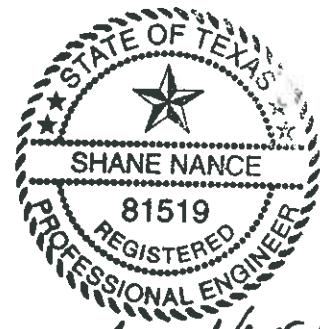




**GEOTECHNICAL INVESTIGATION:  
AMARILLO VA HEALTH CARE SYSTEM  
EXPAND LODGE  
AMARILLO, TX**

**REQUESTED BY:  
CARLA KAUFMAN  
SBBL ARCHITECTURE + PLANNING**

**REPORT NO. 15688  
FEBRUARY 28, 2011**



*Shane Nance, P.E.*  
2/28/11

**F-1753**

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**GEOTECHNICAL INVESTIGATION:  
AMARILLO VA HEALTH CARE SYSTEM  
EXPAND LODGE  
AMARILLO, TX**

**SCOPE OF INVESTIGATION**

This report presents the results of a geotechnical investigation for a proposed expansion to the existing Lodge at the Amarillo VA Health Care System. The site is located on the southwest corner of SW 9<sup>th</sup> Avenue and US Highway 66 in Amarillo, TX. The investigation was conducted on February 17, 2011. Two borings were advanced to 21.5 feet. The boring locations are shown in the Appendix.

This investigation is intended to provide geotechnical information regarding the subsurface soils. The studies requested were for analysis and evaluation of the geotechnical characteristics of the soil. This report consists of a description of the field investigation procedures, laboratory soil test descriptions, subsurface soil conditions, and a summary of test results. All tests were performed in general accordance with ASTM standards, where applicable, or as otherwise noted.

**PROJECT DESCRIPTION**

The proposed project consists of an expansion on the southwest side of the existing Lodge.

**FIELD EXPLORATION**

The subsurface exploration consisted of drilling 2 soil borings. A drilling rig with a 3-inch diameter cutting bit was used to advance the boring. While advancing the borings, standard penetration tests (ASTM D 1586) were taken at depths of 2.5, 5, 7.5, 10, 15, and 20 feet.

After drilling, the boreholes were backfilled with soil. No water or cave-in was observed prior to backfilling the boreholes.

## **LABORATORY TESTING**

Upon completion of the soil boring operation, samples were transported to the laboratory for testing and further study. All tests were conducted according to the latest ASTM standard or other applicable standard. Moisture content (ASTM D 4959) was determined on each sample. Atterberg limit tests (ASTM D 4318) and minus No. 200 sieve analyses (ASTM D 1140) were performed to determine the index properties of the subsurface material and to classify the samples according to the Unified Soil Classification System (ASTM D 2487). Similarity of the above properties indicates uniform strength and compressibility for soils of essentially the same geological origin. A summary of the tests is in the Appendix.

Atterberg limits were determined to estimate the plasticity characteristics of the material. The plasticity index (PI) is the difference between the liquid limit (LL) and the plastic limit (PL) of a soil. The liquid limit is the moisture content, in percent, at which the soil changes from a liquid to a plastic stage. The liquid limit of a soil is determined by Cassagrande's liquid device and is defined as the moisture content at which a groove closure of 1/2 inch occurs at 25 blows. The plastic limit is the moisture content, in percent, at which the soil changes from a plastic to a semisolid state. The plastic limit is defined as the moisture content at which the soil crumbles when rolled into a thread of 1/8 inch in diameter. At moisture contents between the liquid limit and plastic limit, the soil is plastic. Sediments of recent geologic origin have moisture contents generally equal to or greater than the liquid limit while older or over consolidated soils have moisture contents approaching or below the plastic limit. Therefore, the soil's nature moisture content relative to these limits indicates geological history, strength, compressibility characteristics, and depositional process.

## **SUBSOIL CONDITIONS**

As defined by the Unified Soil Classification System (USCS), all soils are lean clay (CL) or lean clay with sand (CL). Atterberg limit tests indicate the soils have plasticity indexes of 14 to 22 and liquid limits ranging from 31 to 39. The amount passing the No. 200 sieve varied from 81.1% to 93.8%. Based on the 2006 International Building Code

Table 1613.5.2 and the standard penetration tests results, the soil site class should be "D". The soils at this site display a medium to high swelling potential. Therefore, the construction recommendations included in this report should be followed.

### **FOUNDATION RECOMMENDATIONS - SPREAD FOOTING**

The structure may be supported on a spread footing foundation system. It is recommended that the building site be undercut and backfilled with select fill (as defined in the Construction Recommendations section) so that the spread footings rest on a minimum of 3 feet of select fill. Provided the building site is prepared as recommended, the allowable soil bearing capacity should be 2500 pounds per square foot (psf). If the site is not undercut and backfilled with select fill, the allowable soil bearing capacity is 1500 psf. These values assume a factor of safety of three against ultimate failure. In addition, the footings should be placed at a minimum of 2.0 feet below finish grade.

### **CONSTRUCTION RECOMMENDATIONS**

In order to minimize the sensitivity of the structure to differential movements, the foundation system and slab should be reinforced.

Due to the soil's shrink/swell potential, the soils should be protected against moisture change. To insure proper drainage, the structure may be elevated with engineered select fill (as defined below). Consideration should be given to the location and design of areas that would produce moisture concentration adjacent to or beneath the structure. Provisions should be made to prevent moisture from accumulating on the building pad during construction and around the foundation during and after construction. To minimize structural or cosmetic damage caused by soil volume changes, the following should be addressed:

1. Proper site drainage - For adjacent ground exposed or vegetative areas, provide adequate drainage away from the foundation (minimum 5 percent slope in the first 10 feet and minimum 2 percent slope elsewhere).

Drainage swales should not be located within 4 feet of the foundation.

Pervious planting beds should slope away from the foundation at least 2 inches per foot and the edging should allow water to drain out of the beds.

2. For any building, gutters or extended roof eaves are recommended. For adjacent ground exposed or vegetative areas, all gutter down spouts or extended eaves should extend at least 2 feet away from the foundation and past any planting beds.
3. Take into account the water demands of specific trees and vegetation, and avoid placing them near foundations.
4. Sufficiently stiffened foundation and slab systems.

Recommended preparation of the site should be in the following manner:


1. Remove all vegetation and undesirable material. If the building site is to be undercut and backfilled with select fill, remove existing soil to an elevation that provides a minimum of 3 feet of fill below the spread footings.
2. Scarify the exposed excavated surface to a depth of approximately 6 inches, add moisture (if required), mix, and recompact. The exposed subgrade soil should be compacted to at least 95% of the standard Proctor maximum dry density (ASTM D698), and have a moisture content of 2% below to 3% above optimum.
3. Place engineered select fill in loose lifts not to exceed 8 inches in thickness. The select fill should be compacted to at least 95% of the standard Proctor maximum dry density (ASTM D698), and have a moisture content of 3% below to 3% above optimum. The select fill should extend a minimum of 2 feet outside the building perimeter.
4. Engineered select fill should be material with a plasticity index between 6 and 15. All fill material should be free of large rock and organic material.
5. The top 2 inches of fill beneath all slabs and sidewalks should be sand, or other free draining soil. The sand or other free draining material should be damp prior to placing concrete.

6. A qualified geotechnical technician from this laboratory should be retained to provide soil engineering and testing services during foundation and earthwork phases of this project. This is to ensure compliance with the design concepts and specifications.

### **LIMITATIONS**

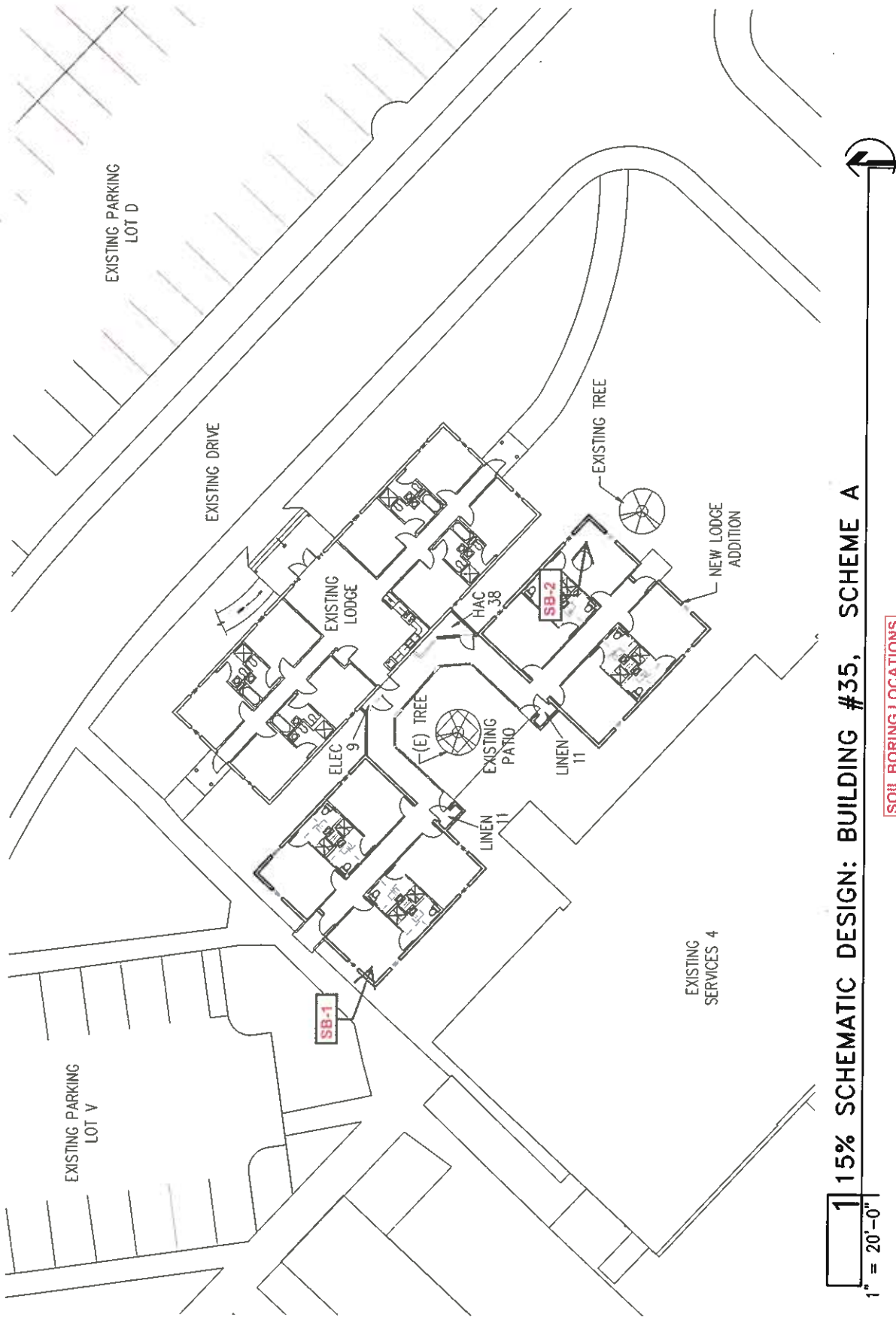
The conclusions and recommendations reached in this report are based on the conditions at the boring locations. In any subsurface investigation, it is necessary to assume that the soil or soil properties in the area between the borings are reasonably uniform and similar to those found in the borings. In the event that any changes in the nature, design, or location of the construction are planned, the conclusions and recommendations contained in this report shall not be considered valid; unless, the changes are reviewed and the conclusions of this report are modified in writing.

Respectfully Submitted,

  
Shane Nance, P.E.

## APPENDIX





**1** 15% SCHEMATIC DESIGN: BUILDING #35, SCHEME A

SOIL BORING LOCATIONS

# SOIL BORING LOG

## CORNERSTONE TESTING & ENGINEERING, INC. - AMARILLO, TX

PROJECT: Amarillo VA Health Care System - Expand Lodge - Amarillo, TX

LAB NO.: 15688

BORING NO.: 1

DATE DRILLED: 2/17/11

GROUND ELEVATION: Existing

LEGEND: ■ Sample □ SPT ▼ Water Table

Depth, ft.	Description	USCS	SPT blows/ft	Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Passing No. 200, %
	■ Dr. Brown Lean Clay w/ Sand	CL		23.5	39	18	21	84.6
	□ Pink Lean Clay	CL	9	19.7				
5	□		14	14.0	31	16	15	93.2
	□ Lt. Reddish Brown Lean Clay w/ Sand	CL	24	14.4				
10	□		17	14.7	35	16	19	83.9
15	□		24	19.0				
20	□ Reddish Yellow Lean Clay w/ Sand	CL	28	18.0	38	16	22	84.2
25	Boring terminated at 21.5'							
30								
35								
40								

# SOIL BORING LOG

## CORNERSTONE TESTING & ENGINEERING, INC. - AMARILLO, TX

**PROJECT:** Amarillo VA Health Care System - Expand Lodge - Amarillo, TX

**LAB NO.:** 15688

**BORING NO.:** 2

**DATE DRILLED:** 2/17/11

**GROUND ELEVATION:** Existing

**LEGEND:** ■ Sample

▨ SPT

▼ Water Table

Depth, ft.	Description	USCS	SPT blows/ft	Moisture Content, %	Liquid Limit	Plastic Limit	Plasticity Index	Passing No. 200, %
	■ Dr. Brown Lean Clay w/ Sand	CL		23.9				
	▨ Pink Lean Clay	CL	12	21.7	34	20	14	93.8
5	▨		11	14.2				
	▨ Pink Lean Clay w/ Sand	CL	28	15.1	33	12	21	88.0
10	▨ Lt. Reddish Brown Lean Clay w/ Sand	CL	15	14.6	32	12	20	81.6
15	▨		22	17.1	34	13	21	81.1
20	▨		47	17.1				
25	Boring terminated at 21.5'							
30								
35								
40								

## SUMMARY OF LABORATORY TESTS

[illegible]

MC ■ Moisture Content

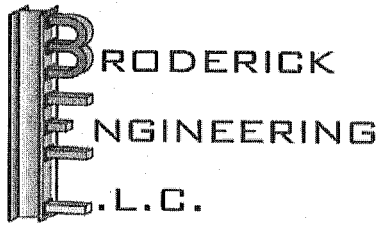
LL – Liquid Limit

PL = Plastic Limit

PI = Plasticity Index

Minus #200 = % Passing No. 200 Sieve

ABC = Allowable Bearing Capacity, psf

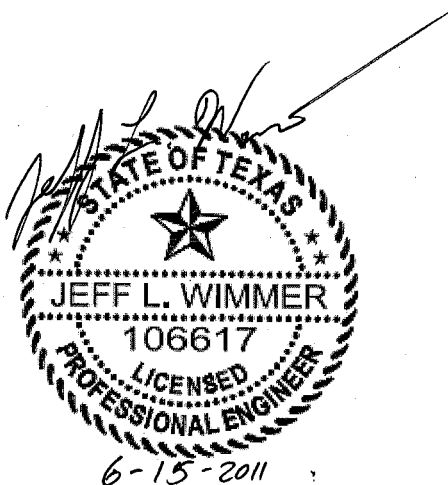


Civil & Structural Engineering Consulting

**SITE DRAINAGE REPORT**  
**FOR**  
**VA PROJECT NO: VA258-P-0196**  
**AMARILLO, TEXAS**

Architect:  
**SBBL ARCHITECTURE**  
1001 N. Alvernon Way, Suite 105  
Tucson, AZ 85711  
(520) 620-0255

Prepared by:  
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6859 E. Rembrandt, Suite 124  
Mesa, Arizona 85212  
(480) 926-6333



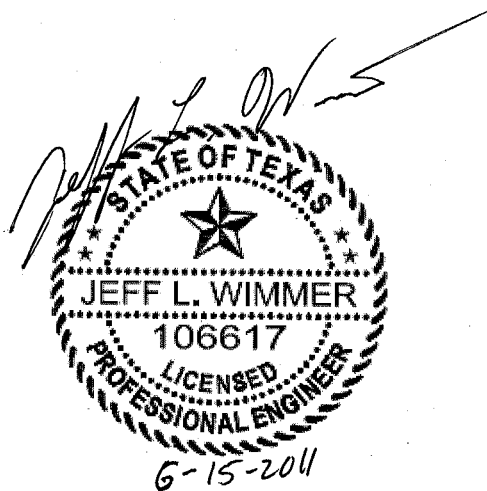
June 15, 2011  
Broderick Engineering Project No. 10111  
**DRAINAGE REPORT**  
**FOR**  
**AMARILLO VA HEALTHCARE SYSTEM – AMARILLO, TEXAS**

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**APPENDICES**

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## **I. INTRODUCTION**

This Amarillo VAHCS Emergency Department Building No. 48 improvement project number VA258-P-0196 is an important project for the patients, staff and visitors of the Amarillo VA Medical Campus. The campus is located in the City of Amarillo, Potter County, Texas. It is situated southwest of Amarillo Boulevard and 9<sup>th</sup> Avenue. The project includes the improvements to create a new parking Emergency Department building to be located adjacent to existing buildings 1 and 4. The building will also cause the modification to existing parking and minor changes to existing drainage patterns. The area where the building will be located is relatively flat and slopes gradually to the northwest. The site design will utilize the existing under ground storm drain systems. (See Site Map, Figure 1).

## **II. FLOOD PLAIN DESIGNATION**

The site is not believed to be in a flood plain and is located within Zone X as shown on the FEMA Flood Insurance Rate Maps FM48375C0510C and FM48375C0509C dated June 4, 2010. Flood Zone X is defined as:

Zones B, C, and X are the flood insurance rate zones that correspond to the areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the contributing drainage areas is less than 1 square mile, or areas protected from the 100-year flood by levees. No BFE's or depths are shown within this zone.

## **III. PRE-DEVELOPED ONSITE CONDITIONS**

The new ER Building No. 48 will be located adjacent to existing buildings No. 1 and No. 4. The area where the building will be located currently is comprised on a small lounge building (to be removed), access drive, parking lot, hardscape and landscape. There is a storm drain system located in a portion of the area that the building footprint will be at, which will from here on referred to as storm drain "System A". This system conveys runoff from portions of buildings 1, 4 and 28 and conveys them through an existing 12 inch storm drain system along the eastern side of the parking lot and then between two buildings and away to the east of building 4. These storm drain systems drain throughout the campus and eventually drain to an adjacent offsite drainage way.

There is a second storm drain system with two arms located to the west of the System A storm drain system that drains a portion of runoff from building 28, the loading dock and southwestern portions of the site which will be here after referred to "System B". The line is an existing 10 inch line which turns into a 15 inch line a short distance after leaving the loading dock. Both storm drain Systems A & B will be utilized to provide both roof and surface storm water runoff conveyance away from this area. These storm drain systems drain throughout the campus and eventually drain to an adjacent offsite drainage way.

#### **IV. POST-DEVELOPED ONSITE CONDITIONS**

The project drainage analysis will be based on the VA and City of Amarillo drainage standards. The site will be improved with curb, gutter, asphalt pavement new landscape areas and sidewalks.

##### **A. Site Drainage**

Currently the surface runoff from a majority of the new building area drains gradually over concrete or grass towards the northwest. It flows into the existing paved drive isle and then towards the loading dock and into existing storm drain System B via a catch basin and trench drain. This system will convey storm water runoff from the from portion of the new building and vehicle drives (west of the building center) via new roof drains and existing catch basins. This system will be utilized less with the new site improvements.

The runoff from buildings 1, 4 and 28 does not surface drain, but are connected to storm drain pipes that lead into storm drain System A. System A will continue to receive the majority of the site drainage that it currently does and also an additional portion of what drains into system B in the existing condition via new roof drains from the rear portions of the new building. The total site runoff will to remain relatively consistent with existing runoff volumes.

On the northern half of the renovations, there will be 2 new access roads, one for the emergency/heavy duty vehicles and the other will be use by staff and visitors (light traffic). Half of each access road has a high point at the side walk extending northwesterly front of the new E.R. building. One side drains northeast and the other side drains southwest. The northern section of the access drives has a high point grade break towards the middle of the isles. The runoff south of the grade break will drain southeasterly through a curb opening to a new catch basin and storm drain pipe (System A). The runoff north of the grade break will continue to drain towards the northwest and then drain away from the area in current historical drainage patterns.

Storm water runoff from the southern drive area southwest of the center sidewalk walk (high point) will drain towards the southwest and into the existing catch basin or trench drain system. Storm water runoff from the northern drive area southwest of the center sidewalk walk (high point) will drain westerly towards the northern gutter and then drain northwesterly across the pavement and into an existing catch basin in the historical drainage pattern.

The total amount of storm water runoff may increase slightly due to replacing some of the existing landscaping and grass with the building structure, additional pavement in the new access drives and new parking areas. However, VA staff has indicated that this is acceptable and that no onsite retention or filtration is required.



There are at least 3 existing roof-drain down spouts located along the southerly side of building 4. They will be drained onto the new building roof and then down the new building roof drains underground and piped into the existing storm drain system.

No offsite improvements are being made with this project.

## **B. Drainage Structures**

The building runoff will connect to the existing storm drain systems via new underground connections at 4 locations along the southern side of the building. Area drains will be added to pick up storm water runoff from the narrow passage way in along the southwest side of the new building adjacent to building 28 and also in the garden areas along the south side of the new ER building. New 12 inch HDPE pipe will run along the corridor and connect to the existing 12 storm drain pipes with new storm drain manholes. This will also facilitate access and maintenance of the existing storm drain system that will largely be located under the new building. The area drains will have 12 inch x 12 inch pedestrian rated grates and 6 inch HDPE connection pipes.

Many of the existing catch basins will either be retrofitted or removed to accommodate new site and drainage designs. Some will still be useable, while other will no longer serve the needs of the site improvements and will need to be modified or removed. A new storm drain line will connect to a roof drain near the front portion of the new ER building. Due to the new sanitary sewer route, the system will cut the first arm of the existing 12 inch storm drain pipe of System B and then extend over the steam tunnel to the second arm and deeper arm of System B.

VA and City of Amarillo details and design criteria will be used to determine the pipe sizes and type of pipe used. The storm drain pipes will be sized for the 10 year storm event.

## **C. Retention Basins**

There are no existing or proposed retention basins with the project area. Existing storm drain system outlet to an adjacent drainage way.

## **V. OFFSITE DRAINAGE**

The project location is internal to the site and away from any offsite drainage flows. It is elevated above the surroundings on all sides. The site area being improved at this time is not affected by any offsite flows.

## **VI. CONCLUSIONS**

- The proposed improvements for the site are in compliance with VA design criteria and other required drainage standards.
- Two existing storm water retention systems will direct storm water away from the project area.
- Roof drainage will be connected to the existing storm drain system. Other site drainage will continue to drain mostly in the current drainage patterns.
- No additional offsite storm water is anticipated to impact the site.

## **VII. REFERENCES**

1. VA Specification 33 40 00
2. PG-18-1 VA Master Construction Specifications. Found for editing by the A/E at: <http://www.cfm.va.gov/til/spec.asp>
3. PG-18-3 VA Design and Construction Procedures. Found via the internet at: <http://www.cfm.va.gov/TIL/cPro.asp>
4. PG-18-4, All Volumes, VA Standard Details are accessible to the A/E at: <http://www.cfm.va.gov/TIL/sDetail.asp>

**APPENDIX A**

**SITE LOCATION MAP**



APPROXIMATE  
BUILDING LOCATION

Amarillo VA- Thomas E Creek

Google

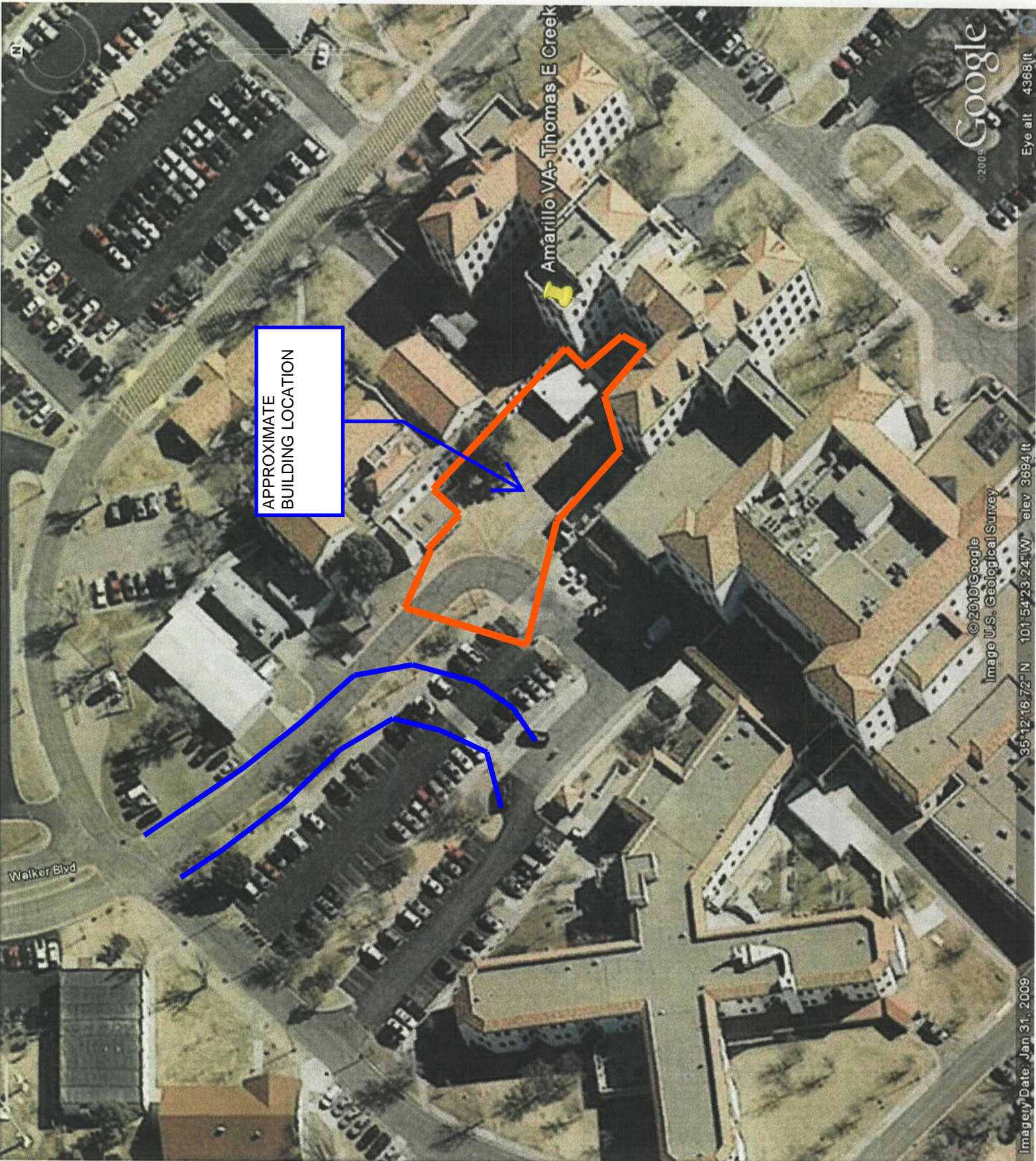
Eye alt 4368 ft

© 2010 Google  
Image U.S. Geological Survey

35°12'16.72"N 101°54'23.24"W elev 3694 ft

Imagery Date: Jan 31, 2009

Walker Blvd



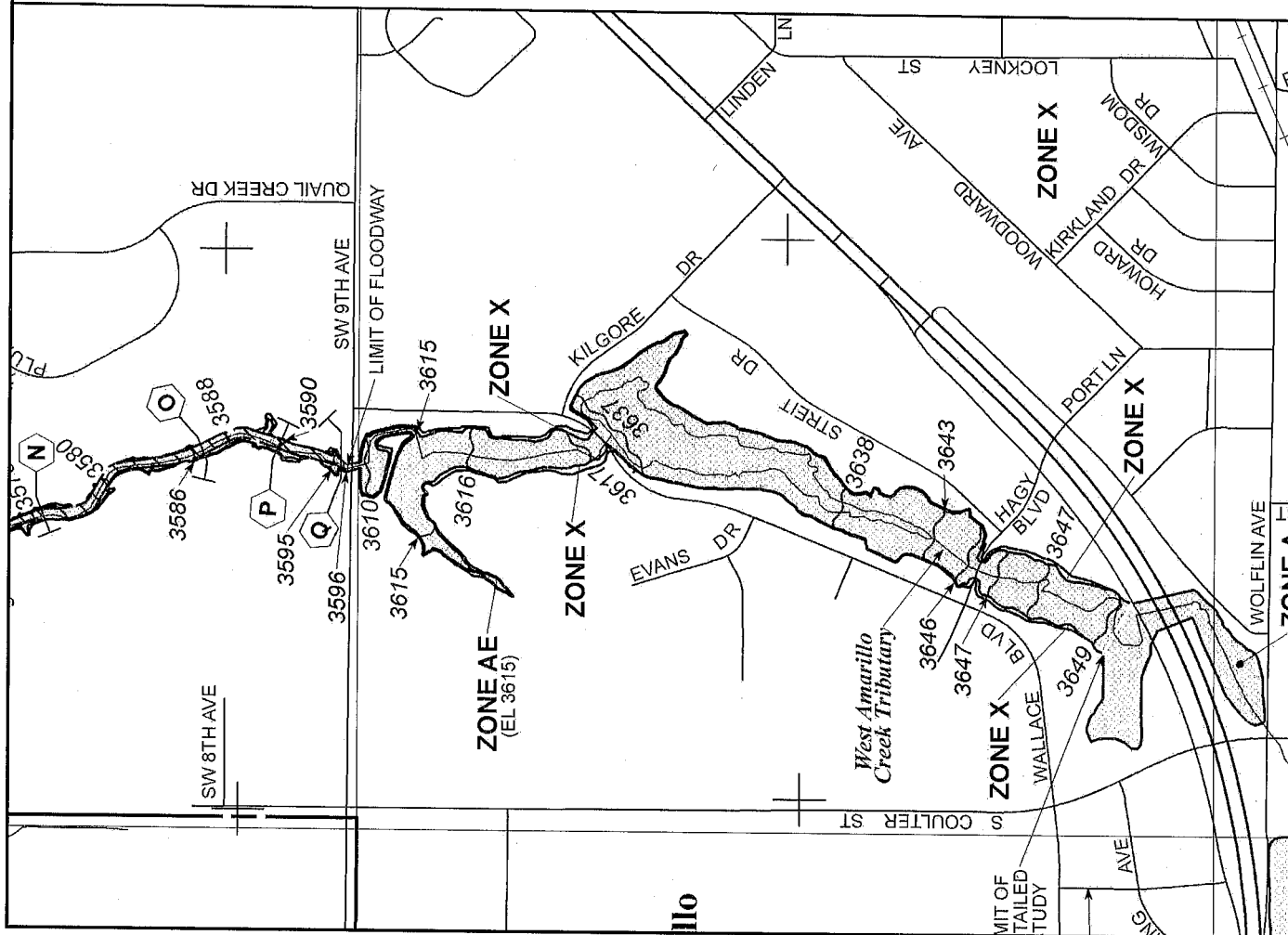
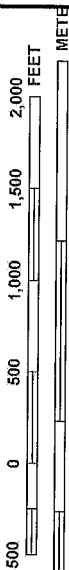


## **APPENDIX B**

### **FEMA FIRM MAP**



MAP SCALE 1" = 1000'



# NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0510C

## FIRM

FLOOD INSURANCE RATE MAP  
POTTER COUNTY  
TEXAS  
AND INCORPORATED AREAS

PANEL 510 OF 600  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:  
COMMUNITY  
AMARILLO, CITY OF  
POTTER COUNTY,  
UNINCORPORATED AREAS  
NUMBER  
480529  
481241  
PANEL  
0510  
0510  
SUFFIX  
C  
C

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

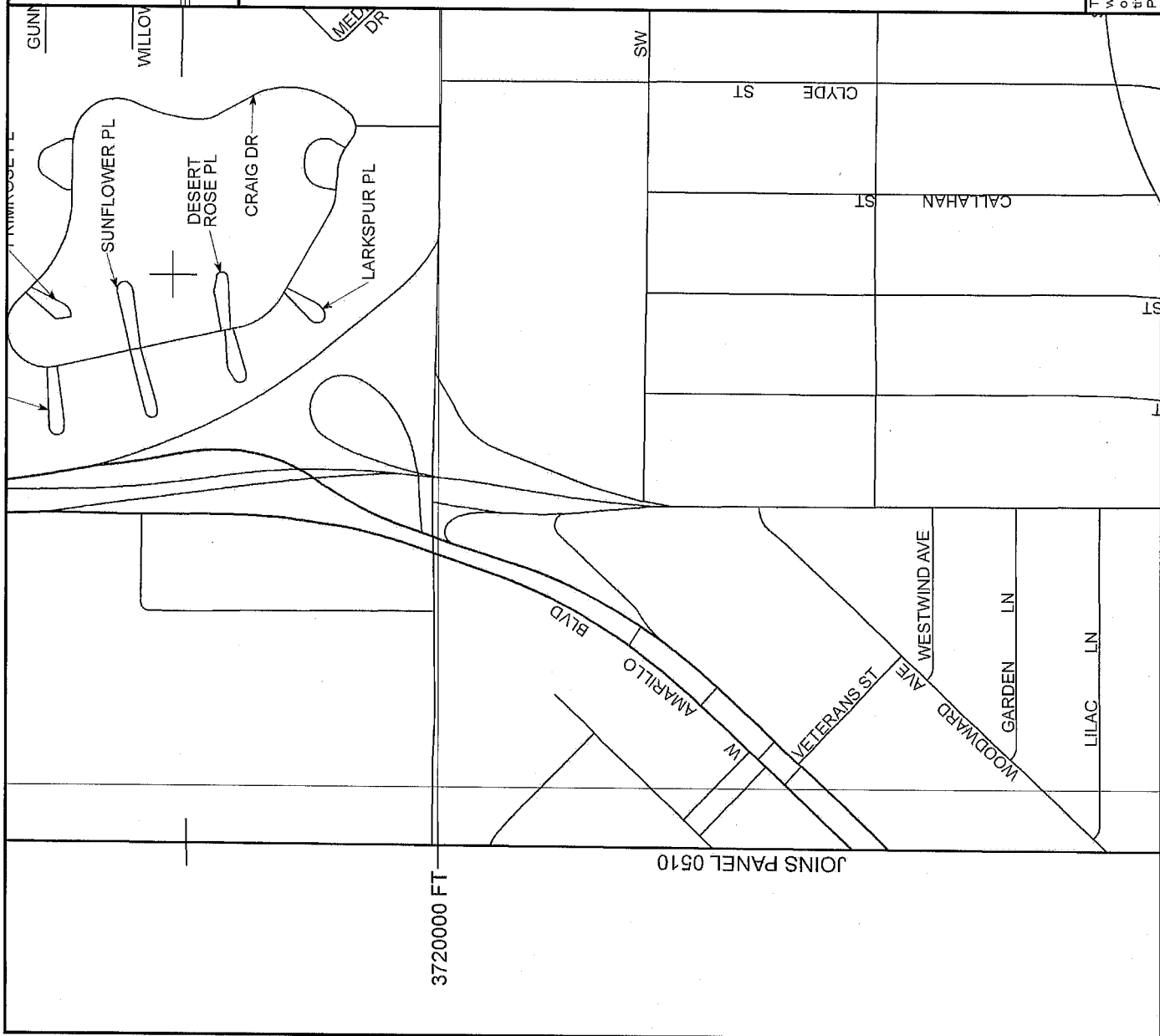


MAP NUMBER  
48375C0510C

EFFECTIVE DATE  
JUNE 4, 2010

Federal Emergency Management Agency

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**NFIP**

**NATIONAL FLOOD INSURANCE PROGRAM**

PANEL 0509C

**FIRM**

**FLOOD INSURANCE RATE MAP**

**POTTER COUNTY,**

**TEXAS**

**AND INCORPORATED AREAS**

**PANEL 509 OF 600**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY: AMARILLO, CITY OF

NUMBER: 483529

PANEL SUFFIX: 0509 C

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER**  
**48375C0509C**

**EFFECTIVE DATE**  
**JUNE 4, 2010**

**Federal Emergency Management Agency**



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