TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 5, 2013

RECEIVED
FEB 19 2013
COUNTY ENGINEER

Mr. Greg Meyer
259 East Torrey
New Braunfels, Texas 78130

Re: Edwards Aquifer, Comal County

NAME OF PROJECT: Oakwood Estates Unit 19; Located at dead-end of Acorn Drive; New Braunfels, Texas

TYPE OF PLAN: Request for Approval of an Organized Sewage Collection System (SCS) Plan; 30 Texas Administrative Code (TAC) Chapter 213 Edwards Aquifer

Edwards Aquifer Protection Program ID No. 3089.00; Investigation No. 1041752; Regulated Entity No. RN106535529

Dear Mr. Meyer:

The Texas Commission on Environmental Quality (TCEQ) has completed its review of the organized sewage collection system plans and specifications for the referenced project submitted to the San Antonio Regional Office on behalf of Mr. Greg Meyer by HMT Engineering & Surveying on October 17, 2012. Final review of the SCS was completed after additional material was received on January 3, 2013, January 17, 2013 and February 4, 2013. As presented to the TCEQ, the construction documents were prepared by a Texas Licensed Professional Engineer to be in general compliance with the requirements of 30 TAC Chapter 213 and Chapter 217. Therefore, based on the Texas Licensed Professional Engineer's concurrence of compliance, the planning materials for construction of the proposed sewage collection system and pollution abatement measures are hereby approved subject to applicable state rules and the conditions in this letter. The applicant or a person affected may file with the chief clerk a motion for reconsideration of the executive director's final action on this Edwards Aquifer protection plan. A motion for reconsideration must be filed no later than 23 days after the date of this approval letter. *This approval expires (2) two years from the date of this letter unless, prior to the expiration date, more than 10 percent of construction has commenced, or an extension of time has been requested.*

PROJECT DESCRIPTION

The proposed sewage collection system will consist of 40 linear feet of 8-inch diameter SDR 26 160-psi pressure rated pipe and joints (ASTM D-2241, ASTM D-3139) and 1,708.02 linear feet of 8-inch diameter SDR 26 115-psi gravity pipe and joints (ASTM D-3034, ASTM D-3212) for a total of 1,748.02 linear feet. The proposed sewage collection system will also include 9 manholes, service laterals and appropriate appurtenances. The proposed sewage collection system will provide service for 36 single-family residences. The system will be connected to an existing New Braunfels Utilities (NBU) wastewater line for conveyance to the Gruene Waste Water Treatment Plant for treatment and disposal. The project is

located within the City of New Braunfels (CONB) and will conform to all applicable codes, ordinances, and requirements of CONB and NBU.

GEOLOGY

According to the geologic assessment included with the application, the site is located on the Person Formation. The geologic assessment indicates that one solution cavity (S-1) and four manmade features were identified on the site within 50 feet of the SCS. The solution cavity was rated as sensitive and the four manmade features were rated as not sensitive by the project geologist. The San Antonio Regional Office conducted a site assessment on November 29, 2012. The San Antonio Regional Office approved an infiltration test for feature S-1 to better determine feature sensitivity. On January 15, 2013, an infiltration test was conducted by the project geologist to better determine feature sensitivity. The results of the infiltration test allowed for the reclassification of Feature S-1 to not sensitive.

SPECIAL CONDITIONS

I. It is emphasized that where wastewater lines must bridge faults, caverns, sinkholes, or solution features the lines shall be constructed in a manner that will maintain the structural integrity of the pipe. When such sensitive features are encountered, 30 TAC §213.5(f)(2) requires that all regulated activities near the feature must be immediately suspended and the owner/developer shall immediately notify the San Antonio Regional Office. Additionally, when such geologic features are encountered which are bridged by construction, the location and extend of those features must be assessed by a geologist and must be reported to the San Antonio Regional Office in writing within two working days of discovery as required by 30 TAC §213.5(c)(3)(K). Construction may not resume in the area of the feature until the executive director has reviewed and approved the methods proposed to protect the aquifer from any potential adverse impacts. See Standard Condition 10 below.

II. By the responsible Engineer's dated signature and seal on the submittal Engineering Design Report attached to this application, all information therein accurately reflects the information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer in accordance with the requirements of 30 TAC 213.5(c) and Chapter 217.

STANDARD CONDITIONS

1. Pursuant to Chapter 7 Subchapter C of the Texas Water Code, any violations of the requirements in 30 TAC Chapter 213 may result in administrative penalties.
2. The holder of the approved Edwards Aquifer protection plan must comply with all provisions of 30 TAC Chapter 213 and all best management practices and measures contained in the approved plan. Additional and separate approvals, permits, registrations and/or authorizations from other TCEQ Programs (i.e., Stormwater, Water Rights, UIC) can be required depending on the specifics of the plan.
3. In addition to the rules of the Commission, the applicant may also be required to comply with state and local ordinances and regulations providing for the protection of water quality.

Prior to Commencement of Construction:

4. 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 SCS plan and this notice of approval shall be maintained at the project location until all regulated activities are completed.

5. Modification to the activities described in the referenced SCS application following the date of approval may require the submittal of a plan to modify this approval, including the payment of appropriate fees and all information necessary for its review and approval prior to initiating construction of the modifications.
6. The applicant must provide written notification of intent to commence construction, replacement, or rehabilitation of the referenced project. Notification must be submitted to the San Antonio Regional Office no later than 48 hours prior to commencement of the regulated activity. Written notification must include the date on which the regulated activity will commence, the name of the approved plan and program ID number for the regulated activity, and the name of the prime contractor with the name and telephone number of the contact person. The executive director will use the notification to determine if the approved plan is eligible for an extension.
7. Temporary erosion and sedimentation (E&S) controls, i.e., silt fences, rock berms, stabilized construction entrances, or other controls described in the approved application, 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. The TCEQ 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.

<u>During Construction:</u>

8. 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 and Chapter 217. 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.
9. If sediment escapes the construction site, the sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain). Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50 percent. Litter, construction debris, and construction chemicals shall be prevented from becoming stormwater discharge pollutants.
10. If any sensitive feature (caves, solution cavities, sink holes, etc.) 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 potentially adverse impacts to water quality. The plan must be sealed, signed, and dated by a Texas Licensed Professional Engineer.
11. The following records shall be maintained by the applicant and made available to the executive director upon request: the dates trenching activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated and completed.
12. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, and construction activities will not resume within 21 days. When the initiation of stabilization measures by the 14th day is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable.
13. Intentional discharges of sediment laden water during construction are not allowed. If dewatering of excavated areas becomes necessary, the discharge will be filtered through appropriately selected temporary best management practices. These may include vegetative filter strips, sediment traps, rock berms, sit fence rings, etc.

14. No part of the system shall be used as a holding tank for a pump-and-haul operation.

After Completion of Construction:

15. Certification by a Texas Licensed Professional Engineer of the testing of sewage collection systems required by 30 TAC Chapter 213 and Chapter 217 shall be submitted to the San Antonio Regional Office within 30 days of test completion and prior to the new sewage collection system being put into service. The certification should include the project name as it appeared on the approved application, the program ID number, and two copies of a site plan sheet(s) indicating the wastewater lines that were tested and are being certified as complying with the appropriate regulations.
16. Every five years after the initial certification, the sewage collection system shall be retested. Any lines that fail the test must be repaired and retested. Certification that the system continues to meet the requirements of 30 TAC Chapter 213 and Chapter 217 shall be submitted to the San Antonio Regional Office. The certification should include the project name as it appeared on the approved application, the program ID number and two copies of a site plan sheet(s) indicating the wastewater lines that were tested and are being certified as complying with the appropriate regulations.
17. If ownership of this organized sewage collection system is legally transferred (e.g., developer to city or Municipal Utility District), the new owner(s) is required to comply with all terms of the approved Edwards Aquifer protection plan. If the new owner intends to commence any new regulated activity on the site, a new Edwards Aquifer protection plan that specifically addresses the new activity must be submitted to the executive director. Approval of the plan for the new regulated activity by the executive director is required prior to commencement of the new regulated activity.
18. An Edwards Aquifer protection plan approval or extension will expire and no extension will be granted if more than 50 percent of the total construction has not been completed within ten years from the initial approval of a plan. A new Edwards Aquifer protection plan must be submitted to the San Antonio Regional Office with the appropriate fees for review and approval by the executive director prior to commencing any additional regulated activities.

This action is taken under authority delegated by the Executive Director of the Texas Commission on Environmental Quality. If you have any questions or require additional information, please contact Dianne Pavlicek, P.G., of the Edwards Aquifer Protection Program of the San Antonio Regional Office at 210-403-4074

Sincerely,

Lynn Bumguardner, Water Section Manager
San Antonio Region Office
Texas Commission on Environmental Quality

LB/DP/eg

cc: Mr. Stephen Hanz, P.E., HMT Engineering & Surveying
Mr. James C. Klein, P.E., City of New Braunfels
Mr. Thomas H. Hornseth, P.E., Comal County
Mr. Roland Ruiz, Edwards Aquifer Authority
TCEQ Central Records, Building F, MC 212

TCEQ
Protecting Texas by Reducing and Preventing Pollution

Fax Cover Sheet

Number of Pages: *(including this sheet)* 2

COPY

RECEIVED
FEB 19 2013
COUNTY ENGINEER

Date:	January 22, 2013
To:	Stephen Hanz, P.E.
Organization:	HMT Engineering & Surveying
Fax:	830-625-8556
To:	Greg Meyer
Organization:	Sole Proprietor
Fax:	Sent email to: gkmeyer@sbcglobal.net
From:	Dianne Pavlicek, P.G.
Division :	Edwards Aquifer Protection Program – San Antonio Region
	Texas Commission on Environmental Quality
Phone:	210-403-4074
Fax:	210-545-4329

Re: Edwards Aquifer, Comal County

Name of Project: Oakwood Estates Unit 19; Located on Acorn Dr., New Braunfels, Texas

Plan Type: Request for the Sewage Collection System (SCS); 30 Texas Administrative Code (TAC) Chapter 213

San Antonio File No. 3089.00

Dear Mr. Hanz:

We are in the process of technically reviewing the SCS you submitted on the above-referenced project. Before we can proceed with our review, the following comments relating to the application must be addressed.

1. Additional review of the SCS revealed that TCEQ Form 10243 is outdated and is not acceptable. An Engineering Design Report (EDR) must be submitted as described in TCEQ Chapter 217.

2. In the SCS Application, item 5 indicates infiltration/inflow to be 0 gallons/day. Please refer to NBU calculations for infiltration/inflow and revise accordingly.

3. ASTM D-2241 pipe must be shown on plan and profile sheets. Please review and revise accordingly.

4. Please review item 24 in the SCS Application and confirm water line crossings within 9 feet of sewer lines. Note also that these crossings should be indicated on all plan and profile sheets.

We ask that you submit one original and four copies of the amended materials to supplement the SCS to this office by no later than **14 days from the date of this fax** to avoid denial of the plan. If the response to this notice is not received, is incomplete or inadequate, or provides new information that is incomplete or inadequate, a second notice will be sent to you requiring a response within 14 days from the notice date. If the response to the second notice is not received, is incomplete or inadequate, or provides new information that is incomplete or inadequate, the application will be denied unless you provide written notification that the application is being withdrawn. Please note that the application fee will be forfeited if the plan is not withdrawn. If you have any questions or require additional information, please contact Dianne Pavlicek, P.G., of the Edwards Aquifer Protection Program of the San Antonio Regional Office at (210) 403-4074.

TCEQ Comments

C – TCEQ Comment
R – HMT Response

- **C** Additional review of the SCS revealed that TCEQ Form 10243 is outdated and is not acceptable. An Engineering Design Report (EDR) must be submitted as described in TCEQ Chapter 217.
  - **R** We have completed an EDR.
- **C** In the SCS Application, item 5 indicates infiltration/inflow to be 0 gallons/day. Please refer to NBU calculations for infiltration/inflow and revise accordingly.
  - **R** Infiltration and inflow have been revised to 750 gallons per day in accordance with NBU specifications.
- **C** ASTM D-2241 pipe must be shown on plan and profile sheets. Please review and revise accordingly.
  - **R** The pipe has been specified on the plan and profile sheet.
- **C** Please review item 24 in the SCS application and confirm water line crossings within 9 feet of sewer lines. Note also that these crossings should be indicated on all plan and profile sheets.
  - **R** These crossings have been updated in the application and confirmed on the plan and profile sheets.

Line	Sheet	Station		Station
"A"	11 of 20	0 + 00	to	0 + 02
"B"	11 of 20	0 + 00	to	0 + 30
	of		to	
	of		to	

Items 24 through 31 must be included on the Plan and Profile sheets.

24. _X_ All existing or proposed water line crossings and any parallel water lines within 9 feet of sewer lines are listed in the table below. These lines must have the type of pressure rated pipe to be installed shown on the plan and profile sheets. Any request for a variance from the required pressure rated piping at crossings must include a variance approval from 30 TAC Chapter 290.

__ There will be no water line crossings.

__ There will be no water lines within 9 feet of proposed sewer lines.

Line	Station or Closest Point	Crossing or Parallel	Horizontal Separation Distance	Vertical Separation Distance
"B"	5 + 39.76	Crossing		2.9'
"B"	8 + 79.76	Crossing		2.3'

25. Vented Manholes:

__ **No part** of this sewer line is within the 100-year floodplain and vented manholes are not required by 30 TAC Chapter 217.

__ **A portion** of this sewer line is within the 100-year floodplain and vented manholes will be provided at less than 1500 foot intervals. These water-tight manholes are listed in the table below and labeled on the appropriate profile sheets.

__ **A portion** of this sewer line is within the 100-year floodplain and an alternative means of venting shall be provided at less than 1500 feet intervals. A description of the alternative means is described on the following page.

_X_ **A portion** of this sewer line is within the 100-year floodplain; however, there is no interval longer than 1500 feet located in the 100-year floodplain. No vented manholes will be used.

5. Existing and anticipated infiltration/inflow is 750 gallons/day. This will be addressed by Use of watertight size-on-size connections at the manholes will be used.

6. A Water Pollution Abatement Plan (WPAP) is required for construction of any associated commercial, industrial or residential project located on the Recharge Zone.

_X_ The WPAP application for this development was approved by letter dated 09/03/1999. A copy of the approval letter is attached at the end of this application.
__ The WPAP application for this development was submitted to the TCEQ on _____, but has not been approved.
__ A WPAP application is required for an associated project, but it has not been submitted.
__ There is no associated project requiring a WPAP application.

7. Pipe description:

Pipe Diameter (Inches)	Linear Feet[1]	Pipe Material[2]	Specifications[3]
8"	40	SDR 26	ASTM-D-2241
8"	1,708.02	SDR 26	ASTM-D-3034
Total Linear Feet	1,748.02	SDR 26	

1) Include stub-outs. Do not include private service laterals.
2) If PVC, state SDR value.
3) ASTM / ANSI / AWWA specification and class numbers should be included.

8. The following Wastewater Treatment Plant (WWTP) Gruene Waste Water Treatment Plant (name) will receive project wastewater for treatment and disposal. This WWTP is an **EXISTING**/PROPOSED (circle one) facility.

9. All components of this sewage collection system will comply with:

_X_ The City of New Braunfels (New Braunfels Utilities) standard specifications.
__ Other. Specifications are provided directly behind this page.

10. _X_ No force main(s) and/or lift station(s) are associated with this sewage collection system.
__ A force main(s) and/or lift station(s) is associated with this sewage collection system and the Lift Station/Force Main System application is included with this application.

ALIGNMENT

11. _X_ There are no deviations from uniform grade in this sewage collection system without manholes and with open cut construction.

12. _X_ Joint Deflection - The maximum allowable joint deflection is the lesser of the following three alternatives:
_X_ equal to 5°; or
__ 80% of the manufacturer's recommended maximum deflection; or
__ 80% of the appropriate ASTM, AWWA, ANSI or nationally-established standard for joint deflection.

13. _X_ There are no deviations from straight alignment in this sewage collection system without manholes.
__ **ATTACHMENT B - Justification and Calculations for Deviation in Straight Alignment Without Manholes.** Justification for deviations from straight alignment in

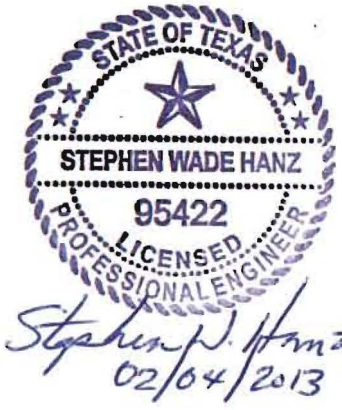
Oakwood Estates

Unit - 19

A distinguished project by:

GK Meyer Investments

Engineering Design Report



New Braunfels, Texas
January 2013

Prepared by:

HMT
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ENGINEERING & SURVEYING

TABLE OF CONTENTS

This Engineering Design Report has been prepared to comply with the Texas Commission on Environmental Quality's Design Criteria for Domestic Wastewater Systems (30 TAC 217), and regulations over the Edwards Aquifer Recharge Zone (30 TAC 213). Please note that throughout this application, the more stringent of NBU or TCEQ regulations shall apply.

PROJECT INFORMATION

Oakwood Estates Unit 19 is a single-family residential development within the Oakwood Estates development consisting of 36 lots on approximately 14.735 acres. The project is located east of the intersection of Acorn Dr. and Hannah's Run, in the city limits of the City of New Braunfels in Comal County, Texas. The site is located entirely over the Edwards Aquifer Recharge Zone. Oakwood Estates was permitted by a Water Pollution Abatement Plan (WPAP) entitled "Oakwood Estates", approved by the 'Texas Commission on Environmental Quality (TCEQ) on September 3, 1999 (EAPP File No. 1298.00).

The Oakwood Estate Unit-19 Sewage Collection System (SCS) application proposes the construction of approximately 1,748.02 linear feet (LF) of 8-inch PVC, SDR 26, 115 psi gravity sewer main. Approximately 40 LF of the total 1,748.02 LF of sewerline is PVC, SDR 26, 160 psi pressure-rated pipe, to be centered on water/sewer-line crossings. The proposed sanitary sewer will tie into an existing sewerline. Regulated activities proposed include excavation, construction of sewer mains, manholes, backfill, and compaction. Approximately 4.74 acres may be disturbed, as identified by the fifty-foot (50') SCS/GA envelope shown on the plans. No onsite, naturally occurring sensitive features were identified in the Geologic Assessment.

Approximately 7,560 gallons per day (gpd) of average domestic wastewater flow are estimated to be generated by this project. Wastewater will be disposed of by conveyance to the existing Gruene Treatment Plant owned by New Braunfels Utilities (NBU).

Potable water service will also be provided by NBU.

Please refer to sheets 12-14 of the attached sewer plans, which show the proposed service area and its topographic features. This system is designed to have a minimum structural life of 50 years.

Safety considerations are the responsibility of the contractor. Safety protection shall be accomplished in accordance with the most recent requirements of the Occupational Safety and Health Administration (OSHA) Standards and Interpretations.

GRAVITY SANITARY SEWER PIPING: FLOW & CAPACITY ANALYSIS

Basis for average flow used for design of collection system (check one or more):

Per Capita Contributions: ____

Service Connections: _X__

Land Area and Use: _X__

Fixture Analysis: ____

Odor Control

Odor Control is not necessary on this project as it is a gravity line and there will be no condition in which sewage is standing and wills become septic.

Flow Calculation

Peaking Factor used for design: **2.5**

Peaking Factor is based on: **NBU Peak Water Demand/Average Water Demand (NBU 2.9.2.A.1.c)**

Total EDUs 36= (proposed and ultimate conditions)

1 EDU=210 gallons per day (average sewage flow)

=525 gallons per day (peak flow)

Infiltration =750 gallons per acre served

Average Flow= [36 EDUs x (210 gpd/EDU]

=7,560 gpd

=7,560 gpd / 1440 min/day = 5.25 ***gpm***

*Peakflow = (18 + (0.0206 * F) ^ 0.5)/(4 + (0.0206 * F) ^ 0.5) * F + 750 gal/day /1440 * Acres*

*F = 210 * # EDU/1440*

*F = 210 * 36/1440 = 5.25 gpm*

*Q = (18+(0.0206*5.25) ^ 0.5) / (4 + (0.0206 * 5.25) ^ 0.5) * 5.25 + 750 /1440 * 14.735*

Q = 29.90 gpm

Please note that capacities are determined using Manning's equation for pipes flowing full with an "n" value of 0.013. A reference for Manning's Equation can be found in "The Uni-Bell Handbook of PVC Pipe: Design and Construction".

Capacity Calculation

Characteristics of 8" ASTM D3034, SDR 26, PVC Sewer Pipe:

Nominal Size 8"

Outer Diameter (D_o) =8.40"

Minimum Wall Thickness (t) =0.323"

Inner Diameter (D_i) 7. 75"

Characteristics of 8"ASTM 2241, Class 160, SDR 26, PVC Sewer Pipe:

Nominal Size =8"

Outer Diameter (D_o) = 8.625"

Minimum Wall Thickness (t) = 0.332"

Inner Diameter (D_i) = 7.961"

Manning's Equation:

$$Q = (k/n)(A)(R^{2/3})(S^{1/2})$$

$$v = Q/A$$

Where:

Q = *Discharge (cfs)*

k = *Constant [(1.49 ft$^{1/3}$)/sec.]*

n = *Manning's roughness coefficient (unitless)*

A = *Flow area (ft^2)*

R = *Hydraulic Radius (ft)*

= *A/P = Cross sectional area of flow (ft^2)/Wetted perimeter (ft.)*

S = *Slope (ft/ft)*

V = *Velocity of flow (ft/s)*

n = *0.013 [as required by 30 TAC 213.53 A(i)]*

Calculations for 8" ASTM D3034, SDR 26, PVC Sewer Pipe:

$A = \pi(D_i^2)/4 = \pi(7.75in)^2/4 = 47.17\ in^2 = 0.33\ ft^2$

$P = \pi(D_i) = \pi(7.75\ in) = 24.35\ in = 2.03\ ft$

$R = A/P = 0.33ft^2 / 2.03\ ft. = 0.16ft$

$S = 0.005$

$Q = [(1.49ft^{1/3}/sec.)/0.013](0.33ft^2)(0.16ft)^{2/3}(0.005)^{1/2}$

$Q = 0.79$ *qfs* 355 *gpm* $= Q_{full}$

$v = 0.79\ cfs/0.33ft^2 = \mathbf{2.39ft/s}$

$Qmax = 0.79\ cfs\ (0.90)\ (7.48\ gallons/1\ cf)(60\ sec/1min.) = \mathbf{319\ gpm}$

Calculations for 8" ASTM2241, Class 160, SDR 26, PVC Sewer Pipe.:

$A = \pi(D_i^2)/4 = \pi(7.961\ in,)^2/4 = 49.76\ in^2 = 0.35ft^2$

$P = \pi(D_i) = \pi(7.961\ in) = 25.01\ in = 2.08ft$

$R = A/P = 0.35\ ft^2 / 2.08\ ft. = 0.17ft$

$S = 0.005$

$Q = [(1.49ft^{1/3}/sec)/0.013](0.35ft^2)(0.17ft)^{2/3}(0.005)^{1/2}$

$Q = 0.87$ *cfs* 390 *gpm* $= Q_{full}$

$v = 0.87\ cfs/0.35ft^2 = \mathbf{2.49ft/s}$

$Qmax = 0.87\ cfs\ (0.90)(7.48\ gallons/1\ cf)(60\ sec/1min.) = \mathbf{351\ gpm}$

Nominal Main Size (in)	Outer Diameter (in)	Minimum Slop	Area (ft)	Hydraulic Radius (A/P)	R	S	Q-Full (cfs)	Max Pipe (%)	Velocity (ft/s)	Q-Max (gpm)
8	8.40	0.50	0.33	0.16	0.29	0.063	0.79	90	2.39	319
8	8.625	0.50	0.35	0.17	0.31	0.063	0.87	90	2.49	351

Conclusion

The proposed 8" pipe (115 and 160 psi) with a minimum slope of 0.50% has sufficient capacity to convey the projected average and peak flows.

GENERAL STRUCTURAL COMPONENTS

Project Materials (Pipe and Joints):

Nominal Pipe Diameter (In)	Liner Feet	Pipe Material	National Standard Specification for Pipe Material	National Standard for Pipe Joints
8	1,708.02	PVC SDR 26	ASTM D3034	ASTM D3212
8	40	PVC SDR 26	ASTM 2241, Class 160	ASTM D3139

Note: Section 217.53 (j)(4) requires a minimum pipe diameter of 6 inches for all gravity sanitary sewer collection system piping.

Watertight, size on size resilient connectors conforming to ASTM C-923 have been specified for connecting pipe to manholes.

Where a collection system parallels a water supply pipe and a nine-foot separation distance cannot be achieved, Section 217.53 (d)(3)(A)(i) requires a collection system pipe be constructed of cast iron, ductile iron, or PVC meeting ASTM specifications with at least a 150 pounds per square inch (psi) rating for both the pipe and joints. The proposed project will comply with these requirements.

Project Materials (Bedding):

The specified bedding will comply with ASTM D2321-ll Class I, II or III for materials and densification. A minimum of 6 inches of bedding is required for all pipe.

Pipe Diameter (in)	Pipe Material	Bedding Class
8	PVC	Class I

The selection of bedding class is based on NBU standard notes for sanitary sewer pipe laid in a trench. Initial backfill for the pipe size shown above will be Class I. Secondary backfill will be Class III.

Project Materials (Manholes):

Section 217.55 (f) prohibits the use of bricks to adjust a manhole cover to grade or construct a manhole. The proposed project will comply with this requirement.

The inside diameter of a manhole must be no less than 48 inches. Section 217.55 (n) requires watertight, size-on-size resilient connectors that allow for differential settlement and must conform to American Society for Testing and Materials C-923. The proposed project complies with this requirement.

Under 30 TAC 213.5(C)(3)(A), all manholes over the Recharge Zone must be watertight, with watertight rings and covers. The proposed project complies with this requirement.

The materials specified for manhole construction are **precast concrete**.

Project Materials (Manhole Covers):

Manhole covers must be constructed of impervious materials. If personnel entry is required, a minimum 30-inch diameter clear opening must be provided. Inclusion of steps in a manhole is prohibited. If a manhole must be located within a 100-year flood plain then a means of preventing inflow is required. A manhole cover that is located in a roadway must meet or exceed

the American Association of State Highways and Transportation Officials Standard M-306 for load bearing.

Minimum and Maximum Slopes

Note: All pipes are designed with a slope that will provide a velocity of at least 2 ft/s flowing full, as calculated using Manning's equation with an "n" value of 0.013. Additionally, the collection system is designed to ensure that, with pipes flowing full, the velocities will be less than 10 feet per second.

The following are the minimum and maximum slopes designed for this project for each pipe diameter:

Pipe Diameter: **8"** Min. Slope: **1.26%** Max. Slope: **8.40%**

Backfill

Note: The backfill will be free of stones greater than 6 inches in diameter and free of organic or any other unstable material.

Trenching

Note: The trench width will be minimized while still allowing adequate width for proper compaction of backfill, and while still ensuring that at least 6 inches of backfill exists below and on each side of the pipe. The trench walls will be vertical to at least one foot above the pipe.

Trenching will occur over the Recharge Zone and will comply with 30 TAC 213.5.

Minimum and Maximum Trench Width

Based on NBU Standard Drawing 430 and 30 TAC 217.54:

Pipe Diameter: **8" (115 psi)** Min. Trench Width: **20"** Max. Trench Width: **32"**

Pipe Diameter: **8" (160 psi)** Min. Trench Width: **21"** Max. Trench Width: **33"**

Corrosion Prevention

Proposed collection system components (pipes, manholes, etc.) will not be susceptible to deterioration through the corrosive effects of an anaerobic sewage environment. The interior of the manholes, however, are to be coated with a NBU approved sewer structural coating per NBU Water & Wastewater Design Criteria 2.9.3.D.4. The epoxy coating on the interior walls of the manhole provide interior corrosion protection.

Manholes (General)

Note: Manholes are provided at all changes in size, grade or alignment of pipe, at the intersection of all pipes and at the end of all lines that may be extended at a future date. A clean-out with watertight plugs may be installed instead of a manhole if no extensions are anticipated. Clean outs must pass all testing requirements outlined for gravity collection pipes.

The project complies with the maximum manhole spacing allowed by the TCEQ:

Pipe Diameter (in)	Max. Manhole Spacing (ft)
6-15	500
18-30	800
36-48	1000
54 or larger	2000

Manhole Spacing:

Pipe Diameter: **8"** Max. Spacing: **381.45 L.F.**

Manholes (Inverts)

The bottom of a manhole must contain a U-shaped channel which is a smooth continuation of the inlet and outlet pipes. The bench above the channel must be sloped a minimum of 0.5 inches per foot. See NBU detail 328 which complies with these requirements. Note, a manhole connected to

a pipe less than 15 inches in diameter must have a channel depth equal to at least half the largest pipe's diameter.

Manholes (Ventilation)

Watertight manholes are not proposed for this SCS. All manholes that lie within the 100-yr floodplain have rim elevations above the 100-yr water surface as defined by a HEC-RAS study performed for Oakwood Estates Unit 18.

Reduction of Inflow

Connection of storm water or roof drains to the sewage collection system is prohibited in accordance with 30 TAC 217.55(j)(6).

FLEXIBLE PIPE COMPUTATIONS

Please note, all flexible pipe computations are based on engineering principles and practices for the design of buried PVC pipe systems. Equations used can be found in "The Uni-Bell PVC Pipe Association Handbook of PVC Pipe: Design and Construction" and Buried Pipe Design, 3 Edition by Moser and Folkman. Please note, the equations used may be in a different format than shown in the Uni-Bell Handbook or Buried Pipe Design, 3 Edition. Throughout this application "160 psi" pipe refers to the pressure rating of the ASTM 2241, Class 160, SDR 26 pipe used at water/sewer crossings.

Live Load Calculations

No influence of live loads on the performance of the SCS is anticipated. The average burial depth for this line is such that the influence of live loads is negligible.

Bucking Pressure Calculations

This area of the Edwards Aquifer is unsaturated; consequently, there are no anticipated areas where sewer pipe will be placed below the water table. The value of $h_w = 0$ as there will be no height or time period of perched water or groundwater above the pipe crowns of the proposed sewer line. No geotechnical borings were done for this line.

The value of H for use in these calculations is ten (10) feet as it is the maximum burial depth for this line. The value of γ_s equals 120 pcf is a conservative value based data from previous units. This value is conservative as it corresponds to saturated unit weights of commonly used backfill materials.

Allowable Buckling Pressure:

(Equation 1)

$$Q_a = 0.4 * \sqrt{32 * R_w * B' * E_b * (E * I / D^3)}$$

$$Q_a = 0.4 * \sqrt{32 * 1 * 0.40 * 400 * (400{,}000 * .0028 / 8.07^3)} = 40.47 \text{ psi (ASTM 3034)}$$

$$Q_a = 0.4 * \sqrt{32 * 1 * 0.40 * 400 * (400{,}000 * .0030 / 8.29^3)} = 40.23 \text{ psi (ASTM 2241)}$$

(Equation 2)

$$R_w = 1 - 0.33 * (h_w / h)$$

$$R_w = 1 - 0.33 * (0 / 120) = 1$$

(Equation 3)

$$B' = 1 / (1 + 4 * e^{-0.065 * H})$$

$$B' = 1 / (1 + 4 * e^{-0.065 * 10}) = 0.32$$

(Equation 4)

$$I = (t^3 / 12) * (\text{inches}^4 / \text{linear inch})$$

$$I = (0.323^3 / 12) * (\text{inches}^4 / \text{linear inch}) = 0.0028 \text{ in}^4\text{/in (ASTM 3034)}$$

$$I = (0.323^3 / 12) * (\text{inches}^4 / \text{linear inch}) = 0.0030 \text{ in}^4\text{/in (ASTM 2241)}$$

(Equation 5)

$$D = D_o - t$$

$$D = 8.40 \text{ inches} - 0.323 \text{ inches} = 8.08 \text{ inches (ASTM 3034)}$$

$$D = 8.625 \text{ inches} - 0.332 \text{ inches} = 8.29 \text{ inches (ASTM 3034)}$$

Where:

q_a = allowable buckling pressure, pounds per square inch (psi)

h = height of soil surface above top of pipe in inches (in)

h_w = height of water surface above top of pipe in inches (in) (groundwater elevation)

R_w = Water buoyancy factor. If $h_w = 0, R_w = 1$. If $0 \leq h_w \leq h$ h (groundwater elevation is between the top of the pipe and the ground surface), calculate R_w with Equation 2

H = Depth of burial in feet (ft) from ground surface to crown of pipe.

B = Empirical coefficient of elastic support

E_b = modulus of soil reaction for the bedding material (psi)

E = modulus of elasticity of the pipe material (psi)

I = moment of inertia of the pipe wall cross section per linear inch of pipe, $inch^4$ /lineal inch = $inch^3$. For solid wall pipe, "I" can be calculated with Equation 4

t = pipe structural wall thickness (in)

D = mean pipe diameter (in)

D_o = pipe outer diameter (in)

Pressure Under Installed Conditions

(Equation 6)

$$q_p = \gamma_w * h_w + R_w * (W_c / D) + L_l$$

$$q_p = 0.0361 * 10*12 + 1 * (69.94/8.08) + 0 = 12.99 \text{ psi (ASTM 3034)}$$

$$q_p = 0.0361 * 10*12 + 1 * (71.85/8.29) + 0 = 13.00 \text{ psi (ASTM 2241)}$$

Where:

q_p = pressure applied to pipe under installed conditions (psi)

γ_w = 0.0361 pounds per cubic inch (pci), specific weight of water

W_c = vertical soil load on the pipe per unit length in pounds per linear inch (lb/in)

L_l = Live load

(Equation 7)

$$W_c = \gamma_w * H * (D+t)/144$$

$$W_c = 120*10*(8.08+0.323)/144 = 70.03 \text{ lb/in (ASTM 3034)}$$

$$W_c = 120*10*(8.29+0.332)/144 = 71.85 \text{ lb/in (ASTM 2241)}$$

γ_s = specific weight of soil in pounds per cubic foot (pcf)

D = means pipe diameter (in)

Pipe Diameter: **8"(115 psi)** Pipe Material: **PVC, SDR 26 ASTM 3034** q_a: **40.47** q_p: **12.99**
Pipe Diameter: **8"(160 psi)** Pipe Material: **PVC, SDR 26 ASTM 2241** q_a: **40.23** q_p,: **13.00**

Since $q_a \geq q_p$, the specified pipe is acceptable for the proposed installation.

Installation Temperature Effects

Flexible pipe will be installed under favorable ambient conditions, per pipe manufacturer's specifications.

Tensile Strength

The information below is from "The Uni-Bell Handbook of PVC Pipe: Design and Construction" Table 2.1 pages 14-15. This applies to all PVC SDR-26 pipe.

Pipe Material: **PVC SDR-26** Tensile Strength: **7,000** Cell Class (PVC only) **12454**
Pipe Material:_____ Tensile Strength:_____ Cell Class (PVC only)_____

Strain

The conditions of this installation are such that strain-related failure will not be a problem. Strain is generally not a performance-limiting factor for buried PVC pipe or a design-limiting criterion for PVC pipes according to the Uni-Bell Handbook of PVC Pipe (Chapter VII, Pages 255 and 257). As pipe deflection will be below 5%, strain-related failure is not anticipated.

Modulus of Soil Reaction

The modulus of soil reaction for the bedding material, E_b, is **700 psi.**

This value was determined using the "Table 1: Soil Classification Chart" and "Table 2: Soil Classes" from ASTM D2321-1 1 and "Average Values of Modulus of Soil Reaction, E" Table 3 from "The Uni-Bell Handbook of PVC Pipe: Design and Construction". Based on NBU standard notes, Class III material was chosen. As the secondary backfill (Class III) has a lower Modulus of Soil Reaction than initial backfill (Class I), its value was used in the calculations that follow. Class III on Table 2 corresponds to coarse grained soils with fines (GM, GC, SM or SC)

and sandy or gravelly finc-grained soils (CL or ML). On Table 7.3, coarse-grained soils with fines at a slight compaction have an E equal to 400 psi.

The modulus of soil reaction for the in-situ soil, E'_n, is **2,000 psi**

This value was determined using the "Table 1: Soil Classification Chart" and "Table 2: Soil Classes" from ASTM D 2321-11 and "Average Values of Modulus of Soil Reaction, E" Table 7.3 from "The Uni-Bell Handbook of PVC Pipe: Design and Construction" attached in Appendix A of this subsection. Based on NBU standards, Class I material was chosen which includes crushed rock as shown on Table 2. Compacted crushed rock on Table 7.3 has an E' equal to 3,000 psi. Values in Table 7.3 are based on empirical data and derived from laboratory and field tests for buried pipe.

Bedding to in-situ soil modulus of soil reaction ratio $=E_b/E'_n =$ **700 psi/2,000 psi = 0.35**

Zeta Calculation

Where native soil is significantly weaker than bedding material, or where predicted deflection approaches 5%, the effect of native soil must be quantified using Leonhardt's Zeta factor. If the ratio of bedding modulus to soil modulus in not equal to 1.0, a zeta factor must be calculated by using the equations below. Zeta is a factor which corrects for the effect of in-situ soil on pipe stability (Uni-Bell Handbook of Pipe, page 267). To calculate zeta, directly use the formulas below. The calculations that are done to determine the zeta factors for the different pipe diameters must be included with this submittal.

$$zeta = \frac{1.44}{f+(1.44)-f)^* (E_b/E_n')} \qquad \textit{(Equation 9)}$$

$$zeta = \frac{1.44}{1.22 +(1.44-1.22)^*(0.35)} = 1.11 \text{ (8" PVC SDR 26, 115 psi)}$$

$$zeta = \frac{1.44}{1.22+(1.44-1.22)^*(0.35)} = 1.11 \text{ (8" PVC SDR 26, 160 psi)}$$

$$f = \frac{b/d_a - 1)}{1.154+0.444*(b/d_a-1)} \qquad \textit{(Equation 10)}$$

$$f = \frac{34/8.40-1}{1.154+0.444*934/8.40-1)} = 1.22(8"PVC,SDR\ 26,\ 115\ psi)$$

$$f = \frac{35/8.625-1}{1.154+0.444*(35/8.625-1)} = 1.22\ (8"PVC,\ SDR\ 26,\ 160\ psi$$

Where:

f = pipe/trench width coefficient

b = trench width (in)

d_a = pipe diameter (in)

E_b = modulus of soil reaction for the bedding material (psi)

E'_n = modulus of soil reaction for the in-situ soil (psi)

Pipe Diameter: **8"(115 psi)** Trench Width: **34"** Zeta: **1.11**

Pipe Diameter: **8"(160 psi)** Trench Width: **35"** Zeta: **1.11**

Pipe Stiffness

Ps is based on National Reference Standards and manufacturer's data. Please see Table 7.1 of the "The Uni-Bell I-Iandbook of PVC Pipe: Design and Construction" listing the pipe stiffness of 8" PVC SDR 26, 115 psi as E =400,000 psi.

Pipe Diameter: **8"** Pipe Material: **PVC SDR 26** P_s: **115 psi**

Deflection

Maximum allowable deflection in installed lines is 5%, as determined by the deflection analysis and verified by a mandrel test. It is recommended that the percent of vertical deflection is below this range; however, a 7.5% deflection limit (recommended by ASTM D3034) provides a conservative factor of safety against structural failure (Handbook of PVC Pipe, page 249).

$$\Delta Y/D(\%) = \frac{K*(L_p+L_l)*100}{(0.149*P_s)+(0.061*zeta*E_b)} \qquad \textit{(Equation 11)}$$

$$Y/D(\%) = \frac{(0.110)(8.33)*100}{0.149*115)+(0.061*1.11*700)} = 1.42\% \text{ for 8" 160 psi pipe}$$

$$Y/D(\%) = \frac{(0.110)(8.33)*100}{(0.149*115)+(0.061*1.11*700)} = 1.42\% \text{ for 8" 160 psi pipe}$$

$$L_p = \frac{Y_s * H}{144} \qquad \text{(Equation 12)}$$

$$L_p = \frac{120*10}{144} = 8.33 \text{ psi}$$

% Y/D = Predicted % vertical deflection under load

Y = Change in vertical pipe diameter under load

D = Undeflected mean pipe diameter (in)

K = Bedding angle constant

Y_s = Unit weight of soil (pcf)

H = Depth of burial (ft) from ground surface to crown of pipe

L_p = Prism load (psi)

	Type of Pipe Material	P_s (psi)	Zeta Factor Assumed or Calculated	E_b (psi)	% Deflection
Pipe Diameter 1	**8" PVC SDR 26 (115 psi)**	**115**	**1.11**	**700**	**1.42**
Pipe Diameter 2	**8" PVC SDR 26 (160 psi)**	**115**	**1.11**	**700**	**1.42**

All pipes proposed for this project have a maximum predicted deflection of less than 5.0%

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

October 19, 2012

Mr. Thomas H. Hornseth, P.E.
Comal County Engineer
195 David Jonas Drive
New Braunfels TX 78132-3710

Re: Edwards Aquifer, Comal County
PROJECT NAME: Oakwood Estates Unit 19, located at the dead end of Acorn Drive off Oakwood Boulevard, New Braunfels, Texas
PLAN TYPE: Application for Approval of a Sewage Collection System Plan (SCS) 30 Texas Administration Code (TAC) Chapter 213; Edwards Aquifer Protection Program
EAPP File No.: 3089.00

Dear Mr. Hornseth:

The referenced application is being forwarded to you pursuant to the Edwards Aquifer Rules. The Texas Commission on Environmental Quality (TCEQ) is required by 30 TAC Chapter 213 to provide copies of all applications to affected incorporated cities and underground water conservation districts for their comments prior to TCEQ approval.

Please forward your comments to this office by November 19, 2012.

The Texas Commission on Environmental Quality appreciates your assistance in this matter and your compliance efforts to ensure protection of the State's environment. If you or members of your staff have any questions regarding these matters, please feel free to contact the San Antonio Region Office at (210) 490-3096.

Sincerely

For

Todd Jones
Water Section Work Leader
San Antonio Regional Office

TJ/eg

Oakwood Estates Unit-19

Organized Sewage Collection System

Stephen W. Hanz PE
10/16/2012

New Braunfels, Texas
October 2012

Prepared by:

HMT
ENGINEERING & SURVEYING

410 N. Seguin Ave.
New Braunfels, TX 78130
HMTNB.COM
830.625.8555 • FAX: 830.625.8556
TBPE FIRM F-10961

General Information Form
For Regulated Activities on the
Edwards Aquifer Recharge and Transition Zones
and Relating to 30 TAC §213.4(b) & §213.5(b)(2)(A), (B)
Effective June 1, 1999

REGULATED ENTITY NAME: OAKWOOD ESTATES UNIT NINETEEN
COUNTY: COMAL STREAM BASIN: Tributary of Bleiders Creek

EDWARDS AQUIFER: _X_ RECHARGE ZONE
__ TRANSITION ZONE

PLAN TYPE: __ WPAP __ AST __ EXCEPTION
_X_ SCS __ UST __ MODIFICATION

CUSTOMER INFORMATION

1. Customer (Applicant):

Contact Person: Greg Meyer
Entity: Sole Proprietor
Mailing Address: 259 East Torrey
City, State: New Braunfels, TX Zip: 78130
Telephone: 830-515-9983 FAX: N/A
Email: gkmeyer@sbcglobal.net

Agent/Representative (If any):

Contact Person: Stephen Hanz, P.E.
Entity: HMT Engineering & Surveying
Mailing Address: 410 N. Seguin Ave
City, State: New Braunfels, TX Zip: 78130
Telephone: 830-625-8555 FAX: 830-625-8556

2. _X_ This project is inside the city limits of New Braunfels.
__ This project is outside the city limits but inside the ETJ (extra-territorial jurisdiction) of _____.
__ This project is not located within any city's limits or ETJ.

3. The location of the project site is described below. The description provides sufficient detail and clarity so that the TCEQ's Regional staff can easily locate the project and site boundaries for a field investigation.

Beginning at TCEQ San Antonio regional office, Head SE on Judson Rd, turn left on IH 35. Take exit 184 Loop TX 337. Turn left onto TX 337. Turn Right onto Oakwood Blvd. Turn left on Acorn Dr. Project will be at the dead-end of Acorn Dr.

4. _X_ **ATTACHMENT A - ROAD MAP**. A road map showing directions to and the location of the project site is attached at the end of this form.

5. _X_ **ATTACHMENT B - USGS / EDWARDS RECHARGE ZONE MAP**. A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') of the Edwards Recharge Zone is attached behind this sheet. The map(s) should clearly show:

_X_ Project site.
_X_ USGS Quadrangle Name(s).
_X_ Boundaries of the Recharge Zone (and Transition Zone, if applicable).
_X_ Drainage path from the project to the boundary of the Recharge Zone.

6. _X_ Sufficient survey staking is provided on the project to allow TCEQ regional staff to locate the boundaries and alignment of the regulated activities and the geologic or manmade features noted in the Geologic Assessment. **The TCEQ must be able to inspect the project site or the application will be returned.**

7. _X_ **ATTACHMENT C - PROJECT DESCRIPTION**. Attached at the end of this form is a detailed narrative description of the proposed project.

8. Existing project site conditions are noted below:
__ Existing commercial site
__ Existing industrial site
__ Existing residential site
__ Existing paved and/or unpaved roads
__ Undeveloped (Cleared)
_X_ Undeveloped (Undisturbed/Uncleared)
__ Other: _____

PROHIBITED ACTIVITIES

9. _X_ I am aware that the following activities are prohibited on the **Recharge Zone** and are not proposed for this project:

(1) waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);
(2) new feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;
(3) land disposal of Class I wastes, as defined in 30 TAC §335.1;
(4) the use of sewage holding tanks as parts of organized collection systems; and
(5) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).

10. _X_ I am aware that the following activities are prohibited on the **Transition Zone** and are not proposed for this project:

(1) waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);
(2) land disposal of Class I wastes, as defined in 30 TAC §335.1; and
(3) new municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

ADMINISTRATIVE INFORMATION

11. The fee for the plan(s) is based on:

__ For a Water Pollution Abatement Plan and Modifications, the total acreage of the site where regulated activities will occur.

_X_ For an Organized Sewage Collection System Plans and Modifications, the total linear footage of all collection system lines.

__ For a UST Facility Plan or an AST Facility Plan, the total number of tanks or piping systems.

__ A request for an exception to any substantive portion of the regulations related to the protection of water quality.

__ A request for an extension to a previously approved plan.

12. Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

__ TCEQ cashier

__ Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)

_X_ San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

13. _X_ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

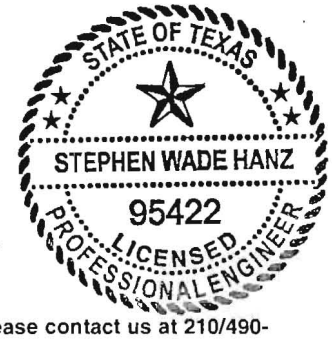
14. _X_ No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **GENERAL INFORMATION FORM** is hereby submitted for TCEQ review. The application was prepared by:

Stephen Hanz, P.E.
Print Name of Customer/Agent

Stephen W. Hanz, PE
Signature of Customer/Agent

10/02/2012
Date

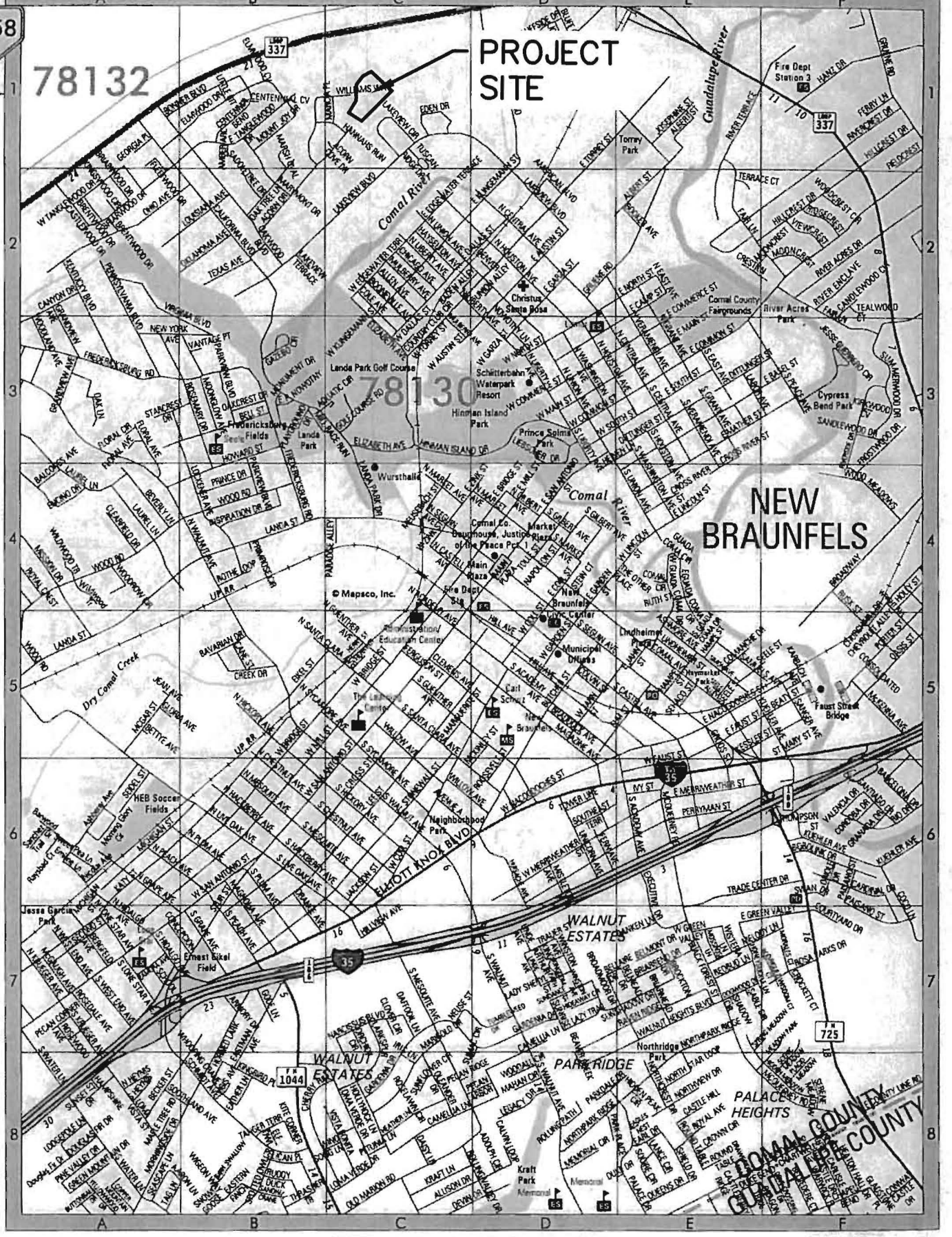


If you have questions on how to fill out this form or about the Edwards Aquifer protection program, please contact us at 210/490-3096 for projects located in the San Antonio Region or 512/339-2929 for projects located in the Austin Region.

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.

CONTINUED ON MAP 424

458



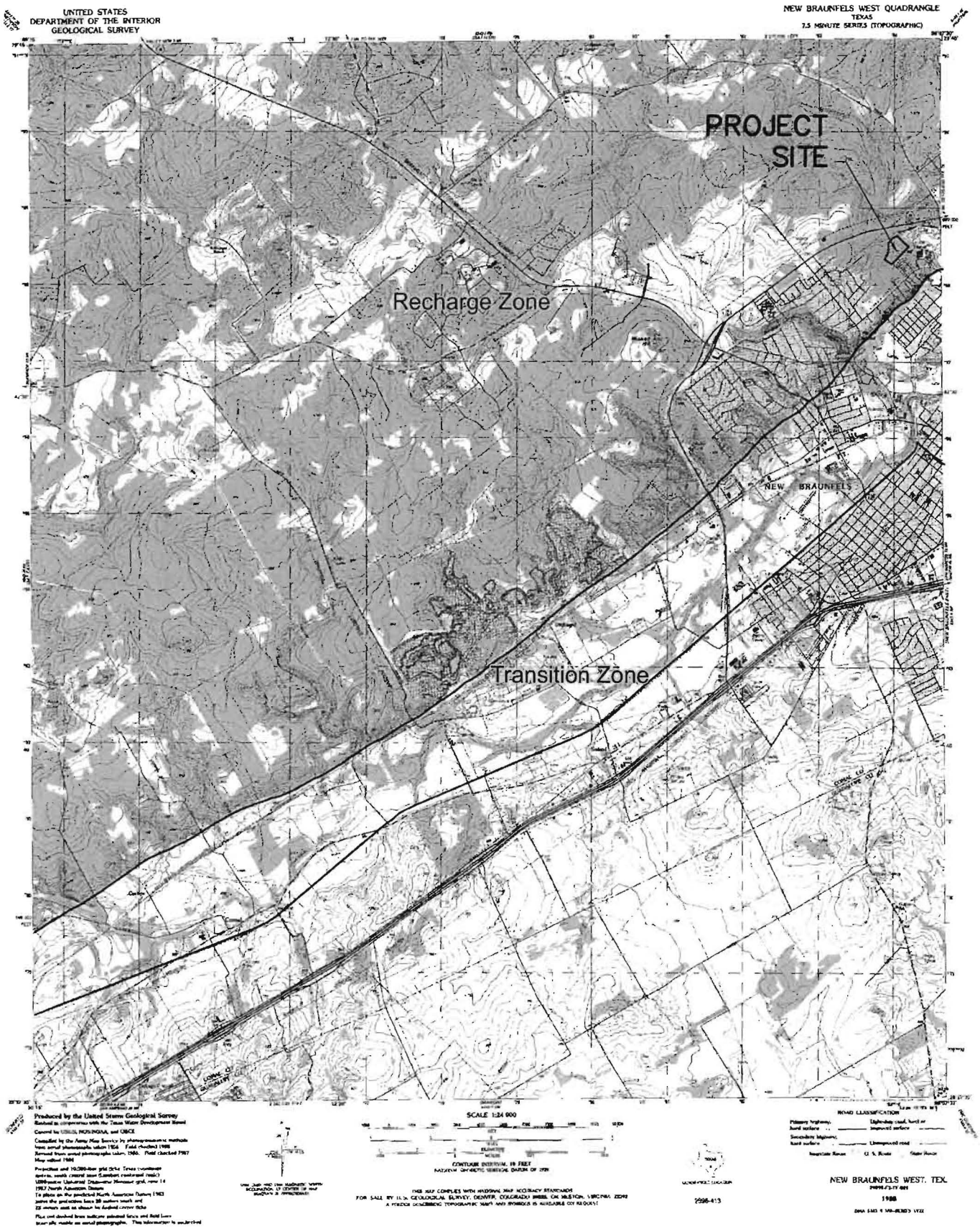
CONTINUED ON MAP 457

CONTINUED ON MAP 490

SCALE IN MILES
0 1/8 1/4 3/8 1/2

SCALE IN FEET
0 1000 2000 3000

Edwards Aquifer Recharge Zone and Contributing Zone Map
Edwards Aquifer Authority Rule Chapter 713



Last revision date of the recharge zone boundary for this quadrangle map: March 1974

Creation date for ch. 713 subchs. E and F boundary: March 2008

EDWARDS AQUIFER AUTHORITY RULES ch. 713, (Water Quality), subchs. E (Spill Reporting) and F (Hazardous Substances Registration, Storage, and Planning) boundary

GENERAL INFORMATION

ATTACHMENT "C"

PROJECT DESCRIPTION

This project is a 36 lot single family subdivision to be located in the Oakwood Estates Development in the City of New Braunfels. This subdivision will be located within the New Braunfels Utility service area. Approximately 1,748.02 linear feet of 8" wastewater lines will be constructed with this project. The construction plans and required applications are hereby submitted for review. A copy of the approved Water Pollution Abatement Plan Letter is hereby attached. This approval was granted on September 3, 1999 and construction of this development has been ongoing since that date.

Geologic Assessment
For Regulated Activities
on The Edwards Aquifer Recharge/transition Zones
and Relating to 30 TAC §213.5(b)(3), Effective June 1, 1999

REGULATED ENTITY NAME: Oakwood Estates - Unit Nineteen

TYPE OF PROJECT: __ WPAP __ AST _X_ SCS __ UST

LOCATION OF PROJECT: _X_ Recharge Zone __ Transition Zone __ Contributing Zone within the Transition Zone

PROJECT INFORMATION

1. _X_ Geologic or manmade features are described and evaluated using the attached **GEOLOGIC ASSESSMENT TABLE**.

2. Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups* (*Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A*, Soil Conservation Service, 1986). If there is more than one soil type on the project site, show each soil type on the site Geologic Map or a separate soils map.

Soil Units, Infiltration Characteristics & Thickness		
Soil Name	Group*	Thickness (feet)
Rumple-Comfort Assoc. (RUD)	C	1.6-3.0
Comfort (CrD)	D	1.08

* Soil Group Definitions (Abbreviated)

A. Soils having a high infiltration rate when thoroughly wetted.

B. Soils having a moderate infiltration rate when thoroughly wetted.

C. Soils having a slow infiltration rate when thoroughly wetted.

D. Soils having a very slow infiltration rate when thoroughly wetted.

3. _X_ A **STRATIGRAPHIC COLUMN** is attached at the end of this form that shows formations, members, and thicknesses. The outcropping unit should be at the top of the stratigraphic column.

4. _X_ A **NARRATIVE DESCRIPTION OF SITE SPECIFIC GEOLOGY** is attached at the end of this form. The description must include a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure, and karst characteristics of the site.

5. _X_ Appropriate **SITE GEOLOGIC MAP(S)** are attached:

The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1" : 400'

Applicant's Site Plan Scale 1" = 50'
Site Geologic Map Scale 1" = 50'
Site Soils Map Scale (if more than 1 soil type) 1" = 50'

6. Method of collecting positional data:
   - X Global Positioning System (GPS) technology.
   - X Other method(s).

7. X The project site is shown and labeled on the Site Geologic Map.

8. X Surface geologic units are shown and labeled on the Site Geologic Map.

9. X Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.
   - __ Geologic or manmade features were not discovered on the project site during the field investigation.

10. N/A The Recharge Zone boundary is shown and labeled, if appropriate.

11. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.):
   - __ There are ___(#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
     - __ The wells are not in use and have been properly abandoned.
     - __ The wells are not in use and will be properly abandoned.
     - __ The wells are in use and comply with 16 TAC Chapter 76.
   - X There are no wells or test holes of any kind known to exist on the project site.

ADMINISTRATIVE INFORMATION

12. X Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

Date(s) Geologic Assessment was performed: 4/15/08
Date(s)

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Boyd Dreyer
Print Name of Geologist

512-295-2307
Telephone

Fax

STATE OF TEXAS
BOYD V DREYER
Geology
67
LICENSED
PROFESSIONAL GEOSCIENTIST

Signature of Geologist

9/18/2012
Date

Representing GeoConsul
(Name of Company)

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.

GEOLOGIC ASSESSMENT TABLE

PROJECT NAME: Oakwood Estates - Unit Nineteen

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)	ROD	DENSITY (NO/FT)	APERTURE (FEET)	INFILL	RELATIVE INFILTRATION RATE	TOTAL	SENSITIVITY		CATCHMENT AREA (ACRES)		TOPOGRAPHY
						X	Y	Z		10						<40	>40	<1.6	>1.6	
S-1	29.722917	-98.133133	SC	20	Kep	4	1	1.5	N43°E	10			O	10	40		40	<1.6		Hillside
S-2			MB	30	Kep										30	30		<1.6		Hillside
S-3			MB	30	Kep										30	30		<1.6		Hillside
S-4			MB	30	Kep										30	30			>1.6	Floodplain
S-5			MB	30	Kep										30	30			>1.6	Floodplain

* DATUM: _____

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 Commission on Environmental Quality's Instructions to Geologists. The information presented 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 Chapter 213.

STATE OF TEXAS
BOYD V. DREYER
Geology
67
LICENSED
PROFESSIONAL GEOSCIENTIST

Date 9/18/2012

Sheet 1 of 1

TCEQ-0585-Table (Rev. 10-01-04)

Attachment A

Soils Narrative
Oakwood Estates - Unit Nineteen
New Braunfels, Texas

The soil series mapped at the site are assigned to the Rumple-Comfort association (RUD) and the Comfort Series. The Rumple Series consists of moderately deep, well drained, undulating clayey and cherty soils on uplands. The soils formed over indurated fractured limestone. Slopes are 1 to 8 percent. A typical soil profile is a follows:

A1 - 0 to 10 inches; dark reddish brown (5YR 3/3) very cherty clay loam, dark reddish brown (5YR 3/2) moist; moderate fine subangular blocky structure; hard, friable; common fine roots; about 35 percent by volume, angular chert fragments mostly 0.5 to 1 inch across; noncalcareous; mildly alkaline; clear smooth boundary.

B21t - 10 to 14 inches; dark reddish brown (2.5YR 3/4) very cherty clay, dark reddish brown (2.5YR 2/4) moist; moderate very fine subangular blocky structure; hard, friable; common fine roots; patchy clay films on peds; about 35 percent by volume, angular chert fragments mostly 0.5 inch to 2 inches across; noncalcareous; mildly alkaline; abrupt irregular boundary.

B22t - 14 to 28 inches; dark reddish brown (2.5YR 3/4) extremely stony clay, dark reddish brown (2.5YR 2/4) moist; few fine roots; about 25 percent by volume, clayey soil material in vertical and horizontal fractures and solution cavities; 75percent limestone cobbles and stones and chert pebbles and cobbles; noncalcareous; mildly alkaline; abrupt wavy boundary.

R - 28 to 36 inches; coarsely fractured indurated limestone with dark reddish brown clay in crevices.

The soils found within 0 to10 inch horizon are classified as a GC, CL, or a SC clay with Liquid Limits ranging from 30 to 40 and Plasticity Indices ranging from 13 to 22. The soils found within 10 to 28 inch horizon are classified as a GC, or a SC clay with Liquid Limits ranging from 41 to 86 and Plasticity Indices ranging from 20 to 60. The Rumple soils have a permeability value which ranges from 0.2 to 0.6 inches per hour.

The Comfort Series consists of shallow, well drained, undulating clayey soils on uplands. The soils formed in clay that weathered from dolomitic limestone. Slopes range from 1 to 8 percent. The typical profile is as follows:

Attachment B

A1 - 0 to 6 inches; dark brown (7.5YR 3/2) extremely stony clay, dark brown (7.5YR 3/2) moist; moderate medium blocky structure parting to moderate fine blocky; very hard, very firm; about 45 percent, by volume, cobbles and stones as much as 4 feet across on the surface and in the soil; noncalcareous, mildly alkaline; clear smooth boundary.

B2t - 6 to 13 inches; dark reddish brown (5YR 3/2) extremely stony clay, dark reddish brown (5YR 3/2) moist; moderate fine blocky structure parting to moderate fine blocky; very hard, very firm; about 70 percent, by volume, cobbies and stones as much as 4 feet across on the surface and in the soil; noncalcaeous, mildly alkaline; clear smooth boundary. clay, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; hard, friable; calcareous; moderately alkaline; abrupt irregular boundary.

R - 13 to 20 inches; indurated dolomitic limestone; soil material in the narrow fractures.

The soils found within 0 to 6 inch horizon are classified as a CH, GC, CL, or a SC clay with Liquid Limits ranging from 41 to 65 and Plasticity Indices ranging from 25 to 45. The soils found within 6 to 13 inch horizon are classified as a CH, GC, or a SC clay with Liquid Limits ranging from 60 to 90 and Plasticity Indices ranging from 45 to 65. The Comfort soils have a permeability value which ranges from 0.06 to 0.2 inches per hour.

References

United States Department of Agriculture, 1984, Soil survey of Comal and Hays Counties Texas, Soil Conservation Service., 136 p.

Geologic Narrative
OakwoodEstates - Unit Nineteen
New Braunfels, Texas

The site is underlain by the Person Formation. The cyclic and marine members (undivided) of the Person Formation are present on the site.

The Edwards Group is about 440 feet thick in Comal County and consists of limestone with chert in the form of nodules, lenses and discontinuous beds. The cyclic and marine members, undivided consist of variably burrowed mudstone, grainstone, and crystalline limestone with chert lenses common. The cyclic member was reportedly eroded prior to the deposition of the Georgetown Formation. The remaining marine member consists of medium to thick beds of mudstone and fossiliferous packstone. The cyclic and marine members (hydrogeologic subdivision II) has moldic and vuggy porosity and permeability associated with fossiliferous zones, and fracture porosity and permeability associated with faulting.

The leached and collapsed members (undivided), which underlie the cyclic and marine members) has vuggy and burrow porosity and permeability assisted with burrowed zones; breccia and cavern porosity and permeability associated with collapsed zones resulting from dissolution of evaporites; and fracture porosity and permeability associated with faulting. The regional dense member, below the leached and collapsed members, has little porosity or permeability except for some fracture porosity and permeability associated with faulting.

Major faults in the area trend North approximately 54 degrees East. No faults mapped or unmapped were found on the site.

References

Small, Ted A. and Hanson John A., 1994, Geologic framework and hydrogeologic characteristics of the Edwards aquifer outcrop, Comal County, Texas, U.S. Geological Survey Water-Resources Investigations Report 94-4117, 10 p.

Geologist Comments
Oakwood Estates - Unit Nineteen
New Braunfels, Texas

The site is underlain by the Person Formation (Kep). The cyclic and marine members (undivided) of the Person Formation are present on the site. Major faults in the area trend North approximately 54 degrees East. No faults mapped or unmapped were found on the site.

The following features were observed on the site. A description of the features are as follows:

S-1 Solution Cavity (SC) 4.0 ' diameter, 1.0' maximum width, 1.5' maximum depth with orientation N 43° E. Probed to 2.0 feet. Feature filled with soil and organic material. Animal burrow under rock. Feature located on hillside 48 feet North 30° East from southern most corner of Lot 12 and eastern most corner of Lot 13. Lat. 29.722917 Long. -98.133133

S-2 Man made feature, existing sewer line on southern edge of site.

S-3 Man made feature, existing sewer line on western edge of site.

S-4 Man made feature, existing sewer line on northern edge of site.

S-5 Man made feature, existing sewer line on northern edge of site.

Site Specific Geologic Column
Oakwood Estates - Unit Nineteen
New Braunfels, Texas

Formation	Member	Lithology	Thickness (feet)
Person	Cyclic and marine (undivided)	Mudstone to packstone; miliolid grainstone; chert	80 -100
Person	Leached & collapsed (undivided)	Crystalline limestone, mudstone to grainstone; chert; collapsed breccia	80 - 100
Person	Regional dense	Dense, argillaceous mudstone	20 - 24
Kainer	Grainstone	Grainstone; mudstone to wackestone; chert	50 - 60
Kainer	Kirschberg evaporite	Highly altered crystalline limestone; chalky mudstone; chert	50 - 60
Kainer	Dolomitic	Mudstone to grainstone; crystalline limestone; chert	110 - 130
Kainer	Basal Nodular	Shaly, nodular limestone; mudstone and grainstone	50 - 60
Glen Rose	Upper	Thinly bedded limestone and marl	350 - 500

Attachment C

Geologic Narrative
OakwoodEstates - Unit Nineteen
New Braunfels, Texas

The site is underlain by the Person Formation. The cyclic and marine members (undivided) of the Person Formation are present on the site.

The Edwards Group is about 440 feet thick in Comal County and consists of limestone with chert in the form of nodules, lenses and discontinuous beds. The cyclic and marine members, undivided consist of variably burrowed mudstone, grainstone, and crystalline limestone with chert lenses common. The cyclic member was reportedly eroded prior to the deposition of the Georgetown Formation. The remaining marine member consists of medium to thick beds of mudstone and fossiliferous packstone. The cyclic and marine members (hydrogeologic subdivision II) has moldic and vuggy porosity and permeability associated with fossiliferous zones, and fracture porosity and permeability associated with faulting.

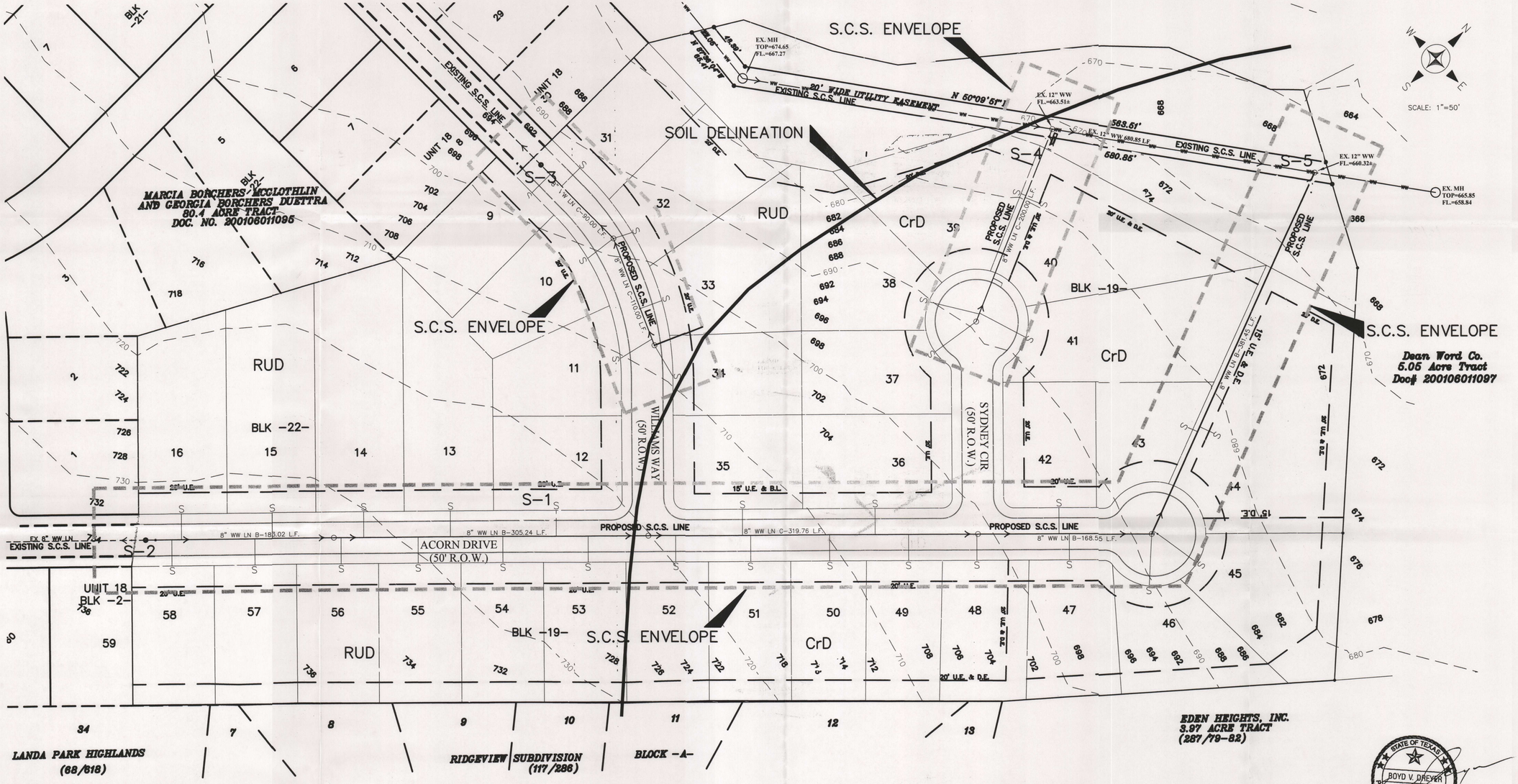
The leached and collapsed members (undivided), which underlie the cyclic and marine members) has vuggy and burrow porosity and permeability assisted with burrowed zones; breccia and cavern porosity and permeability associated with collapsed zones resulting from dissolution of evaporites; and fracture porosity and permeability associated with faulting. The regional dense member, below the leached and collapsed members, has little porosity or permeability except for some fracture porosity and permeability associated with faulting.

Major faults in the area trend North approximately 54 degrees East. No faults mapped or unmapped were found on the site.

References

Small, Ted A. and Hanson John A., 1994, Geologic framework and hydrogeologic characteristics of the Edwards aquifer outcrop, Comal County, Texas, U.S. Geological Survey Water-Resources Investigations Report 94-4117, 10 p.

Attachment D



SOIL LEGEND

RUD	Rumple–Comfort Association
CrD	Comfort Association
S–1	SPECIFIC FEATURE DESIGNATION (SEE ATTACHMENT "B" FOR FEATURE SPECIFIC INFORMATION

STATE OF TEXAS — BOYD V. DREYER — Geology — 67 — LICENSED PROFESSIONAL GEOSCIENTIST
10/3/2012

GeoConsul
Geologic and Environmental Consultants

Project:	Oakwood Estates – Unit Nineteen New Braunfels, Texas
Title:	Soil Map
Plate: II	Project No.: 08014
Drawn By: Boyd Dreyer	Approved by: BD Date: 10/3/12

*Base Map Provided by HMT Engineering & Surveying

HMT
ENGINEERING & SURVEYING
410 N. SEGUIN AVE.
NEW BRAUNFELS, TEXAS, 78130
TBPE FIRM F-10961
www.HMTNB.com
PH: (830)625-8555
FAX: (830)625-8556

SITE SOIL MAP

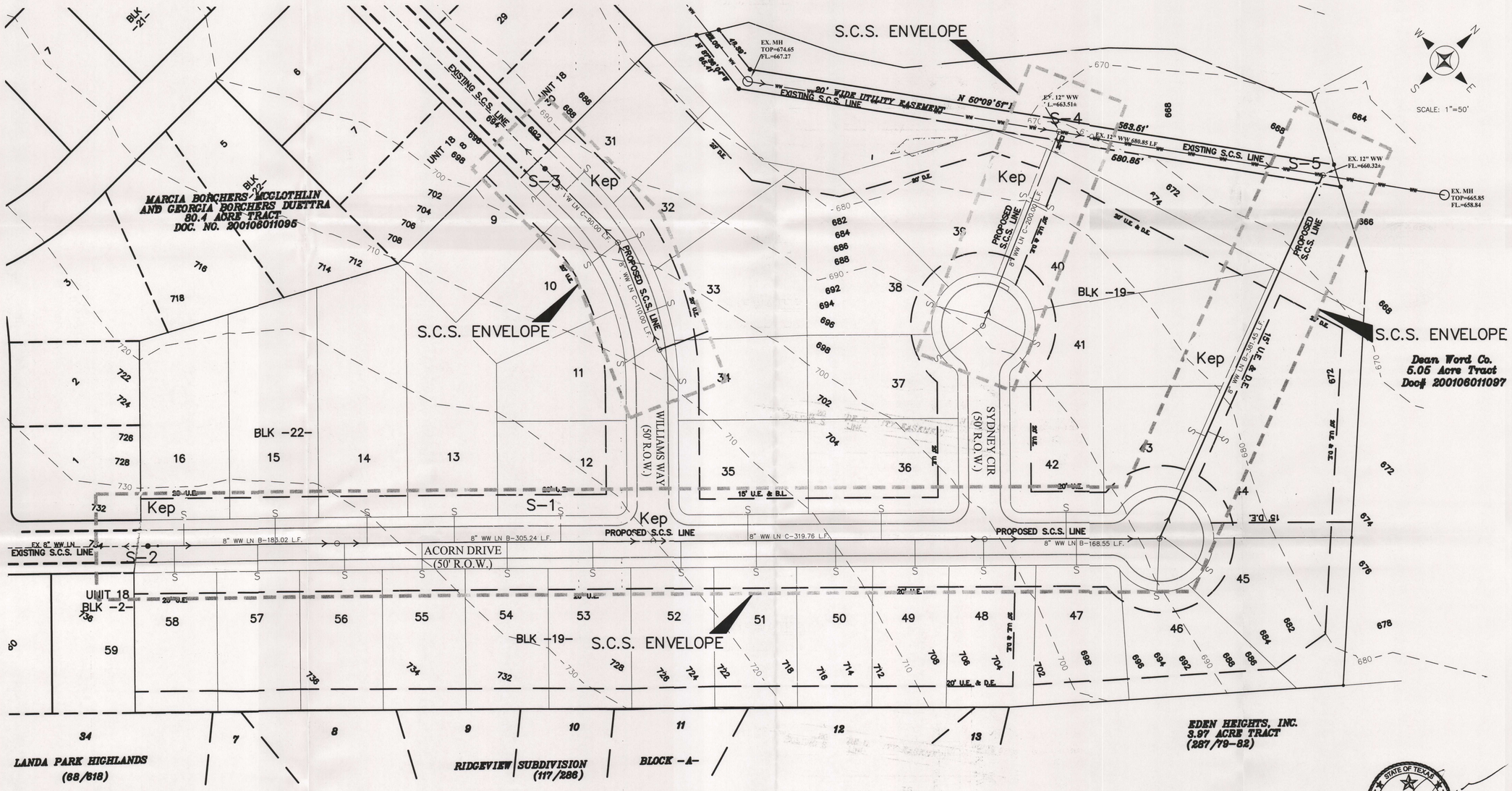
CIVIL SITE CONSTRUCTION PLANS

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE: OCTOBER 2012
DRAWN BY: TAR
DESIGNED BY: TAR
CHECKED BY: AM
REVIEWED BY: SH
PROJECT NUMBER: 042.001

SHEET
1 OF 1



WASTEWATER LINES
AS DESIGNED BY ENGINEER

STATE OF TEXAS
BOYD V. DREYER
Geology
67
LICENSED
PROFESSIONAL GEOSCIENTIST
10/5/2012

GEOLOGIC LEGEND

Kep	PERSON FORMATION
S-1	SPECIFIC FEATURE DESIGNATION (SEE ATTACHMENT "B" FOR FEATURE SPECIFIC INFORMATION

GeoConsul Geologic and Environmental Consultants		
Project:	Oakwood Estates – Unit Nineteen New Braunfels, Texas	
Title:	Geologic Map	
Plate: I		Project No.: 08014
Drawn By: Boyd Dreyer		Approved by: BD Date: 10/3/12

*Base Map Provided by HMT Engineering & Surveying

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www.HMTNB.com
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FAX:(830)625-8556

SITE GEOLOGIC MAP

CIVIL SITE CONSTRUCTION PLANS

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE: OCTOBER 2012
DRAWN BY: TAR
DESIGNED BY: TAR
CHECKED BY: AM
REVIEWED BY: SH
PROJECT NUMBER: 042.001

SHEET
1 OF 1

Organized Sewage Collection System (SCS) Application
for Regulated Activities
on the Edwards Aquifer Recharge Zone
and Relating to 30 TAC §213.5(c), Effective June 1, 1999

REGULATED ENTITY NAME: OAKWOOD ESTATES UNIT NINETEEN

X **ATTACHMENT A – SCS Engineering Design Report.** This Engineering Design Report is provided to fulfill the requirements of 30 TAC Chapter 217, including 217.10 of Subchapter A, §§217.51 – 217.70 of Subchapter C, and Subchapter D as applicable, and is required to be submitted with this SCS Application Form.

CUSTOMER INFORMATION (if different than customer information provided on core data form)

1. The entity and contact person responsible for providing the required engineering **certification** of testing for this sewage collection system upon completion (including private service connections) and every five years thereafter to the appropriate TCEQ region office pursuant to 30 TAC §213.5(c) is:

Contact Person: Stephen Hanz, P.E.
Entity: HMT Engineering & Surveying
Mailing Address: 410 N. Seguin Ave.
City, State: New Braunfels, TX Zip: 78130
Telephone: 830-625-8555 Fax: 830-625-8556

The appropriate regional office must be informed of any changes in this information within 30 days of the change.

2. The engineer responsible for the **design** of this sewage collection system is:

Contact Person: Stephen Hanz, P.E.
Texas Licensed Professional Engineer's Number: 95422
Entity: HMT Engineering & Surveying
Mailing Address: 410 N. Seguin Ave.
City, State: New Braunfels, TX Zip: 78130
Telephone: 830-625-8555 Fax: 830-625-8556

PROJECT DESCRIPTION

3. Anticipated type of development to be served (estimated future population to be served, plus adequate allowance for institutional and commercial flows):

X Residential: # of single-family lots: 36 Lots
__ Multi-family residential units: _____
__ Commercial
__ Industrial
__ Off-site system (not associated with any development)
__ Other: _____

4. The character and volume of wastewater is shown below:

100 % Domestic	66150 gallons/day
_____ % Industrial	_____ gallons/day
_____ % Commingled	_____ gallons/day
100 Total	66150 gallons/day

5. Existing and anticipated infiltration/inflow is 0 gallons/day. This will be addressed by Use of watertight size-on-size connections at the manholes will be used. I do not anticipate any infiltration to occur along the SCS lines.

6. A Water Pollution Abatement Plan (WPAP) is required for construction of any associated commercial, industrial or residential project located on the Recharge Zone.

X The WPAP application for this development was approved by letter dated 09/03/1999. A copy of the approval letter is attached at the end of this application.
__ The WPAP application for this development was submitted to the TCEQ on _____, but has not been approved.
__ A WPAP application is required for an associated project, but it has not been submitted.
__ There is no associated project requiring a WPAP application.

7. Pipe description:

Pipe Diameter (Inches)	Linear Feet[1]	Pipe Material[2]	Specifications[3]
8"	40	SDR 26	ASTM-D-2241
8"	1,708.02	SDR 26	ASTM-D-3034
Total Linear Feet	1,748.02	SDR 26	

1) Include stub-outs. Do not include private service laterals.
2) If PVC, state SDR value.
3) ASTM / ANSI / AWWA specification and class numbers should be included.

8. The following Wastewater Treatment Plant (WWTP) Gruene Waste Water Treatment Plant (name) will receive project wastewater for treatment and disposal. This WWTP is an **EXISTING**/PROPOSED (circle one) facility.

9. All components of this sewage collection system will comply with:

X The City of New Braunfels (New Braunfels Utilities) standard specifications.
__ Other. Specifications are provided directly behind this page.

10. X No force main(s) and/or lift station(s) are associated with this sewage collection system.
__ A force main(s) and/or lift station(s) is associated with this sewage collection system and the Lift Station/Force Main System application is included with this application.

ALIGNMENT

11. X There are no deviations from uniform grade in this sewage collection system without manholes and with open cut construction.

12. X Joint Deflection - The maximum allowable joint deflection is the lesser of the following three alternatives:
X equal to 5°; or
__ 80% of the manufacturer's recommended maximum deflection; or
__ 80% of the appropriate ASTM, AWWA, ANSI or nationally-established standard for joint deflection.

13. X There are no deviations from straight alignment in this sewage collection system without manholes.
__ **ATTACHMENT B - Justification and Calculations for Deviation in Straight Alignment Without Manholes.** Justification for deviations from straight alignment in

this sewage collection system without manholes is provided in **ATTACHMENT B** at the end of this form.

__ For curved sewer lines, all curved sewer line notes (TCEQ-0596) are included on the construction plans for the wastewater collection system.

MANHOLES AND CLEANOUTS

14. Manholes or clean-outs exist at the end of each sewer line(s). These locations are listed below:

Line	Shown on Sheet	Station	Manhole or Clean-out?
"A"	11 Of 20	2 + 00	Manhole "A2"
"C"	11 Of 20	2 + 00	Manhole "C2"
	Of		
	Of		
	Of		
	Of		
	Of		
	Of		
	Of		
	Of		
	Of		
	Of		

15. _X_ Manholes are installed at all Points of Curvature and Points of Termination of a sewer line.

16. _X_ The maximum spacing between manholes on this project for each pipe diameter is no greater than:

Pipe Diameter (inches)	Max. Manhole Spacing (feet)
6 - 15	500
16 - 30	800
36 - 48	1000
≥54	2000

__ **ATTACHMENT C – Justification for Variance from Maximum Manhole Spacing.** The maximum spacing between manholes on this project (for each pipe diameter used) is greater than listed in the table above. Justification for any variance from the maximum spacing provided as **ATTACHMENT C** at the end of the form must include a letter from the entity which will operate and maintain the system stating that it has the capability to maintain lines with manhole spacing greater than the allowed spacing.

17. __ All manholes will be monolithic, cast-in-place concrete.

_X_ The owner/developer of this project is requesting the use of pre-cast manholes. The manufacturer's specifications and construction drawing, showing the method of sealing

the joints, are attached.

SITE PLAN

Items 18 through 23 must be included on the Site Plan.

18. The Site Plan must have a minimum scale of 1" = 400'.
Site Plan Scale: 1" = __50'.

19. The Site Plan must include the sewage collection system general layout, including manholes with station numbers, and sewer pipe stubouts (if any). Site plan must be overlain by topographic contour lines, using a contour interval of not greater than ten feet and showing the area within both the five-year floodplain and the 100-year floodplain of any drainage way.

20. Lateral stub-outs:

__ The location of all lateral stub-outs are shown and labeled.
_X_ No lateral stub-outs will be installed during the construction of this sewer collection system.

21. Location of existing and proposed water lines:

_X_ The entire water distribution system for this project is shown and labeled.
__ If not shown on the Site Plan, a Utility Plan is provided showing the entire water and sewer systems.
__ There will be no water lines associated with this project.

22. 100-year floodplain:

__ After construction is complete, no part of this project will be in or cross a 100-year floodplain, either naturally occurring or manmade. (Do not include streets or concrete-lined channels constructed above of sewer lines.)
_X_ After construction is complete, all sections located within the 100-year floodplain will have water-tight manholes. These locations are listed in the table below and are shown and labeled on the Site Plan. (Do not include streets or concrete-lined channels constructed above sewer lines.)

Line	Sheet	Station		Station
"A"	11 of 20	0 + 00	to	0 + 17
"B"	11 of 20	0 + 00	to	0 + 92
	of		to	
	of		to	

23. 5-year floodplain:

__ After construction is complete, no part of this project will be in or cross a 5-year floodplain, either naturally occurring or man-made. (Do not include streets or concrete-lined channels constructed above sewer lines.)
_X_ After construction is complete, all sections located within the 5-year floodplain will be encased in concrete or capped with concrete. These locations are listed in the table below and are shown and labeled on the Site Plan. (Do not include streets or concrete-lined channels constructed above sewer lines.)

Line	Sheet	Station		Station
"A"	11 of 20	0 + 00	to	0 + 02
"B"	11 of 20	0 + 00	to	0 + 30
	of		to	
	of		to	

Items 24 through 31 must be included on the Plan and Profile sheets.

24. X All existing or proposed water line crossings and any parallel water lines within 9 feet of sewer lines are listed in the table below. These lines must have the type of pressure rated pipe to be installed shown on the plan and profile sheets. Any request for a variance from the required pressure rated piping at crossings must include a variance approval from 30 TAC Chapter 290.

__ There will be no water line crossings.

__ There will be no water lines within 9 feet of proposed sewer lines.

Line	Station or Closest Point	Crossing or Parallel	Horizontal Separation Distance	Vertical Separation Distance
"B"	3 + 70.45	Crossing		2.0'
"B"	5 + 39.76	Crossing		2.0'
"B"	8 + 79.76	Crossing		2.0'

25. Vented Manholes:

__ **No part** of this sewer line is within the 100-year floodplain and vented manholes are not required by 30 TAC Chapter 217.

__ **A portion** of this sewer line is within the 100-year floodplain and vented manholes will be provided at less than 1500 foot intervals. These water-tight manholes are listed in the table below and labeled on the appropriate profile sheets.

__ **A portion** of this sewer line is within the 100-year floodplain and an alternative means of venting shall be provided at less than 1500 feet intervals. A description of the alternative means is described on the following page.

X **A portion** of this sewer line is within the 100-year floodplain; however, there is no interval longer than 1500 feet located in the 100-year floodplain. No vented manholes will be used.

Line	Manhole	Station	Sheet
			of
			of
			of
			of
			of
			of

26. Drop manholes:

_X_ There are no drop manholes associated with this project.
__ Sewer lines which enter new or existing manholes or "manhole structures" higher than 24 inches above the manhole invert are listed in the table below and labeled on the appropriate profile sheets. These lines meet the requirements of 30 TAC §217.55(l)(2)(H).

Line	Manhole	Station	Sheet
			of
			of
			of
			of
			of
			of

27. Sewer line stub-outs (For proposed extensions):

__ The placement and markings of all sewer line stub-outs are shown and labeled.
_X_ No sewer line stub-outs are to be installed during the construction of this sewage collection system.

28. Lateral stub-outs (For proposed private service connections):

_X_ The placement and markings of all lateral stub-outs are shown and labeled.
__ No lateral stub-outs are to be installed during the construction of this sewage collection system.

29. Minimum flow velocity (From APPENDIX A)

_X_ Assuming pipes are flowing full, all slopes are designed to produce flows equal to or greater than 2.0 feet per second for this system/line.

30. Maximum flow velocity/slopes (From APPENDIX A)

_X_ Assuming pipes are flowing full, all slopes are designed to produce maximum flows of less than or equal to 10 feet per second for this system/line.

__ **ATTACHMENT D – Calculations for Slopes for Flows Greater Than 10.0 Feet Per Second.** Assuming pipes are flowing full, some slopes produce flows which are greater than 10 feet per second. These locations are listed in the table below. Calculations are provided in **ATTACHMENT D** at the end of this form.

Line	Profile Sheet	Station		Station	FPS	% Slope	Erosion/Shock Protection
	of		to				
	of		to				
	of		to				
	of		to				

31. Assuming pipes are flowing full, where flows are ≥ 10 feet per second, the provisions noted below have been made to protect against pipe displacement by erosion and/or shock under 30 TAC §217.53(l)(2)(B).

_N/A_ Concrete encasement shown on appropriate Plan and Profile sheets for the locations listed in the table above.

_N/A_ Steel-reinforced, anchored concrete baffles/retards placed every 50 feet shown on appropriate Plan and Profile sheets for the locations listed in the table above.

ADMINISTRATIVE INFORMATION

32. _X_ The **final plans and technical specifications** are submitted for TCEQ review. Each sheet of the construction plans and specifications are dated, signed, and sealed by the Texas Licensed Professional Engineer responsible for the design on each sheet.

33. Standard details are shown on the detail sheets, which are dated, signed, and sealed by the Texas Licensed Professional Engineer, as listed in the table below:

Standard Details	Shown on Sheet
Lateral stub-out marking [**REQUIRED**]	16 of 20
Manhole, showing inverts comply with 30 TAC §217.55(l)(2) [**REQUIRED**]	16 of 20
Alternate method of joining lateral to existing SCS line for potential future connections [**REQUIRED**]	17 of 20
Typical trench cross-sections [**REQUIRED**]	17 of 20
Bolted manholes [**REQUIRED**]	16 of 20
Sewer Service lateral standard details [**REQUIRED**]	16 of 20
Clean-out at end of line [**REQUIRED, if used**]	N/A

Baffles or concrete encasement for shock/erosion protection [**REQUIRED, if flow velocity of any section of pipe >10 fps**]	N/A
Detail showing Wastewater Line/Water Line Crossing [**REQUIRED, if crossings are proposed**]	17 of 20
Mandrel detail or specifications showing compliance with 30 TAC §217.57(b) and (c) [**REQUIRED, if Flexible Pipe is used**]	17 of 20
Drop manholes [**REQUIRED, if a pipe entering a manhole is more than 24 inches above manhole invert**]	16 of 20

34. _X_ All organized sewage collection system general construction notes (TCEQ-0596) are included on the construction plans for this sewage collection system.

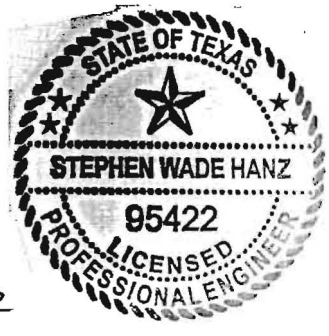
35. _X_ All proposed sewer lines will be sufficiently surveyed/staked to allow an assessment prior to TCEQ executive director approval. If the alignments of the proposed sewer lines are not walkable on that date, the application will be deemed incomplete and returned.

36. _X_ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

37. _X_ Any modification of this SCS application will require TCEQ approval, prior to construction, and may require submission of a revised application, with appropriate fees.

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **ORGANIZED SEWAGE COLLECTION SYSTEM APPLICATION** is hereby submitted for TCEQ review and executive director approval. The system was designed in accordance with the requirements of 30 TAC §213.5(c) and 30 TAC §217 and prepared by:

Place engineer's seal here:



Stephen Hanz, P.E.
Print Name of Licensed Professional Engineer

Stephen W. Hanz DE
Signature of Licensed Professional Engineer

10/02/2012
Date

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.

APPENDIX A
Flow Velocity Table

Flow Velocity (Flowing Full)

All gravity sewer lines on the Edwards Aquifer Recharge Zone shall be designed and constructed with hydraulic slopes sufficient to give a velocity when **flowing full** of not less than 2.0 feet per second, and not greater than 10 feet per second. The grades shown in the following table are based on Manning's formula and an n factor of 0.013 and shall be the minimum and maximum acceptable slopes unless provisions are made otherwise.

Pipe Diameter (Inches)	% Slope required for minimum flow velocity of 2.0 fps	% Slope which produces flow velocity of 10.0 fps
6	0.50	12.35
8	0.33	8.40
10	0.25	6.23
12	0.20	4.88
15	0.15	3.62
18	0.11	2.83
21	0.09	2.30
24	0.08	1.93
27	0.06	1.65
30	0.055	1.43
33	0.05	1.26
36	0.045	1.12
39	0.04	1.01
>39	*	*

*For lines larger than 39 inches in diameter, the slope may be determined by Manning's formula (as shown below) to maintain a minimum velocity greater than 2.0 feet per second when flowing full and a maximum velocity less than 10 feet per second when flowing full.

$$v = \frac{1.49}{n} \times R_h^{0.67} \times \sqrt{S}$$

Where:

v = *velocity (ft/sec)*

n = *Manning's roughness coefficient (0.013)*

R_h = *hydraulic radius (ft)*

S = *slope (ft/ft)*

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

Texas Commission on Environmental Quality
SEWAGE COLLECTION SYSTEM SUBMITTAL APPLICATION FOR PLANS AND SPECIFICATIONS REVIEW

This application is intended as an aid in fulfilling the review requirements of 30 TAC Chapter 317, titled *Design Criteria for Sewerage Systems*, sections 317.1 and 317.2. This application may be submitted in lieu of a separate engineering report. This form will only be accepted for review if all the pages of this application, including any attachments, are permanently bound together, and the application is signed, sealed and dated on the final page by a professional engineer registered in the State of Texas, or if each page of attachments and each page of this application have the signed and dated seal of a Professional Engineer registered in the State of Texas. **Use of the application form is not mandatory except for Edwards Aquifer applications.** The intent of this application is to expedite Texas Commission on Environmental Quality (TCEQ) plan review by providing a format which ensures that the information required to complete a TCEQ review of the project is included in the submittal materials, and to assist the reviewer in locating this information. Please note that the determination of whether or not the information submitted by the applicant is sufficient to obtain TCEQ approval will be made by the TCEQ reviewer and that additional information regarding the project design may be required before the TCEQ will approve construction of the project. Except as exempted in question A23 of this application, in addition to this application, each submittal must include one set of the project specifications, permanently bound, with the signed and dated seal of a Professional Engineer registered in the State of Texas on the cover of the specifications and one set of plans, with each plan sheet containing the signed and dated seal of a Professional Engineer registered in the State of Texas. The submittal of the plans, specifications and application need to be made to the following address:

TCEQ
Wastewater Permits Section
MC 148
P.O. Box 13087
Austin, Texas 78711-3087

For answers to questions relating to wastewater plan review contact:

Louis C. Herrin, III, P.E.
Phone No. (512) 239-4552

ADMINISTRATIVE REVIEW

TCEQ review is intended to provide both a technical review and a historical record of wastewater construction projects. The following information is required for administrative review purposes.

A1) **Does the project include any potable water distribution or water treatment related construction?** Yes **If yes, a separate review by the TCEQ Water Utilities Division may be required.** Please contact Joe Strouse, PE, at (512) 239-6960 for this determination.

A2) Name and mailing address of entity submitting project for review: HMT Engineering & Surveying 410 N. Seguin Ave. New Braunfels TX 78133

A3) Name of design engineer: Stephen Hanz, PE Phone No. : (830) 625-8555

A4) County in which the project is located: Comal

A5) Name of project (include subdivision name, contract numbers, or any other identifying information which is relevant to this project):

Oakwood Estates Unit-19

A6) Entity which will own and maintain the sanitary sewer collection system described in this application: New Braunfels Utilities

A7) Identify the wastewater treatment plant (WWTP) which will receive and treat flows from the project.

TCEQ Permit No. : WQ0010232-002 Permittee: New Braunfels Utilities

Facility or plant name if different from permittee: Gruene Waste Water Treatment Plant

A8) If this WWTP is not under enforcement skip to A10. If this WWTP is currently under a TCEQ enforcement order, please provide the name and phone number of the TCEQ enforcement coordinator and the TCEQ Region Office wastewater inspector assigned to the enforcement case.

Name:_____ Phone No. :_____
Name:_____ Phone No. :_____

A9) Describe the nature of the enforcement case. If the WWTP which will receive flow from this project is under enforcement due to flow exceedance, the description should include the permitted average daily flow, information regarding average daily flows currently measured at the WWTP during both dry and wet weather conditions, and any other information which would help describe the flow exceedance problems:

Use the back of this page and attachments if needed for long narrative answers or engineering calculations.

A10) If any portion of the project is within the Edwards Aquifer Recharge Zone, **attach this form to your Edwards Aquifer protection plan**. The project must be reviewed by the appropriate TCEQ Region Office as required by 30 TAC Chapter 213. For information on the submittal requirements for projects located over the Edwards Aquifer Recharge Zone contact the appropriate Region Office for details. Are all portions of this project outside the Edwards Aquifer Recharge Zone? No

A11) If the project is publicly funded, identify the source of funding. Please include the name and phone number of a contact person at the funding entity.

Source of Funding: Private

Name: _____ Phone No. : _____

A12) Identify entities other than TCEQ which will review the project. Please include the name and phone number of a contact person for each entity other than the TCEQ which will review this project.

Entity: City of New Braunfels Name: Octavio Garza Phone No. : (830) 221-4022
Entity: [illegible] Name: _____ Phone No. : _____
Entity: New Braunfels Utilities Name: [illegible] Herb Shadrack Phone No. : (830) 608-8969
Entity: _____ Name: _____ Phone No. : _____

A13) If this project proposes any sewage collection system (gravity sewer pipe, lift station or force main) installation or construction which would not be considered maintenance and rehabilitation work, skip to page 7 of this application and complete the applicable portions of the technical review section of this application starting with T1 on page 7. If a project consists solely of maintenance and repair of an existing sanitary sewer collection system, a waiver of review may be granted on a case by case basis in accordance with Section 317.1(a)(7) of the Design Criteria. Section 317.1(a)(7) states, "Waiver of submittal or review requirements. When minor upgrade, rehabilitation, or maintenance work is planned for existing systems a waiver of submittal or review may be granted at the discretion of the executive director...If a waiver of submittal or review is desired, written notification to the commission...shall be made and shall include

sufficient information to describe the significance of such modifications. If a waiver of submittal or review is requested, it shall be submitted by a professional engineer registered in Texas, and shall include the signed and dated seal of the engineer submitting the waiver request. The executive director...will determine whether a submittal or review of engineering plans and specifications will be required following this initial notification of the extent of the planned modifications. Replacement of equipment, piping or materials with like equipment, piping, or materials for purposes of maintenance and repair only, will not routinely require a submittal or a technical review by the executive director, and also will not routinely require a request for a waiver of submittal or a request for a waiver of review." If this project only proposes collection system maintenance and rehabilitation work, state whether the project consists of sewage collection piping rehabilitation work, lift station rehabilitation work, or both sewage collection system piping and lift station rehabilitation work:_____

_____

If this project only consists of sewage collection piping maintenance and rehabilitation work, answer items A14 through A18.

If this project only consists of maintenance and rehabilitation work for one or more lift stations, answer items A19 through A22 and continue on with A23.

If this project proposes both sewage collection system piping rehabilitation and maintenance and rehabilitation of one or more sanitary sewer lift station, answer items A14 through A22 and continue on with A23.

A14) Detail the scope of the sewer collection pipe rehabilitation project. Include details regarding linear feet of pipe which will be rehabilitated, types of pipe rehabilitation technologies which are proposed, pipe, pipe joint and pipe bedding materials which are proposed for the maintenance and rehabilitation work and any other information which may be necessary to show that the proposed project will be accomplished utilizing standard acceptable engineering practices:

A15) Are all proposed lines to be constructed in the same trench as existing lines?_____

A16) Are all proposed lines the same diameter as existing lines?_____

A17) Are all slopes the same as or greater than existing lines?_____

A18) Will flows and connections be equal to or less than current flows and connections? _____ If no lift station rehabilitation work is planned, skip to A23.

A19) Detail the scope of the maintenance and rehabilitation work proposed for the lift station(s). Include the number of lift stations which will be rehabilitated, information regarding structural maintenance which is

to be performed on each lift station proposed for rehabilitation, the size of any pumps which are to be replaced in each lift station, the size of any pumps which currently exist in each lift station, the size of any pumps which are not proposed to be replaced and will remain in each lift station, details regarding any force main rehabilitation which is intended for the sewage system and any other information which may be necessary to show that the proposed project will be accomplished utilizing standard acceptable engineering practices:

A20) Will the operating characteristics of the rehabilitated lift station(s) be equivalent to the operating characteristics of the existing lift station(s) regarding pumping capacity versus total dynamic head?_____

A21) Will the force main piping either remain unchanged, or, be replaced at the same alignment and with the same diameter pipe as the existing force main piping? (yes or no)_____

A22) Will the lift station(s) and force main(s) include, at a minimum, an arrangement of valves and appurtenances which ensures that the lift station(s) operation will be equivalent to or superior to that of the lift station(s) and force main(s) being upgraded or replaced?_____

A23) **If you answered no to any of the items in A15, A16, A17, A18, A20, A21, or A22, skip to A24. If you answered yes to all the items in A15, A16, A17, A18, A20, A21, or A22,** which are relevant to the project, **STOP**. This project meets the criteria which must be met to allow the TCEQ to grant a

general waiver of review and to allow an exemption from the requirement to submit plans and specifications to the TCEQ. Submit pages 1 through 6 of this application, and any attachments associated with pages 1 through 6 of this application to the TCEQ for record keeping purposes. The submitted pages shall be properly bound and the final page shall include the signed and dated seal of a Professional Engineer registered in the State of Texas. The pages can be stapled or left loose if each page of the submittal has the signed and dated seal of a Professional Engineer registered in the State of Texas.

A24) **If you answered no to any of the items in A15, A16, A17, A18, A20, A21, or A22,** but believe that the project constitutes routine maintenance of an existing system, please provide engineering justification why TCEQ review should not be required. Please detail in what ways the rehabilitation project differs from the existing system with regard to the items in A15, A16, A17, A18, A20, A21 or A22. Submit all attachments and pages 1 through 6 of this application to the TCEQ for a determination of whether review is required for this project. The pages of the submittal shall be properly bound and the final page shall include the signed and dated seal of a Professional Engineer registered in the State of Texas. The pages can be stapled or left loose if each page of the submittal has the signed and dated seal of a Professional Engineer registered in the State of Texas. Please be aware that review may be required at the discretion of the Executive Director. If it is determined that the proposed maintenance and rehabilitation work will be reviewed by the TCEQ, in addition to pages 1 through 6 of this application, the applicant will need to submit one set of the project specifications, permanently bound, with the signed and dated seal of a Professional Engineer registered in the State of Texas on the cover of the specifications, an engineering report, permanently bound, with the signed and dated seal of a Professional Engineer registered in the State of Texas on the cover of the engineering report (For collection system submittals which contain no lift stations or force mains, this application form may substitute for the engineering report, provided the application is properly completed) and one set of plans, with each plan sheet containing the signed and dated seal of a Professional Engineer registered in the State of Texas.

TECHNICAL REVIEW

T1) Please provide a brief summary of the project scope:

T2) If a conflict exists between the various submitted documents (engineering calculations, project specifications, project plans, addendums, etc.), which document takes precedent? For instance do plans govern over

specifications or do specifications govern over plans? Do special conditions govern over technical specifications or plans? etc. Where in the submitted materials is the prioritization of documents specified? Provide answers to these items below. Please be aware that the TCEQ may require any identified discrepancies between plans and specifications to be corrected or clarified:

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T3) This application form is intended to function as a document, which when completed properly, constitutes full compliance with Sections 317.1 and 317.2 of the TCEQ's rules. All the requirements in these Sections of Chapter 317 have been restated in this application in a format which is intended to clarify what is needed to show compliance with Sections 317.1 and 317.2. ***If during the course of completing this application it is determined that the project does not comply with specific portions of the requirements in Chapter 317, as indicated by "no" answers to the items in the application, the applicant must request a variance from the rules for these items. The specifics of what requirements must be met to obtain a variance can be found on page 35 of this application. Page 35 is also the appropriate places to provide the details needed to justify any variance requests.***

Part I of the technical review portion of this application covers gravity sewer collection piping only. Part II of this application has not yet been developed. Part II, when developed, will cover lift stations and force main piping only. If this project contains gravity collection piping complete the items in Part I, beginning with T4 on page 8 of this application. Until Part II is finalized, if this project contains lift stations and force main piping, which need a TCEQ review, a separate engineering report which shows full compliance with Section 317.3 of the TCEQ's rules titled Design Criteria for Sewerage Systems, must be submitted to the TCEQ for the lift station and force main portions of the project. Conceptually similar Chapter 317 requirements have been grouped together under their relevant citations in Part I of this application. For more detailed information on these requirements, please consult the relevant rules.

PART I - GRAVITY SANITARY SEWER PIPING

Capacity Design

Flow and Capacity Analysis: 30 TAC, Sections 317.2.(a)(1), 317.2.(b)(1), 317.2.(b)(2), 317.2.(b)(3), 317.4.(a)

T4) Basis for average flow used for design of collection system (**check one or more**):

Per Capita Contributions:____ Service Connections:✓ Land Area and Use:____ Fixture Analysis:____

T5) Peaking factor used for design: 4.5 A peaking factor of at least 4 is required for minor lines. A peaking factor greater than 4 must be used if needed to convey peak flows. Has a peaking factor greater than or equal to 4 been used in the design? Yes

T6) Provide flow/capacity analysis. The capacity analysis must derive the average and peak flows to be carried by each line. Additionally, the analysis must verify that the diameters and slopes for each reach of collection line (or for the minimum capacity reach of each line) provide a capacity adequate to carry the anticipated peak flow. The analysis must include consideration of all existing upstream flow contributions, and the impact of

the project on the downstream collection system. The stated design flow must be justified on the basis of future population to be served, and must include any anticipated industrial, commercial, or institutional flow contributions. Please note that capacities must be determined using Manning's equation for pipes flowing full with an "n" value of 0.013:

Number of Lots: 36 single-family lots.

Average Day: $36 \text{ lots} \times 210 \frac{\text{gallons}}{\text{day}} \times 3.5 = 26{,}460 \frac{\text{gal}}{\text{day}} = 0.04 \text{ cfs}$

Peak Day: $36 \text{ lots} \times 210 \text{ gal/day/lot} \times 4.5 = 34{,}020 \text{ gal/day} = 0.05 \text{ cfs}$

Pipe Capacity @ 0.50% min. slope 8" PVC; n = 0.013

$Q_{FULL} = 0.87 \text{ cfs}$

$V_{FULL} = 2.46 \text{ fps}$

General Structural Components

The Design Criteria outlined in Section 317.2 of the TCEQ's rules states, "The collection system design shall provide a minimum structural life cycle of 50 years." Section 317.2 also states, "The collection system design shall provide for the minimization of anaerobic conditions." These two TCEQ requirements can be assumed to have been met for the purposes of Plans and Specifications approval provided that the items in T7 through T104, detailed below, are met:

Materials Used and ASTM Standards Adhered To: 30 TAC 317.2(a)(2), 317.2(a)(3), 317.2(a)(5), 317.2(c)(5)(A)

T7) List all the pipe diameters proposed for this project. Specify the total linear feet of pipe proposed for each listed diameter, the pipe material proposed for each diameter, the national standard specifications (ASTM, AWWA, ANSI, etc...) which govern each proposed pipe material and the appropriate national standard specifications for joints which correspond to each of these proposed materials:

	Linear Feet	Pipe Material	National Standard Specification for Pipe Material	National Standard for Pipe Joints
Pipe Diameter 1	8" - 40'	SDR 26 PVC	ASTM-D-2241	ASTM-D-3139
Pipe Diameter 2	8" - 1,708.02	SDR 26 PVC	ASTM-D-3034	ASTM-D-3212
Pipe Diameter 3				
Pipe Diameter 4				
Pipe Diameter 5				
Pipe Diameter 6				

Location in submittal: Plan sheet 12-14 Specifications page _____ Item No. _____

Note: Section 317.2.(c)(1) requires a minimum pipe diameter of 6 inches for all sanitary sewer collection system piping except service laterals. The TCEQ does not currently review service laterals. The design, installation and testing of service laterals is regulated by municipal and county codes. Compliance with these codes is considered sufficient to satisfy the TCEQ.

T8) Watertight, size on size resilient connectors conforming to ASTM C-923 must be specified for connecting pipe to manholes. Have such connectors been specified? Yes

Location in submittal: Plan sheet 16 Specifications page _____ Item No. _____

T9) For purposes of TCEQ review, rigid pipe materials include, but are not limited to, concrete, vitrified clay or ductile iron pipe. If the design does not include rigid pipe, skip to T11. If the design includes rigid pipe, the specified bedding must comply with ASTM C-12 class A, B, or C for materials and densification. A minimum of 4 inches of bedding is required for all pipe. Will the proposed project comply with these requirements? Yes

T10) Specify the bedding class proposed for each diameter of rigid pipe and each rigid pipe material:

Pipe Diameter:_____ Pipe Material:_____ Bedding Class:_____
Pipe Diameter:_____ Pipe Material:_____ Bedding Class:_____
Pipe Diameter:_____ Pipe Material:_____ Bedding Class:_____
Pipe Diameter:_____ Pipe Material:_____ Bedding Class:_____
Pipe Diameter:_____ Pipe Material:_____ Bedding Class:_____
Pipe Diameter:_____ Pipe Material:_____ Bedding Class:_____

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T11) For purposes of TCEQ review, flexible materials include, but are not limited to, plastics, PVC, ABS,

fiberglass, and, polyethylene. If the design does not include flexible pipe, skip to T13. If the design includes flexible pipe materials, the specified bedding must comply with ASTM D-2321 class IA, IB, II or III for materials and densification. A minimum of 4 inches of bedding is required for all pipe. Will the proposed project comply with these requirements? Yes

T12) Specify the bedding class proposed for each diameter of flexible pipe and each flexible pipe material:

Pipe Diameter: 8"	Pipe Material: PVC	Bedding Class: III
Pipe Diameter:	Pipe Material:	Bedding Class:
Pipe Diameter:	Pipe Material:	Bedding Class:
Pipe Diameter:	Pipe Material:	Bedding Class:
Pipe Diameter:	Pipe Material:	Bedding Class:
Pipe Diameter:	Pipe Material:	Bedding Class:

Location in submittal: Plan sheet 17 Specifications page _____ Item No. _____

Note: For TCEQ review, cement stabilized bedding materials are considered to comply with ASTM D-2321 if the base material and compaction meet the minimum requirements of ASTM D-2321, class IA, IB, II or III.

T13) Brick manhole construction is not allowed. Use of brick for adjusting manhole covers to grade is also prohibited. Do the project plans and/or specifications prohibit the use of brick manholes and the use of brick to adjust manholes to grade? Yes

Location in submittal: Plan sheet 16 Specifications page _____ Item No. _____

T14) Are materials specified for manhole construction limited to monolithic cast in place concrete, fiberglass, precast concrete or HDPE? Yes List all materials specified for manhole construction:

1) Pre-cast 2) _____ 3) _____ 4) _____

Location in submittal: Plan sheet 16 Specifications page _____ Item No. _____

Minimum and Maximum Slopes: 30 TAC 317.2(c)(2), 317.2(c)(3)

T15) All pipe must be designed with a slope that will provide a velocity of at least 2 ft/s flowing full, as calculated using Manning's equation with an "n" value of 0.013. Additionally, the collection system must be designed to ensure that, with pipes flowing full, the velocities will be less than 10 feet per second. For each diameter of pipe, indicate the minimum and maximum collection line slopes which will exist in this project (see 317.2(c)(2) of the TCEQ's rules for a table of maximum and minimum slopes allowed for each diameter of pipe):

Pipe Diameter: 8"	Min. Slope: 1.26%	Max. Slope: 8.40%
Pipe Diameter:	Min. Slope:	Max. Slope:
Pipe Diameter:	Min. Slope:	Max. Slope:
Pipe Diameter:	Min. Slope:	Max. Slope:
Pipe Diameter:	Min. Slope:	Max. Slope:
Pipe Diameter:	Min. Slope:	Max. Slope:

T16) Do these proposed slopes ensure a velocity greater than or equal to 2 feet per second and less than or equal to 10 feet per second? Yes

General Trenching and Backfill: 30 TAC 317.2.(a)(5), 317.2.(a)(9), 317.2.(a)(10), 317.2.(c)(3)

T17) Describe any known soil, geologic, or hydrologic conditions on the site which may pose difficulties for construction or compromise the structural integrity of the collection system. These include but are not limited to high water table; low soil strength; high plasticity index; active faults; zones of active subsidence; and, caves, solution caverns or sinkholes. If no such conditions are known to exist in the proposed project location, skip to T19.) N/A

T18) Describe the measures which will be taken to provide for the structural integrity of the collection line and for construction safety where pipe must be installed in conditions described in T17:

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T19) **If faults, caverns, or subsidence are discovered during construction, construction should be halted to allow the features to be inspected by the design engineer or a geological or geotechnical professional.** For active faults, localized subsidence zones, or caverns, the system must be laid out to minimize the number of crossings through, and construction within, the unfavorable features. Where crossings through faults or subsidence zones are unavoidable, the design must allow for deflection due to differential settlement. Manholes should be provided on each side of such features to allow pumping in case of sewer failures. Service connections within 50 feet of such features should be avoided. These design features should be detailed in the project specifications. Will these requirements be met? Yes
Please provide appropriate details:

Refer to Note on pages 12-14, Sanitary Sewer Sheets

Location in submittal: Plan sheet 12-14 Specifications page _____ Item No. _____

T20) The trench width must be minimized while still allowing adequate width for proper compaction of backfill, and while still ensuring that at least 4 inches of backfill exists on each side of the pipe. Will this be accomplished? Yes

T21) For each diameter of pipe, indicate minimum and maximum trench width:

Pipe Diameter: 8" Min. Trench Width: 32" Max. Trench Width: 36"
Pipe Diameter: _____ Min. Trench Width: _____ Max. Trench Width: _____
Pipe Diameter: _____ Min. Trench Width: _____ Max. Trench Width: _____
Pipe Diameter: _____ Min. Trench Width: _____ Max. Trench Width: _____
Pipe Diameter: _____ Min. Trench Width: _____ Max. Trench Width: _____
Pipe Diameter: _____ Min. Trench Width: _____ Max. Trench Width: _____

T22) Will the trench walls be vertical to at least one foot above the pipe? Yes

Location in submittal: Plan sheet 17 Specifications page _____ Item No. _____

T23) Will the backfill be free of stones greater than 6 inches in diameter and free of organic or any other unstable material? Yes

Location in submittal: Plan sheet 3 Specifications page _____ Item No. _____

Corrosion Prevention:

T24) List any proposed collection system components (pipes, manholes, etc...) that will be susceptible to deterioration through the corrosive effects of an anaerobic sewage environment. If the collection system does not contain any components which are susceptible to deterioration through the corrosive effects of an anaerobic sewage environment, skip to T26:

N/A

T25) If the proposed wastewater collection system contains components susceptible to corrosive attack, provisions to protect these components from corrosive attack, such as coatings, liners, high alkalinity concrete, etc, are needed. If steps have been taken to protect the wastewater collection system from corrosive attack, detail these corrosion prevention measures below. Indicate that these measures are sufficient to protect the gravity sanitary sewer piping from corrosive attack for a design life of 50 years and indicate where in the plans and specifications these measures are required. If the proposed wastewater collection system contains components susceptible to corrosive attack, and if corrosion prevention measures will not be taken for this project, provide an engineering analysis demonstrating that the collection system will adequately resist corrosive attack through the 50 year design life of the project. This analysis must consider the potential for anaerobic conditions both under startup conditions and at ultimate buildout. (Refer to ASCE Manual and Reports on Engineering Practice-No. 69, Sulfide in Wastewater Collection and Treatment Systems). Have these specifics been addressed?_____

Analysis:

Manholes - General: 30 TAC Section 317.2(c)

T26) Are manholes provided at all changes in size, grade or alignment of pipe? Yes

T27) Are manholes or cleanouts provided at the end of all lines? Yes

T28) The maximum manhole spacings allowed by the TCEQ are as follows:

Pipe Diameter (in)	Maximum Manhole Spacing (ft)
6 - 15	500
18 - 30	800
36 - 48	1000
54 or larger	2000

Indicate what the maximum spacing in this project will be for each proposed diameter of pipe.

Pipe Diameter: 8"	Max. Spacing: 381.45'	Pipe Diameter: _____	Max. Spacing: _____
Pipe Diameter: _____	Max. Spacing: _____	Pipe Diameter: _____	Max. Spacing: _____
Pipe Diameter: _____	Max. Spacing: _____	Pipe Diameter: _____	Max. Spacing: _____

T29) Do the maximum spacings for this project comply with the TCEQ's maximum manhole spacing requirements? Yes

Manholes - Ventilation: 30 TAC 317.2.(c)(5)(C)

T30) Provide the 100-year flood plain elevation for the project area(s): 670.22 at line "A"
667.38 at line "B"

T31) On what basis was the 100-year flood plain elevation determined?
HEC-RAS study performed for Oakwood Estates Unit 18

Use the back of this page and attachments if needed for long narrative answers or engineering calculations.

T32) Manhole covers which lie within a 100 year flood plain must be sealed and gasketed or otherwise provided with adequate protection against inflow. Such measures should also be provided to any manholes lying in drainageways or streets subject to carrying drainage flows. Will this requirement be met? Yes

Location in submittal: Plan sheet 16 Specifications page _____ Item No. _____

T33) If this project does not contain any sections of line with more than three manholes in sequence which are bolted and gasketed, or protected against inflow in some other fashion, skip to T34. Where more than three manholes in sequence are to be bolted and gasketed, every third manhole (or a maximum of every 1,500 feet) must be vented to a point above the 100 year flood plain elevation in a way that prevents stormwater inflow. Additionally, the plans should identify the nearest known flood plain elevation and indicate any manhole covers which are required to be sealed. Will these requirements be met?_____ Does this project solely protect against inflow with bolted and gasketed manholes?_____Describe ventilation provisions:

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

Manholes - Minimizing Turbulence: 30 TAC 317.2.(c)(5)(E)

T34) Where unequal sized pipes enter a manhole, the crowns of the pipes should be at equal elevation where feasible and the manhole channel should slope evenly between pipe inverts. If relevant, have these principles been incorporated into the design (If not relevant to this project skip to T35)? N/A

T35) Drop inlets must be provided for pipes entering a manhole at an elevation greater than 30 inches above the manhole invert. This requirement is especially important where force mains or inverted siphons discharge into the gravity collection system. Any required drops should be detailed in the project plan sheets. If relevant, have these requirements been specified (If not relevant skip to T36)? N/A

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T36) Where sewer lines enter the manhole higher than 24 inches above the manhole invert, the invert shall be filleted to prevent solids deposition. A drop pipe should be provided for a sewer entering a manhole more than 30 inches above the invert. Any required fillets should be indicated in the project plans or profile drawings. If relevant, have these features been incorporated into the design (If not relevant skip to T37)? N/A

T37) A U-shaped channel must be provided through the manhole base. For pipes less than 15 inches diameter, channel depth must be at least half the pipe diameter. For pipes greater than 15 inches but

less than 24 inches diameter, channel depth must be at least 3/4 the pipe diameter. For pipes greater than 24 inches diameter, channel depth must be at least equal to the pipe diameter. Has this principle been followed in the design? Yes

T38) The manhole bench (base area outside the flow channel) must be sloped at least 0.5 inches per foot. Has this principle been followed in the design? Yes

Inverted Siphons: 30 TAC 317.2.(c)(6)

T39) Inverted Siphons (sag pipes) can be a major source of corrosive activity due to anaerobic conditions. If the project does not include any sag pipes skip to T40. If the project includes sag pipes, have they been designed in accordance with section 317.2.(c)(6) of the Design Criteria?_____ Provide design assumptions and calculations which justify the design of the sag pipes and show that 317.2(c)(6) of the TCEQ's rules has been complied with:

Trenchless Technology: 30 TAC 317.2(a)(2)(A)

T40) If the project propose any trenchless installation of pipe (e.g. slip-lining; boring and jacking; or, microtunneling), please provide a brief description of the type of installation, design basis, and engineering justification of why the proposed method is appropriate for this project. If the project does not propose trenchless installation of pipe skip to T41:

Vertical Curvature: 30 TAC 317.2(c)(4)

T41) Vertical curvature between manholes is not allowed in gravity collection systems. Has this project been designed without the use of vertically curved gravity collection piping between manholes? Yes

Horizontal Curvature: 30 TAC 317.2(c)(4)

T42) If this project does not contain any portions which include horizontally curved gravity sanitary sewer piping, skip to T57. Chapter 317 of the TCEQ's rules states "Sewers shall be laid in straight alignment with uniform grade between manholes unless slight deviations from straight alignment and uniform grade are justified to the satisfaction of the Executive Director." To clarify what constitutes justification to the satisfaction of the Executive Director, the TCEQ developed a horizontal curvature policy. The specifics

of this horizontal curvature policy are detailed in T43 through T56. If this project includes horizontally curved gravity sanitary sewer piping, complete the relevant portions of T43 through T56, then continue with T57. Has the amount of horizontal curvature which will be used in this design been minimized? Yes

T43) Horizontal curvature must be either by joint deflection or pipe flexure, but not both. Indicate the method utilized: N/A If horizontal curve will be provided by joint deflection skip to T46. If horizontal curvature will be provided by pipe flexure, for each type and size of pipe to be installed using pipe flexure, calculate the minimum radius of curvature which is proposed in this project and calculate a value for 300 * D_o, where D_o is the average outside diameter of the pipe in inches.

T44) For each type of pipe material and for each pipe diameter, report the minimum radius of curvature recommended by the manufacturer, the minimum radius of curvature recommended by a national reference standard (if available), the minimum radius of curvature calculated in T43 and the value for 300*D_o calculated in T43:

	Pipe Material	Minimum Radius of Curvature Recommended by Manufacturer	Minimum Radius of Curvature Recommended by National Reference Standard (N/A if none)	Calculated Minimum Radius of Curvature	Value for 300*D_o
Pipe Diameter 1					
Pipe Diameter 2					
Pipe Diameter 3					
Pipe Diameter 4					
Pipe Diameter 5					

Use the back of this page and attachments if needed for long narrative answers or engineering calculations.

Pipe Diameter 6					

T45) If curvature will be provided by pipe flexure, all joints must be installed fully seated. The specifications must describe how installation will be performed for curved sections. The minimum radius of curvature calculated cannot be less than the minimum radius of curvature recommended by the manufacturer or the minimum radius of curvature recommended by any applicable national reference standards. The minimum radius of curvature also should not be less than $300*D_o$. Will these requirements be met? N/A

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T46) If the horizontal curvature in this project will not be provided by joint deflection, skip to T52. If the horizontal curvature in this project will be provided by joint deflection, calculate the joint deflection proposed for each pipe diameter:

N/A

T47) Report the maximum proposed joint deflection for each pipe diameter:

Pipe Diameter: N/A Maximum Proposed Joint Deflection: _____
Pipe Diameter: _____ Maximum Proposed Joint Deflection: _____
Pipe Diameter: _____ Maximum Proposed Joint Deflection: _____
Pipe Diameter: _____ Maximum Proposed Joint Deflection: _____
Pipe Diameter: _____ Maximum Proposed Joint Deflection: _____
Pipe Diameter: _____ Maximum Proposed Joint Deflection: _____

T48) Indicate manufacturer's maximum recommended joint deflection for pipe to be used and/or indicate maximum joint deflection recommended by the appropriate national reference standard (ASTM, AWWA, ANSI etc...) for pipe to be used:

a) Manufacturer's maximum recommended joint deflection (degrees):

Pipe Diameter: N/A	Deflection:_____	Pipe Diameter:_____	Joint Deflection:_____
Pipe Diameter:_____	Deflection:_____	Pipe Diameter:_____	Joint Deflection:_____
Pipe Diameter:_____	Deflection:_____	Pipe Diameter:_____	Joint Deflection:_____

b) National Reference Standard maximum recommended joint deflection (degrees):

Pipe Diameter:_____	Deflection:_____	Pipe Diameter:_____	Joint Deflection:_____
Pipe Diameter:_____	Deflection:_____	Pipe Diameter:_____	Joint Deflection:_____
Pipe Diameter:_____	Deflection:_____	Pipe Diameter:_____	Joint Deflection:_____

T49) The maximum allowable joint deflection allowed by the TCEQ's horizontal curvature policy is equal to the lesser of 5 degrees, **or** 80% of T48(a) **or** 80% of T48(b). Indicate the maximum allowable joint deflection for each pipe diameter:

Pipe Diameter:_____ Max. Allowable Joint Deflection:_____ Max. Joint Deflection for Project:_____
Pipe Diameter:_____Max. Allowable Joint Deflection:_____Max. Joint Deflection for Project:_____
Pipe Diameter:_____Max. Allowable Joint Deflection:_____Max. Joint Deflection for Project:_____
Pipe Diameter:_____Max. Allowable Joint Deflection:_____Max. Joint Deflection for Project:_____
Pipe Diameter:_____Max. Allowable Joint Deflection:_____Max. Joint Deflection for Project:_____
Pipe Diameter:_____Max. Allowable Joint Deflection:_____Max. Joint Deflection for Project:_____

T50) If the proposed joint deflection, for any individual portion of pipe, as calculated in T46 is greater than the maximum allowable joint deflection as determined in T49 for that same portion of pipe, the proposed curvature will not be approved by TCEQ. Does the proposed horizontal curvature comply with TCEQ policy as outlined in T43 through T49 above? N/A

T51) Curved lines constructed using joint deflection must be tested for deflection with a mandrel sized to verify that the design maximum joint deflection is not exceeded. Has this test been specified? N/A

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T52) For each size of pipe which will be installed with horizontal curvature, indicate the minimum slope.

Pipe Diameter: N/A	Min. Slope:_____	Pipe Diameter:_____	Min. Slope:_____
Pipe Diameter:_____	Min. Slope:_____	Pipe Diameter:_____	Min. Slope:_____
Pipe Diameter:_____	Min. Slope:_____	Pipe Diameter:_____	Min. Slope:_____

T53) All curved sections of gravity line must be installed at a minimum slope at least 3% greater than the corresponding minimum slope for straight lines. Do the slopes in T52 comply with this requirement? N/A

T54) Maximum allowable manhole spacing for sections of pipe with horizontal curvature is 300 feet. Has this requirement been met in the design? N/A

T55) Manholes should be provided at PC and PT of horizontal curves. Does the design include such provisions? N/A

T56) Trench excavation must match the radius of curvature of the installed pipe, with the pipe laid in the center of the trench. Has this requirement been incorporated into the design and detailed in the specifications? N/A

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

Reduction of Inflow: 30 TAC 317.2(a)(8)

T57) TCEQ rules do not allow combined sewers. Has the project been designed to preclude or eliminate any connections of storm drains, roof drains, etc... to the sanitary sewer? Yes

T58) If storm drainage facilities are proposed for construction in conjunction with this project, were these designed to prevent storm water from entering the sanitary sewer? Yes

T59) Please indicate the design storm return period for the storm sewer, if applicable: 100 Yr.

Rigid Pipe Design

General Requirements: 30 TAC 317.2(a)(2)(B)

T60) If the project does not specify an option to use rigid pipe, skip to T61. If the project specifies an option to use rigid pipe, please provide an engineering analysis which shows that the rigid pipe design will be adequate to withstand the applied loads expected from the proposed installation. Consideration should be given to trench width, depth of cover, effect of water table elevation on the rigid pipe, etc. Please indicate the maximum burial depth or applied load for each diameter and type of pipe material and the corresponding minimum strength properties or allowable depth of installation as specified in the appropriate national reference standard, or as specified by the pipe manufacturer.

Flexible Pipe Design

T61) If the project specifies an option to use flexible pipe materials, complete T62 through T87. If the project does not specify an option to use flexible pipe materials, skip to T89.

Live Load Analysis: 30 TAC 317.2(a)(2)(A)

T62) For the purposes of this application, the minimum depth of burial for gravity sanitary sewer pipe, from the ground surface to the crown of the pipe (H) is 2 feet. Does the submitted design comply with this minimum H? Yes

T63) If all pipe proposed for this project will be installed at a burial depth of greater than or equal to 3.0 feet and the pipe will not be subjected to live loads greater than 18 kip axle, assume that the pressure due to live load (L_l) = 0 and skip to T68. If a value of H greater than or equal to 2 feet and less than 3 feet is proposed for any portions of the gravity sanitary sewer pipeline or if the pipe will be subjected to live loads greater than 18 kip axle, calculations which quantify what the L_l on the pipe will be must be provided:

T64) Indicate minimum H: _____

T65) Indicate maximum anticipated L_l as determined in T63: _____

T66) Are all proposed flexible pipe materials capable of supporting this L_l?_____

T67) Indicate source of maximum L_l:_____

Buckling Analysis: 30 TAC 317.2(a)(2)(A)

T68) Calculate allowable and predicted buckling pressure. Predicted and allowable buckling pressures must be calculated for each size of pipe and type of flexible pipe material. For the purposes of this application form, the buckling analysis must be performed using the method outlined below. The method of calculating allowable buckling pressure provided below is only valid for lines which are installed at depths of 2 ft ≤ H ≤ 80 feet.

a) Calculate allowable bucking pressure as follows:

$$q_a = 0.4 * \sqrt[2]{32 * R_w * B' * E_s * (E * I / D^3)}$$ **Equation (1)**

$$R_w = 1 - 0.33 * (h_w / h)$$ **Equation (2)**

$$B' = \frac{1}{1 + 4 * e^{-0.065H}}$$ **Equation (3)**

$$I = (t^3/12) * (inches^4/Linch)$$ **Equation (4)**

q_a = allowable buckling pressure, pounds per square inch (psi)

h = height of soil surface above top of pipe in inches (in)

h_w = height of water surface above top of pipe in inches (in) (groundwater elevation)

R_w = Water buoyancy factor. If $h_w = 0$, $R_w = 1$. If $0 \leq h_w \leq h$ (groundwater elevation is between the top of the pipe and the ground surface), calculate R_w with Equation 2

H = Depth of burial in feet (ft) from ground surface to crown of pipe.

B' = Empirical coefficient of elastic support

E_b = modulus of soil reaction for the bedding material (psi)

E = modulus of elasticity of the pipe material (psi)

I = moment of inertia of the pipe wall cross section per linear inch of pipe, $inch^4$/lineal inch = $inch^3$. For solid wall pipe, I can be calculated with equation 4. If the pipe used is not solid wall pipe (for example a pipe with a ribbed cross section), the proper moment of inertia formula must be obtained from the manufacturer.

t = pipe structural wall thickness (in)

D = mean pipe diameter (in)

b) Calculate pressure applied to pipe under installed conditions:

$$q_p = \gamma_w * h_w * R_w * (W_c/D) * L_f$$ **Equation (5)**

$$W_c = \gamma_s * H * (D + t)/144$$ **Equation (6)**

q_p = pressure applied to pipe under installed conditions (psi)

γ_w = 0.0361 pounds per cubic inch (pci), specific weight of water

γ_s = specific weight of soil in pounds per cubic foot (pcf)

W_c = vertical soil load on the pipe per unit length in pounds per linear inch (lb/in)

L_l = Live load as determined in T63

T69) Report q_a and q_p for each pipe diameter proposed and for each type of pipe material proposed:

Pipe Diameter: 8	Pipe Material: ASTM 3034	q_a: 40.47	q_p: 10.14
Pipe Diameter: 8	Pipe Material: ASTM 2241	q_a: 40.23	q_p: 10.14
Pipe Diameter:	Pipe Material:	q_a:	q_p:
Pipe Diameter:	Pipe Material:	q_a:	q_p:
Pipe Diameter:	Pipe Material:	q_a:	q_p:
Pipe Diameter:	Pipe Material:	q_a:	q_p

T70) If $q_a \geq q_p$, specified pipe is acceptable for the proposed installation. If $q_a \leq q_p$, the wall thickness of the pipe must be increased and/or a pipe with a larger modulus of elasticity (E) must be used. Make the appropriate modifications and repeat the buckling analysis, showing that for the upgraded pipe, $q_a \geq q_p$. Does all the pipe proposed for this project meet these requirements? Yes

Wall Crushing: 30 TAC 317.2(a)(2)(A)

T71) If no concrete encased flexible pipe is proposed for the submitted project, skip to T73. If any flexible pipe will be installed in rigid encasement (e.g. concrete), calculate the maximum depth that the pipe can be buried before wall crushing (or failure by ring compression) will occur using the method outlined below. It should be noted that cement stabilized sand or soil is not considered a rigid encasement for purposes of TCEQ review:

$$H=(24*P_L*A)/(\gamma_s*D_o) \qquad \textbf{Equation (7)}$$

D_o = outside pipe diameter, in.

P_c = compressive stress or hydrostatic design basis (HDB). For typical PVC pipe assume 4,000 psi. For any other pipe material the HDB must be supplied by the pipe manufacturer.

A = surface area of the pipe wall, $in.^2/ft$

γ_s = specific weight of soil in pounds per cubic foot (pcf)

H = Depth of burial in feet (ft) from ground surface to crown of pipe.

24 = conversions and coefficients

T72) Will all pipe installations proposed for this project have an H less than or equal to the maximum allowable H calculated in T71 and greater than or equal to 2 feet?_____ Report maximum allowable H, (H_a), and the maximum H which is proposed, (H_p), for each proposed pipe diameter and each type of flexible pipe material.

Pipe Diameter:_____	Pipe Material:_____	H_a:_____	H_p:_____
Pipe Diameter:_____	Pipe Material:_____	H_a:_____	H_p:_____
Pipe Diameter:_____	Pipe Material:_____	H_a:_____	H_p:_____
Pipe Diameter:_____	Pipe Material:_____	H_a:_____	H_p:_____
Pipe Diameter:_____	Pipe Material:_____	H_a:_____	H_p:_____
Pipe Diameter:_____	Pipe Material:_____	H_a:_____	H_p:_____

Installation Temperature Effects: 30 TAC 317.2(a)(2)(A)

T73) If flexible pipe will be installed under favorable ambient temperature conditions, skip to T74. If flexible pipe will be installed under very high or low ambient temperature conditions, please indicate provisions

for handling which will protect the pipe and ensure an adequate installation:

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

Tensile Strength: 30 TAC Sections 317.2.(a)(2)(A), 317.2.(a)(5)

T74) The project specifications need to indicate minimum allowable tensile **strength** in psi for each flexible pipe material. If PVC pipe is proposed, specify cell class:

Pipe Material: PVC	Tensile Strength: 7000	Cell Class (PVC only): 12454 B	ASTM 3034 & 2241
Pipe Material: _____	Tensile Strength: _____	Cell Class (PVC only): _____	
Pipe Material: _____	Tensile Strength: _____	Cell Class (PVC only): _____	
Pipe Material: _____	Tensile Strength: _____	Cell Class (PVC only): _____	

Location in submittal: Plan sheet 3 Specifications page _____ Item No. _____

Strain: TAC 30 Section 317.2.(a)(2)(A)

T75) Are the conditions of this installation such that strain-related failure will not be a problem? Yes If any proposed flexible pipe material is considered to be susceptible to strain-related failure at less than 5% long-term deflection provide analysis for predicted strain due to hoop stress and bending strain. If strain-related failure will not be a problem for the pipe installation proposed in this project, skip to T76.:

Deflection Analysis: 30 TAC 317.2(a)(2)(A)

T76) Indicate E_b (modulus of soil reaction for the bedding material) in psi. If E_b is greater than 750 psi, justification must be provided.: 700 psi

How was E_b determined or estimated? See Attachments

T77) Indicate E'_n (modulus of soil reaction for the in-situ soil) in psi: 2000 psi

How was E'_n determined or estimated?

T78) Based on T76 and T77, above, calculate the ratio of bedding modulus to soil modulus:

E_b/E'_n = 0.35.

If this ratio is greater than 1.25, a zeta factor must be calculated by completing T79 and T80, where zeta is a factor which corrects for the effect of in-situ soil on pipe stability. ~~If the ratio~~ of bedding modulus to soil modulus is less than or equal to 1.25, assume zeta = 1.0 and skip to T80.

T79) Where native soil is significantly weaker than bedding material, or where predicted deflection approaches 5%, the effect of native soil must be quantified using Leonhardt's Zeta factor. Zeta must be determined for each diameter of pipe and corresponding trench width. Zeta may be estimated graphically or calculated directly. If zeta is estimated graphically, identify the source for tables, figures, etc...(including page numbers and table numbers or figure numbers for each source) which were used to estimate zeta. To calculate zeta directly use the formulas in T79(b), below. The calculations which are done to determine the zeta factors for the different pipe diameters must be included with this submittal.

(a) Sources:

(b) Calculations:

$$zeta = \frac{1.44}{f + (1.44 - f) * (E_b / E_n')}$$ **Equation (8)**

$$f = \frac{b/d_a - 1}{1.154 + 0.444 * (b/d_a - 1)}$$ **Equation (9)**

f = pipe/trench width coefficient

b = trench width

d_a = pipe diameter

E_b = modulus of soil reaction for the bedding material (psi)

E'_n = modulus of soil reaction for the in-situ soil (psi)

Use the back of this page and attachments if needed for long narrative answers or engineering calculations.

T80) For each size of pipe, report zeta factor determined in T78 or T79:

Pipe Diameter:	8"	Trench Width:	32"	Zeta:	1
Pipe Diameter:		Trench Width:		Zeta:	
Pipe Diameter:		Trench Width:		Zeta:	
Pipe Diameter:		Trench Width:		Zeta:	
Pipe Diameter:		Trench Width:		Zeta:	
Pipe Diameter:		Trench Width:		Zeta:	

T81) Determine pipe stiffness (P_s) in psi. P_s can be determined either by parallel plate test at 5% deflection, based on manufacturer's data or national reference standards; or, calculated using either equation 10 or equation 11. As an example, the minimum pipe stiffness at 5% deflection for PVC pipe less than 15 inches in diameter meeting ASTM D 3034, is 46 psi for SDR-35 and 115 psi for SDR 26. If equation 11 is used, the ring stiffness constant (RSC) is provided by the pipe manufacturer. Show calculations, or provide proper references, for each size of pipe and for each flexible pipe material.

$$P_s = \frac{EI}{0.149 * r^3}$$ **Equation (10)**

or

$$P_s = 0.80 * RSC * (8.337/D)$$ **Equation (11)**

E = modulus of elasticity of the pipe material (psi)

I = moment of inertia of the pipe wall cross section per linear inch of pipe, $inch^4$/lineal inch = $inch^3$. For solid wall pipe, I can be calculated with equation 4. If the pipe used is not solid wall pipe (for example a pipe with a ribbed cross section), the proper moment of inertia formula must be obtained from the manufacturer.

D = mean pipe diameter (in)

r = mean radius (in)

See Attachments

T82) Report P_s for each pipe size and each type of flexible pipe material as determined in T81.

Pipe Diameter: 8	Pipe Material: PVC	P_s: 115 (ASTM 3034)
Pipe Diameter: 8	Pipe Material: PVC	P_s: 115 (ASTM 2241)
Pipe Diameter:_____	Pipe Material:_____	P_s:_____
Pipe Diameter:_____	Pipe Material:_____	P_s:_____
Pipe Diameter:_____	Pipe Material:_____	P_s:_____
Pipe Diameter:_____	Pipe Material:_____	P_s:_____

T83) Because the terms in the denominator of the modified Iowa formula (Equation 13) are added, it is theoretically possible to have zero pipe stiffness ($P_s = 0$) and still predict flexible pipe deflections less than 5%. In order to ensure that the stiffness being provided to the installation has a reasonable contribution from pipe stiffness, and does not rely solely on the stiffness provided by the soil stiffness factor (SSF), the ratio of P_s/SSF must be calculated. If P_s/SSF < 0.15, T81 and T82 must be repeated such that a higher stiffness pipe is chosen for each portion of the project where P_s/SSF < 0.15. The P_s/SSF ratio(s) must then be recalculated for the new higher stiffness pipe. This process must be repeated until P_s/SSF ≥ 0.15 exists for all proposed pipe sizes and for all types of flexible pipe materials.

$$\frac{P_s}{SSF} = \frac{P_s}{0.061 * zeta * E_b} \geq 0.15 \qquad \frac{115}{0.061 \times 1 \times 700} = 2.69 \geq 0.15 \checkmark$$ **Equation (12)**

P_s = Pipe stiffness (psi) [from T82]

E_b = modulus of soil reaction for the bedding material (psi) [from T76]

zeta = 1.0, or a value calculated with the method in T79

SSF = soil stiffness factor ($0.061 * zeta * E_b$)

T84) Indicate the final values calculated for P_s/SSF for each diameter of pipe and for each pipe material:

Pipe Diameter: 8	Pipe Material: ASTM 3034	P_s/SSF: 2.69	PVC
Pipe Diameter: 8	Pipe Material: ASTM 2241	P_s/SSF: 2.69	PVC
Pipe Diameter:	Pipe Material:	P_s/SSF:	
Pipe Diameter:	Pipe Material:	P_s/SSF:	
Pipe Diameter:	Pipe Material:	P_s/SSF:	
Pipe Diameter:	Pipe Material:	P_s/SSF:	

T85) Do all proposed pipe sizes and flexible pipe materials have a pipe stiffness to soil stiffness factor ratio of greater than or equal to 0.15? Yes

T86) Calculate and report predicted deflection. Predicted deflection must be calculated for each size of pipe and type of flexible pipe material. For the purposes of this application form, predicted deflection must be calculated using the method outlined below. Show calculations and report calculated maximum deflection for each size of pipe and type of flexible pipe material. Maximum allowable deflection in installed lines is 5%, as determined by the deflection analysis and verified by a mandrel test conforming to T89. Some conservatism should be employed in determining allowable predicted deflections. This conservatism is necessary to allow for variability in the quality of installation.

$$\Delta Y/D(\%) = \frac{K * (L_p + L_l) * 100}{(0.149 * P_s) + (0.061 * zeta * E_b)}$$ **Equation (13)**

$$L_p = \frac{Y_s * H}{144}$$ **Equation (14)**

%ΔY/D = Predicted % vertical deflection under load.

ΔY = Change in vertical pipe diameter under load

D = Undeflected mean pipe diameter (in)

K = Bedding angle constant. Assumed to be 0.110 unless otherwise justified.

γ_s = Unit weight of soil (pcf). γ_s less than 120 pcf must be justified.

H = Depth of burial (ft) from ground surface to crown of pipe.

L_p = Prism load (psi). If prism load is calculated using Marston's load formula, or other formulas less conservative than the one provided above, the load should be multiplied by a deflection lag factor $D_L = 1.5$ to account for long-term deflection of the pipe as the bedding consolidates.

(P_s from T82; *zeta* from T80; and E_b from T76)

★ If the predicted %ΔY/D for any proposed pipe size or material is over 5%, the proposed flexible pipe design cannot be approved by the TCEQ. Appropriate design modifications must be made and the analysis must be repeated until a deflection of less than or equal to 5% is predicted.

★ If a zeta value of 1.0 was assumed as a result of T78, and the predicted deflection for any size or type of pipe is determined to be between 4% and 5%, the deflection analysis must be repeated. Repeat the deflection analysis by performing all the same calculations. The difference will be that instead of using an assumed zeta factor of 1.0, the zeta factor must be calculated as outlined in T79. If the predicted deflection is determined to be above 5% after the deflection analysis is repeated, this flexible pipe design cannot be approved by the TCEQ. Appropriate design modifications must be made and the analysis must be repeated until a deflection of less than or equal to 5% is predicted.

★ If the predicted deflection, for a particular pipe, using the deflection analysis method detailed above, is less than or equal to 4%, and a zeta factor of 1.0 was assumed as a result of T78, that particular pipe is assumed to comply with the TCEQ's requirements for deflection analysis and can therefore be approved.

★ If the predicted deflection, for a particular pipe, using the deflection analysis method detailed above, is between 4% and 5%, and the zeta factor which was used in the analysis was determined using the method in T79, that particular pipe is assumed to comply with the TCEQ's requirements for deflection analysis and can therefore be approved.

T87) Report the final pipe diameters, types of pipe material proposed for each diameter, type of pipe material, pipe stiffness for each pipe material (P_s), zeta factors assumed or calculated for each pipe diameter, modulus of the pipe bedding material (E_b) and % deflection predicted for each pipe size and type of pipe material.

	Type of Pipe Material	P_s (psi) [T82]	Zeta Factor Assumed or Calculated [T80]	E_b (psi) [T76]	% Deflection [T86]
Pipe Diameter 1	8" PVC	115	1	700	1.53
Pipe Diameter 2					
Pipe Diameter 3					

Use the back of this page and attachments if needed for long narrative answers or engineering calculations.

Pipe Diameter 4					
Pipe Diameter 5					
Pipe Diameter 6					

T88) Do all pipes proposed for this project have a maximum predicted deflection of 5.0%? YES

Miscellaneous Requirements

Testing, Inspection, and Certification: 30 TAC Sections 317.2.(a)(1), 317.2.(a)(4)(A)&(B), 317.2(a)(4)(C), 317.2.(c)(5)(H)

T89) All gravity lines utilizing flexible pipe must be tested for deflection by pulling a rigid mandrel through the installed pipe. The test must be conducted at least 30 days after placement and compaction of final backfill. No pipe shall exceed a deflection of 5%. A rigid mandrel shall be used to measure deflection. The test must be performed without mechanical pulling devices. The mandrel's minimum outside diameter is 95% of the pipe inside diameter. The mandrel must have an odd number of runners, totaling nine or more. The barrel section of the mandrel must have a length at least 75% of the pipe inside diameter. A TV test cannot substitute for the deflection test. Will these requirements be met? YES

Location in submittal: Plan sheet 3 Specifications page _____ Item No. _____

T90) A professional engineer registered in the State of Texas must certify that the entire installation passed the required deflection test. This certification may be made in conjunction with the notice of completion required in section 317.1.(e)(1). Will these requirements be met? YES

T91) A leakage test is required for all gravity lines. For line that is not horizontally curved, a hydrostatic test and/or a low pressure air test must be performed on all proposed gravity sanitary sewer collection piping. These tests must comply with Section 317.2(a)(4) of the TCEQ's rules. All sections of horizontally curved line must be subjected to a hydrostatic leakage test conforming to the requirements of Section 317.2.(a)(4)(A) of the Design Criteria, with a maximum allowable leakage of 10 gallons/inch diameter/mile/day. Do all leakage tests proposed for this project comply with these leakage test requirements of 317.2(a)(4)? YES Which leakage test will be used? Low Pressure Air

Location in submittal: Plan sheet 3 Specifications page _____ Item No. _____

T92) ~~Manholes~~ must be tested for leakage. If manholes will be tested with a hydrostatic test, answer T93, then skip to T102. If manholes will be tested with a vacuum test, answer T94 through T101 and continue with T102. If project specifications allow either a hydrostatic test and/or a vacuum test, answer T93 through T101 and continue with T102. How will manholes be tested? Hydrostatic

T93) Does the hydrostatic manhole test proposed for the manholes in this project comply with the test requirements detailed in Section 317.2(c)(5)(H) of the TCEQ's rules? Yes

Location in submittal: Plan sheet 3 Specifications page _____ Item No. _____

T94) Each manhole shall be tested immediately after assembly and prior to backfilling. Manholes which have been backfilled shall either be excavated to expose the entire exterior prior to vacuum testing or the manhole shall be tested for leakage by means of a hydrostatic test. Will this requirement be met?_____

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T95) All lift holes and exterior joints shall be plugged with an approved non-shrink grout. Will this requirement be met?_____

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T96) No grout shall be placed in horizontal joints before testing. Will this requirement be met?_____

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T97) All pipes entering the manhole shall be plugged, taking care to securely brace the plugs from being drawn into the manhole. Will this requirement be met?_____

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T98) Stubouts, manhole boots and pipe plugs shall be secured to prevent movement while the vacuum is drawn. Will this requirement be met?_____

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T99) A minimum 60-inch/lb torque wrench shall be used to tighten the external clamps that secure the test cover to the top of the manhole. Will this requirement be met?_____

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T100) The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendation. Will this requirement be met?_____

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T101) A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches of mercury. The manhole shall pass if the time is greater than 2 minutes. If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. If the manhole fails a second time, repairs should again be made and the manhole shall be tested by means of a hydrostatic test which complies with Section 317.2(c)(5)(H) of the TCEQ's rules. If any manhole fails the hydrostatic test, after failing the vacuum test twice, the contractor should consider replacing that manhole. If the contractor chooses to attempt to repair that manhole, the manhole must be retested by means of the hydrostatic test outlined in Section 317.2(c)(5)(H) of the TCEQ's rules, until it passes. Will these requirements be satisfied?_____

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

T102) Inspection must be provided during critical phases of construction by a qualified inspector under the direction of a P.E. Critical phases of construction are deemed at a minimum to include testing of pipe and manholes for leakage, and testing of flexible pipe for installed deflection. Do the project plans or specifications define the scope of inspection, and indicate who (owner, design engineer, project manager, etc...) will assume this responsibility? YES

Location in submittal: Plan sheet 3 Specifications page _____ Item No. _____

T103) TCEQ approval letters for plans and specifications review contain the requirement that once the project is completed, a P.E. registered in the state of Texas must certify that the construction was performed substantially in accordance with the approved plans and specifications. If flexible pipe was installed, a P.E. must also certify that all pipe was subjected to and passed the required deflection test. Will these requirements be met? YES

T104) Indicate who (owner, design engineer, project manager, etc...) will certify the installation:

Name: Stephen Hanz P.E. Project Relation: Design Engineer

Location in submittal: Plan sheet _____ Specifications page _____ Item No. _____

Occupational Safety, Public Health, and Environmental Protection: TAC 30 317.2.(a)(7), 317.13, 317.2.(a)(8) 317.2.(c)(5)(D), 317.2(c)(5)(E), 317.2(c)(F)

T105) The project plans and specifications must ensure that the pipe installation will adhere to the minimum separation distances allowed by 317.13, Appendix E of the TCEQ's rules. Additionally, the project plans or specifications should include language (preferably an exact reproduction of the separation distance wording detailed in Section 317.13 (Appendix E) of the Design Criteria) which ensures that the separation distance between any unknown water lines which are discovered during the installation phase of the project, and, the gravity sanitary sewer pipe which will be installed, will be sufficient to comply with the minimum separation distances allowed by 317.13, Appendix E, of the TCEQ's rules. Will the requirements of 317.13, Appendix E, been met? YES

Location in submittal: Plan sheet 3 Specifications page _____ Item No. _____

T106) Briefly describe provisions to control erosion or sedimentation due to runoff during construction of the project. Additional information may be required by the TCEQ on a case by case basis:

Use of Silt Fence and rock berms, Refer to Temporary Stormwater Section

Location in submittal: Plan sheet 5 Specifications page _____ Item No. _____

T107) If the project site does not contain any water wells, springs, surface water sources of potable water, or potable water storage facilities, skip to T108. If the project site does contain any water wells, springs,

surface water sources of potable water, or potable water storage facilities, does the design conform to and include any applicable sections of 30 TAC Chapter 290, Rules and Regulations for Public Water Systems?_____

T108) If an air gap is required for the project, is the project designed with a minimum 18 inch air gap between the elevation of all potable water outlets and the maximum water surface elevation of any nearby sewer appurtenances? N/A If no air gap is required for this project, skip to T109

Occupational Safety: 30 TAC Sections

T109) Are all manhole base sections at least 48 inches in diameter? YES

T110) Are all manhole covers at least 24 inches nominal diameter? YES

T111) For purposes of this application, **the use of manhole steps to access manholes for maintenance purposes will not be approved by the TCEQ!** Please indicate how manholes will be accessed if a manhole is in need of maintenance. Portable ladder

Location in submittal: Plan sheet 20 Specifications page _____ Item No. _____

T112) Personal gas detectors are required for wear by all personnel whose jobs require entering enclosed spaces (such as manholes and lift stations) capable of having accumulations of hydrogen sulfide or other harmful gases. Please indicate who is responsible for ensuring that these detectors are provided to the appropriate personnel.

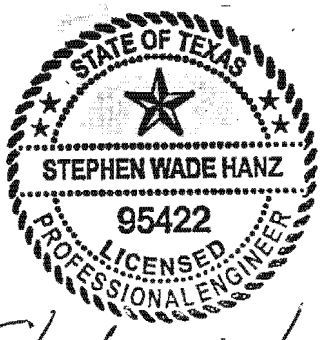
Location in submittal: Plan sheet 3 Specifications page _____ Item No. _____

T113) If you answered no to any of the items in this application you may need to obtain a variance from those items in accordance with Section 317.1(f) of the TCEQ's rules. Section 317.1(f) of the TCEQ's rules states, "Variance. A variance from the design criteria herein may be granted by the commission if the variance would not result in an unreasonable risk to treatment plant performance, public health or the waters in the state. Requests for variances must be submitted in writing by the design engineer and must, for each affected item, include a detailed engineering justification." List each item to which you answered no below. For each item which had a no answer, provide an engineering justification which addresses the requirements of 317.1(f). The TCEQ review engineer will determine whether or not a variance is needed. If a variance is needed, the TCEQ review engineer will determine whether or not sufficient engineering justification to comply with 317.1(f) has been provided to warrant granting a variance.

In order for this document to be valid, the professional engineer responsible for the completion of this application form must certify that all the information provided in this application and in the accompanying set of plans and specifications show full compliance with the requirements of Chapter 317 of the TCEQ's rules, unless a variance from Chapter 317 is being requested, and the professional engineer responsible for this application form provides the needed justification for the

variance. Additionally, the professional engineer responsible for completing this application must certify that all portions of the application, which were relevant to the project, were filled out as completely as possible, and that all supporting calculations and engineering analyses requested in this application were performed. These calculations shall show that the proposed design complies with Chapter 317. By affixing a Texas registered professional engineer's seal to this document, below, that professional engineer certifies the compliance requirements described in this item (item T113) have been met.

Signature, Seal and Date of the Texas Professional Engineer who is certifying that item T113 has been complied with:



Stephen W. Hanz PE
10/11/2012

T 68 Buckling Analysis

$$q_A = 0.4 \times \sqrt{32 \times R_w \times B' \times E_b \times (E \times I/D^3)}$$

$$R_w = 1 - 0.33 \times (h_w/h)$$

$$B' = 1/(1 + 4 \times e^{-0.065H})$$

$$I = (t^3/12) \times (\text{inches}^4/L\ \text{inch})$$

OD = 8.625" (2241)

OD = 8.400" (3034)

D = 8.29" (2241)

D = 8.07" (3034)

WORST CASE SCENERIO

- GROUNDWATER @ SURFACE
- MAX COVER = 10'

$$R_w = 1 - 0.33 \times (10' \times 12/10' \times 12) = 0.67$$

$$B' = 1/(1 + 4 \times e^{-0.065 \times 10}) = 0.32$$

E_b = 700 psi (clean coarse-grained soil)

E = 400,000 psi (3034 & 2241)

t = 0.323 SDR 26 (ASTM 3034)

t = 0.332 SDR 26 (ASTM 2241)

I = 0.0028 in^4/in SDR 26 (ASTM 3034)

I = 0.0030 in^4/in SDR 26 (ASTM 2241)

$$q_A = 0.4\sqrt{32 \times 0.67 \times 0.32 \times 700 \times (400000 \times 0.0028/8.07^3)}$$

q_A = 40.47 (ASTM 3034)

$$q_A = 0.4\sqrt{32 \times 0.67 \times 0.32 \times 700 \times (400,000 \times 0.0030/8.29^3)}$$

q_A = 40.23 (ASTM 2241)

T68 Applied pressure

$$q_p = \gamma_w + h_w + R_w + (W_c/D) + L_i$$

$$W_c = \gamma_s \times H \times (D+t)/144$$

$\gamma_s = 120\ lb/ft^3$ $\quad L_i = 0$

$\gamma_w = 0.0361\ lb/in^3$

$W_c = 120 \times 10 \times (8.07 + 0.323)/144$

$W_c = 69.94\ lb/in$ (ASTM 3034)

$W_c = 120 \times 10 \times (8.29 + 0.332)/144$

$W_c = 71.85\ lb/in$ (ASTM 2241)

$q_p = 0.0361 \times 10 \times 12 + (0.67) \times (69.94/8.07) + 0$

$q_p = 10.14\ psi$ (ASTM 3034)

$q_p = 0.0361 \times 10 \times 12 + (0.67) \times (71.85/8.29) + 0$

$q_p = 10.14\ psi$ (ASTM 2241)

SOIL CLASSIFICATION OF EMBEDMENT Unified Soil Classification System	DEGREE OF COMPACTION OF EMBEDMENT			
	DUMPED	SLIGHT < 85% P < 40% RD	MODERATE ≥ 85 to < 95% P ≥ 40 to < 70% RD	HIGH ≥ 95% P ≥ 70% RD
Highly compressible fine-grained soils **CH, MH, OH, OL** or any soil containing one of these symbols (i.e., CL/CH)	Soils with medium to high plasticity or with significant organic content No data available. -NOT RECOMMENDED-			
Fine-grained soils Soils with medium to no plasticity and with less than 30% coarse-grained particles CL, ML (or CL-ML, CL/ML, ML/CL)	$E' = 50$ $F_d = 0.5$ $T_f = *1.5$	$E' = 200$ $F_d = 0.5$ $T_f = *2$	$E' = 400$ $F_d = 0.67$ $T_f = *2.5$	$E' = 1500$ $F_d = 0.75$ $T_f = *2.5$
Sandy or gravelly fine-grained soils Soils with medium to no plasticity and with 30% or more coarse-grained particles CL, ML (or CL-ML, CL/ML, ML/CL) Coarse-grained soils with fines Sands, gravels with more than 12% fines GC, GM, SC, SM (or any soil beginning with one of these symbols (i.e., SC/CL))	$E' = 150$ $F_d = 0.5$ $T_f = *1.5$	$E' = 400$ $F_d = 0.5$ $T_f = *2$	$E' = 1000$ $F_d = 0.67$ $T_f = *2.5$	$E' = 2500$ $F_d = 0.75$ $T_f = *2.5$
Clean coarse-grained soils Sands, gravels with 12% or less fines GW, GP, SW, SP or any soil beginning with one of these symbols (i.e., GP-GM)	$E' = 200$ $F_d = 0.67$ $T_f = 1.5$	$E' = 700$ $F_d = 0.67$ $T_f = 2$	$E' = 2000$ $F_d = 0.75$ $T_f = 2.5$	$E' = 3000$ $F_d = 1$ $T_f = 2.5$
Crushed rock Not more than 25% passing 3/8-inch sieve and not more than 12% fines; maximum size not to exceed 3 inches.	$E' = 1000$ $F_d = 0.67$ $T_f = 2$		$E' = 3000$ $F_d = 1$ $T_f = 3$	

*Double T_f value if embedment will become saturated

Notes: Soil classification based on ASTM D 2487 or D 2488
Fines are soil particles that pass a No. 200 (75-μm) sieve
P is Proctor Density
RD is Relative Density
Percent Proctor based on ASTM D 698, AASHTO T-99 or USBR 5500 ("Standard Proctor")
Percent Relative Density based on ASTM D 4253 and D 4254 or USBR 5525, 5530, and 7250
Values applicable only for cover of about 50 feet or less
E' values are in lb/in²; F_d and T_f are dimensionless

TB1.)

Short Form Specification : :

::SCOPE

This specification designates general requirements for 1.5" through 12" unplasticized polyvinyl chloride (PVC) plastic pressure pipe with integral bell and spigot joints for the conveyance of water and other fluids.

::MATERIALS

This pipe shall meet the requirements of ASTM D 2241 "Standard Specification for Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series)." All pipe shall be made from quality PVC resin, compounded to provide physical and mechanical properties that equal or exceed cell class 12454 as defined in ASTM D 1784.

::HYDROSTATIC TESTING

Random samples at given intervals are tested in compliance with ASTM D 2241 for hydrostatic capability in the quick burst test.

::STANDARD LAYING LENGTHS

Standard laying lengths shall be 20 feet for all sizes. At least 85% of the total footage of pipe of any class and size shall be furnished in standard lengths. The remaining 15% can be furnished in random lengths.

::PIPE

All pipe shall be suitable for use as pressure conduit. Provisions must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a factory installed, solid cross section Rieber elastomeric gasket which meets the requirements of ASTM F 477. The bell section shall be designed to be at least as hydrostatically strong as the pipe barrel and meet the requirements of ASTM D 2241. The joint design meets the requirements of ASTM D 3139, under both pressure and 22" Hg vacuum. Sizes and dimensions shall be as shown in this specification.

Pipe installation and usage shall be in compliance with JMM Publication TR-403B "I.P.S. Pressure and Irrigation Pipe Installation Guide" and TR-410A "Pressure Pipe Tapping Guide."

::QUICK BURST TEST

Randomly selected samples tested in accordance with ASTM D 1599 shall withstand, without failure, the pressure listed below when applied for 60-70 seconds.

DR	Rating (psi)	Minimum burst pressure at 73°F (psi)
41	100	315
32.5	125	400
26	160	500
21	200	630
17	250	800

::PIPE STIFFNESS

The pipe stiffness using F/Δy for PVC rated water pipe is contained in the table below:

DR	Rating (psi)	F/Δy
41	100	28
32.5	125	57
26	160	115
21	200	224
17	250	437

::DROP IMPACT TEST

The pipe shall withstand, without failure at 73°F, an impact of a falling missile, Tup B, at the following levels (Per ASTM D 2444).

Pipe Size (in)	Impact (ft/lbs)	Pipe Size (in)	Impact (ft/lbs)
1.5	30	5	100
2	30	6	120
2.5	40	8	160
3	60	10	160
4	90	12	160

There shall be no visible evidence of shattering or splitting when the energy is imposed.

::ADDITIONAL TESTING REQUIREMENTS FOR RING-TITE PVC PRESSURE PIPE

Test	ASTM 2241 100 psi	125 psi	160 psi	200 psi	250 psi
Long Term Pressure Test 1000 hours (psi)	210	270	340	420	530
Short Term Burst Test (psi)	315	400	500	630	800
Acetone Immersion Test A measure of proper fluxing and precise temperature control	20 Min.	20 Min.	20 Min.	20 Min.	20 Min.
Flattening Test Tests extrusion quality and ductility under slow loading conditions.	60% in 2-5 Min.	60% in 2-5 Min.	60% in 2-5 Min.	60% in 2-5 Min.	60% in 2-5 Min.

::TYPICAL PHYSICAL AND CHEMICAL PROPERTIES AND CAPACITIES

Property	ASTM D 2241 Pressure PVC Pipe	ASTM Test Method
ISO Hoop Stress at 73°F Short Term Bursting Strength (psi) Min.	6400	D 1599
1,000 Hour Strength (psi) Min.	4200	D 1598
Working Pressure Rating 73°F (% of rating at 73°F)	100%	
80°F (% of rating at 73°F)	88%	
100°F (% of rating at 73°F)	62%	
Chemical Resistance at 73°F Acids	Excellent	
Salts - Bases	Excellent	
Aliphatic Hydrocarbons (including crude oil)	Good	
Physical Properties at Std. Test Specimens Tensile Strength (psi) at 73°F Min.	7000	D 638
Thermal Expansion (in/100 ft/50°F change)	2"	
Fire Resistance	Self Extinguishing	
Flame Spread	10	E 162
Smoke Development	330	E 84
Coefficient of Flow Hazen & Williams	C = 150	
Mannings N Value	N= 0.009	

TB1)

CHAPTER VII

DESIGN OF BURIED PVC PIPE

A flexible pipe may be defined as a conduit that will deflect at least two percent without any sign of structural distress such as injurious cracking. For a conduit to behave as a flexible pipe when buried, it is required that the pipe be more yielding than the embedment soil surrounding it.

A flexible pipe derives its soil load carrying capacity from its flexibility. Under soil load, the pipe tends to deflect, thereby developing passive soil support at the sides of the pipe. At the same time, the ring deflection relieves the pipe of the major portion of the vertical soil load which is then carried by the surrounding soil through the mechanism of an arching action over the pipe. (See Chapter VI.)

The effective strength of the pipe-soil system is remarkably high. For example, tests at Utah State University indicate that a rigid pipe with a three-edge bearing strength of 3300 lb/ft (48.15 kN/m) buried in Class C bedding will fail with a soil load of 5000 lb/ft (72.95 kN/m). However, under the identical soil conditions and loading, PVC sewer pipe with a minimum pipe stiffness of 46 psi deflects only 5 percent. This deflection is far below that which could cause damage to the PVC pipe wall. Thus, in this example, the rigid pipe has failed but the flexible pipe has performed successfully.

Of course, in flat plate or three-edge loading, the rigid pipe will support much more than the flexible pipe. This anomaly tends to mislead many would-be flexible pipe users because they relate low flat plate supporting strength for flexible pipe to the in-soil load capacity. Flat plate or three-edge loading is an appropriate measure of load bearing strength for rigid pipes but not for flexible pipes.

Pipe Stiffness: The inherent strength of flexible pipe is called pipe stiffness which is measured, according to ASTM D 2412 Standard Test Method for External Loading Properties of Plastic Pipe by Parallel-Plate Loading, at an arbitrary datum of 5 percent deflection. Pipe stiffness is defined as:

EQUATION 7.1

$$PS = F/\Delta Y = \frac{EI}{0.149r^3} = \frac{6.71EI}{r^3}$$

For solid wall pipes Equation 7.1 can be rewritten as:

T81

EQUATION 7.2

$$PS = F/\Delta Y = \frac{6.71Et^3}{12r^3} = 0.559E\left[\frac{t}{r}\right]^3$$

Where:
- PS = Pipe Stiffness, lbf/in/in. or psi
- F = Force, lbs./Lin.
- ΔY = Vertical deflection, in.
- E = Modulus of elasticity, psi
- I = Moment of inertia of the wall cross-section per unit length of pipe, in^4/Lin. = in^3
- r = Mean radius of pipe, in.
- t = wall thickness, in.

For solid wall PVC pipe with outside diameter controlled dimensions (rather than I.D.) Equation 7.2 can be further simplified:

EQUATION 7.3

$$PS = 4.47\frac{E}{(DR - 1)^3}$$

Where: $DR = \frac{D_o}{t}$

The resulting PS values for various dimension ratios and E values of PVC pipe are as shown in Table 7.1.

In addition to altering the "I" value by changing the DR, alternative shapes can be employed. It is this option of more efficient shapes that has resulted in a variety of profile wall gravity PVC pipe products for sanitary and drain applications. Users are afforded the economy of a higher stiffness than a DR product of the same raw material quantity and strength.

Equation 7.1 shows that the pipe stiffness increases as the moment of inertia of the wall cross section increases. For a solid wall pipe the moment of inertia is equal to $\frac{t^3}{12}$ in^4/Lin., with the center of gravity being at the midpoint of the pipe wall.

T 81)

TABLE 7.1
PVC PIPE STIFFNESS (psi)

DR or SDR	Min. E = 400,000 psi	Min. E = 500,000 psi
64	7	9
51	14	18
42	26	32
41	28	35
35	46	57
33.5	52	65
32.5	57	71
28	91	114
26	115	144
25	129	161
21	224	279
18	364	455
17	437	546
14	815	1,019
13.5	916	1,145

In the case of a profile wall pipe, however, the calculation of the moment of inertia is more complex. First the center of gravity, or centroid, (C) must be calculated from a common x axis (the inside surface of the pipe) using Equation 7.4 (Figure 7.1).

EQUATION 7.4

$$Y' = \frac{\sum_i A_i y'_i}{\sum_i A_i}$$

T86 PREDICTED DEFLECTION

$$\Delta Y/D\,(\%) = \frac{K \times (L_p + L_i) \times 100}{(0.149 \times P_s) + (0.061 + Z + E_b)}$$

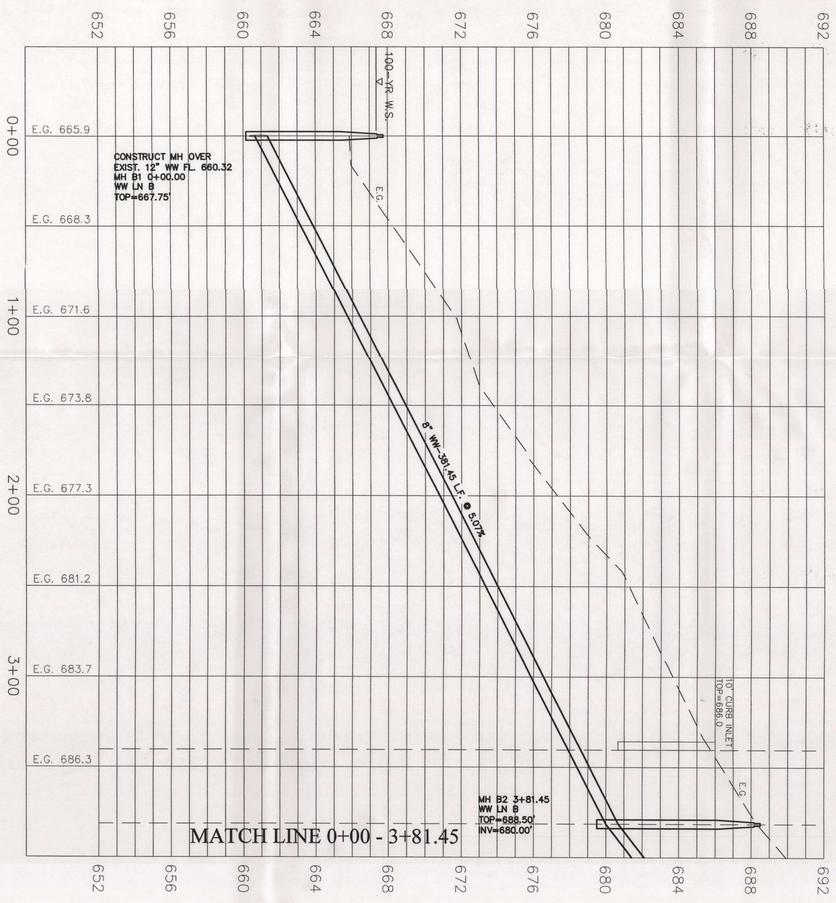
$$L_p = \frac{\gamma_g \times H}{144} = \frac{120 \times 10}{144} = 8.33 \text{ psi}$$

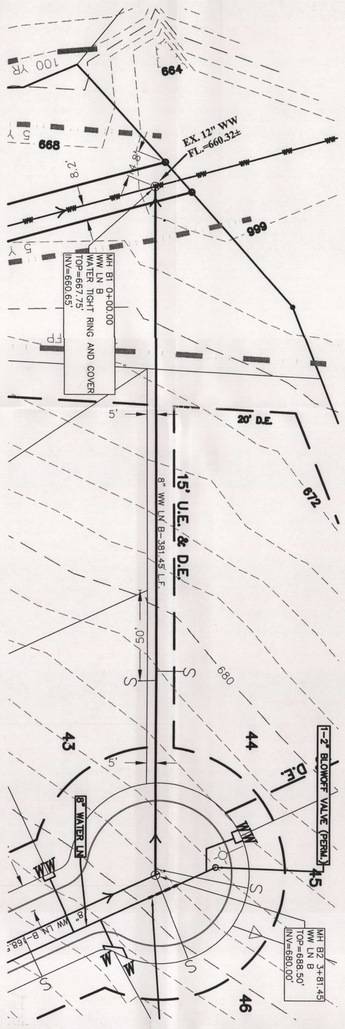
$L_i = 0$

$K = 0.110$

$$\Delta Y/D = \frac{0.110 \times (8.33 + 0) \times 100}{(0.149 \times 115) + (0.061 \times 1 \times 700)}$$

$$\Delta Y/D = 1.53\%$$





NOTE:
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HORZ. SCALE: 1"=40'
VERT. SCALE: 1"=4'

DATE:	OCTOBER 2012
DRAWN BY:	TAR
DESIGNED BY:	TAR
CHECKED BY:	AM
REVIEWED BY:	SH
PROJECT NUMBER:	042.001

SHEET 13 OF 20

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

WASTEWATER LINE "B"
STA: 0+00 - 3+81.45

CIVIL SITE CONSTRUCTION PLANS

STATE OF TEXAS
STEPHEN WADE HANZ
95422
LICENSED PROFESSIONAL ENGINEER
10/11/12

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TEXAS, 78130
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www.HMTNB.com
PH: (830)625-8555
FAX: (830)625-8556

NOTE:
REVEGETATE AREA OF DISTURBANCE AFTER FINAL GRADING.

SCALE: 1"=50'

EX. MH
TOP=674.65
FL.=667.27

20' WIDE UTILITY EASEMENT

N 50°09'51" E

820 L.F. SILT FENCE

EX MH UNIT 18
TOP=694.10'
INV=687.10'
TIE TO EXIST.
8" STUB-OUT
10 LF @ 1.26%
INV=687.22'

EXIST. 6" GATE VALVE W/BOX
EXIST. 2" BLOWOFF VALVE
REMOVE 2" BLOWOFF VALVE
AND TIE TO EXISTING
8" WATER MAIN

MH C1 0+90.00
WW LN C
TOP=699.29'
INV=688.35'

MH A1 0+00.00
WW LN A
WATER TIGHT RING
AND COVER
TOP=671.00'
INV=663.84

EX. 12" WW
FL.=663.51±

EXIST. 8" WATER MAIN

583.61'

EX. 12" WW 680.85 L.F.

590.85'

EX. 12" WW
FL.=660.32±

MH B1 0+00.00
WW LN B
WATER TIGHT RING AND COVER
TOP=667.75'
INV=660.65'

EX. MH
TOP=665.85
FL.=658.84

1-8" CUT-IN 90° BEND
1-8" VALVE
1-8" 11.25° BEND

2-45° BENDS 8"

MH A2 2+00.00
WW LN A
TOP=689.00'
INV=682.40

580 L.F. SILT FENCE

MARCIA BORCHERS MCCLOTHLIN
AND GEORGIA BORCHERS DUETTRA
80.4 ACRE TRACT
DOC. NO. 200106011095

1-22½° BEND 8"

AREA TO REMAIN
UNDISTURBED
FOR SUBDIVISION
CONSTRUCTION

402 L.F. SILT FENCE

1-8"X6" TEE
1-6" GATE VALVE & BOX
1-FIRE HYDRANT

1-22½° BEND 8"

MH C2 2+00.00
WW LN C
TOP=708.31'
INV=699.59'

2-11 ¼° BENDS 8"

AREA TO REMAIN
UNDISTURBED
FOR SUBDIVISION
CONSTRUCTION

430 L.F. SILT FENCE

BLK -22-

BLK -19-

REMOVE ABANDONED
WATER MAIN THIS AREA
±350 L.F.

Dean Word Co.
5.05 Acre Tract
Doc# 200106011097

WILLIAMS WAY
(50' R.O.W.)

SYDNEY CIR
(50' R.O.W.)

6" WATER LN

MH B5 11+75.00
WW LN B
TOP=731.64'
INV=725.00'

8+79.76 WW LN B
CENTER ONE 20' JOINT
OF CLASS 160 PIPE
UNDER WATER MAIN

MH B4 8+69.76
WW LN B
TOP=719.76'
INV=713.00'

5+39.76 WW LN B
CENTER ONE 20' JOINT
OF CLASS 160 PIPE
UNDER WATER MAIN

MH B3 5+50.00
WW LN B
TOP=700.32'
INV=693.00'

STAGING
AREA

ACORN DRIVE
(50' R.O.W.)

STA: 13+58.02
TIE TO
EX. MH
UNIT 18
TOP=733.60
FL.=729.42'

EX 8" WW LN
EX 8" WTR LN

8" WW LN B-183.02 L.F.
8" WW LN B-305.24 L.F.
8" WW LN C-319.76 L.F.
8" WW LN B-168.55 L.F.

1-2" BLOWOFF VALVE (PERM.)

MH B2 3+81.45
WW LN B
TOP=688.50'
INV=680.00'

UNIT 18
BLK -2-

1-8"X6" TEE
1-6" GATE VALVE & BOX
1-FIRE HYDRANT

1-CUT-IN TEE

CENTER ONE 18" JOINT
16" STEEL CASING OVER
8" WATER MAIN @
WASTEWATER MH.

EXIST. 8" GATE VALVE W/BOX
EXIST. 2" BLOWOFF VALVE
REMOVE 2" BLOWOFF VALVE
AND TIE TO EXISTING
8" WATER MAIN

CENTER ONE 18" JOINT
16" STEEL CASING OVER
8" WATER MAIN @
WASTEWATER MH.

1-8"X6" TEE
1-8" GATE VALVE & BOX
1-FIRE HYDRANT

1-8"X6" TEE
1-8" GATE VALVE
WITH BOX

CENTER ONE 18" JOINT
16" STEEL CASING OVER
8" WATER MAIN @
WASTEWATER MH.

1-8"X6" TEE
1-6" GATE VALVE & BOX
1-FIRE HYDRANT

1-8" TEE
2-8" GATE VALVES
WITH BOXES

CENTER ONE 18" JOINT
16" STEEL CASING OVER
8" WATER MAIN @
WASTEWATER MH.

EXIST. 8" WATER MAIN

1160 L.F. SILT FENCE

LANDA PARK HIGHLANDS
(68/618)

RIDGEVIEW SUBDIVISION
(117/286)

BLOCK -A-

EDEN HEIGHTS, INC.
3.97 ACRE TRACT
(287/79-82)

LEGEND

- SF — SF — SILT FENCE
- STABILIZED CONSTRUCTION ENTRANCE
- ROCK BERM
- FLOW ARROW
- ABOVE GRADE CONCRETE WASHOUT PIT SEE SHEET 4 FOR DETAIL

410 N. SEGUIN AVE.
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10/11/2012

SITEPLAN WATER& WASTEWATER

CIVIL SITE CONSTRUCTION PLANS

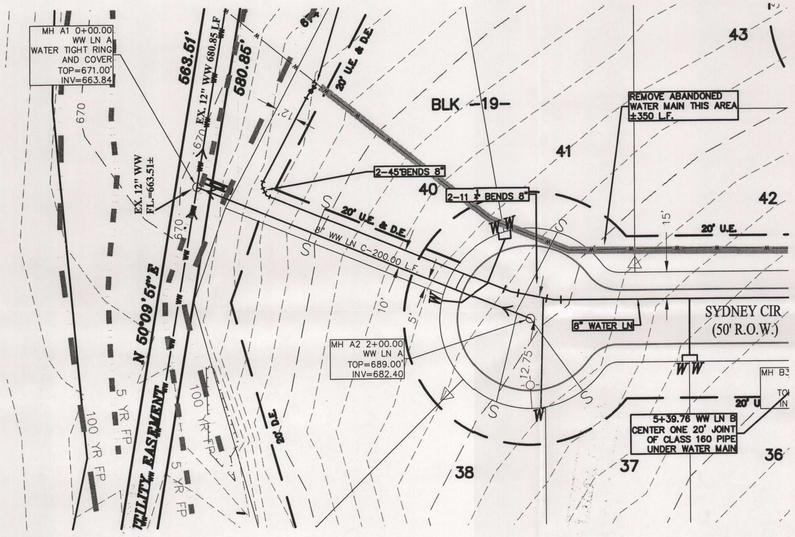
OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

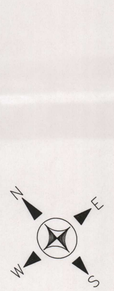
GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE: OCTOBER 2012
DRAWN BY: TAR
DESIGNED BY: TAR
CHECKED BY: AM
REVIEWED BY: SH
PROJECT NUMBER: 042.001

SHEET 11 OF 20

Drawing Name: N:_Projects\042- Greg Meyer\042.001.101 - Oakwood Estates U19\Construction Plans\OAKWOOD19_SITE-WWW.dwg User: troxler Oct 11, 2012 - 3:03pm





HORZ. SCALE: 1"=40'
VERT. SCALE: 1"=4'

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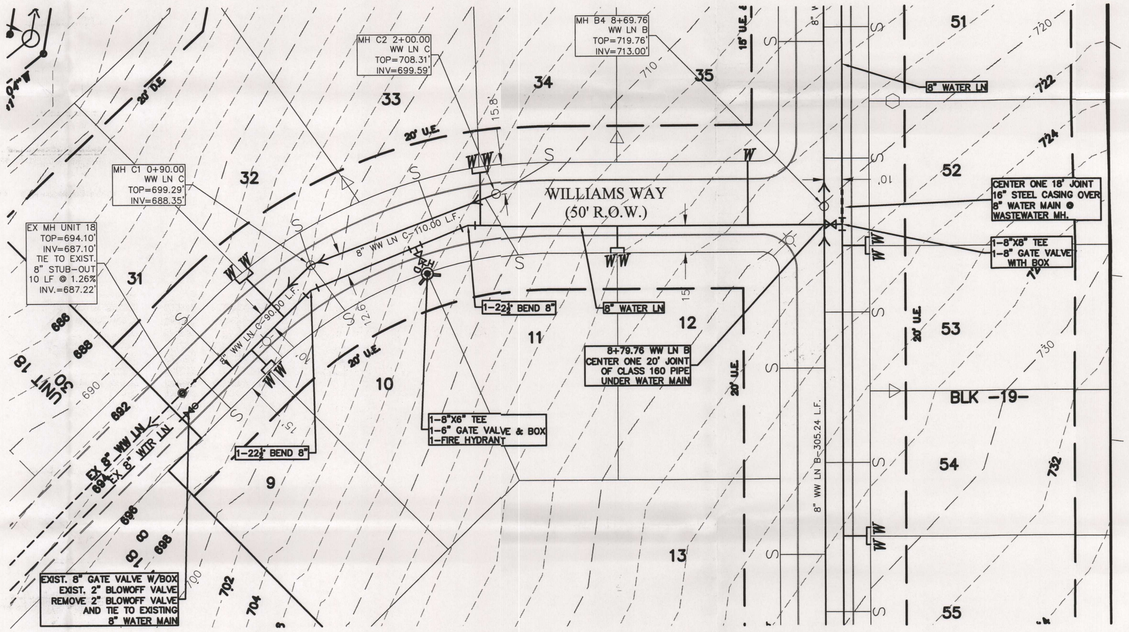

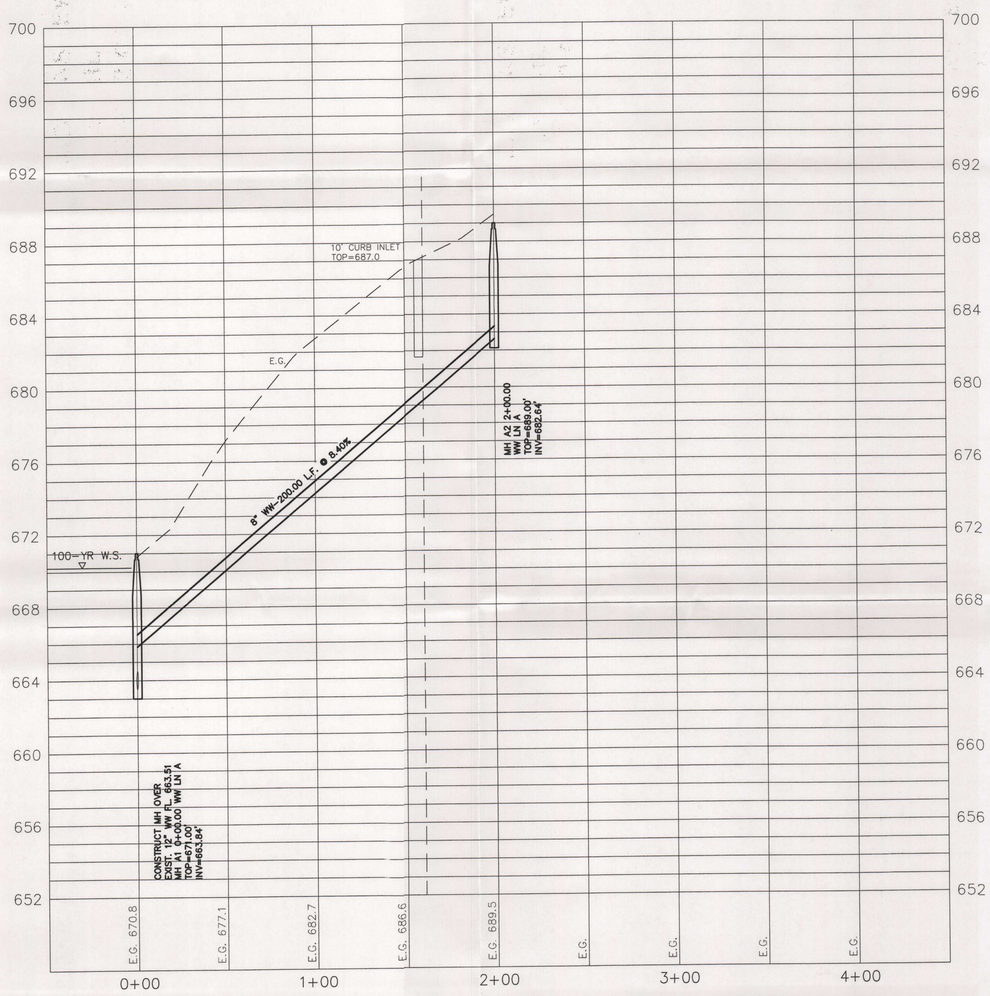

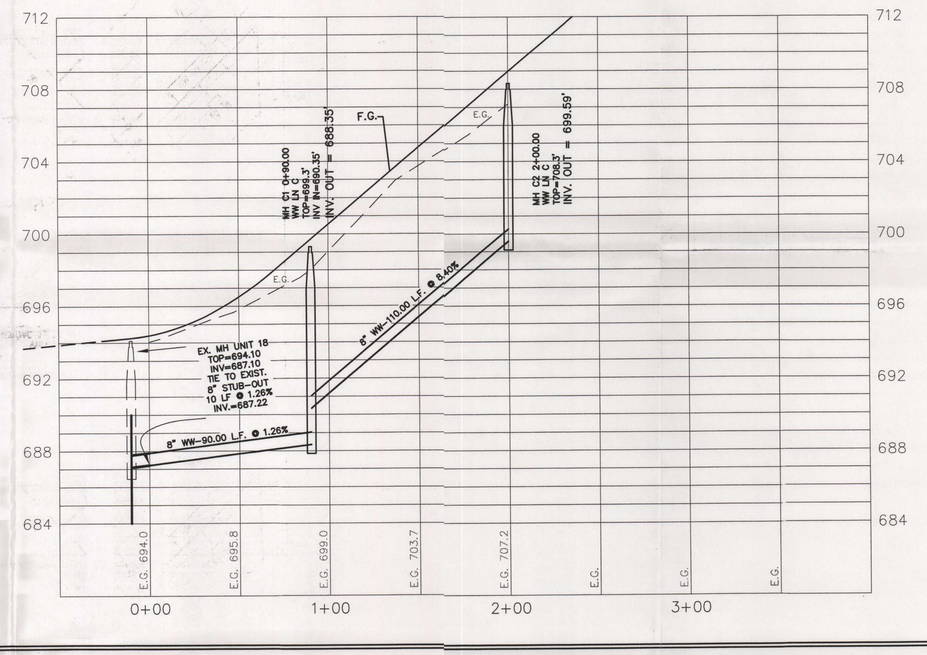

HORZ. SCALE: 1"=40'
VERT. SCALE: 1"=4'

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Stephen W Hanz, PE
10/11/2012

WASTEWATER LINES "A" & "C"

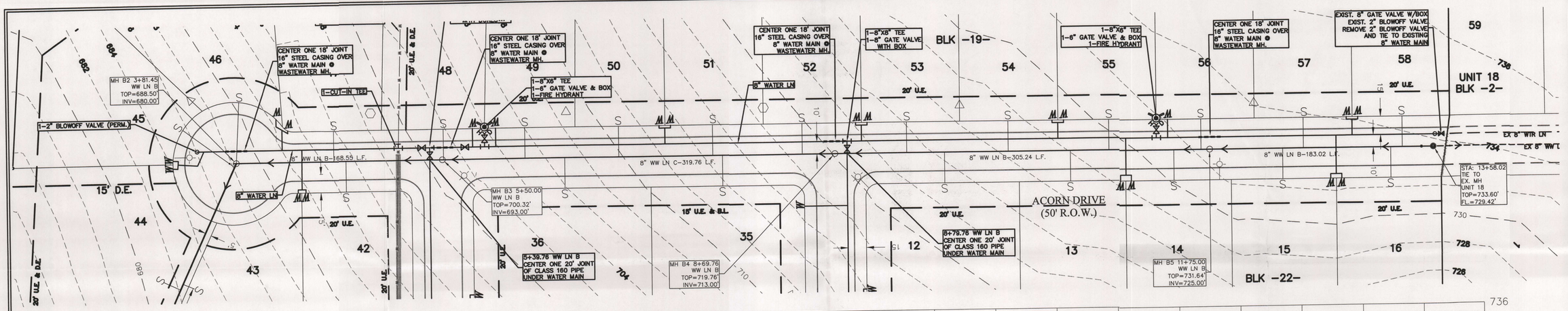
CIVIL SITE CONSTRUCTION PLANS

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE: OCTOBER 2012
DRAWN BY: TAR
DESIGNED BY: TAR
CHECKED BY: AM
REVIEWED BY: SH
PROJECT NUMBER: 042.001

SHEET
12
OF 20



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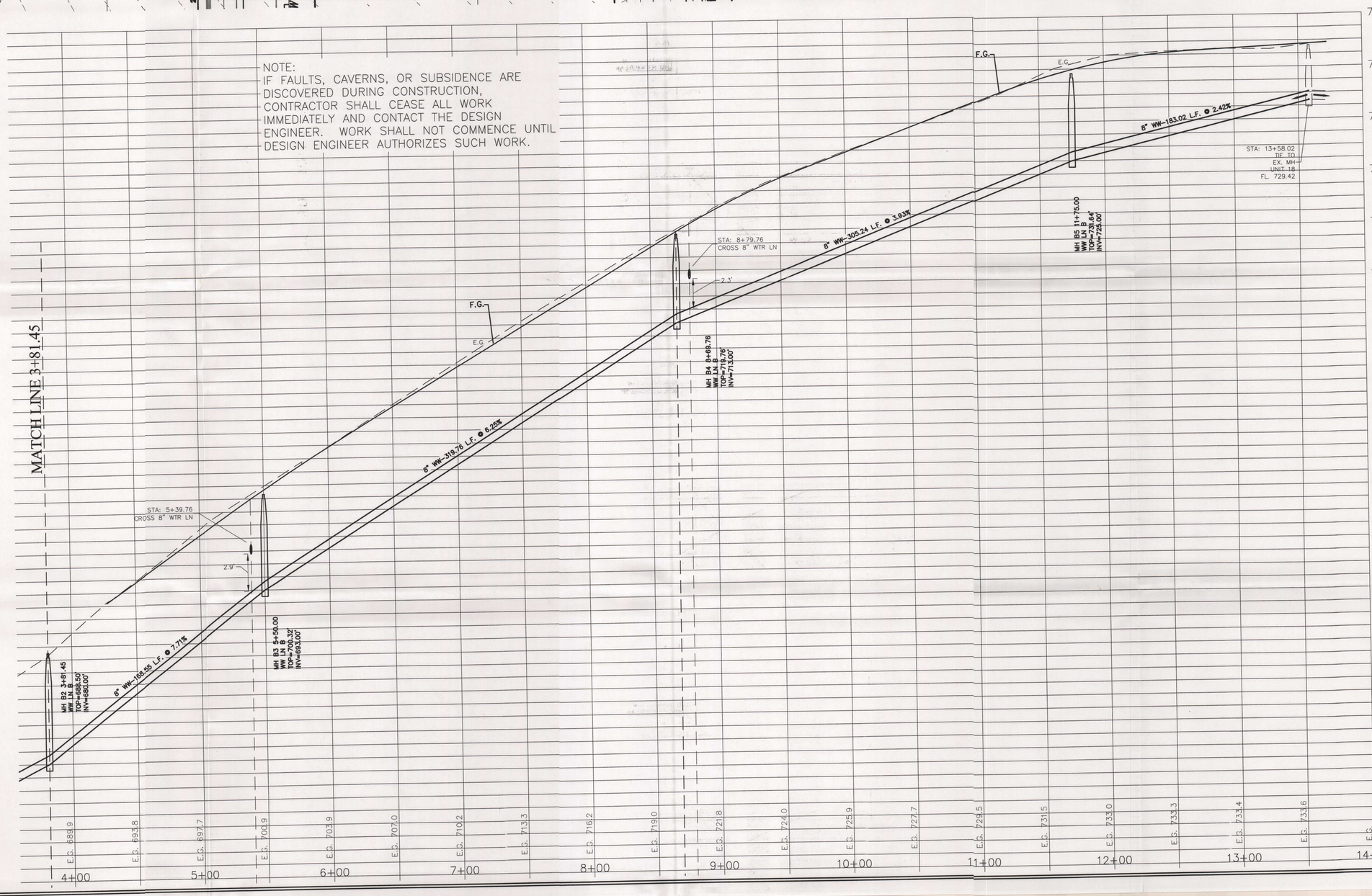

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STATE OF TEXAS
STEPHEN WADE HANZ
95422
LICENSED
PROFESSIONAL ENGINEER
10/11/2012

WASTEWATER LINE "B"
STA: 3+81.45 - 14+00

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

CIVIL SITE CONSTRUCTION PLANS

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CHECKED BY:	AM
REVIEWED BY:	SH
PROJECT NUMBER:	042.001

SHEET
14
OF 20

Drawing Name: N:_Projects\042-_Greg Meyer\042.001.101 - Oakwood Estates U19\Construction Plans\OAKWOOD19_SHT--WWW.dwg User: trovier Oct 11, 2012 - 11:48am

Temporary Stormwater Section
for Regulated Activities
on the Edwards Aquifer Recharge Zone
and Relating to 30 TAC §213.5(b)(4)(A), (B), (D)(I) and (G); Effective June 1, 1999

REGULATED ENTITY NAME: OAKWOOD ESTATE UNIT NINETEEN

POTENTIAL SOURCES OF CONTAMINATION
Examples: Fuel storage and use, chemical storage and use, use of asphaltic products, construction vehicles tracking onto public roads, and existing solid waste.

1. Fuels for construction equipment and hazardous substances which will be used during construction:

__ Aboveground storage tanks with a cumulative storage capacity of less that 250 gallons will be stored on the site for less than one (1) year.
__ Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.
__ Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An **Aboveground Storage Tank Facility Plan** application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.
_X_ Fuels and hazardous substances will not be stored on-site.

2. _X_ **ATTACHMENT A - Spill Response Actions**. A description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is provided at the end of this form.

3. _N/A_ Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.

4. _X_ **ATTACHMENT B - Potential Sources of Contamination.** Describe in an attachment at the end of this form any other activities or processes which may be a potential source of contamination.
__ There are no other potential sources of contamination.

SEQUENCE OF CONSTRUCTION

5. _X_ **ATTACHMENT C - Sequence of Major Activities.** A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is provided at the end of this form. For each activity described, an estimate of the total area of the site to be disturbed by each activity is given.

6. _X_ Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: Blieders Creek

TEMPORARY BEST MANAGEMENT PRACTICES (TBMPs)
Erosion control examples: tree protection, interceptor swales, level spreaders, outlet stabilization, blankets or matting, mulch, and sod. Sediment control examples: stabilized construction exit, silt fence, filter dikes, rock berms, buffer strips, sediment traps, and sediment basins. Please refer to the Technical Guidance Manual for guidelines and specifications. **All structural BMPs must be shown**

on the site plan.

7. _X_ **ATTACHMENT D - Temporary Best Management Practices and Measures.** A description of the TBMPs and measures that will be used during and after construction are provided at the end of this form. For each activity listed in the sequence of construction, include appropriate control measures and the general timing (or sequence) during the construction process that the measures will be implemented.

_X_ TBMPs and measures will prevent pollution of surface water, groundwater, and stormwater. The construction-phase BMPs for erosion and sediment controls have been designed to retain sediment on site to the extent practicable. The following information has been provided in the attachment at the end of this form

a. A description of how BMPs and measures will prevent pollution of surface water, groundwater or stormwater that originates upgradient from the site and flows across the site.

b. A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.

c. A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.

d. A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring sensitive features identified in either the geologic assessment, TCEQ inspections, or during excavation, blasting, or construction.

8. The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.

__ **ATTACHMENT E - Request to Temporarily Seal a Feature.** A request to temporarily seal a feature is provided at the end of this form. The request includes justification as to why no reasonable and practicable alternative exists for each feature.

_X_ There will be no temporary sealing of naturally-occurring sensitive features on the site.

9. _X_ **ATTACHMENT F - Structural Practices.** Describe the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site. Placement of structural practices in floodplains has been avoided.

10. _X_ **ATTACHMENT G - Drainage Area Map.** A drainage area map is provided at the end of this form to support the following requirements.

__ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.

__ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.

__ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not attainable, but other TBMPs and measures will be used in combination to protect down slope and side slope boundaries of the construction area.

_X_ There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.

11. _N/A_ **ATTACHMENT H - Temporary Sediment Pond(s) Plans and Calculations.** Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure has been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are provided as at the end of this form.

12. _X_ **ATTACHMENT I - Inspection and Maintenance for BMPs.** A plan for the inspection of temporary BMPs and measures and for their timely maintenance, repairs, and, if necessary, retrofit is provided at the end of this form. A description of documentation procedures and recordkeeping practices is included in the plan.

13. _X_ All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.

14. _X_ If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).

15. _X_ Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.

16. _X_ Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).

SOIL STABILIZATION PRACTICES

Examples: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, or preservation of mature vegetation.

17. _X_ **ATTACHMENT J - Schedule of Interim and Permanent Soil Stabilization Practices.** A schedule of the interim and permanent soil stabilization practices for the site is attached at the end of this form.

18. _X_ Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.

19. _X_ Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

ADMINISTRATIVE INFORMATION

20. _X_ All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.

21. _X_ If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.

22. _X_ Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **TEMPORARY STORMWATER SECTION** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Stephen Hanz, P.E.
Print Name of Customer/Agent

Stephen W. Hanz, PE
Signature of Customer/Agent

10/02/2012
Date

TEMPORARY STORMWATER SECTION

ATTACHMENT A

Spill Response Actions

Contractor to notify all appropriate authorities if more than 25 gallons of hydrocarbons are spilled. The construction plans include the required notes regarding appropriate spill response actions as directed by TECQ. There will be no temporary storage vessels of fuel or hydro carbons to be stored on site.

If spills of any hydrocarbons occur, construction must contain spills by immediate action. Earthen materials must be kept readily available to provide a Dike. Sand should be used to help soak fuels. Property disposal of any materials used will be required.

Contractor must promote job site awareness to all employees involved. All employees must be made aware of the provisions in this report.

Spill Prevention and Control

The objective of this section is to describe measures to prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

(1) Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills. Employees should also be aware of when spill must be reported to the TCEQ. Information available in 30 TAC 327.4 and 40 CFR 302.4

(2) Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.

(3) Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).

(4) Establish a continuing education program to indoctrinate new employees.

(5) Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

(1) To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110, 117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.

(2) Store hazardous materials and wastes in covered containers and protect from vandalism.

(3) Place a stockpile of spill cleanup materials where it will be readily accessible.

(4) Train employees in spill prevention and cleanup.

(5) Designate responsible individuals to oversee and enforce control measures.

(6) Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.

(7) Do not bury or wash spills with water.

(8) Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance wit the provisions in applicable BMP's.

(9) Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with applicable regulations.

(10) Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.

(11) Place Material Safety Data Sheets (MSDS), as well as proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.

(12) Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

(1) Clean up leaks and spills immediately.

(2) Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.

(3) Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMP's in this section for specific information.

Minor Spills

(1) Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

(2) Use absorbent materials on small spills rather than hosing down or burying the spill.

(3) Absorbent materials should be promptly removed and disposed of properly.

(4) Follow the practice below for a minor spill:

(5) Contain the spread of the spill.

(6) Recover spilled materials.

(7) Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

Spills should be cleaned up immediately:

(1) Contain spread of the spill.

(2) Notify the project foreman immediately.

(3) If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with the absorbent materials and do not let the spill spread widely.

(4) If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.

(5) If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

For significant or hazardous spills that are in reportable quantities:

(1) Notify the TCEQ by telephone as soon as possible and within 24 hours at 512-339-2929 (Austin) or 210-490-3096 (San Antonio) between 8 AM and 5 PM. After hours, contact the Environmental Release Hotline at 1-800-832-8224. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

(2) For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110, 119 and 302, the contractor should notify the National Response Center at (800) 424-8802.

(3) Notification should first be made by telephone and followed up with a written report.

(4) The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

(5) Other agencies which may need to be consulted include, but are not limited to, the City of Police Department, County Sheriff Office, Fire Departments, etc.

More information on spill rules and appropriate responses is available on the TCEQ website at: http://www.tnrcc.state.tx.us/enforcement/emergency response.html

Vehicle and Equipment Maintenance

(1) If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.

(2) Regularly inspect onsite vehicles and equipment for leaks and repair immediately.

(3) Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.

(4) Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.

(5) Place drip pans or absorbent materials under paving equipment when not in use.

(6) Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.

(7) Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.

(8) Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.

(9) Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are not sure it is not leaking.

Vehicle and Equipment Fueling

(1) If fueling must occur on site, use designated areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.

(2) Discourage "topping off" of fuel tanks.

(3) Always use secondary containment, such as a drain pan, when fueling to catch spills/leaks.

TEMPORARY STORMWATER SECTION

SECTION B

Potential Sources of Contamination

This project includes the construction of 1,748.02 L.F. of 8" gravity wastewater line. The possible sources of contamination include fuel spills by the Contractor while refueling equipment. Other smaller quantities of solvent for construction may be present. Contractor shall keep all fuel transfers and any other contaminants used secure.

Please see Attachment "A" for response actions.

TEMPORARY STORMWATER SECTION

ATTACHMENT C

Sequence of Major Activities

Construction sequencing

1. Call New Braunfels Utilities and TCEQ 48-hours prior to beginning any work. Call the Dig Test for utility locations.
2. Install temporary erosion controls prior to any clearing and grubbing.
3. Begin site clearing of the street right-of-way and drainage easement (2.9 Acres Disturbance).
4. Inspect erosion controls at weekly intervals, before and after significant rainfall events to insure they are functioning properly.
5. Cut utility trench. (2.9 Acres already disturbed)
6. Install the utilities including drainage infrastructure.
7. Complete street paving.
8. Complete all construction.
9. Contact project engineer to inspect the site. Final City inspection to be scheduled.
10. Complete any necessary final dress up areas disturbed.
11. Remove and dispose of temporary erosion controls after site revegetation has occurred.

2.9 acres soil disturbance (total) for SCS, street and drainage construction.

TEMPORARY STORMWATER SECTION
ATTACHMENT D
Temporary Best Management Practices and Measures

Temporary erosion controls are proposed for this project to include silt fence, rock berms, and stabilized construction entrances and exits.

3,392 Lineal feet of silt fence will be used. This will be placed downgradient of all proposed construction. Please see Sheet #5 of the plans.

A stabilized construction entrance at the beginning of the project will be required. Please see Sheet #5 of the plans.

A contractor's staging area has been shown on Sheet # 5 as well. All other areas not associated with construction will also be protected by restricting the contractor from disturbing areas not necessary for construction.

A. All upgradient stormwater will be diverted into the interceptor channel that is shown on Sheet #9. This channel intercepts approximately 13.5 acres and will divert these flows around the SCS lines.

B. There is no known surface streams of ground water that originates on this site. Silt fence, rock berms and areas that remain undisturbed with natural vegetation in place.

C. From the TCEQ RG 348 dated July, 2005, silt fences and rock berms provide protection. In addition, the contractor has been directed to minimize disturbance to just the SCS line and reasonable working space.

D. There are no sensitive features that were identified in the Geologic Assessment by Geo Consul dated October 3, 2012.

TEMPORARY STORMWATER SECTION

ATTACHMENT F

Structural Practices

During construction, silt fence and rock berms will be used until construction is complete and vegetation and paving has been established. Rough cutting of the proposed streets will divert flows from entering the trench area. Specifically Channel C, constructed with this unit will divert upgradient flows away from the construction of the SCS lines. Please see Sheet # 9 for the location of Channel C. This Channel diverts 13.5 acres at upgradient flows away from the SCS lines. Two Rock Berms in series will be used during construction. The channel will be constructed on concrete and has design slopes ranging from 0.63% to 10.00%. After construction is complete the contractor shall revegetate all disturbed areas.

In addition, the contractor will be directed to minimize site disturbance and avoid having equipment in areas that are not necessary for the construction of the SCS lines. Natural vegetation shall be left undisturbed and will help remove sediment if any bypass at silt fences or other structural measures occurs.

Oakwood Unit 19 - Proposed Onsite Hydrology Calculations Summary																	
PT.	Area ID	Area (ac)	"C" Value	"CA"	Tc (min)	I2 (in/hr)	I10 (in/hr)	I25 (in/hr)	I100 (in/hr)	K2	K10	K25	K100	Q2 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)	Location
1	A-1	5.00	0.58	2.90	15.00	4.20	6.31	7.54	9.87	1.00	1.00	1.10	1.25	12.17	18.28	24.06	35.79	
2	A-1 TO A-2	9.97	0.58	5.78	15.00	4.20	6.31	7.54	9.87	1.00	1.00	1.10	1.25	24.28	36.46	47.98	71.36	
3	A-1 TO A-3	12.02	0.58	6.97	15.00	4.20	6.31	7.54	9.87	1.00	1.00	1.10	1.25	29.27	43.96	57.85	86.03	
4	A-4	4.45	0.58	2.58	15.00	4.20	6.31	7.54	9.87	1.00	1.00	1.10	1.25	10.83	16.27	21.42	31.85	
5	A-1 TO A-5	17.03	0.58	9.88	15.00	4.20	6.31	7.54	9.87	1.00	1.00	1.10	1.25	41.46	62.28	81.96	121.89	
6	A-6	1.36	0.58	0.79	15.00	4.20	6.31	7.54	9.87	1.00	1.00	1.10	1.25	3.31	4.97	6.55	9.73	

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PROFESSIONAL ENGINEER
Stephen W. Hanz, PE
10/11/2012

DRAINAGE AREA PLAN & EROSION CONTROL MEASURES

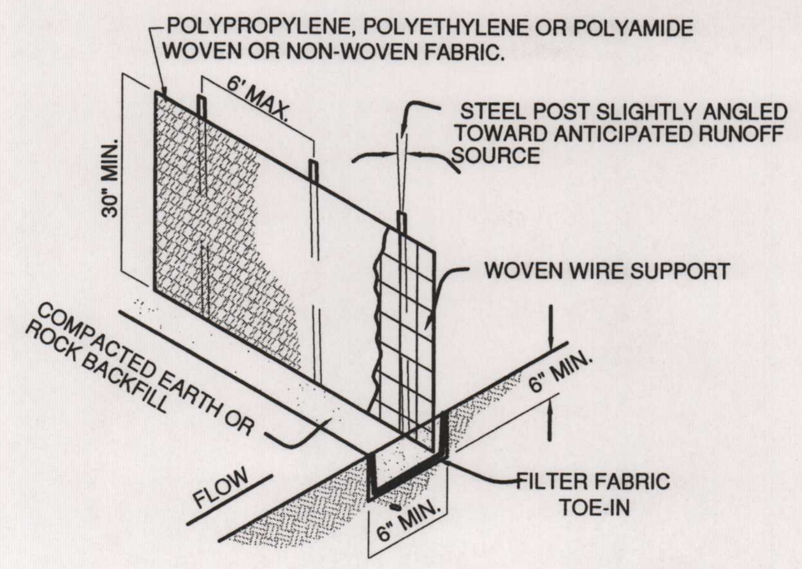
CIVIL SITE CONSTRUCTION PLANS

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE:	OCTOBER 2012
DRAWN BY:	TAR
DESIGNED BY:	TAR
CHECKED BY:	AM
REVIEWED BY:	SH
PROJECT NUMBER:	042.001

SHEET 5 OF 20



SILT FENCE

MATERIALS:

(1) SILT FENCE MATERIAL SHOULD BE POLYPROPYLENE, POLYETHYLENE OR POLYAMIDE WOVEN OR NONWOVEN FABRIC. THE FABRIC WIDTH SHOULD BE 36 INCHES, WITH A MINIMUM UNIT WEIGHT OF 4.5 OZ/YD, MULLEN BURST STRENGTH EXCEEDING 190 LB/IN2, ULTRAVIOLET STABILITY EXCEEDING 70%, AND MINIMUM APPARENT OPENING SIZE OF U.S. SIEVE NO. 30.

(2) FENCE POSTS SHOULD BE MADE OF HOT ROLLED STEEL, AT LEAST 4 FEET LONG WITH TEE OR YBAR CROSS SECTION, SURFACE PAINTED OR GALVANIZED, MINIMUM NOMINAL WEIGHT 1.25 LB/FT2, AND BRINDELL HARDNESS EXCEEDING 140.

(3) WOVEN WIRE BACKING TO SUPPORT THE FABRIC SHOULD BE GALVANIZED 2" X 4" WELDED WIRE, 12 GAUGE MINIMUM.

INSTALLATION:

(1) STEEL POSTS, WHICH SUPPORT THE SILT FENCE, SHOULD BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POST MUST BE EMBEDDED A MINIMUM OF 1- FOOT DEEP AND SPACED NOT MORE THAN 8 FEET ON CENTER. WHERE WATER CONCENTRATES, THE MAXIMUM SPACING SHOULD BE 6 FEET.

(2) LAY OUT FENCING DOWN-SLOPE OF DISTURBED AREA, FOLLOWING THE CONTOUR AS CLOSELY AS POSSIBLE. THE FENCE SHOULD BE SITED SO THAT THE MAXIMUM DRAINAGE AREA IS ¼ ACRE/100 FEET OF FENCE.

(3) THE TOE OF THE SILT FENCE SHOULD BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWN-SLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TRENCHED IN (E.G., PAVEMENT OR ROCK OUTCROP), WEIGHT FABRIC FLAP WITH 3 INCHES OF PEA GRAVEL ON UPHILL SIDE TO PREVENT FLOW FROM SEEPING UNDER FENCE.

(4) THE TRENCH MUST BE A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.

(5) SILT FENCE SHOULD BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POST. THERE SHOULD BE A 3-FOOT OVERLAP, SECURELY FASTENED WHERE ENDS OF FABRIC MEET.

(6) SILT FENCE SHOULD BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

INSPECTION AND MAINTENANCE GUIDELINES:

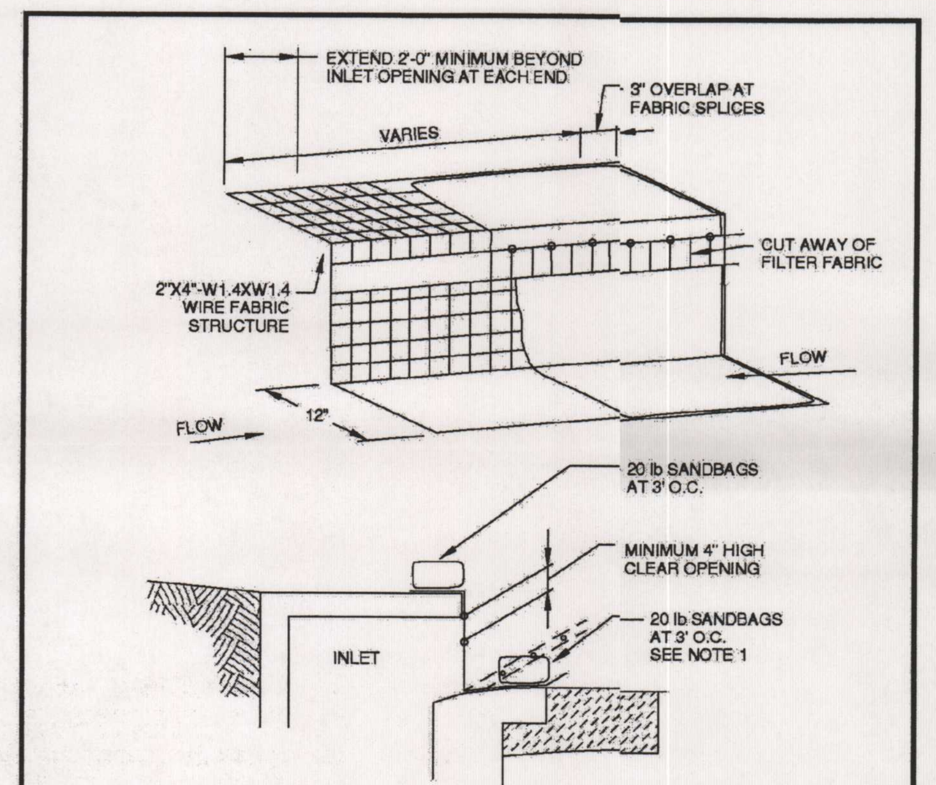
(1) INSPECT ALL FENCING WEEKLY, AND AFTER ANY RAINFALL.

(2) REMOVE SEDIMENT WHEN BUILDUP REACHES 6 INCHES.

(3) REPLACE ANY TORN FABRIC OR INSTALL A SECOND LINE OF FENCING PARALLEL TO THE TORN SECTION.

(4) REPLACE OR REPAIR ANY SECTIONS CRUSHED OR COLLAPSED IN THE COURSE OF CONSTRUCTION ACTIVITY. IF A SECTION OF FENCE IS OBSTRUCTING VEHICULAR ACCESS, CONSIDER RELOCATING IT TO A SPOT WHERE IT WILL PROVIDE EQUAL PROTECTION, BUT WILL NOT OBSTRUCT VEHICLES. A TRIANGULAR FILTER DIKE MAY BE PREFERABLE TO A SILT FENCE AT COMMON VEHICLE ACCESS POINTS.

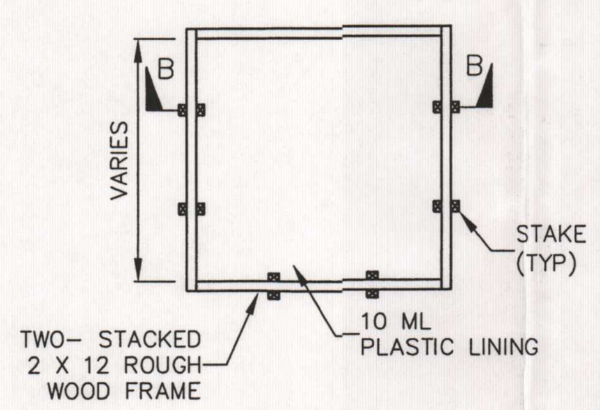
(5) WHEN CONSTRUCTION IS COMPLETE, THE SEDIMENT SHOULD BE DISPOSED OF IN A MANNER THAT WILL NOT CAUSE ADDITIONAL SILTATION AND THE PRIOR LOCATION OF THE SILT FENCE SHOULD BE REVEGETATED. THE FENCE ITSELF SHOULD BE DISPOSED OF IN AN APPROVED LANDFILL.



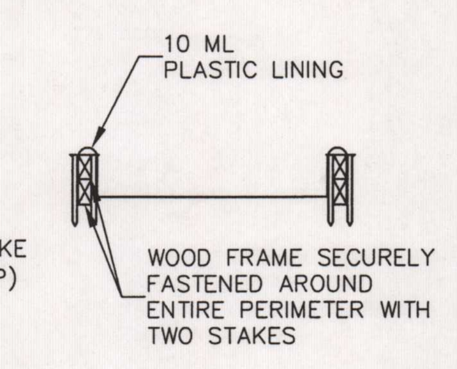
NOTES:

1. WHERE MINIMUM CLEARANCES CAUSE TRAFFIC TO DRIVE IN THE GUTTER, THE CONTRACTOR MAY SUBSTITUTE A 1" X 4" BOARD SECURED WITH CONCRETE NAILS 3' O.C. NAILED INTO THE GUTTER IN LIEU OF SANDBAGS TO HOLD THE FILTER DIKE IN PLACE. UPON REMOVAL, CLEAN ANY DIRT/DEBRIS FROM NAILING LOCATIONS, APPLY CHEMICAL SANDING AGENT AND APPLY NON-SHRINK GROUT FLUSH WITH SURFACE OF GUTTER.
2. A SECTION OF FILTER FABRIC SHALL BE REMOVED AS SHOWN ON THIS DETAIL OR AS DIRECTED BY THE ENGINEER OR DESIGNATED REPRESENTATIVE. FABRIC MUST BE SECURED TO WIRE BACKING WITH CLIPS OR HOG RINGS AT THIS LOCATION.
3. DAILY INSPECTION SHALL BE MADE BY THE CONTRACTOR AND SILT ACCUMULATION MUST BE REMOVED WHEN DEPTH REACHES 2".
4. CONTRACTOR SHALL MONITOR THE PERFORMANCE OF INLET PROTECTION DURING EACH RAINFALL EVENT AND IMMEDIATELY REMOVE THE INLET PROTECTIONS IF THE STORM-WATER BEGINS TO OVER-TOP THE CURB.
5. INLET PROTECTIONS SHALL BE REMOVED AS SOON AS THE SOURCE OF SEDIMENT IS STABILIZED.

NBU NEW BRAUNFELS UTILITIES WATER SYSTEMS ENGINEERING	DRAWN BY: H Shadrock / APPROVED BY:	STANDARD DRAWING: FILTER DIKE CURB INLET PROTECTION			
		UPDATED: 4-29-03	SCALE: N.T.S.	SHEET: 1 OF 1	DRAWING NO. 505



PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"



SECTION B-B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.

CONCRETE WASHOUT AREAS

THE PURPOSE OF CONCRETE WASHOUT AREAS IS TO PREVENT OR REDUCE THE DISCHARGE OF POLLUTANTS TO STORMWATER FROM CONCRETE WASTE BY CONDUCTING WASHOUT OFFSITE, PERFORMING ONSITE WASHOUT IN A DESIGNATED AREA, AND TRAINING EMPLOYEES AND SUBCONTRACTORS.

THE FOLLOWING STEPS WILL HELP REDUCE STORMWATER POLLUTION FROM CONCRETE WASTES:

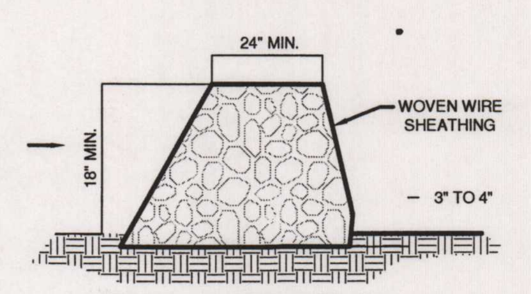
- INCORPORATE REQUIREMENTS FOR CONCRETE WASTE MANAGEMENT INTO MATERIAL SUPPLIER AND SUBCONTRACTOR AGREEMENTS.
- AVOID MIXING EXCESS AMOUNTS OF FRESH CONCRETE.
- PERFORM WASHOUT OF CONCRETE TRUCKS IN DESIGNATED AREAS ONLY.
- DO NOT WASH OUT CONCRETE TRUCKS INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS.
- DO NOT ALLOW EXCESS CONCRETE TO BE DUMPED ONSITE, EXCEPT IN DESIGNATED AREAS.

FOR ONSITE WASHOUT:

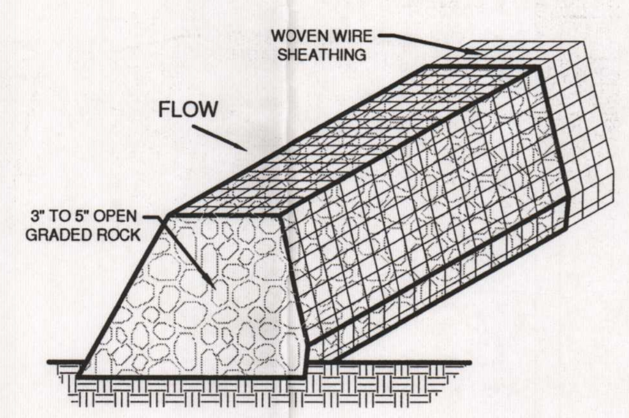
- LOCATE WASHOUT AREA AT LEAST 50 FEET FROM SENSITIVE FEATURES, STORM DRAINS, OPEN DITCHES, OR WATER BODIES. DO NOT ALLOW RUNOFF FROM THIS AREA BY CONSTRUCTING A TEMPORARY PIT OR BERMED AREA LARGE ENOUGH FOR LIQUID AND SOLID WASTE.
- WASH OUT WASTES INTO THE TEMPORARY PIT WHERE THE CONCRETE CAN SET, BE BROKEN UP, AND THEN DISPOSED PROPERLY.

BELOW GRADE CONCRETE WASHOUT FACILITIES ARE TYPICAL. THESE CONSIST OF A LINED EXCAVATION SUFFICIENTLY LARGE TO HOLD EXPECTED VOLUME OF WASHOUT MATERIAL. ABOVE GRADE FACILITIES ARE USED IF EXCAVATION IS NOT PRACTICAL. TEMPORARY CONCRETE WASHOUT FACILITY (TYPE ABOVE GRADE) SHOULD BE CONSTRUCTED AS SHOWN ON THE DETAILS AT THE END OF THIS SECTION, WITH SUFFICIENT QUANTITY AND VOLUME TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS. PLASTIC LINING MATERIAL SHOULD BE A MINIMUM OF 10 MIL IN POLYETHYLENE SHEETING AND SHOULD BE FREE OF HOLES, TEARS, OR OTHER DEFECTS THAT COMPROMISE THE IMPERMEABILITY OF THE MATERIAL.

WHEN TEMPORARY CONCRETE WASHOUT FACILITIES ARE NO LONGER REQUIRED FOR THE WORK, THE HARDENED CONCRETE SHOULD BE REMOVED AND DISPOSED OF. MATERIALS USED TO CONSTRUCT TEMPORARY CONCRETE WASHOUT FACILITIES SHOULD BE REMOVED FROM THE SITE OF THE WORK AND DISPOSED OF. HOLES, DEPRESSIONS OR OTHER GROUND DISTURBANCE CAUSED BY THE REMOVAL OF THE TEMPORARY CONCRETE WASHOUT FACILITIES SHOULD BE BACKFILLED AND REPAIRED.



CROSS SECTION



ISOMETRIC PLAN VIEW

ROCK BERM

MATERIALS:

(1) THE BERM STRUCTURE SHOULD BE SECURED WITH A WOVEN WIRE SHEATHING HAVING MAXIMUM OPENING OF 11 INCH AND A MINIMUM WIRE DIAMETER OF 20 GAUGE GALVANIZED AND SHOULD BE SECURED WITH SHOAT RINGS.

(2) CLEAN, OPEN GRADED 3 - 5 INCH DIAMETER ROCK SHOULD BE USED, EXCEPT IN AREAS WHERE HIGH VELOCITIES OR LARGE VOLUMES OF FLOW ARE EXPECTED, WHERE 5 - 8 INCH DIAMETERS ROCKS MAY BE USED.

INSTALLATION:

(1) LAY OUT THE WOVEN WIRE SHEATHING PERPENDICULAR TO THE FLOW LINE. THE SHEATHING SHOULD BE 20 GAUGE WOVEN WIRE MESH WITH 1 INCH OPENINGS.

(2) BERM SHOULD HAVE A TOP WIDTH OF 2 FEET WITH SIDE SLOPES BEING 2:1 (H:V) OR FLATTER.

(3) PLACE THE ROCK ALONG THE SHEATHING AS SHOWN IN THE DIAGRAM, TO A HEIGHT OF NOT LESS THAN 18 INCHES.

(4) WRAP THE WIRE SHEATHING AROUND THE ROCK AND SECURE WITH THE WIRE SO THAT THE ENDS OF THE SHEATHING OVERLAPS AT LEAST 2 INCHES, AND THE BERM RETAINS ITS SHAPE WHEN WALKED UPON.

(5) BERM SHOULD BE BUILT ALONG THE CONTOUR AT ZERO PERCENT GRADE OR AS NEAR AS POSSIBLE.

(6) THE ENDS OF THE BERM SHOULD BE TIED INTO EXISTING UPSLOPE GRADE AND THE BERM SHOULD BE BURIED IN A TRENCH APPROXIMATELY 3 TO 4 INCHES DEEP TO PREVENT FAILURE OF THE CONTROL.

INSPECTION AND MAINTENANCE GUIDELINES:

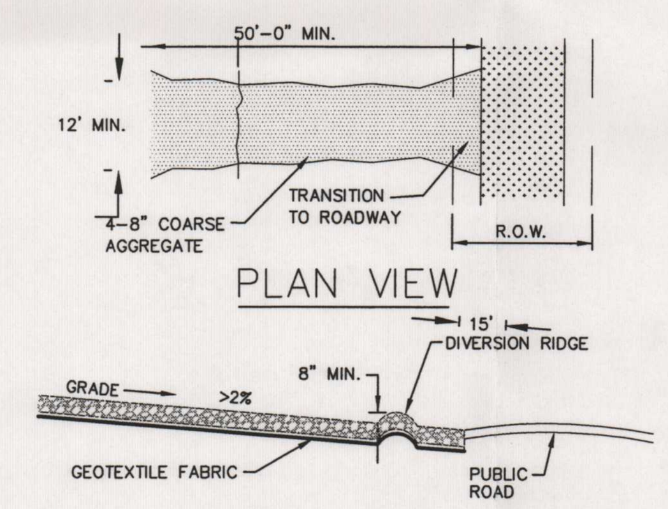
(1) INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL. REPAIR OR REPLACEMENT SHOULD BE MADE PROMPTLY AS NEEDED BY CONTRACTOR. (2) REMOVE SEDIMENT AND OTHER DEBRIS WHEN BUILDUP REACHES 6" AND DISPOSE OF THE ACCUMULATED SILT IN AN APPROVED MANNER THAT WILL NOT CAUSE ANY ADDITIONAL SILTATION.

(3) REPAIR ANY LOOSE WIRE SHEATHING.

(4) THE BERM SHOULD BE RESHAPED AS NEEDED DURING INSPECTION.

(5) THE BERM SHOULD BE REPLACED WHEN STRUCTURE CEASES TO FUNCTION AS INTENDED DUE TO SILT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.

(6) THE ROCK BERM SHOULD BE LEFT IN PLACE UNTIL ALL UPSTREAM AREAS ARE STABILIZED AND ACCUMULATED SILT REMOVED.



STABILIZED CONSTRUCTION ENTRANCE / EXIT

MATERIALS:

(1) THE AGGREGATE SHOULD CONSIST OF 4 TO 8 INCH WASHED STONE OVER A STABLE FOUNDATION AS SPECIFIED IN THE PLAN.

(2) THE AGGREGATE SHOULD BE PLACED WITH A MINIMUM THICKNESS OF 8 INCHES.

(3) THE GEOTEXTILE FABRIC SHOULD BE DESIGNED SPECIFICALLY FOR USE AS A SOIL FILTRATION MEDIA WITH AN APPROXIMATE WEIGHT OF 6 OZ/YD2, A MULLEN BURST RATING OF 140 LB/IN2, AND AN EQUIVALENT OPENING SIZE GREATER THAN A NUMBER 50 SIEVE.

(4) IF A WASHING FACILITY IS REQUIRED, A LEVEL AREA WITH A MINIMUM OF 4 INCH DIAMETER WASHED STONE OR COMMERCIAL RACK SHOULD BE INCLUDED IN THE PLANS. DIVERT WASTEWATER TO A SEDIMENT TRAP OR BASIN.

INSTALLATION:

(1) AVOID CURVES ON PUBLIC ROADS AND STEEP SLOPES. REMOVE VEGETATION AND OTHER OBJECTIONABLE MATERIAL FROM THE FOUNDATION AREA. GRADE CROWN FOUNDATION FOR POSITIVE DRAINAGE.

(2) THE MINIMUM WIDTH OF THE ENTRANCE/EXIT SHOULD BE 12 FEET OR THE FULL WIDTH OF EXIT ROADWAY, WHICHEVER IS GREATER.

(3) THE CONSTRUCTION ENTRANCE SHOULD BE AT LEAST 50 FEET LONG.

(4) IF THE SLOPE TOWARD THE ROAD EXCEEDS 2%, CONSTRUCT A RIDGE, 6 TO 8 INCHES HIGH WITH 3:1 (H:V) SIDE SLOPES, ACROSS THE FOUNDATION APPROXIMATELY 15 FEET FROM THE ENTRANCE TO DIVERT RUNOFF AWAY FROM THE PUBLIC ROAD.

(5) PLACE GEOTEXTILE FABRIC AND GRADE FOUNDATION TO IMPROVE STABILITY, ESPECIALLY WHERE WET CONDITIONS ARE ANTICIPATED.

(6) PLACE STONE TO DIMENSIONS AND GRADE SHOWN ON PLANS. LEAVE SURFACE SMOOTH AND SLOPE FOR DRAINAGE.

(7) DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE STONE PAD TO A SEDIMENT TRAP OR BASIN.

(8) INSTALL PIPE UNDER PAD AS NEEDED TO MAINTAIN PROPER PUBLIC ROAD DRAINAGE.

INSPECTION AND MAINTENANCE GUIDELINES:

(1) THE ENTRANCE SHOULD BE MAINTAINED IN A CONDITION, WHICH WILL PREVENT TRACKING OR LOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

(2) ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY SHOULD BE REMOVED IMMEDIATELY BY CONTRACTOR.

(3) WHEN NECESSARY, WHEELS SHOULD BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.

(4) WHEN WASHING IS REQUIRED, IT SHOULD BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

(5) ALL SEDIMENT SHOULD BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATER COURSE BY USING APPROVED METHODS.

410 N. SEGUIN AVE.
NEW BRAUNFELS, TEXAS, 78130
TBPE FIRM F-10961
www.HMTNB.com
PH: (830)625-8555
FAX: (830)625-8556
HMT ENGINEERING & SURVEYING
STATE OF TEXAS
STEPHEN WADE HANZ
95422
LICENSED PROFESSIONAL ENGINEER
Stephen W. Hanz PE
10/11/2012

EROSION CONTROL DETAILS & NOTES
CIVIL SITE CONSTRUCTION PLANS

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE: OCTOBER 2012
DRAWN BY: TAR
DESIGNED BY: TAR
CHECKED BY: AM
REVIEWED BY: SH
PROJECT NUMBER: 042.001

SHEET 4 OF 20

TEMPORARY STORMWATER SECTION

ATTACHMENT I

Inspection and Maintenance for BMP's

The Contractor will be directed to inspect and maintain all temporary BMP's. The design engineer will also make regular visits to the project and will provide visual inspections as well. Any deficiency noted must be corrected immediately by Contractor.

Maintenance:

(1). Inspect all silt fencing weekly and after any rainfalls.

(2). Remove sediment when buildup reaches 6 inches or install a second line of silt fence parallel.

(3). Replace any torn fabric or install a second line of silt fence parallel.

(4). Replace or repair any sections crushed or collapsed in the course of construction.

(5). See stormwater pollution plan details as shown in the construction plans for proper size and installation.

(6). Contractor to maintain a daily log and note any deficiencies to temporary BMP's and corrective action taken. Rainfall events shall also be noted.

SWPPP INSPECTION REPORT ATTACH "I"

Operator: _____ Date: *Rain Fall*

Job Name: _____ Receiving Waters: _____

Location: _____ Map Gird: _____

Inspector: _____ Inspector Qualifications: *See Qualification Form*

Is this site over the Aquifer recharge or contributing zone _____ If this site is in compliance with the SWPPP and Permit *Check here* ☐

Visual inspection of site	Y	N	N/A
NOI Posted?			
Site Notice Posted?			
Was a copy of the NOI sent to the Reporting agency?			
SWPPP Plan in Box?			
Copy of WPAP in the box? (If applies)			
SWPPP Information updates			
Material list updated?			
Project Milestone current with intended dates?			
All current locations of BMP's Identified on plans?			
Areas under operators control clearly Identified on site map?			
Trash Containers and Restrooms noted?			
Stabilized areas updated or noted on plans?			
Site Condition			
Entrance and exits free from off site tracking?			
Trash and Debri being contained on site?			
Material storage area effectively controlling pollutants?			
Wash out pit in working order?			
Are all pollutants contained on site?			
Erosion Control devices in working order?			
Are all BMP's Adequate for this site at this time?			
Hazardous Waste			
Is there materials being exposed to storm water runoff?			
Any signs of major leaks or spills?			
Any Leaks or spills of reputable Quantity need to be reported?			

Comments

Job Name: ______________________ Date: __________

Location	What Failed and Amount	Reason	Modification to be made	Correction Date

Location	What Failed and Amount	Reason	Modification to be made	Correction Date

Location	What Failed and Amount	Reason	Modification to be made	Correction Date

Location	What Failed and Amount	Reason	Modification to be made	Correction Date

Location	What Failed and Amount	Reason	Modification to be made	Correction Date

I certify under the penalty of law that this document and all attachments were prepared under my direction or Supervision in accordance with a system designed to assure that qualified personnel properly gathered and Evaluated the information submitted. Based on my inquiry of the person or persons who manage the system? Or those persons directly responsible for gathering the information, the information submitted is, too the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for Submitting false information, including the possibility of fine and imprisonment for knowing violations.

Qualified BMP Inspector ______________________

SWPPP Inspection Report ATTACH "L"

Job Name: _____ Date: _____

Construction Activities and location

Block /Lot or Address	Work being done	Date

NOTES: _____

TEMPORARY STORMWATER SECTION

ATTACHMENT J

Schedule of Interim and Permanent Soil Stabilization Practices

Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by weather conditions, stabilization measures shall be initiated as soon as practicable. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site.

If after 21 days, and construction activity will not resume, hydromulch shall be applied to all disturbed areas except in drainage channels or where slopes exceed 3:1. In areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonal arid conditions, stabilization measures shall be initiated as soon as practicable.

All erosion control measures must remain in place until such stabilization has successfully occurred.

Rock berms shall be used as indicated. Owner shall consult with design engineer to determine all necessary measures to stabilize the site if construction does not resume.

TCEQ RG 348 dated July 2005 shall be used as a guide in determining these areas that may require stabilization.

Agent Authorization Form
For Required Signature
Edwards Aquifer Protection Program
Relating to 30 TAC Chapter 213
Effective June 1, 1999

I Greg Meyer,
Print Name

Sole proprietor,
Title - Owner/President/Other

of _____,
Corporation/Partnership/Entity Name

have authorized Stephen Hanz, P.E.
Print Name of Agent/Engineer

of HMT Engineering & Surveying
Print Name of Firm

to represent and act on the behalf of the above named Corporation, Partnership, or Entity for the purpose of preparing and submitting this plan application to the Texas Commission on Environmental Quality (TCEQ) for the review and approval consideration of regulated activities.

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to $10,000 per day per violation.

2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.

3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.

4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.

5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

Applicant's Signature

9/28/12
Date

THE STATE OF Texas §

County of Comal §

BEFORE ME, the undersigned authority, on this day personally appeared Gregory Meyer known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that (s)he executed same for the purpose and consideration therein expressed.

GIVEN under my hand and seal of office on this 28th day of September, 2012.

Amanda M. Gold
NOTARY PUBLIC

Amanda M. Gold
Typed or Printed Name of Notary

Amanda M Gold
Notary Public
State of Texas
My Comm. Exp. 9-15-2013

MY COMMISSION EXPIRES: 9-15-2013

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Form

NAME OF PROPOSED REGULATED ENTITY: OAKWOOD ESTATES UNIT NINETEEN
REGULATED ENTITY LOCATION: COMAL COUNTY
NAME OF CUSTOMER: Gregory Meyer
CONTACT PERSON: Greg Meyer PHONE: 830-515-9983
(Please Print)

Customer Reference Number (if issued): CN _____ (nine digits)

Regulated Entity Reference Number (if issued): RN _____ (nine digits)

Austin Regional Office (3373) ☐ Hays ☐ Travis ☐ Williamson

San Antonio Regional Office (3362) ☐ Bexar ☒ Comal ☐ Medina ☐ Kinney ☐ Uvalde

Application fees must be paid by check, certified check, or money order, payable to the **Texas Commission on Environmental Quality**. Your canceled check will serve as your receipt. **This form must be submitted with your fee payment.** This payment is being submitted to (Check One):

☐ **Austin Regional Office**

☐ **Mailed to TCEQ**:
TCEQ – Cashier
Revenues Section
Mail Code 214
P.O. Box 13088
Austin, TX 78711-3088

☒ **San Antonio Regional Office**

☐ **Overnight Delivery to TCEQ**:
TCEQ - Cashier
12100 Park 35 Circle
Building A, 3rd Floor
Austin, TX 78753
512/239-0347

Site Location (Check All That Apply): ☒ Recharge Zone ☐ Contributing Zone ☐ Transition Zone

Type of Plan	Size	Fee Due
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	$
Sewage Collection System	1748.02 L.F.	$874.01
Lift Stations without sewer lines	Acres	$
Underground or Aboveground Storage Tank Facility	Tanks	$
Piping System(s)(only)	Each	$
Exception	Each	$
Extension of Time	Each	$

Signature

Date 10/12/12

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.

Texas Commission on Environmental Quality
Edwards Aquifer Protection Program
Application Fee Schedule
30 TAC Chapter 213 (effective 05/01/2008)

Water Pollution Abatement Plans and Modifications
Contributing Zone Plans and Modifications

PROJECT	PROJECT AREA IN ACRES	FEE
One Single Family Residential Dwelling	< 5	$650
Multiple Single Family Residential and Parks	< 5 5 < 10 10 < 40 40 < 100 100 < 500 ≥ 500	$1,500 $3,000 $4,000 $6,500 $8,000 $10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1 1 < 5 5 < 10 10 < 40 40 < 100 ≥ 100	$3,000 $4,000 $5,000 $6,500 $8,000 $10,000

Organized Sewage Collection Systems and Modifications

PROJECT	COST PER LINEAR FOOT	MINIMUM FEE MAXIMUM FEE
Sewage Collection Systems	$0.50	$650 - $6,500

Underground and Aboveground Storage Tank System Facility Plans and Modifications

PROJECT	COST PER TANK OR PIPING SYSTEM	MINIMUM FEE MAXIMUM FEE
Underground and Aboveground Storage Tank Facility	$650	$650 - $6,500

Exception Requests

PROJECT	FEE
Exception Request	$500

Extension of Time Requests

PROJECT	FEE
Extension of Time Request	$150

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided)*

☒ New Permit, Registration or Authorization *(Core Data Form should be submitted with the program application)*

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Attachments **Describe Any Attachments:** *(ex. Title V Application, Waste Transporter Application, etc.)*

☒ Yes ☐ No — SCS Application

3. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	4. Regulated Entity Reference Number *(if issued)*
CN		RN

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy) 12/12/2011

6. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check only one of the following:*

☒ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other: _____

7. General Customer Information

☒ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State) ☐ No Change**

If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.

8. Type of Customer:	☐ Corporation	☒ Individual	☐ Sole Proprietorship- D.B.A
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☐ Limited Partnership	☐ Other:

9. Customer Legal Name *(If an individual, print last name first: ex: Doe, John)*	*If new Customer, enter previous Customer below*	*End Date:*
Meyer, Gregory K	CN603206459	12/12/2011

10. Mailing Address: 259 East Torrey

City	New Braunfels	State	TX	ZIP	78130	ZIP + 4	

11. Country Mailing Information *(if outside USA)*	12. E-Mail Address *(if applicable)*
	gkmeyer@sbcglobal.net

13. Telephone Number	14. Extension or Code	15. Fax Number *(if applicable)*
(830) 515-9983		( ) -

16. Federal Tax ID *(9 digits)*	17. TX State Franchise Tax ID *(11 digits)*	18. DUNS Number *(if applicable)*	19. TX SOS Filing Number *(if applicable)*
467723149			

20. Number of Employees

☒ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

21. Independently Owned and Operated?

☒ Yes ☐ No

SECTION III: Regulated Entity Information

22. General Regulated Entity Information *(If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)*

☒ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information ☒ No Change** *(See below)*

**If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.

23. Regulated Entity Name *(name of the site where the regulated action is taking place)*

Oakwood Estates Unit 19

24. Street Address of the Regulated Entity: *(No P.O. Boxes)*							
	City		State		ZIP		ZIP + 4	
25. Mailing Address:	259 East Torrey						
	City	New Braunfels	State	TX	ZIP	78130	ZIP + 4	

26. E-Mail Address:	gkmeyer@sbcglobal.net

27. Telephone Number	28. Extension or Code	29. Fax Number *(if applicable)*
(830) 515-9983		( ) -

30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)	32. Primary NAICS Code (5 or 6 digits)	33. Secondary NAICS Code (5 or 6 digits)
6552			

34. What is the Primary Business of this entity? *(Please do not repeat the SIC or NAICS description.)*

Land Development

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	Dead end of Acorn Drive

36. Nearest City	County	State	Nearest ZIP Code
New Braunfels	Comal	TX	78133

37. Latitude (N) In Decimal:	29.7211		38. Longitude (W) In Decimal:	98.1347	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	43	16	98	08	05

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
☐ New Source Review – Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
☐ Stormwater	☐ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☒ Other: SCS

SECTION IV: Preparer Information

40. Name:	Travis Robinson, E.I.T.	41. Title:	Project Engineer

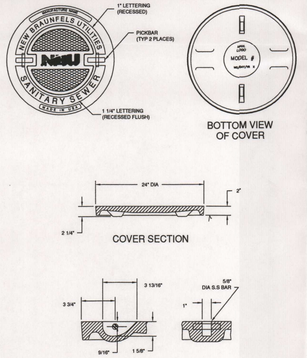
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(830) 625-8555		(830) 625-8556	travisr@hmtnb.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

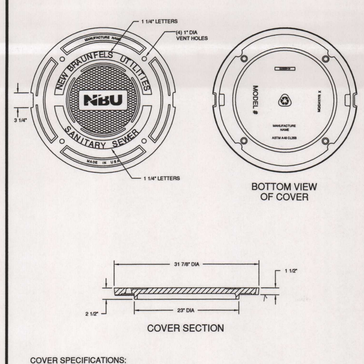
Company:	HMT Engineering & Surveying	Job Title:	Principal Engineer
Name *(In Print)*:	Stephen Hanz, P.E.	Phone:	(830) 625-8555
Signature:	Stephen W. Hanz, PE	Date:	10/11/2012



COVER SPECIFICATIONS:
1. EST. WEIGHT - 150 LBS
2. GRAY IRON
3. ASTM A48 CL35

√ MACHINED SURFACE

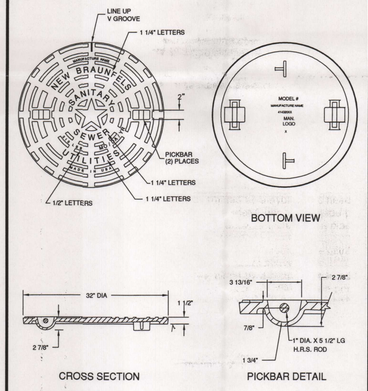
NBU NEW BRAUNFELS UTILITIES WATER SYSTEMS ENGINEERING	DRAWN BY: H Shadrock	STANDARD DRAWING: SANITARY SEWER MANHOLE - 24" COVER				
	APPROVED BY:	UPDATED: 4-30-03	SCALE: N.T.S.	SHEET: 1 OF 1	DRAWING NO. 330	



COVER SPECIFICATIONS:
1. EST. WEIGHT - 275 LBS
2. GRAY IRON
3. ASTM A48 CL35B

√ MACHINED SURFACE

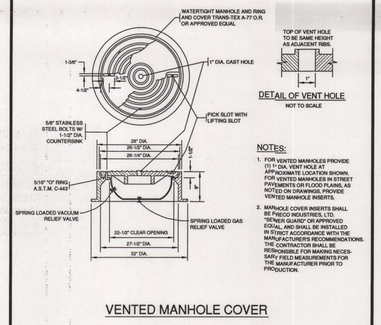
NBU NEW BRAUNFELS UTILITIES WATER SYSTEMS ENGINEERING	DRAWN BY: H Shadrock	STANDARD DRAWING: SANITARY SEWER MANHOLE - 31 7/8 " COVER				
	APPROVED BY:	UPDATED: 4-30-03	SCALE: N.T.S.	SHEET: 1 OF 1	DRAWING NO. 331	



COVER SPECIFATIONS:
1. EST. WEIGHT - 210 LBS
2. GRAY IRON
3. ASTM A48 CL35

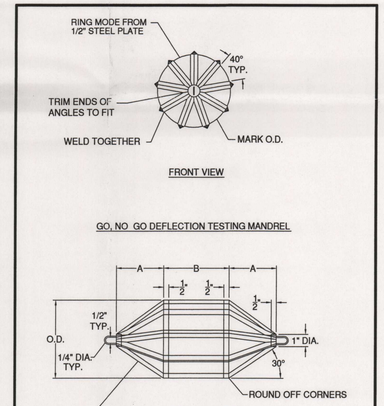
√ MACHINED SURFACE

NBU NEW BRAUNFELS UTILITIES WATER SYSTEMS ENGINEERING	DRAWN BY: H Shadrock	STANDARD DRAWING: SANITARY SEWER MANHOLE - 32" COVER				
	APPROVED BY:	UPDATED: 4-30-03	SCALE: N.T.S.	SHEET: 1 OF 1	DRAWING NO. 332	

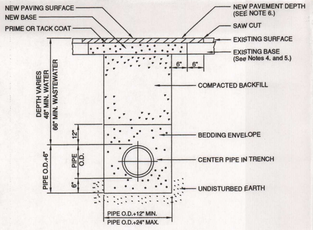


NOTES:
1. FOR VENTED MANHOLES PROVIDE (1) 1" DIA. VENT HOLE AT APPROXIMATE LOCATION SHOWN. FOR VENTED MANHOLES IN STREET PAVEMENTS OR FLOOD PLAINS, AS NOTED ON DRAWINGS, PROVIDE VENTED MANHOLE INSERTS.
2. MANHOLE COVER INSERTS SHALL BE FIBECO INDUSTRIES, LTD. "SEWER GUARD" OR APPROVED EQUAL, AND SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING NECESSARY FIELD MEASUREMENTS FOR THE MANUFACTURER PRIOR TO PRODUCTION.

NBU NEW BRAUNFELS UTILITIES WATER SYSTEMS ENGINEERING	DRAWN BY: H Shadrock	STANDARD DRAWING: VENTED MANHOLE COVER				
	APPROVED BY:	UPDATED: 5-6-03	SCALE: N.T.S.	SHEET: 1 OF 1	DRAWING NO. 334	

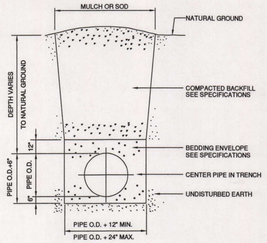


NBU NEW BRAUNFELS UTILITIES WATER SYSTEMS ENGINEERING	DRAWN BY: JO Arrieta	STANDARD DRAWING: GO, NO GO DEFLECTION TESTING MANDREL				
	APPROVED BY:	UPDATED: 5-6-03	SCALE: N.T.S.	SHEET: 1 OF 1	DRAWING NO. 350	



NOTES:
1. THE EXISTING PAVING SURFACE SHALL BE SAW CUT IN A STRAIGHT LINE A MINIMUM OF 12" WIDER THAN THE UNDISTURBED SIDES OF THE TRENCH, SYMMETRICAL ABOUT THE CENTER LINE OF THE EXCAVATION.
2. ANY CONCRETE PAVING SHALL BE SAW CUT 6" WIDER THAN UNDISTURBED SIDES OF EXCAVATION.
3. IF EXCAVATION AREA IS OPEN FOR TEMPORARY PUBLIC USE THE SURFACE SHALL BE MAINTAINED LEVEL WITH ADJACENT RIDING SURFACE WITH COLD MIX OR TEMPORARY HOT MIX.
4. ROAD BASE AND SURFACE MATERIALS IN THE TRENCH CUT SHALL BE REPLACED IN KIND OF EQUAL THICKNESS, OR MINIMUM BASE THICKNESS OF 10 INCHES, WHICHEVER IS GREATER.
5. ALL DAMAGED AREAS OF PAVEMENT OUTSIDE THE TRENCH CUT SHALL BE REMOVED AND REPLACED WITH MINIMUM OF 8 INCHES OF BASE OR MATCH EXISTING, WHICHEVER IS GREATER.
6. SURFACE PAVEMENT SHALL BE OF THE KIND AND THICKNESS AS EXISTING, OR MINIMUM 2 INCHES, WHICHEVER IS GREATER.

NBU NEW BRAUNFELS UTILITIES WATER SYSTEMS ENGINEERING	DRAWN BY: H Shadrock	STANDARD DRAWING: TYPICAL TRENCH WITH UNFINISHED SURFACE				
	APPROVED BY:	UPDATED: 4-30-03	SCALE: N.T.S.	SHEET: 1 OF 1	DRAWING NO.	



NBU NEW BRAUNFELS UTILITIES WATER SYSTEMS ENGINEERING	DRAWN BY: H Shadrock	STANDARD DRAWING: TYPICAL TRENCH WITH UNFINISHED SURFACE				
	APPROVED BY:	UPDATED: 4-30-03	SCALE: N.T.S.	SHEET: 1 OF 1	DRAWING NO. 422	

410 N. SEGUIN AVE.
NEW BRAUNFELS, TEXAS, 78130
TBPE FIRM F-10961
www.HMTNB.com
PH: (830)625-8555
FAX: (830)625-8556

HMT
ENGINEERING & SURVEYING

STATE OF TEXAS
STEPHEN WADE HANZ
95422
LICENSED PROFESSIONAL ENGINEER
10/11/2012

STANDARD WASTEWATER DETAILS
SHEET 2 OF 2
CIVIL SITE CONSTRUCTION PLANS

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE: OCTOBER 2012
DRAWN BY: TAR
DESIGNED BY: TAR
CHECKED BY: AM
REVIEWED BY: SH
PROJECT NUMBER: 042.001

SHEET 17 OF 20

Drawing Name: N:_Projects\042- Greg Meyer\042.001.101 - Oakwood Estates I119\Construction Plans\OAKWOD019_SHT--NBU--WW--DETAILS.dwg User: trevior Oct 11, 2012 - 2:53pm

Texas Commission on Environmental Quality
Organized Sewage Collection System (SCS)
General Construction Notes

1. This Organized Sewage Collection System must be designed and constructed in accordance with the Texas Commission on Environmental Quality's (TCEQ) Edwards Aquifer Rules 30 Texas Administrative Code (TAC) §§213.5(c) and 217.51 – 217.70 and 30 TAC Chapter 217, Subchapter D, and the City of NEW BRAUNFELS Standard Specifications.

2. All contractors conducting regulated activities associated with this proposed regulated project must be provided with copies of the Sewage Collection System plan and the TCEQ letter indicating the specific conditions of its approval. During the course of these regulated activities, the contractors must be required to keep on-site copies of the plan and the approval letter.

3. No later than 48 hours 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. Any modification to the activities described in the referenced SCS application following the date of approval may require the submittal of an SCS application to modify this approval, including the payment of appropriate fees and all information necessary for its review and approval.

5. All temporary erosion and sedimentation controls must be installed prior to construction, must be maintained during construction, and must be removed when sufficient vegetation is established to control the erosion and sedimentation and the construction area is stabilized.

6. The sewer line trench details showing the cross section with the dimensions, pipe placement, and backfill instructions are included on Plan Sheet __ of __ of these plans. All sewer pipes joints must meet the requirements in 30 TAC §§217.53(c) and 217.65.

   Gravity lines must have a SDR 35 or less. Pressurized sewer systems must have pipe with a minimum working pressure rating of 150 psi.

   The ASTM, ANSI, or AWWA specification numbers for the pipe(s) and joints are _____
   PIPE – ASTM-D-2241 & ASTM-D-3034, JOINT – ASTM-D-3139, ASTM-D-3212.

   The pipe material, the pressure classes, and the SDR and/or DR designations are _____
   PVC SDR 26.

7. If any sensitive features are discovered during the wastewater line trenching activities, all regulated activities near the sensitive feature must be suspended immediately. The applicant must immediately notify the appropriate regional office of the Texas Commission on Environmental Quality of the feature discovered. A geologist's assessment of the location and extent of the feature discovered must be reported to that regional office in writing within two working days. The applicant must submit a plan for ensuring the structural integrity of the sewer line or for modifying the proposed collection system alignment around the feature. The regulated activities near the sensitive feature may not proceed until the executive director has reviewed and approved the methods proposed to protect the sensitive feature and the Edwards Aquifer from any potentially adverse impacts to water quality while maintaining the structural integrity of the line.

8. Sewer lines located within or crossing the 5-year floodplain of a drainage way will be protected from inundation and stream velocities which could cause erosion and scouring of backfill. The trench must be capped with concrete to prevent scouring of backfill, or the sewer lines must be encased in concrete. All concrete shall have a minimum thickness of six (6) inches.

9. Blasting procedures for protection of existing sewer lines and other utilities will be in accordance with the National Fire Protection Association criteria. Sand is not allowed as bedding or backfill in trenches that have been blasted. If any existing sewer lines are damaged, the lines must be repaired and retested.

10. All manholes constructed or rehabilitated on this project must have watertight size on size resilient connectors allowing for differential settlement. If manholes are constructed within the 100-year floodplain, the cover must have a gasket and be bolted to the ring. Where gasketed manhole covers are required for more than three manholes in sequence or for more than 1500 feet, alternate means of venting will be provided. Bricks are not an acceptable construction material for any portion of the manhole.

    The diameter of the manholes must be a minimum of four feet and the manhole for entry must have a minimum clear opening diameter of 30 inches. These dimensions and other details showing compliance with the commission's rules concerning manholes and sewer line/manhole inverts described in 30 TAC §217.55 are included on Plan Sheet __ of __.

    It is suggested that entrance into manholes in excess of four feet deep be accomplished by means of a portable ladder. The inclusion of steps in a manhole is prohibited.

11. Where water lines and new sewer line are installed with a separation distance closer than nine feet (i.e., water lines crossing wastewater lines, water lines paralleling wastewater lines, or water lines next to manholes) the installation must meet the requirements of 30 TAC §217.53(d) (Pipe Design) and 30 TAC §290.44(e) (Water Distribution).

12. Where sewers lines deviate from straight alignment and uniform grade all curvature of sewer pipe must be achieved by the following procedure which is recommended by the pipe manufacturer: _____N/A_____.

    If pipe flexure is proposed, the following method of preventing deflection of the joint must be used: _____N/A_____.

    Specific care must be taken to ensure that the joint is placed in the center of the trench and properly bedded in accordance with 30 TAC §217.54.

13. New sewage collection system lines must be constructed with stub outs for the connection of anticipated extensions. The location of such stub outs must be marked on the ground such that their location can be easily determined at the time of connection of the extensions. Such stub outs must be manufactured wyes or tees that are compatible in size and material with both the sewer line and the extension. At the time of original construction, new stub-outs must be constructed sufficiently to extend beyond the end of the street pavement. All stub-outs must be sealed with a manufactured cap to prevent leakage. Extensions that were not anticipated at the time of original construction or that are to be connected to an existing sewer line not furnished with stub outs must be connected using a manufactured saddle and in accordance with accepted plumbing techniques.

    If no stub-out is present an alternate method of joining laterals is shown in the detail on Plan Sheet __ of __. (For potential future laterals).

    The private service lateral stub-outs must be installed as shown on the plan and profile sheets on Plan Sheet 2-1 of 20 and marked after backfilling as shown in the detail on Plan Sheet 18 of 20.

14. Trenching, bedding and backfill must conform with 30 TAC §217.54. The bedding and backfill for flexible pipe must comply with the standards of ASTM D-2321, Classes IA, IB, II or III. Rigid pipe bedding must comply with the requirements of ASTM C 12 (ANSI A 106.2) classes A, B or C.

15. Sewer lines must be tested from manhole to manhole. When a new sewer line is connected to an existing stub or clean-out, it must be tested from existing manhole to new manhole. If a stub or clean-out is used at the end of the proposed sewer line, no private service attachments may be connected between the last manhole and the cleanout unless it can be certified as conforming with the provisions of 30 TAC §213.5(c)(3)(E).

16. All sewer lines must be tested in accordance with 30 TAC §217.57. The engineer must retain copies of all test results which must be made available to the executive director upon request. The engineer must certify in writing that all wastewater lines have passed all required testing to the appropriate regional office within 30 days of test completion and prior to use of the new collection system. Testing method will be:
    (a) For a collection system pipe that will transport wastewater by gravity flow, the design must specify an infiltration and exfiltration test or a low-pressure air test. A test must conform to the following requirements:
        (1) Low Pressure Air Test.
            (A) A low pressure air test must follow the procedures described in American Society For Testing And Materials (ASTM) C-828, ASTM C-924, or ASTM F-1417 or other procedure approved by the executive director, except as to testing times as required in Table C.3 in subparagraph (C) of this paragraph or Equation C.3 in subparagraph (B)(ii) of this paragraph.
            (B) For sections of collection system pipe less than 36 inch average inside diameter, the following procedure must apply, unless a pipe is to be tested as required by paragraph (2) of this subsection.
                (i) A pipe must be pressurized to 3.5 pounds per square inch (psi) greater than the pressure exerted by groundwater above the pipe.
                (ii) Once the pressure is stabilized, the minimum time allowable for the pressure to drop from 3.5 psi gauge to 2.5 psi gauge is computed from the following equation:

Equation C.3 $$T = \frac{0.085 \times D \times K}{Q}$$

Where:

T = time for pressure to drop 1.0 pound per square inch gauge in seconds
K = 0.000419 X D X L, but not less than 1.0
D = average inside pipe diameter in inches
L = length of line of same size being tested, in feet
Q = rate of loss, 0.0015 cubic feet per minute per square foot internal surface

            (C) Since a K value of less than 1.0 may not be used, the minimum testing time for each pipe diameter is shown in the following Table C.3:

Pipe Diameter *(inches)*	Minimum Time *(seconds)*	Maximum Length for Minimum Time *(feet)*	Time for Longer Length *(seconds/foot)*
6	340	398	0.855
8	454	298	1.520
10	567	239	2.374
12	680	199	3.419
15	850	159	5.342
18	1020	133	7.693
21	1190	114	10.471
24	1360	100	13.676
27	1530	88	17.309
30	1700	80	21.369
33	1870	72	25.856

            (D) An owner may stop a test if no pressure loss has occurred during the first 25% of the calculated testing time.
            (E) If any pressure loss or leakage has occurred during the first 25% of a testing period, then the test must continue for the entire test duration as outlined above or until failure.
            (F) Wastewater collection system pipes with a 27 inch or larger average inside diameter may be air tested at each joint instead of following the procedure outlined in this section.
            (G) A testing procedure for pipe with an inside diameter greater than 33 inches must be approved by the executive director.
        (2) Infiltration/Exfiltration Test.
            (A) The total exfiltration, as determined by a hydrostatic head test, must not exceed 50 gallons per inch of diameter per mile of pipe per 24 hours at a minimum test head of 2.0 feet above the crown of a pipe at an upstream manhole.
            (B) An owner shall use an infiltration test in lieu of an exfiltration test when pipes are installed below the groundwater level.
            (C) The total exfiltration, as determined by a hydrostatic head test, must not exceed 50 gallons per inch diameter per mile of pipe per 24 hours at a minimum test head of two feet above the crown of a pipe at an upstream manhole, or at least two feet above existing groundwater level, whichever is greater.
            (D) For construction within a 25-year flood plain, the infiltration or exfiltration must not exceed 10 gallons per inch diameter per mile of pipe per 24 hours at the same minimum test head as in subpargraph (C) of this paragraph.
            (E) If the quantity of infiltration or exfiltration exceeds the maximum quantity specified, an owner shall undertake remedial action in order to reduce the infiltration or exfiltration to an amount within the limits specified. An owner shall retest a pipe following a remediation action.

    (b) If a gravity collection pipe is composed of flexible pipe, deflection testing is also required. The following procedures must be followed:
        (1) For a collection pipe with inside diameter less than 27 inches, deflection measurement requires a rigid mandrel.
            (A) Mandrel Sizing.
                (i) A rigid mandrel must have an outside diameter (OD) not less than 95% of the base inside diameter (ID) or average ID of a pipe, as specified in the appropriate standard by the ASTMs, American Water Works Association, UNI-BELL, or American National Standards Institute, or any related appendix.
                (ii) If a mandrel sizing diameter is not specified in the appropriate standard, the mandrel must have an OD equal to 95% of the ID of a pipe. In this case, the ID of the pipe, for the purpose of determining the OD of the mandrel, must equal be the average outside diameter minus two minimum wall thicknesses for OD controlled pipe and the average inside diameter for ID controlled pipe.
                (iii) All dimensions must meet the appropriate standard.
            (B) Mandrel Design.
                (i) A rigid mandrel must be constructed of a metal or a rigid plastic material that can withstand 200 psi without being deformed.
                (ii) A mandrel must have nine or more odd number of runners or legs.
                (iii) A barrel section length must equal at least 75% of the inside diameter of a pipe.
                (iv) Each size mandrel must use a separate proving ring.
            (C) Method Options.
                (i) An adjustable or flexible mandrel is prohibited.
                (ii) A test may not use television inspection as a substitute for a deflection test.
                (iii) If requested, the executive director may approve the use of a deflectometer or a mandrel with removable legs or runners on a case-by-case basis.
        (2) For a gravity collection system pipe with an inside diameter 27 inches and greater, other test methods may be used to determine vertical deflection.
        (3) A deflection test method must be accurate to within plus or minus 0.2% deflection.
        (4) An owner shall not conduct a deflection test until at least 30 days after the final backfill.
        (5) Gravity collection system pipe deflection must not exceed five percent (5%).
        (6) If a pipe section fails a deflection test, an owner shall correct the problem and conduct a second test after the final backfill has been in place at least 30 days.

17. All manholes must be tested to meet or exceed the requirements of 30 TAC §217.58.
    (a) All manholes must pass a leakage test.
    (b) An owner shall test each manhole (after assembly and backfilling) for leakage, separate and independent of the collection system pipes, by hydrostatic exfiltration testing, vacuum testing, or other method approved by the executive director.
        (1) Hydrostatic Testing.

            (A) The maximum leakage for hydrostatic testing or any alternative test methods is 0.025 gallons per foot diameter per foot of manhole depth per hour.
            (B) To perform a hydrostatic exfiltration test, an owner shall seal all wastewater pipes coming into a manhole with an internal pipe plug, fill the manhole with water, and maintain the test for at least one hour.
            (C) A test for concrete manholes may use a 24-hour wetting period before testing to allow saturation of the concrete.
        (2) Vacuum Testing.
            (A) To perform a vacuum test, an owner shall plug all lift holes and exterior joints with a non-shrink grout and plug all pipes entering a manhole.
            (B) No grout must be placed in horizontal joints before testing.
            (C) Stub-outs, manhole boots, and pipe plugs must be secured to prevent movement while a vacuum is drawn.
            (D) An owner shall use a minimum 60 inch/lb torque wrench to tighten the external clamps that secure a test cover to the top of a manhole.
            (E) A test head must be placed at the inside of the top of a cone section, and the seal inflated in accordance with the manufacturer's recommendations.
            (F) There must be a vacuum of 10 inches of mercury inside a manhole to perform a valid test.
            (G) A test does not begin until after the vacuum pump is off.
            (H) A manhole passes the test if after 2.0 minutes and with all valves closed, the vacuum is at least 9.0 inches of mercury.

18. All private service laterals must be inspected and certified in accordance with 30 TAC §213.5(c)(3)(I). After installation of and, prior to covering and connecting a private service lateral to an existing organized sewage collection system, a Texas Licensed Professional Engineer, Texas Registered Sanitarian, or appropriate city inspector must visually inspect the private service lateral and the connection to the sewage collection system, and certify that it is constructed in conformity with the applicable provisions of this section. The owner of the collection system must maintain such certifications for five years and forward copies to the appropriate regional office upon request. Connections may only be made to an approved sewage collection system.

THESE GENERAL CONSTRUCTION NOTES MUST BE INCLUDED ON THE CONSTRUCTION PLANS PROVIDED TO THE CONTRACTOR AND ALL SUBCONTRACTORS.

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STEPHEN WADE HANZ
95422
LICENSED
PROFESSIONAL ENGINEER
Stephen W. Hanz, PE
10/11/2012

T.C.E.Q. NOTES

CIVIL SITE CONSTRUCTION PLANS

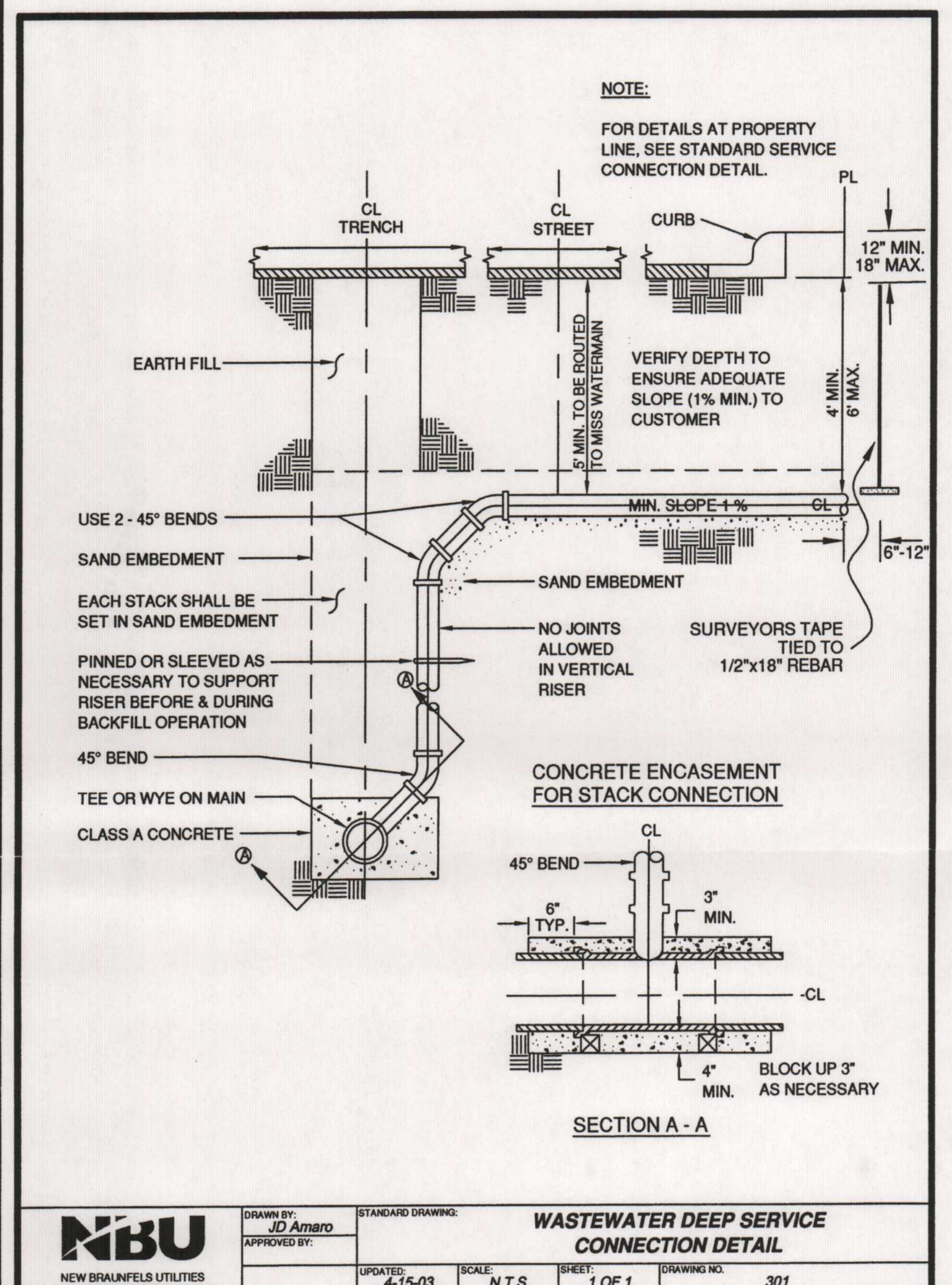
OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

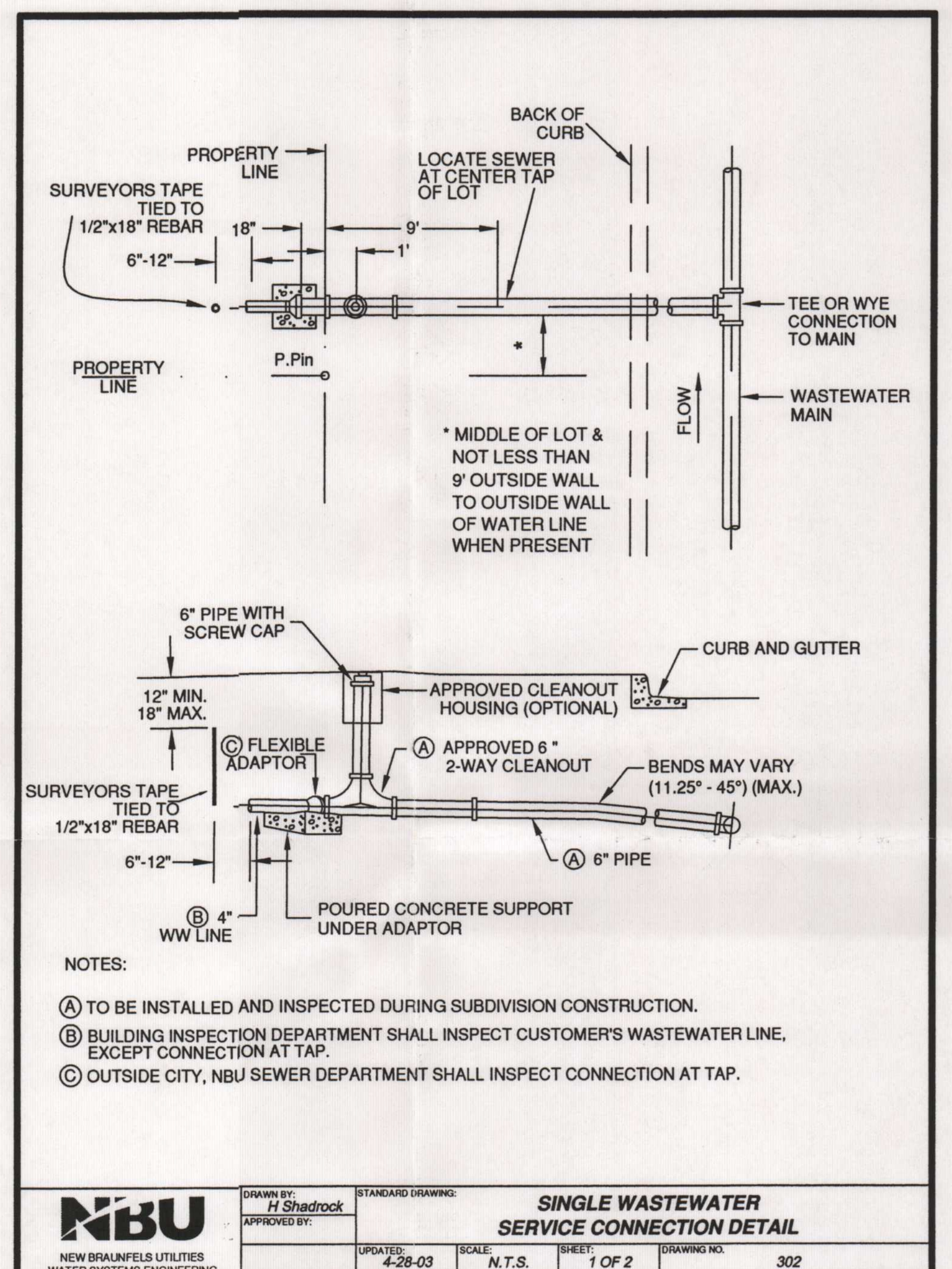
GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE: OCTOBER 2012
DRAWN BY: TAR
DESIGNED BY: TAR
CHECKED BY: AM
REVIEWED BY: SH
PROJECT NUMBER: 042.001

SHEET 20 OF 20

Drawing Name: N:_Projects\042-- Greg Meyer\042.001.101 -- Oakwood Estates Ut19\Construction Plans\OAKWOOD19_SHT-TCEQ-NOTES.dwg User: trovier Oct 11, 2012 - 1:25pm





NOTES:

1. UTILITY CONTRACTOR, DURING SUBDIVISION CONSTRUCTION, INSTALLS WASTEWATER CONNECTION TO MAIN, 6" STUB WITH 6" SERVICE BRANCH WITH 2-WAY CLEANOUT AND RISER FOR CLEANOUTS (CAPPED) AND PLUGS FOR 2-WAY CLEANOUTS AT PROPERTY LINE END. ALL WASTEWATER PIPING SHALL HAVE ELASTOMERIC GASKET TYPE JOINTS AND SHALL SLOPE DOWNWARD TO MAIN 2%, 1/4 " PER FOOT, MINIMUM TO 45° MAXIMUM. DEPTH OF SERVICE STUB AT PROPERTY LINE WILL BE SHOWN ON PLANS BY ENGINEER OR DESIGNATED REPRESENTATIVE IF GREATER THAN 4', OTHERWISE, THE INSTALLED DEPTH WILL TYPICALLY BE 4' TO 6'. IF WASTEWATER SERVICE LINE TO MAIN REQUIRES DEFLECTION EXCEEDING 45°, REFER TO DETAIL DRAWING 301. ALL INSTALLATIONS SHALL BE MADE IN ACCORDANCE WITH INFORMATION SHOWN ON APPLICABLE STANDARD DRAWINGS AND WILL BE INSPECTED BY NEW BRAUNFELS UTILITIES (NBU) CONSTRUCTION INSPECTION PERSONNEL.

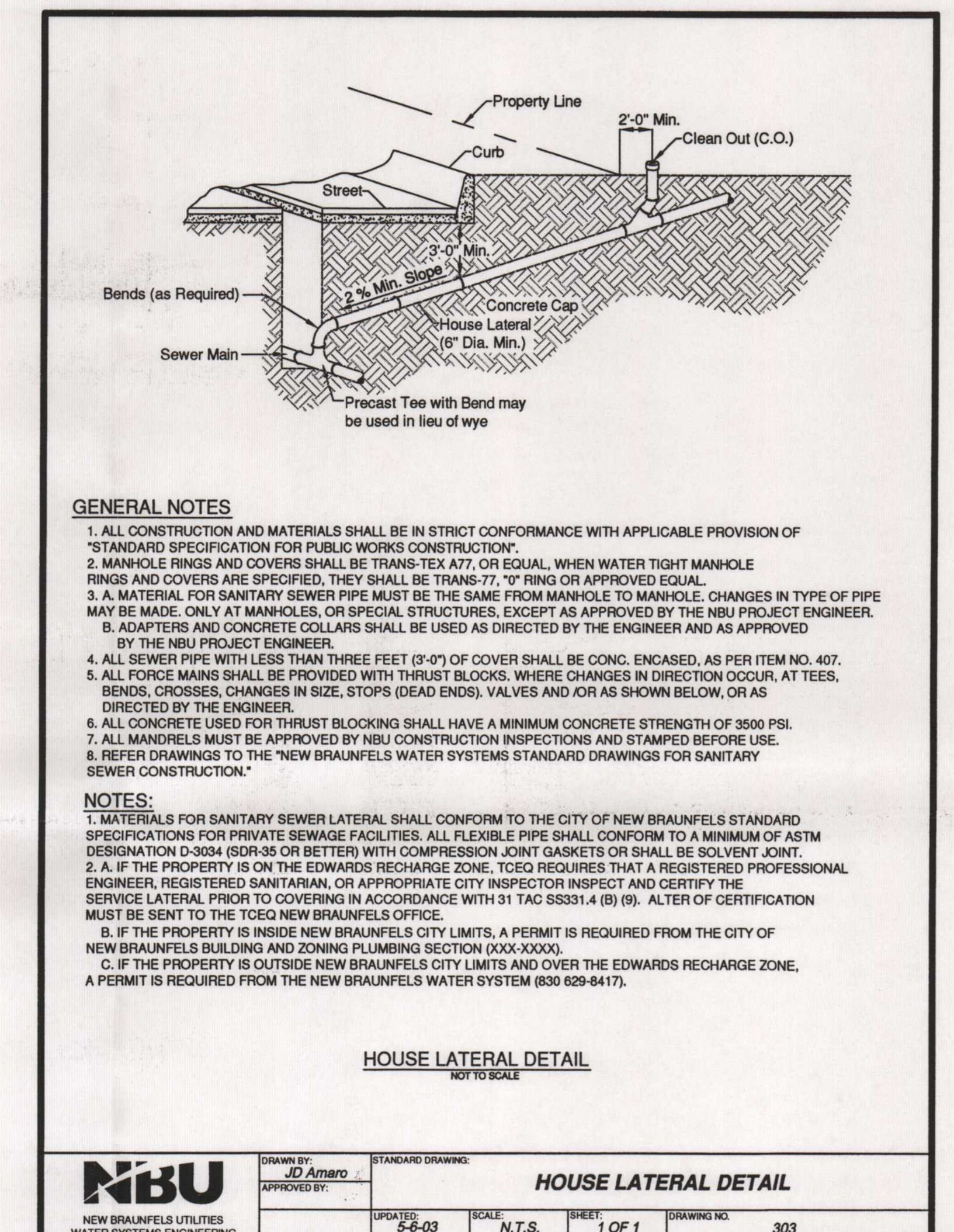
2. CUSTOMERS REMOVE PLUGS FROM 2-WAY CLEANOUT, AT PROPERTY LINE, INSTALL MINIMUM 18" LENGTH OF 6" PIPE, INSTALL 4" WASTEWATER LINES [EXTEND 4" PIPE 6" MINIMUM INTO 6" PIPE AND JOINT WITH FLEXIBLE ADAPTOR] AND CAST IN PLACE CONCRETE SUPPORT BLOCK UNDER THE FLEXIBLE ADAPTOR. BLOCK SHALL HAVE MINIMUM DIMENSIONS OF 6" THICK AND 18" WIDE AND EXTEND A MINIMUM OF 6" BEYOND EITHER END OF ADAPTOR. IF WASTEWATER WILL NOT SATISFACTORILY FLOW BY GRAVITY TO SEWER MAIN ADJACENT TO PROPERTY, PUMP EQUIPMENT MUST BE PROVIDED BY THE CUSTOMER AS PART OF CUSTOMER'S WASTEWATER SYSTEM.

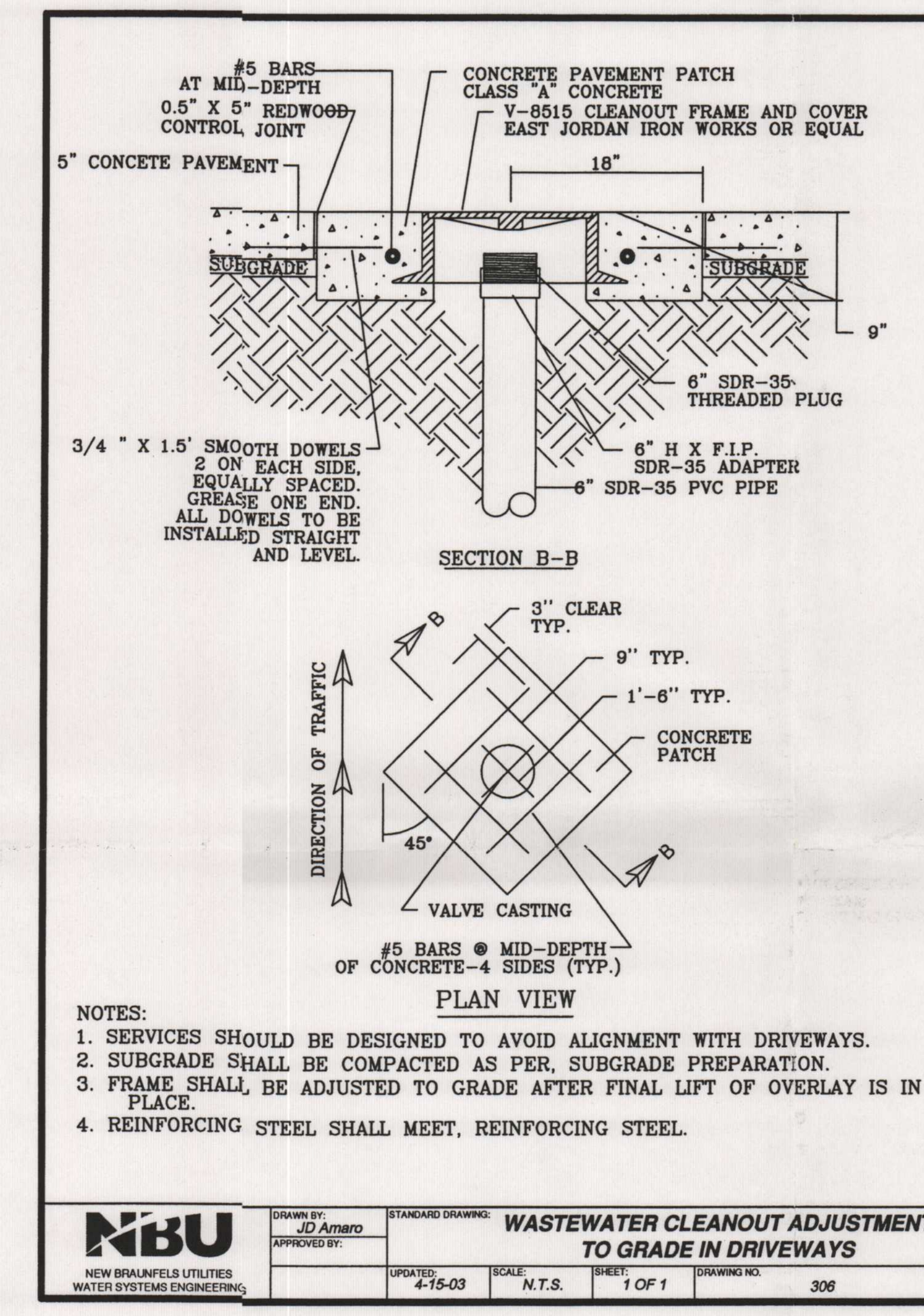
3. CUSTOMER IS RESPONSIBLE FOR PIPING SYSTEM UNTIL WASTEWATER IS CONNECTED. ANY MISSING OR DAMAGED PARTS SHALL BE REINSTALLED BY CUSTOMER WHO SHALL GUARANTEE, FOR A PERIOD OF ONE (1) YEAR FROM DATE OF ACCEPTANCE, THAT CONNECTIONS TO NBU SYSTEMS ARE FREE FROM DEFECTS IN WORKMANSHIP OR MATERIALS. CUSTOMER ALSO HAS THE RESPONSIBILITY TO ASSURE THAT 2-WAY CLEANOUTS REMAIN CLEAR OF SIDEWALKS AND OTHER OBSTRUCTIONS.

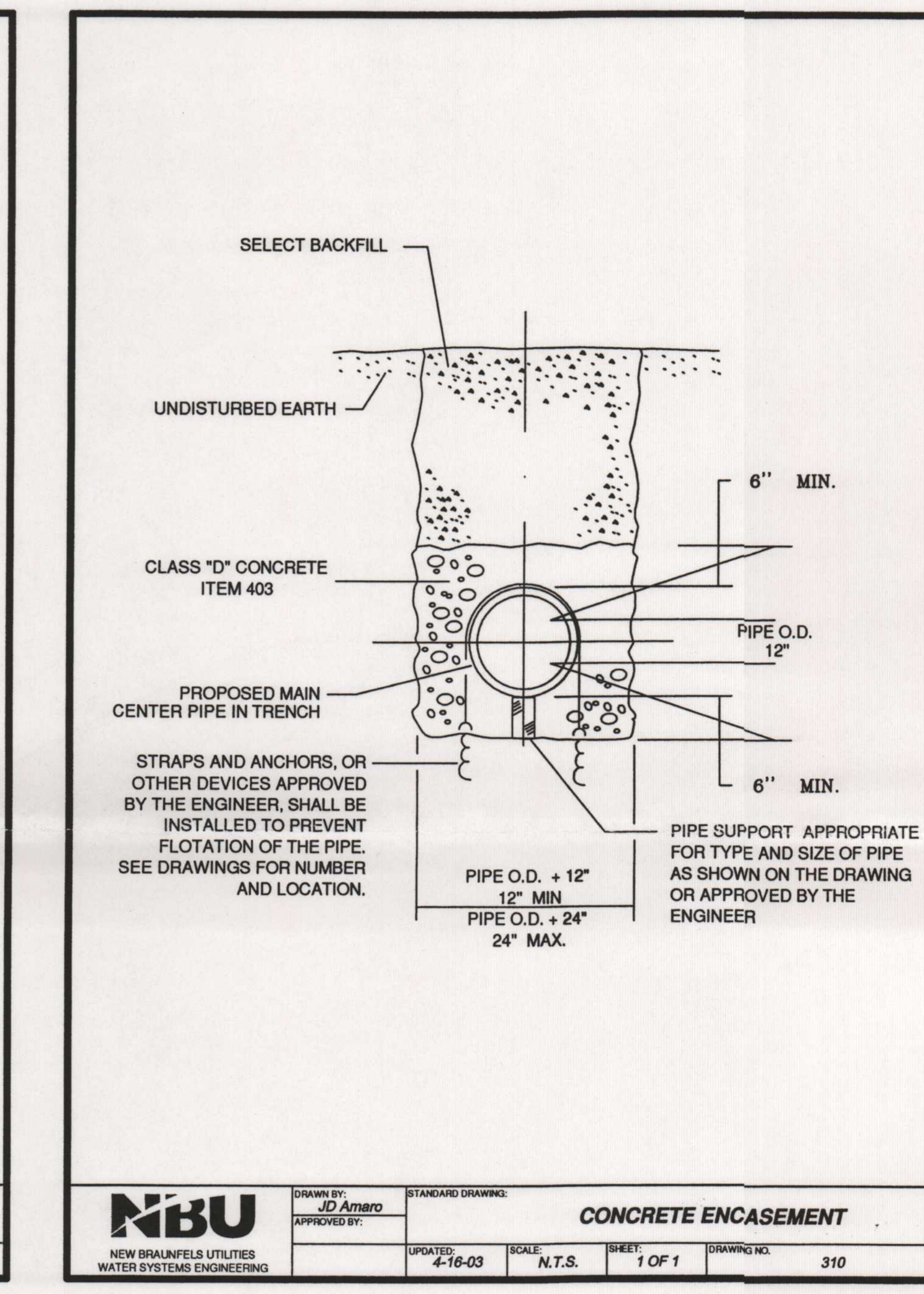
4. NEW BRAUNFELS UTILITIES (NBU) ACTIVITY IS LIMITED TO INSPECTION OF CONNECTIONS TO NBU'S WASTEWATER SYSTEM. FOR MAINTENANCE PURPOSES, NBU'S RESPONSIBILITY ENDS AT THE CUSTOMER'S WASTEWATER CONNECTION TO THE 2-WAY CLEANOUT.

5. PIPING IN STREET RIGHT-OF-WAY AND IN EASEMENT AREA SHALL BE BEDDED IN GRANULAR MATERIALS AS REQUIRED BY NBU STANDARD SPECIFICATION; MATERIALS SHALL BE AS SPECIFIED; BACKFILL ABOVE THE GRANULAR BEDDING. SERVICE LINES IN THESE AREAS SHALL HAVE A MINIMUM COVER BELOW FINAL STREET GRADE OF 42"; ANY EXCEPTION MUST BE SPECIFICALLY APPROVED BY THE ENGINEER.

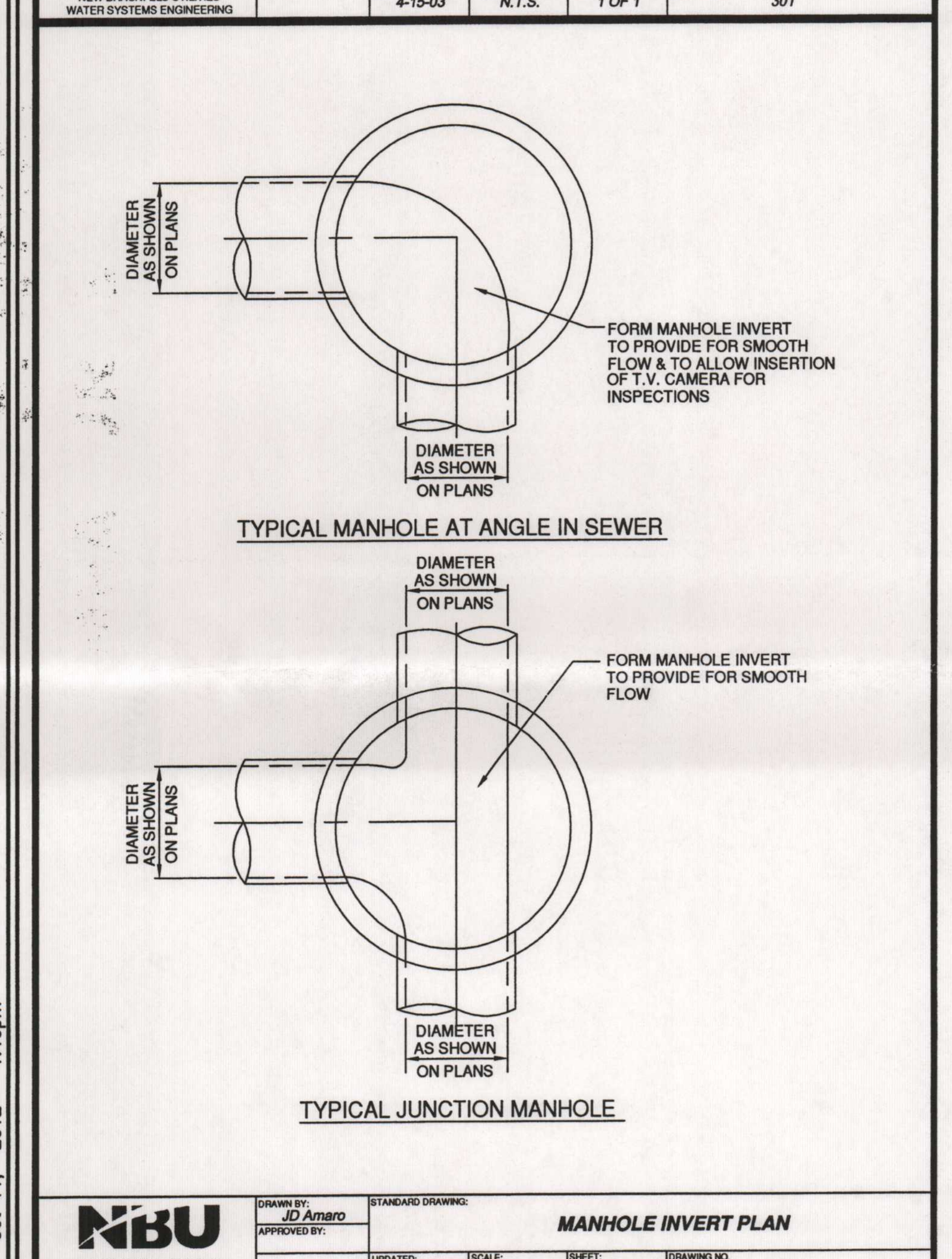
NBU — SINGLE WASTEWATER SERVICE CONNECTION DETAIL — 4-28-03 — N.T.S. — 2 OF 2 — 302

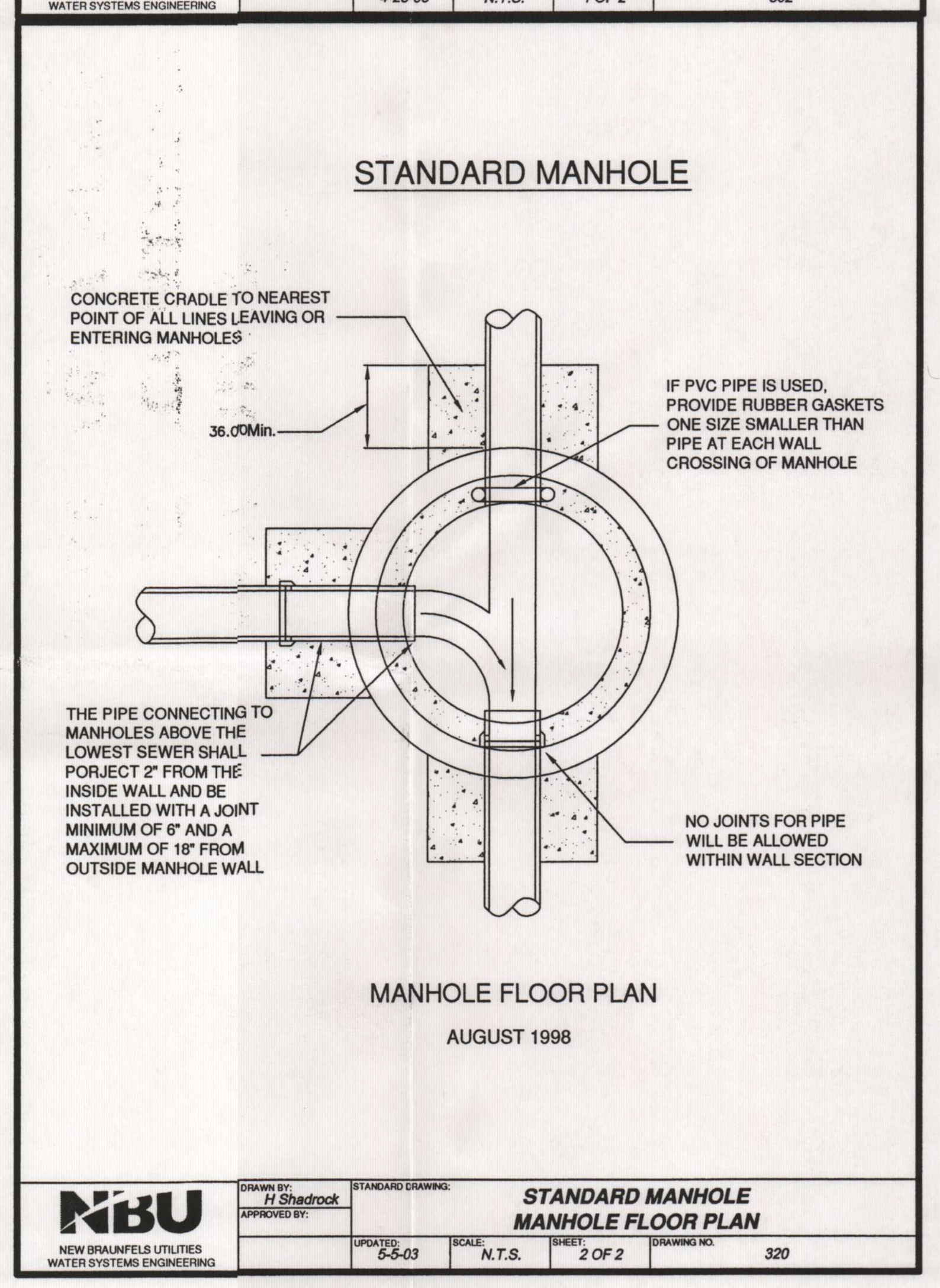


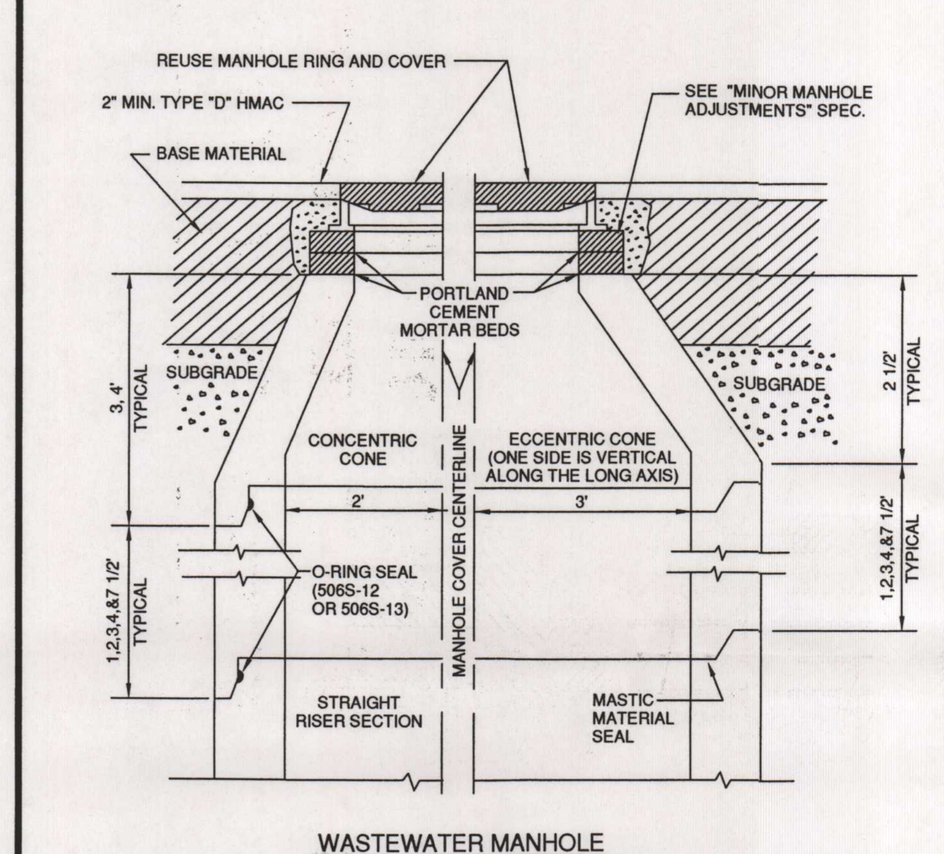




Stephen W. Hanz PE 10/11/2012



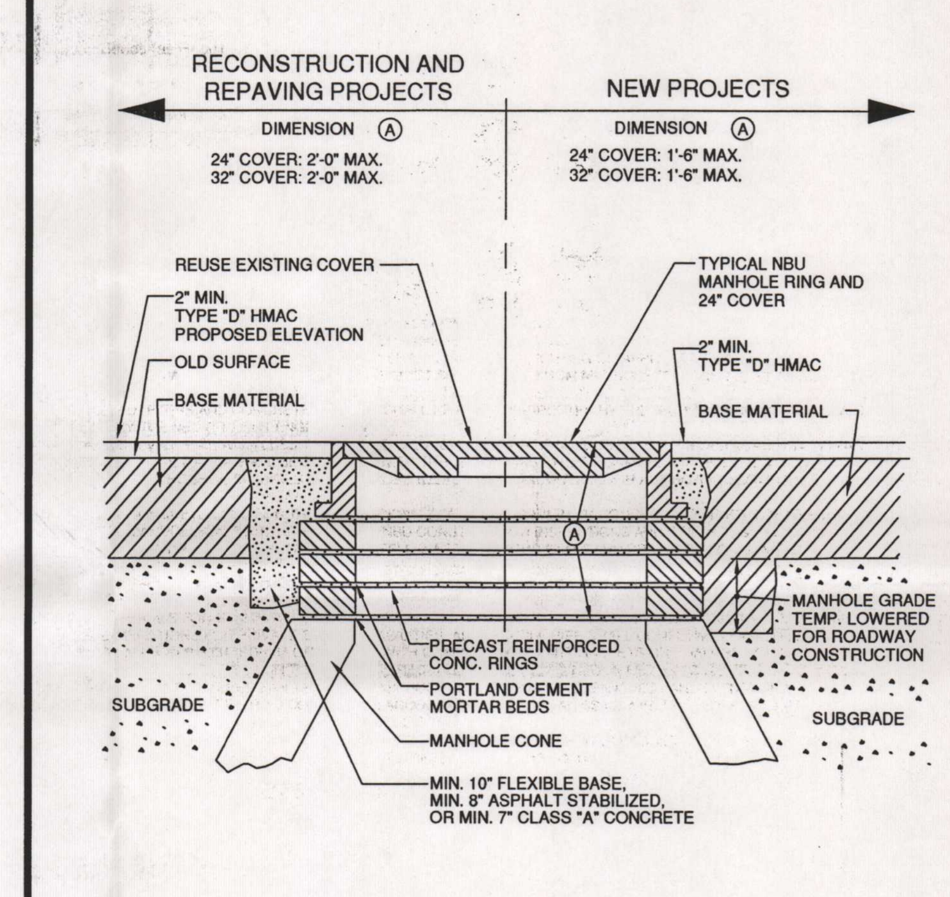




WASTEWATER MANHOLE

1. MANHOLE SECTIONS TEMPORARILY REMOVED FOR ROADWAY CONSTRUCTION MAY BE REUSED ONLY WITH THE WRITTEN APPROVAL OF THE INSPECTOR. O-RINGS SHALL NOT BE REUSED.
2. ANY COMBINATION OF REMOVING THE CONCRETE RINGS, AND / OR THE MANHOLE CONE, AND/OR THE STRAIGHT RISER SECTION OF THE MANHOLE SHALL BE ACCEPTABLE TO TEMPORARILY LOWER THE MANHOLE GRADE FOR ROADWAY RECONSTRUCTION.
3. WHILE THE MANHOLE IS TEMPORARILY LOWERED, A SHEET OF STEEL SUITABLE TO SUPPORT ALL IMPOSED LOADS SHALL BE USED TO COVER THE OPENING. THE STEEL PLATE SHALL BE SET IN MORTAR TO PREVENT LEAKAGE.
4. SUBGRADE AND BASE MATERIALS SHALL BE COMPACTED TO 95% AND 100% DENSITIES, RESPECTIVELY, COMPACTION SHALL BE BY MECHANICAL TAMPING TO THE DENSITIES SPECIFIED.
5. MANHOLE SHALL BE SET SO RING AND COVER MATCH STREET SLOPE.
6. THE USE OF BRICKS ARE PROHIBITED IN ANY WAY.

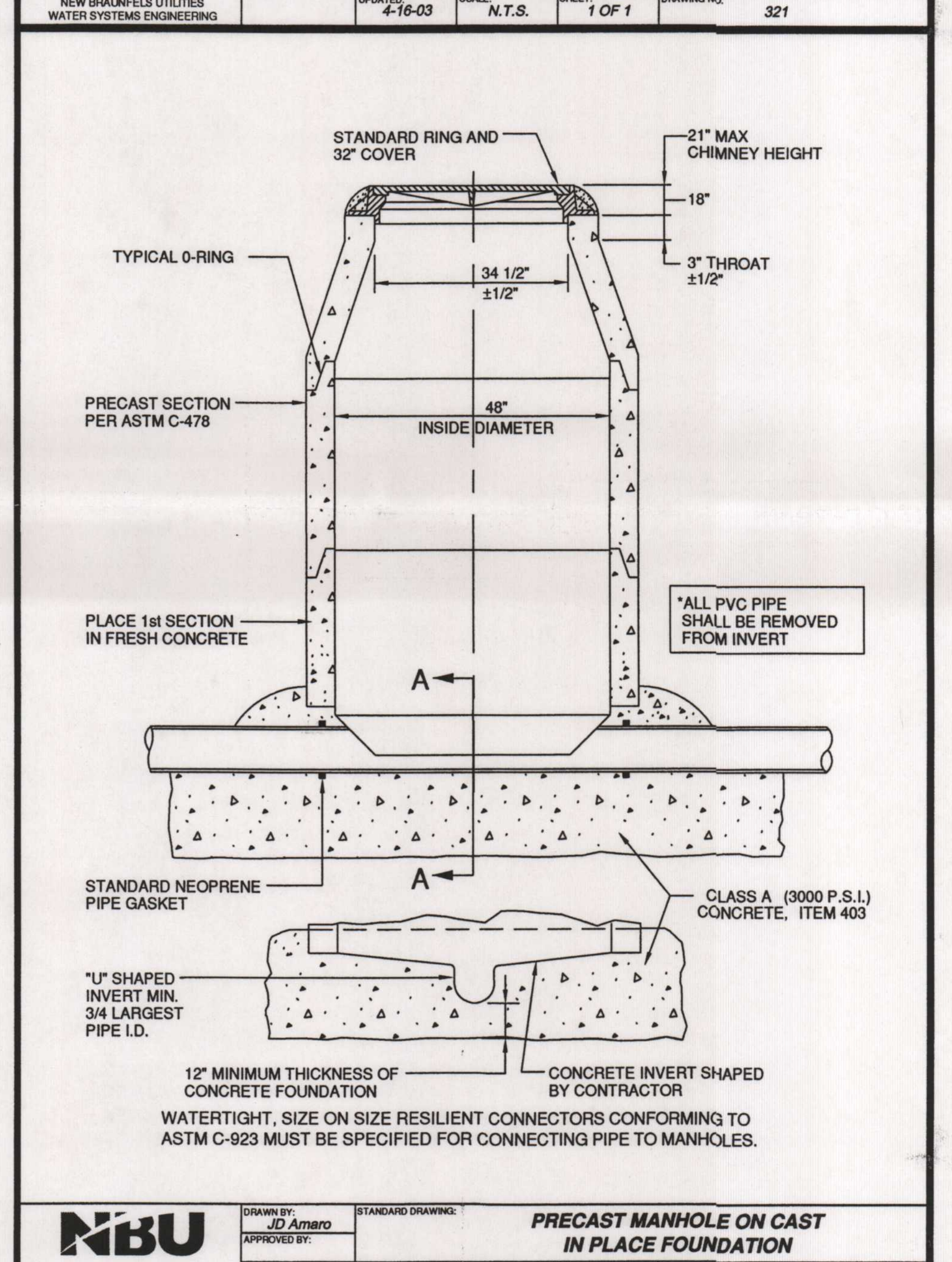
NBU — NEW BRAUNFELS UTILITIES WATER SYSTEMS ENGINEERING — DRAWN BY: JD Amaro — MAJOR MANHOLE ADJUSTMENT — UPDATED: 4-16-03 — SCALE: N.T.S. — SHEET: 1 OF 1 — DRAWING NO. 321

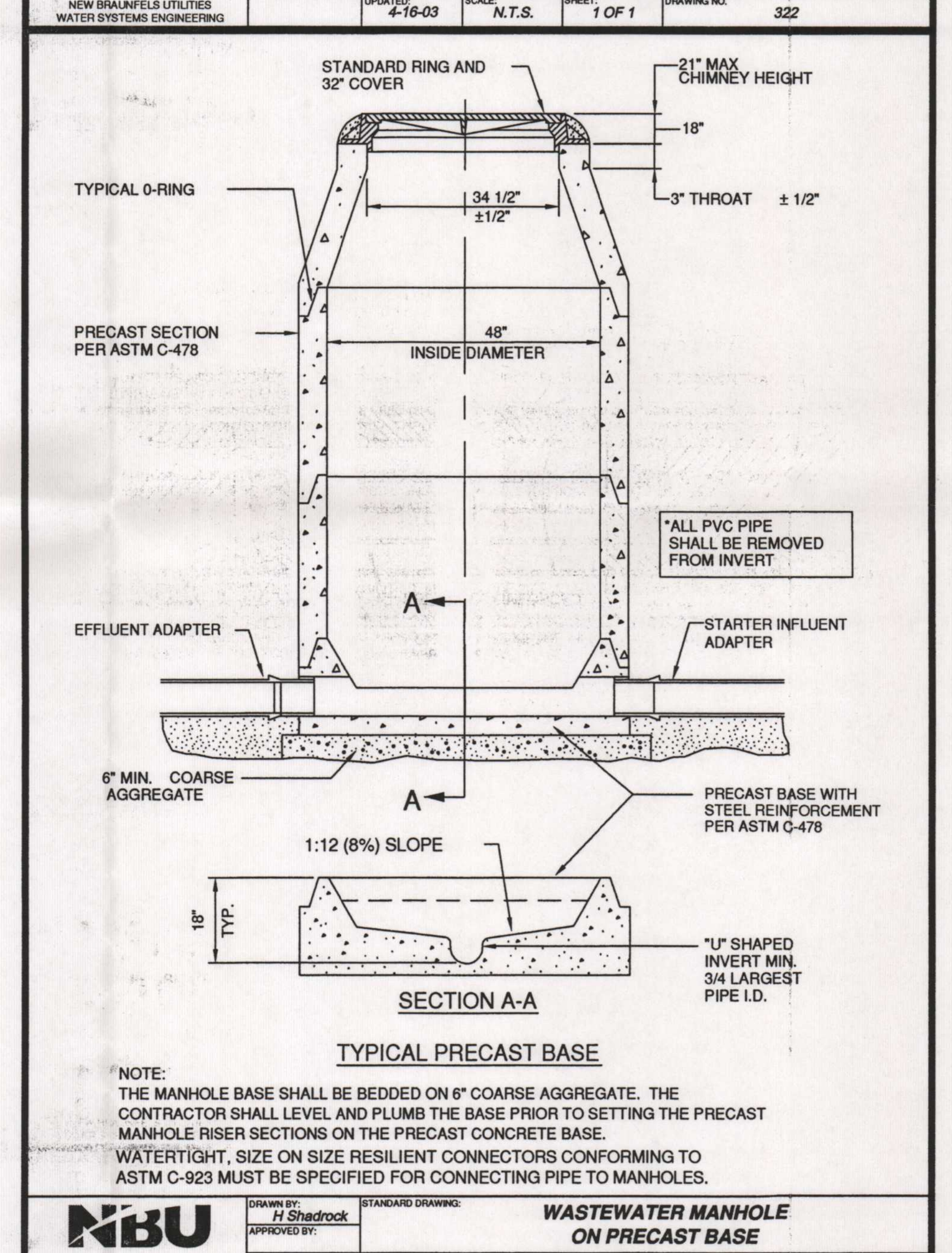


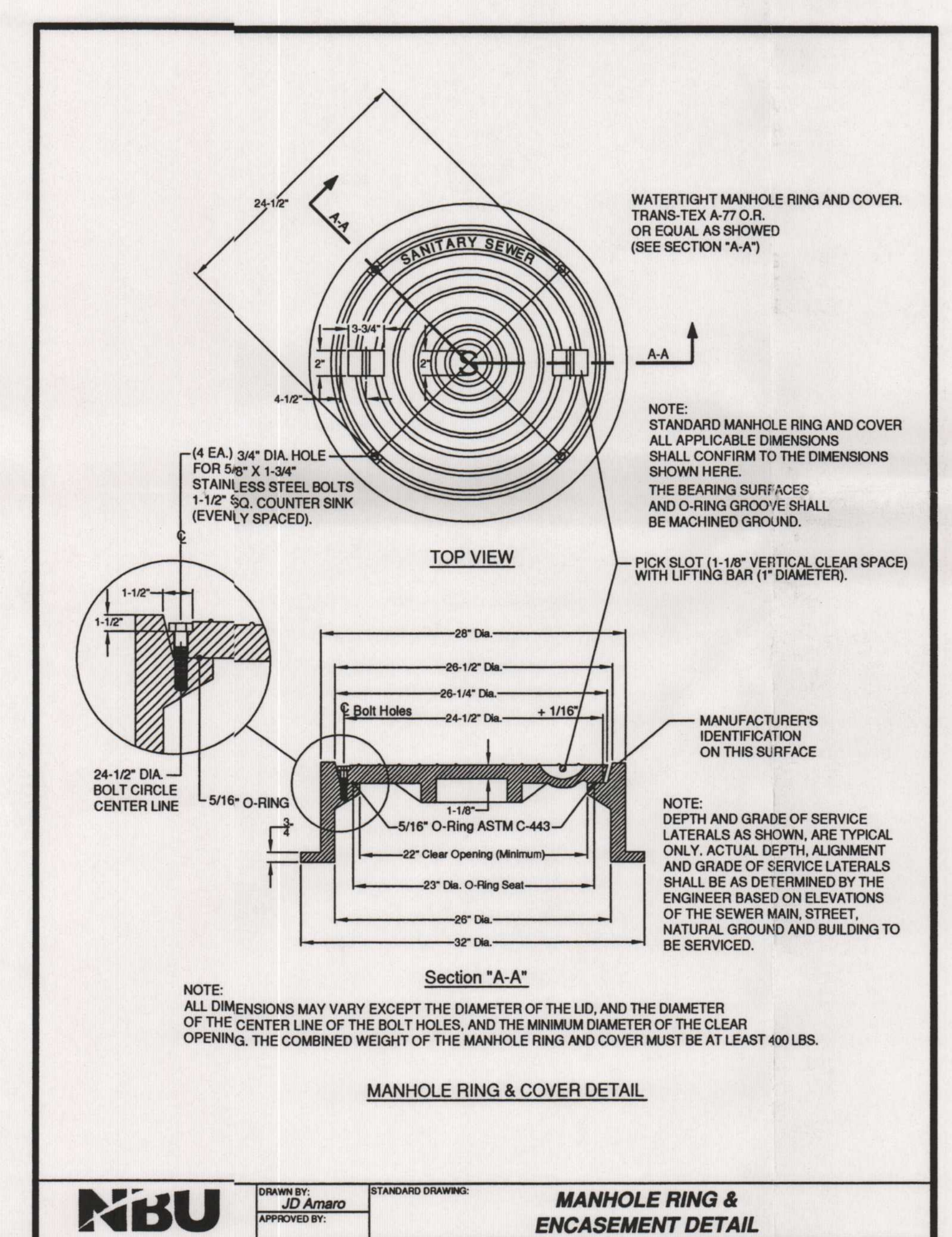
NOTES:

1. MORTAR BEDS SHALL NOT EXCEED 1".
2. SUBGRADE AND BASE MATERIALS SHALL BE COMPACTED ACCORDING TO STANDARD SPECIFICATIONS.
3. THE USE OF BRICKS ARE PROHIBITED IN ANY WAY.

NBU — NEW MANHOLE CONSTRUCTION AND MINOR MANHOLE ADJUSTMENT — 4-16-03 — N.T.S. — 1 OF 1 — 322







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STATE OF TEXAS — STEPHEN WADE HANZ — 95422 — LICENSED PROFESSIONAL ENGINEER

STANDARD WASTEWATER DETAILS SHEET 1 OF 2

CIVIL SITE CONSTRUCTION PLANS

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE: OCTOBER 2012
DRAWN BY: TAR
DESIGNED BY: TAR
CHECKED BY: AM
REVIEWED BY: SH
PROJECT NUMBER: 042.001

SHEET 16 OF 20

GENERAL NOTES:

ALL MATERIALS AND CONSTRUCTION PROCEDURES WITHIN THE SCOPE OF THIS CONTRACT SHALL COMPLY WITH:

A. CURRENT CITY OF NEW BRAUNFELS CONSTRUCTION SPECIFICATIONS AND STANDARDS AS OF THE DATE OF THIS CONTRACT

B. THE MOST CURRENT EDITION OF TEXAS DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS, AND BRIDGES".

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE MOST CURRENT TEXAS DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS, AND BRIDGES." ALONG WITH CURRENT CITY OF SAN ANTONIO AND COMAL COUNTY SPECIFICATIONS. ANY DISCREPANCIES BETWEEN SPECIFICATIONS SHALL BE RESOLVED BY THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION.

CONTRACTOR SHALL PROCURE ALL PERMITS AND LICENSES, PAY ALL CHARGES, FEES, AND TAXES AND GIVE ALL NOTICES NECESSARY AND INCIDENTAL TO THE DUE AND LAWFUL PROSECUTION OF THE WORK.

ANY EXISTING OFF-SITE IMPROVEMENTS THAT ARE DAMAGED OR UNDERCUT BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED AS DIRECTED BY THE ENGINEER AND APPROVED BY THE OWNER OF THE EXISTING IMPROVEMENT AT THE CONTRACTOR'S EXPENSE. (NO SEPARATE PAY ITEM)

WORK COMPLETED BY THE CONTRACTOR WHICH HAS NOT RECEIVED A WORK ORDER OR CONSENT OF THE OWNER OR ENGINEER WILL BE SUBJECT TO REMOVAL AND REPLACEMENT BY AND AT THE EXPENSE OF THE CONTRACTOR.

CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL WASTE MATERIALS UPON PROJECT COMPLETION. THE CONTRACTOR SHALL NOT PLACE ANY WASTE MATERIAL IN THE 100yr FLOOD PLAIN WITHOUT FIRST OBTAINING AN APPROVED FLOOD PLAIN DEVELOPMENT PERMIT.

BARRICADES AND WARNING SIGNS SHALL CONFORM TO THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND SHALL BE LOCATED TO PROVIDE MAXIMUM PROTECTION TO THE PUBLIC AS WELL AS CONSTRUCTION PERSONNEL AND EQUIPMENT WHILE PROVIDING CONTINUOUS TRAFFIC FLOW AT ALL TIMES DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL DEVICES DURING CONSTRUCTION.

CONTRACTOR IS REQUIRED TO VERIFY PROJECT ELEVATIONS. THE TERM "MATCH EXISTING" SHALL BE UNDERSTOOD TO SIGNIFY BOTH HORIZONTAL AND VERTICAL ALIGNMENT.

WHEN MATCHING EXISTING PAVEMENTS, CURBS, DRIVES, AND WALKS, THEY SHALL BE SAW CUT FULL DEPTH AND REMOVED TO ALLOW FOR PROPOSED CONSTRUCTION. IF ANY EXISTING JOINT IS ENCOUNTERED, PRECAUTION SHALL BE TAKEN DURING REMOVAL OF CONCRETE SO AS NOT TO DAMAGE EXISTING DOWELS. ALL EXISTING DOWELS SHALL BE EXPOSED AND CLEANED.

ITEM OF WORK DESIGNATED "BY OTHERS" SHALL NOT BE CONSIDERED PART OF THIS CONTRACT.

ALL "COMPACTED SUBGRADE" SHALL CONSIST OF NATIVE MATERIAL SCARIFIED TO A MINIMUM DEPTH OF SIX INCHES AND COMPACTED TO 95% DENSITY ACCORDING TO DENSITY TEST METHOD TEX-115E OR ACCORDING TO ASTM D-698 AND TESTED BY ASTM D-2922.

ALL "FLEXIBLE BASE" SHALL BE TYPE "A", GRADE 4, ACCORDING TO TxDOT ITEM 247, COMPACTED TO 95% MODIFIED DENSITY AT A MOISTURE CONTENT BETWEEN −2 AND +3 OF OPTIMUM PERCENT MOISTURE ACCORDING TO ASTM D-1557 (MODIFIED PROCTOR) AND TESTED BY ASTM D-2922.

ASPHALT PAVEMENT SHALL BE THE TYPE SPECIFIED ON THE PLANS AND ACCORDING TO TxDOT ITEM 340 "HOT MIX ASPHALT CONCRETE PAVEMENT".

PRIME COAT USING MC-30 AT A RATE OF 0.2 GALLONS PER SQUARE YARD SHALL BE PLACED OVER PREPARED BASE AT LEAST ONE DAY PRIOR TO LAYING ASPHALTIC CONCRETE PAVEMENT. ANY NECESSARY TACK COAT SHALL BE MC-30 AT 0.05 GALLONS PER SQUARE YARD. IT IS REQUIRED THAT BOTH THE PRIME COAT AND THE TACK COAT BE APPLIED AT THE TEMPERATURE SPECIFIED UNDER TxDOT ITEM 300.3.

CONCRETE SHALL BE CLASS "A" ACCORDING TO TxDOT ITEM 421 UNLESS OTHERWISE ON PLANS.

REINFORCING STEEL SHALL BE FROM NEW BILLET AND SHALL CONFORM TO TxDOT ITEM 440. ALL DIMENSIONS RELATING TO REINFORCING STEEL ARE TO CENTER OF BARS EXCEPT WHEN REFERRING TO CLEARANCE.

ALL SAWED JOINTS SHALL BE SAWED WITHIN 24 HOURS OF POURING,

ABSOLUTELY NO WELDING OF REINFORCING BARS OR TORCHING TO BEND REINFORCING BARS SHALL BE ALLOWED WITHOUT THE SPECIFIC APPROVAL OF THE ENGINEER.

ORDINARY COMPACTION CONTROL IS REQUIRED ON THIS PROJECT.

ALL ROLLING FOR COMPACTION OF ASPHALTIC CONCRETE PAVEMENT SHALL BE COMPLETED BEFORE THE MIXTURE TEMPERATURE DROPS BELOW 175 DEG. (F).

ALL FILL MATERIAL SHALL BE SUBJECT TO THE ENGINEER'S APPROVAL.

CONTRACTOR AGREES TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND SHALL NOT BE LIMITED TO THE NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNERS AND THE ENGINEER AND HIS EMPLOYEES, PARTNERS, OFFICES, DIRECTORS, OR CONSULTANTS, HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF THE WORK ON THIS PROJECT, EXCEPTING FROM LIABILTY ARISING FROM SOLE NEGLIGENCE OF THE OWNER OR ENGINEER, ENGINEER'S DIRECTORS, OFFICERS, EMPLOYEES, OR CONSULTANTS.

ALL CMP (CORRUGATED METAL PIPE) USED ON THIS PROJECT SHALL HAVE A MANNING'S "n" VALUE OF 0.024., UNLESS OTHERWISE SHOWN ON PLANS.

CONTRACTOR WILL BE RESPONSIBLE FOR ALL CONSTRUCTION TESTING PER CURRENT CITY OF NEW BRAUNFELS REQUIREMENTS. ALL TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL. ENGINEER AND OWNER RESERVE THE RIGHT TO HAVE THE CONTRACTOR REMOVE AND REPLACE ANY MATERIAL THAT WAS NOT TESTED OR FAILED TESTING. ALL COST ASSOCIATED WITH THE REMOVAL, REPLACEMENT AND TESTING SHALL BE PAID BY THE CONTRACTOR.

ALL PVC SLEEVES SHALL BE INSTALLED 3 FEET BELOW FINISHED GRADE AND ENDS SHALL BE MARKED SO THAT LOCATIONS OF SLEEVES CAN BE EASILY IDENTIFIED.

PRE--CONSTRUCTION CONFERENCE IS REQUIRED, ENGINEER WILL ARRANGE SUCH CONFERENCE IN COORDINATION WITH CITY OF NEW BRAUNFELS STREET INSPECTOR. NO CONSTRUCTION MAY BEGIN PRIOR TO THE PRE-CONSTRUCTION CONFERENCE.

CONTRACTOR SHALL COORDINATE WITH DRY UTILITY INSTALLERS AND SHARED TRENCHING SHALL BE UTILIZED. CUTTING THE STREETS AFTER COMPLETION BY DRY UTILITIES SHALL NOT BE ACCEPTABLE.

AS PER PLATTING ORDINANCE SECTIN 118-38M.: WHEN ALL IMPROVEMENTS ARE FOUND TO BE CONSTRUCTED AND COMPLETED IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS AND WITH THE CITY'S STANDARDS, AND UPON RECEIPT OF ONE SET OF "RECORD DRAWINGS" PLANS, AND A DIGITAL COPY OF ALL PLANS (AUTOCAD 2000 MINIMUM) THE CITY ENGINEER SHALL ACCEPT SUCH IMPROVEMENTS FOR THE CITY OF NEW BRAUNFELS, SUBJECT TO THE GUARANTY OF MATERIAL AND WORKMANSHIP PROVISIONS IN THIS SECTION.

EROSION / SEDIMENTATION CONTROL:

AT A MINIMUM, THESE CONTROLS SHALL CONSIST OF ROCK BERMS AND/OR SILT FENCES CONSTRUCTED PARALLEL TO AND DOWN GRADIENT FROM THE TRENCHES. THE ROCK BERM OR SILT FENCES SHALL BE INSTALLED IN A MANNER SUCH THAT ANY RAINFALL RUNOFF SHALL BE FILTERED. HAY BALES SHALL NOT BE USED FOR TEMPORARY EROSION AND SEDIMENTATION CONTROLS.

ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS MUST BE INSTALLED PRIOR TO CONSTRUCTION AND SHALL BE MAINTAINED DURING CONSTRUCTION BY THE CONTRACTOR. THE CONTRACTOR SHALL REMOVE THE CONTROLS WHEN VEGETATION IS ESTABLISHED AND THE CONSTRUCTION AREA IS STABILIZED {31 TAC 313.5 (c)(12)}. ADDITIONAL PROTECTION MAY BE REQUIRED IF EXCESSIVE SOLIDS ARE BEING DISCHARGED FROM THE SITE.

ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS SHALL BE REMOVED BY THE CONTRACTOR AT FINAL ACCEPTANCE OF THE PROJECT BY THE OWNER/ENGINEER.

PLACEMENT OF TEMPORARY EROSION AND SEDIMENTATION CONTROLS SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION PLANS. ACTUAL LOCATIONS MAY VARY SLIGHTLY FROM THE PLANS, BUT WILL BE VERIFIED BY THE ENGINEER/INSPECTOR IN THE FIELD PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL INSPECT THE CONTROLS AT WEEKLY INTERVALS AND AFTER EVERY SIGNIFICANT RAINFALL TO INSURE DISTURBANCE OF THE STRUCTURES HAS NOT OCCURRED. SEDIMENT DEPOSITED AFTER A RAINFALL SHALL BE REMOVED FROM THE SITE OR PLACED IN AN ENGINEER APPROVED DESIGNATED DISPOSAL AREA.

CONTRACTOR SHALL BE RESPONSIBLE TO INSURE THAT NO EROSION CONTROL MEASURES BLOCK THE DRAINAGE SYSTEM FROM WORKING AS DESIGNED.

UTILITIES

LOCATION AND DEPTH OF EXISTING UTILITIES SHOWN HERE ARE APPROXIMATE ONLY. ACTUAL LOCATIONS AND DEPTHS MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF ALL EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION, INCLUDING THOSE NOT SHOWN ON THE DRAWINGS.

ANY EXISTING UTILITIES, ON OR OFF THE SITE, THAT ARE DAMAGED OR UNDERCUT BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED AS DIRECTED BY THE ENGINEER AND APPROVED BY THE RESPECTIVE UTILITY COMPANY AT THE CONTRACTOR'S EXPENSE.

CONTRACTOR SHALL NOTIFY APPROPRIATE UTILITY COMPANIES AND GOVERNMENTAL AGENCIES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION AT:

THE CONTRACTOR SHALL NOTIFY THE FOLLOWING UTILITY COMPANIES 48 HOURS PRIOR TO EXCAVATION

NEW BRAUNFELS UTILITIES (WATER AND SEWER)	(830) 608-8971
NEW BRAUNFELS UTILITIES (ELECTRIC)	(830) 608-8951
TIME WARNER CABLE	(830) 625-3408
CENTERPOINT ENERGY (GAS)	(830) 643-6434
AT&T	(830) 303-1333
TEXAS ONE CALL SYSTEM	1-800-245-4545

DUE TO FEDERAL REGULATIONS TITLE 49, PART 192(8), GAS COMPANIES MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT THE WORK AROUND ANY GAS VALVES THAT ARE IN THE PROJECT AREA.

CONTRACTOR SHALL REFERENCE NEW BRAUNFELS UTILITIES PLANS FOR FINAL ELECTRICAL LINE DESIGNS AND LAYOUT.

SEWER NOTES

1. THE CONTRACTOR SHALL MAINTAIN SERVICE TO EXISTING SANITARY SEWERS AT ALL TIMES DURING CONSTRUCTION.
2. DUE TO FEDERAL REGULATIONS TITLE 49, PART 192.181 CENTER POINT ENERGY MUST MAINTAIN ACCESS TO GAS VALVES AT ALL TIMES. THE CONTRACTOR MUST PROTECT AND WORK AROUND GAS VALVES THAT ARE IN THE PROJECT AREAS.
3. ALL 8" GRAVITY SEWER PIPE (MAINS & LATERALS) AND FITTINGS IN THIS PROJECT ARE PVC SDR-26, ASTM D-3034, D-3212, F-477. ALL PRESSURE RATED SEWER PIPE IS PVC AWWA C-900 PIPE. COLORED GREEN.
4. ALL RESIDENTIAL WASTEWATER SERVICE LATERALS SHALL BE EXTENDED TO THE PROPERTY LINE AND A CLEANOUT SHALL BE INSTALLED AT THE PROPERTY LINE. SERVICES TO LOTS WILL EXTEND FOUR (4) FEET PAST THE UNDERGROUND ELECTRIC CONDUIT IF ELECTRIC IS INSTALLED IN THE FRONT EASEMENT.
5. INITIAL BACKFILL OF SEWER MAINS AND SEWER LATERALS SHALL BE 1" TO 1-1/2" WASHED GRAVEL FOR CONVEYANCE OF GROUNDWATER.
6. SECONDARY BACKFILL OF SEWER LINES SHALL GENERALLY CONSIST OF MATERIALS REMOVED FROM THE TRENCH AND SHALL BE FREE FROM BRUSH, DEBRIS, AND TRASH, NO ROCKS OR STONES HAVING ANY DIMENSION LARGER THAN 6 INCHES AT THE LARGEST DIMENSION.
7. ALL SEWER PIPES SHALL HAVE COMPRESSION OR MECHANICAL JOINTS AS PER 31 TAC 313.5 (C) (2) (II).
8. FOR SEWER LINES LESS THAN 24" IN DIAMETER, SELECT INITIAL BACKFILL MATERIAL SHALL BE PLACED IN TWO LIFTS.

A. THE FIRST LIFT SHALL BE SPREAD UNIFORMLY AND SIMULTANEOUSLY ON EACH SIDE AND UNDER THE SHOULDERS OF THE PIPE TO THE MID POINT OF SPRING LINE OF THE PIPE.

B. THE SECOND LIFT SHALL BE PLACED TO A DEPTH AS SHOWN ON THE PIPE BACKFILL DETAIL. FOR PIPES LARGER THAN 24", 12" MAXIMUM LIFTS SHALL BE USED.

9. ALL MANHOLES MUST BE WATER TIGHT. EITHER MONOLITHIC, CAST-IN-PLACE CONCRETE STRUCTURES OR PREFABRICATED MANHOLES SPECIFICALLY APPROVED BY NBU. THE MANHOLES SHALL HAVE WATER TIGHT RINGS AND COVERS, WHEREVER THEY ARE WITHIN THE 100 YEAR FLOODPLAIN, THE MANHOLE COVERS SHALL BE BOLTED. EVERY FOURTH MANHOLE IN SEQUENCE SHALL HAVE AN ALTERNATIVE MEANS OF VENTING [31 TAC 313.5(C)(1) AND 31 TAC 317.2(C)(5)(F)].\
10. ALL MANHOLES SHALL BE CONSTRUCTED SO THAT THE TOP OF THE RING IS ABOVE THE SURROUNDING GROUND, EXCEPT WHEN LOCATED IN PAVED AREAS. IN PAVED AREAS, THE MANHOLE RING SHALL BE FLUSH WITH PAVEMENT.
11. ALL NEW MANHOLES ARE TO HAVE COVERS WITH 32" OPENINGS. MANHOLES SHALL BE CONSTRUCTED OF OR LINED WITH A CORROSION MATERIAL RESISTANT MATERIAL. WHERE NEW CONSTRUCTION TIES INTO AN EXISTING MANHOLE, THE EXISTING MANHLE MUST BE LINED, COATED, OR REPLACED WITH A CORROSION RESISTANT MATERIAL.
12. SEWER PIPE CONNECTIONS TO PRE-CAST MANHOLES WILL BE COMPRESSION JOINTS OF MECHANICAL "BOOT TYPE" JOINT AS APPROVED BY NBU.
13. SEWER LINES SHALL BE TESTED FROM MANHOLE TO MANHOLE.
14. IN AREAS WHERE A NEW SANITARY SEWER MANHOLE IS TO BE CONSTRUCTED OVER AN EXISTING SANITARY SEWER SYSTEM, IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO TEST THE EXISTING MANHOLES BEFORE CONSTRUCTION. AFTER PROPOSED MANHOLE HAS BEEN BUILT, THE CONTRACTOR SHALL RE-TEST THE EXISTING SYSTEM TO THE SATISFACTION OF THE CONSTRUCTION INSPECTOR. (NO SEPARATE PAY ITEM).
15. WHERE THE MINIMUM 9 FEET SEPARATION DISTANCE BETWEEN SEWER LINES AND WATER LINES/MAINS CANNOT BE MAINTAINED, THE INSTALLATION OF SEWER LINES SHALL BE IN STRICT ACCORDANCE WITH TCEQ. THE WASTEWATER LINE SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON, OR PVC MEETING THE ASTM SPECIFICATION FOR BOTH PIPES AND JOINTS OF 150 PSI AND SHALL BE IN ACCORDANCE WITH 30 TAC 290.44(E)(5).
16. AFTER CONSTRUCTION TESTING WILL BE DONE BY TV CAMERA BY THE CONTRACTOR AND OBSERVED BY THE INSPECTOR OR WATER SYSTEMS ENGINEERING PERSONNEL. AS THE CAMERA IS RUN THROUGH THE LINES (NSPI). ANY ABNORMALITIES FOUND IN THE LINE, SUCH AS BROKEN PIPE OR MISALIGNED JOINTS, MUST BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE. CONTRACTOR TO PROVIDE TV TAPES TO CONSTRUCTION INSPECTION FOR REVIEW PRIOR TO FINAL INSPECTION OF THE PROJECT.
17. WATER JETTING THE BACKFILL WITHIN A STREET WILL NOT BE PERMITTED. SANITARY SEWER TRENCHES SUBJECT TO TRAFFIC SHALL CONFORM TO NBU CONNECTION & CONSTRUCTION POLICY MANUAL.
18. NO TESTING WILL BE PERFORMED PRIOR TO 30 DAYS FROM COMPLETE INSTALLATION OF THE SANITARY SEWER LINES. THE FOLLOWING SEQUENCE WILL BE STRICTLY ADHERED TO.

A. PULL MANDRELL.
B. PERFORM AIR TEST.
C. CLEANING OF ANY DEBRIS.
D. FLUSHING OF SYSTEM.
E. TV INSPECTION (WITHIN 72 HOURS OF FLUSHING).

19. WHERE REQUIRED, CONCRETE ENCASEMENT SHALL BE PLACED AS SHOWN ON THE STANDARD DETAIL SHEET.
20. A MINIMUM OF 3 FEET OF COVER IS TO BE MAINTAINED OVER THE SANITARY SEWER MAIN AND LATERALS AT SUBGRADE, OTHERWISE CONCRETE ENCASEMENT WILL BE REQUIRED.
21. SANITARY SEWER MAIN CONNECTIONS MADE DIRECTLY TO EXISTING MANHOLES WILL REQUIRE SUCCESSFUL TESTING OF THE MANHOLE IN ACCORDANCE WITH NBU CONNECTION & CONSTRUCTION POLICY MANUAL.
22. TCEQ AND EPA REQUIRE EROSION AND SEDIMENTATION CONTROL FOR CONSTRUCTION OF SEWER COLLECTION SYSTEMS. CONTRACTOR SHALL PROVIDE EROSION AND SEDIMENTATION CONTROL PER THE PROJECT PLANS. ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS SHALL BE REMOVED BY THE CONTRACTOR AT FINAL ACCEPTANCE OF THE PROJECT BY NBU WATER SYSTEMS.
23. ALL MANHOLES NOT WITHIN PAVED STREETS SHALL HAVE LOCKING CONCRETE COLLAR TO SECURE RING AND COVER TO MANHOLE CONE PER NBU DETAIL DRAWING #329. (NO SEPARATE PAY ITEM)
24. ALL MANHOLES OVER THE EDWARD'S AQUIFER RECHARGE ZONE SHALL HAVE LOCKING CONCRETE COLLAR TO SECURE RING AND COVER TO MANHOLE CONE PER NBU DETAIL DRAWING #329. (NO SEPARATE PAY ITEM)
25. ALL SEWER SERVICES SHALL HAVE CLEANOUTS INSTALLED AT PROPERTY LINE PER NBU DRAWING #302 AND #303. (NO SEPARATE PAY ITEM)
26. EACH LOT OWNER SHALL BE RESPONSIBLE FOR VERIFYING THE DEPTH OF THE SEWER SERVICE STUB OUT, AND DETERMINE THE MINIMUM SERVICEABLE FINISHED FLOOR ELEVATION.
27. VERTICAL SEWER SERVICE STACKS SHALL BE REQUIRED WHERE THE TOP OF THE SEWER MAIN IS AT A DEPTH OF 8 FEET OF GREATER, UNLESS SHOWN OTHERWISE ON PLANS.

WATER NOTES:

1. ALL WATER MAINS SHALL BE AWWA C900 (CLASS 150 OR GREATER).
2. WATER SERVICES SHALL BE SINGLE 1" COPPER TUBING.
3. WATER LINE IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE NBU SYSTEMS CONNECTION & CONSTRUCTION POLICY.
4. WATER MAIN SHALL HAVE A MINIMUM OF 42 INCHES OF COVER, OTHERWISE CONCRETE ENCASEMENT WILL BE REQUIRED.
5. EACH UNIT IN A DUPLEX, TRIPLEX, FOURPLEX, OR CONDOMINIUM SHALL BE PROVIDED WITH AN INDIVIDUAL WATER METER. A MASTER METER CAN BE CONSIDERED FOR SEPARATE BUILDINGS, HOWEVER, THOSE BUILDINGS MUST BE PLUMBED TO ALLOW SEPARATE METERS FOR FUTURE CONSIDERATION.
6. CONTRACTOR WILL KEEP THE AREA ON TOP OF AND AROUND THE WATER METER BOX FREE OF ALL OBJECTS AND DEBRIS.
7. INITIAL BACKFILL OF WATER LINES SHALL BE MANUFACTURED SAND OR PEA GRAVEL AS PER NBU SYSTEMS CONNECTION & CONSTRUCTION POLICY.
8. SECONDARY BACKFILL OF WATER LINES SHALL GENERALLY CONSIST OF MATERIAL REMOVED FROM THE TRENCH AND SHALL BE FREE FROM BRUSH, DEBRIS AND TRASH OR STONES HAVING ANY DIMENSION LARGER THAN 6" INCHES AT THE LARGEST DIMENSION.
9. HYDROSTATIC TESTING IS DONE FROM VALVE TO VALVE.
10. NO METER BOXES TO BE SET IN DRIVEWAYS OR SIDEWALKS. ANY METER BOXES SET IN DRIVEWAYS OR SIDEWALKS WILL BE RELOCATED AT CONTRACTOR'S AND/OR DEVELOPER'S EXPENSE.
11. METER BOXES MUST BE SET AT THE PROPOSED GRADE. ANY METER BOXES THAT ARE NOT SET AT THE FINAL GRADE WILL BE ADJUSTED AT CONTRACTOR'S AND/OR DEVELOPER'S EXPENSE.
12. MATERIAL FOR METER BOX'S BODY AND LID SHOULD BE OF POLYMER (PLASTIC) CONSTRUCTION. METER BOXES SHOULD BE DESIGNED FOR AMR'S. METAL FRAMES OR LIDS WILL NOT BE ACCEPTABLE.
13. THRUST BLOCKS WILL NOT BE ALLOWED ON THE SYSTEM WITHOUT SPECIAL APPROVAL. JOINTS WILL BE RESTRAINED WITH RESTRAINING SYSTEMS APPROVED BY NBU AND RESTRAINT LENGTH SHALL BE SUBMITTED TO NBU AT THE TIME OF PLAN SUBMITTAL.
14. CONTRACTOR SHALL PLACE TRACER WIRE ON TOP OF THE WATER MAINS. TRACER WIRE SHOULD RUN FROM VALVE TO VALVE AND EXIT AT THE VALVE BOX. THE TRACER WIRE SHOULD BE ATTACHED TO THE TOP OF THE PIPE USING TAPE. EXCESS WIRE SHOULD BE LEFT WITHIN VALVE BOXES TO BE PLACED WITHIN LID OF COVER.

CITY OF NEW BRAUNFELS CONSTRUCTION NOTES

DRAINAGE NOTE
FINISHED FLOOR ELEVATIONS
THE ELEVATION OF THE LOWEST FLOOR SHALL BE AT LEAST 10 INCHES ABOVE THE FINISHED GRADE OF THE SURROUNDING GROUND, WHICH SHALL BE SLOPED IN A FASHION SO AS TO DIRECT STORMWATER AWAY FROM THE STRUCTURE. PROPERTIES ADJACENT TO STORMWATER CONVEYANCE STRUCTURES MUST HAVE FLOOR SLAB ELEVATION OR BOTTOM OF FLOOR JOISTS A MINIMUM OF ONE FOOT ABOVE THE 100-YEAR WATER FLOW ELEVATION IN THE STRUCTURE. DRIVEWAYS SERVING HOUSES ON THE DOWNHILL SIDE OF THE STREET SHALL HAVE A PROPERLY SIZED CROSS SWALE PREVENTING RUNOFF FROM ENTERING THE GARAGE.

GROUNDWATER
IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER, CONTRACTOR, SUBCONTRACTORS, BUILDERS, GEO-TECHNICAL ENGINEER, AND PROJECT ENGINEER TO IMMEDIATELY NOTIFY THE OFFICE OF THE CITY ENGINEER AND PROJECT ENGINEER IF THE PRESENCE OF GROUNDWATER WITHIN THE SITE IS EVIDENT. UPON NOTIFICATION THE PROJECT ENGINEER SHALL RESPOND WITH PLAN REVISIONS FOR THE MITIGATION OF THE GROUNDWATER ISSUE. THE CITY ENGINEER SHALL RESPOND WITHIN TWO (2) BUSINESS DAYS UPON RECEIPT OF THE MITIGATION PLAN. ALL CONSTRUCTION ACTIVITY, IMPACTED BY THE DISCOVERY OF GROUNDWATER, SHALL BE SUSPENDED UNTIL THE CITY ENGINEER GRANTS A WRITTEN APPROVAL OF THE GROUNDWATER MITIGATION PLAN.

ROADWAY
ALL ROADWAY COMPACTION TESTS SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEO-TECHNICAL ENGINEER. FLEXIBLE BASE OR FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED SIX-INCHES (6") COMPACTED. EACH LAYER OF MATERIAL, INCLUSIVE OF SUBGRADE, SHALL BE COMPACTED AS SPECIFIED AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX-114-E, TEX-115-E. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEO-TECHNICAL ENGINEER AND APPROVED BY THE CITY OF NEW BRAUNFELS STREET INSPECTOR. UPON COMPLETION OF TESTING THE GEO-TECHNICAL ENGINEER WILL PROVIDE THE CITY OF NEW BRAUNFELS STREET INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FLEXIBLE BASE, AND FILL MATERIAL, AND SUBGRADE, HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS.

ITEM 340
ASPHALTIC CONCRETE PAVEMENT SHALL BE TYPE "D" HOT MIX ASPHALT AS DEFINED IN TXDOT'S STANDARD SPECIFICATIONS FOR TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREET AND BRIDGES, 2004.

THE ASPHALTIC CONCRETE SURFACE COURSE SHALL BE PLANT MIXED, HOT LAID TYPE"D" MEETING THE SPECIFICATION REQUIREMENTS OF 2004 TXDOT ITEM 340. THE MIX SHALL BE DESIGNED FOR A STABILITY OF AT LEAST 35 AND SHALL BE COMPACTED TO BETWEEN 91 AND 95 PERCENT OF THE MAXIMUM THEORETICAL DENSITY AS DETERMINED BY TXDOT TEST METHOD TEX-227-F. THE ASPHALT CEMENT CONTENT BY PERCENT OF TOTAL MIXTURE WEIGHT SHALL FALL WITHIN A TOLERANCE OF +0.5 PERCENT FROM A SPECIFIC MIX DESIGN.

UTILITY TRENCH COMPACTION
ALL UTILITY TRENCH COMPACTION TESTS WITHIN THE STREET PAVEMENT SECTION SHALL BE THE RESPONSIBILITY OF THE DEVELOPER'S GEO-TECHNICAL ENGINEER. FILL MATERIAL SHALL BE PLACED IN UNIFORM LAYERS NOT TO EXCEED TWELVE INCHES (12") LOOSE. EACH LAYER OF MATERIAL SHALL BE COMPACTED AS SPECIFIED AND TESTED FOR DENSITY AND MOISTURE IN ACCORDANCE WITH TEST METHODS TEX-113-E, TEX-114-E, TEX-115-E. TESTS SHALL BE TAKEN AT A MINIMUM OF 1 TEST PER EVERY 100 LF OF TRENCH, FOR EACH LIFT. THE NUMBER AND LOCATION OF REQUIRED TESTS SHALL BE DETERMINED BY THE GEO-TECHNICAL ENGINEER AND APPROVED BY THE CITY OF NEW BRAUNFELS STREET INSPECTOR. UPON COMPLETION OF TESTING THE GEO-TECHNICAL ENGINEER SHALL PROVIDE THE CITY OF NEW BRAUNFELS STREET INSPECTOR WITH ALL TESTING DOCUMENTATION AND A CERTIFICATION STATING THAT THE PLACEMENT OF FILL MATERIAL HAS BEEN COMPLETED IN ACCORDANCE WITH THE PLANS.

GENERAL NOTES
CONTRACTOR IS REQUIRED TO OBTAIN AN APPLICATION FOR ROAD EXCAVATION FOR ANY CONSTRUCTION THAT WILL INCLUDE STREET CUT/REPAIRS ON ANY CITY STREETS AND/OR RIGHT-OF-WAYS.

ENSURE ALL DRIVEWAY APPROACHES ARE BUILT IN GENERAL ACCORDANCE WITH A.D.A. SPECIFICATIONS. NO VALVES, HYDRANTS, ETC. SHALL BE CONSTRUCTED WITHIN CURBS, SIDEWALKS, OR DRIVEWAYS.

TCEQ SEWAGE COLLECTOIN SYSTEM NOTES

REF T89 – MANDREL TEST SHALL BE PERFORMED WITHOUT MECHANICAL PULLING DEVICES.

REF T91 – LEAKAGE TEST IS REQUIRED FOR ALL GRAVITY LINES. THESE TESTS MUST COMPLY WITH SECTION 317.2 (a)(4) OF THE TCEQ's RULES.

REF T93 – HYDROSTATIC MANHOLE TEST FOR PROPOSED MANHOLES SHALL COMPLY WITH SECTION 317.2 (c)(5)(H) OF THE TCEQ's RULES.

REF T102 – INSPECTION MUST BE PROVIDED DURING CRITICAL PHASES OF CONSTRUCTION BY A QUALIFIED INSPECTOR UNDER THE DIRECTION OF A P.E. CRITICAL PHASES OF CONSTRUCTION ARE DEEMED AT A MINIMUM TO INCLUDE THE TESTING OF PIPE AND MANHOLES FOR LEAKAGE, AND TESTING OF FLEXIBLE PIPE FOR INSTALLED DEFLECTION.

REF T105 – WATER/WASTEWATER SEPARATION DISTANCES FROM TCEQ SECTION 317.13 APPENDIX E
(1) WATERLINE/NEW SEWER LINE SEPARATION. WHEN NEW SANITARY SEWERS ARE INSTALLED, THEY SHALL BE INSTALLED NO CLOSER TO WATERLINES THAN NINE FEET IN ALL DIRECTIONS. SEWERS THAT PARALLEL WATERLINES MUST BE INSTALLED IN SEPARATE TRENCHES. WHERE THE NINE-FOOT SEPARATION DISTANCE CANNOT BE ACHIEVED, THE FOLLOWING GUIDELINES WILL APPLY.

(A) WHERE A SANITARY SEWER PARALLELS A WATERLINE, THE SEWER SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON, OR PVC MEETING ASTM SPECIFICATIONS WITH A PRESSURE RATING FOR BOTH THE PIPE AND JOINTS OF 150 PSI. THE VERTICAL SEPARATION SHALL BE A MINIMUM OF TWO FEET BETWEEN OUTSIDE DIAMETERS AND THE HORIZONTAL SEPARATION SHALL BE A MINIMUM OF FOUR FEET BETWEEN OUTSIDE DIAMETERS. THE SEWER SHALL BE LOCATED BELOW THE WATERLINE.

(B) WHERE A SANITARY SEWER CROSSES A WATERLINE AND THE SEWER IS CONSTRUCTED OF CAST IRON, DUCTILE IRON, OR PVC WITH A MINIMUM PRESSURE RATING OF 150 PSI, AN ABSOLUTE MINIMUM DISTANCE OF SIX INCHES BETWEEN OUTSIDE DIAMETERS SHALL BE MAINTAINED. IN ADDITION, THE SEWER SHALL BE LOCATED BELOW THE WATERLINE WHERE POSSIBLE AND ONE LENGTH OF THE SEWER PIPE MUST BE CENTERED ON THE WATERLINE.

(C) WHERE A SEWER CROSSES UNDER A WATERLINE AND THE SEWER IS CONSTRUCTED OF ABS TRUSS PIPE, SIMILAR SEMI-RIGID PLASTIC COMPOSITE PIPE, CLAY PIPE, OR CONCRETE PIPE WITH GASKETED JOINTS, A MINIMUM TWO-FOOT SEPARATION DISTANCE SHALL BE MAINTAINED. THE INITIAL BACKFILL SHALL BE CEMENT STABILIZED SAND (TWO OR MORE BAGS OF CEMENT PER CUBIC YARD OF SAND) FOR ALL SECTIONS OF SEWER WITHIN NINE FEET OF THE WATERLINE. THIS INITIAL BACKFILL SHALL BE FROM ONE QUARTER DIAMETER BELOW THE CENTERLINE OF THE PIPE TO ONE PIPE DIAMETER (BUT NOT LESS THAN 12 INCHES) ABOVE THE TOP OF THE PIPE.

(D) WHERE A SEWER CROSSES OVER A WATERLINE, ALL PORTIONS OF THE SEWER WITHIN NINE FEET OF THE WATERLINE SHALL BE CONSTRUCTED OF CAST IRON, DUCTILE IRON, OR PVC PIPE WITH A PRESSURE RATING OF AT LEAST 150 PSI USING APPROPRIATE ADAPTERS. IN LIEU OF THIS PROCEDURE THE NEW CONVEYANCE MAY BE ENCASED IN A JOINT OF 150 PSI PRESSURE CLASS PIPE AT LEAST 18 FEET LONG AND TWO NOMINAL SIZES LARGER THAN THE NEW CONVEYANCE. THE SPACE AROUND THE CARRIER PIPE SHALL BE SUPPORTED AT FIVE FEET INTERVALS WITH SPACERS OR BE FILLED TO THE SPRING LINE WITH WASHED SAND. THE ENCASEMENT PIPE SHOULD BE CENTERED ON THE CROSSING AND BOTH ENDS SEALED WITH CEMENT GROUT OR MANUFACTURED SEAL.

(2) WATERLINE MANHOLE SEPARATION. UNLESS SANITARY SEWER MANHOLES AND THE CONNECTING SEWER CAN BE MADE WATERTIGHT AND TESTED FOR NO LEAKAGE, THEY MUST BE INSTALLED SO AS TO PROVIDE A MINIMUM OF NINE FEET OF HORIZONTAL CLEARANCE FROM AN EXISTING OR PROPOSED WATERLINE. WHERE THE NINE-FOOT SEPARATION DISTANCE CANNOT BE ACHIEVED, A CARRIER PIPE AS DESCRIBED IN PARAGRAPH (1)(D) OF THIS SECTION MAY BE USED WHERE APPROPRIATE.

REF T112 – PERSONAL GAS DETECTORS ARE REQUIRED FOR WEAR BY ALL PERSONNEL WHOSE JOBS REQUIRE ENTERING ENCLOSED SPACES (SUCH AS MANHOLES AND LIFT STATIONS) CAPABLE OF HAVING ACCUMULATIONS OF HYDROGEN SULFIDE OR OTHER HARMFUL GASES.

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ENGINEERING & SURVEYING

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10/11/2012

CONSTRUCTION NOTES

CIVIL SITE CONSTRUCTION PLANS

OAKWOOD ESTATES - UNIT NINETEEN
CIVIL SITE CONSTRUCTION PLANS

GK MEYER INVESTMENTS
259 EAST TORREY
NEW BRAUNFELS, TEXAS, 78130

DATE: OCTOBER 2012
DRAWN BY: TAR
DESIGNED BY: TAR
CHECKED BY: AM
REVIEWED BY: SH
PROJECT NUMBER: 042.001

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OF 20

Drawing Name: N:_Projects\042– Greg Meyer\042.001.101 – Oakwood Estates U19\Construction Plans\OAKWOOD19_SHT–CONST NOTES.dwg User: travisr Oct 11, 2012 – 11:20am