

Project No. ASF19-124-01
March 25, 2020



12821 W. Golden Lane
San Antonio, TX 78249

Mr. Nima Ghahremani, Ph.D.
Edwards Aquifer Protection Program
Texas Commission on Environmental Quality
Region 13 Field Office
14250 Judson Road
San Antonio, Texas 78233-4480

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San Antonio, TX 78269

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**RE: Evaluation of Karst Feature (S-8)
Solution Feature Discovery Notification
Village at Gruene Condominiums
New Braunfels (Comal County), Texas
Regulated Entity ID No. RN110919453**

Dear Mr. Ghahremani:

Per our recent communications, **Raba Kistner, Inc. (RKI)** has prepared this correspondence to formally document the assessment of and recommended protective measures for a horizontal solution cavity feature designated herein as **Feature S-8**, which was recently discovered at the Village at Gruene Condominiums project site located east of the Gruene Road and Ewelling Lane intersection in New Braunfels, Comal County, Texas (hereinafter referred to as SITE). A Site Location Map is provided herein as **Attachment 1A**. As described in the Revised Geologic Assessment (GA) report for the referenced project that was submitted to the Texas Commission on Environmental Quality (TCEQ) for review and approval on March 5, 2020, the subject feature was discovered at the base of an exploratory excavation in conjunction with assessment/excavation efforts for a separate karst feature (small vertical solution cavity) designated as **Feature S-7**, which were conducted on February 18, 2020 using heavy equipment. As further discussed herein, results of feature excavation activities confirmed that **Feature S-7** terminated, but revealed the presence of a separate horizontal solution opening (**Feature S-8**) within the lower contact zone of the uppermost (resistant) limestone bedding unit.

Although **Feature S-8** had no previous connection to the surface, it was assessed as part of the referenced GA study effort in accordance the Edwards Aquifer Protection Program (EAPP) Rules, which apply to the discovery of subsurface solution features during construction. Although the sensitivity of the feature was assessed pursuant to *Instructions to Geologists for Geologic Assessments (TCEQ-0585-Instructions, dated 10/1/04)* and determined to be not sensitive based on point criteria and professional judgment, TCEQ has directed that subsurface flow conditions be maintained and that measures be implemented to protect the feature in conjunction with next phases of land development. To that end, please find attached the requested **Solution Feature Discovery Notification Form (TCEQ-10256)** and associated attachments for your review and consideration.

Project No. ASF19-124-01
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On behalf of HMT Engineering & Survey and the project owner, we appreciate your review of this submittal. If you have any questions regarding the information provided herein, please do not hesitate to call either of the undersigned at (210) 699-9090.

Very truly yours,

RABA KISTNER, INC.



Richard A. Sample
Project Professional



Richard V. Klar, P.G.
Vice President

RAS/RVK/srw

Attachments

Copies submitted: Above (1 Electronic PDF Copy)

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:

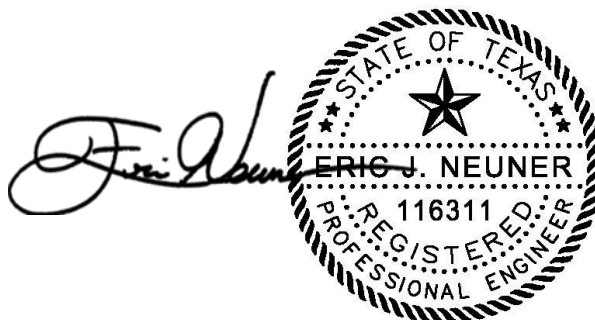
Regulated Entity Name:	Village at Gruene Condominiums (RN110919453)	EAPP ID #:	13001056
Project Type:	<u>WPAP</u> <u>SCS</u> UST AST WPAP Modification	Approval Date:	<i>Currently In Review</i>
Regulated Entity Location:	East of Gruene Road and Ewelling Lane Intersection, New Braunfels, Texas	Approval Dates/ID#'s of any Modifications:	<i>Not Applicable</i>
Date Feature(s) Discovered:	February 18, 2020	Date TCEQ Notified:	February 18, 2020
Holder of Approved Plan:	HMT Engineering & Surveying	Solution Feature Plan Submitted By:	Richard V. Klar, P.G.
Contact:	Mr. Chris Van Heerde, P.E.	Title:	Vice President
Title:	Managing Partner	Company:	Raba Kistner, Inc.
Mailing Address:	290 S. Castell Avenue New Braunfels, Texas 78130	Mailing Address:	12821 West Golden Lane San Antonio, Texas 78249
Phone:	(830) 625-8555	Phone:	(210) 699-9090
Fax:		Fax:	(210) 699-6426

Feature No.	Feature Dimensions	Location of Feature (Reference features related to a SCS by Line and Station)	Case*/ Sensitivity**
S-8	7' x 1.75' x 1.2'	Solution cavity located within the proposed SCS alignment	38 pts (Not Sensitive)

* per TCEQ 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**.
4. If the discovery is related to a sewage collection system, a Texas Registered Professional Engineer is required to submit the protection plan.

Submitted by: _____ Date: March 25, 2020



3/25/20

Printed name: Eric J. Neuner, P.E.

If you have questions on how to fill out this form or about the Edwards Aquifer protection program, please contact us at 210/490-3096 for projects located in the San Antonio Region or 512/339-2929 for projects located in the Austin Region.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512/239-3282.

ATTACHMENTS

ATTACHMENT 1

NARRATIVE DESCRIPTION OF FEATURE
1A – SITE AND FEATURE LOCATION MAP
1B – FEATURE PLAN AND PROFILE
1C – PHOTOGRAPHS

ATTACHMENT 1 NARRATIVE DESCRIPTION OF SOLUTION FEATURE

Introduction

As described in the Revised Geologic Assessment (GA) report for the Village at Gruene Condominiums project that was submitted to the Texas Commission on Environmental Quality (TCEQ) for review and approval on March 5, 2020, the subject property comprises approximately 14.9 acres of land located near the intersection of Gruene Road and Ewelling Lane, in New Braunfels, Comal County, Texas (hereinafter referred to as SITE). A SITE Location Map is provided herein as **Attachment 1A**. We understand that proposed improvements associated with the planned residential development project will include residential structures, roadways, in addition to an organized sewage collection system that will extend offsite to allow connection to an existing sewer utility located within the Gruene Road right-of-way. The property is currently vacant but hosts concrete slabs (i.e. former residence and farm structures), a plugged domestic water well, derelict septic system, and a stone shed structure.

The SITE is fully located within the Edwards Aquifer Recharge Zone (EARZ). As such, the performance of a geologic assessment was required to facilitate planned residential development and sewage collection system construction activities in accordance with applicable provisions set forth in the EAPP rules as specified in *Title 30 of the Texas Administrative Code, Section 213 (30 TAC 213, effective April 24, 2008)*. The referenced GA study was therefore conducted to support preparation of both a Water Pollution Abatement Plan (WPAP) and Sewage Collection System (SCS) Plan for the project. We understand that referenced plans have been prepared by HMT Engineering and Surveying on behalf of the project owner, but that the regulatory review process for the most recent WPAP submittal is currently underway. Information contained in the WPAP will be considered in conjunction with the results of additional solution feature assessment activities documented herein pertaining to **Features S-7 and S-8**, the locations of which are depicted on **Attachment 1A**. We understand that an updated SCS Plan will be submitted for agency review within the next few weeks.

Solution Feature Assessment Activities

The March 5, 2020 GA report documents conditions observed by **RKI** within project boundaries in conjunction with initial survey efforts on October 10, 2019, a follow-up SITE visit conducted on January 31, 2020 at the request of TCEQ, and subsequent solution feature assessment/excavation conducted on February 18, 2020 using heavy equipment. The follow-up visit was performed specifically to re-assess the south-central portion of the SITE and evaluate the presence of a small vertical solution cavity (**Feature S-7**) that appears to have recently developed a connection to the surface due to recent rain events. Feature excavation activities were subsequently conducted at this location using heavy equipment in accordance with applicable EAPP requirements as set forth in a TCEQ-approved work plan to further assess the sensitivity of the feature and its potential connection to a larger subsurface void space. As further discussed herein, results of feature excavation activities confirmed that **Feature S-7** terminated, but revealed the presence of a separate horizontal solution opening within the lower contact zone of the uppermost (resistant) limestone bedding unit, which has been designated herein as **Feature S-8**.

Although **Feature S-8** had no previous connection to the surface, it was assessed as part of the recent GA study effort and serves as the focus of this Solution Feature Discovery Notification submittal. Pertinent assessment information for both referenced solution features is summarized below and presented on the *Geologic Assessment Table (TCEQ-0585 Table)*, which is provided herein as **Attachment 2**.

Feature S-7 consisted of a small-diameter vertical solution cavity that extended approximately 4 feet into the underlying Person Formation. No surface expression was evident during the initial October 2019 assessment, but this feature appears to have developed a surface connection in association with subsequent rainfall events. Results of an initial assessment conducted on January 31, 2020 indicated that the feature appeared to taper with depth, but it was not possible to determine its complete vertical extent. Surface soil with grass was present at the base of the feature, which confirmed recent collapse of soil cover. This feature was initially classified as potentially sensitive owing to its inferred karst origin, connection to underlying limestone, and inferred potential for rapid infiltration. Although classified as sensitive, it was not considered to represent a significant recharge feature, however, owing to its small size, lack of established drainage, and very small upgradient catchment area.

The project owner subsequently elected to further assess feature sensitivity in accordance with established EAPP protocols (i.e., Phase II assessment) to determine whether a significant hydrologic connection to the subsurface existed at this location (i.e., feature serves to transmit recharge directly to the subsurface). Following TCEQ approval of a work plan request submitted on February 12, 2020, excavation activities were subsequently conducted on February 18, 2020 using heavy equipment (backhoe excavator) to further assess the sensitivity of the feature and potential for connection to a larger subsurface void space. The vertical solution cavity was confirmed to extend through an uppermost (very resistant) bedding unit and terminate at a depth of approximately 4 feet at its lower bedding contact. The original vertical solution cavity was fully removed as the result of excavation activities.

Feature S-8. In conjunction with vertical excavation efforts that extended slightly (i.e., 1-2 feet) below the termination point for **Feature S-7** through the weathered bedding-unit contact zone, a separate horizontal void space (solution cavity) was observed at the northwest corner of the excavation trench. The aperture was measured at approximately 21 x 14 inches and confirmed to extend approximately 7 feet along the contact zone at an orientation of 29° (NE-SW). The feature is localized in nature and does not connect to the south or west excavation walls. The floor of the horizontal solution cavity area was observed to be comprised of clay soils. The thickness of the soils along the bedding contact is estimated to be about 1.5 to 2 feet based on excavation activities within the exploration trench. The solution cavity opening was directly observable and found to taper with distance away from the excavation site (trench). The lateral boundaries of the solution cavity area are irregular and comprised of weathered (in-place) limestone and terra rossa clay.

Feature plan and profile sketches that depict the locations and dimensions of solution cavity features relative to proposed SITE improvements are provided as **Attachment 1B**. Photographs taken in conjunction with assessment activities initiated on February 18, 2020 are provided as **Attachment 1C**.

Solution Feature Sensitivity

On the basis of collective observations and consideration of assessment criteria set forth in *Instructions to Geologists*, **Features S-7 and S-8** were classified as not sensitive. Information developed as the result of the assessment effort that supports this classification is as follows:

Feature S-7

- The solution cavity appears to have been formed in association with surficial erosional processes and tree root activity. Tree roots were encountered during the excavation process.
- The feature was found to terminate at the bedding contact and did not exhibit direct connection to any larger karst openings or subsurface void space.
- Although the bedding contact was observed to be highly weathered, with iron-staining and evidence of dissolution, the majority of the dissolution openings throughout this zone of weathering were partially to completely infilled with red “terra rossa” clay soil and scattered tree roots.
- There is no well-defined drainage or channelization of surface flow to the feature. The feature did not contribute significant recharge to the subsurface.

Feature S-8

- Prior to excavation, this horizontal solution opening did not have a direct connection to the surface. No direct connection to **Feature S-7** was observed.
- The solution cavity is localized and appears to have been formed by dissolution along the limestone bedding-unit contact zone. The contact zone that hosts the feature is partially to completely infilled with red terra rossa clay soils, which typically facilitate the retention of subsurface soil moisture.
- The feature was found to terminate at a maximum distance of 7 feet from its opening. No air flow from the feature was observed and interior conditions were observed to be dry to moist. The feature does not constitute a drain and is not considered to represent a major component of the subsurface flow system.
- As tree roots were present within the solution cavity void space and surrounding walls, it appears that the feature (and the larger bedding unit contact zone) has been exploited historically by tree root activity.
- There is no well-defined subsurface drainage toward or through the feature. The feature does not contribute significant recharge to the subsurface.

As further described in **Attachment 3**, pursuant to TCEQ directives, subsurface flow conditions will be maintained and measures implemented to protect remaining **Feature S-8** in conjunction with next phases of land development.

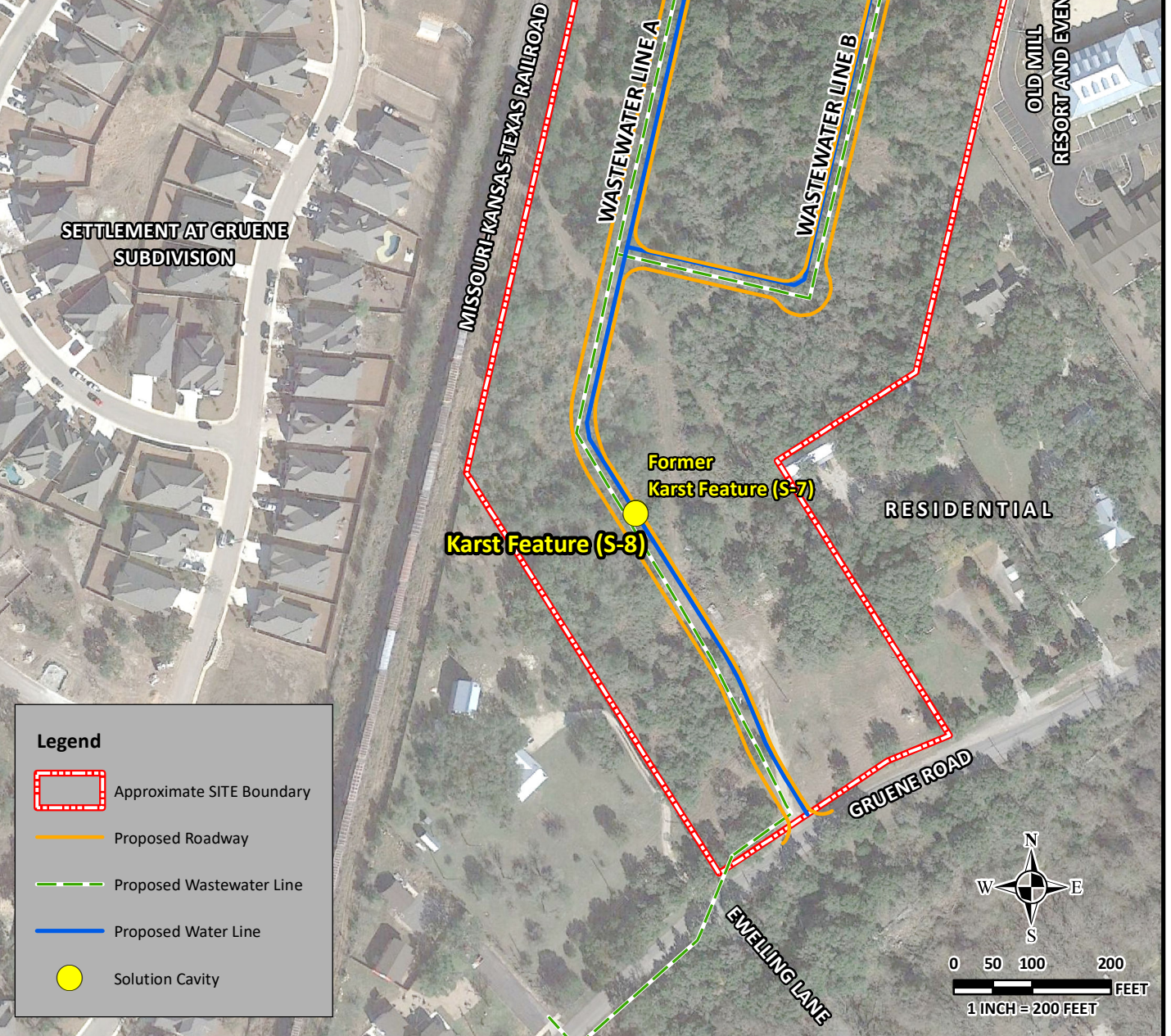
References

1. Collins, Edward W., 2000, Geologic Map of the New Braunfels, Texas 30 x 60 Minute Quadrangle: Geologic Framework of an Urban-Growth Corridor Along the Edwards Aquifer, South-Central Texas: Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas.
2. HMT Engineering and Surveying, 2020, *Horizontal Solution Cavity Exhibit – Village at Gruene Condominiums*, provided to **RKI** via email correspondence on March 23, 2020.
3. Raba Kistner, Inc., 2020, Geologic Assessment – Village at Gruene Condominiums, Revised March 5, 2020.
4. Texas Commission on Environmental Quality, 2004, *Instructions to Geologists for Geologic Assessments on the Edwards Aquifer Recharge/Transition Zone*, October 1, 2004.
5. Texas Commission on Environmental Quality, 2020, Decision / Features S-7 and S-8 / Village at Gruene Condominiums WPAP, provided to **RKI** via email correspondence on March 10, 2020.

VICINITY MAP



Source: © OpenStreetMap (and) contributors, CC-BY-SA



12821 West Golden Lane
San Antonio, Texas 78249

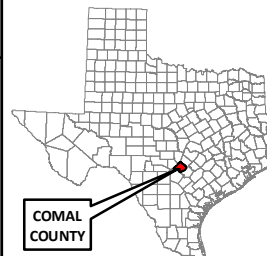
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Source: Google Earth Pro, November 2018 orthoimagery.

SITE AND FEATURE LOCATION MAP VILLAGE AT GRUENE CONDOMINIUMS EAST OF GRUENE ROAD AND EWELLING LANE NEW BRAUNFELS, COMAL COUNTY, TEXAS REGULATED ENTITY No. RN 110919453



PROJECT No.:
ASF19-124-01

ISSUE DATE: 03-25-2020

DRAWN BY: LAW

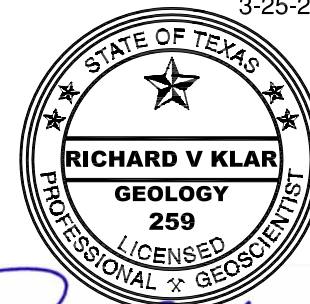
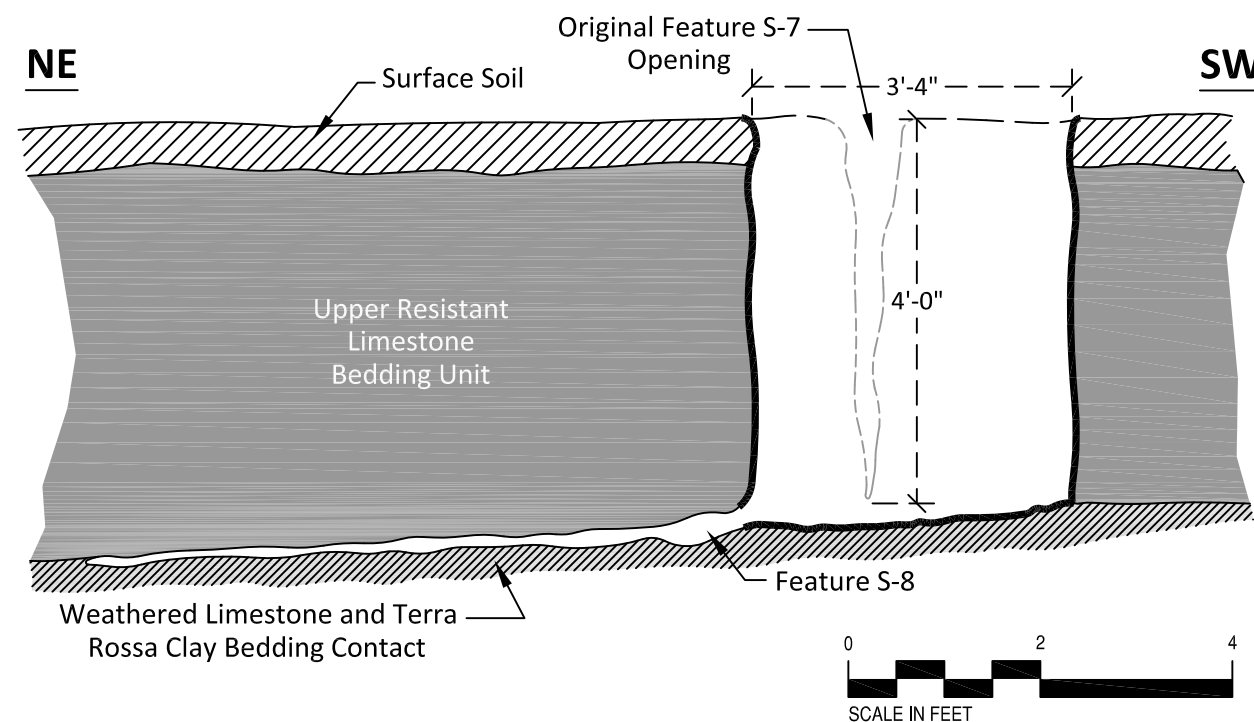
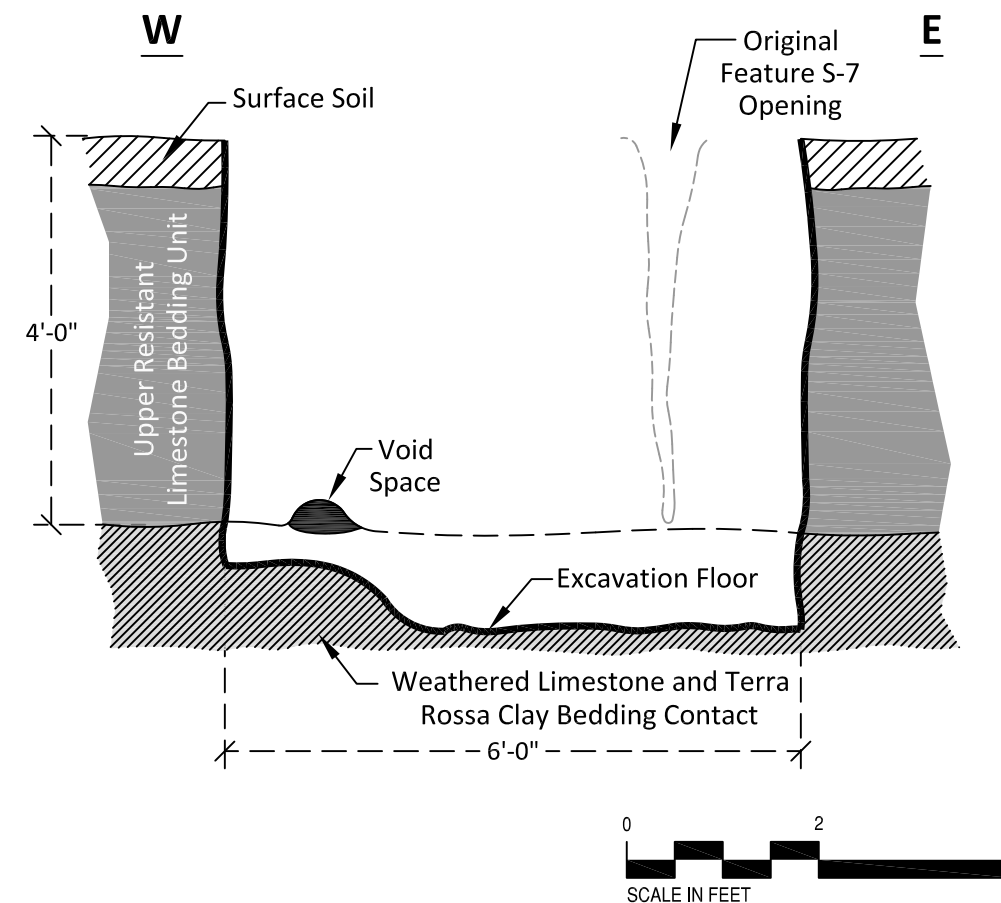
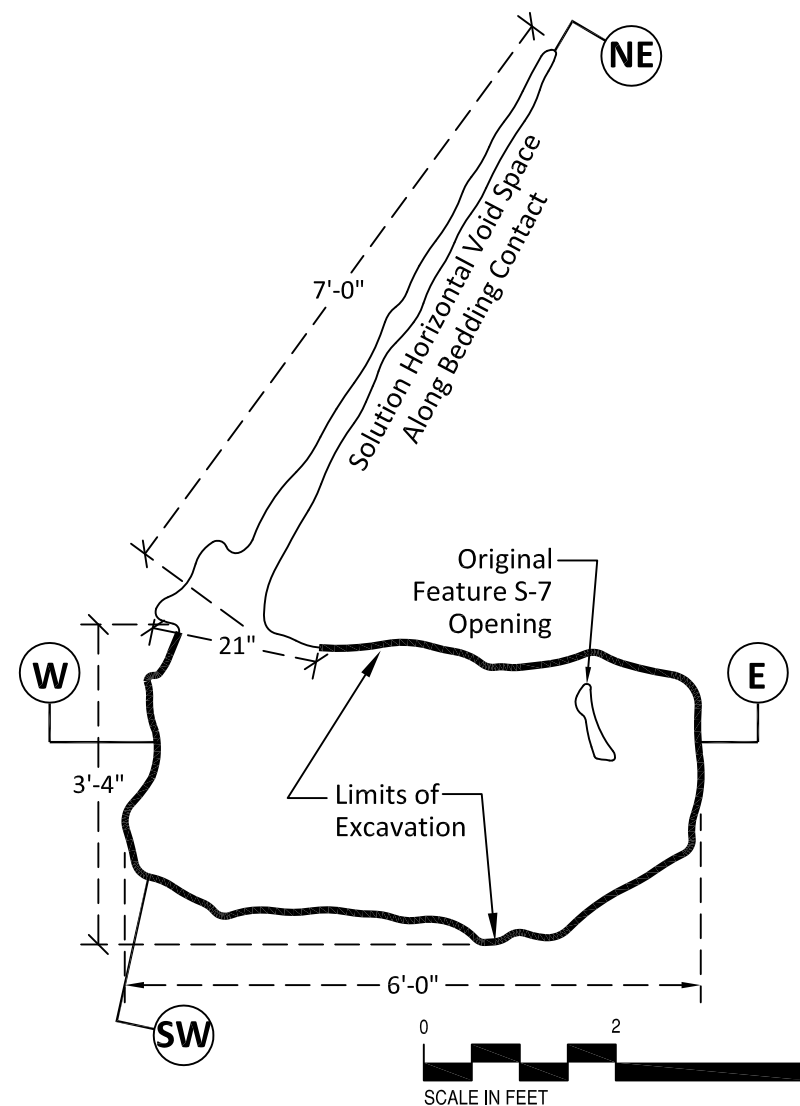
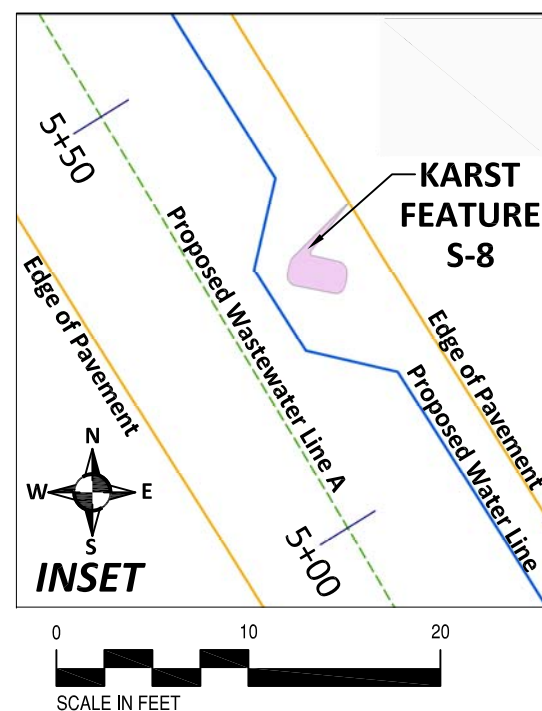
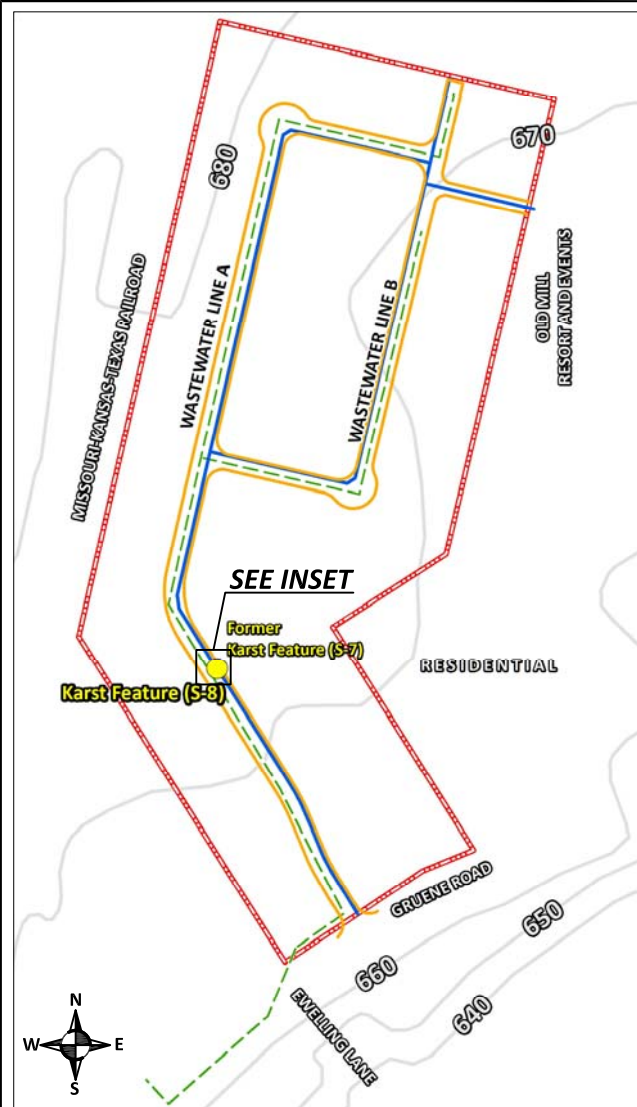
CHECKED BY: RAS

REVIEWED BY: RVK

ATTACHMENT

1A

NOTE: This Drawing is Provided for Illustration Only, May Not be to Scale and is Not Suitable for Design or Construction Purposes



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FEATURE PLAN AND PROFILE

FEATURE PLAN AND PROFILE
VILLAGE AT GRUENE CONDOMINIUMS
NEW BRAUNFELS, COMAL COUNTY, TEXAS
REGULATED ENTITY No. RN110919453

REVISIONS:

[illegible]

PROJECT No.:

ASF19-124-01

ISSUE DATE:	03-25-2020
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ISSUE DATE:	03/20
DRAWN BY:	LAW

CHECKED BY:	RAS
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REVIEWED BY:	RVK
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ATTACHMENT

1B



Photo 1. View of Feature S-7 prior to excavation. Feature size is approximately 1 x 0.8 x 4 feet in length, width, and depth, respectively.



Photo 2. Top of limestone bedding unit at Feature S-7 following removal of soil and vegetation.

Photographs taken on 2/18/2020.



Photo 3. Excavation at Feature S-7 in progress through the resistant upper bedding unit of the Person Formation (Cyclic and Marine member).

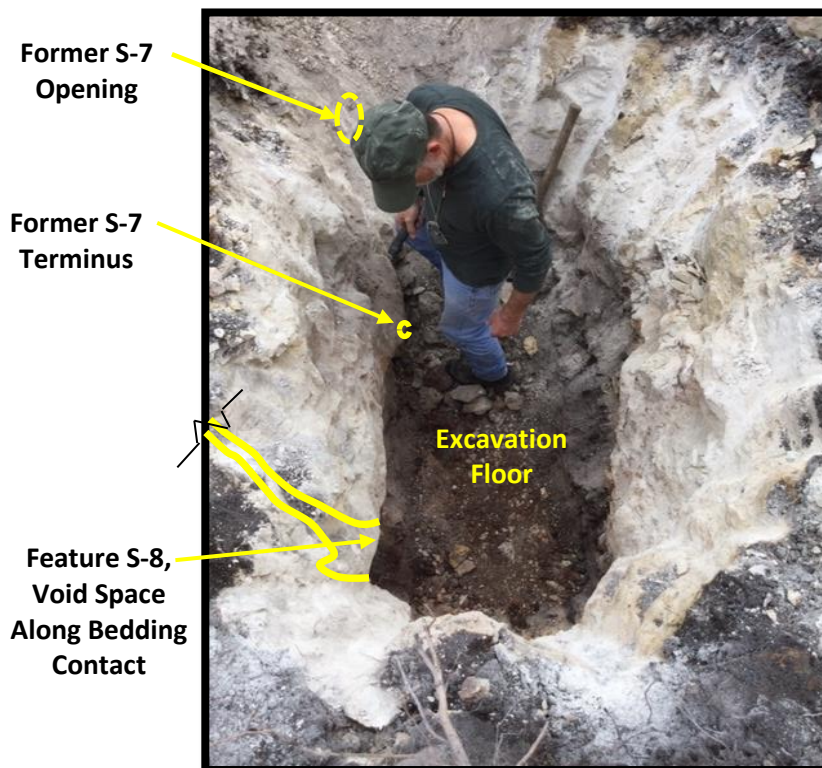


Photo 4. Final excavation extent. Feature S-7 is completely removed and was determined to be terminated at the weathered limestone contact zone (excavation floor).

Photographs taken on 2/18/2020.

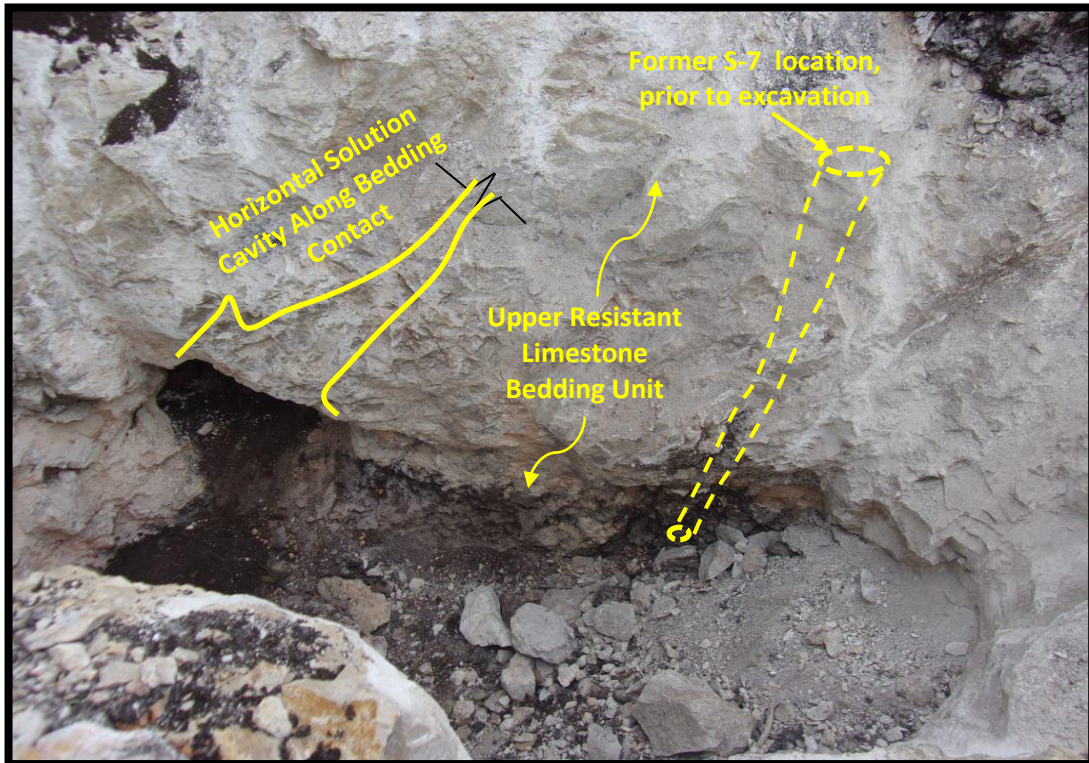


Photo 5. Overview of Feature S-8 opening at base of the bedding contact. Floor of the excavation consists of the weathered contact zone with abundant terra rossa clay infilling.



Photo 6. Feature S-8 opening at base of the excavation along the bedding contact. The feature is partially infilled with terra rossa clay.

Photographs taken on 2/18/2020.



Photo 7. Feature S-8 vertical dimensions (14 inches) of the horizontal solution cavity in the excavation sidewall.



Photo 8. Feature S-8 horizontal dimension (21 inches) of the horizontal solution cavity in the excavation sidewall.

Photographs taken on 2/18/2020.



Photo 9. Feature S-8 maximum horizontal extent (approximately 7 feet) of the horizontal solution cavity along the long axis.

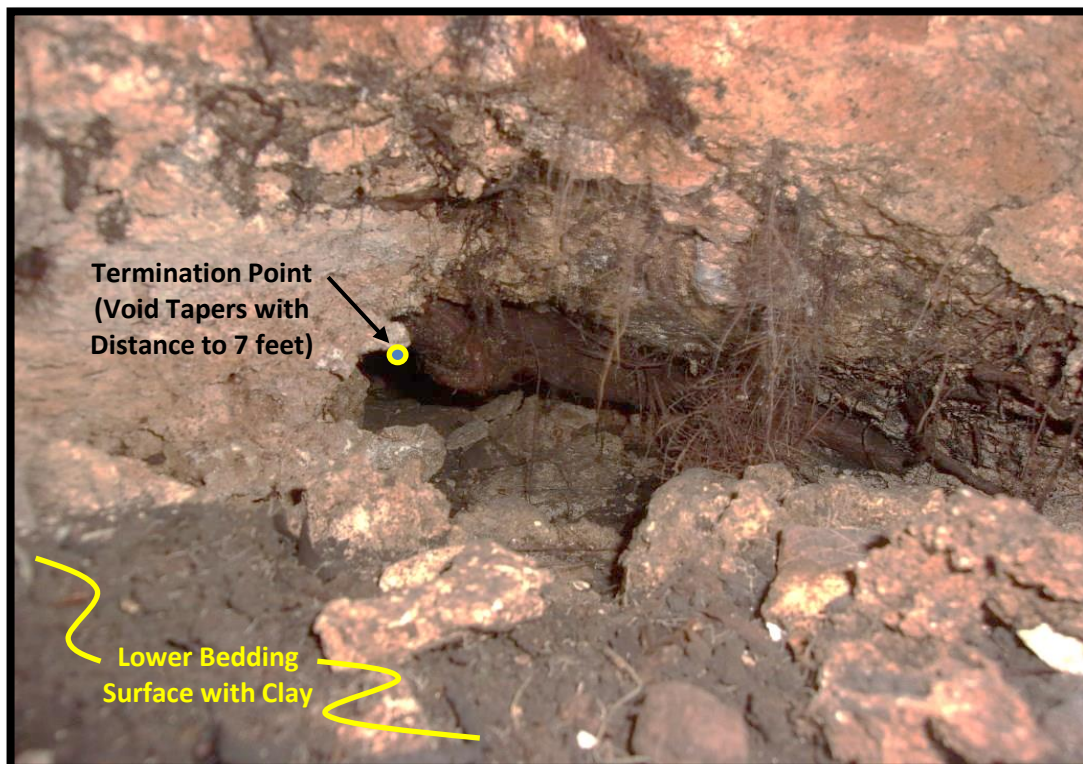


Photo 10. View of horizontal void space (Feature S-8) taken from inside the aperture.

Photographs taken on 2/18/2020.



Photo 11. Silt-fencing placed around Features S-7/S-8 excavation site.

Photographs taken on 2/18/2020.

ATTACHMENT 2

GEOLOGIC ASSESSMENT TABLE (TCEQ-0585-Table)

GEOLOGIC ASSESSMENT TABLE						PROJECT NAME: Village at Gruene Condominiums - New Braunfels, Comal County, Texas (RKI Project No. ASF19-124-01)														
LOCATION			FEATURE CHARACTERISTICS											EVALUATION		PHYSICAL SETTING				
1A	1B *	1C*	2A	2B	3	4			5	5A	6	7	8A	8B	9	10	11	12		
FEATURE ID	LATITUDE	LONGITUDE	FEATURE TYPE	POINTS	FORMATION	DIMENSIONS (FEET)			TREND (DEGREES)	DOM	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY	CATCHMENT AREA (ACRES)		TOPOGRAPHY	
																	<40	≥40		<1.6
S-7	N29 44 05.3	W98 06 51.0	SC	20	Kep	1.0	0.8	4.0	NW-SE	0			C / N	22	42		✓	✓		Hilltop
S-8	N29 44 05.2	W98 06 51.0	SC	20	Kep	7	1.75	1.2	NW-SE	10			C / F / N	8	38	P		P	P	Hilltop

* DATUM: **NAD83**

Formation: *Kep = Person Formation*


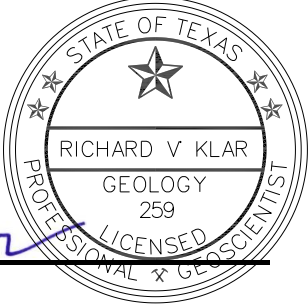
2A TYPE	TYPE	2B POINTS
C	Cave	30
SC	Solution cavity	20
SF	Solution-enlarged fracture(s)	20
F	Fault	20
O	Other natural bedrock features	5
MB	Manmade feature in bedrock	30
SW	Swallow hole	30
SH	Sinkhole	20
CD	Non-karst closed depression	5
Z	Zone, clustered or aligned features	30

8A INFILLING	
N	None, exposed bedrock
C	Coarse - cobbles, breakdown, sand, gravel
O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
V	Vegetation. Give details in narrative description
FS	Flowstone, cements, cave deposits
X	Other materials:

12 TOPOGRAPHY
Cliff, Hilltop, Hillside, Drainage, Floodplain, Streambed

I have read, I understood, and I have followed the Texas Natural Resource Conservation Commission's Instructions to Geologists. The information presented here complies with that document and is a true representation of the conditions observed in the field.

My signature certifies that I am qualified as a geologist as defined by 30 TAC 213.

Date 3/25/2020

Sheet 1 of 1

ATTACHMENT 3

PROPOSED PROTECTION MEASURES 3A.1 – FEATURE PROTECTION MEASURE

ATTACHMENT 3 NARRATIVE DESCRIPTION OF PROPOSED PROTECTION MEASURE

As discussed in **Attachment 1**, it is proposed that protective measures be adopted in conjunction with final planned construction activities in accordance with tenets of the Edwards Aquifer Protection Program (30 TAC 213). Pursuant to TCEQ directives, subsurface flow conditions will be maintained and measures implemented to protect remaining **Feature S-8** in conjunction with the next phases of land development. **Raba Kistner, Inc. (RKI)** geotechnical engineering staff has reviewed the existing feature characteristics and developed an appropriate protection plan as presented below and graphically depicted on **Attachment 3A**.

Feature S-8

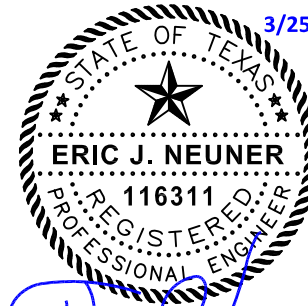
As depicted on the attached drawing (**Attachment 1B**), the referenced solution feature is located within the proposed roadway corridor for the land development project. It is our understanding that 2-3 feet of surface grading will generally be necessary to achieve the proposed elevation for the placement of road base. Based on information provided by the project design engineer (HMT Engineering and Surveying), approximately 3.07 feet of excavation is necessary at this location. Considering this, the specific protection procedures are summarized as follows:

1. Prior to commencement of SITE grading activities, the aperture of **Feature S-8** will be filled approximately 1 foot into the solution cavity by hand placement of washed No. 57 coarse limestone aggregate (1 inch to No. 4 sieve size) as defined per ASTM C33/C33M. The portion of the feature excavation corresponding to the weathered bedding contact will also be filled with washed aggregate to a minimum of 6 inches to 1 foot above the solution cavity opening.
2. Approximately 4 to 6 inches of concrete, with a minimum strength of 2,500 psi, will be placed on top of the aggregate and allowed to cure at least 24 hours prior to resuming any construction operations at or surrounding the feature location
3. Implementation of these protective measures will be monitored and approved by the project geotechnical engineering firm.

By following this protocol, it is anticipated that **Feature S-8** will be isolated from potentially contaminated water by the referenced concrete placement, yet still maintain its subsurface flow capability.

Protection Procedures:

1. Prior to commencement of site grading activities, the feature aperture will be filled by hand to approximately 1 foot into the solution cavity opening with washed No. 57 coarse aggregate (1 inch to No. 4 sieve) as defined per ASTM C33/C33M. The portion of the feature excavation corresponding to the weathered bedding contact will also be filled with the washed aggregate to a minimum of 6 inches to 1 foot above the solution cavity opening.
2. Approximately 4 to 6 inches of concrete, with a minimum strength of 2,500 psi, will be placed on top of the aggregate and allowed to cure at least 24 hours prior to resuming any construction operations at or surrounding the feature location.
3. Implementation of protective measures will be monitored and approved by the project geotechnical firm.



3/25/20



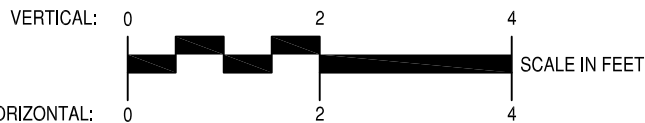
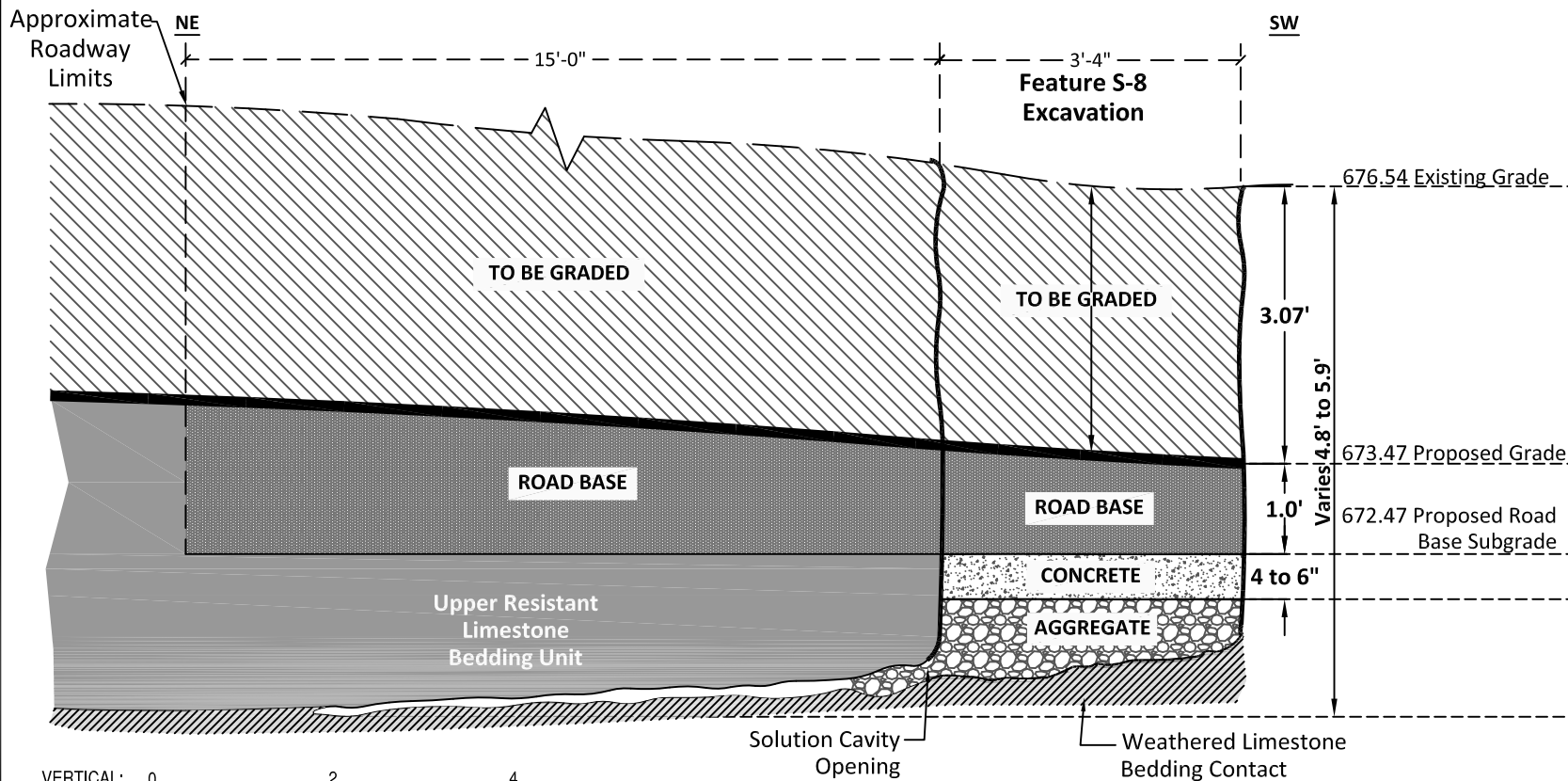
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**PROPOSED KARST FEATURE
PROTECTION PLAN**
VILLAGE AT GRUENE CONDOMINIUMS
NEW BRAUNFELS, COMAL COUNTY, TEXAS
REGULATED ENTITY No. RN110919453



REVISIONS:

No.	DATE	DESCRIPTION

PROJECT No.:

ASF19-124-01

ISSUE DATE: 03-25-2020

DRAWN BY: LAW

CHECKED BY: RVK

REVIEWED BY: EJM

ATTACHMENT

3A