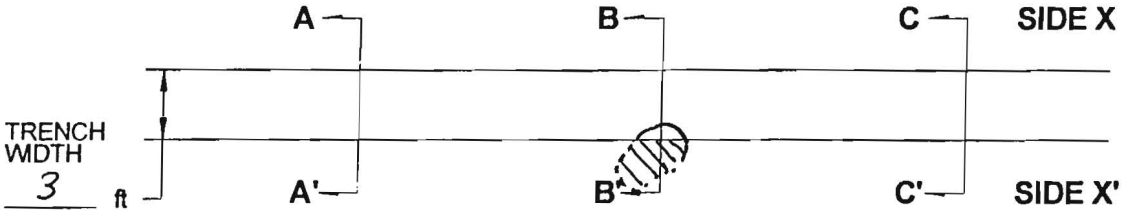
EAPP - Solution Cavity Form

☒ Sewage Collection System
☐ Water Line
☐ Other _____

PROJECT: Oakwood Estates Unit-14

DATE OF FIND: 1/11/00 DATE TNRCC NOTIFIED: _____

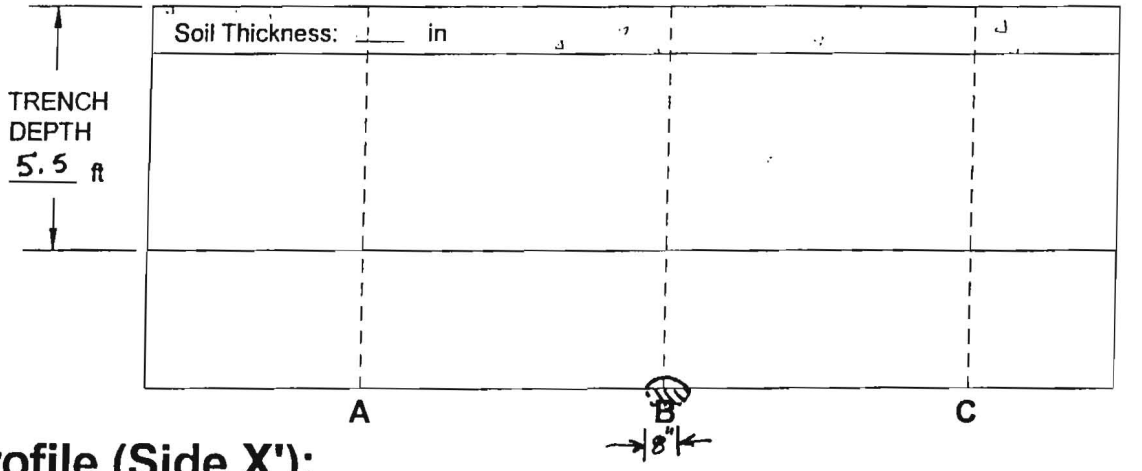
Plan View:



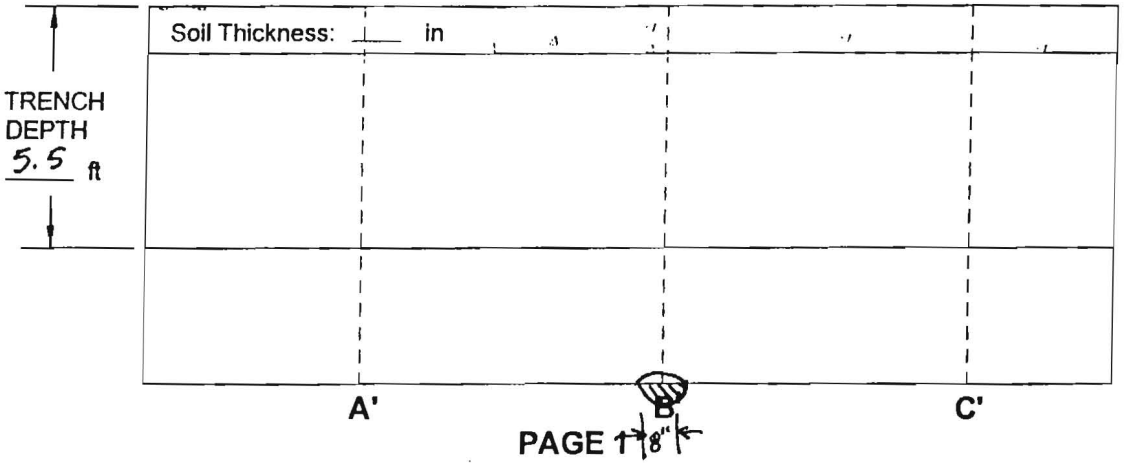
LINE: A STATION ____ + ____ 12 + 00 ____ + ____

Downgradient ← POROSITY ZONE → Upgradient

Profile (Side X):



Profile (Side X'):



FEATURE-1 (A4)

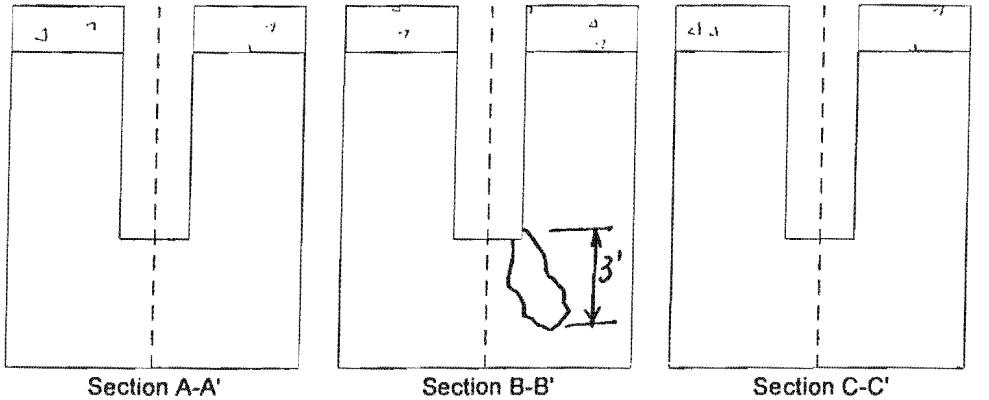
Sewage Collection System

Solution Cavity Form
TNRCC - EAPP

Notes:

- Include dimensioning
- Include illustrative pictures for complex features
- Attach additional pages if necessary.
- Identify case of feature (EAGD 96.004)

Cross-Section View:



Section A-A' Section B-B' Section C-C'

Line	Station	Feature	Case	Sensitivity
B A	12+00	A4-1	3	Sensitive

Notes:

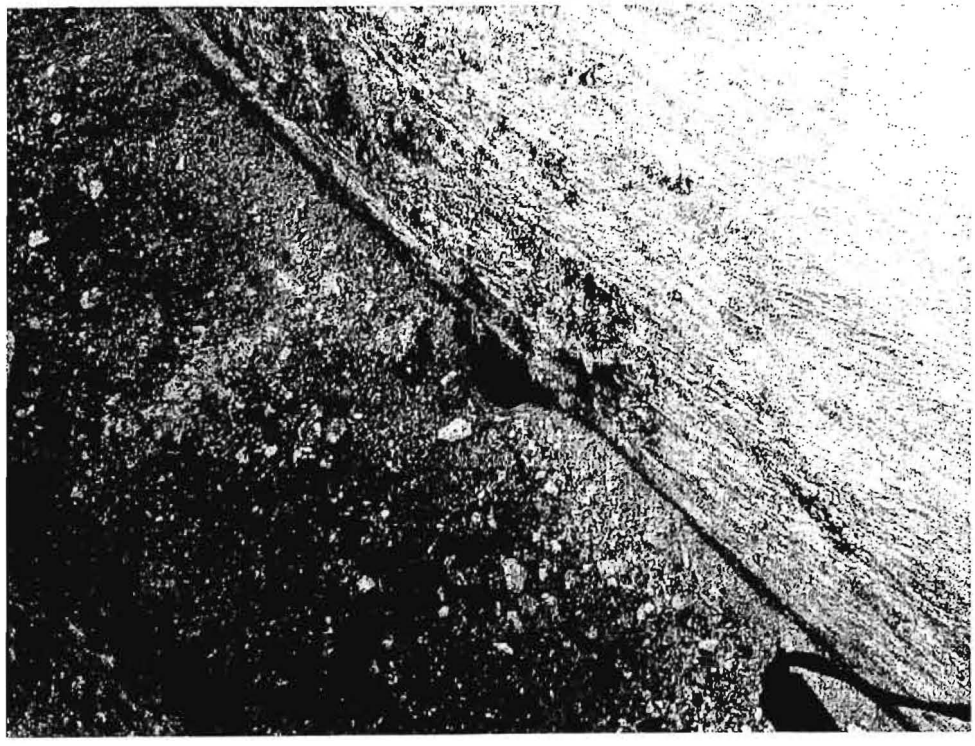
Jeffrey S. Neathery

Printed Name of Geologist

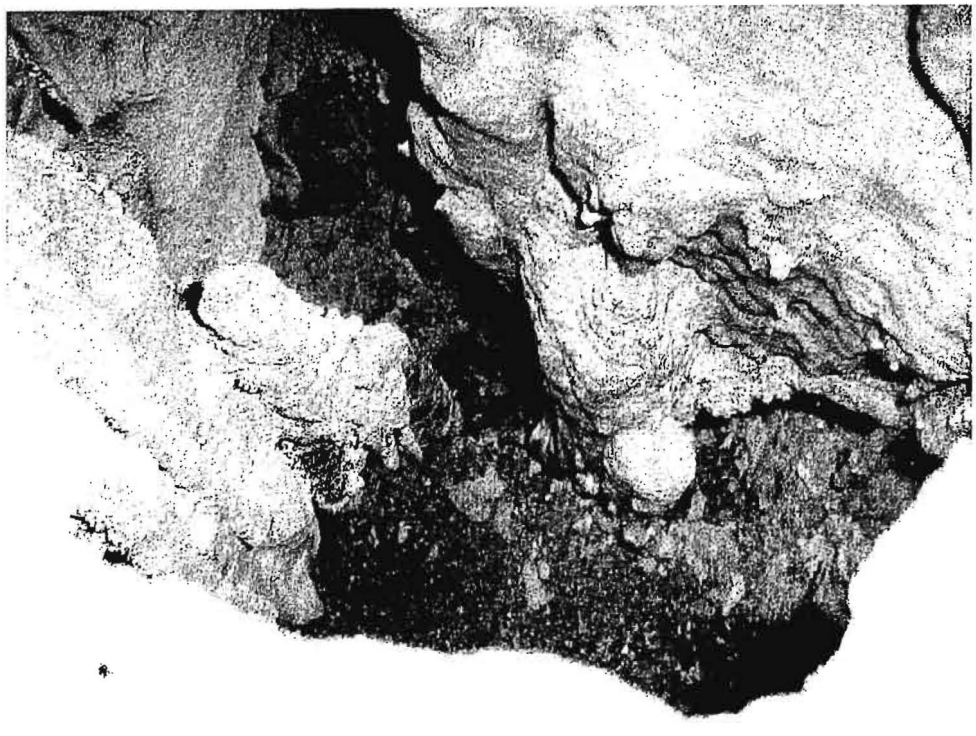
Signature of Geologist

3/1/00

Date



Photograph 1: A view of the feature on Line A.



Photograph 2: A view into the feature.

ATTACHMENT 2

Geologic Assessment Table (Not Applicable)

ATTACHMENT 3

Proposed Protection Measures

Features A1-1 and A1-2 shall be filled with flowable fill concrete. This shall be done by encasing the entire sanitary sewer line in flowable fill for a length of five (5) foot before to five (5) foot after the feature for a total length of 17'. The depth shall equal 4" above the feature or the pipe, which ever is greater. After placement of flowable fill, the remainder of the features (A1-3 and A1-4) shall be filled with washed gravel as the remainder of the trench is filled by standard backfill materials.

Features A2-1 and A2-2 located on line "A" at station 6+15 are located above the proposed sanitary sewer line. The features shall be filled with washed gravel after the sanitary sewer line is placed and initial backfill covers the pipe. Due to the height from the trench floor and length of the features, the contractor shall place gravel in the features as fill is placed to the same height within the trench.

Features A3-1 and A3-2 located on line "A" at station 11+65 shall be filled with flowable fill concrete. This shall be done by encasing the entire sanitary sewer line in flowable fill for a length of five (5) foot before to five (5) foot after the feature for a total length of 17'. The depth shall equal 4" above the feature or the pipe, which ever is greater.

Feature A4-1 located on line "A" shall be filled with flowable fill concrete.

Robert J. Huston, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
Kathleen Hartnett White, *Commissioner*
Jeffrey A. Saitas, *Executive Director*

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FEB 1 1 2002
COUNTY ENGINEER

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

February 7, 2002

Mr. William H. Borchers
Oakwood Estates I, L.L.C.
251 S. Seguin
New Braunfels, TX 78130

Re: EDWARDS AQUIFER, Comal County
PROJECT: Oakwood Estates, Unit 15, Project number: 1703.01
TYPE: Solution Feature/Sensitive Feature; 30 Texas Administrative Code (TAC) §213.5(f)(2); Edwards Aquifer Protection Program

Dear Mr. Borchers:

The Texas Natural Resource Conservation Commission (TNRCC) received a plan which addresses protection of solution features encountered during construction of the above referenced project. It was submitted on behalf of Oakwood Estates I, L.L.C., Inc. by Brian Merriman, P.E. of S. Craig Hollmig, Inc. and received by the San Antonio office on January 29, 2002. Feature locations and assessments are outlined in Table I below. Final review was completed on February 4, 2002.

TABLE I

Type of Solution Feature	Line	Station	Case*
Solution Cavity	Lateral on Line B	0+80	4

* See TABLE II (enclosed)

The San Antonio office did conduct a site investigation on January 18, 2002. The field investigator agrees with the case assessment. The plan submitted by Brian Merriman, P.E. has been reviewed and was found to conform to the treatment outlined for this case in Table II (enclosure).

Based in the information provided, and it's certification by Brian Merriman, P.E., your protection plan is approved with the following conditions:

1. The location of the solution feature shall be shown on the "as-built" plans.

2. Any concrete or concrete encasement shall meet or exceed New Braunfels Utilities (NBU) specifications for minimum thickness and compression strength.

Should clarification of this letter be desired or if we may be of any other assistance, please contact Robert R. Villarreal, II of our San Antonio Regional office at 210/403-4073. Please reference project number 1703.01

Sincerely,

Bobby D. Caldwell

Bobby D. Caldwell
Water Section Manager
San Antonio Regional Office

BDC/RRV/eg

Enclosures: Table II (Minimum Standards for Closing Solution Features in Sewer Line Trenches)
Cave Closure Plan

cc: Mr. Brian Merriman, P.E., S. Craig Hollmig, Inc.
Mr. Michael Short, P.E., City of New Braunfels
Mr. Tom Hornseth, Comal County
Mr. Greg Ellis, Edwards Aquifer Authority
TNRCC Field Operations

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FEB 11 2002
COUNTY ENGINEER

TABLE II

EDWARDS AQUIFER PROTECTION PROGRAM - TNRCC
Minimum Protective Standards for Sewer Line and Storm Sewer Trenches
(from Edwards Aquifer Guidance Document 96.004, Effective 8/11/98)

Case	Description	Concern	Treatment	Notification/Approval
1	Sensitive feature is less than or equal to six (6) inches in all directions and is located above the embedment of the pipe. All rock within and surrounding the feature is sound.	Not environmental nor pipe integrity	No abatement required.	None required.
2	Sensitive feature is either larger than six (6) inches in at least one direction or is located within the level of the pipe embedment. No portion of the sensitive feature may intersect the plane of trench floor. All rock within and surrounding the feature is sound.	Environmental	The sensitive feature shall be filled with concrete. Gravel to "fist sized" rock or sacks of gravel may be placed in feature prior to placement of the concrete as long as a minimum of eighteen (18) inches of concrete is used to close the feature. minimum).	Requires notification and prior **written** approval from TNRCC.
3	Sensitive feature intersects the plane of the trench floor is less than four (4) feet in any direction. All rock within and surrounding the feature is sound.	Environmental	Sensitive feature shall be filled with concrete. Gravel to "fist sized" rock or sacks of gravel may be placed in feature prior to placement of concrete at least eighteen (18) inches of concrete is used to close the feature. The sewer line or storm sewer lines shall be concrete encased for width of the sensitive feature plus a minimum of five (5) feet on either end. The encasement shall provide a minimum of six (6) inches of concrete on all sides of the pipe and shall have a compression strength of at least two thousand five hundred (2,500) psi (28-day strength). The concrete may be steel reinforced.	Requires notification and prior **written** approval from TNRCC.
4	Sensitive feature intersects the plane of the trench floor and any opening in trench floor is greater than four (4) feet in any direction or the trench floor is unstable.	Environmental & Structural	Requires an engineered resolution at least as protective as Case 3 above. Additional protective measures, including rerouting of line, may be required.	Requires notification and prior **written** approval from TNRCC.

All plans submitted to the TNRCC regional office shall have a signed and dated seal of a Texas licensed Professional Engineer. All plans will be reviewed on a case-by-case basis and additional protective measures or additional information may be required