NOTICE OF REGULAR CITY COUNCIL MEETING
CITY OF TOMBALL, TEXAS

MONDAY, OCTOBER 4, 2010

7:00 P.M.

Notice is hereby given of a meeting of the Tomball City Council, to be held on Monday, October 4, 2010 at 7:00 P.M., City Hall, 401 Market Street, Tomball, Texas 77375, for the purpose of considering the following agenda items. All agenda items are subject to action. The Tomball City Council reserves the right to meet in a closed session for consultation with attorney on any agenda item should the need arise and if applicable pursuant to authorization by Title 5, Chapter 551, of the Texas Government Code.

1.0 Call to Order

2.0 Invocation

- Led by Tara Dorrough, Chaplain for Tomball Fire Department

3.0 Pledges to U.S. and Texas Flags

- Led by Members of Tomball High School Student Council Members – E. J. Jones and Cooper Cason

4.0 Public Comments and Receipt of Petitions *[At this time, anyone will be allowed to speak on any matter other than personnel matters or matters under litigation, for length of time not to exceed three minutes. No Council/Board discussion or action may take place on a matter until such matter has been placed on an agenda and posted in accordance with law.]*

5.0 Presentations:

- Presentation regarding Passenger Rail – Maureen Crocker, Gulf Rail District Authority, regarding Passenger Rail
- Presentation regarding the Grand Parkway – David Gornet, Executive Director of the Grand Parkway Association
- Proclamation – "**Fire Prevention Week**" – October 3-9, 2010 – Mayor Fagan

6.0 Reports and Announcements

- October 9, 2010 – **Farmers Market** – 8:00 a.m.
- October 9, 2010 – **2nd Saturday at the Depot –** 5:00 p.m. **(Special Time)**
- October 23, 2010 – **Farmers Market** – 8:00 a.m.
- October 29-30, 2010 – **Fire Department Fall Festival** – 6:00 p.m.
- October 30, 2010 - **Special Walk Tomball** to support American Heart Association – 10:00 a.m.; Heart Walk routes (1, 2 or 3 mile options) begin at The Heart Center at Tomball Regional (north entrance; use free parking garage or adjacent lots)
- ***Walk Tomball!*** (Every Saturday at **9:00 a.m.** at the Depot)
- Reports by City staff and members of Council about items of community interest on which no action will be taken
    - Mark McClure – Update regarding Slope Failure at 31422 Rigel Court

7.0 Approve the Minutes of the September 20, 2010 Regular City Council Meeting

8.0 Old Business:

8.1 Adopt, on Second Reading, Ordinance No. 2010-20, An Ordinance of the City of Tomball, Texas, Setting the Tax Levy of $0.251455/$100 Value Assessed for the Year 2010 on All Taxable Real and Personal Property Located in the City of Tomball, Texas; Allowing for Homestead Exemptions for Property Owners Sixty-Five Years of Age and Over, and for Property Owners Who Qualify for Disability Benefits Under the Federal Old Age, Survivors, and Disability Insurance Program; Providing for Penalty, Interest, and Additional Penalty on Taxes Not Timely Paid; and Providing Other Matters Relating to the Subject.

8.2 Adopt, on Second Reading, Ordinance No. 2010-16, an Ordinance amending the Code of Ordinances of the City of Tomball, Texas, by Deleting all of Chapter 38 Thereof and Substituting Therefore a New Chapter 38; Providing Rules and Regulations Designed to Prevent Damage to Property and Injury to Persons Resulting from Flooding; Providing a Penalty in an Amount not to exceed $2,000 for Each Day of Violation of any Provision Hereof; and Providing for Severability.

9.0 New Business:

9.1 Approve Resolution No. 2010-21, a Resolution of the City Council of the City of Tomball, Texas, Supporting the 45th Annual Tomball Holiday Parade, "**Peace, Love, and the Holidays**" to be held in Tomball on Saturday,

November 20, 2010 and to Approve Requested Street Closures and In-kind Services.

9.2 Approve Request by Tomball Fire Department to Close School Street between Main and Malone on Friday Night, October 29, and Saturday Night, October 30, 2010 in Conjunction with the Fire Department's Annual Fall Festival and Haunted House Event and to Allow the Safe Passage of Pedestrians from the School Parking Lot across School Street to the Event Site.

9.3 Approve Proposal from Momentum Construction for the Expansion of Tomball Fire Station #1 (Project No. 2010-08) and Authorize the City Manager to Negotiate and Execute a Contract with Momentum Construction

9.4 Authorize the City Manager to Negotiate a Memorandum of Understanding (MOU) with Northwest EMS, whereby Northwest EMS would Purchase Fuel for Ambulances and Vehicles from the City of Tomball.

9.5 Discussion and Possible Action to Authorize the Tomball Fire Department to Submit a Staffing for Adequate Fire and Emergency Response (SAFER) Grant Application for Two Firefighters under the SAFER Program.

9.6 Discussion and Possible Action regarding the Establishment of a Hotel Occupancy Tax Funds Board (HOT Board)

9.7 Executive Session: The City Council will meet in Executive Session as Authorized by Title 5, Chapter 551, Government Code, the Texas Open Meetings Act, for the Following Purpose:

- Sec. 551.072 – Deliberations Regarding Real Property

10.0 Adjournment

C E R T I F I C A T I O N

I hereby certify that the above notice of meeting was posted on the bulletin board of City Hall, City of Tomball, Texas, a place readily accessible to the general public at all times, on the 1st day of October 2010 by 5:00 p.m., and remained posted for at least 72 continuous hours preceding the scheduled time of said meeting.

Doris Speer

Doris Speer
City Secretary, TRMC

This facility is wheelchair accessible and accessible parking spaces are available Requests for accommodations or interpretive services must be made 48 hours prior to this meeting. Please feel free to contact the City Secretary's office at (281) 290-1002 or FAX (281) 351-6256 for further information.

AGENDAS MAY ALSO BE VIEWED ONLINE AT www.ci.tomball.tx.us.

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

- Presentation regarding Passenger Rail – Maureen Crocker, Gulf Rail District Authority, regarding Passenger Rail
- Presentation regarding the Grand Parkway – David Gornet, Executive Director of the Grand Parkway Association
- Proclamation – "**Fire Prevention Week**" – October 3-9, 2010 – Mayor Fagan

Background:

Origination:

Recommendation:

Funding:

Party(ies) responsible for placing this item on agenda:

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

ATTACHMENTS:

Resolution No. 2010-12 - Supporting Commuter Rail
Proclamation - "Fire Prevention Week"

RESOLUTION NO. 2009-12

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TOMBALL, TEXAS EXPRESSING SUPPORT FOR COMMUTER RAIL ALONG THE SH 249/BNSF HOUSTON SUBDIVISION CORRIDOR AND THE US 290/EUREKA SUBDIVISION CORRIDOR AS A VITAL ELEMENT OF THE LONG-RANGE CITY OF TOMBALL TRANSPORTATION PLAN TO ADDRESS CONGESTION AND AIR QUALITY

* * * * * * * *

WHEREAS, traffic congestion and air quality have become and continue to be major concerns for the greater Tomball area; and

WHEREAS, regional rail improvements, including commuter rail, are key elements in the near- and long-term plans to address the transportation needs of the greater Tomball area; and

WHEREAS, the City of Tomball supports the efforts of the Greater Tomball Area Chamber of Commerce Mobility & Transportation Committee and Commuter Rail Advisory Group to address the mobility and air quality needs of the citizens of Tomball and the surrounding area; and

WHEREAS, the expansion of SH 249 and FM 2920 has become laborious and difficult due to the time, expense, complexity and environmental issues involved and may soon become unrealistic options for future transportation needs in our area; and

WHEREAS, local elected officials, business leaders, and transportation professionals in the greater Tomball area have studied transportation options including roadways, commuter rail, and transit, finding that commuter rail appears to be the best solution/option for improving transportation congestion and air quality in the greater Tomball area;

WHEREAS, the Baseline System Plan developed by the Houston-Galveston Area Council describes the corridors likely to be built first to represent a Baseline System, and those specific corridors were based on public support, strength of ridership demand, and strategic need in light of the construction of other corridor specific transportation infrastructure, and

WHEREAS, the recommended corridors are US 290/Eureka Subdivision Corridor, SH 3/Galveston Subdivision Corridor, SH 249/BNSF Houston Subdivision Corridor, South Fort Bend/BNSF Galveston/Popp Subdivision Corridor, and SH 35 Tollway Corridor.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Tomball recognizes the value of the work performed by the Houston-Galveston Area Council and the Greater Tomball Area Chamber of Commerce Mobility & Transportation Committee and

Commuter Rail Advisory Group. The Tomball City Council wishes to express the City's support for commuter rail as part of a multi-faceted solution to traffic congestion and air quality problems in the greater Tomball area and desires to be a part of the planning process to bring commuter rail to the greater Tomball area. The Tomball City Council supports steps to bring commuter rail to the SH 249/BNSF Houston Subdivision Corridor and the US 290/Eureka Subdivision Corridor. Commuter rail in these corridors will ultimately create a cost-effective, efficient transportation system essential for the quality of life that we support.

PASSED, APPROVED, AND RESOLVED this 6th day of April 2009.

Gretchen Fagan, Mayor
City of Tomball

ATTEST:

Doris Speer, City Secretary
City of Tomball

Office of the Mayor

Tomball, Texas

Proclamation

WHEREAS, the City of Tomball is committed to ensuring the safety and security of all those living in and visiting Tomball; and

WHEREAS, fire is a serious public safety concern both locally and nationally, and people are at the greatest risk from fire in their own homes; and

WHEREAS, approximately 3,000 people die as a result of home fires and burns, more than 200,000 individuals are seen in the nation's emergency rooms for burn injuries; and

WHEREAS, scalds outnumber burns roughly two-to-one for children ages five and under, cooking is the leading cause of home fires and home fire injuries, and heating equipment and smoking are the leading causes of home fire deaths; and

WHEREAS, Tomball's first responders are dedicated to reducing the occurrence of home fires and home fire injuries through prevention and protection education; and

WHEREAS, individuals who have planned and practiced a home fire escape plan are more prepared and will therefore be more likely to survive a fire; and

WHEREAS, the 2010 Fire Prevention Week theme, **"Smoke Alarms: a Sound You Can Live With",** effectively serves to remind citizens how to stay safer from fire during Fire Prevention Week and year-round;

NOW, THEREFORE, I, Gretchen Fagan, Mayor of the City of Tomball, Texas, on behalf of the Tomball City Council and all citizens hereof, do hereby proclaim **the week of October 3-9, 2010**, as:

"FIRE PREVENTION WEEK"

In witness whereof I have hereunto set my hand and caused this seal to be affixed.

ATTEST: Doni Tyson

DATE: September 30, 2010

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

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- October 9, 2010 – **2nd Saturday at the Depot –** 5:00 p.m. **(Special Time)**
- October 23, 2010 – **Farmers Market** – 8:00 a.m.
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- ***Walk Tomball!*** (Every Saturday at **9:00 a.m.** at the Depot)
- Reports by City staff and members of Council about items of community interest on which no action will be taken
    - Mark McClure – Update regarding Slope Failure at 31422 Rigel Court

Background:

Origination:

Various

Recommendation:

N/A

Funding:

Party(ies) responsible for placing this item on agenda:

City Secretary

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

ATTACHMENTS:

Farmers Market
2nd Saturday - October 2010
Update regarding Slope Failure at 31422 Rigel Court - 9/27/2010
Update regarding Slope Failure at 31422 Rigel Court - 7/12/2010

TOMBALL FARMERS MARKET TEXAS

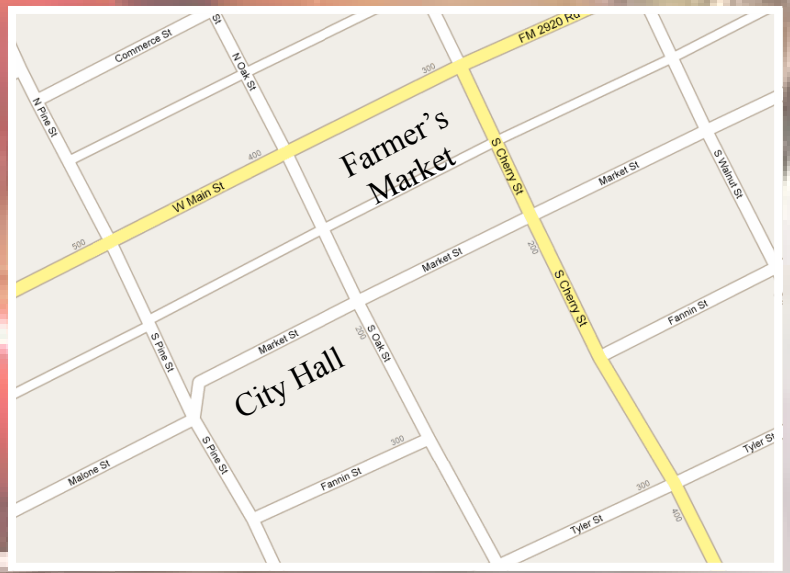
Bringing the farmers back to the community!

Come enjoy the Tomball Farmer's Market! We'll have produce, prepared foods and crafts for you to purchase.

Located at the corner of Cherry & FM 2920

Now open on the 2nd & 4th Saturday of every month!

Market opens at 9 AM!



2nd SATURDAY AT THE DEPOT
OCTOBER 9—TOMBALL, TX
You voted, now come enjoy!

Kids Activities:

Fun Fall Festival Games

Pet Rock Painting

Pumpkin Decorating

Bounce House

Face Painting

Pumpkin Decorating

Pumpkins donated by:
The Tomball Children's Literacy Center at HEB

Meet H-E-Buddy

Concessions by Snowie:

Nachos
Chili Pies
&
Hot Dogs!

Music By:

James—The Movie Man

HISTORIC TOMBALL DEPOT PLAZA

201 South Elm ~ One block south of Main Street
Opens at 5:00 PM ~ Movie begins at dark

Free family entertainment for all ages
Bring your lawn chairs
No Glass Containers!

For more information, please call
Rosalie Dillon at 281-610-2595

In case of rain, event will be held at the Tomball Community Center—221 Market Street

File Name: Council Update 09-27-10

City of Tomball
Engineering and Planning Department
501 James St
Tomball, Texas 77375

Memorandum

Date: September 27, 2010

To: Mayor & City Council

From: Mark A. McClure, P.E., CFM – Director of Engineering and Planning

Subject: 31422 & 31418 Rigel Ct., Tomball, TX

CC: George Shackelford – City Manager

This memorandum has been prepared by the Engineering & Planning Department (E&P) to provide to the Mayor and City Council a current update to the work that is being conducted at the above mentioned addresses located in the North Star Estates Subdivision.

Status Review
A permit application was submitted June 11, 2010 by Geotech Engineering & Testing (GET) to conduct eight (8) soil borings, located on the mentioned properties and/or within the adjacent Tomball earthen channel. The soil samples will be obtained from ground surface ranging between twenty (20) and fifty (50) feet. The permit was signed by E&P on June 14, 2010 for approval and was issued June 15, 2010, copy attached. GET started the drilling and sampling on June 16, 2010. The engineer indicated that they were taking six (6) inch core samples every two (2) feet. They also informed the City that the results and report should be published in four (4) to six (6) weeks. It is E&P's understanding that GET was contracted by Partners In Building.

Gary Smith provided a status update by e-mail dated June 17, 2010 (copy attached), including two proposals prepared by DeAnda Engineering. Several e-mails were exchanged between Gary Smith and Mark McClure, between July 20, 2010 and September 16, 2010 primarily concerning the status of the geotechnical evaluation (copies attached).

Tom Frank with Partners In Building provide by e-mail September 9, 2010, the results of the previously mentioned and permitted soil sampling event with results and recommendations. The report was prepared by Geotech Engineering and Testing (GET), dated August 2010 (copy attached) and was stamped by David A. Eastwood, P.E. A summary is presented in Section 12.0 of the report, titled "Summary of Slope/Retaining

Wall Failure Causation", page 13. The recommended slope repair techniques are addressed in Section 13.0, beginning on page 13 of the report.

As of the date of this memorandum preparation, a proposed final design has not been submitted to E&P for review. Final design will need to present the proposed solution and include an Engineer's Opinion of Cost of the option selected. Depending on the final design configuration selected, an Agreement may need to be prepared between the Owner and the City. Based on approved plans and execution of the Agreement, the Contractor may apply for permit. The permit will require proof of insurance and posting of a bond.

Attachments:
Memo to Council , 31422_31418_Rigel_Court
E-mails dated July 20 to September 16, 2010 between Gary Smith and Mark McClure
Forensic Engineering Study Slope Distress at North Star Drainage Ditch North Star Estates Subdivision Report No. 10-328E, dated August 2010

Mark McClure

From: Gary Smith [glsmith@inlineplc.com]
Sent: Tuesday, July 20, 2010 8:09 PM
To: Mark McClure
Subject: RE: Gary Smith Update

Mark, thank you for the email and update. The drawings submitted to the City was intended to keep you aware that I was complying to your demand letter. The design was based on the condition of the creek's bank and the damage inside of my yard at the time. Having been onsite during GET's soil core drilling, the extent of the inadequate backfill and retention wall design was far worse than the data my budget allowed me to research and identify myself. I would comment that the drawings I submitted would need to be updated based on the core samples taken by PIB's consulting geo-tech report.

I do appreciate you keeping me informed on PIB's status.

Regards,

Gary Smith

From: Mark McClure [mailto:mmcclure@ci.tomball.tx.us]
Sent: Tuesday, July 20, 2010 6:26 PM
To: Gary Smith
Subject: Gary Smith Update

Gary, fyi, the attached was provided to Council on July 19, 2010 as an updated status to date based on information received by E&P. I know that the information you provided was a concept. The redlines I provided will needed to be considered for the final design.

Mark A. McClure, P.E.
City of Tomball
Director of Engineering & Planning
501 James Street
Tomball, Texas 77375
(281) 290-1412
Fax: (281) 351-4735
mmcclure@ci.tomball.tx.us

Mark McClure

From: Gary Smith [glsmith@inlineplc.com]
Sent: Monday, August 30, 2010 10:23 AM
To: Mark McClure
Subject: RE: Gary Smith Update

Mark, have you heard at all from PIB? We refrained from going farther on our proposal when PIB said that they would use their own geotech data and engineers. I am not sure if you have been back to the creek in the last 7 weeks, but the 2 major rains we have had doubled the amount of damage. I am not sure if I have the resources to fix this now. Gary

---

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mmcclure@ci.tomball.tx.us

Mark McClure

From: Gary Smith [glsmith@inlineplc.com]
Sent: Monday, August 30, 2010 10:43 AM
To: Mark McClure
Subject: RE: Gary Smith Update

Thanks Mark. They have had ample time to get this data. 4 weeks ago that told us that they would have the engineered drawings and so far they have not been back in touch. Gary

---

From: Mark McClure [mailto:mmcclure@ci.tomball.tx.us]
Sent: Monday, August 30, 2010 10:55 AM
To: Gary Smith
Subject: RE: Gary Smith Update

Gary, I have not had any further contact from PIB concerning the results and in reference to the permitted drilling of June 15th. They had indicated that they should have a report to publish in 4-6 weeks but to-date the report has not been submitted to E&P. On July 22nd they requested by e-mail the City files on North Star, Section 6. I provided them numerous plan sheets on July 22nd by email, I will forward you a copy of the email.

Mark A. McClure, P.E.
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Director of Engineering & Planning
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mmcclure@ci.tomball.tx.us

Mark McClure

From: Gary Smith [glsmith@inlineplc.com]
Sent: Monday, August 30, 2010 10:51 AM
To: Mark McClure
Subject: RE: North Star Section 5

Thanks Mark

From: Mark McClure [mailto:mmcclure@ci.tomball.tx.us]
Sent: Monday, August 30, 2010 10:58 AM
To: Gary Smith
Subject: FW: North Star Section 5

I will let you know of a response.

Mark A. McClure, P.E.
City of Tomball
Director of Engineering & Planning
501 James Street
Tomball, Texas 77375
(281) 290-1412
Fax: (281) 351-4735
mmcclure@ci.tomball.tx.us

From: Mark McClure
Sent: Monday, August 30, 2010 10:57 AM
To: 'Tom Rabalais'
Subject: RE: North Star Section 5

Tom, any progress on a proposed solution as a result of the previous geotechnical work?

Mark A. McClure, P.E.
City of Tomball
Director of Engineering & Planning
501 James Street
Tomball, Texas 77375
(281) 290-1412
Fax: (281) 351-4735
mmcclure@ci.tomball.tx.us

From: Mark McClure
Sent: Thursday, July 22, 2010 9:19 AM
To: 'Tom Rabalais'
Subject: North Star Section 5

Tom,

I think you mean Section 5, Section 6 includes a single street (Altair Drive) at the entrance. If you really want Section 6, I can send. I provided a brief update to Council on July 19, 2010 (reference attached memorandum). In addition, I have attached the plans for Section 5 and the final plat. Let me know if you received the files successfully.

Mark A. McClure, P.E.
City of Tomball
Director of Engineering & Planning
501 James Street
Tomball, Texas 77375
(281) 290-1412
Fax: (281) 351-4735
mmcclure@ci.tomball.tx.us

From: Tom Rabalais [mailto:tom.rabalais@partnersinbuilding.com]
Sent: Thursday, July 22, 2010 8:34 AM
To: Mark McClure
Subject:

Mr. McClure,
Pursuant to our recent telephone, please send what you have in your file for North Star, Section 6. Thank you, Tom Rabalais

Mark McClure

From: Gary Smith [glsmith@inlineplc.com]
Sent: Thursday, September 09, 2010 8:06 AM
To: Mark McClure
Subject: Geotech report

Mark, the reports from PIB's geotech engineers has been completed. Any way I could stop by your office for a few minutes to discuss, or would you rather wait for PIB to notify you.

Regards,
Gary Smith

Intelligent Pipeline Maintenance

Inline Services Inc.
27731 Commercial Park Dr.
Tomball, TX 77375
Tel: (281) 401-8142
Toll Free: (888) 973-0079
Fax: (281) 401-8147
glsmith@inlineplc.com

Mark McClure

From: Gary Smith [glsmith@inlineplc.com]
Sent: Thursday, September 09, 2010 9:38 AM
To: Mark McClure
Subject: RE: Geotech report

Mark, the interesting, ironic thing about the report is that it states verbatim the points brought up at the City Council meeting in the spring. Thanks for you help on this.

From: Mark McClure [mailto:mmcclure@ci.tomball.tx.us]
Sent: Thursday, September 09, 2010 9:09 AM
To: Gary Smith
Subject: RE: Geotech report

PIB is sending me a copy of the report. I will need to review it prior to any discussions. I will let you know next week of the review.

Mark A. McClure, P.E.
City of Tomball
Director of Engineering & Planning
501 James Street
Tomball, Texas 77375
(281) 290-1412
Fax: (281) 351-4735
mmcclure@ci.tomball.tx.us

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cid:3625

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Mark McClure

From: Gary Smith [glsmith@inlineplc.com]
Sent: Thursday, September 16, 2010 7:15 AM
To: Mark McClure
Subject: PIB

Morning Mark.

I received a call from Field yesterday following a conversation he just had PIB's attorney, and I wanted to make sure I understand better what he said.

PIB says the City will not allow them to work on the City's side of the property line. Does this mean that they cannot make repairs on the City's side, or they cannot access my property to make repairs from the City's property, or both?

Or, do I have this incorrect?

Regards,

Gary Smith
Inline Services

t. 281.401.8142
t. 888.973.0079
f. 281.401.8047
c. 713.252.8887

"Intelligent Pipe Cleaning"

Mark McClure

From: Gary Smith [glsmith@inlineplc.com]

Sent: Thursday, September 16, 2010 4:09 PM

To: Mark McClure; tom.frank@partnersinbuilding.com

Subject: Re: Engineering Study Slope Distress at North Star Drainage Ditch North Star Estates Subdivision Tomball, Texas, Report No. 10-328E

Thanks Mark. If possible, I would like to get a few minutes of your time either tomorrow or next week. Gary

---

Sent using BlackBerry

----- Original Message -----
From: Mark McClure <mmcclure@ci.tomball.tx.us>
To: Gary Smith; Tom Frank <tom.frank@partnersinbuilding.com>
Sent: Thu Sep 16 16:20:39 2010
Subject: Engineering Study Slope Distress at North Star Drainage Ditch North Star Estates Subdivision Tomball, Texas, Report No. 10-328E

Gary and Tom,

I received the above referenced report by email on September 9, 2010, that was addressed to Partners In Building, L.P. Houston, Texas, prepared by Geotech Engineering and Testing, dated and stamped August 23, 2010. I am in the process of reviewing the subject report findings and recommendations.

In reference and in response to Gary Smith's email dated September 16th (below), the Engineering and Planning Department has not concluded their review of the geotechnical report, nor has the final alternative been presented for final design review and comments. Most likely, each of the geotechnical report referenced slope repair techniques would require access to the adjacent channel and to the private property to adequately construct the final improvements. To permit, the final design plans will need to include requirements for construction, access, and repair, including the private and public property. As a note, the City routinely permits access and/or work within the Public ROW/easements.

Let me know if this answers your question below.

Mark A. McClure, P.E.

City of Tomball

Director of Engineering & Planning

501 James Street

Tomball, Texas 77375

(281) 290-1412

Fax: (281) 351-4735

mmcclure@ci.tomball.tx.us

From: Gary Smith [mailto:glsmith@inlineplc.com]
Sent: Thursday, September 16, 2010 7:15 AM

To: Mark McClure
Subject: PIB

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Or, do I have this incorrect?

Regards,

Gary Smith

Inline Services

t. 281.401.8142

t. 888.973.0079

f. 281.401.8047

c. 713.252.8887

"Intelligent Pipe Cleaning"

FORENSIC ENGINEERING STUDY
SLOPE DISTRESS AT
NORTH STAR DRAINAGE DITCH
NORTH STAR ESTATES SUBDIVISION
TOMBALL, TEXAS

REPORT NO. 10-328E

TO

PARTNERS IN BUILDING, L.P.
HOUSTON, TEXAS

BY

GEOTECH ENGINEERING AND TESTING

SERVICING

TEXAS, LOUISIANA, NEW MEXICO, OKLAHOMA

www.geotecheng.com

AUGUST 2010

GEOTECH ENGINEERING and TESTING

ACCREDITED

Geotechnical, Environmental, Construction Materials, and Forensic Engineering

Partners In Building, L.P.
17361 Village Green Drive
Houston, Texas 77040

Report No. 10-328E
Report Type: D/wall
August 23, 2010

Attention: Mr. Tom C. Frank
Vice President

FORENSIC ENGINEERING STUDY
SLOPE DISTRESS AT
NORTH STAR DRAINAGE DITCH
NORTH STAR ESTATES SUBDIVISION
TOMBALL, TEXAS

Gentlemen:

Submitted here is a summary of observations and evaluations of our site visit and slope distress at the above referenced project site. This study was authorized by Mr. Tom C. Frank, Vice President on May 28, 2010.

This report presents the results of our site visit, field exploration, laboratory testing, documents reviews, engineering analyses, causation of distress and recommendations for slope repair techniques.

We appreciate the opportunity to be of service. Should you have any questions or need additional assistance, please call.

Very truly yours,

GEOTECH ENGINEERING AND TESTING

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1.0 INTRODUCTION

Existing retaining wall structures and slope at North Star Drainage Ditch located at 31422 and 31418 Rigel Court, North Star Estates Subdivision in Tomball, Texas have experienced failure. The failures are due to the movements associated with existing slope at the backyards of the above mentioned two residences. A site vicinity map is presented on Plate 1. Our site visit and furnished information by the client indicated that the slope is about 20-ft high and covered with grass and trees.

The purpose of this study was to (a) identify the cause(s) of slope/retaining wall failure and (b) recommend suitable repair techniques to reduce future movements of slope and retaining wall structures. These objectives were met by (1) conducting site visits, (2) interviewing the residents, (3) performing a geotechnical study, (4) executing laboratory testing, (5) reviewing existing data and reports by others and (6) analyzing this and previous data to develop engineering recommendations. This report presents our site visit and field exploration together with our laboratory test results and recommendations.

2.0 SUMMARY

Existing retaining wall structures at two residences have experienced distress. The residences associated with slope failure are located along North Star Drainage Ditch. Two segments of existing retaining wall structures are located at the backyard of the residence at 31422 Rigel Court in Tomball, Texas. The height of the upper section of the retaining wall ranges from 8- to 10-ft. Furthermore, the height of the lower section of the retaining wall ranges from 1.5- to 3-ft. Bulging and gaps are observed in the retaining wall structures.

The other project site associated with slope movement is located at the backyard of the residence at 31418 Rigel Court in Tomball, Texas. We understand that the bulkhead at this site has moved downward about 20-inch in the past several years. The ditch is about 20-ft deep and it has side slopes of 2(h):1(v)±.

The causes of the slope failure are (a) not considering the ditch steep slopes in design, (b) inadequate use or compaction of the fill soils and (c) inadequate design of the retaining wall and deadman anchor structures. Detailed discussions of the slope distress causations and repair recommendations are presented in the following report sections.

3.0 DOCUMENTS REVIEWED

The following documents were reviewed during the development of this report:

- Letter indicating the construction schedule for North Star Estates Subdivision, Sections 5 and 6, Harris County in Texas by Lentz Engineering, L.C., dated March 29, 2000.
- Drawings, Sheet 1 through Sheet 17, of water distribution, wastewater collection, paving and drainage facilities for North Star Estates Subdivision, Sections 5 and 6, Harris County in Texas by Lentz Engineering, L.C., dated April 28, 2000.
- Geotechnical Investigation Report for North Star Estates Subdivision, Section 5, Harris County in Texas by The Murillo Company, dated November 07, 2000.

- Flood Insurance Rate Map (FIRM) of 31422 Rigel Court in Tomball, Texas by National Flood Insurance Program, dated June 18, 2007.
- Video of the project site condition at 31422 Rigel Court in Tomball, Texas, dated March 26, 2010.
- Embankment Repair/Rehabilitation Report for existing slope of 31422 Rigel Court in Tomball, Texas by HTS, Inc. Consultants, dated April 13, 2010.
- Drawings of construction plans for concrete retaining wall at drainage unit J133-00-00, Drawing No. 1 through No. 3, of 31422 Rigel Court in Tomball, Texas by De Anda Engineering, Inc., dated May 18, 2010.

4.0 PROJECT TIMELINE

Based on the information reviewed, the project timeline is as follows:

Date	Action	Remarks
August 13, 2000	The construction of the North Star Estates Subdivision, Section 5 in Harris County, TX was completed.	This information was obtained during the meeting with the client at the attorney's office.
November 07, 2000	Geotechnical Investigation Report for North Star Estates Subdivision, Section 5, Harris County, Texas by The Murillo Company.	The subsurface exploration was accomplished by drilling seven (7) borings to a depth of 15-ft below existing ground surface. The subgrade soils consists of reddish brown fine sand (SW) soils from ground surface to a depth of 7-ft followed by brown sandy clay (SC) soils to the boring completion depth of 15-ft. No free water was encountered during drilling.
2003	The retaining wall structures were constructed.	We understand that the retaining wall structures were constructed by Partners In Building, L.P. This information was obtained during the meeting with the client.
In or about end of 2003	Slope movements were observed at the house located in 31422 Rigel Court, Tomball, Texas.	This information was obtained during the interview with the homeowner, Mr. Gary Smith.

Date	Action	Remarks
April 13, 2010	Embankment Repair/Rehabilitation Report for existing slope of 31422 Rigel Court, Tomball, Texas by HTS, Inc. Consultants.	Two (2) soil borings were drilled to a depth of 20-ft below existing ground surface. The subgrade soils consist of firm to stiff, dark gray and reddish brown clayey sand (SC) fill soils from the ground surface to a depth of 6-ft in Boring B-1 only. Dark gray, light gray, tan and dark brown silty sand (SM) and Clayey Sand (SC) soils were encountered from the ground surface to the boring completion depth at 20-ft.
May 18, 2010	Drawings of construction plans for concrete retaining wall at drainage unit J133-00-00, Drawing No. 1 through No. 3, of 1422 Rigel Court in Tomball, Texas by De Anda Engineering, Inc.	The concrete retaining wall structures were planned at a depth of 11-ft below the existing grade.
May 28, 2010	Geotech Engineering and Testing (GET) was authorized by Mr. Tom C. Frank, Vice President to perform Forensic Engineering Study for slope distress at North Star Drainage Ditch, Tomball, Texas.	The scope of work includes causation and recommendations for slope stabilization.
June 02, 2010	Principal Engineer, Mr. David A. Eastwood, P.E. and Mr. Bernard Jung, Ph.D. of GET performed a site reconnaissance.	
June 16, 2010 through June 23, 2010	GET performed field exploration by drilling eight (8) soil borings. Borings were drilled to depths ranging from 20- to 50-ft below the existing grade. All field works were monitored by a GET project manager.	Subsurface soils consist of silty sand fill, clayey sand fill, silty sand, fat clay, clayey sand and lean clay soils from existing ground surface.

5.0 COMMENTS ON DOCCUMENTS PROVIDED

5.1 The Murillo Company Report

Our review of the geotechnical investigation report for North Star Estate Subdivision, Section 5 in Harris County, Texas (Report No. GEO52520), dated November 07, 2000, prepared by The Murillo Company indicated that seven (7) borings were drilled at a depth of 15-ft below the existing grade. The report is presented in Appendix A of this report. The subsurface soils consist of fine sand (SW) soils from ground surface to 7-ft, followed by sandy clay (SC) soils to the completion depth of the borings at 15-ft. Groundwater was not encountered during drilling operations. Furthermore, a prestress post-tensioned foundation was recommended.

5.2 HTS, Inc. Report

Our review of the geotechnical investigation report (Project No. 10-S-172), dated April 13, 2010, prepared by HTS, Inc. indicated the geotechnical recommendation pertaining to the proposed embankment repairs/rehabilitation at 31422 Rigel Court in Tomball, Texas. The HTS, Inc. report is presented in Appendix B of this report. Two (2) drilling and sampling were conducted to a depth of 20-ft below the existing grade. The subsurface soils consist of clayey sand (SC) fill soils from ground surface to 6-ft in Boring B-1 only. Silty sand (SM) and clayey sand (SC) soils were encountered from ground surface to the completion depth of the borings at 20-ft. Groundwater was not encountered during drilling in Boring B-1 and was encountered at a depth of 10-ft in Boring B-2. Holes were caved-in at the depths ranging from 7- to 8-ft after 25 minutes of drilling.

HTS, Inc. also indicated that the possible causes of the slope failure were as follows:

- The existing surface soils at the backfilled area in order to provide an additional area during the development stage of the subdivision consist of clayey sand which are highly erosive soils when exposed to water flow. The water flow would create weak zones through cavities that may have resulted from the erosion of the clayey sand soils until the occurrence of the failure of the embankment slope.

- The embankment clayey sand fill may have been improperly placed and compacted. These may have resulted in the occurrence of weak zones near the toe of the embankment when saturated.

Furthermore, HTS, Inc. recommended the use of lean clay soils for the embankment fill materials and a retaining wall structure at a depth of 9-ft from the natural ground surface. Bearing capacity of the bottom of the retaining wall was recommended to be 3,000 psf for axial compression dead loads plus sustained loads and 4,500 psf for axial compression dead loads plus sustained and transient live loads.

Our review of the report indicated the deficiency in conducting slope stability analysis for North Star Drainage Ditch and retaining wall global slope stability analysis.

5.3 De Anda Engineering, Inc. Drawings

Our review of the retaining wall restoration design, dated May 18, 2010, prepared by De Anda Engineering, Inc. indicated the recommendation of the concrete retaining wall structure at a depth of 11-ft below the existing grade. The plans are presented in Appendix C of this report. Excavation of silty sand and clayey sand soils behind the failed bulkhead was recommended in the drawings.

The construction specifications also indicated that the subgrade should be compacted to at least 95% density (ASTM D 698) at ±2% of moisture content. Concrete shall have a minimum compressive strength of 3,000 psi at 28 days. Backfill materials to be place behind the newly constructed wall should be selected clay (CL) soils with a plasticity index (PI) between 15 and 30.

6.0 SITE VISIT

6.1 General

The project site was visited by Mr. David Eastwood, P.E. and Mr. Bernard Jung, Ph.D. for a preliminary evaluation on June 02, 2010. The project site is sloping to the North Star Drainage Ditch. Pictures of the project site were taken at the time of our site visits. These pictures are shown in Appendix D.

6.2 Observations

- The project sites consist of slope failure at two residences located at 31422 and 31418 Rigel Court in Tomball, Texas (Pictures P-1 and P-2). The slope failures are due to the movements associated with existing slope in the backyards of two residences (Pictures P-3 and P-4).

- The residence located at 31422 Rigel Court in Tomball, Texas had a bulkhead in it. The furnished information indicated that this bulkhead was constructed during 2003. The bulkhead has failed (Picture P-5). Our site visit indicated presence of perforated pipe behind the bulkhead (Picture P-5). Nobody knows where the perforated pipe came from. The owner said he did not put it in.

- The residence located at 31418 Rigel Court in Tomball, Texas has a bulkhead as well. The fence behind the bulkhead has settled as much as 20-inch in the past several years.

- The owner of the residence located at 31422 Rigel Court in Tomball, Texas dug a ditch from his backyard all the way to the nearby detention pond for drainage purpose. The detention pond is about 15 -ft deep.

- The failure of bulkhead at the residence located at 31418 Rigel Court in Tomball, Texas was observed in or about end of 2003.

7.0 FIELD EXPLORATION

The soil conditions were explored by seven (8) soil borings located approximately as shown on Plate 2. Furthermore, pictures of our field explorations are presented in Appendix E of this report. A summary of our boring schedule was as follows:

Boring(s) No.	Depth, ft.	Remarks
B-1 and B-2	50	The borings were drilled at the high bank of the North Star Drainage Ditch.
B-3 through B-7	20	The borings were drilled along the slope of the North Star Drainage Ditch with portable drill rig.
B-8	20	At the request of the homeowner, a boring was drilled at backyard of the house with portable drill rig.

Soil samples were obtained continuously at each boring location from the ground surface to the boring completion depth at 20-ft at Borings B-3 through B-8. Soil samples were obtained continuously at each boring location from the ground surface to 25-ft and at five-ft intervals thereafter to the completion depth of the boring at 50-ft at Borings B-1 and B-2. The cohesive soils were sampled in general accordance with the ASTM D 1587.

Cohesionless soils were generally sampled with a split-spoon sampler driven in general accordance with the Standard Penetration Test (SPT), ASTM D 1586. This test is conducted by recording the number of blows required for a 140-pound weight falling 30-inch to drive the sampler 12-inch into the soil. Driving resistance for the SPT, expressed as blows per foot of sampler resistance (N), is tabulated on the boring logs.

Soil samples were examined and classified in the field, and cohesive soil strengths were estimated using a calibrated hand penetrometer. This data, together with a classification of the soils encountered and strata limits, is presented on the logs of borings, Appendix F. A key to the log terms and symbols is also presented in Appendix F.

Borings were drilled dry and the depth at which groundwater was first encountered was recorded. A wet rotary boring technique was used thereafter to the completion depth of the borings at Borings B-1 and B-2. Water levels were measured after 24 hours period in the boreholes. Water level observations made during and 24 hours after drilling are indicated at the bottom portion of the individual logs.

8.0 LABORATORY TESTS

8.1 General

Soil classifications and shear strengths were further evaluated by laboratory tests on representative samples of the major strata. The laboratory tests were performed in general accordance with ASTM Standards. Specifically, ASTM D 2487 is used for classification of soils for engineering purposes. A graphical representation of the laboratory test results that includes all the boring logs are presented on Plates 3 through 6. A summary of laboratory test results is also presented on Plate 7.

8.2 Classification Tests

As an aid to visual soil classifications, physical properties of the soils were evaluated by classification tests. These tests consisted of natural moisture content tests (ASTM D 4643), percent passing No. 200 sieve tests (ASTM D 1140), dry unit weights and Atterberg limit determinations (ASTM D 4318). Similarity of these properties is indicative of uniform strength and compressibility characteristics for soils of essentially the same geological origin. Results of these tests are tabulated on the boring logs at respective sample depths.

8.3 Particle Size Analysis Tests

The tests were based on ASTM D 422, the Standard Method for Particle-Size Analysis of Soils. The soil samples were first separated to two portions using the No. 10 (2.00-mm) sieve. A sieve analysis was performed on the soil samples retained on the No. 10 sieve, if any obtained. The portion of soil samples passed the No. 10 sieve then went into the hydrometer tests followed by another sieve analysis to complete the particle size distribution curve. Soil samples had to be soaked in the sodium hexametaphosphate solution (40g/L), dispersed by stirring the beaker, and kept in the sedimentation cylinder in order to obtain accurate hydrometer readings. This test was performed on samples obtained from Borings B-1 and B-6. The analysis results are presented Appendix G of this report.

8.4 Strength Tests

Undrained shear strengths of the cohesive soils were measured using calibrated hand penetrometer, unconfined compressive strength tests (ASTM D 2166) and Torvane tests. The test results are also presented on the borings logs

Effective soil strength parameters were investigated by multi-stage consolidated-undrained ($\overline{CIU}$) triaxial compression tests with pore pressure. Results of these tests plotted in accordance with Mohr's criteria for shearing failure are presented in Appendix H. The interpreted effective strength parameters, angle of internal friction and cohesion together with stress-strain curves are all shown in Appendix H.

8.5 Soil Sample Storage

Soil samples tested or not tested in the laboratory will be stored for a period of three months subsequent to submittal of this report. The samples will be discarded after this period, unless we are instructed otherwise.

9.0 GENERAL SOILS AND DESIGN CONDITIONS

9.1 Soil Stratigraphy

Subsurface soils appear to be variable across the site. Details of subsurface conditions at each boring location are presented on the respective boring logs. In general, the soils can be grouped into seven (7) major strata with depth limits and characteristics as follows:

Stratum No.	Range of Depth, ft.	Soil Description*
I	0 – 6	FILL: SILTY SAND, loose, light gray, brown, dark brown, reddish brown, with root fibers, clay pockets, moist (SM)
II	0 – 6	FILL: CLAYEY SAND, light gray, light brown, brown, dark brown, with root fibers, clay pockets, moist to wet (SC)
III	0 – 4	SILTY SAND, gray, brown, dark brown, reddish brown, with root fibers, clay pockets, moist (SM)
IV	2 – 32	FAT CLAY, firm to very stiff, light gray, gray, light brown, brown, reddish brown, with root fibers to 8', ferrous and calcareous nodules, silts, slickensided, moist (CH)
V	4 – 18	CLAYEY SAND, medium dense to dense, light gray, light brown, brown, dark brown, reddish brown, with root fibers to 8', clay pockets, clay seams, moist to wet (SC)
VI	8 – 18	LEAN CLAY, stiff to very stiff, light gray, light brown, brown, with ferrous and calcareous nodules, sands, sand seams, slickensided, moist (CL)
VII	10 – 50	SILTY SAND, medium dense to dense, light gray, light brown, brown, reddish brown, with clay pockets, clay seams, moist to wet (SM)

* Classification in general accordance with the Unified Soil Classification System (ASTM D 2487)

9.2 Design Conditions

Soil strength and index properties and how they relate to retaining wall system are summarized below:

Stratum No.	Soil Type	PI(s)	SPT	Soil Expansivity	Soil Strength, tsf	Remarks
I	Fill: Silty Sand (SM)	–	5 – 7	Non-Expansive	–	Moisture Sensitive
II	Fill: Clayey sand (SC)	11	–	Non-Expansive	–	Moisture Sensitive
III	Silty Sand (SM)	–	–	Non-Expansive	–	Moisture Sensitive
IV	Fat Clay (CH)	48 – 72	–	Expansive to Highly Expansive	0.31 – 1.82	–
V	Clayey sand (SC)	6 – 14	18 – 48	Non-Expansive	–	Moisture Sensitive
VI	Lean Clay (CL)	21 – 26	–	Non- to Moderately Expansive	0.56 – 1.50	–
VII	Silty Sand (SM)	–	21 – 39	Non-Expansive	–	–

Legend: PI = Plasticity Index
SPT = Standard Penetration Test

9.3 Water-Level Measurements

The soil borings were first drilled dry to evaluate the presence of perched or free-water conditions. A wet rotary boring technique was used thereafter to the completion depths of the borings. The levels where free water was encountered in the open boreholes during and 24 hours after drilling are shown on the boring logs. Detailed groundwater/perched water measurements are summarized below:

	Groundwater/Perched Water Depth, ft.		Caved-In Depth, ft.	
Boring No.	at the Time of Drilling	after 24 Hours	at the Time of Drilling	after 24 Hours
B-1 and B-3	8	4	–	–
B-2	Dry	Dry	25	17
B-4	3	0.5	–	–
B-5 through B-7	Dry	Dry	–	–
B-8	7	5	–	–

Fluctuations in groundwater generally occur as a function of seasonal moisture variation, temperature, groundwater withdrawal and future construction activities that may alter the surface drainage and subdrainage characteristics of this site.

An accurate evaluation of the hydrostatic water table in the relatively impermeable clays and low permeable sands/silts requires long term observation of monitoring wells and/or piezometers. It is not possible to accurately predict the pressure and/or level of groundwater that might occur based upon short-term site exploration. The installation of piezometers/monitoring wells was beyond the scope of our study.

10.0 ENGINEERING ANALYSIS

10.1 Site Conditions

Existing retaining wall structures have experienced distress. The area associated with slope failure is located along North Star Drainage Ditch. Two segments of existing retaining wall structures are located at the backyard of the residence at 31422 Rigel Court. The height of the upper section of the retaining wall ranges from 8- to 10-ft. Furthermore, the height of the lower section of the retaining wall ranges from 1.5- to 3-ft. Bulging and gaps are observed in the retaining wall structures.

The other retaining wall is located at the backyard of the residence at 31418 Rigel Court. Our observations indicated that the bulkhead at this site has settled about 20-inch in the past several years. The ditch is about 20-ft deep and it has side slopes of 2(h):1(v)±. The slope is covered with grass and trees. Our site visit did not indicate tilting of trees in this section of the ditch. This condition is indicative of pending slope failure.

10.2 Review of Aerial Photography

We reviewed the aerial photographs from 2000 to 2008, presented in Appendix I, for the project site. Our review of aerial photograph of 2000 indicates the project site was not developed and the site was wooded. Our review of the aerial photograph of 2002 also indicates that the subdivision streets were concrete paved. Our review of the aerial photographs from 2002 through 2008 indicates that the residences were constructed and trees were present around the residences.

10.3 Global Slope Stability Analysis of Existing Retaining Wall Structures

10.3.1 General

Slope stability analyses were conducted to evaluate the pre-failure condition of existing retaining wall structures. Potential slope failure mode, termed deep seated or global failure, occurs when the entire soil mass and wall fails along a circular arc which passes below the tip of the retaining wall. Evaluation of retaining wall global or deep seated failure was evaluated using the GSTABL7 with STEDwin computer program (Ref. 1) for the three following conditions: (a) Short-Term (ST), (b) Rapid-Drawdown (RDD) and (c) Long-Term (LT) conditions. The short-term (ST) parameters represent the end of construction loading conditions. Rapid drawdown (RDD) represents a flooded condition where the water rises to the top of the slope, then recedes fast enough leaving an unbalanced piezometric head behind the slope. Long-term (LT) design values are applicable to soil gravity loads and continuously applied live loads. The long term represents a steady-state soil parameter condition.

10.3.2 Design parameters

Short-terms strengths (Ref. 2) were determined from undrained test data including hand penetrometer, Torvane, and unconfined compression. Soil strengths for the long-term and rapid draw-down conditions (Ref. 3 and Ref. 4) were estimated from correlations between the soil index properties, blow counts, residual and soften secant friction angles (Ref. 4) and previous work experience with similar soils of the same geologic origin. In general, the residual shear strengths parameters are used for the slope stability analyses, instead of the peak shear strengths obtained in the laboratory tests. The design parameters used in the analysis are as follows:

						Design Strength Parameters					
						Short Term		Rapid Draw Down		Long Term	
Stratum No.	Depth, range, ft.	Soil Symbol	Description	γ_t, pcf	γ_s, pcf	c_0, psf	ϕ_0	c', psf	ϕ'	c", psf	ϕ"
I	0 – 6	Fill: SC	Fill: Clayey Sand	115	120	0	32	0	32	0	32
II	6 – 20	SC	Clayey Sand	115	120	0	34	0	34	0	34
III	20 – 24	CH	Fat Clay	120	125	900	0	400	16	220	17
IV	24 – 50	SM	Silty Sand	115	120	0	36	0	36	0	36

Where:

γ_t = Total unit weight of soils, pcf

γ_s = Saturated unit weight of soils, pcf

c_o, c', c" = Undrained, consolidated undrained and consolidated drained, cohesion, psf

ϕ_o, ϕ', ϕ" = Undrained, consolidated undrained and consolidated drained, angle of internal friction, degrees

10.3.3 Slope Stability Analysis

Slope stability analysis was performed on the most critical cross sections using the computer program "GSTABL7 with STEDwin". The modified Bishop method of analysis was used for the slope stability analysis. In the Modified Bishop analysis method, slope stability is evaluated along a circular arc. The degree of safety is measured by comparison of the driving forces (soil gravity loading, surcharge, etc.) causing movement with the soil friction and cohesive forces resisting failure. The ratio of driving forces to resisting forces defines the factor of safety.

The stability was evaluated for numerous radii representing trial circles originating from a grid system of trial circle centers selected to incorporate the failure. For a stable slope, we recommend minimum safety factors of 1.3 for the Short Term (ST) condition, 1.25 for the Rapid Draw Down (RDD) condition, and 1.5 for the Long Term (LT) condition. The general global stability analysis results are presented in Appendix J of this report.

The stability was evaluated for numerous radii representing trial circles originating from a grid system of trial circle centers selected to incorporate the failure. The factors of safety for all the conditions for the global stability are shown below:

Design Conditions	Pre-Failure Slope Factor of Safety
Short Term Condition (ST)	1.31
Rapid Draw Down Condition (RDD)	0.80
Long Term Condition (LT)	0.92

Based on the stability analysis, the retaining walls were not properly designed to resist global slope stability.

11.0 CAUSE(S) OF SLOPE/RETAINING WALL FAILURE

11.1 General

We understand that the homeowners observed signs of distress of the retaining wall structures sometimes after the construction. The signs of distress consisted of the movements and settlement of the retaining wall structures. Furnished information indicate that portions of the high bank along the North Star Drainage Ditch were backfilled during the construction of the subdivision. However, it should be noted that GET did not have any information regarding field compaction data of the backfilled area. In addition, we did not have structural drawings for existing retaining wall structures.

The slope and retaining wall structures generally fail as a result of one or combination of inadequate design, poor construction and poor materials used in construction. Based on the evaluation of our field exploration, laboratory test data and engineering analysis, it is our opinion that inadequate slope ratios, inadequate retaining wall design and construction caused the failure. Our evaluations of the slope/bulkhead failure are discussed in the following report sections.

11.2 Inadequate Design

Slope/retaining wall failure can occur if the slope or retaining wall structures are poorly designed. For example, if an inadequate geotechnical exploration was done to come up with the slope and retaining wall design recommendations or faulty structural design procedures were followed, etc. Our observation with respect to slope and retaining wall design is as follows:

- Our site visit indicates that the residences associated with slope failure are located along North Star Drainage Ditch. The ditch is about 20-ft deep and it has side slopes about 2(h):1(v). This indicates that the backyard areas are located within the slope hazard zone [slopes steeper than 4(h):1(v)]. Therefore, a slope stability analysis should have been conducted before the construction of the residences near the ditch or when designing the retaining wall.

- Our field exploration and laboratory testing data indicate that the surficial soils consist of silty sand and clayey sand fill soils. These fill soils are highly erosive soils when exposed to water flow. The water flow would create weak zones through cavities that may have resulted from the erosion of the sand fill soils. The sand fill soils may also have been improperly placed and compacted. These may have resulted in the occurrence of weak zones when saturated.

- Our site visit also indicated that the existing retaining wall has failed with deadman anchor structure. This is due to the insufficient penetration depth of the retaining wall. Furthermore, the deadman anchors were not properly placed far enough from the wall to resist the lateral earth pressures.

- Relatively shallow groundwater conditions were encountered in soil borings during our field exploration. Moreover, the 100-year flood event brings the ditch water close to the top of the slope. The water can rise to the top of the slope during the heavy rainfall, and then recedes fast enough, leaving an unbalanced piezometer head. The excess pore water pressure reduces the normal pressure on the slip surface, thereby lowering the mobilized frictional resistance to movement. This condition which is called a rapid-draw down was a part of failures. The slopes and retaining walls should have been designed for this condition.

11.3 Inadequate Construction/Materials

Improper construction practices or using wrong material as backfill behind retaining walls or on slopes can result in poor slope/retaining wall performance and structural distress. No information regarding backfill materials used was available for GET's review at the time of our study. However, a review of our field exploration and laboratory test indicated that the on-site fill soils consist of silty sand and clayey sand soils. The thickness of the on-site cohesionless fill soils ranges from 2- to 6-ft. These soils do not meet the requirements for structural fill.

12.0 SUMMARY OF SLOPE/RETAINING WALL FAILURE CAUSATION

Based on the review of the expert reports presented and field and laboratory evaluations, it is our opinion that slope/retaining wall failure occurred as results of combination of the following:

- Not considering the steep slope along the North Star Drainage Ditch in design (Geotechnical Design Problem).
- Inadequate design of the retaining wall and deadman anchor structures (Structural Design Problem).
- Inadequate use or compaction of the fill soils (Construction/Material Problem).

13.0 RECOMMENDED SLOPE REPAIR TECHNIQUES

It is our opinion that the existing slope can be repaired using soldier pile-wall, soil nailed wall or gabion wall system. Other retaining wall systems can also be used. Detailed discussions of the slope repair techniques are presented in the following report sections. It is our opinion that a soldier pile system will be the least intrinsic system.

13.1 Soldier Pile Wall System

13.1.1 General

Based on the slope stability analysis presented earlier, the existing slope does not have adequate factor of safety against failure. Therefore, we recommend that a soldier pile wall system should be placed near the high bank of the ditch. A soldier pile wall system should consist of closely-spaced drilled shafts of cast-in-place reinforced concrete. The soldier pile wall can protect the backyard, swimming pool and house structures. We understand that the homeowners would like to keep the backyard in natural condition, therefore, the wall should be placed just at the edge of the property line. The soldier piles can be spaced about three-ft on center. The solider pile system should be anchored.

We recommend placement of tension steel in the drilled footings to resist uplift loads due to expansive soils. An adhesion value of 0.5 tsf should be applied to the straight shaft portion of the drilled footings for computation of uplift loads. Due to presence of silty sand/clayey sand soils and relatively shallow groundwater condition, casing or slurry method of construction may be required during the soldier pile installation.

We conducted the global slope stability analysis considering the soldier pile system at the project site. For designing of the wall structure, the slope in front of the soldier pile system was not considered due to the failure of the slope. This report section presents the global slope stability analysis considering the soldier pile system at the project site. The analysis and recommendations for the construction of soldier pile wall structure are presented in the following report section.

13.1.2 Lateral Earth Pressures

The soldier pile walls should be designed to withstand lateral earth loads and surcharge pressures plus any hydrostatic pressures that may develop due to possible entrapped surface water behind the walls, unless an effective drainage system is provided.

It is anticipated that the proposed soldier pile walls will be subjected to both active lateral pressures and passive lateral earth pressures, which may be computed by the use of the pressure diagram. A lateral net earth pressure diagram is presented on Plate 8.

The passive lateral earth pressure includes a factor of safety of 2.0. The passive lateral earth pressure is applicable only if the soil in front of the retaining wall will not eroded away during the life of the structure.

13.1.3 Hydrostatic Pressures

Hydrostatic pressures due to groundwater and surface water intrusion may build up and act on the wall. The hydrostatic pressures should be added on the lateral earth pressure equations for design of the proposed soldier pile retaining wall structures.

13.1.4 Slope Stability Analysis with Soldier Pile System

The global stability analysis results for the soldier pile system are presented in Appendix K of this report. The stability was evaluated for numerous radii representing trial circles originating from a grid system of trial circle centers selected to incorporate the failure. Furthermore, we do not consider the slope in front of the soldier pile system due to the potential slope failure. The penetration depth of the soldier pile system should be computed to support the full design lateral earth, surcharge, and water pressures. The general global stability was analyzed considering various wall penetration depths. Based on the analysis results, we recommend that the minimum penetration depth should be at least 33-ft from the high bank of the ditch. The factors of safety for all the conditions for the global stability are shown below:

Design Conditions	Factor of Safety
Short Term Condition (ST)	1.54
Rapid Draw Down Condition (RDD)	1.40
Long Term Condition (LT)	1.72

Based on the slope stability analysis, a minimum soldier pile penetration depth of 33-ft from the high bank of the slope (elevation 180-ft) is recommended to prevent the deep seated failure.

13.1.5 Anchor Requirements

Economic limitations govern the use of cantilevered soldier piers. However, the force increases as a function of the square of the height. This results in an increase in the required depth of penetration below the failure surface, a greater diameter of pier and additional reinforcing to resist the overturning moment. Alternate use of anchor tie-backs using helical piers should, therefore, be considered on this project.

A helical pier consists of a shaft that may be constant or variable section size and have one or more bearing plates that are formed to the shape of helix. The pile is placed into the soil by applying torque to the shaft in combination with moderate down pressure. The helical shape of that bearing plates allow the pier to be torqued into the earth in a manner comparable to the way a wood screw is place into a piece of wood.

13.1.6 Anchor Capacity

The method used to determine the ultimate theoretical anchor capacity of a helical pier assumes a bearing type failure occurs in the soil below each helix. The anchor capacity equation is used to determine the soil unit capacity which is applied to the projected area of the bearing plate. The bearing capacity equation is as follows:

$Q_n = A_n (cN_c + qN_q)$

Where: Q_n = ultimate theoretical bearing capacity of helical plate, pounds
A_n = projected area of the helical bearing plate, square inches
c = cohesion of the soil. This is generally taken as the average value for approximates three feet below the bearing plate location (psf).
N_c = bearing capacity factor for cohesive soil which is typically taken to be 9.
q = effective overburden pressure (psf). This is the product of the bearing plate depth and the average effective unit weight of soil.
N_q = bearing capacity factor for cohesionless soil.

It should be noted that the actual anchor capacity should be checked by pull out tests in the field. The location of bearing plate should be outside of the potential failure surface due to global failure as shown in Appendix K. Based on the slope stability analysis and nature of failure surface, we recommend that in case anchors are used, it should be located at least 45-ft from the retaining wall.

13.1.7 Soil Design Parameters

The following soil design parameters can be used in the design:

Depth Range, ft.	Symbol*	Soil Description	Total Unit Weight (γ_t), pcf	Saturated Unit Weight (γ_s), pcf	Undrained Shear Strength (C_u), psf	Angle of Internal Friction (ϕ), degrees
0 – 4	SM	Fill: Silty Sand	115	120	0	32
0 – 6	SC	Fill: Clayey Sand	115	120	0	32
0 – 4	SM	Silty Sand	115	120	0	32
2 – 10	CH	Fat Clay	120	125	700	0
10 – 32	CH	Fat Clay	125	130	900	0
4 – 20	SC	Clayey Sand	115	120	0	34
8 – 18	CL	Lean Clay	130	135	560	0

Depth Range, ft.	Symbol*	Soil Description	Total Unit Weight (γ_t), pcf	Saturated Unit Weight (γ_s), pcf	Undrained Shear Strength (C_u), psf	Angle of Internal Friction (ϕ), degrees
10 – 50	SM	Silty Sand	115	120	0	36

* Unified Soil Classification System (ASTM D 2487)

13.2 Soil Nailed Wall System

13.2.1 General

Soil nailed wall system can be also be used to stabilized the slope. The soil nailing is an in-situ reinforcement technique wherein nails are inserted into a soil mass to reinforce the soil. This wall system consists of a large number of reinforcing elements drilled and grouted into the slope/wall mass.

The system consists (a) removal of all vegetation from the ditch slope, (b) proofrolling and compacting all slopes, (c) covering the slope with shortcrete, (d) drill anchors into the face of the wall and (e) placement of facing on the wall.

13.2.2 Soil Design Parameters

The soil design parameters for soil nailed wall will be the same as soil design parameters presented in section 13.1.7.

13.2.3 Soil-Nailed Walls Design

The design of a soil-nailed wall includes the evaluation of internal and external stability. The maximum tensile force created in the nails separates the nail-reinforced mass into an active zone and a resistance zone. In the active zone, lateral shear stresses are mobilized at the perimeter of the nail to restrain the outward ground movement, and, in the resistance zone, nail tension forces are transferred into the ground behind the wall.

The internal stability design of a soil-nailed wall involves the sizing and spacing of the soils nails. The overall approach includes: (1) the total nail reinforcing force; (2) nail spacing, (3) nail lengths. The nail/soil bond strength is estimated to be 0.83- to 1.25-kip/ft^2 for design (Ref. 5) and is recommended to be verified in the field through nail pullout tests.

13.2.4 Construction Sequence

The sequence of construction for soil-nailed wall is described below:

- An initial excavation in the soil need to be made to a specified depth. This excavation depth is governed by the ability of the soil to stand unsupported, but is no greater than the required vertical spacing of the nails.

- Prefabricated drainage strips, need to be placed and then the exposed excavated soil face need to be covered with a steel mesh-reinforcement shotcrete layer.

- Nails of specified length and inclination are installed at predetermined locations. A method of drilling is used that is appropriate for the in-situ soil type. Typical installation methods include rotary and auger drilling. Drill holes constructed using rotary drilling equipment ranging in diameter from 4- to 8-inch, while for auger drilling, drill hole diameters range from 6- to 12-inch. Usually, the nails are standard reinforcing bars with typical diameters of 1- to 1½-inch.

- This sequence is repeated until the final excavated grade is reached.

- For permanent wall applications, a CIP or precast concrete facing or other type of facing is connected to the complete shotcreted structure. Various connection methods are used depending on the facing type and expected loadings.

13.3 Gabion Wall System

13.3.1 General

Gabion walls are compartment units filled with stone that is 3- to 8-inches in size with clean and hard stone. Each unit is a rectangular basket made of galvanized steel, geosynthetic grid or polyvinylchloride-coated wire. Each gabion unit is laced together on-site and filled with select stone. The system works as a retaining wall as well as an erosion protection system.

13.3.2 Gabion Walls Design

Gabion walls are generally designed as gravity retaining walls which use their own weight to resist the lateral earth pressures. Gabion walls also can be designed with wire mesh or geosynthetic reinforcement that extends back into the retained soil from between the gabion unit.

The main forces acting on gabion walls are the vertical forces from the weight of the gabion and the lateral earth pressure acting on the back of the gabion wall. Based on our field exploration and laboratory testing, passive lateral earth pressure coefficients were developed, using correlation of soil data, for the design of the proposed wall structure. The design coefficients were computed based on the proposed wall configuration and soil type using the Log-Spiral theory. These data are summarized on Plate 9.

The proper design of the wall requires estimation of the lateral earth pressures, which are functions of several factors, such as wall type, amount of wall movement, shear strength parameters of the soils, unit weight of the soils, drainage condition in the backfill, surcharge loading, etc. The scope of our work did not include the design of the gabion wall structure. The wall structure should be properly designed by the structural engineer on the basis of the soil parameters provided herein. We recommend GET be retained to review the design of the wall to confirm compliance with our recommendations.

13.3.3 Gabion Wall Bearing Capacity

Bearing Capacity is the ability of the soil to safely carry the pressure placed on the soil without undergoing a shear failure with accompanying large settlements. A review of subsoil data indicates that a gabion structure will be placed on top of on-site silty sand soils. Based on the results of the field and laboratory testing and bearing capacity theory, a net allowable bearing capacity of 1,000 psf can be used for dead load. The allowable loading for total load (Dead + Live Load) will be 50 percent larger.

14.0 SLOPE EROSION PROTECTION

14.1 General

Erosion problems can usually be associated with North Star Drainage Ditch where proposed retaining wall structures will be constructed. Excessive erosion can lead to a loss of ground and gradual (progressive) sloughing of the slopes. Consequently, progressive slope failures can occur. Our field exploration indicates that subsurface soils consist of silty sand and clayey sand soils. Severe surface erosion problems are usually associated with ditch enhancements due to silty sand and clayey sand soils.

14.2 Surface Erosion Control Systems

Dressing of the slopes with surface erosion control systems should ensure successful long-term performance. These systems may consist of the following:

- Grass Cover. Grass cover can provide a suitable erosion protection system provided the root systems can sustain the peak velocities from the rain water. Periodic observation of slopes should be planned to identify areas that may require a more positive erosion protection system.

- Rip-Rap. Protection of the toe is critical for providing acceptable stability along the embankment and in front of the bulkhead. Concrete, stone, cement-stabilized or special rip-rap system may be placed in the project site. Texas Department of Transportation (TxDOT) Specification, Item 432 should be used for construction of Rip-Rap.

- Geotextiles. Geotextiles may be placed directly against the slope to serve as a filter layer to prevent migration on site through a crushed stone rip-rap layer. The rip-rap layer should consist of four to eight-inch diameter crushed stone with thicknesses on the order of 12-inches. In the areas of steeper slopes, gabions should be used for support of the geotextile and rip-rap layer. Alternatively, geotextiles are now available that can be used without rip-rap to minimize erosion.

15.0 CONSTRUCTION CONSIDERATIONS

15.1 Surface Water Drainage

It is recommended that site drainage be well developed. Surface water should be directed away from the top bank of the slope. Measures should be taken to achieve minimal water runoff down the slope. This can be accomplished by placing a swale behind the retaining wall.

15.2 Soldier Pile (Drilled Footings) Installations

It is our recommendation that specifications for the installation of the drilled shafts should follow the guidelines presented in drilled shaft design and construction guidelines manual (Ref. 6), and that we should be also review the proposed specification in draft forms.

Based on our experience, we anticipated that the installation of drilled shafts may encounter difficulties from groundwater and caving soils below the ground. It is our opinion that the drilled footings should be constructed using casing or slurry method of construction if the groundwater or caving soils are encountered. The drilled shafts should be clean and free of loose materials prior to concreting. Concrete slump should be five- to seven-inches. Concrete placement should be planned immediately after drilling, with placement by trime methods.

Detailed observations of pier construction should be required by a qualified engineering technician to assure that the piers are (a) founded in the proper bearing Stratum, (b) have the proper depth, (c) have the correct size, and (d) that all loose materials have been removed prior to concrete placement.

15.3 Earthwork

Our recommendations (where applicable) on the slope repair earthwork preparation are summarized below:

1. The subgrade areas should then be proofrolled with a loaded dump truck or similar pneumatic-tired equipment with loads ranging from 25- to 50-tons. The proofrolling serves to compact surficial soils and to detect any soft or loose zones. Any soils deflecting excessively under moving loads should be undercut to firm soils and recompacted. The proofrolling operations should be observed by an experienced geotechnician.

2. Scarify the subgrade, add moisture, or dry if necessary, and recompact to 95% of the maximum dry density (90% next to the wall) as determined by ASTM D 698 (Standard Proctor). The moisture content at the time of compaction of subgrade soils should be within ±2% of the Proctor optimum value. We recommend that the degree of compaction and moisture in the subgrade soils be verified by field density tests at the time of construction.

3. Structural fill should consist of off-site inorganic lean clays with a liquid limit of less than 40 and a plasticity index between 12 and 20. Other types of structural fill available locally, and acceptable to the geotechnical engineer, can also be used.

   These soils should be placed in loose lifts not exceeding eight-inch in thickness and compacted to 95 percent of the maximum dry density determined by ASTM D 698 (Standard Proctor). The moisture content of the fill at the time of compaction should be between optimum and +3% of the optimum value. We recommend that the degree of compaction and moisture in the fill soils be verified by field density tests at the time of construction.

4. In cut areas, the soils should be excavated to grade and the surface soils proofrolled and scarified to a minimum depth of six-inch and recompacted to the previously mentioned density and moisture content.

15.4 Construction Surveillance

Construction surveillance and quality control tests should be planned to verify materials and placement in accordance with the specifications. The recommendations presented in this report were based on a discrete number of soil test borings. Soil type and properties may vary across the site. As a part of quality control, if this condition is noted during the construction, we can then evaluate and revise the design and construction to minimize construction delays. We recommend the following quality control procedures be followed by a qualified engineer or technician during the construction of the facility:

- Observe the site stripping and proofrolling.
- Verify the compaction of fill and subgrade soils.
- Evaluate the quality of fill and monitor the fill compaction for all lifts.
- Observe all excavation operations.
- Monitor concrete placement, conduct slump tests and make concrete cylinders.
- Monitor the wall construction including the depth, size, steel, concrete, tie back, etc.

It is the responsibility of the client to notify GET of when each phase of the construction is taking place so that proper quality control and procedures are implemented.

16.0 RECOMMENDED ADDITIONAL STUDIES

We recommend that a meeting be set up with the client together with the structural engineer to discuss the various recommendations presented herein. Furthermore, cost/benefit aspects of our recommendations must be evaluated. The following additional studies are also recommended:

- Develop a set of plans and specifications for the project repair.

- Help the contractor to develop a cost estimate of the slope repairs.
- Monitor the field implementations of the repairs.

17.0 STANDARD OF CARE

The recommendations described herein were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical engineering profession practicing contemporaneously under similar conditions in the locality of the project. No other warranty or guarantee, expressed or implied, is made other than the work was performed in a proper and workmanlike manner.

18.0 REPORT DISTRIBUTION

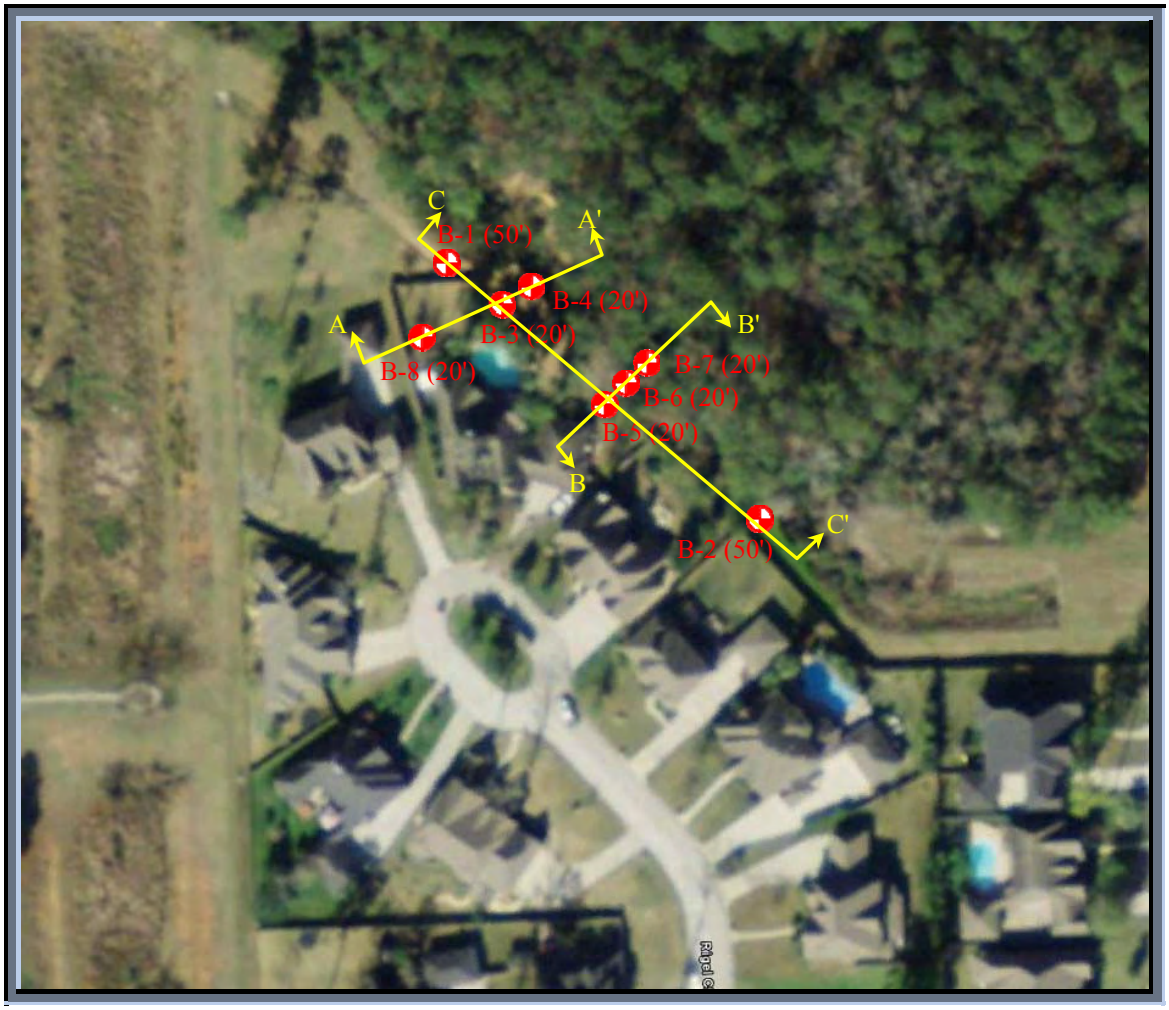
This report was prepared for the sole and exclusive use by our client, based on specific and limited objectives. All reports, boring logs, field data, laboratory test results, maps and other documents prepared by GET as instruments of service shall remain the property of GET. Reuse of these documents is not permitted without written approval by GET. GET assumes no responsibility or obligation for the unauthorized use of this report by other parties and for purposes beyond the stated project objectives and work limitations.

19.0 REFERENCES

1. "GSTABL7 with STEDwin", by Gregory, P.E. Gregory Geotechnical Software, 2003.
2. "An Engineering Manual for Slope Stability Studies", by J.M. Duncan and A.L. Buchigwani, University of California at Berkley, Department of Engineering, 1975.
3. "Cohesion Intercept in Effective Stress-Stability Analysis", by G. Mesri, and M.E.M. Abdel-Ghaffar, Journal of Geotechnical Engineering, Vol. 119, No. 8, August 1993, pp. 1229-1249.
4. "Shear Strength Correlations and Remedial Measure Guidelines for Long-Term Stability of Slopes Constructed of Highly Plastic Clay Soils", by A. A. Saleh and Stephen G. Wright, Center for Transportation Research Bureau of Engineering Research, The University of Texas at Austin, October, 1997.
5. Reese, L.C. and J.D. Allen (1977), "Drilled Shaft Design and Construction Guidelines Manuals" U. S. D. O. T. Implementation Package, Vol. II.
6. "Manual for Design, Construction, Monitoring of Soil Nail Wall" – Federal highway Administration (FHWA-SA-96-69R)

SITE VICINITY MAP			NORTH
PROJECT: Forensic Engineering Study, Slope Distress at North Star Drainage Ditch Tomball, Texas			
SCALE: NOT TO SCALE	DATE: AUGUST 2010	REPORT NO.: 10-328E	

GEOTECH ENGINEERING AND TESTING **PLATE 1**



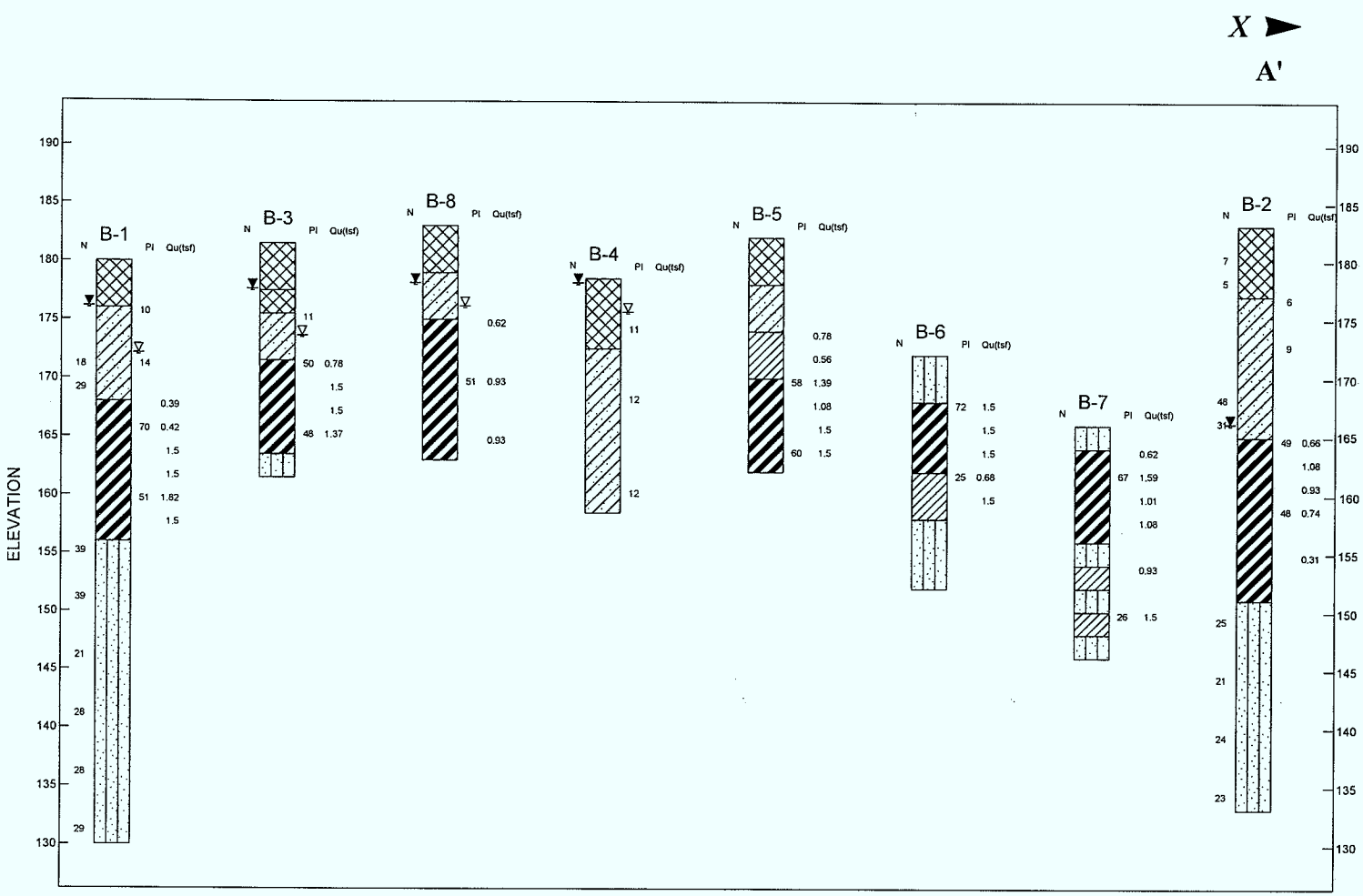
PLAN OF BORINGS (boring dimensions and locations are approximate)

NORTH

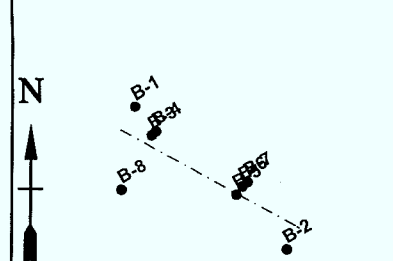
PROJECT: Forensic Engineering Study, Slope Distress at North Star Drainage Ditch
Tomball, Texas

SCALE: NOT TO SCALE	DATE: AUGUST 2010	REPORT NO.: 10-328E

GEOTECH ENGINEERING AND TESTING **PLATE 2**



DISTANCE ALONG PROFILE



Site Map Scale 1 inch equals 225 feet

Explanation

B-1 — Borehole Number

Borehole Lithology

Water Level Reading at time of drilling.

Water Level Reading after drilling.

0 62

Horizontal Scale

Vertical Exaggeration: 4x

Lithology Graphics

Fill

Clayey Sand (SC)

Fat Clay (CH)

Silty Sand (SM)

Lean Clay (CL)

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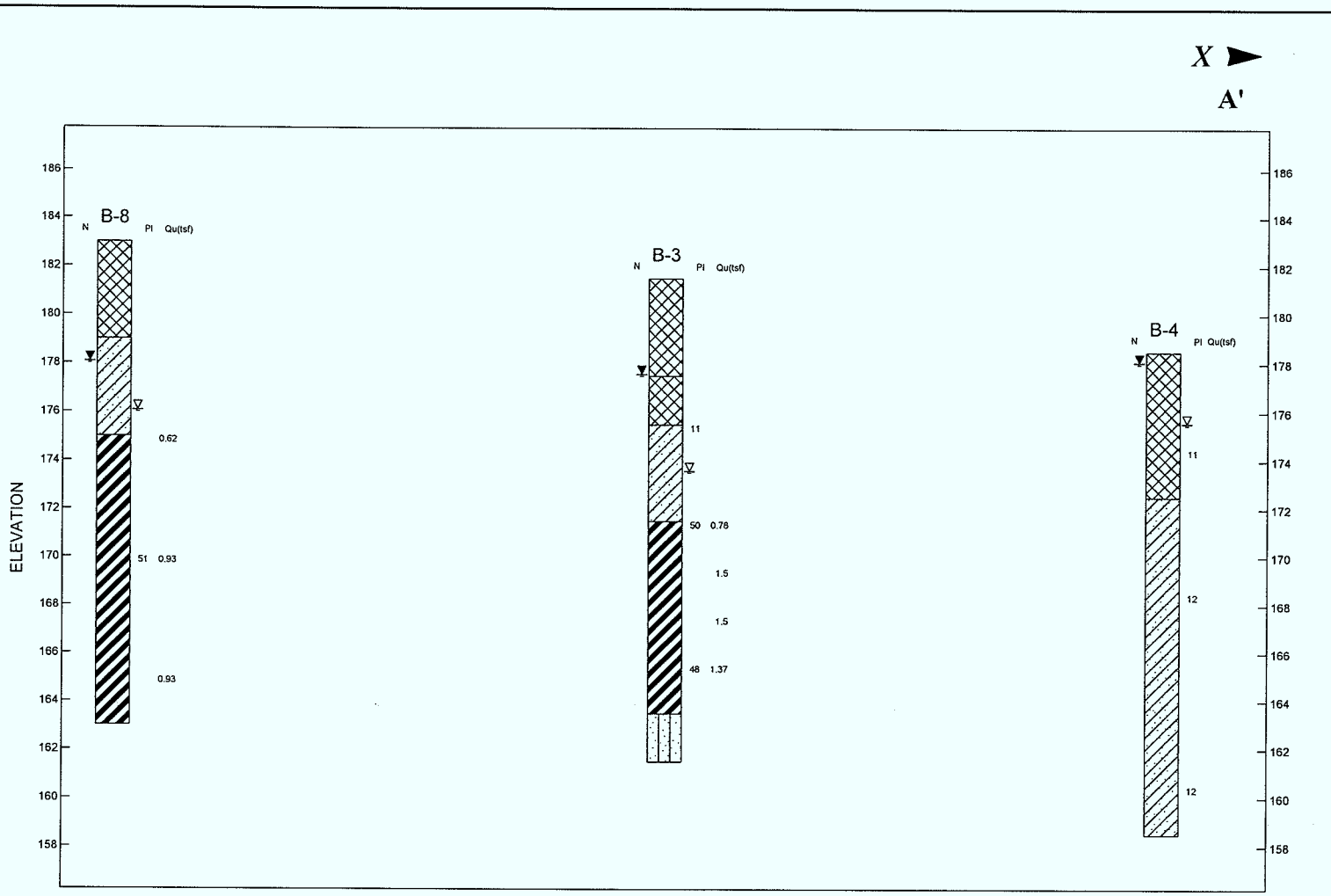
SOIL STRATIGRAPHY

Slope Distress at
North Star Drainage Ditch
Tomball, Texas

JOB NUMBER	PLATE NUMBER
10-328E	Plate 3



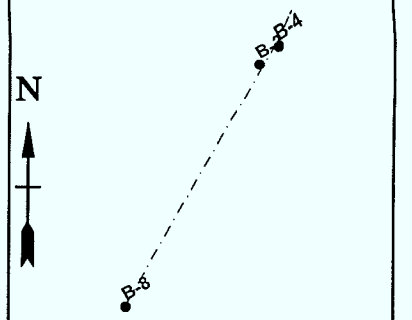
Lithology Graphics

Fill

Clayey Sand (SC)

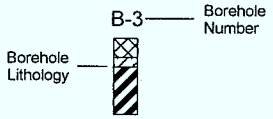
Fat Clay (CH)

Silty Sand (SM)



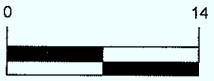
Site Map Scale 1 inch equals 50 feet

Explanation



Water Level Reading at time of drilling.

Water Level Reading after drilling.



Vertical Exaggeration: 2x

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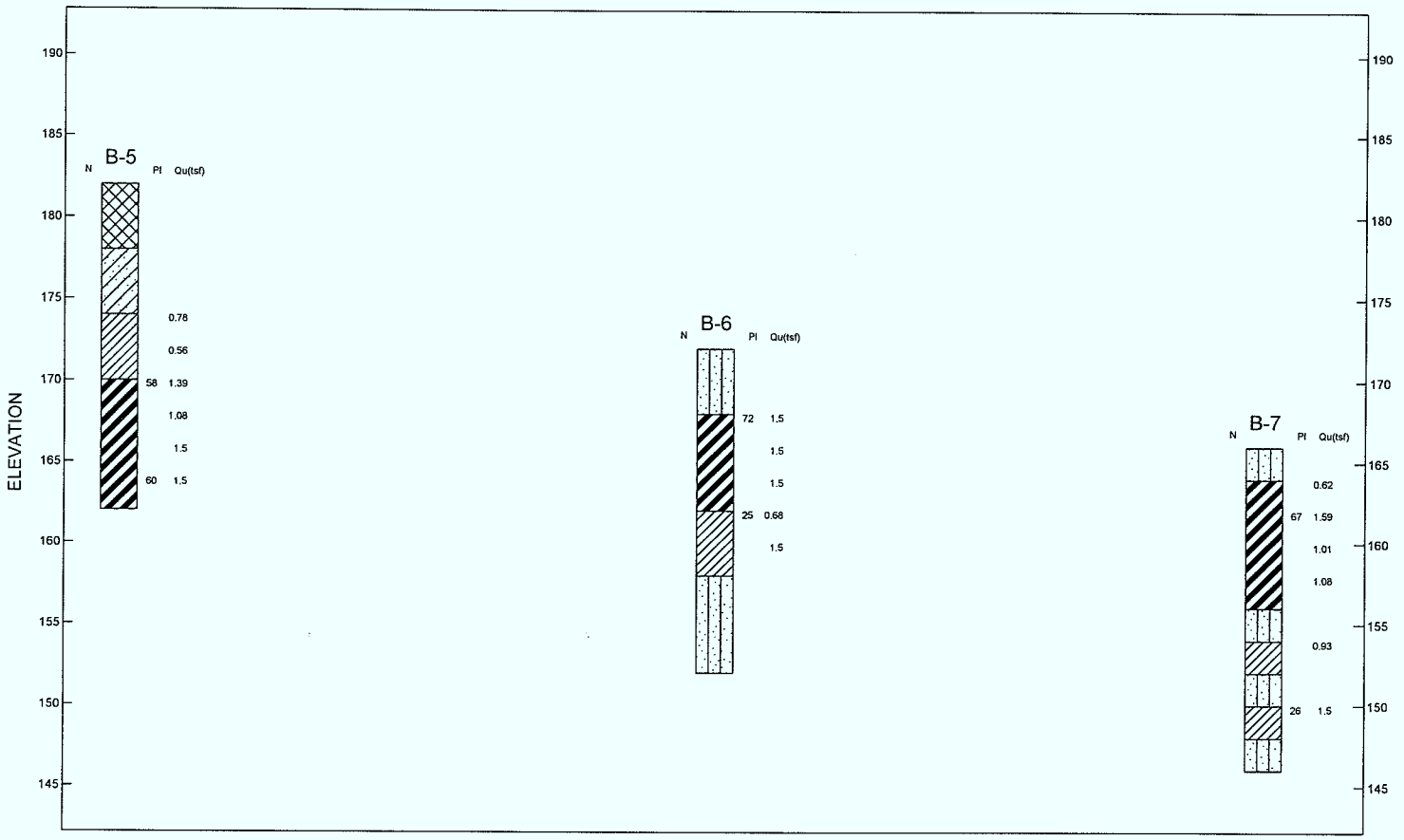
Section A-A'

GET GEOTECH ENGINEERING & TESTING

Slope Distress at
North Star Drainage Ditch
Tomball, Texas

JOB NUMBER	PLATE NUMBER
10-328E	Plate 4

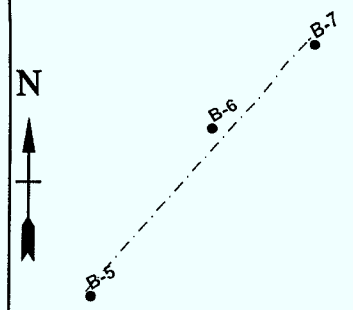
BERNARD 10-328E.GPJ FANWNL01.GDT 7/15/10



DISTANCE ALONG PROFILE

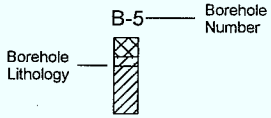
Lithology Graphics

- Fill
- Clayey Sand (SC)
- Lean Clay (CL)
- Fat Clay (CH)
- Silty Sand (SM)

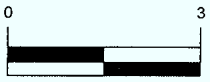


Site Map Scale 1 inch equals 10 feet

Explanation



- Water Level Reading at time of drilling.
- Water Level Reading after drilling.



Horizontal Scale

Vertical Exaggeration: 0.5x

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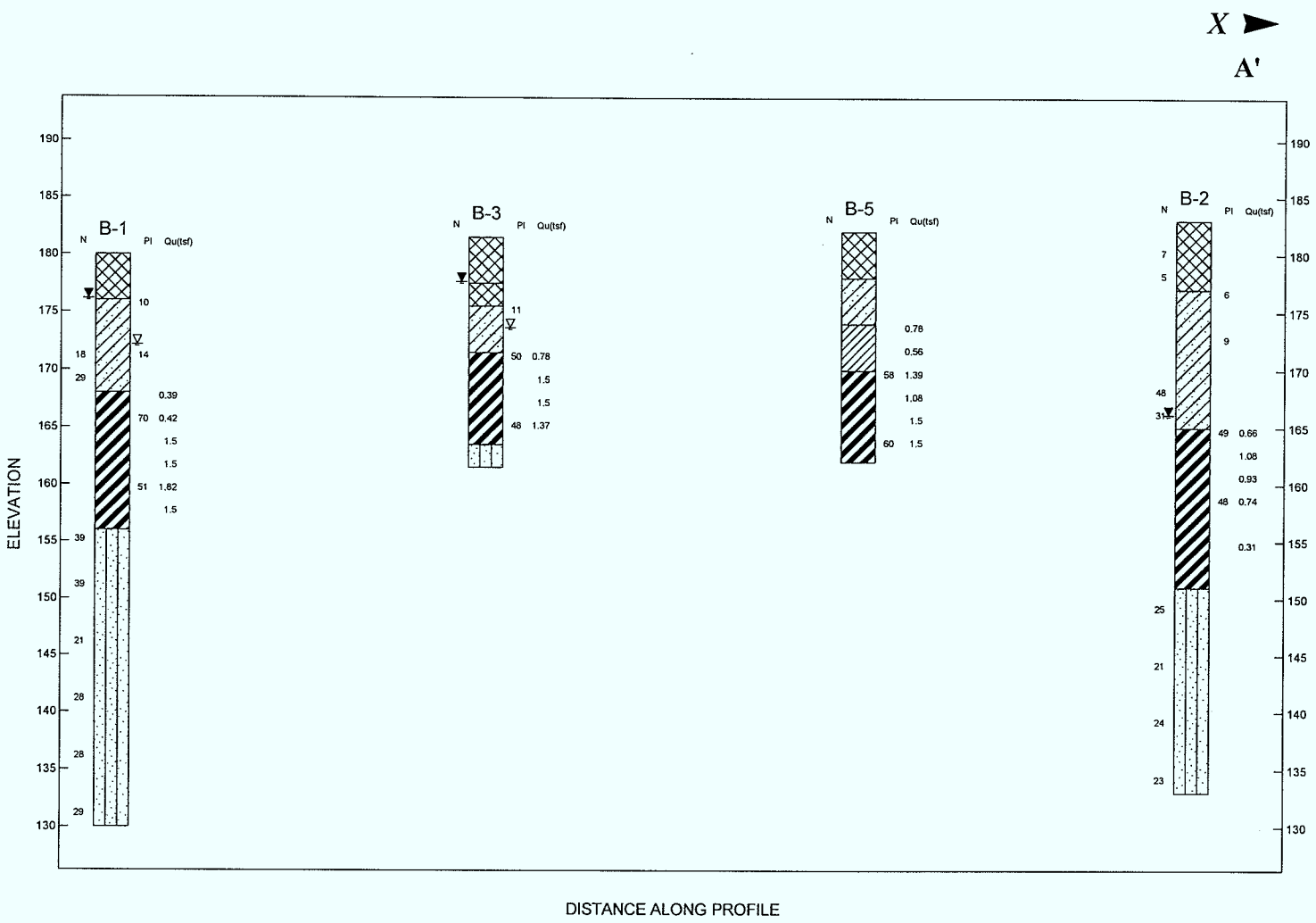
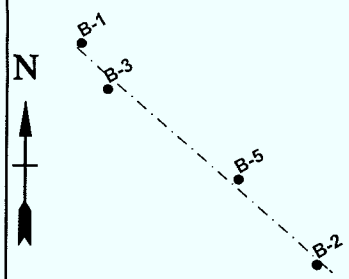
Section B-B'

GET GEOTECH ENGINEERING & TESTING

Slope Distress at
North Star Drainage Ditch
Tomball, Texas

JOB NUMBER	PLATE NUMBER
10-328E	Plate 5





Site Map Scale 1 inch equals 145 feet

Explanation

B-1 — Borehole Number

Borehole Lithology

Water Level Reading at time of drilling.

Water Level Reading after drilling.

0 40

Horizontal Scale

Vertical Exaggeration: 2.5x

Lithology Graphics

Fill

Clayey Sand (SC)

Fat Clay (CH)

Silty Sand (SM)

Lean Clay (CL)

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Section C-C'

GET GEOTECH ENGINEERING & TESTING

Slope Distress at
North Star Drainage Ditch
Tomball, Texas

JOB NUMBER	PLATE NUMBER
10-328E	Plate 6

GET GEOTECH ENGINEERING & TESTING
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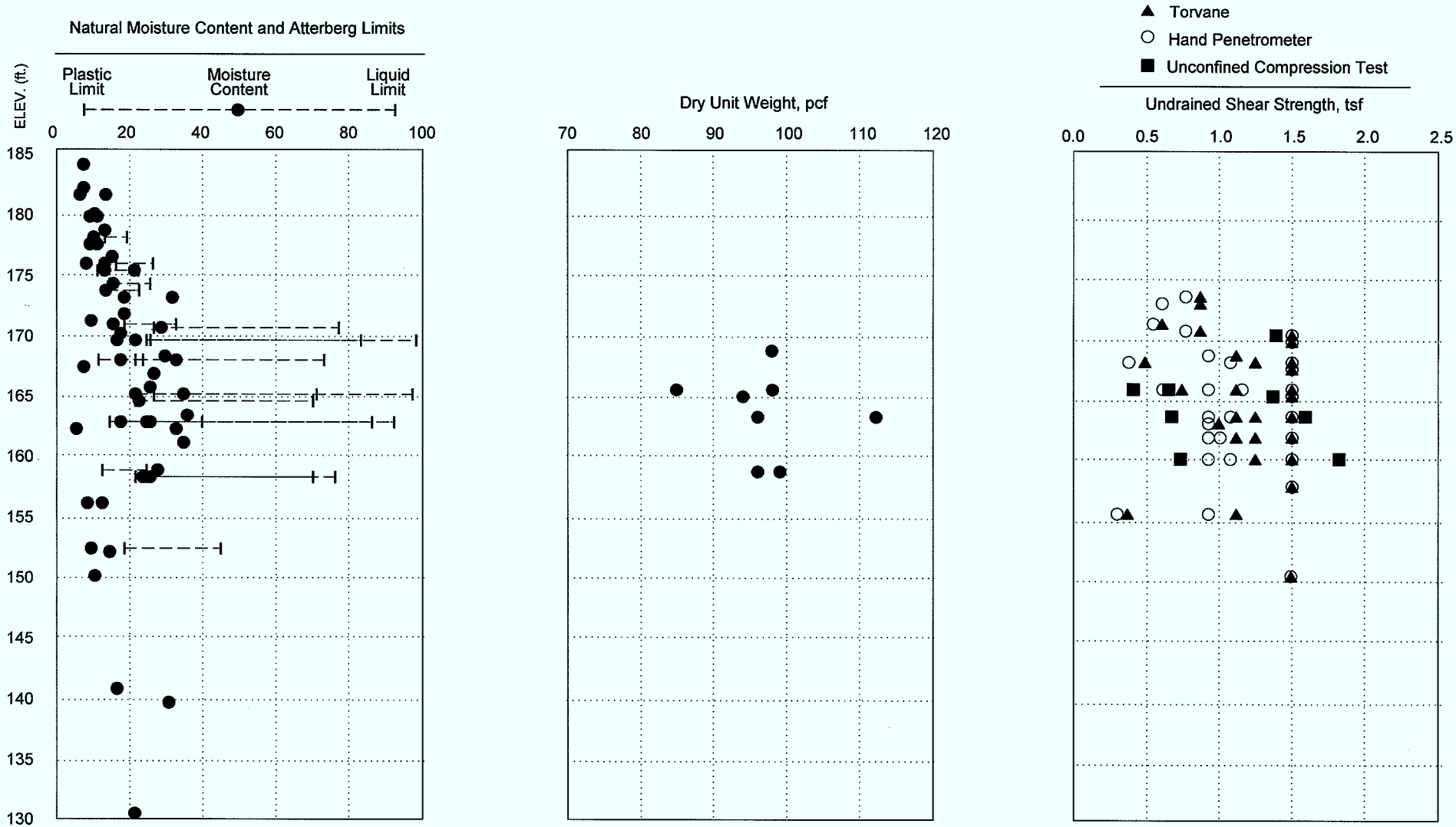
Houston, Texas

SUMMARY OF TEST RESULTS

PROJECT: Forensic Engineering Study: Slope Distress at North Star Drainage Ditch
North Star Estates Subdivision, Tomball, Texas

PROJECT NO.: 10-328E



Notes:
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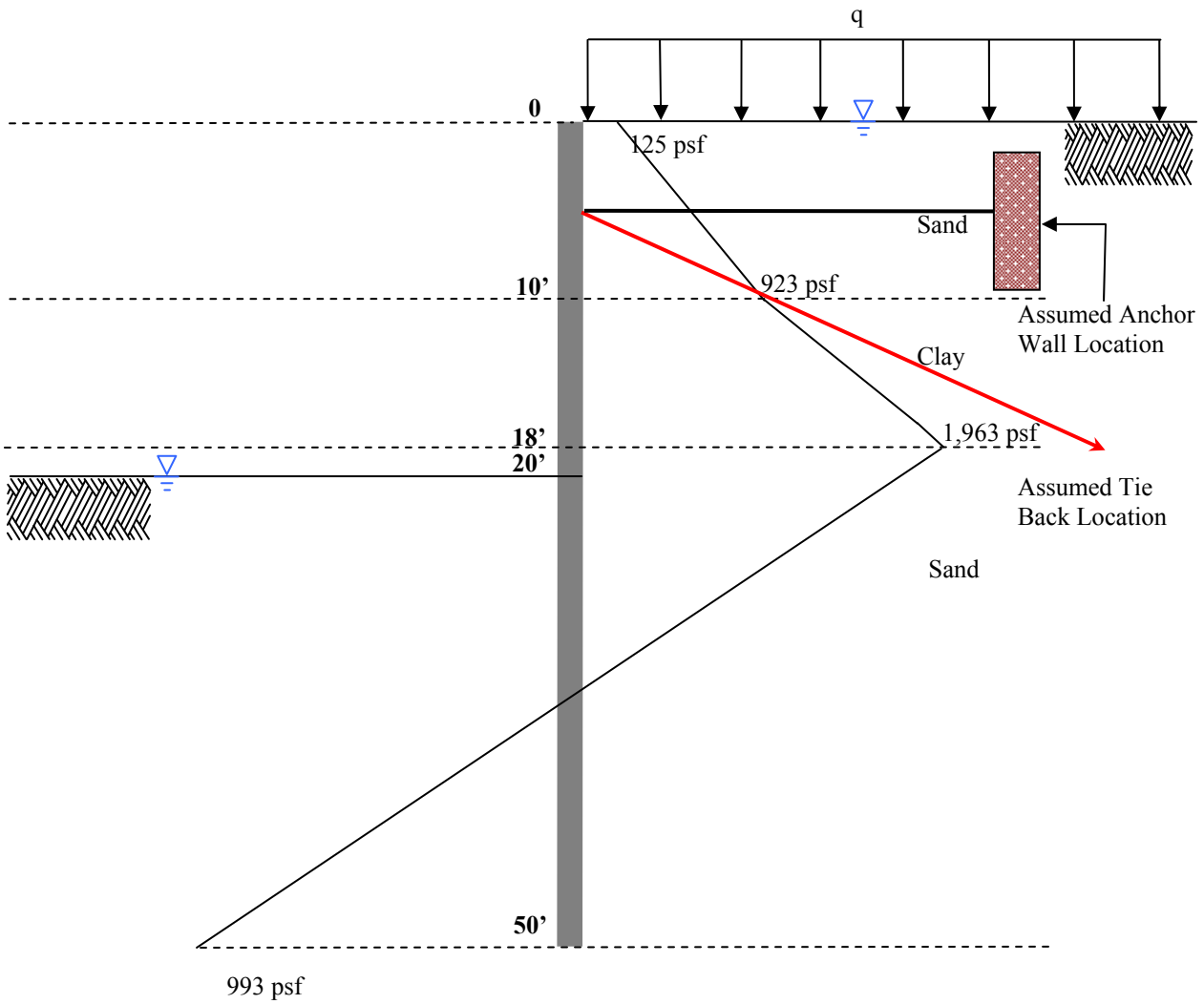
Plate 7

LATERAL NET EARTH PRESSURE DIAGRAM FOR THE SOLDIER PILE SYSTEM



LATERAL NET EARTH PRESSURE DIAGRAM FOR THE SOLDIER PILE SYSTEM

PROJECT: Forensic Engineering Study, Slope Distress at North Star Drainage Ditch
Tomball, Texas

SCALE: NOT TO SCALE	DATE: AUGUST 2010	REPORT NO.: 10-328E

Soil Design Parameters

Soil Type	Depth Range, ft.	γ_t, pcf	γ_s, pcf	c, psf	Lateral Earth Pressure Coefficients						
					ϕ	c′, psf	ϕ'	k_a	k_p	k_a'	k_p'
Fill: Silty Sand (SM)	0 – 4	115	120	0	32	0	32	0.30	2.16	0.30	2.16
Fill: Clayey Sand (SC)	0 – 6	115	120	0	32	0	32	0.30	2.16	0.30	2.16
Silty Sand (SM)	0 – 4	115	120	0	32	0	32	0.30	2.16	0.30	2.16
Fat Clay (CH)	2 – 10	120	125	700	0	350	12	1.00	1.00	0.70	1.48
Fat Clay (CH)	10 – 32	125	130	900	0	400	16	1.00	1.00	0.70	1.78
Clayey Sand (SC)	4 – 20	115	120	0	34	0	34	0.30	2.32	0.30	2.32
Lean Clay (CL)	8 – 18	130	135	560	0	210	19	1.00	1.00	0.70	1.90
Silty Sand (SM)	10 – 50	115	120	0	36	0	36	0.30	2.81	0.30	2.81

Where:

γ_t = Total Unit Weight, pcf
γ_s = Saturated Unit Weight, pcf
c, c′ = Undrained and Effective Stress Cohesions
ϕ, ϕ' = Undrained and Effective Stress Angle of Internal Friction, Degrees
k_a, k_a' = Undrained and Effective Stress Coefficient of Active Earth Pressure
k_p, k_p' = Undrained and Effective Stress Coefficient of Passive Earth Pressure

APPENDIX A

The Murillo Company Report

The Murillo Company
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GEOTECHNICAL INVESTIGATION

NORTH STAR ESTATES SECTION FIVE

HARRIS COUNTY, TEXAS

PREPARED BY

THE MURILLO COMPANY
GEOTECHNICAL CONSULTANTS
HOUSTON, TEXAS

REPORT NUMBER

GEO52520

REPORTED TO

NORWOOD HOMES
HOUSTON, TEXAS

NOVEMBER 2000

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GEOTECHNICAL INVESTIGATION

NORTH STAR ESTATES SECTION FIVE

HARRIS COUNTY, TEXAS

INTRODUCTION

The study reported herein is an investigation of the subsurface conditions at the site of North Star Estates Subdivision, Section Five. North Star Estates is located north of North Star Estates Section Four, at the extension of Spice Street in Harris County, Texas.

AUTHORIZATION

This study was authorized on October 19, 2000 for Norwood Homes by Robert Beishir Land Development Coordinator in response to our agreement for Geotechnical Engineering Services dated October 17, 2000.

PURPOSE

The purpose of this study was to determine the subsurface soil conditions in the subject residential development with particular reference to foundation design.

The study for residential foundation design was performed in accordance with the requirements for a subsurface evaluation as directed by Circular Letter No. 75-4 dated April 21, 1975 and No. 81-4 dated June 4, 1984 from the Department of Housing and Urban Development, Federal Housing Administration, Southeast Texas District, and the Home Buyers Warranty Program.

SUBSURFACE EXPLORATION

The subsurface exploration at the site was accomplished by means of seven (7) undisturbed sample core borings drilled to a depth of fifteen (15) feet below existing ground surface.

The seven (7) core borings drilled were considered to be adequate since the development is residential, the low relief of the surface and the uniformity of soils encountered. The approximate boring locations are shown on the attached Boring Plan.

SUBSURFACE INVESTIGATION

The subsurface investigation consisted of drilling two-inch nominal diameter core borings. Undisturbed samples of the

cohesive soils obtained from the borings by means of thin-wall, seamless steel Shelby Tube samplers in accordance with the ASTM Method D-1587.

The shear strength of cohesive soil samples was approximately estimated by hand penetrometer in the field. All undisturbed samples were extruded mechanically from the core barrels in the field, wrapped in aluminum foil, and sealed in air-tight plastic bags to prevent moisture loss and disturbance. The samples were placed in core boxes and transported to our laboratory for testing and further study.

LABORATORY INVESTIGATIONS

All samples from the borings were examined and classified in the laboratory by a soils engineer. Laboratory tests were performed on selected soil samples in order to evaluate the engineering properties of the foundation soils in accordance with the ASTM Standards.

The laboratory testing program was directed primarily towards valuation of the pertinent physical properties and shear strength characteristics of the foundation soils. Classification tests were performed on selected samples to aid soil classification.

SUBSURFACE CONDITIONS

Specific types and depths of subsurface strata encountered at the site are shown on the attached Boring Logs. Review of the Boring Logs indicates that the stratigraphy varies to some degree from boring to boring and may be described as follows:

Depth, Feet	Description of Strata
0 - 7	Reddish brown fine sand (SW) w/surface roots
7 - 15	Brown very sandy clay (SC)

The near surface soils, when classified by the Unified Soils Classification System were noted to be "SW-SC" type soils which normally do not exhibit expansive properties when subjected to seasonal moisture variations.

All borings were augered dry in order to determine ground water location. Ground water was not encountered in the borings during drilling operations, and the boreholes remained dry upon completion of exploration.

The topography throughout the site is of low relief since there is less than two (2) feet difference in elevation throughout the area investigated.

CONSTRUCTION VARIATIONS

The information contained in this report summarizes conditions as found on the date and at the locations where the borings were drilled. The depth to the static water table may be expected to vary with environmental variations such as frequency and magnitude of precipitation and the time of year that construction begins.

FAULT AND SUBSIDENCE REVIEW

A visual review of the area around The North Star Estates Development was made during this investigation. The geological data published for this area does not reveal the existence of a active geological fault encroaching on or crossing the subject area, and no visual evidence was seen on the ground of any such geological activity.

Review of the "Land and Water Resource" Houston-Galveston Area Council Map, dated 1975 indicates that the nearest active faults in the vicinity, The Addicks Fault System, is several miles southeast of the development. A detailed fault study was not within the scope of our services.

The rate of subsidence in this area of Harris County between 1965 and 1978 has been less than 1.0 foot. No benchmark relevelling information after 1978 is available.

DESIGN ANALYSIS AND RECOMMENDATIONS

FOUNDATION TYPES

Based on an analysis of the boring logs, laboratory tests results, and engineering studies, it is our opinion that structural loads imposed at the site may be supported by a prestress post-tension foundation.

Using the structural design procedure as recommended by the Post-Tensioning Institute in their design manual entitled "Design and Construction of Post-Tensioned Slabs-on-Ground", Second Edition dated 1996, the design should consist of four

(4) inch minimum slab thickness, exterior grade beams of twelve (12) inch minimum width, and based on the following parameters:

1. Effective Plasticity Index (P.I.) = 10%
2. Percent of Clay Mineral = 30%
3. Depth to Constant Moisture = 7 feet
4. Constant Suction, $_pf$ = 3.40
5. Velocity of Moisture Flow = 0.70 in/mo
6. Soil Modules of Elasticity, E_s = 1000 psi
7. Subgrade Friction Coefficient, u = 0.75

Utilizing the soils properties given above, the edge moisture variation, e_m equals 4.0 feet (for center lift) and 5.0 feet (for edge lift). The differential soil movement Y_m is then calculated as:

Y_m = 0.313 inches (edge lift)

Y_m = 0.381 inches (center lift)

It is recommended that an allowable bearing capacity of 1,200 pounds per square foot for dead load be used for design purposes.

Foundation Settlement

A detailed settlement analysis was not within the scope of this study. It is anticipated that the footings designed using the recommended allowable bearing capacity will experience small settlements that will be well within the tolerable limit for the proposed structure.

The grade beams supporting the structural loads should extend a minimum twelve (12) inches into the undisturbed or recompacted surface soils.

If additional select fill material is required prior to placement of the foundation to achieve positive drainage away from the structure, the fill should consist of a non-active sandy clay or clayey sand having a Plasticity Index (P.I.) which varies from 8 to 20.

Select fill should be placed under laboratory control in no greater than eight (8) inch loose layers and compacted to a minimum of 95% of Standard Proctor Density, as determined by the ASTM D-698 Procedure.

SURFACE DRAINAGE

The following drainage precautions should be observed during construction and maintained at all times after the structure has been completed:

(a) Backfill around the perimeter foundation walls should be moistened as needed, the compacted to minimize potential erosion in the area

(b) The ground surface around the perimeter foundation walls should be sloped to drain away from the structure in all directions. We recommend a minimum slope of eight (8) inches in the first ten (10) feet

(c) Roof downspouts and other water collection systems should discharge well beyond the limits of the backfill, or perimeter grade beams

(d) Perimeter grade beams should not be exposed more than six (6) inches above final grade in order to minimize moisture changes and erosion of soil strata at bottom of grade beams

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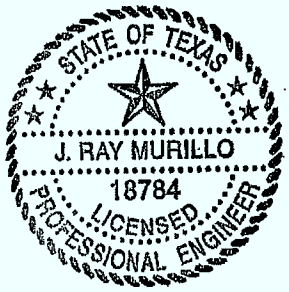
Respectfully Submitted,

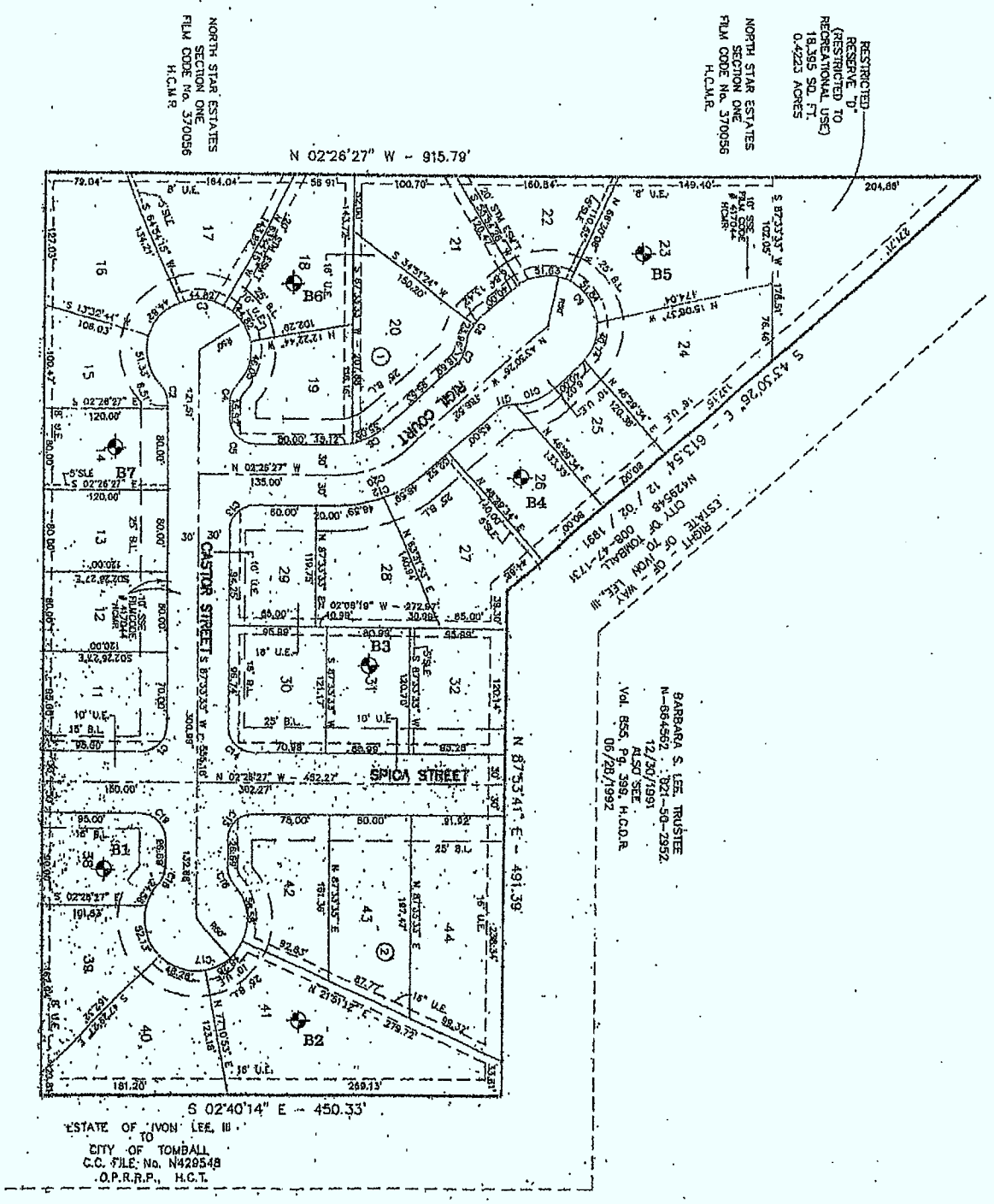


J. Ray Murillo, P.E.

November 7, 2000

Copies Submitted:

Norwood Homes (4)
File (1)



BORING PLAN
GEO 52520
NOVEMBER 2000

The Murillo Company

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Project **NORTH STAR ESATES SECTION 5**

Date **10-28-00**

Location **See Boring Plan** Boring **B-1**

No Water Encountered

Final Water Level N/A

Surface Material **2 In. Topsoil**

Type **Core Boring** Project # **GEO52520**

DEPTH (ft)	SYMBOL	CORES	DESCRIPTION	BLOWS per ft	MC (%)	UDW (pcf)	SHEAR STRENGTH, TSF (○ – Pocket Penetrometer; ● – Laboratory Unconfined; 0.5 1.0 1.5 2.0 2.5)	LIQUID LMT	PLASTIC LMT
0			Reddish Brown Sand w/surface roots	10					
5				16					
			Tan Very Sandy Clay						
10			Brown Very Sandy Clay		6	116	● ○ ○	26	13
15			Termination Depth						
20									
25									
30									
35									
40									
45									
50									

12

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Project **NORTH STAR ESATES SECTION 5**

Date **10-28-00**

Location **See Boring Plan** Boring **B-2**

No Water Encountered

Final Water Level N/A

Surface Material **2 In. Topsoil**

Type **Core Boring** Project # **GEO52520**

DEPTH (ft)	SYMBOL	CORES	DESCRIPTION	BLOWS per ft	MC (%)	UDW (pcf)	SHEAR STRENGTH, TSF (○ – Pocket Penetrometer; ● – Laboratory Unconfined; 0.5 1.0 1.5 2.0 2.5)	LIQUID LMT	PLASTIC LMT
0			Reddish Brown Sand w/surface roots	12					
5				16					
10				20					
15			Brown Very Sandy Clay		13	125	● ○	21	16
			Termination Depth						
20									
25									
30									
35									
40									
45									
50									

13

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Project **NORTH STAR ESATES SECTION 5**

Date **10-28-00**

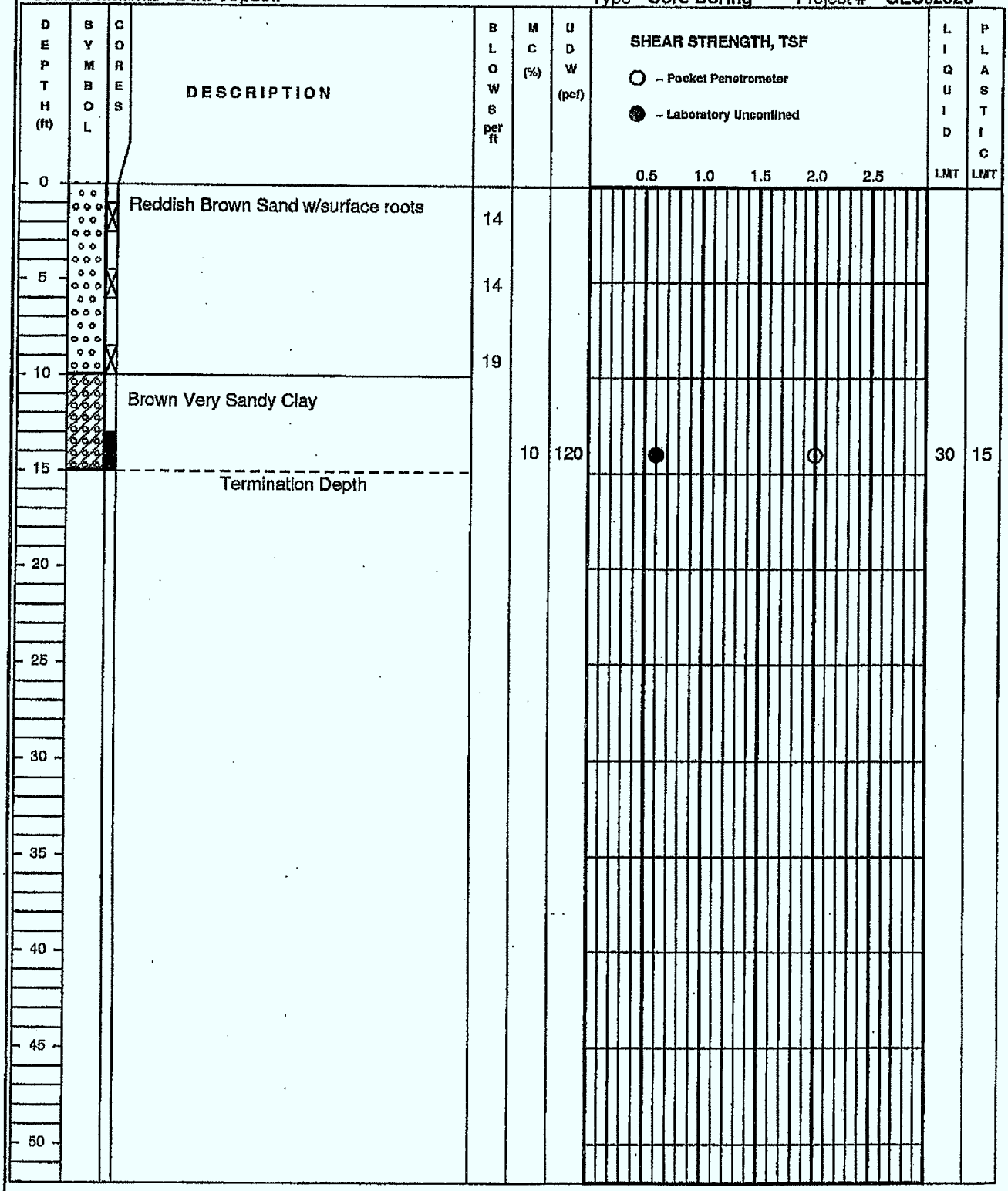
Location **See Boring Plan** Boring **B-3**

No Water Encountered

Final Water Level N/A

Surface Material **2 In. Topsoil**

Type **Core Boring** Project # **GEO52520**



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Project **NORTH STAR ESATES SECTION 5**

Date **10-28-00**

Location **See Boring Plan** Boring **B-4**

No Water Encountered

Final Water Level N/A

Surface Material **2 In. Topsoil**

Type **Core Boring** Project # **GEO52520**

DEPTH (ft)	SYMBOL	CORES	DESCRIPTION	BLOWS per ft	MC (%)	UDW (pcf)	SHEAR STRENGTH, TSF (○ – Pocket Penetrometer, ● – Laboratory Unconfined; 0.5 1.0 1.5 2.0 2.5)	LIQUID LMT	PLASTIC LMT
0			Reddish Brown Sand w/surface roots	16					
5				19					
10			Tan Very Sandy Clay Brown Very Sandy Clay		7	122		26	16
15			Termination Depth						
20									
25									
30									
35									
40									
45									
50									

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Project **NORTH STAR ESATES SECTION 5**

Date **10-28-00**

No Water Encountered

Surface Material **2 In. Topsoil**

Location **See Boring Plan** Boring **B-5**

Final Water Level N/A

Type **Core Boring** Project # **GEO52520**

DEPTH (ft)	SYMBOL	CORES	DESCRIPTION	BLOWS per ft	MC (%)	UDW (pcf)	SHEAR STRENGTH, TSF (○ – Pocket Penetrometer; ● – Laboratory Unconfined; 0.5 1.0 1.5 2.0 2.5)	LIQUID LMT	PLASTIC LMT
0			Reddish Brown Sand w/surface roots	16	8	122	● 1.0; ○ 1.5; ○ 2.0	16	16
5									
10			Tan Very Sandy Clay Brown Very Sandy Clay						
15			Termination Depth						
20									
25									
30									
35									
40									
45									
50									

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Project **NORTH STAR ESATES SECTION 5**

Date **10-28-00**

Location **See Boring Plan** Boring **B-6**

No Water Encountered

Final Water Level N/A

Surface Material **2 In. Topsoil**

Type **Core Boring** Project # **GEO52520**

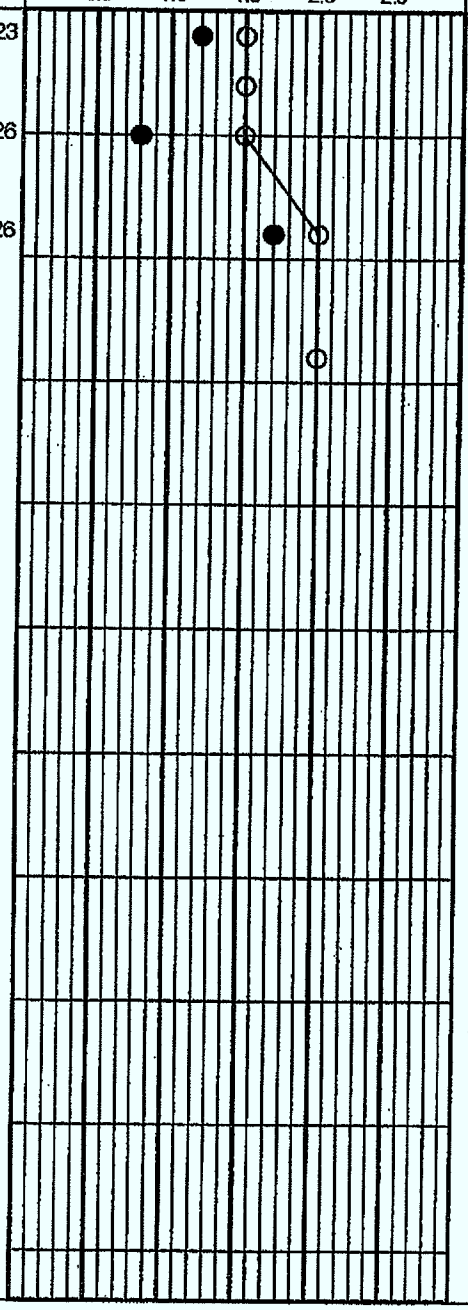
DEPTH (ft)	SYMBOL	CORES	DESCRIPTION	BLOWS per ft	MC (%)	UDW (pcf)	LIQUID LMT	PLASTIC LMT
0								
			Reddish Brown Sand w/surface roots		10	123	17	16
5					11	126		
			Tan Very Sandy Clay					
10			Brown Very Sandy Clay		11	126	23	16
15			Termination Depth					
20								
25								
30								
35								
40								
45								
50								

SHEAR STRENGTH, TSF

○ – Pocket Penetrometer

● – Laboratory Unconfined

0.5 1.0 1.5 2.0 2.5



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Project **NORTH STAR ESATES SECTION 5**

Date **10-28-00**

Location **See Boring Plan** Boring **B-7**

No Water Encountered

Final Water Level N/A

Surface Material **2 In. Topsoil**

Type **Core Boring** Project # **GEO52520**

DEPTH (ft)	SYMBOL	CORES	DESCRIPTION	BLOWS per ft	MC (%)	UDW (pcf)	SHEAR STRENGTH, TSF (○ – Pocket Penetrometer; ● – Laboratory Unconfined; 0.5 1.0 1.5 2.0 2.5)	LIQUID LMT	PLASTIC LMT
0			Reddish Brown Sand w/surface roots	10	5	118		12	12
5									
10			Brown Very Sandy Clay		16	117		33	16
15			Termination Depth						
20									
25									
30									
35									
40									
45									
50									

APPENDIX B

HTS, Inc. Report

REPORT
GEOTECHNICAL INVESTIGATION
PROPOSED EMBANKMENT
REPAIR/REHABILITATION
31422 RIGEL COURT
TOMBALL, TEXAS

PREPARED FOR:

Mr. Gary Smith
31422 Rigel Court
Tomball, Texas

PREPARED BY:

HTS, Inc. Consultants
416 Pickering Street
Houston, Texas 77091-3312

HTS Project No.: 10-S-172

April 13, 2010

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Excellence in Engineering, Consulting, Testing and Inspection

April 13, 2010

Mr. Gary Smith
31422 Rigel Court
Tomball, Texas

Re: Report
Geotechnical Investigation
Proposed Embankment Repair/Rehabilitation
31422 Rigel Court
Tomball, Texas

HTS Project No.: 10-S-172

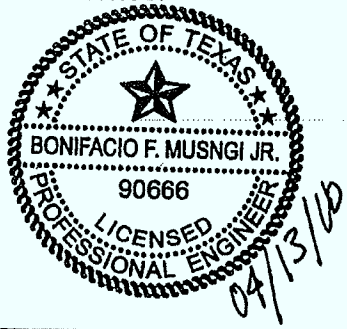
Dear Mr. Smith:

H TS, Inc. Consultants is pleased to transmit our report of the geotechnical investigation pertaining to the above referenced project. This report includes the results of field and laboratory testing and geotechnical recommendations pertaining to the proposed embankment repair/rehabilitation project.

We appreciate the opportunity to perform this geotechnical investigation and look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report or if we may be of further service, please contact me at your convenience.

Respectfully submitted,
HTS, Inc. Consultants

Bonifacio F. Musngi Jr., P.E.
Senior Project Engineer



HTS, Inc. Consultants
F-3478

BFM/cg

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REPORT
GEOTECHNICAL INVESTIGATION
PROPOSED EMBANKMENT REPAIR/REHABILITATION
31422 RIGEL COURT
TOMBALL, TEXAS

1.0 INTRODUCTION AND SUMMARY

1.1 Introduction

This report presents the results of a geotechnical investigation pertaining to the design and construction of the proposed retaining structures that may be used to repair/rehabilitate the embankment slopes at the rear end of the residence at 31422 Rigel Court in Tomball, Texas. The location of the proposed repair/rehabilitation project is shown on Figures 1 through 3.

The objectives of this geotechnical investigation were to:

- define the subsurface soils and groundwater conditions at the site of the proposed repair/rehabilitation project,
- determine the possible causes of the embankment slope failure near the back yard of the residence, and
- provide geotechnical design data and parameters for foundations that may be used for the repair/rehabilitation of the embankment slope.

This geotechnical investigation was performed by HTS, Inc. Consultants (HTS) for Mr. Gary Smith in accordance with an authorization provided to HTS through an electronic mail on or about March 26, 2010.

The scope of work for this project consisted of:

- drilling and sampling 2 geotechnical borings (Boring Nos. 1 and 2) to a depth of 20 feet beneath the surface within the area where the slope has failed as shown on Figures 2 and 3,
- performing field tests during drilling and recovering both disturbed and relatively undisturbed soil samples,
- measuring the depth to groundwater in the borings during drilling and within approximately 25 minutes after the completion of drilling,
- backfilling the boreholes with soil cuttings after the completion of the drilling activities,

- visually classifying samples obtained and conducting laboratory tests to determine the physical and mechanical properties of the soils,
- analyzing the field and laboratory test data,
- preparing boring logs based upon the results of laboratory tests and visual soil classifications,
- performing engineering analyses in order to: (1) determine the possible causes of the embankment slope failure and (2) determine and provide recommendations for the retaining structure that may be used for the slope repair/rehabilitation, and
- preparing and submitting 3 copies of a report presenting the results of the geotechnical investigation.

1.2 Summary of Findings

The pertinent findings of this geotechnical investigation pertaining to the repair/rehabilitation of the embankment slope are provided below.

1.2.1 Subsurface Soil Conditions

The subsurface subsoil conditions at the location of the 2 geotechnical borings (Boring Nos. 1 and 2) within the area where the slope has failed are described by the laboratory test results presented in Table 1 and the boring logs presented in Appendix A.

Data from the 2 geotechnical borings drilled at the site of the proposed repair/rehabilitation project suggest that the upper 20 feet of the overburden soils are composed of 2 separate soil layers. Descriptions of each layer are provided below:

Layer	Depth (ft)	Soil Description
I *	0 – 6	Fill materials consisting of dark gray and reddish brown CLAYEY SAND, firm to stiff, with roots near the surface (encountered in Boring No. 1 only).
II	0 - 20	Dark gray, light gray, tan, and dark brown SILTY SAND (SM) and CLAYEY SAND (SC).

* Boring No. 1 ground surface elevation is about 3 feet lower than the ground surface elevation in Boring No. 2.

Laboratory testing was performed on selected samples of the subsurface materials obtained to classify the soils in accordance with ASTM D 2487 and to define the engineering properties of the soils. Portions of the test results indicating the high and low values of specific testing are provided in the table below:

Layer	Depth (ft)	Liquid Limit (%)		Plasticity Index (%)		Moisture Content (%)		Passing No. 200 Sieve (%)	
		High	Low	High	Low	High	Low	High	Low
I	0 – 6	31	24	17	12	19.0	18.4	37.9	29.0
II	0 - 20	39	15	25	2	30.3	10.0	36.6	28.4

1.2.2 Groundwater Conditions

Groundwater depths were measured when encountered during drilling and approximately within 25 minutes after drilling operations were complete. The following table presents the results of the groundwater measurements.

BORING NO.	TOTAL DEPTH OF BORING (FT.)	DEPTH TO WATER DURING DRILLING (FT.)	DEPTH TO WATER WITHIN APPROX. 25 MINUTES AFTER THE COMPLETION OF DRILLING (FT.)	DEPTH TO OBSTRUCTION WITHIN APPROX. 25 MINUTES AFTER THE COMPLETION OF DRILLING (FT.)
1	20	Dry	Caved at 7.0'	
2	20	10 *	Caved at 8.0'	

* The groundwater level may have been affected by the sprinkler system line that was hit before moving to a different location.

1.2.3 Possible Causes of the Slope Failure

Based on my site visit on March 25, 2010, the following information was provided:

- The portion of the embankment that failed was an embankment fill in order to provide an additional area at the back area of the residential lot and enable the provision of a straight back fence (property line) throughout the residential lots along the existing creek. It was indicated by the homeowner that the filled portion used to be a cove that needed to be backfilled during the development stage of the

subdivision. During my site visit, it was observed that the top of the failed portion has moved about 3 feet lower than the original grade elevation (see Photographs in Figure 3).

- The water level in the existing creek goes up by about 3 to 5 feet above the normal flow elevation during a storm or a heavy rainfall event. During my site visit, the water level in the creek is about 13 to 15 feet below the top of bank.

- The existing bulkhead that was installed to prevent embankment failure was initially installed upright or vertical. During my site visit, the lower portion of the bulkhead had moved laterally at an inclination of about 1 horizontal to 3 vertical (1H:3V). The top of the bulkhead was provided with anchors that are tied to deadman objects. During my site visit, the slope failure pulled the anchors and deadman objects and some of the steel rod anchors have snapped off.

- A swale was installed alongside and near the back fence in order to divert runoff water away from the embankment slopes.

Based on the results of our field investigation and laboratory testing, it was determined that the fill material used for the backfilling operation consisted of soils classified as CLAYEY SAND (based on % passing No. 200 sieve test results ranging from 29.0 to 37.9 that are less than 50%). Clayey sand soils are highly erosive soils that are susceptible to erosion and washouts when exposed to water flow especially during storms and/or heavy rain events in which higher water flow velocities are created. It is possible that the water flow (with increased velocities and quantities from storms and/or heavy rain events) found its way, particularly through the existing swale, into the clayey sand fill soils and gradually created weak zones through cavities that may have resulted from the erosion of the clayey sand soils until the occurrence of the failure of the embankment slope. Additionally, the embankment clayey sand fill may have been improperly placed and compacted (unless engineering drawings and test documentations of the fill process could be provided to prove otherwise) which may have resulted in the occurrence of weakened zones near the toe of the embankment when saturated during times of storms and/or heavy rain events that eventually contributed to the failure. It should be noted that the natural soils (as shown in the soil profiles in Boring Nos. 1 and 2) also consisted of sandy soils but these soils are more stable than fill soils because of natural consolidation and densification with time. In general, in order to control erosion and dispersion of channel embankment fill soils, it is typically recommended that channel embankment fills consist of clay soils classified as CL (lean clay, lean clay with sand, and sandy lean clay) soils with % passing No. 200 sieve between 60 and 85, liquid

limits no higher than 49, plasticity indices between 15 and 30, and tested to be non-dispersive soils.

1.3 Summary of Recommendations

The recommendations, as summarized below, are provided for use in the design and construction of the proposed embankment repair/rehabilitation.

1.3.1 Recommended Retaining Structure

It is recommended that a reinforced concrete retaining wall be used for the repair/rehabilitation of the failed embankment. The retaining wall should be founded at a depth of at least 9 feet beneath the surface (measured from the top of the natural ground surface) and bearing on the in-situ clayey sand soils. The base of the retaining wall should be designed for maximum allowable bearing pressures of 3,000 psf for axial compression dead loads plus sustained loads and 4,500 psf for axial compression dead loads plus sustained and transient live loads. These values consider a safety factor of at least 3 and 2, respectively, against a bearing capacity failure.

The coefficient of friction at the base of the retaining wall, where the foundation soil consists of the clayey sand layer, should be about 0.4. The wall of the retaining structure should be designed for lateral earth pressures due to lean clays as backfill behind the retaining wall based on the following: active earth pressure coefficient (Ka) = 1.0, passive earth pressure coefficient (Kp) = 1.5, and wet unit weight (γ) = 130 pcf. For design purposes, the proposed retaining wall should be designed for factors of safety values of 1.5 and 2.0 against sliding and overturning failure, respectively.

The retaining wall may be installed within the inside of the fence line if restricted to work along the creek right of way or as desired by the homeowner. The presence of the existing bulkhead would provide additional factor of safety against a slope stability failure. However, design of the proposed retaining wall should be performed without the presence of the bulkhead for a situation where a failure of the embankment within the creek right of way occurs.

If the exposed subgrade soil within the footing area of the proposed retaining wall is relatively wet and unstable, it will be necessary that the subgrade soils be made stable by performing the following procedures.

- Over-excavate the exposed subgrade soil for a depth of at least 6 inches.
- Place crushed stone or crushed concrete foundation wrapped in filter fabric.

1.3.2 Recommended Foundation Preparation Requirements

The foundation soils should be prepared in accordance with the following recommended procedures.

- Excavate the overburden soils to the final foundation grade elevation.
- Compact the exposed subgrade soils to an in-place dry density equal to at least 95% of the maximum dry density at a moisture content within ± 2% of the optimum moisture content as determined by ASTM D 698. A tamping plate hand compactor or other suitable impact compactor should be used to perform the compaction. Without proper compaction of the retaining wall foundation soils, settlement of the retaining wall exceed 1 inch.

1.3.3 Recommended Earth Fill Material/Compaction Requirements

In order to prevent erosion and dispersion of the backfill soils, it is recommended that earth fill should consist of a soil classified by ASTM D 2487 as a CL soil (lean clay with sand or sandy lean clay) that possesses the following physical and engineering properties:

- maximum liquid limit (ASTM D 4318) of 49%,
- plasticity index (ASTM D 4318) not less than 15% and not more than 30%,
- percent soil particles passing the No. 200 sieve (ASTM D 1140) not less than 60% and not more than 85%, and
- fill material should be dispersive (ASTM D4647, Method A)

Fill materials should be placed in 8-inch loose lifts and compacted to an in-place dry density equal to at least 95% of the maximum dry density at a moisture content within ± 2% of the optimum moisture content as determined by ASTM D 698.

Additionally, it is recommended that the top 2 feet of the fill soils within the retaining wall area extend, as applicable, at least 5 feet into the natural soils (determined to consist of silty sand soil as shown in Boring No. 2). A drainage swale could then be constructed near and along the back fence and over the retaining wall area. Placement of the appropriate fill material would ensure that water infiltration into the backfill soils is minimal.

2.0 FIELD INVESTIGATION

The 2 borings (Boring Nos. 1 and 2) were drilled and sampled for this geotechnical investigation on March 30, 2010 at the locations shown in Figures 2 and 3. The boring locations, as shown in Figures 2 and 3, were selected and located in the field by HTS. Drilling, sampling, and testing were performed in accordance with applicable ASTM procedures. Due to limited access at the area of the rear end of the residential lot, drilling was performed using a portable drilling rig. M.G. Drilling Company performed the drilling under contract to HTS and under the supervision of an HTS geotechnical engineer.

Soil sampling during the drilling of the geotechnical borings consisted of continuous sampling to a depth of 12 feet and sampling on 5-foot intervals thereafter, with both relatively undisturbed samples and disturbed samples being obtained.

Relatively undisturbed samples were obtained by hydraulically forcing sections of 2-inch O.D. tubing (Shelby tube) into the subsoils. The tube samples were extruded in the field, sealed with foil, and placed into airtight plastic bags. Estimates of the unconfined compressive strengths of the cohesive soils were obtained with pocket penetrometer readings being taken on the tube samples.

Disturbed samples of soils were taken through the flight auger of the sampler. The samples recovered were removed from the sampler, visually classified, and placed into airtight plastic bags.

All samples were transported to HTS' laboratory for purposes of performing laboratory tests on selected samples.

3.0 LABORATORY TESTING

A laboratory testing program was conducted to obtain engineering properties for use in performing engineering analyses and to adjust field soil classifications. The following laboratory tests, as applicable, were performed:

LABORATORY TEST	TEST STANDARD
Moisture Content of Soils	ASTM D 2216
Moisture Content and In Situ Dry Density of Soils	ASTM D 2937
Percent Soil Particles Passing a No. 200 Sieve	ASTM D 1140
Liquid Limit, Plastic Limit, and Plasticity Index of Soils	ASTM D 4318

The number of tests and the test results are presented in the attached Table 1. All tests were performed in accordance with applicable ASTM procedures and methods and soil classifications were completed in accordance with the procedures and guidelines of ASTM D 2487 and ASTM D 2488.

4.0 SUBSURFACE CONDITIONS

4.1 Subsoils

The subsurface soil conditions as determined from the drilling of the geotechnical borings are provided in Section 1.2.1 of this report and the boring logs presented in Appendix A.

The boring logs were prepared by using both field visual classifications and the results of laboratory testing. The stratification lines shown on the boring logs and in the soil profiles represent the approximate boundaries between soil types and the transitions between soil types may be gradual.

4.2 Groundwater

Groundwater conditions are described in Section 1.2.2 of this report and on the boring logs provided in Appendix A. The depth to groundwater was obtained by observing the drilling operations and the free moisture contained in the samples recovered during drilling and obtaining water level measurements in the borings during drilling and within approximately 25 minutes after the completion of drilling.

It is possible that seasonal variations will cause fluctuations in the water levels measured at the time of our field investigation. We recommend that the contractor determine the groundwater level at the site at the time of construction in order to determine the impact, if any, of the groundwater to the construction activities. It should be noted that recommendations contained in this report are based on groundwater depths at the time of this geotechnical investigation and that an accurate determination of the true groundwater levels may require several days or even months of observations.

5.0 CLOSING REMARKS

HTS, Inc. Consultants has performed a geotechnical investigation and provided data, analyses, and recommendations pertaining to the failure and repair/rehabilitation of the embankment slope for a residence located at 31422 Rigel Court in Tomball, Texas. This report has been prepared for the exclusive use of Mr. Gary Smith in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

The data, analyses, and recommendations presented in this report are based upon data obtained from 2 geotechnical borings that were drilled on March 30, 2010. The nature and extent of variations within the subsurface materials may not become evident until after

repair/rehabilitation work is initiated. If significant variations in the subsurface materials are encountered during construction, it may be necessary to re-evaluate the recommendations provided in this report.

We appreciate the opportunity to be of service to Mr. Gary Smith. If we can answer any questions concerning the contents of this report, or be of further service, please do not hesitate to contact us at your convenience.

TABLES

TABLE 1

LABORATORY TEST SUMMARY

PROJECT: Proposed Embankment Repair/Rehabilitation
31422 Rigel Court
LOCATION: Tomball, Texas

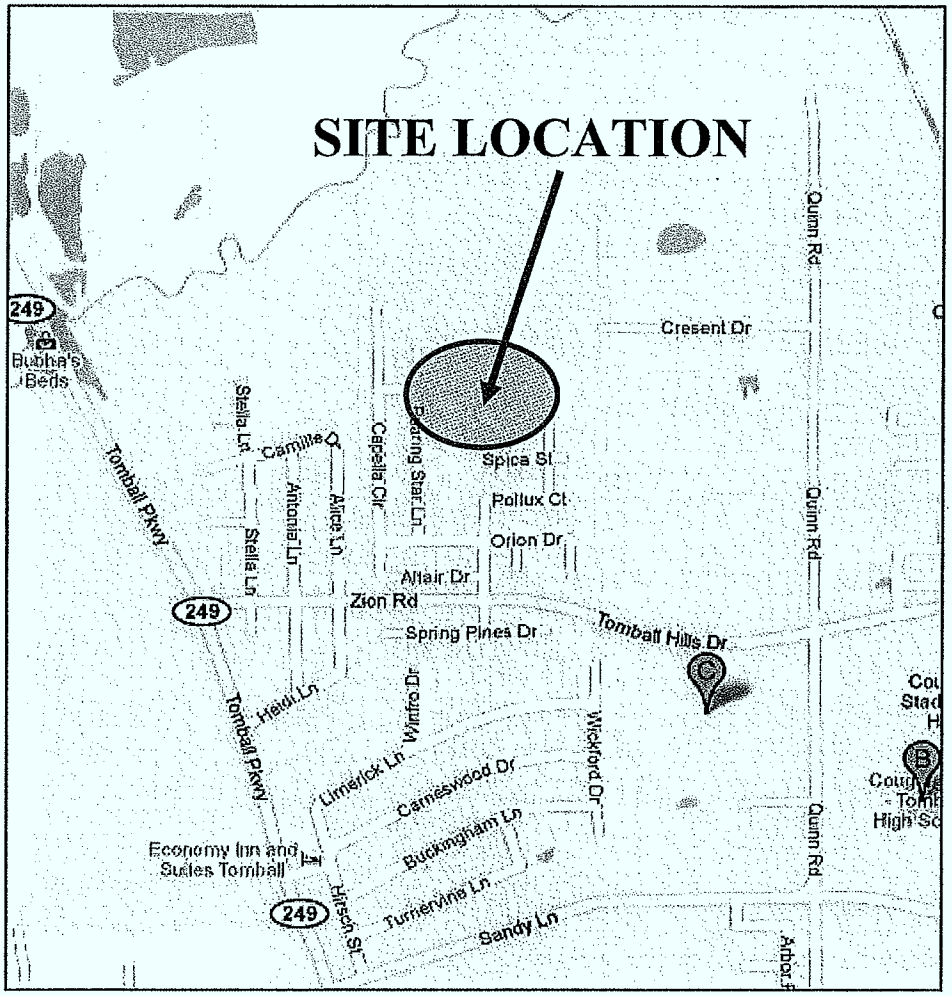
HTS PROJECT NO.: 10-S-172

CLIENT: Mr. Gary Smith

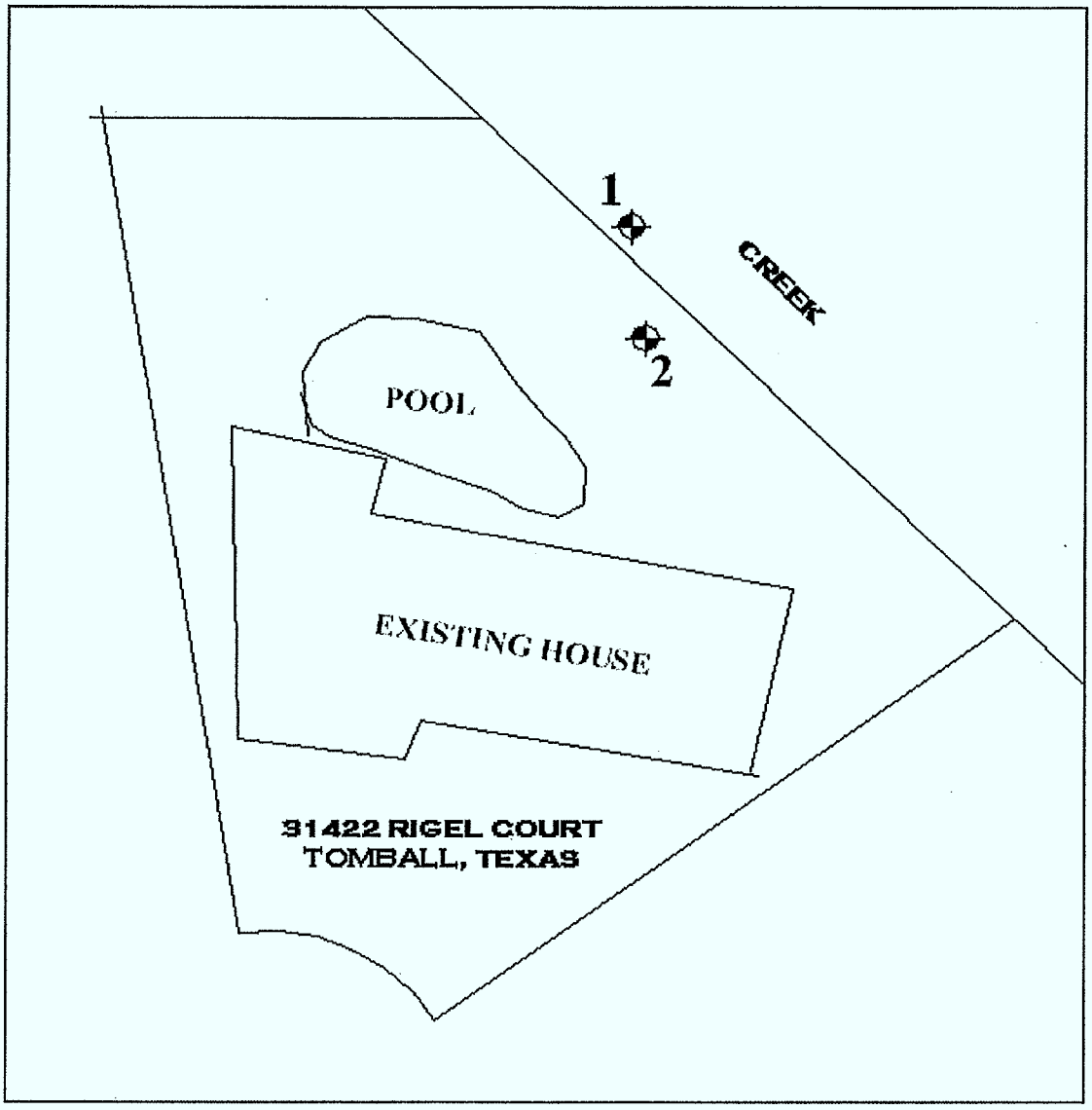
Boring No.	Sample Depth (feet)	Type of Material	Moisture Content (%)	Atterberg Limits (%)			-200 Sieve (%)	Remarks
				LL	PL	PI		
1	0-2	Clayey Sand (FILL)	19.0	31	14	17	37.9	
	4-6	Clayey Sand (FILL)	18.4	24	12	12	29.0	
	8-10	Clayey Sand (SC)	27.7	39	14	25	35.4	
	13-15	Clayey Sand (SC)	30.3	36	17	19	36.6	
2	2-4	Silty Sand (SM)	10.0	15	13	2	33.8	
	4-6	Clayey Sand (SC)	15.1				33.8	
	8-10	Clayey Sand (SC)	26.3	21	12	9	32.2	
	13-15	Clayey Sand (SC)	27.9	28	14	14	28.4	

HTS, INC. Consultants

FIGURES



HTS, Inc. Consultants		
Proposed Embankment Repair/Rehabilitation 31422 Rigel Court Tomball, Texas		
SITE LOCATION		
Date: 04/08/10	HTS Project No. 10-S-172	Figure 1



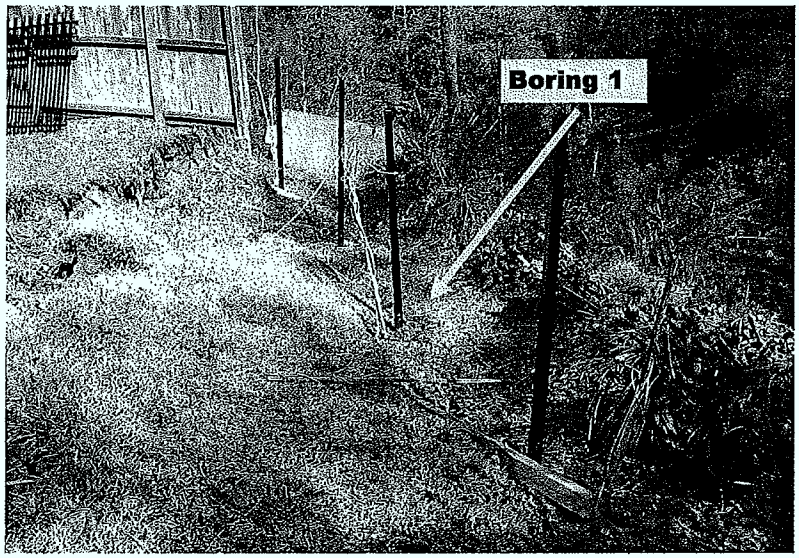
HTS, INC. Consultants

HTS, Inc. Consultants

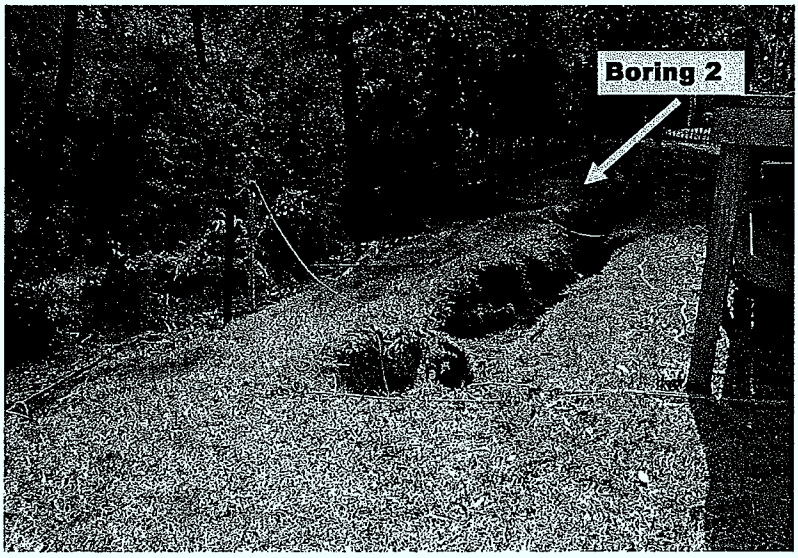
Proposed Embankment Repair/Rehabilitation
31422 Rigel Court
Tomball, Texas

LOCATIONS OF BORINGS

Date: 04/08/10 | HTS Project No. 10-S-172 | **Figure 2**



Photograph No. 1 : Failed embankment (looking Northwest) and approximate location of Boring No. 1.



Photograph No. 2 : Failed embankment (looking Southeast) and approximate location of Boring No. 2.

HTS, INC. Consultants

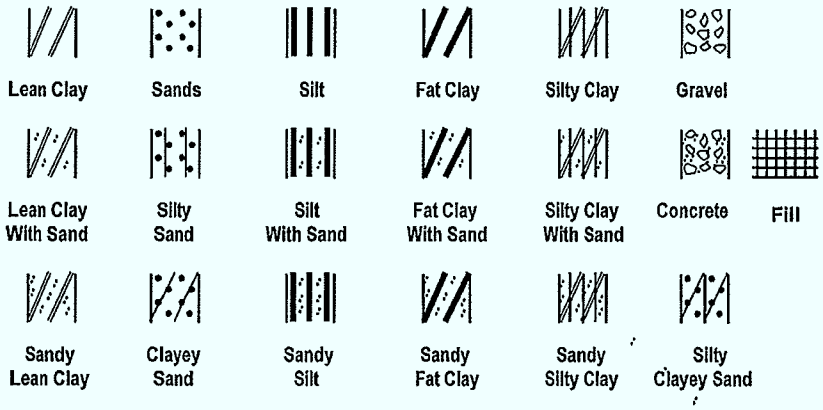
HTS, Inc. Consultants		
Proposed Embankment Repair/Rehabilitation 31422 Rigel Court Tomball, Texas		
Photographic Documentation		
Date: 04/08/10	HTS Project No. 10-S-172	Figure 3

APPENDIX A
BORING LOGS

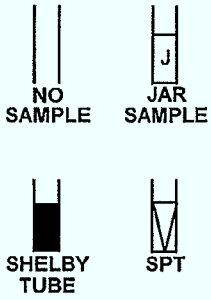
(Boring Nos. 1 and 2)

TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE



SAMPLER TYPE



SPT DENSITY

Very Loose	< 4 bpf
Loose	5-10 bpf
Med. Dense	11-30 bpf
Dense	31-50 bpf
Very Dense	> 50 bpf

bpf = blows/foot

GROUND WATER DATA

▼ WATER LEVEL AFTER 48 HOURS

▽ WATER LEVEL DURING DRILLING

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487

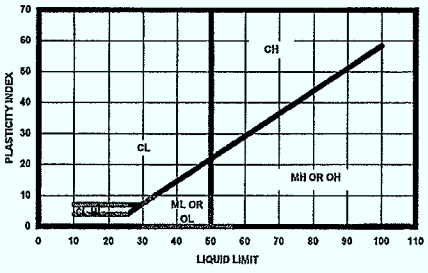
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES)	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		W/ APPRECIABLE FINES	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN 50% PASSING NO. 4 SIEVE	CLEAN SANDS LITTLE FINES	SW	WELL GRADED SAND, GRAVELY SAND (LITTLE FINES)
			SP	POORLY GRADED SANDS, GRAVELY SAND (L.FINES)
		SANDS WITH APPRECIABLE FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS,SAND-CLAY MIXTURES
FINE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS & VERY FINE SANDS,ROCK FLOUR SILTY OR CLAYEY FINE SANDS OR CLAYEY SILT W/ LOW PI
			CL	INORGANIC CLAY OF LOW TO MEDIUM PI LEAN CLAY GRAVELY CLAYS, SANDY CLAYS, SILTY CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PI
	SILTS AND CLAYS LIQUID LIMIT 50 OR GREATER		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY FAT CLAYS
			OH	ORGANIC CLAYS OF MED TO HIGH PI, ORGANIC SILT
HIGHLY ORGANIC SOIL			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
UNCLASSIFIED FILL MATERIALS			ARTIFICIALLY DEPOSITED AND OTHER UNCLASSIFIED SOILS AND MANMADE SOIL MIXTURES	

DEGREE OF PLASTICITY OF COHESIVE SOILS

Degree		Plasticity Index
None	------	0 - 4
Slight	------	5 - 10
Medium	------	11 - 20
High	------	21 - 40
Very High	------	> 40

UNDRAINED SHEAR STRENGTH OF COHESIVE SOILS

Very Soft	------	< 0.25	ksf
Soft	------	0.25 - 0.50	ksf
Firm	------	0.50 - 1.00	ksf
Stiff	------	1.00 - 2.00	ksf
Very Stiff	------	2.00 - 4.00	ksf
Hard	------	< 4.00	ksf



CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

6"	3"	3/4"	No.4	No.10	No.40	No.200

BOUL--DERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		

152	76.2	19.1	4.76	2.0	0.42	0.074	0.005	0.001

GRAIN SIZE IN MM

LOG OF BORING

PROJECT: **Proposed Embankment Repair/Rehabilitation**
31422 Rigel Court

PROJECT LOCATION: **Tomball, Texas**

CLIENT: **Mr. Gary Smith**

BORING NO.: **1**
BORING LOCATION: **See Figure 2**
BORING TYPE: **Auger**

HTS PROJECT NO.: **10-S-172**
DATE: **March 30, 2010**

DEPTH, FT.	SAMPLE	SOIL TYPE	DESCRIPTION OF STRATUM	HAND PEN. RDG. (TSF)	SPT BLOWS (PER 6")	MOISTURE CONTENT, %	ATTERBERG LIMITS (%) LL	PL	PI	PASS #200 SIEVE, %	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (TSF)
			CLAYEY SAND (FILL), reddish brown with roots near the surface	1.00		19.0	31	14	17	37.9		
			- firm to stiff to 4'	0.75								
5	J		- dark gray and reddish brown below 4'			18.4	24	12	11	29.0		
	J		**CLAYEY SAND (SC),** reddish brown									
	J					27.7	39	14	25	35.4		
10	J											
	J					30.3	36	17	19	36.6		
15												
	J		20'									
20			(Boring terminated at 20')									
			Note: Ground surface elevation is about 3' lower than the elevation in Boring No. 2.									
25												

DRILLING CONTRACTOR: **MG Drilling Company** LOGGER: **Manuel Guzman**

Groundwater was not encountered during the drilling of the boring. Approx. 25 minutes after drilling completion, the boring caved in at a depth of 7'. The boring was backfilled with soil cuttings after the completion of the drilling activities.

HTS, INC. Consultants

LOG OF BORING

PROJECT: **Proposed Embankment Repair/Rehabilitation**
31422 Rigel Court

PROJECT LOCATION: **Tomball, Texas**

CLIENT: **Mr. Gary Smith**

BORING NO.: **2**
BORING LOCATION: **See Figure 2**
BORING TYPE: **Auger**

HTS PROJECT NO.: **10-S-172**
DATE: **March 30, 2010**

DEPTH, FT.	SAMPLE	SOIL TYPE	DESCRIPTION OF STRATUM	HAND PEN. RDG. (TSF)	SPT BLOWS (PER 6")	MOISTURE CONTENT, %	ATTERBERG LIMITS (%) LL	PL	PI	PASS #200 SIEVE, %	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (TSF)
	J		**SILTY SAND (SM),** loose, dark brown, with roots near the surface	0.50		10.0	15	13	2	33.8		
5	J		**CLAYEY SAND (SC),** dark brown			15.1				33.8		
	J		- dark gray from 6' to 13'									
	J					26.3	21	12	9	32.2		
10	J											
	J		- light gray and tan below 13'			27.9	28	14	14	28.4		
15												
	J		20'									
20			(Boring terminated at 20')									
25												

DRILLING CONTRACTOR: **MG Drilling Company**

LOGGER: **Manuel Guzman**

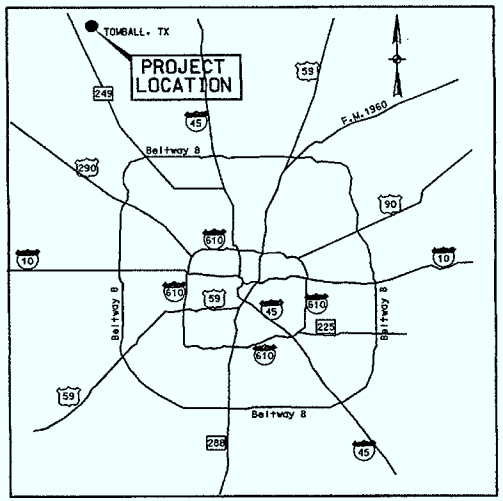
Groundwater was encountered at a depth of 10' during the drilling of the boring. Approx. 25 minutes after drilling completion, the boring caved in at a depth of 8'. The boring was backfilled with soil cuttings after the completion of the drilling activities.

HTS, INC. Consultants

APPENDIX C

De Anda Engineering, Inc. Drawings

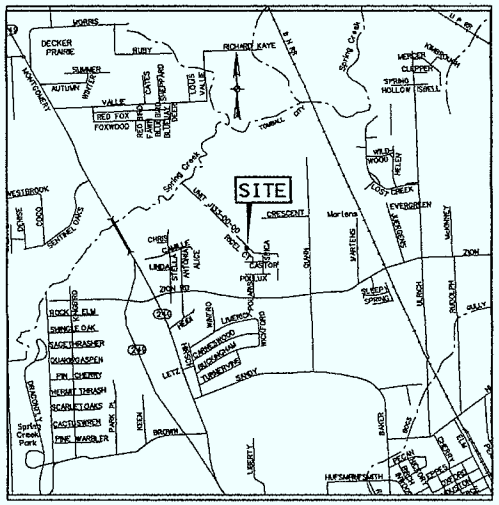
31422 RIGEL COURT
TOMBALL, HARRIS COUNTY, TEXAS 77375



LOCATION MAP
NTS

LIST OF DRAWINGS

No.	DESCRIPTION
1	COVER SHEET
2	SITE, DEMOLITION AND EXCAVATION PLAN
3	CONCRETE RETAINING WALL CONSTRUCTION PLAN



VICINITY MAP
NTS
(KEY MAP 248/X)

CONSTRUCTION PLANS FOR CONCRETE RETAINING WALL AT DRAINAGE UNIT J133-00-00

MAY 18, 2010

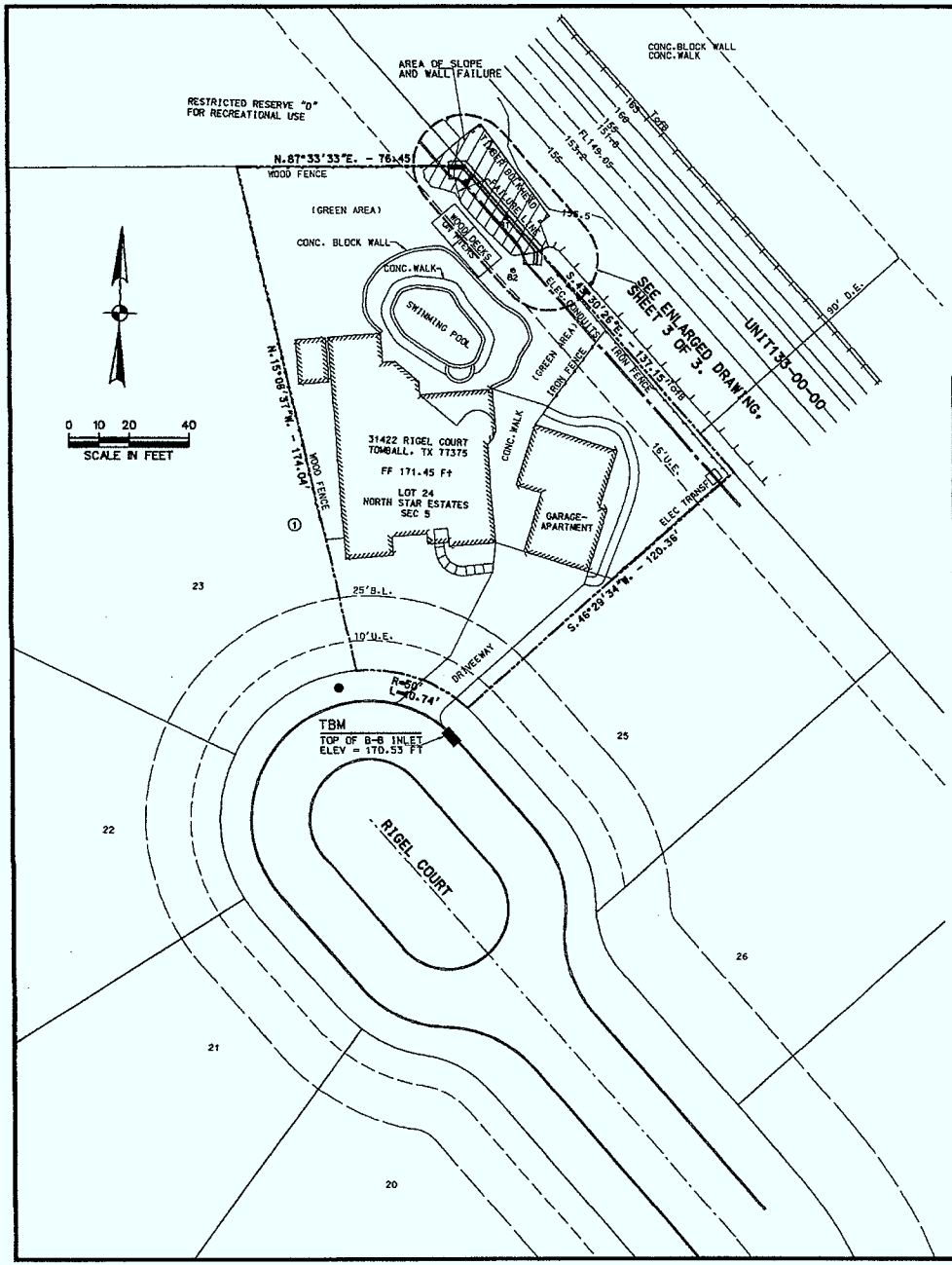
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY ARNOLD DE ANDA, P.E. 36752 ON MAY 18, 2010.

RETAINING WALL RESTORATION ON DRAINAGE UNIT J133-00-00

GARY & JUDY SMITH RESIDENCE

DE ANDA ENGINEERING, INC.
Consulting Civil / Municipal Engineers
1710 Telephone Rd. Houston, Texas 77023
(713) 246-4305 FAX: (713) 926-6366
E-Mail: deandadatt.net

SCALE: N.T.S.
DATE:
DESIGNED BY: AdeA
DRAWN BY: SB
SHEET No. 1 OF 3
DWG. No. C-1



OFFICIAL BENCH MARK

FLOODPLAIN REFERENCE MARK No. 10016S, BEING A H.C.F.C.D BRASS DISK STAMPED J100 BM03 ON CONCRETE BRIDGE ON HWY 249 AT SPRING CREEK, LOCATED ON DOWNSTREAM CONCRETE TRAFFIC BARRIER, ON EAST SIDE OF NORTH BOUND TRAFFIC.

ELEV = 167.51 FT, NAVD 1988, 2001 ADJUSTMENT.

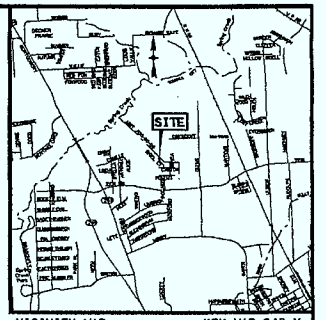
TEMPORARY BENCHMARK (TBM)

TOP OF B-8 DRAINAGE INLET ON NE SIDE OF RIGEL COURT.

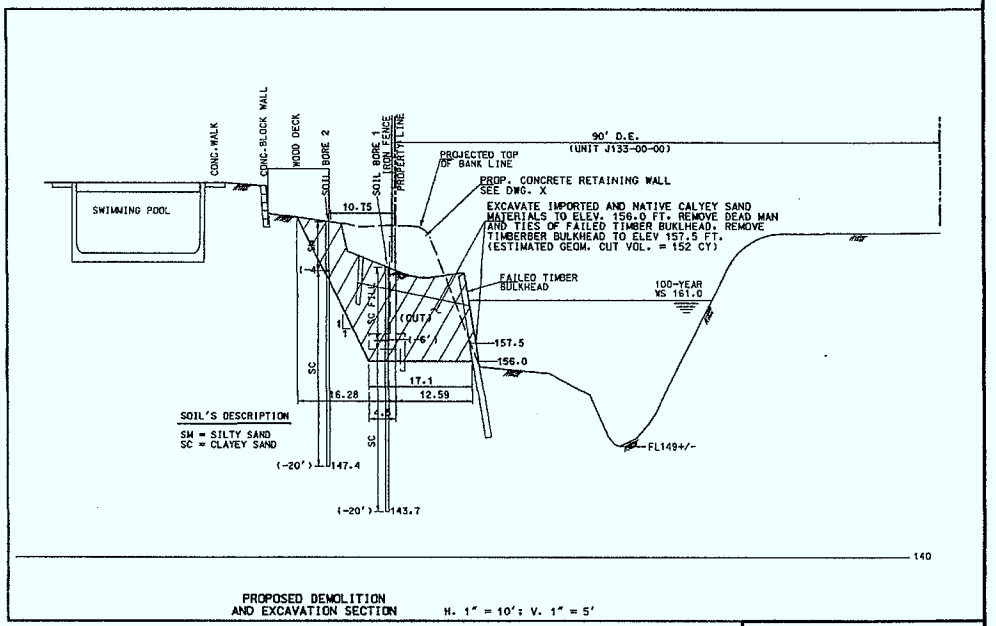
ELEV = 170.53 FT

100-YEAR FLOOD PLAIN STATEMENT

THE PROJECT IS IN UNSHADED ZONE X OF FIRM PANEL No. 48201C210L, REV. JUNE 18, 2007, WHICH ARE AREAS TO BE DETERMINED TO BE OUTSIDE 100 AND 500-YEAR FLOODPLAINS.



VICINITY MAP KEY MAP 248-X



PROPOSED DEMOLITION AND EXCAVATION SECTION H. 1" = 10'; V. 1" = 5'

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY ARNOLD DE ANDA, P.E. 38752 ON MAY 18, 2010.

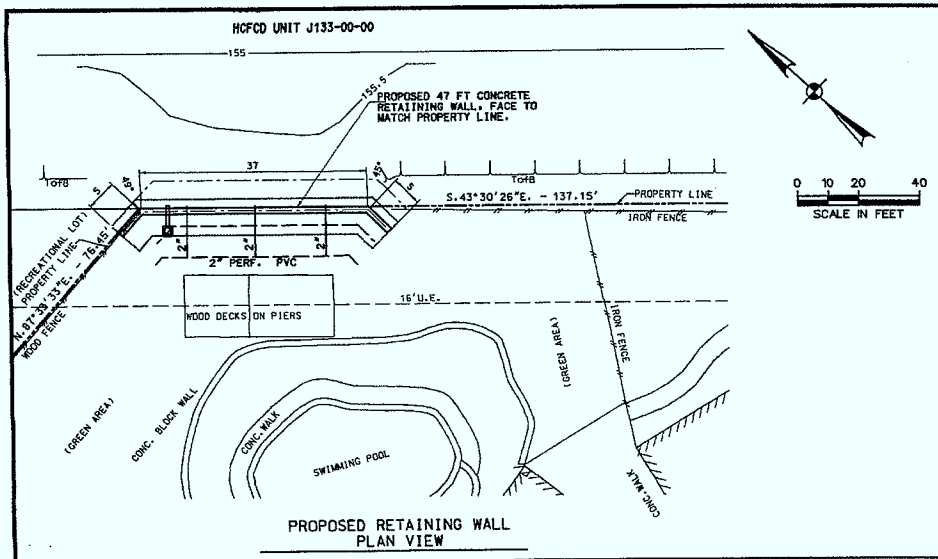
GARY & JUDY SMITH RESIDENCE
31422 RIGEL COURT
TOMBAL, HARRIS COUNTY, TX 77375

RETAINING WALL RESTORATION ON DRAINAGE UNIT J133-00-00

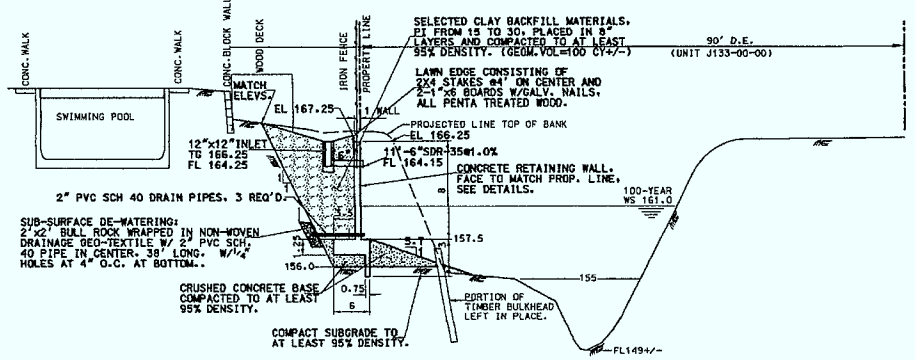
SITE, DEMOLITION AND EXCAVATION PLAN

DE ANDA ENGINEERING, INC.
Consulting Civil / Municipal Engineers
1710 Telephone Rd. Houston, Texas 77023
(713) 248-4305 FAX: (713) 926-6366
E-Mail: deanda@att.net

SCALE: 1" = 20'
DATE: 5/18/2010
DESIGNED BY: ADdA
DRAWN BY: SB
SHEET No. 2 OF 3
DWG. No. C-2



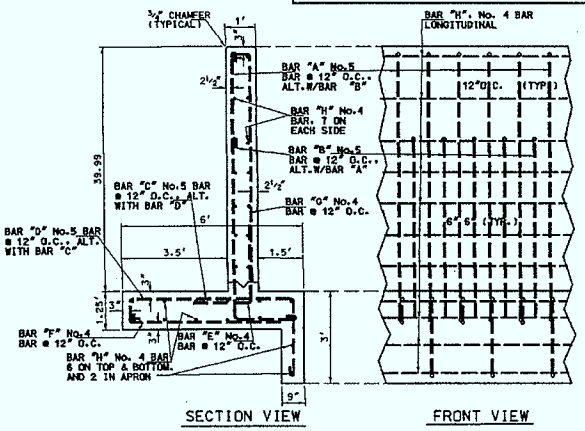
PROPOSED RETAINING WALL
PLAN VIEW



SECTION OF PROPOSED RETAINING WALL WORK

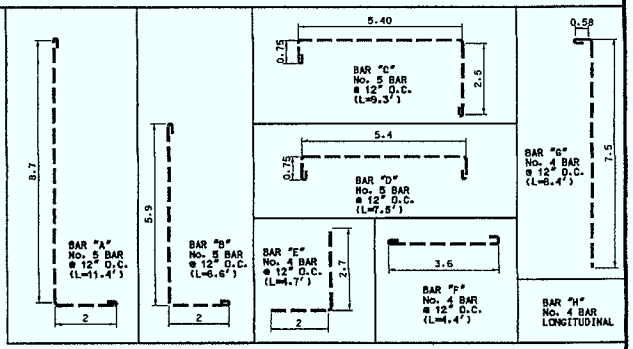
CONSTRUCTION SPECIFICATIONS

1. CONTRACTOR TO ACCESS CONSTRUCTION AREA VIA THE RECREATIONAL PROPERTY TOWARD THE NORTHEAST OF AREA OF WORK.
2. CONTRACTOR TO DEMOLISH, REMOVE AND DISPOSE OF FAILED TIMBER BULLKHEAD TO ELEVATION SHOWN IN SECTIONS.
3. CONTRACTOR TO EXCAVATE SILTY SAND AND CLAYEY SAND MATERIALS BEHIND THE FAILED BULKHEAD AND DISPOSE OF IN A LEGAL AND PROPER MANNER.
4. IF THE NATIVE SUBGRADE MATERIALS AT ELEV. 156.0 FT. ARE NOT ADEQUATE FOR RETAINING WALL FOUNDATION NOR TO ACHIEVE 95% DENSITY COMPACTION. CONTRACTOR SHALL NOTIFY ENGINEER PRIOR TO PROCEDING FURTHER WITH WORK.
5. CEMENT STABILIZED SAND SHALL BE 1-5 SACK PORTLAND CEMENT, MIN., IF NEEDED.
6. CONTRACTOR SHALL COMPACT SUBGRADE TO AT LEAST 95% DENSITY, ASTM D-698., AT 2%+/- MOISTURE CONTENT.
7. CONTRACTOR SHALL CONSTRUCT RETAINING WALL AS PER DIMENSIONS AND LOCATION SHOWN IN PLANS. CONTRACTOR MAY CONSTRUCT THE RETAINING IN TWO PHASES WITH A LOCK JOINT AT THE BASE.
8. ALL CONCRETE SHALL BE PROPERLY VIBRATED TO FILL ALL VOID AND MINIMIZE AIR-HONEY COMBS.
9. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS OF AGE. CONTRACTOR MUST SUBMIT CONCRETE MIX DESIGN PRIOR TO ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PERFORMING CONCRETE WORK.
10. REINFORCING STEEL SHALL BE NO. 4 DEFORMED BARS , ASTM A-615, AND SHALL BE PLACED AS SHOWN ON PLANS.
11. BAR REINFORCEMENT SHALL BE SUPPORTED ON PLASTIC CHAIRS.
12. REINFORCEMENT SPLICING SHALL OVERLAP AT LEAST 18".
13. EXPOSED CORNERS SHALL BE CHAMFERED 3/4" MINIMUM.
14. CONSTRCTOR TO INSTALL SUB-SURFACE DRAINAGE SYSTEM CONSISTING OF 2" PVC SCH. 40 PIPE PERFORATED WITH 1/4" HOLES AT 4" ON CENTER AT THE BOTTOM, AND 2" PVC SCH. 40 DISCHARGE LINES AS SHOWN IN PLANS. PERFORATED PIPE SHALL BE WRAPPED IN 2'X2' CONCRETE BULL ROCK WITH NON-WOVEN DRAINAGE GEO-TEXTILE.
15. BACKFILL MATERIALS TO BE PLACED BEHIND THE NEWLY CONSTRUCTED WALL SHALL BE SELECTED CLAY (CL) SOILS WITH A PI RANGING FROM 15 TO 30. BACKFILL MATERIALS SHALL BE PLACED IN 8" LAYERS AND COMPACTED TO AT LEAST 95% DENSITY, ASTM D-698 SPECS.
16. CONSTRUCT 4.5" THICK CONCRETE FENCE EDGE TO EDGE OF WALL WITH 3000 PSI CONCRETE AND REINFORCED WITH WWF6X6-W2.9XW2.9 STEEL WIREMESH OR NO. 3 BARS AT 12" ON CENTERS EACH WAY.
17. INSTALL EXPANSION BETWEEN FENCE EDGE AND WALL. SEAL JOINT WITH TWO PART POLYURETHANE SELF-LEVELING ELASTOMERIC SEALANT, TYPE M, GRADE P, CLASS 25, FED. SPEC. TT-S00227E. ON BOND BREAKER TAPE.



SECTION VIEW FRONT VIEW

PROPOSED RETAINING WALL



STEEL REINFORCEMENT SCHEDULE

NOTE: DIMENSION ARE APPROXIMATE.

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY ARNOLD DE ANDA, P.E. 38752 ON MAY 18, 2010.

GARY & JUDY SMITH RESIDENCE
31422 RIGEL COURT
TOMBAL, HARRIS COUNTY, TX 77375

RETAINING WALL RESTORATION ON DRAINAGE UNIT J133-00-00

CONCRETE RETAINING WALL CONSTRUCTION PLAN

DE ANDA ENGINEERING, INC.
Consulting Civil / Municipal Engineers
1710 Telephone Rd. Houston, Texas 77023
(713) 248-4305 FAX: (713) 926-6366
E-Mail: deanda@att.net

SCALE: 1" = 20'
DATE: 5/18/2010
DESIGNED BY: AdeA
DRAWN BY: SB
SHEET No. 3 OF 3
DWG. No. C-3

APPENDIX D

Project Site Pictures from Site Reconnaissance

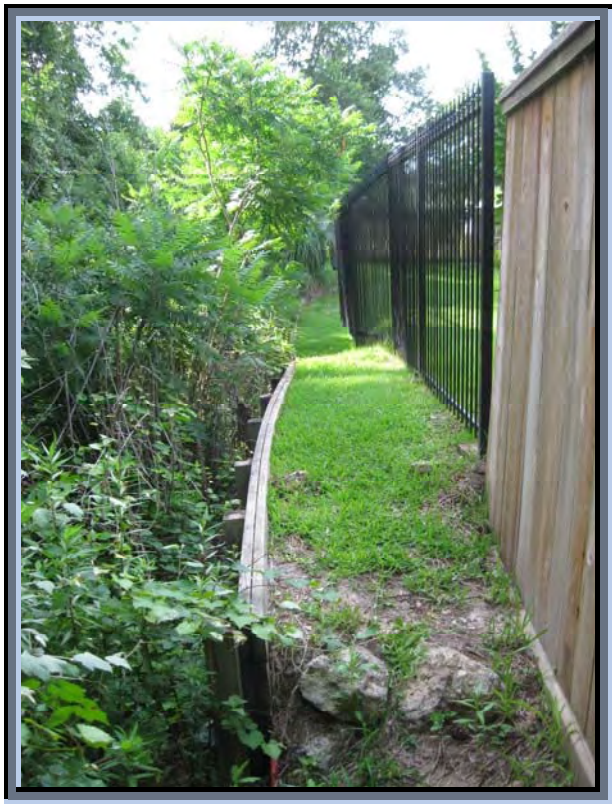
PICTURE INDEX

Picture No.	Description
P-1	Front view of the Residence at 31422 Regel Court, Tomball, Texas
P-2	Front view of the Residence at 31418 Regel Court, Tomball, Texas
P-3	A view of slope movement at the backyard of house at 31422 Regel Court, Tomball, Texas
P-4	A view of slope settlement at the backyard of house at 31418 Regel Court, Tomball, Texas
P-5	A view of bulkhead failure at the backyard of house at 31422 Regel Court, Tomball, Texas
P-6	A view of the presence of perforated pipe at the backyard of house at 31422 Regel Court, Tomball, Texas
P-7	A view of the existing North Star Drainage Ditch
P-8	A view of the deadman anchor with slope failure at the backyard of house at 31422 Regel Court, Tomball, Texas
P-9	A view of the slope failure at the backyard of house at 31422 Regel Court, Tomball, Texas
P-10	A view of the slope failure at the backyard of house at 31422 Regel Court, Tomball, Texas
P-11	A view of the backyard of house at 31418 Regel Court, Tomball, Texas
P-12	A view of the fill settlement at backyard of house at 31418 Regel Court, Tomball, Texas

 # P-1

 # P -2

 # P – 3



 # P – 4

 # P-5

 # P -6

 # P-7

 # P-8

 # P-9

 # P-10

 # P-11

 # P-12

APPENDIX E

Project Site Pictures from Field Exploration

PICTURE INDEX

Picture No.	Description
P-1	A view of the drilling operations performed at Boring B-1
P-2	A view of the drilling operations performed at Boring B-2
P-3	A view of the drilling operations performed at Boring B-3
P-4	A view of the drilling operations performed at Boring B-4
P-5	A view of the drilling operations performed at Boring B-5
P-6	A view of the drilling operations performed at Boring B-6
P-7	A view of the drilling operations performed at Boring B-7
P-8	A view of the drilling operations performed at Boring B-8

 # P-1

 # P -2

 # P – 3

 # P – 4

 # P-5

 # P -6

 # P-7

 # P-8

APPENDIX F

Plan of Borings and Boring Logs

PLAN OF BORINGS (boring dimensions and locations are approximate)

NORTH

PROJECT: Forensic Engineering Service, Slope Distress at North Star Drainage Ditch
Tomball, Texas

SCALE: NOT TO SCALE	DATE: AUGUST 2010	REPORT NO.: 10-328E

GEOTECH ENGINEERING AND TESTING **PLATE F-1**

LOG OF BORING NO. B-1

Geotech Engineering and Testing
800 Victoria Drive
Houston, Texas 77040
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: FES: Slope Distress at North Star Drainage Ditch
LOCATION: Tomball, Texas
PROJECT NO.: 10-328E STATION NO.:
DATE: 6-16-10 COMPLETION DEPTH: 50.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
					ELEVATION: Existing									
0					FILL: SILTY SAND (SM), light gray, brown, with root fibers, clay pockets, moist - dark brown 2' to 4'	11				30				
5					CLAYEY SAND (SC), light gray, brown, reddish brown, with root fibers to 8', clay seams, moist	14	27	17	10	43				
10	18 29				- medium dense, wet 8' to 12'	16	33	19	14	37				
15					FAT CLAY (CH), firm, light gray, light brown, with ferrous and calcareous nodules, moist - light brown 10' to 12' - with slickensided 14' to 16' - very stiff 16' to 24'	35	97	27	70			85		
20						24	76	25	51			99		
25	39				SILTY SAND (SM), dense, light gray, light brown, with clay pockets, wet									
30	39					15				26				
35	21				- brown 33' to 35'									
40	28				- medium dense 38' to 50'	17				27				
45	28													
50	29					21				22				

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
▮ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
▽: WATER ENCOUNTERED AT 8.0 ft. DURING DRILLING
▼: WATER DEPTH AT 4.0 ft. AFTER 24-HOUR

DRY AUGER: 0 TO 10 ft.
WET ROTARY: 10 TO 50 ft.

DRILLED BY: Van&Sons
LOGGED BY: Bernard

OVM2 10-328E.GPJ OVM.GDT 8/13/10

LOG OF BORING NO. B-2

Geotech Engineering and Testing
800 Victoria Drive
Houston, Texas 77040
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: FES: Slope Distress at North Star Drainage Ditch
LOCATION: Tomball, Texas
PROJECT NO.: 10-328E STATION NO.:
DATE: 6-16-10 COMPLETION DEPTH: 50.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ELEVATION: Existing Grade									
	7				FILL: SILTY SAND (SM), brown, with root fibers, clay pockets, moist - loose 2' to 6'	8				31				
5	5				- light gray 4' to 6'									
					CLAYEY SAND (SC), light gray, brown, with clay seams, moist	11	20	14	6	46				
10						14	23	14	9					
15	48				- dense, with clay pockets 14' to 18'									
	31				- light brown 16' to 18'									
					FAT CLAY (CH), stiff, light gray, reddish brown, with ferrous nodules, moist - very stiff 20' to 22'	22	71	22	49			98		
20														
25						26	70	22	48			96		
					- firm 28' to 30'									
30														
	25				SILTY SAND (SM), medium dense, light gray, reddish brown, with clay pockets, wet	21				28				
35														
	21													
40					- with clay seams 43' to 45'									
	24					31				32				
45														
	23													
50														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
▮ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
: CAVED-IN AT 25.0 ft. DURING DRILLING
: CAVED-IN AT 17.0 ft. AFTER 24-HOUR

DRY AUGER: 0 TO 25 ft.
WET ROTARY: 25 TO 50 ft.

DRILLED BY: Van&Sons
LOGGED BY: Bernard

OVM2 10-328E.GPJ OVM.GDT 7/8/10

GEOTECH ENGINEERING & TESTING

PLATE F-3

LOG OF BORING NO. B-3

Geotech Engineering and Testing
800 Victoria Drive
Houston, Texas 77040
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: FES: Slope Distress at North Star Drainage Ditch
LOCATION: Tomball, Texas
PROJECT NO.: 10-328E STATION NO.:
DATE: 6-16-10 COMPLETION DEPTH: 20.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
					ELEVATION: Existing									
0					FILL: SILTY SAND (SM), light gray, reddish brown, with root fibers, clay pockets, moist - dark brown 2' to 4'	14								
						12				32				
5					FILL: CLAYEY SAND (SC), light gray, brown, with root fibers, clay pockets, moist	10								
					CLAYEY SAND (SC), light gray, reddish brown, with clay pockets, moist	14	23	12	11	39				
						19								
10					FAT CLAY (CH), stiff, light gray, brown, reddish brown, with ferrous nodules, moist - very stiff 12' to 18'	29	77	27	50					
						30								
15						27								
						23	70	22	48			94		
					SILTY SAND (SM), light gray, light brown, moist	6								
20														
25														
30														
35														
40														
45														
50														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
▽: WATER ENCOUNTERED AT 8.0 ft. DURING DRILLING
▼: WATER DEPTH AT 4.0 ft. AFTER 24-HOUR

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: GET (P)
LOGGED BY: Jesus

OVM2 10-328E.GPJ OVM.GDT 8/13/10

LOG OF BORING NO. B-4

Geotech Engineering and Testing
800 Victoria Drive
Houston, Texas 77040
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: FES: Slope Distress at North Star Drainage Ditch
LOCATION: Tomball, Texas
PROJECT NO.: 10-328E STATION NO.:
DATE: 6-17-10 COMPLETION DEPTH: 20.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
					ELEVATION: Existing									
0					FILL: CLAYEY SAND (SC), gray, brown, dark brown, with root fibers, clay pockets, moist - light brown 2' to 4' - wet 4' to 6'	14				47				
						16								
5						16	26	15	11	35				
					CLAYEY SAND (SC), light gray, brown, reddish brown, with clay pockets, wet	19								
						18								
10						18	24	12	12					
						26								
15						36				39				
						35								
20						28	25	13	12					
25														
30														
35														
40														
45														
50														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
▽: WATER ENCOUNTERED AT 3.0 ft. DURING DRILLING
▼: WATER DEPTH AT 0.5 ft. AFTER 24-HOUR

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: GET (P)
LOGGED BY: Jesus

OVM2 10-328E.GPJ OVM.GDT 8/13/10

LOG OF BORING NO. B-5

Geotech Engineering and Testing
800 Victoria Drive
Houston, Texas 77040
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: FES: Slope Distress at North Star Drainage Ditch
LOCATION: Tomball, Texas
PROJECT NO.: 10-328E STATION NO.:
DATE: 6-16-10 COMPLETION DEPTH: 20.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ELEVATION: Existing									
					FILL: SILTY SAND (SM), light gray, reddish brown, with root fibers, clay pockets, moist	8				28				
5					CLAYEY SAND (SC), light gray, brown, with root fibers, clay pockets, moist	9				41				
10					LEAN CLAY (CL), stiff, light gray, light brown, with ferrous nodules, sand seams, moist									
					FAT CLAY (CH), very stiff, light gray, reddish brown, with ferrous nodules, moist	22	83	25	58			98		
15					- with silt 16' to 20'									
20						26	86	26	60					
25														
30														
35														
40														
45														
50														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
▮ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: GET (P)
LOGGED BY: Jesus

OVM2 10-328E.GPJ OVM.GDT 8/13/10

LOG OF BORING NO. B-6

Geotech Engineering and Testing
800 Victoria Drive
Houston, Texas 77040
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: FES: Slope Distress at North Star Drainage Ditch
LOCATION: Tomball, Texas
PROJECT NO.: 10-328E STATION NO.:
DATE: 6-17-10 COMPLETION DEPTH: 20.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
0					ELEVATION: Existing									
					SILTY SAND (SM), gray, brown, reddish brown, with root fibers, clay pockets, moist	10				28				
5					FAT CLAY (CH), very stiff, light gray, gray, brown, with root fibers to 8', ferrous nodules, moist	17	98	26	72					
10					LEAN CLAY (CL), stiff, light gray, brown, with ferrous nodules, sands, slickensided, moist - very stiff, with sand seams 12' to 14'	18	40	15	25			112		
15					SILTY SAND (SM), light gray, with clay pockets, moist	13				28				
20														
25														
30														
35														
40														
45														
50														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: GET (P)
LOGGED BY: Jesus

OVM2 10-328E.GPJ OVM.GDT 8/13/10

LOG OF BORING NO. B-7

Geotech Engineering and Testing
800 Victoria Drive
Houston, Texas 77040
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: FES: Slope Distress at North Star Drainage Ditch
LOCATION: Tomball, Texas
PROJECT NO.: 10-328E STATION NO.:
DATE: 6-22-10 COMPLETION DEPTH: 20.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
					ELEVATION: Existing									
0					SILTY SAND (SM), brown, dark brown, with root fibers, clay pockets, moist	8				30				
					FAT CLAY (CH), stiff, light gray, light brown, with root fibers to 8', ferrous nodules, moist - very stiff 4' to 10'									
5						25	92	25	67			96		
10					SILTY SAND (SM), light gray, with clay pockets, moist	9				18				
					LEAN CLAY (CL), stiff, light gray, light brown, with ferrous and calcareous nodules, sands, moist									
15					SILTY SAND (SM), light gray, with clay pockets, moist	10	45	19	26					
					LEAN CLAY (CL), very stiff, light gray, light brown, with ferrous nodules, sands, moist	11				29				
20					SILTY SAND (SM), light gray, with clay pockets, moist									
25														
30														
35														
40														
45														
50														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
▮ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
NO FREE WATER ENCOUNTERED DURING DRILLING

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: GET (P)
LOGGED BY: Jesus

OVM2 10-328E.GPJ OVM.GDT 8/13/10

LOG OF BORING NO. B-8

Geotech Engineering and Testing
800 Victoria Drive
Houston, Texas 77040
Phone: 713-699-4000 Fax: 713-699-9200

PROJECT: FES: Slope Distress at North Star Drainage Ditch
LOCATION: Tomball, Texas
PROJECT NO.: 10-328E STATION NO.:
DATE: 6-22-10 COMPLETION DEPTH: 20.0 ft.

DEPTH, ft	SPT N-VALUE blows per foot	OVM, ppm	SYMBOL	SAMPLES	DESCRIPTION	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	SUCTION (pF)	DRY UNIT WEIGHT, pcf	PERCENT COMPACTION	PASSING/FAILING (P/F)
					ELEVATION: Existing									
0					FILL: SILTY SAND (SM), dark brown, with root fibers, clay pockets, moist - brown 2' to 4'	7				34				
						10								
5					CLAYEY SAND (SC), brown, dark brown, with root fibers, clay pockets, moist - wet 6' to 8'	12								
						22								
10					FAT CLAY (CH), stiff, light gray, light brown, with ferrous nodules, moist	32								
						33	73	22	51					
15														
						33								
20														
25														
30														
35														
40														
45														
50														

UNDRAINED SHEAR STRENGTH, tsf
▲ HAND PENETROMETER
■ TORVANE
● UNCONFINED COMPRESSION
○ UNCONSOLIDATED-UNDRAINED TRIAXIAL
0.5 1.0 1.5 2.0 2.5

WATER OBSERVATIONS:
▽: WATER ENCOUNTERED AT 7.0 ft. DURING DRILLING
▼: WATER DEPTH AT 5.0 ft. AFTER 24-HOUR

DRY AUGER: 0 TO 20 ft.
WET ROTARY: ____ TO ____ ft.

DRILLED BY: GET (P)
LOGGED BY: Jesus

OVM2 10-328E.GPJ OVM.GDT 8/13/10

KEY TO LOG TERMS AND SYMBOLS

UNIFIED SOIL CLASSIFICATIONS

Symbol		Material Descriptions
GW		WELL GRADED-GRAVELS, GRAVEL-SAND MIXTURES LITTLE OR NO FINES
GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GM		SILTY GRAVELS, GRAVEL-SAND SILT MIXTURES
GC		CLAY GRAVELS, GRAVEL-SAND CLAY MIXTURES
SW		WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP		POORLY GRADED SANDS, OR GRAVELLY SANDS, LITTLE OR NO FINES
SM		SILTY SANDS, SAND-SILT MIXTURES a
SC		CLAYEY SANDS, SAND-SILT MIXTURES b
ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, LEAN CLAYS
OL		ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
PT		PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT
		FILL SOILS

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided	-	Having incline planes of weakness that are slick and glossy in appearance.
Fissured	-	Containing shrinkage cracks frequently filled with fine sand or silt: usually vertical.
Laminated	-	Composed of thin layers of varying colors and soil sample texture.
Interbedded	-	Composed of alternate layers of different soil types.
Calcareous	-	Containing appreciable quantities of calcium carbonate.
Well Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes.
Poorly Graded	-	Predominantly of one grain size, or having a range of sizes with some intermediate sizes missing.
Pocket	-	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	-	Inclusion less than ⅛-inch thick extending through the sample.
Seam	-	Inclusion ⅛- to 3-inch thick extending through the sample.
Layer	-	Inclusion greater than 3-inch thick extending through the sample.
Interlayered	-	Soils sample composed of alternating layers of different soil types.
Intermixed	-	Soil samples composed of pockets of different soil type and layered or laminated structure is not evident.

COARSE GRAINED SOILS (major portion retained on No. 200 Sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Conditions rated according to standard penetration test (SPT)* as performed in the field.

Descriptive Terms	Blows Per Foot*
Very Loose	0 – 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	over 50

* 140 pound weight having a free fall of 30-inch

FINE GRAINED SOILS (major portion passing No. 200 Sieve): Include (1) inorganic or organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength as indicated by hand penetrometer readings or by unconfined compression tests.

Descriptive Term	Undrained Shear Strength Ton/Sq. Ft.
Very Soft	Less than 0.13
Soft	0.13 to 0.25
Firm	0.25 to 0.50
Stiff	0.50 to 1.00
Very Stiff	1.00 to 2.00
Hard	2.00 or higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above because of weakness or cracks in the soil. The consistency ratings of such soils are based on hand penetrometer readings.

SOIL SAMPLERS

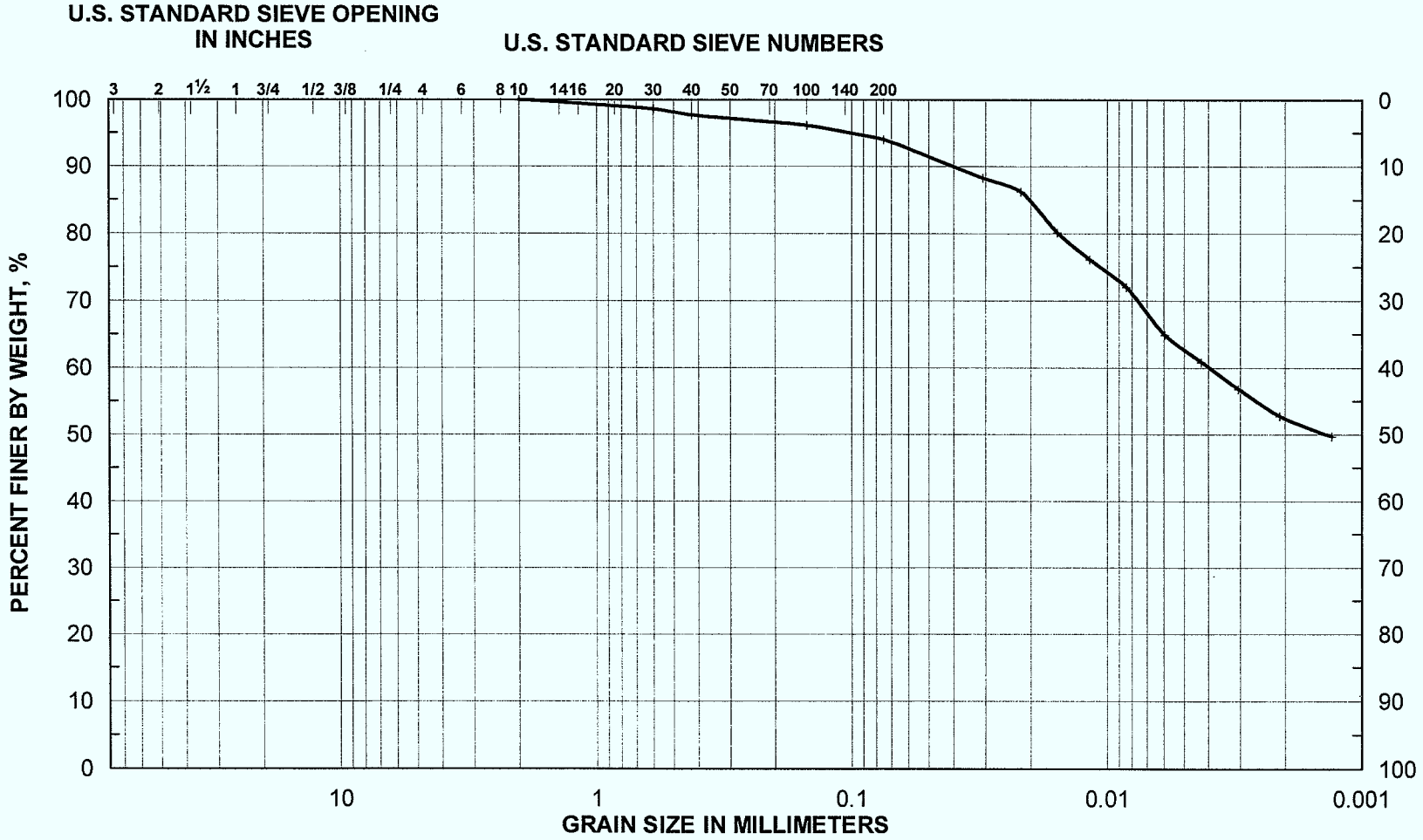
- SHELBY TUBE SAMPLER
- STANDARD PENETRATION TEST
- AUGER SAMPLING

TERMS CHARACTERIZING ROCK PROPERTIES

VERY SOFT OR PLASTIC	Can be remolded in hand: corresponds in consistency up to very stiff in soils.
SOFT	Can be scratched with fingernail.
MODERATELY HARD	Can be scratched easily with knife; cannot be scratched with fingernail. Difficult to scratch with knife.
VERY HARD	Cannot be scratched with knife.
POORLY CEMENTED OR FRIABLE	Easily crumbled.
CEMENTED	Bounded Together by chemically precipitated materials.
UNWEATHERED	Rock in its natural state before being exposed to atmospheric agents.
SLIGHTLY WEATHERED	Noted predominantly by color change with no disintegrated zones.
WEATHERED	Complete color change with zones of slightly decomposed rock.
EXTREMELY WEATHERED	Complete color change with consistency, texture, and general appearance or soil.

APPENDIX G

Particle Size Distribution Curves

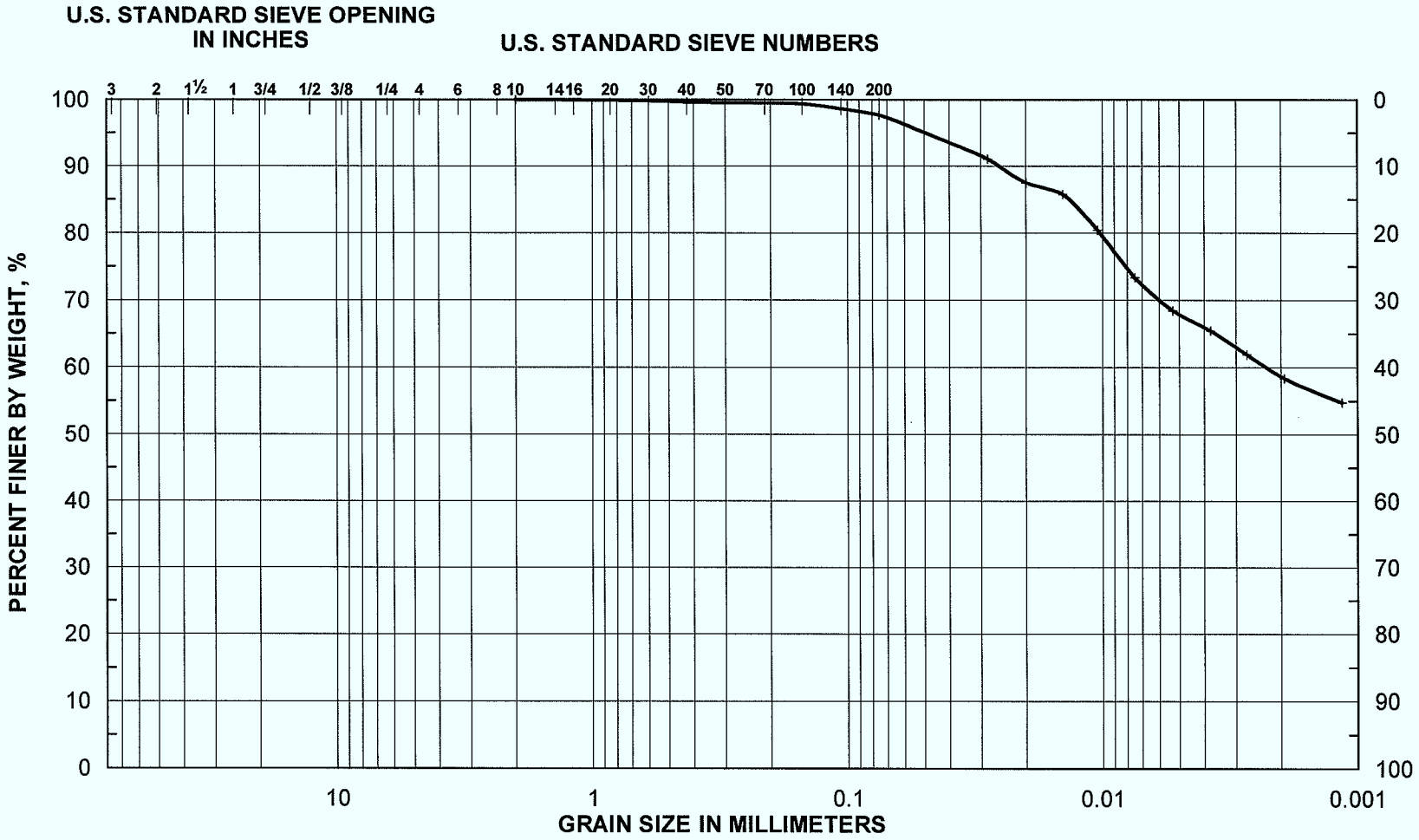


GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: Fat Clay (CH)

GRAIN SIZE DISTRIBUTION CURVES FOR B- 1 (18' TO 20')

Report No. 10-328E



GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		

USCS Soil Classification: Fat Clay (CH)

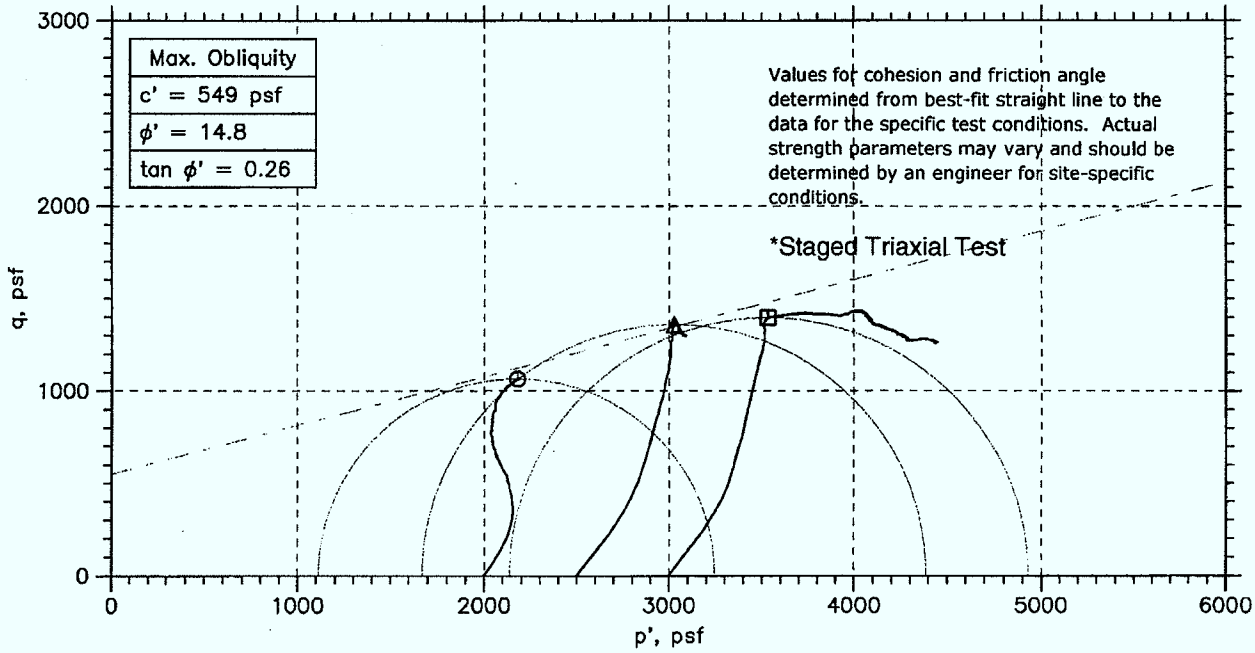
GRAIN SIZE DISTRIBUTION CURVES FOR B- 6 (8' TO 10')

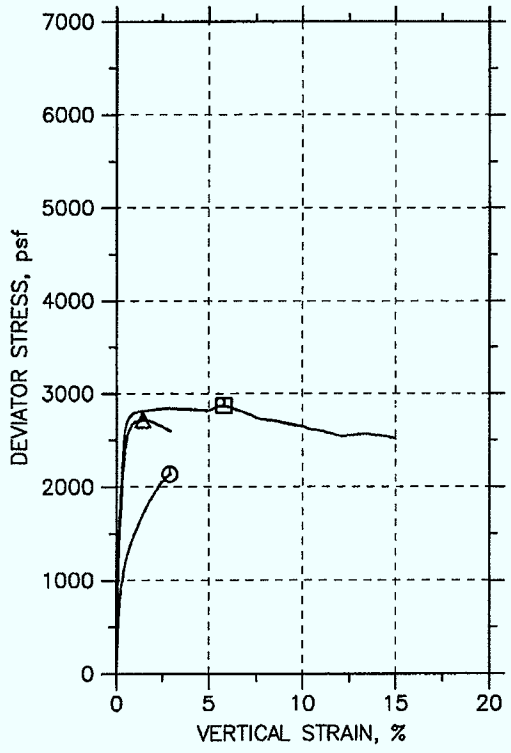
Report No. 10-328E

APPENDIX H

Multi-Stage Consolidated Undrained Triaxial Test Results

CONSOLIDATED UNDRAINED TRIAXIAL TEST

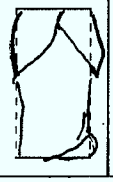




Symbol		⏲	△	⊡	
Sample No.		---	---	---	
Test No.		CU-2-1	CU-2-2	CU-2-3	
Depth		22-24 ft	22-24 ft	22-24 ft	
Initial	Diameter, in	2	2	2	
	Height, in	4.1	3.959	3.856	
	Water Content, %	32.3			
	Dry Density, pcf	84.27			
	Saturation, %	87.1			
	Void Ratio	1			
Before Shear	Water Content, %			31.6	
	Dry Density, pcf			91.01	
	Saturation*, %			100.0	
	Void Ratio			0.852	
	Back Press., psf	6475	9674	12240	
Ver. Eff. Cons. Stress, psf		1998	2499	3001	
Shear Strength, psf		1068	1359	1435	
Strain %		2.93	1.45	5.8	
Strain Rate, %/min		0.016	0.016	0.016	
B-Value		0.98	---	---	
Estimated Specific Gravity		2.7	2.7	2.7	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

GeoTesting express
a subsidiary of Geocomp Corporation

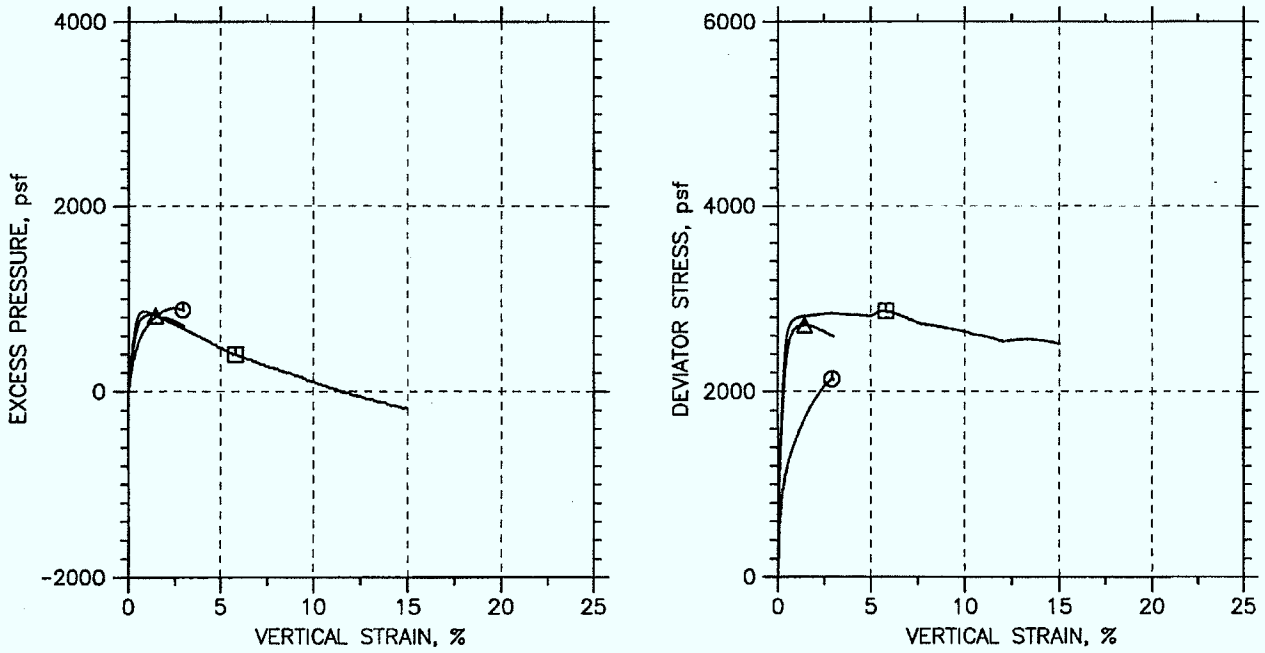
Project: FES Slope at North Star
Location: Tomball, TX
Project No.: GTX 10023
Boring No.: B-2
Sample Type: core
Description: Moist, brownish yellow and gray clay
Remarks: System W

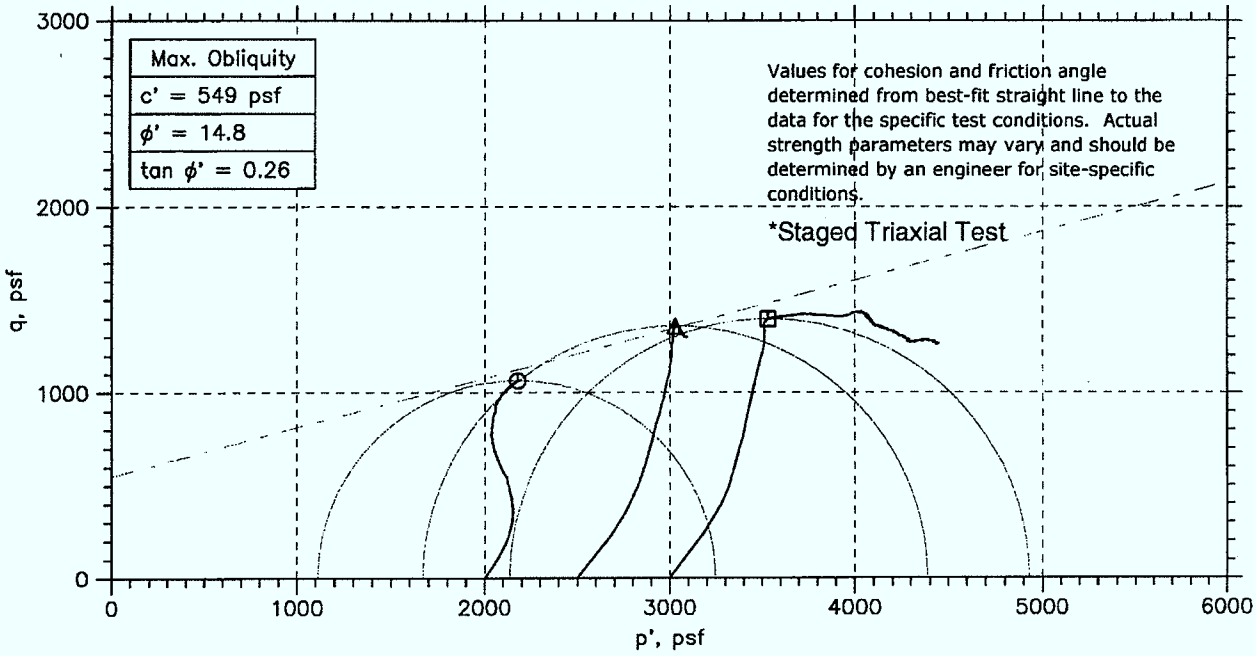


Wed, 21-JUL-2010 11:27:32

Phase calculations based on start and end of test.
* Saturation is set to 100% for phase calculations.

CONSOLIDATED UNDRAINED TRIAXIAL TEST





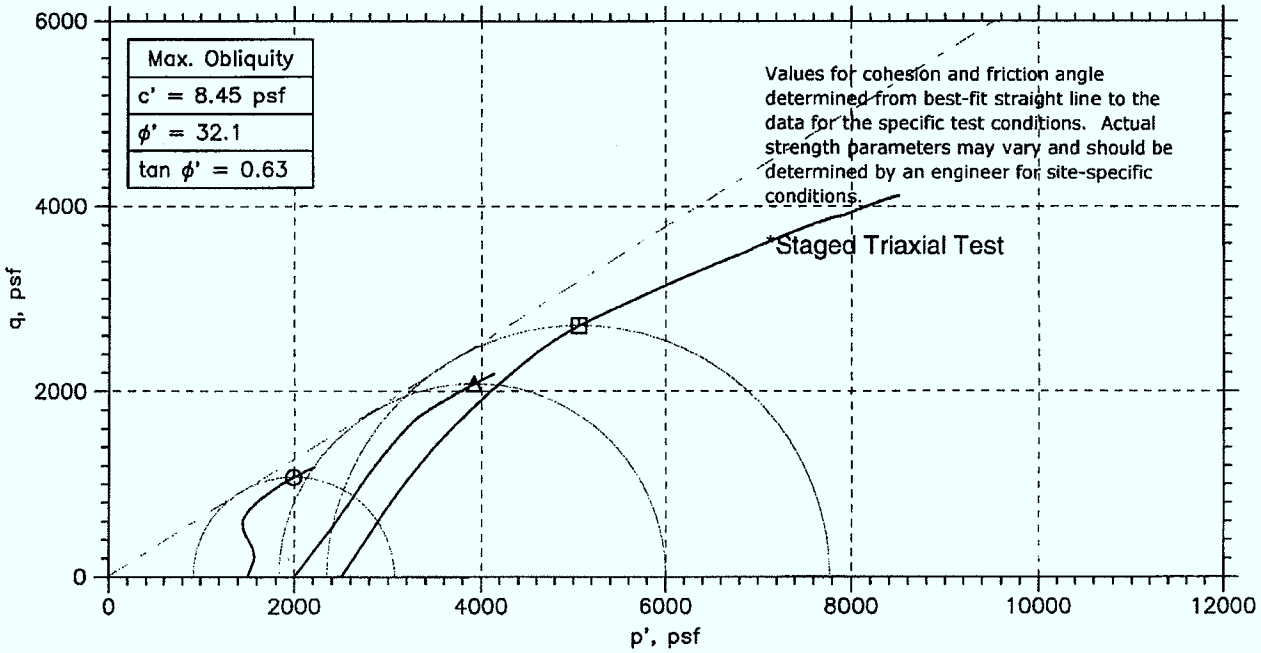
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
⊙	---	CU-2-1	22-24 ft	md	07/12/10	jdt		10023-CU-2-1An.dat
△	---	CU-2-2	22-24 ft	md	07/16/10	jdt		10023-CU-2-2n.dat
⊡	---	CU-2-3	22-24 ft	md	07/16/10	jdt		10023-CU-2-3n.dat

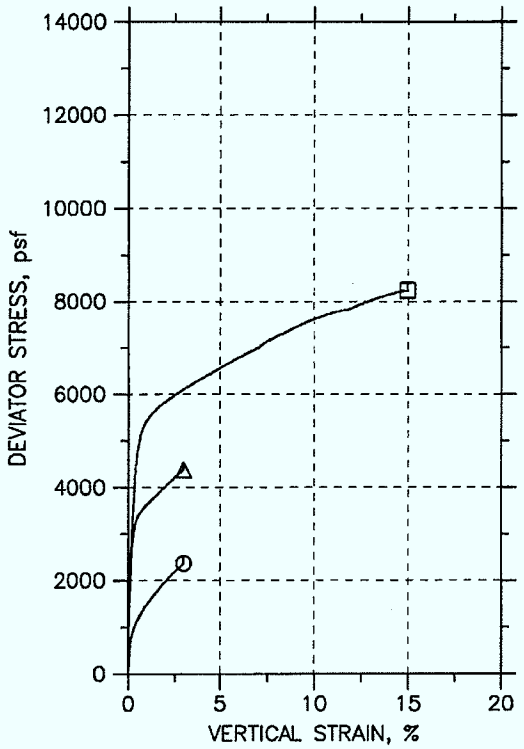
GeoTesting express
a subsidiary of Geocomp Corporation

Project: FES Slope at North Star	Location: Tomball, TX	Project No.: GTX 10023
Boring No.: B-2	Sample Type: core	
Description: Moist, brownish yellow and gray clay		
Remarks: System W		

Wed, 21-JUL-2010 11:15:55

CONSOLIDATED UNDRAINED TRIAXIAL TEST

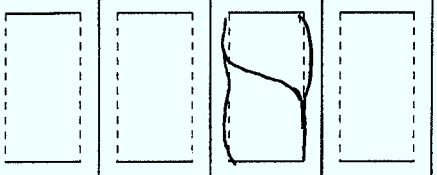




Symbol		⊙	△	⊡	
Sample No.		---	---	---	
Test No.		CU-1-1	CU-1-2	CU-1-3	
Depth		6-8 ft	6-8 ft	6-8 ft	
Initial	Diameter, in	2	2	2	
	Height, in	4.13	3.987	3.877	
	Water Content, %	15.0			
	Dry Density, pcf	110.7			
	Saturation, %	77.6			
	Void Ratio	0.523			
Before Shear	Water Content, %			14.1	
	Dry Density, pcf			122.1	
	Saturation*, %			100.0	
	Void Ratio			0.38	
	Back Press., psf	11950	14450	14450	
Ver. Eff. Cons. Stress, psf		1502	1999	2500	
Shear Strength, psf		1183	2191	4119	
Strain %		3	3	15	
Strain Rate, %/min		0.016	0.016	0.016	
B-Value		0.95	---	---	
Estimated Specific Gravity		2.7	2.7	2.7	
Liquid Limit		---	---	---	
Plastic Limit		---	---	---	

GeoTesting express
a subsidiary of Geocomp Corporation

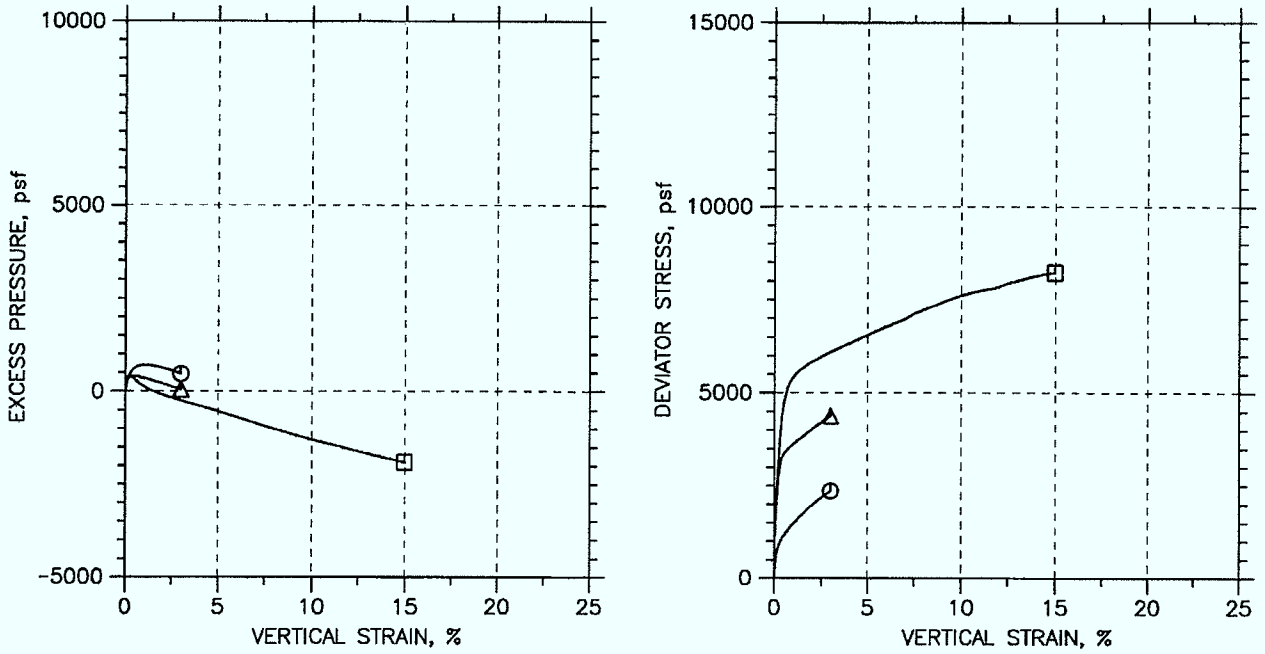
Project: FES Slope at North Star
Location: Tomball, TX
Project No.: GTX-10023
Boring No.: B-1
Sample Type: core
Description: Moist, mottled gray, yellow and brown sandy clay
Remarks: System U

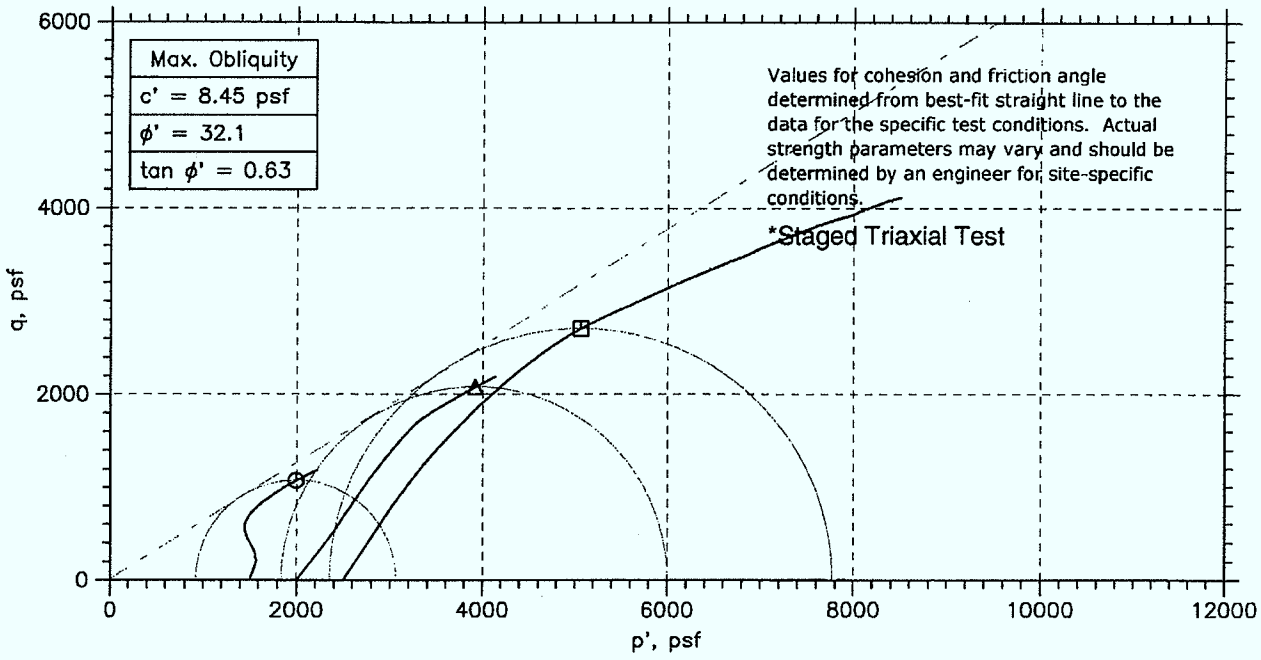


Phase calculations based on start and end of test.
* Saturation is set to 100% for phase calculations.

Wed, 21-JUL-2010 09:45:47

CONSOLIDATED UNDRAINED TRIAXIAL TEST





	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
⊙	---	CU-1-1	6-8 ft	md	07/13/10	jdt		10023-CU-1-1n.dat
△	---	CU-1-2	6-8 ft	md	07/14/10	jdt		10023-CU-1-2n.dat
⊡	---	CU-1-3	6-8 ft	md	07/16/10	jdt		10023-CU-1-3n.dat

GeoTesting express
a subsidiary of Geocomp Corporation

Project: FES Slope at North Star	Location: Tomball, TX	Project No.: GTX-10023
Boring No.: B-1	Sample Type: core	
Description: Moist, mottled gray, yellow and brown sandy clay		
Remarks: System U		

Wed, 21-JUL-2010 09:46:02

APPENDIX I

Aerial Photographs from Terraserver Website (www.terraserver.com)

AERIAL PHOTOGRAPH 2000

NORTH

PROJECT: Forensic Engineering Study, Slope Distress at North Star Drainage Ditch
Tomball, Texas

SCALE: NOT TO SCALE	DATE: AUGUST 2010	REPORT NO.: 10-328E

AERIAL PHOTOGRAPH 2002

NORTH

PROJECT: Forensic Engineering Study, Slope Distress at North Star Drainage Ditch
Tomball, Texas

SCALE: NOT TO SCALE	DATE: AUGUST 2010	REPORT NO.: 10-328E

AERIAL PHOTOGRAPH 2007

NORTH

PROJECT: Forensic Engineering Study, Slope Distress at North Star Drainage Ditch
Tomball, Texas

SCALE: NOT TO SCALE	DATE: AUGUST 2010	REPORT NO.: 10-328E

AERIAL PHOTOGRAPH 2008

NORTH

PROJECT: Forensic Engineering Study, Slope Distress at North Star Drainage Ditch
Tomball, Texas

SCALE: NOT TO SCALE	DATE: AUGUST 2010	REPORT NO.: 10-328E

APPENDIX J

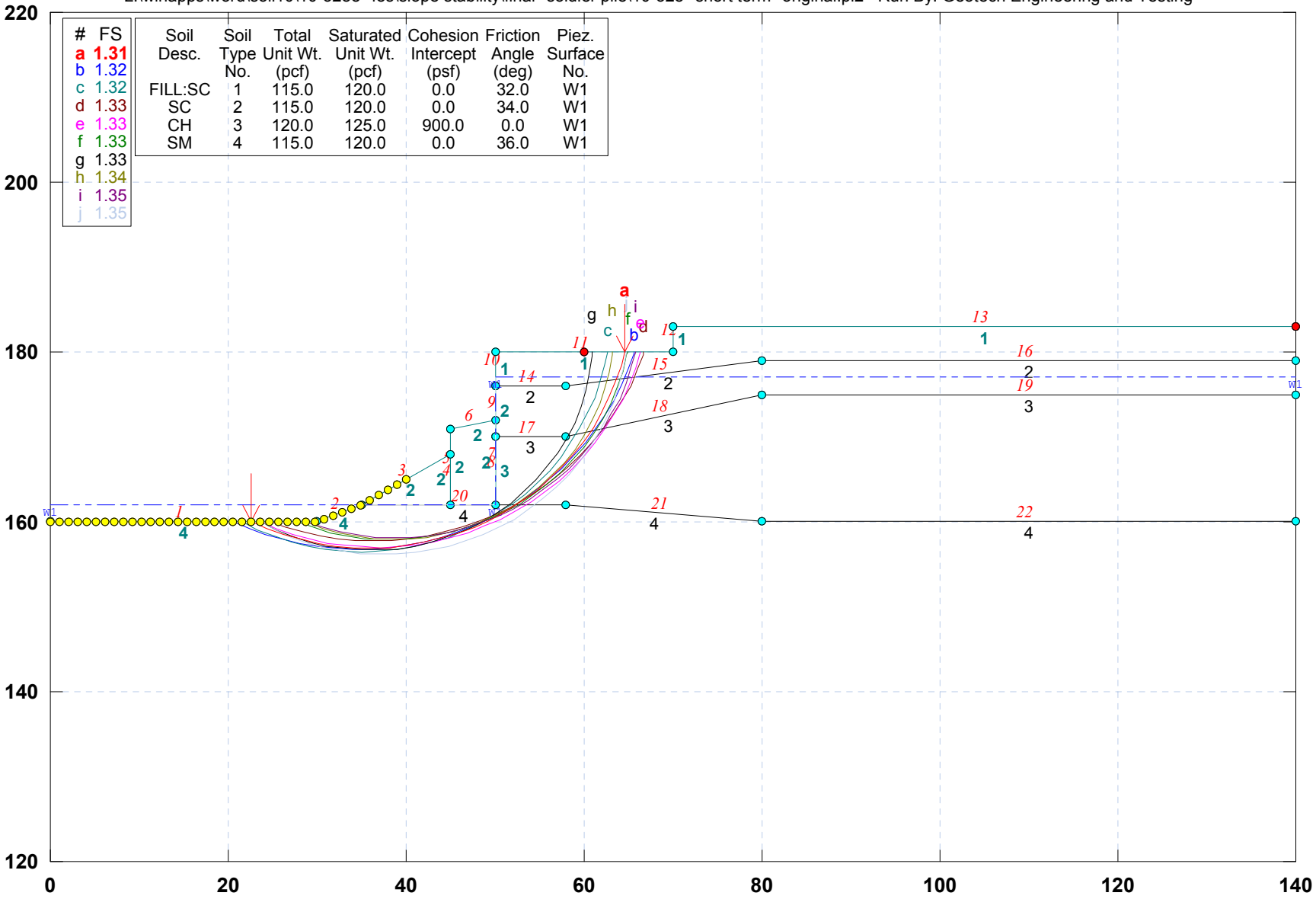
Results of Slope Stability Analysis

Slope Distress at N. Star Drainage Ditch-- Short Term Stability Analysis

z:\winapps\word\soil10\10-328e--fes\slope stability\final--soldier pile\10-328--short term--original.pl2 Run By: Geotech Engineering and Testing

#	FS
a	1.31
b	1.32
c	1.32
d	1.33
e	1.33
f	1.33
g	1.33
h	1.34
i	1.35
j	1.35

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
FILL:SC	1	115.0	120.0	0.0	32.0	W1
SC	2	115.0	120.0	0.0	34.0	W1
CH	3	120.0	125.0	900.0	0.0	W1
SM	4	115.0	120.0	0.0	36.0	W1



GSTABL7 v.2 FSmin=1.31

Safety Factors Are Calculated By The Modified Bishop Method

Slope Distress at N. Star Drainage Ditch-- Rapid Draw Down Stability Analysis

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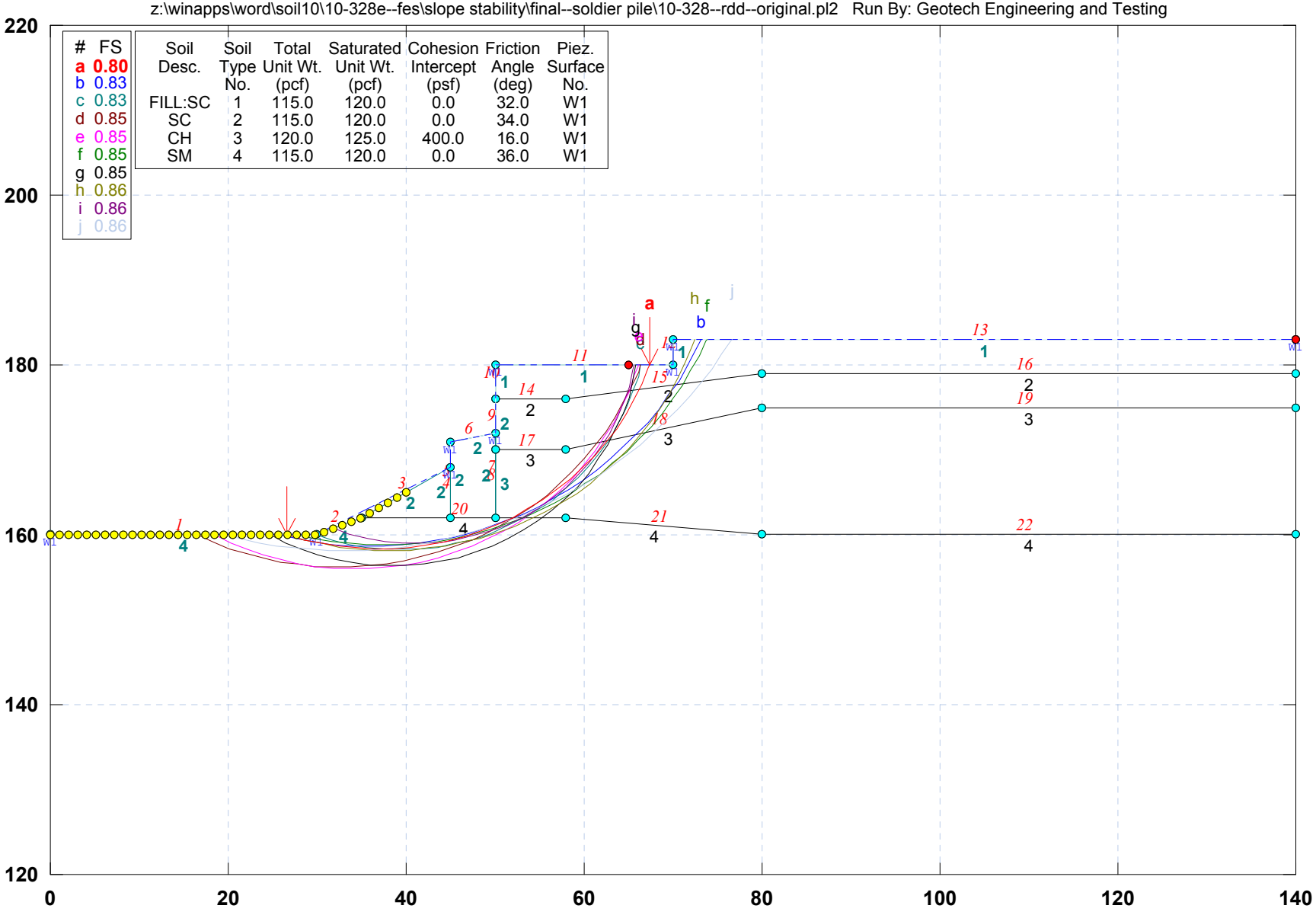


#	FS
a	0.80
b	0.83
c	0.83
d	0.85
e	0.85
f	0.85
g	0.85
h	0.86
i	0.86
j	0.86

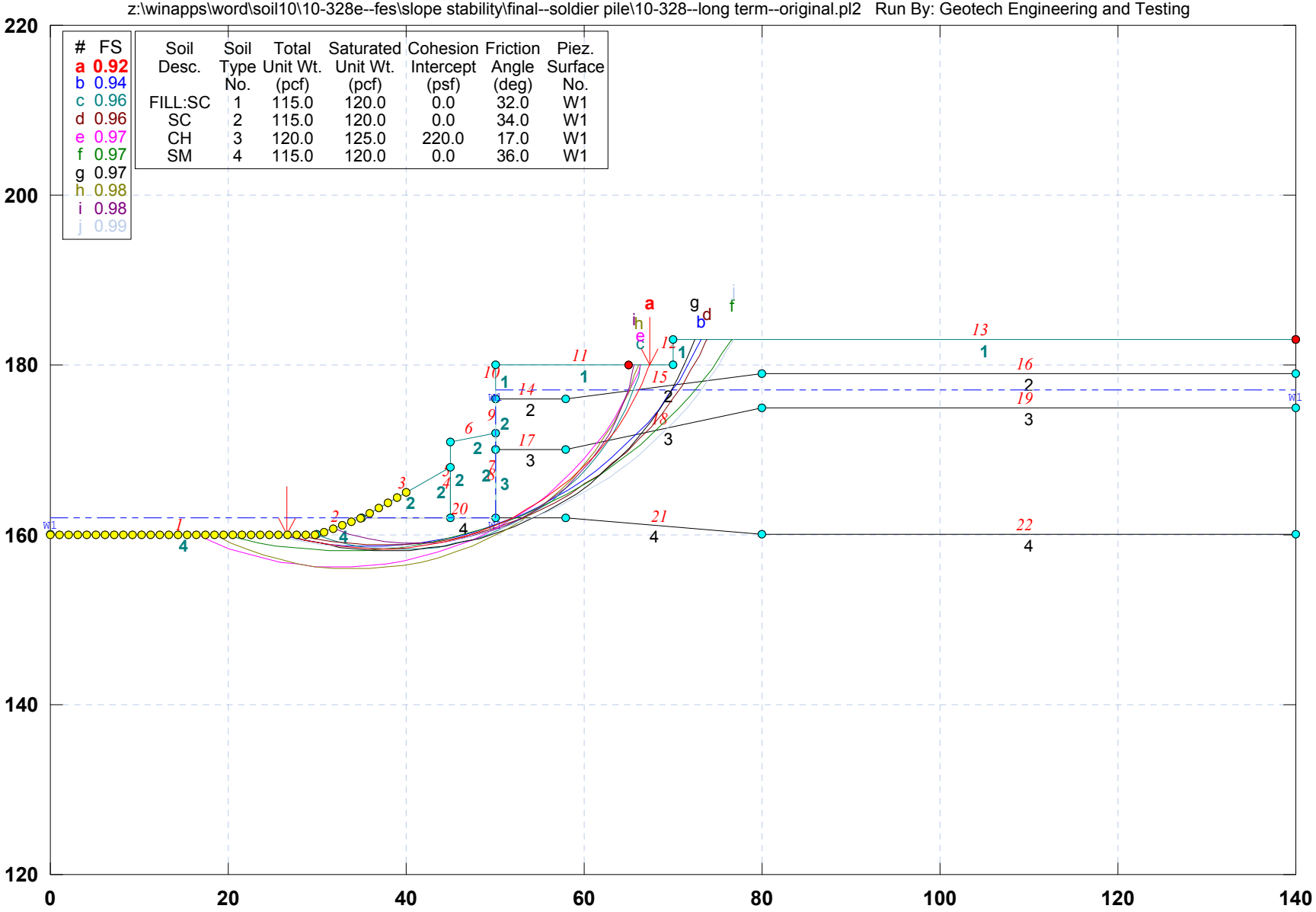
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
FILL:SC	1	115.0	120.0	0.0	32.0	W1
SC	2	115.0	120.0	0.0	34.0	W1
CH	3	120.0	125.0	400.0	16.0	W1
SM	4	115.0	120.0	0.0	36.0	W1

GSTABL7 v.2 FSmin=0.80

Safety Factors Are Calculated By The Modified Bishop Method

Slope Distress at N. Star Drainage Ditch-- Long Term Stability Analysis

z:\winapps\word\soil10\10-328e--fes\slope stability\final--soldier pile\10-328--long term--original.pl2 Run By: Geotech Engineering and Testing



#	FS
a	0.92
b	0.94
c	0.96
d	0.96
e	0.97
f	0.97
g	0.97
h	0.98
i	0.98
j	0.99

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
FILL:SC	1	115.0	120.0	0.0	32.0	W1
SC	2	115.0	120.0	0.0	34.0	W1
CH	3	120.0	125.0	220.0	17.0	W1
SM	4	115.0	120.0	0.0	36.0	W1

GSTABL7 v.2 FSmin=0.92

Safety Factors Are Calculated By The Modified Bishop Method

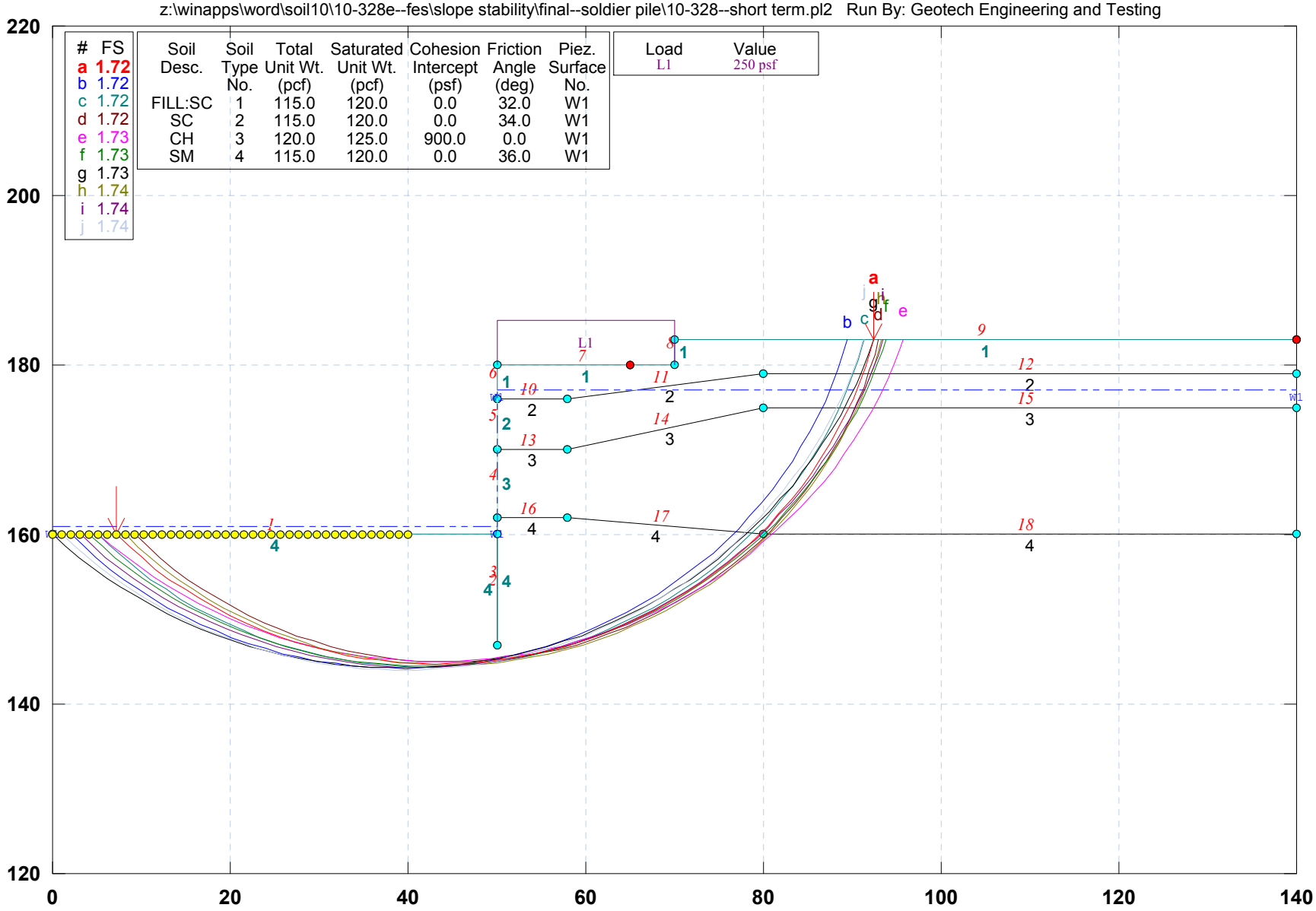
GSTABL7

APPENDIX K

Results of Slope Stability Analysis for Residence with Soldier Pile System

Slope Distress at N. Star Drainage Ditch-- Short Term Stability Analysis

z:\winapps\word\soil10\10-328e--fes\slope stability\final--soldier pile\10-328--short term.pl2 Run By: Geotech Engineering and Testing

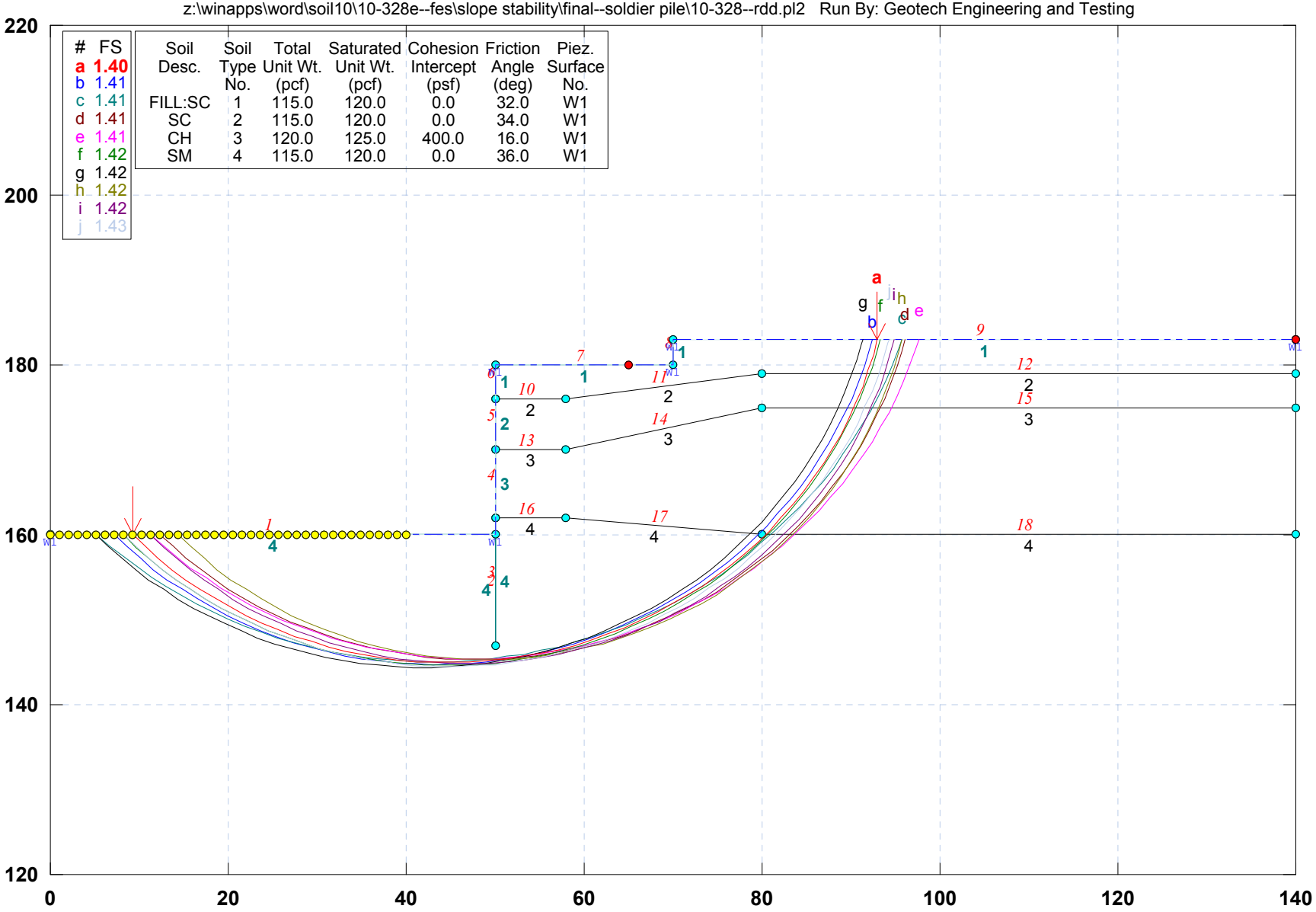


GSTABL7 v.2 FSmin=1.72

Safety Factors Are Calculated By The Modified Bishop Method

Slope Distress at N. Star Drainage Ditch-- Rapid Draw Down Stability Analysis

z:\winapps\word\soil10\10-328e--fes\slope stability\final--soldier pile\10-328--rdd.pl2 Run By: Geotech Engineering and Testing



GSTABL7 v.2 FSmin=1.40

Safety Factors Are Calculated By The Modified Bishop Method

Slope Distress at N. Star Drainage Ditch-- Long Term Stability Analysis

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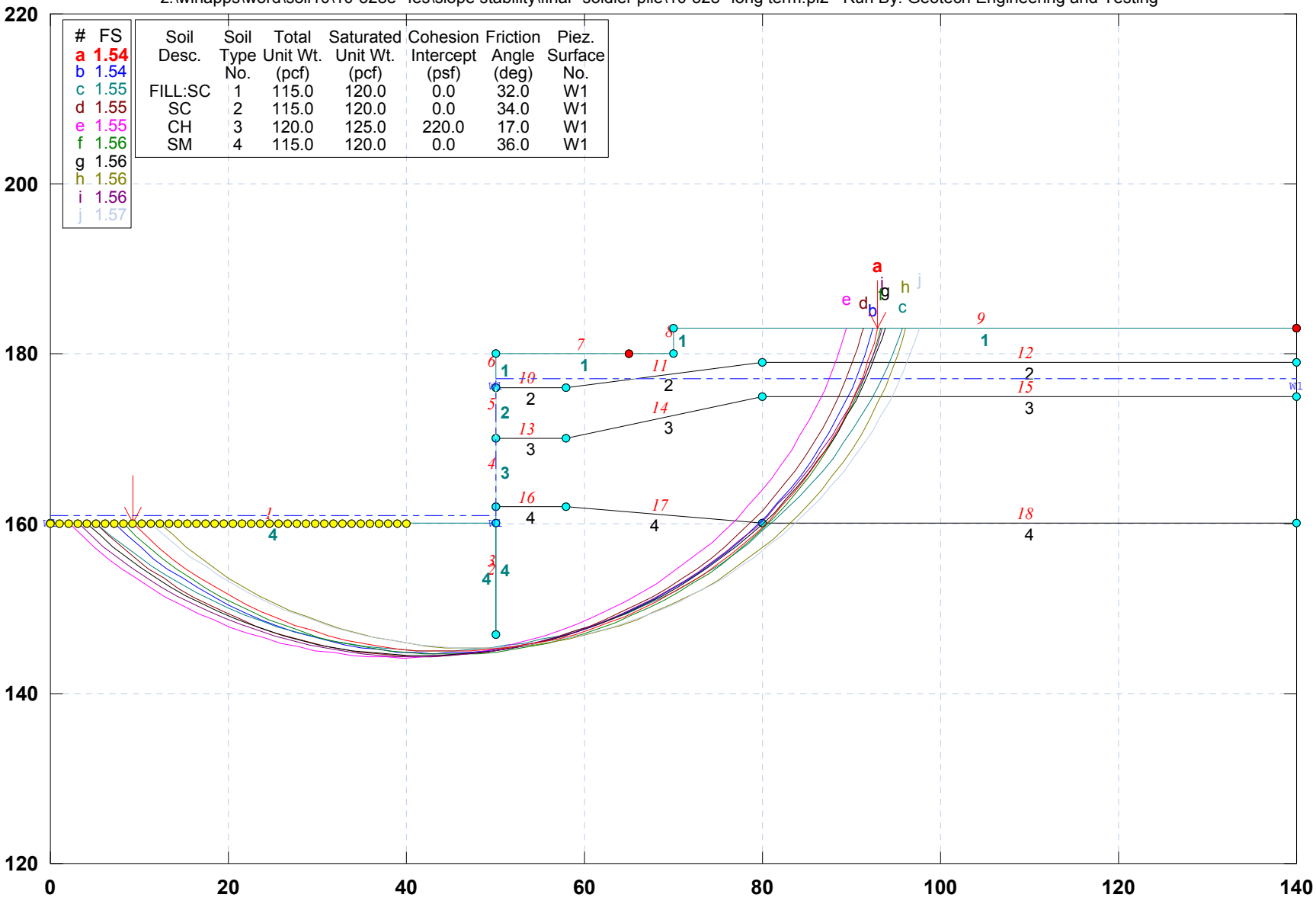


GSTABL7 v.2 FSmin=1.54

Safety Factors Are Calculated By The Modified Bishop Method

FileName: Councilpack 07-12-10

Permit Application submitted 6-11-10
- 8 Borings
- 20-50' deep
- 6" Core Samples every 2'

Permit signed by E&P 6-14-10

City of Tomball
Engineering and Planning Department
501 James St
Tomball, Texas 77375

Memorandum

Date: July 12, 2010

To: City Council

From: Mark A. McClure, P.E., CFM – Director of Engineering and Planning

Subject: 31422 & 31418 Rigel Ct., Tomball, TX

CC: George Shackelford – City Manager

This memorandum has been prepared by the Engineering & Planning Department (E&P) to provide to City Council a current update to the work that is being conducted at the above mentioned addresses located in the Northstar Estates Subdivision.

A permit application was submitted June 11, 2010 by Geotech Engineering & Testing (GET) to conduct eight (8) soil borings, located on the mentioned properties and/or within the adjacent Tomball earthen channel. The soil samples will be obtained from ground surface ranging between twenty (20) and fifty (50) feet. The permit was signed by E&P on June 14, 2010 for approval and was issued June 15, 2010, copy attached. GET started the drilling and sampling on June 16, 2010. The engineer indicated that they were taking six (6) inch core samples every two (2) feet. They also informed the City that the results and report should be published in four (4) to six (6) weeks. It is E&P's understanding that GET was contracted by Partners In Building.

Gary Smith provided a status update by e-mail dated June 17, 2010 (copy attached), including two proposals prepared by DeAnda Engineering.

As of the date of this memorandum preparation, a proposed final design has not been submitted to E&P for review.

Attachments: 31422_31418_Rigel_Ct_Construction_Permit_App.PDF
E-mail dated June 17, 2010 from Gary Smith to Mark McClure

Mark McClure

From: Gary Smith [glsmith@inlineplc.com]
Sent: Thursday, June 17, 2010 10:31 AM
To: Bernard Jung; Mark McClure
Subject: Proposed by De Anda
Attachments: 100514RigelSite.pdf; 100514RigelWall.pdf; 100520Rigel-C3.pdf

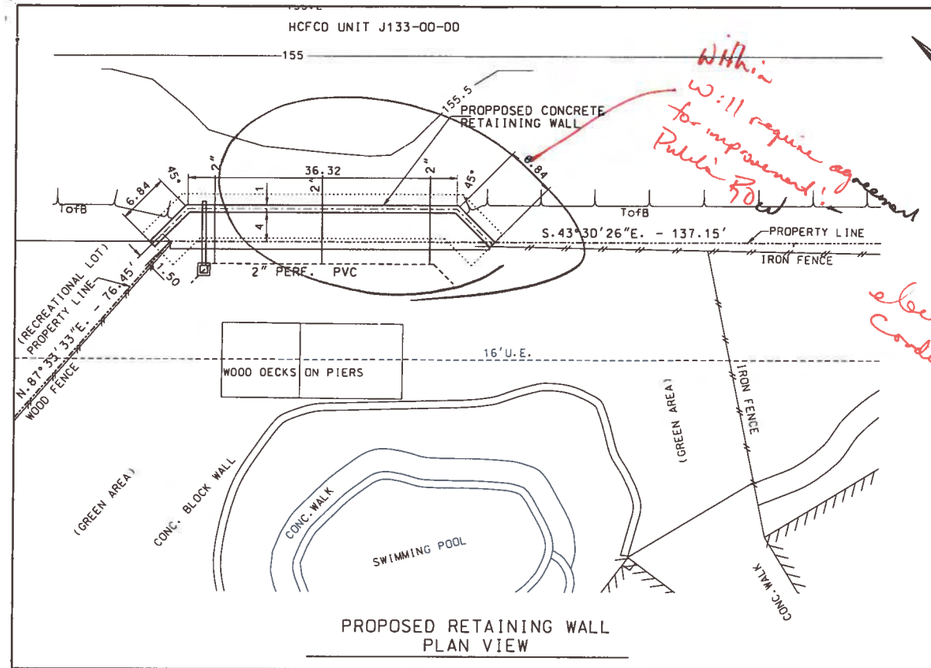
Bernard, Mark,

Attached are 2 proposals that were developed by De Anda Engineering. This was funded by myself and are based on the core sampling done by HTS. I had
De Anda look at this 2 ways; one to quickly secure my property in fear of further erosion towards my pool, and the second was a wall to replace the existing wooden wall.

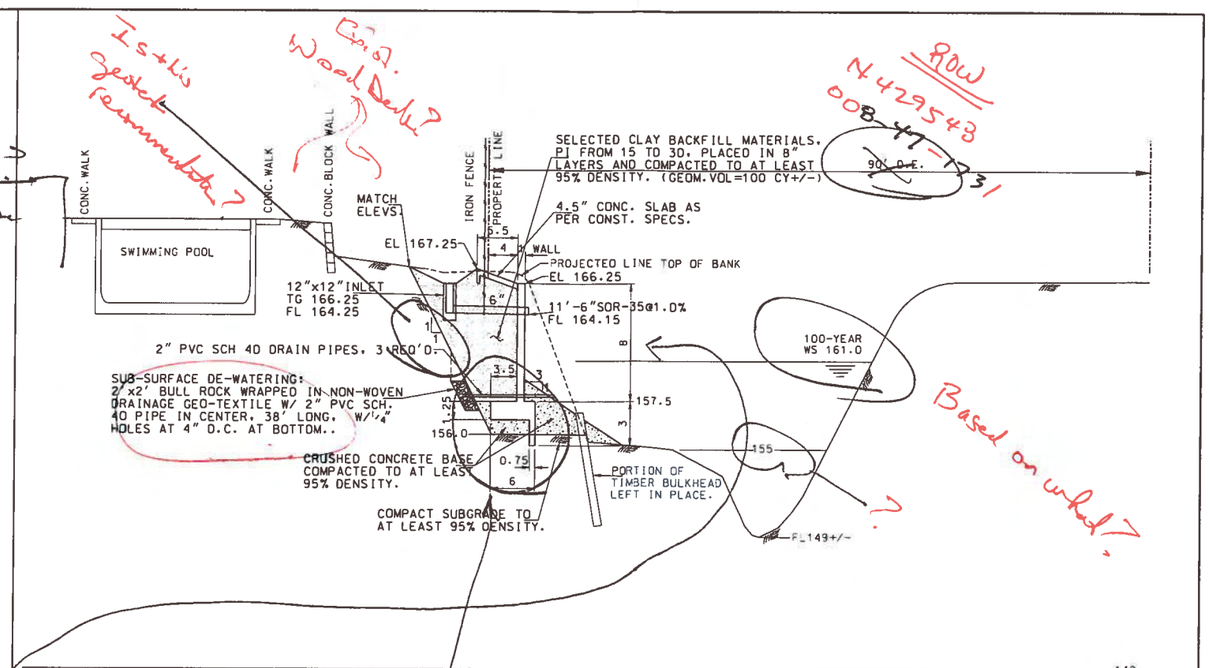
Regards,
Gary Smith

inline
Intelligent Pipeline Maintenance

Inline Services Inc.
27731 Commercial Park Dr.
Tomball, TX 77375
Tel: (281) 401-8142
Toll Free: (888) 973-0079
Fax: (281) 401-8147
glsmith@inlineplc.com



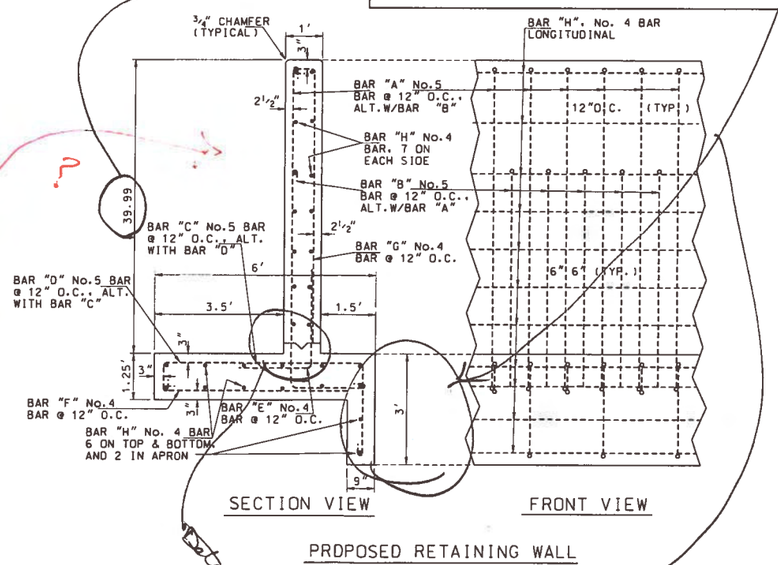
PROPOSED RETAINING WALL
PLAN VIEW



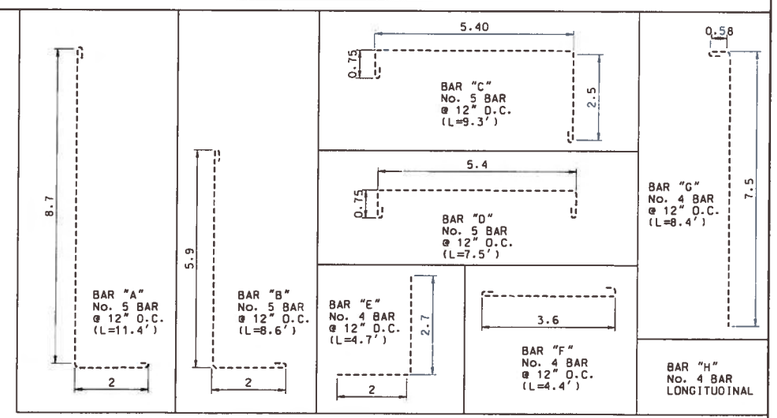
SECTION OF PROPOSED RETAINING WALL WORK

CONSTRUCTION SPECIFICATIONS

1. CONTRACTOR TO ACCESS CONSTRUCTION AREA VIA THE RECREATIONAL PROPERTY TOWARD THE NORTHEAST OF AREA OF WORK.
2. CONTRACTOR TO DEMOLISH, REMOVE AND DISPOSE OF FAILED TIMBER BULLKHEAD TO ELEVATION SHOWN IN SECTIONS.
3. CONTRACTOR TO EXCAVATE SILTY SAND AND CLAYEY SAND MATERIALS BEHIND THE FAILED BULKHEAD AND DISPOSE OF IN A LEGAL AND PROPER MANNER.
4. IF THE NATIVE SUBGRADE MATERIALS AT ELEV. 156.0 FT. ARE NOT ADEQUATE FOR RETAINING WALL FOUNDATION NOR TO ACHIEVE 95% DENSITY COMPACTION, CONTRACTOR SHALL NOTIFY ENGINEER PRIOR TO PROCEDING FURTHER WITH WORK.
5. CEMENT STABILIZED SAND SHALL BE 1.5 SACK PORTLAND CEMENT, MIN., IF NEEDED.
6. CONTRACTOR SHALL COMPACT SUBGRADE TO AT LEAST 95% DENSITY, ASTM D-698., AT 2%+/- MOISTURE CONTENT.
7. CONTRACTOR SHALL CONSTRUCT RETAINING WALL AS PER DIMENSIONS AND LOCATION SHOWN IN PLANS. CONTRACTOR MAY CONSTRUCT THE RETAINING IN TWO PHASES WITH A LOCK JOINT AT THE BASE.
8. ALL CONCRETE SHALL BE PROPERLY VIBRATED TO FILL ALL VOID AND MINIMIZE AIR-HONEY COMBS.
9. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS OF AGE. CONTRACTOR MUST SUBMIT CONCRETE MIX DESIGN PRIOR TO ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PERFORMING CONCRETE WORK.
10. REINFORCING STEEL SHALL BE NO. 4 DEFORMED BARS , ASTM A-615, AND SHALL BE PLACED AS SHOWN ON PLANS.
11. BAR REINFORCEMENT SHALL BE SUPPORTED ON PLASTIC CHAIRS.
12. REINFORCEMENT SPLICING SHALL OVERLAP AT LEAST 18".
13. EXPOSED CORNERS SHALL BE CHAMFERED 3/4" MINIMUM.
14. CONSTRCTOR TO INSTALL SUB-SURFACE DRAINAGE SYSTEM CONSISTING OF 2" PVC SCH. 40 PIPE PERFORATED WITH 1/4" HOLES AT 4" ON CENTER AT THE BOTTOM, AND 2" PVC SCH. 40 DISCHARGE LINES AS SHOWN IN PLANS. PERFORATED PIPE SHALL BE WRAPPED IN 2'X2' CONCRETE BULL ROCK WITH NON-WOVEN DRAINAGE GEO-TEXTILE.
15. BACKFILL MATERIALS TO BE PLACED BEHIND THE NEWLY CONSTRUCTED WALL SHALL BE SELECTED CLAY (CL) SOILS WITH A PI RANGING FROM 15 TO 30. BACKFILL MATERIALS SHALL BE PLACED IN 8" LAYERS AND COMPACTED TO AT LEAST 95% DENSITY, ASTM D-698 SPECS.
16. CONSTRUCT 4.5" THICK CONCRETE FENCE EDGE TO EDGE OF WALL WITH 3000 PSI CONCRETE AND REINFORCED WITH WWF6X6-W2.9XW2.9 STEEL WIREMESH OR NO. 3 BARS AT 12" ON CENTERS EACH WAY.
17. INSTALL EXPANSION BETWEEN FENCE EDGE AND WALL. SEAL JOINT WITH TWO PART POLYURETHANE SELF-LEVELING ELASTOMERIC SEALANT, TYPE M, GRADE P, CLASS 25, FED. SPEC. TT-S00227E, ON BOND BREAKER TAPE.



PROPOSED RETAINING WALL



STEEL REINFORCEMENT SCHEDULE

NOTE: DIMENSION ARE APPROXIMATE.

SUBMITTAL FOR REVIEW ONLY

MAY 14, 2010

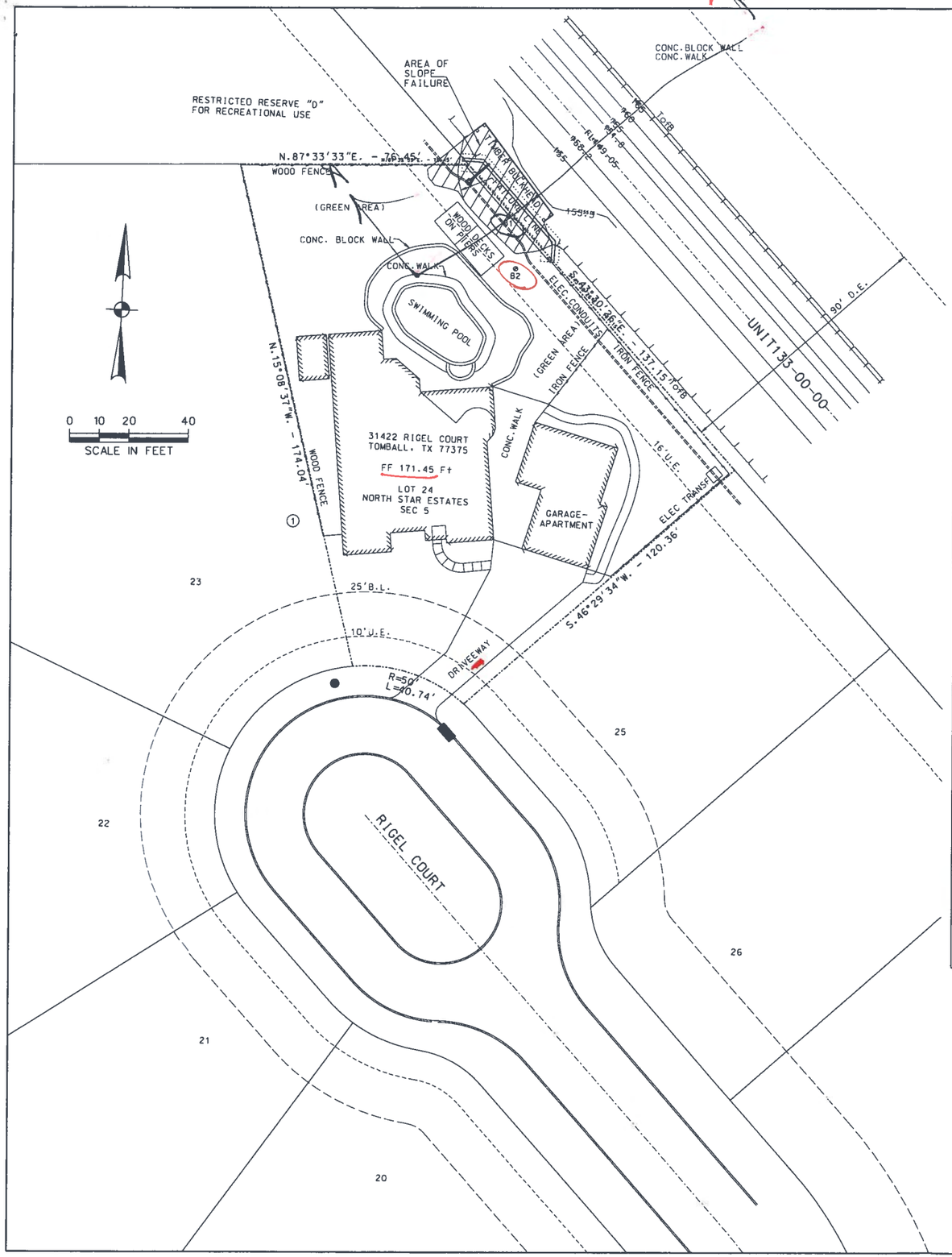
GARY & JUDY SMITH RESIDENCE
31422 RIGEL COURT
TOMBAL, HARRIS COUNTY, TX 77375

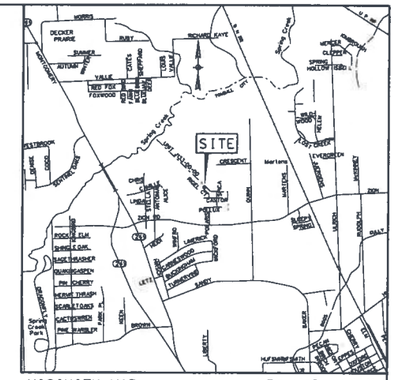
RETAINING WALL RESTORATION ON HCFCD UNIT J133-00-00

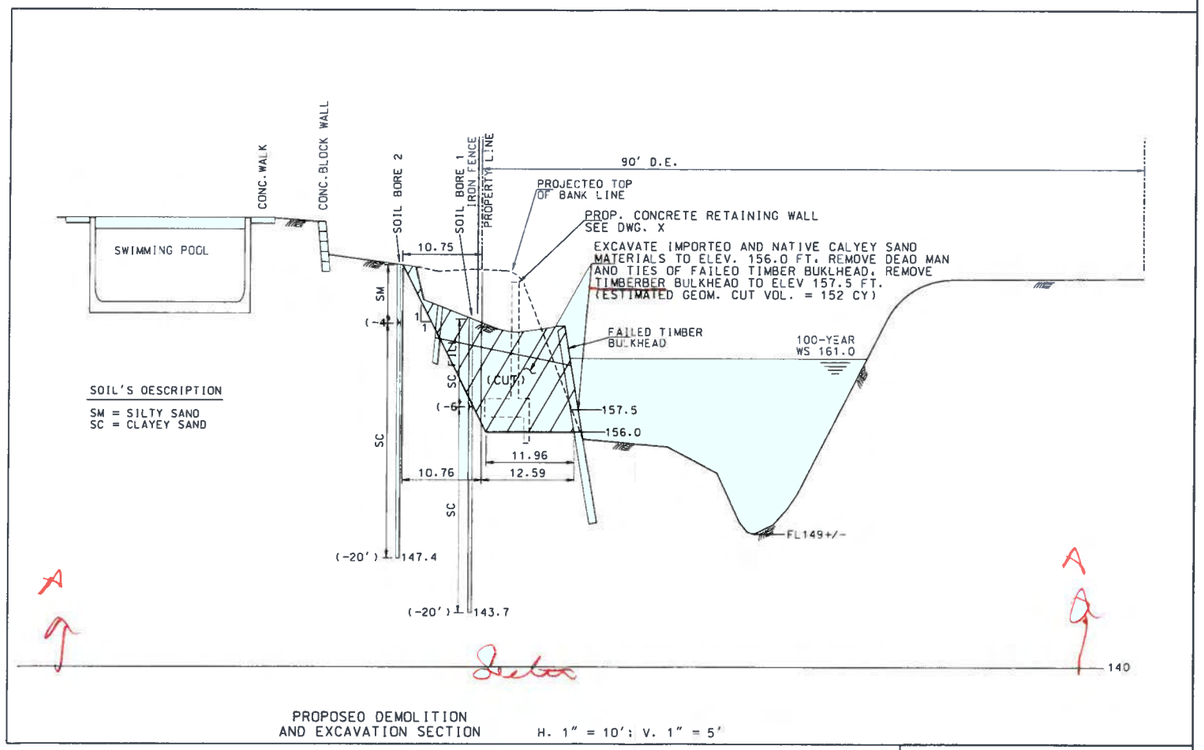
GARY & JUDY SMITH RESIDENCE

DE ANDA ENGINEERING, INC.
Consulting Civil / Municipal Engineers
1710 Telephone Rd. Houston, Texas 77023
(713) 248-4305 FAX: (713) 926-6366
E-Mail: deanda@att.net

SCALE: 1" = 20'
DATE: 5/13/2010
DESIGNED BY: AdeA
DRAWN BY: SB
SHEET No. 3 OF
OWG. No.







SUBMITTAL FOR REVIEW ONLY

MAY 14, 2010

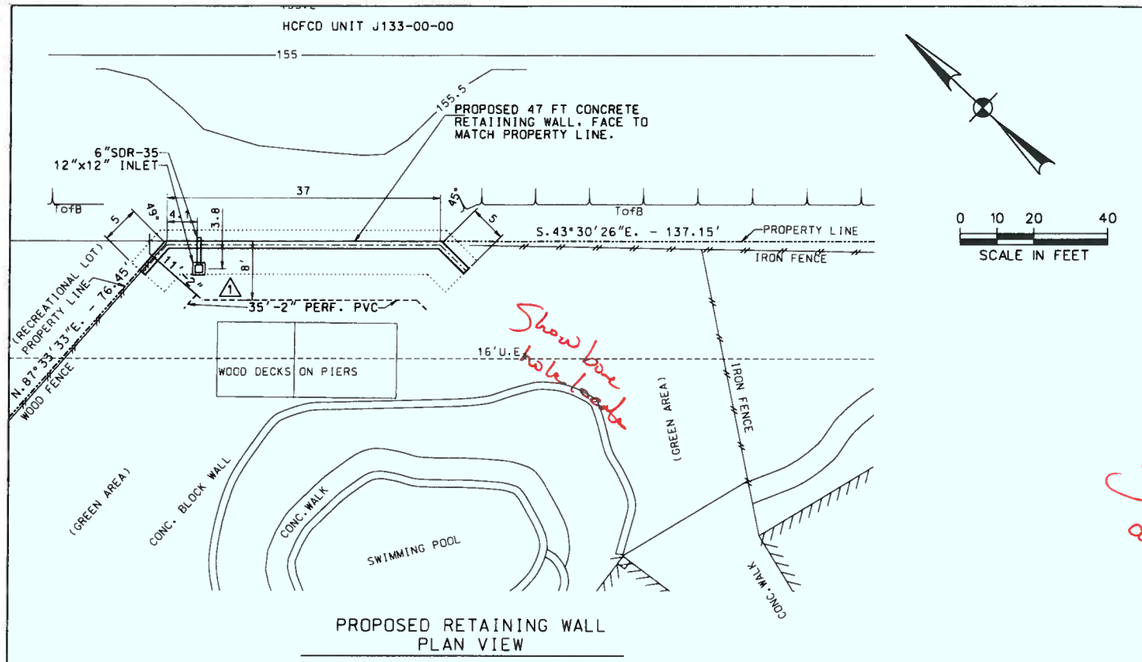
GARY & JUDY SMITH RESIDENCE
31422 RIGEL COURT
TOMBAL, HARRIS COUNTY, TX 77375

RETAINING WALL RESTORATION ON HCFCD UNIT J133-00-00

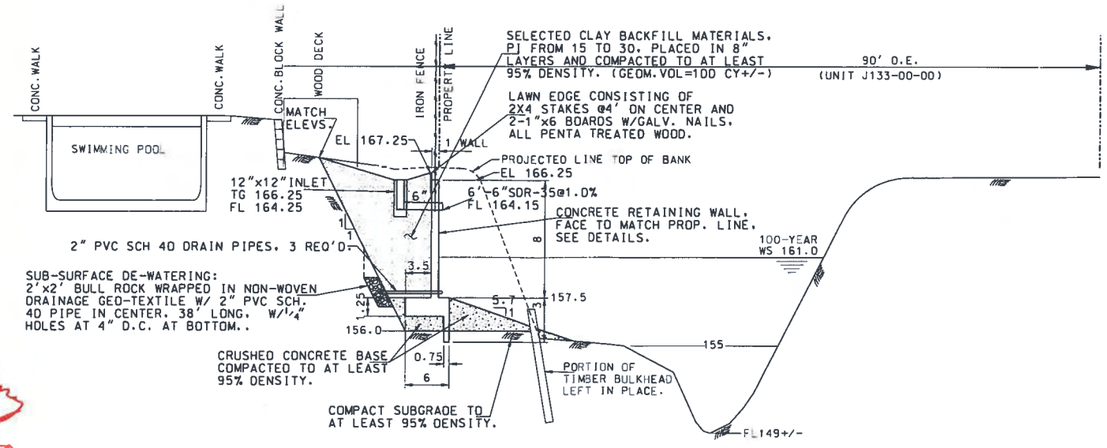
GARY & JUDY SMITH RESIDENCE

DE ANDA ENGINEERING, INC.
Consulting Civil / Municipal Engineers
1710 Telephone Rd. Houston, Texas 77023
(713) 248-4305 FAX: (713) 926-6366
E-Mail: deanda@att.net

SCALE: 1" = 20'
DATE: 5/13/2010
DESIGNED BY: AdeA
DRAWN BY: SB
SHEET No. 3 OF
DWG. No.



PROPOSED RETAINING WALL
PLAN VIEW



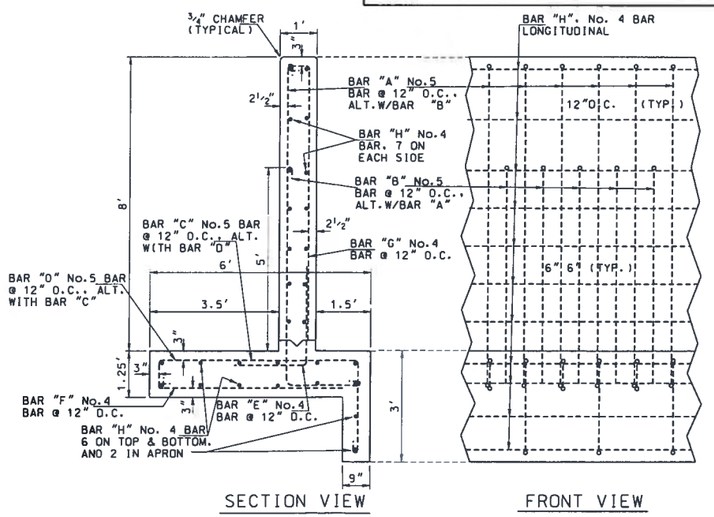
Many Same comments as 1st Shed

140

SECTION OF PROPOSED RETAINING WALL WORK

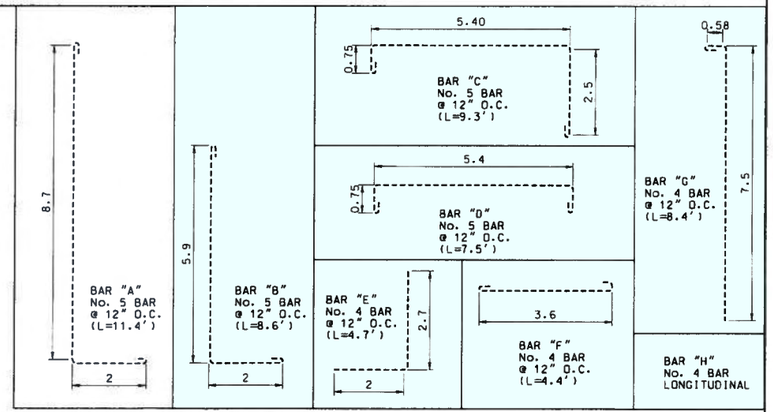
CONSTRUCTION SPECIFICATIONS

1. CONTRACTOR TO ACCESS CONSTRUCTION AREA VIA THE RECREATIONAL PROPERTY TOWARD THE NORTHEAST OF AREA OF WORK.
2. CONTRACTOR TO DEMOLISH, REMOVE AND DISPOSE OF FAILED TIMBER BULLKHEAD TO ELEVATION SHOWN IN SECTIONS.
3. CONTRACTOR TO EXCAVATE SILTY SAND AND CLAYEY SAND MATERIALS BEHIND THE FAILED BULKHEAD AND DISPOSE OF IN A LEGAL AND PROPER MANNER.
4. IF THE NATIVE SUBGRADE MATERIALS AT ELEV. 156.0 FT. ARE NOT ADEQUATE FOR RETAINING WALL FOUNDATION NOR TO ACHIEVE 95% DENSITY COMPACTION, CONTRACTOR SHALL NOTIFY ENGINEER PRIOR TO PROCEDING FURTHER WITH WORK.
5. CEMENT STABILIZED SAND SHALL BE 1.5 SACK PORTLAND CEMENT, MIN., IF NEEDED.
6. CONTRACTOR SHALL COMPACT SUBGRADE TO AT LEAST 95% DENSITY, ASTM D-698., AT 2%+/- MOISTURE CONTENT.
7. CONTRACTOR SHALL CONSTRUCT RETAINING WALL AS PER DIMENSIONS AND LOCATION SHOWN IN PLANS. CONTRACTOR MAY CONSTRUCT THE RETAINING IN TWO PHASES WITH A LOCK JOINT AT THE BASE.
8. ALL CONCRETE SHALL BE PROPERLY VIBRATED TO FILL ALL VOID AND MINIMIZE AIR-HONEY COMBS.
9. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS OF AGE. CONTRACTOR MUST SUBMIT CONCRETE MIX DESIGN PRIOR TO ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PERFORMING CONCRETE WORK.
10. REINFORCING STEEL SHALL BE NO. 4 DEFORMED BARS , ASTM A-615, AND SHALL BE PLACED AS SHOWN ON PLANS.
11. BAR REINFORCEMENT SHALL BE SUPPORTED ON PLASTIC CHAIRS.
12. REINFORCEMENT SPLICING SHALL OVERLAP AT LEAST 18".
13. EXPOSED CORNERS SHALL BE CHAMFERED 3/4" MINIMUM.
14. CONSTRCTOR TO INSTALL SUB-SURFACE DRAINAGE SYSTEM CONSISTING OF 2" PVC SCH. 40 PIPE PERFORATED WITH 1/4" HOLES AT 4" ON CENTER AT THE BOTTOM, AND 2" PVC SCH. 40 DISCHARGE LINES AS SHOWN IN PLANS. PERFORATED PIPE SHALL BE WRAPPED IN 2'X2' CONCRETE BULL ROCK WITH NON-WOVEN DRAINAGE GEO-TEXTILE.
15. BACKFILL MATERIALS TO BE PLACED BEHIND THE NEWLY CONSTRUCTED WALL SHALL BE SELECTED CLAY (CL) SOILS WITH A PI RANGING FROM 15 TO 30. BACKFILL MATERIALS SHALL BE PLACED IN 8" LAYERS AND COMPACTED TO AT LEAST 95% DENSITY, ASTM D-698 SPECS.
16. CONSTRUCT 4.5" THICK CONCRETE FENCE EDGE TO EDGE OF WALL WITH 3000 PSI CONCRETE AND REINFORCED WITH WWF6X6-W2.9XW2.9 STEEL WIREMESH OR NO. 3 BARS AT 12" ON CENTERS EACH WAY.
17. INSTALL EXPANSION BETWEEN FENCE EDGE AND WALL. SEAL JOINT WITH TWO PART POLYURETHANE SELF-LEVELING ELASTOMERIC SEALANT. TYPE M, GRADE P, CLASS 25, FED. SPEC. TT-S00227E. ON BOND BREAKER TAPE.



SECTION VIEW FRONT VIEW

PROPOSED RETAINING WALL



STEEL REINFORCEMENT SCHEDULE

NOTE: DIMENSION ARE APPROXIMATE.

STATE OF TEXAS
ARNOLD DE ANDA
38752
REGISTERED PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY ARNOLD DE ANDA, P.E. 38752 ON MAY 20, 2010.

⚠1 REVISED TO DISCHARGE 2" SUB-SURFACE DRAINAGE TO NORTH END OF WALL.

GARY & JUDY SMITH RESIDENCE
31422 RIGEL COURT
TOMBALL, HARRIS COUNTY, TX 77375

RETAINING WALL RESTORATION ON DRAINAGE UNIT J133-00-00

CONCRETE RETAINING WALL CONSTRUCTION PLAN

DE ANDA ENGINEERING, INC.
Consulting Civil / Municipal Engineers
1710 Telephone Rd. Houston, Texas 77023
(713) 248-4305 FAX: (713) 926-6366
E-Mail: deanda@att.net

SCALE: 1" = 20'
DATE: 5/20/2010
DESIGNED BY: AdeA
DRAWN BY: SB
SHEET No. 3 OF 3
DWG. No. C-3

PERMIT NO. _____

CITY OF TOMBALL
CONSTRUCTION PERMIT APPLICATION

SELECT PERMIT TYPE ☒ **Site Work** ☐ **Public Utilities** ☐ **Public ROW**

Note: If a Structure is proposed a Building Permit is required.

RECEIVED
JUN 11 2010
By _____

SECTION 1: General Provisions (APPLICANT to read and sign)

1. No work of any kind may start until a permit is issued.
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Compliance and/or Occupancy is issued.
5. The permit will expire if no work or construction is commenced within six (6) months of issuance, or if construction or work is abandoned for a period of six (6) months at any time after work is commenced.
6. Applicant is hereby informed that other permits may be required to fulfill local, state, and federal regulatory requirements. Separate permits are required for building, electrical, plumbing, heating, ventilation or air conditioning.
7. All provisions of laws and ordinances governing this type of work will be complied with whether specified herein or not.
8. The granting of a permit does not presume to give authority to violate or cancel the provisions of any other state or local law relating to construction, nor does it give authorization or approval to encroach on any easement or property or violate any deed restrictions.
9. The City of Tomball shall never be liable for any damage or loss by reason of the issuance hereof.
10. Each holder and other persons acting under authority of this permit are personally responsible for compliance with all the above provisions and assume the entire risks incidental to the work being permitted.
11. Applicant hereby gives consent to the Local Administrator or his/her representative to make reasonable inspections required to verify compliance.
12. THE APPLICANT, CERTIFY THAT ALL STATEMENTS HEREIN AND IN ATTACHMENTS TO THIS APPLICATION ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND ACCURATE.

APPLICANT'S SIGNATURE _____ DATE 06-11-2010

APPLICANT'S NAME (In Print) BERNARD JUNG

SECTION 2: Proposed Development (To be completed by **APPLICANT**)

OWNER INFORMATION: _____

STREET ADDRESS: _____ CITY _____ STATE: _____ ZIP: _____

PHONE NUMBER: _____ EMAIL: _____

ENGINEER INFORMATION: Bernard Jung

STREET ADDRESS: 800 Victoria Drive, CITY Houston STATE: TX ZIP: 77022

PHONE NUMBER: 713-699-4000 EMAIL: bernard@geotecheng.com

ARCHITECT INFORMATION: _____

STREET ADDRESS: _____ CITY _____ STATE: _____ ZIP: _____

PHONE NUMBER: _____ EMAIL: _____

CONTRACTOR INFORMATION: Geotech Engineering & Testing.

STREET ADDRESS: 800 Victoria Drive CITY Houston STATE: TX ZIP: 77022

PHONE NUMBER: 713-699-4000 EMAIL: _____

PROJECT LOCATION:

To avoid delay in processing the application, please provide enough information to easily identify the project location. Include an area map with the project location identified.

Project Title: Drilling & Sampling at Northstar Drainage Ditch, Tomball, TX

Project Address: 31422 & 31418 Rigel Court, Tomball, TX

Subdivision (If applicable): Northstar Estates Legal Description: _____

Lot No.: _____ Block: _____ Tract: _____

PERMIT NO. _____

DESCRIPTION OF WORK (Check all applicable boxes):

A. STRUCTURE TYPE

ACTIVITY	STRUCTURE TYPE
☐ New Structure	☐ Residential (Single Family)
☐ Addition	☐ Residential (Duplex)
☐ Alteration	☐ Residential (Multi-Family)
☐ Relocation	☐ Non-Residential
☐ Replacement	☐ Floodproofing
☐ Demolition	☐ Combined Use (Residential & Commercial)
	☐ Manufactured Home (Single Lot)
	☐ Manufactured Home (Manufactured Home Park)

ESTIMATED COST OF PROJECT $_____

B. OTHER DEVELOPMENT ACTIVITIES

☐ Clearing ☐ Filling ☐ Mining ☒ Drilling ☐ Grading
☐ Excavation (Except for Structural Development Checked Above)
☐ Watercourse Alteration (Including Dredging and Channel Modifications)
☐ Drainage Improvements (Including Culvert Work)
☐ Road, Street, or Bridge Construction
☐ Subdivision (New or Expansion)
☐ Utility Extensions (Water, Sanitary, and Gas)
☐ Individual Water or Sewer System (If allowed by Ordinance)
☐ Other (Please Specify) _____

C. OTHER PERMIT REQUIRED (Submit Copy of Permits)

☐ TxDOT ☐ HCFCD ☐ Harris County

DESCRIPTION: GET will conduct eight(8) soil borings, located approximately as shown on plan. Soil Samples will be obtained from groundsurface to ranging 20 to 50 ft. GET will move a section of the barricade at the dead of Spica Street to gain access but GET will reinstall this at the same day.

OFFICIAL USE ONLY

LIVING UNIT EQUIVALENCY (LUEs): _____

DRAINAGE BASIN: _____ TOTAL ACREAGE OF SITE: _____ acres

PROJECT ACREAGE (Area of Site being developed for Impact Fees): _____ acres

	TAP SIZE	TAP FEE	IMPACT FEE	TOTAL
WATER		$	$	$
SANITARY		$	$	$
GAS		$	[redacted]	$
DRAINAGE	[redacted]	[redacted]	$	$
PLAN CHECK FEE				$
CONSTRUCTION FEE				$
TOTAL AMOUNT DUE				$ 0.00

SIGNATURE: _____ DATE: 06/04/10

CITY ENGINEER

CITY COMMENTS: MUST CONTACT CITY INSPECTOR TO OBSERVE DURING ENTRY & TESTING.

PERMIT NO. _____

TYPE OF WORK (To be Completed by **APPLICANT**)

Describe the type of construction you are applying for in the space below, if there is not enough space attach extra page.
Public – water lines, sanitary sewer lines, storm sewers, gas lines and/or paving
Private – Site work, clearing, grubbing, parking, private utilities

PRIVATE / PUBLIC	TYPE OF CONSTRUCTION	DESCRIPTION OF PROPERTY LOCATION	LENGTH	SIZE	COST	CONTRIBUTOR *
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
					$	
		TOTAL COST			$	
		2% OF TOTAL COST			$	

* Names of all persons contributing to any part of the cost of the construction , whether new or for improvements must be listed with the amount paid by each for the property listed.

Construction plans with the Engineer seal must be submitted in duplicate for review for all utility construction permits issued by the City of Tomball. These plans must reflect all materials to be used and the exact dimensions of the project. All applications and plans for public utility / ROW construction work are to be submitted to the City of Tomball Director of Engineering and Planning where they will be filed and become public record.

Construction for _____ will begin on or after the _____ day of _____, 20 ____.

The map or plat of the subdivision named above is recorded in HCFC _____ or Volume _____, Page _____, of the _____ Records of Harris County, Texas.

FOR PUBLIC UTILTY WORK AND PUBLIC ROW WORK ONLY

By signing this section I agree to follow the Code of Ordinances for the City of Tomball and any associated laws applicable in the City of Tomball, Harris County, the State of Texas and the United States. Therefore I am bound to defend at my own cost and expense any suit(s), action(s), claim(s) or damage(s) sustained against the City of Tomball for any loss, cost, expense or damage charged or imposed upon the City for granting this permit. Furthermore, I agree to keep in good repair the refilling and surfacing necessitated by the excavation covered by this application for a period of one year. I also understand and agree that this permit shall be granted giving the City of Tomball, or any other person entitled, the lawful right to use said street, alley or other public place. I understand and agree that should this permit be granted for the purpose of locating or placing any pipe, conduit, duct, tunnel or other structure there is no fixed or vested right in said location and the City of Tomball, or any other person entitled, has the lawful right to lay or place its pipes, conduits or other structures in, under, over or across such pipes, conduits or other structures laid without cost or charge by the prior location for such use. I also understand and agree that these improvements, when constructed, will be public improvements, the property of the City of Tomball, and without right of reimbursement by the City for any of the costs, except as stipulated in the CITY OF TOMBALL CODE OF ORDINANCES, Section 82-231, Section 66-136 and Section 82-206 in consideration of the granted permit and the use of public property for the purpose of constructing the described facilities.

APPLICANT'S SIGNATURE _____ DATE 06-11-2010

APPLICANT'S NAME (In Print) BERNARD JUNG

Plan of Borings

Plate 1

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:
Approve the Minutes of the September 20, 2010 Regular City Council Meeting

Background:

Origination:
City Secretary

Recommendation:
N/A

Funding:

Party(ies) responsible for placing this item on agenda:
City Secretary

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

ATTACHMENTS:
Draft Minutes - 9/20/2010 Council Meeting

MINUTES OF REGULAR CITY COUNCIL MEETING
CITY OF TOMBALL, TEXAS

MONDAY SEPTEMBER 20, 2010

7:00 P.M.

1.0 The meeting was called to order by Mayor Fagan. Other members present were:

Councilman Dodson
Councilman Stoll
Councilman Brown
Councilman Townsend
Councilman Quinn

Others present:

City Manager – George Shackelford
City Secretary – Doris Speer
City Attorney – Scott Bounds
Fire Chief – Randy Parr
Police Chief – Robert Hauck
Finance Director – Glenn Windsor
Director of Public Works – David Kauffman
Assistant to City Manager – Shawn Cox
Director of Engineering and Planning – Mark McClure
Assistant City Engineer – Lori Lakatos
Chief, Northwest EMS - Brian Petrilla

2.0 Invocation

- Led by Chaplain Steve Allison, VFW Post 2427

3.0 Pledges to U. S. and Texas Flags

- Led by Members of Tomball High School Student Council Members - Anna Liu, Parliamentarian, and Mansi Baxi, Committee Chair

4.0 The following public comments were received:

Mary Harvey 405 S. Walnut, 77375	- Expressed her support for the German Christmas Market and special standing reservations for the tennis courts at Matheson Park.
Rosalie Dillon 14166 Turnervine, 77375	- Thanked City Council, City staff, and volunteers for successful 2nd Saturday event on September 11
Joe Myrick 552 FM 3083, 77375	- Expressed his opposition to President Obama and the current federal government policies, immigration, open borders, drug cartels, and past City Council decisions.
Mark Degge 30619 McKinney, 77375	- Expressed his opposition to the day labor site, socialism, communism, and ethics violations; requested Mayor Fagan's resignation.
Mary Lu Wiley 14120 Carneswood, 77375	- Expressed her concerns regarding events that do not meet the requirements for HOT funds.
Tina Salem (email)	- Her email requesting that standing reservations at the tennis courts at Matheson Park to be granted to the tennis league to which she belongs was read into the record.

5.0 Presentations:

- Presentation regarding Type B Sales Tax Corporations was given by Betty Reinbeck.
- Shawn Cox presented information regarding the 4th Annual Mayor's Challenge Community Blood Drive. Mayor Fagan presented to the Mayor's Trophy Cup to the Public Works Department, Winners of the 4th Annual Mayor's Challenge Community Blood Drive.

6.0 Reports and Announcements:

- September 25, 2010 – **Farmers Market** – 8:00 a.m.
- October 9, 2010 – **2nd Saturday at the Depot**, **5:00 p.m.**
- October 9 and 23, 2010 – **Farmers Market** – 8:00 a.m.
- ***Walk Tomball!*** (Every Saturday at 8:00 a.m. at the Depot)
- Reports by City staff and members of Council about items of community interest on which no action will be taken
    - Mark McClure presented information regarding the City of Tomball's Comprehensive Plan – Vision 2030, which has been awarded the 2010 Comprehensive Planning Award by the Texas Chapter of the American Planning

Association (APA). Texas APA planning awards recognize individuals, organizations and communities for outstanding contributions to planning in Texas. Tomball's Comprehensive Plan was adopted in December 2009 after a year-long community involvement process that included more than 1,700 citizens, stakeholders, business owners, elected/appointed officials, consultants and City staff. The award will formally be presented to the City at the 2010 APA Texas Chapter Annual Conference on October 8, 2010 in San Antonio.

- Robert Hauck and David Kauffman presented an update on the School Zone Flasher Project.
- George Shackelford presented information regarding the Railroad Commission of Texas – Pipeline Safety Evaluation.

7.0 Motion was made by Councilman Stoll, second by Councilman Townsend, to approve the Minutes of the Regular City Council Meeting of September 7, 2010.

Motion carried unanimously.

8.0 New Business:

8.1 Betty Reinbeck presented an overview of the proposed Budget. Motion was made by Councilman Townsend, second by Councilman Stoll, to approve the Tomball Economic Development Corporation (TEDC) 2010-2011 Fiscal Year Budget.

Motion carried unanimously.

8.2 Shawn Cox presented an overview of the proposed Request. Motion was made by Councilman Dodson, second by Councilman Brown, to approve Request from the Tomball Sister City for Support, Funding, and Road Closures for the 3rd Annual Tomball German Christmas Market and 2nd Saturday, to be held December 10-12, 2010.

Motion carried unanimously.

8.3 Doris Speer presented an overview of the proposed Resolution. Motion was made by Councilman Dodson, second by Councilman Townsend to approve Resolution No. 2010-19, a Resolution of the City Council of the City of Tomball, Texas for the Designation of Representative and Alternate for the Houston-Galveston Area Council 2010 General Assembly, designating Councilman Townsend as the Representative and Councilman Stoll as the Alternate.

Motion carried unanimously.

8.4 Glenn Windsor presented an overview of the proposed Resolution. Motion was made by Councilman Townsend, second by Councilman Dodson, to approve Resolution No. 2010-20, a Resolution of the City of Tomball, Texas, Adopting the City of Tomball's Investment

Policy, as Set Out in City of Tomball Administrative Policy No. 13, Entitled "Investment Policy."

Motion carried unanimously.

8.5 Glenn Windsor Presented the 2010 Effective Tax Rate to the City Council. No action necessary.

8.6 Glenn Windsor presented an overview of the proposed Tax Rate. Motion was made by Councilman Dodson, second by Councilman Stoll, to Ratify the FY 2011 Budget and Find that the proposed Tax Rate of $.251455/$100 Generates Less Property Tax Revenue than the FY 2010 Budget.

Motion carried unanimously.

8.7 Glenn Windsor presented an overview of the proposed Debt Service Fund. Motion was made by Councilman Townsend, second by Councilman Dodson, to adopt $0.140000 as the Portion of the Tax Rate for the Interest and Sinking (Debt Service) Fund for FY 2010.

Motion carried unanimously.

8.8 Glenn Windsor presented an overview of the proposed M & O. Motion was made by Councilman Townsend, second by Councilman Brown, to adopt $0.111455 as the Portion of the Tax Rate to Fund Maintenance and Operations (M&O) for FY 2011.

Motion carried unanimously.

8.9 Glenn Windsor presented an overview of the proposed Ordinance. Motion was made by Councilman Brown, second by Councilman Dodson, to read Ordinance No. 2010-20 by caption only on first reading.

Motion carried unanimously.

Motion was made by Councilman Townsend, second by Councilman Brown, to adopt, on First Reading, Ordinance No. 2010-20, An Ordinance of the City of Tomball, Texas, Setting the Tax Levy of $0.251455/$100 Value Assessed for the Year 2010 on All Taxable Real and Personal Property Located in the City of Tomball, Texas; Allowing for Homestead Exemptions for Property Owners Sixty-Five Years of Age and Over, and for Property Owners Who Qualify for Disability Benefits Under the Federal Old Age, Survivors, and Disability Insurance Program; Providing for Penalty, Interest, and Additional Penalty on Taxes Not Timely Paid; and Providing Other Matters Relating to the Subject. Vote was as follows:

Councilman Townsend Aye

draft

Councilman Dodson	Aye
Councilman Quinn	Aye
Councilman Stoll	Aye
Councilman Brown	Aye

Motion carried unanimously.

8.10 Mark McClure and Lori Lakatos presented an overview of the proposed Ordinance. Motion was made by Councilman Townsend, second by Councilman Dodson, to read Ordinance No. 2010-16 by caption only on first reading.

Motion carried unanimously.

Council requested amendments to the ordinance to add to Section 38-30(c) that, following the decision of the board, the applicant should be notified of their right to appeal the decision, and to add to Section 38-6(b) that "the City Engineer may, with approval of City Council by resolution, designate certain areas to be flood-prone based on flood history or other characteristics that indicate a potential for future flooding events". Motion was made by Councilman Townsend, second by Councilman Stoll, to adopt, on First Reading, Ordinance Number 2010-16, as amended, an Ordinance amending the Code of Ordinances of the City of Tomball, Texas, by Deleting all of Chapter 38 Thereof and Substituting Therefore a New Chapter 38; Providing Rules and Regulations Designed to Prevent Damage to Property and Injury to Persons Resulting from Flooding; Providing a Penalty in an Amount not to exceed $2,000 for Each Day of Violation of any Provision Hereof; and Providing for Severability. Vote was as follows:

Councilman Dodson	Aye
Councilman Quinn	Aye
Councilman Stoll	Aye
Councilman Brown	Aye
Councilman Townsend	Aye

Motion to adopt Ordinance No. 2010-16, as amended, carried unanimously.

8.11 Rob Hauck presented an overview of the proposed Authorization. Motion was made by Councilman Townsend, second by Councilman Stoll, to authorize Substitute Position Authorities to Cover Vacancies created by unfilled Police Officer Positions and Long-term Absence of Tomball Police Officer, Paul Overcast.

Motion carried unanimously.

8.12 David Kauffman presented an overview of the proposed Contract. Motion was made by Councilman Brown, second by Councilman Stoll, to award Contract for Janitorial

Services for City of Tomball Facilities for the 2010-2011 Fiscal Year to Low Bidder, Phillips Cleaning Services, LLC.

Motion carried unanimously.

8.13 David Kauffman presented an overview of the proposed amendment. Motion was made by Councilman Stoll, second by Councilman Brown to approve amendment to Administrative Policy #24, Entitled *"Tennis Court Reservation Policy."* Revisions to the proposed amendments were requested by Council, to allow reservation of four courts at one time, to limit reservations to four months at a time, to restrict reservations to three months in advance, to limit reservations per court to three hours, and to increase non-resident league fees to $170.00. Council also requested that notice be sent to special-needs users regarding the changes in the reservation policy. Motion was made by Councilman Townsend, second by Councilman Dodson, to approve the amendments to Administrative Policy #24, as revised by Council.

Motion carried unanimously.

8.14 Mark McClure presented the Capital Improvements Plan Advisory Committee (CIPAC) recommendation for the Mayor to Issue the Certificate of Compliance Letter to the Texas Attorney General Regarding Compliance with Chapter 395 of the Texas Local Government Code. Motion was made by Councilman Stoll, second by Councilman Brown, to receive the CIPAC recommendation.

Motion carried unanimously.

8.15 Mark McClure presented an overview of the proposed Compliance Letter. Motion was made by Councilman Townsend, second by Councilman Stoll, to authorize the Mayor to Issue the Certificate of Compliance Letter to the Texas Attorney General Regarding Compliance with Chapter 395 of the Texas Local Government Code.

Motion carried unanimously.

8.16 Mark McClure presented an overview of the proposed Change Orders. Motion was made by Councilman Townsend, second by Councilman Stoll to consider and vote on the Change Orders separately.

Motion carried unanimously.

Motion was made by Councilman Townsend, second by Councilman Brown, to approve Change Orders No. 1 for $59,320.00 for the Quinn Road Sidewalks and Utilities Project, Engineering and Planning Project No. 2007-10005, Project Bid No. 2010-01.

Motion FAILED unanimously.

Motion was made by Councilman Townsend, second by Councilman Stoll to table consideration of Change Order, pending additional information regarding the contract and Change Order #1, to be provided at the October 4, 2010 meeting.

Motion carried unanimously.

Motion was made by Councilman Dodson to table consideration of Change Order #2; motion was withdrawn.

Motion was made by Councilman Townsend, second by Councilman Dodson, to approve Change Order No. 2 for $29,030.00 for the Quinn Road Sidewalks and Utilities Project, Engineering and Planning Project No. 2007-10005, Project Bid No. 2010-01.

Motion carried unanimously.

8.17 The City Council recessed at 9:27 p.m. to meet in Executive Session as Authorized by Title 5, Chapter 551, Government Code, the Texas Open Meetings Act, for the Following Purpose:

- Sec. 551.072 – Deliberations Regarding Real Property

Upon reconvening into open session at 9:39 p.m., no action was taken.

9.0 Motion was made by Councilman Townsend, second by Councilman Stoll, for adjournment.

Motion carried unanimously.

Meeting adjourned.

PASSED AND APPROVED this 4th day of October 2010.

Doris Speer, TRMC
City Secretary

Gretchen Fagan
Mayor

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

Adopt, on Second Reading, Ordinance No. 2010-20, An Ordinance of the City of Tomball, Texas, Setting the Tax Levy of $0.251455/$100 Value Assessed for the Year 2010 on All Taxable Real and Personal Property Located in the City of Tomball, Texas; Allowing for Homestead Exemptions for Property Owners Sixty-Five Years of Age and Over, and for Property Owners Who Qualify for Disability Benefits Under the Federal Old Age, Survivors, and Disability Insurance Program; Providing for Penalty, Interest, and Additional Penalty on Taxes Not Timely Paid; and Providing Other Matters Relating to the Subject.

Background:

Council adopted Ordinance No. 2010-20 on First Reading at the September 20, 2010 Council meeting.

Ordinance No. 2010-16 includes the allocation of the proposed tax rate for FY 2011 (Tax Year 2010) as $0.140000 for the Interest & Sinking Fund and $0.111455 to Maintenance and Operations, for a total tax rate of $.251455, adopts the total tax rate, includes the current $90,000 homestead exemption for property owners sixty-five years of age and over and for property owners who qualify for disability benefits under the Federal Old Age, Survivors, and Disability Insurance Program, and provides for the levying of taxes for Fiscal Year 2011.

Origination:

Finance Department

Recommendation:

Adoption of Ordinance No. 2010-20 on Second Reading.

Funding:

Party(ies) responsible for placing this item on agenda:

City Secretary

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

ATTACHMENTS:

Notice of Vote on Tax Rate
Ordinance No. 2010-20

Notice of Vote on Tax Rate

The **CITY OF TOMBALL**, **TEXAS**
is scheduled to vote on the tax rate
at public meetings to be held
on **September 20, 2010** at 7:00 p.m.
and on **October 4, 2010** at 7:00 p.m.
at **TOMBALL CITY HALL**
401 Market Street, Tomball, Texas

The tax information above is published as a courtesy. Your individual taxes will not increase unless Harris County Appraisal District has appraised your property at a higher value. The tax rate for the City of Tomball remains the same for the fifth year.

ORDINANCE NO. 2010-20

AN ORDINANCE OF THE CITY OF TOMBALL, TEXAS, SETTING THE TAX LEVY OF $0.251455 FOR THE YEAR 2010 ON ALL TAXABLE REAL AND PERSONAL PROPERTY LOCATED IN THE CITY OF TOMBALL, TEXAS; ALLOWING FOR HOMESTEAD EXEMPTIONS FOR PROPERTY OWNERS SIXTY-FIVE YEARS OF AGE AND OVER, AND FOR PROPERTY OWNERS WHO QUALIFY FOR DISABILITY BENEFITS UNDER THE FEDERAL OLD AGE, SURVIVORS, AND DISABILITY INSURANCE PROGRAM; PROVIDING FOR PENALTY, INTEREST, AND ADDITIONAL PENALTY ON TAXES NOT TIMELY PAID; AND PROVIDING OTHER MATTERS RELATING TO THE SUBJECT.

* * * * * * * * * *

WHEREAS, pursuant to the provisions of the Constitution and Laws of the State of Texas, the City Council of the City of Tomball, Texas, is vested with the power to levy, assess and collect an annual tax upon all taxable real and personal property located within the City Limits, and said power allowing for the granting of homestead exemptions for all City of Tomball property owners sixty-five years of age and over or who are disabled; and

WHEREAS, pursuant to the Charter of the City of Tomball, this ordinance has been read two (2) times and considered at two (2) sessions of the City Council, and published in the City's official newspaper after the first reading; and

WHEREAS, the Council is required to set a tax rate, expressed as a rate per hundred-dollar valuation of said property, located in the City of Tomball, January 2, 2009; and

WHEREAS, Section 26.05 of the Texas Property Tax Code provides that before the later of September 30th or the 60th day after the date the certified appraisal roll is received by the taxing unit, the governing body of each taxing unit shall adopt a tax rate for the current tax year; and

WHEREAS, such Section further provides that where the tax rate consists of two components (one which will impose the amount of taxes needed to pay the unit's debt service and the other which will impose the amount of taxes needed to fund maintenance and operation expenditures of the unit for the next year), each of the components must be approved separately; and

WHEREAS, the proposed tax rate for the current tax year of the City of Tomball, Texas, consists of two components, a tax rate of fourteen ten thousandths cents ($0.140000) for the purpose of paying the accruing interest and to provide a sinking fund for payment of the indebtedness of the City, and a tax rate of eleven and one thousand four hundred fifty-five ten-thousandths cents ($0.111455) for the purpose of funding the maintenance and operation expenditures of the City for the next fiscal year; and

WHEREAS, City Council has approved, by separate motions, the tax rates heretofore specified for each of said components; and

WHEREAS, all notices and hearings required by law as a prerequisite to the passage, approval, and adoption of this Ordinance have been timely and properly given and held;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF TOMBALL, TEXAS:

Section 1. The facts and recitations set forth in the preamble of this Ordinance are found to be true and correct and are hereby adopted, ratified, and confirmed.

Section 2. That said tax levied as aforesaid, based upon valuations established by Harris County Appraisal District, will be sufficient to meet the requirements of the City for the Budget Year 2010-2011.

Section 3. There is hereby levied, for the tax year 2010, to fund the City's fiscal year 2010-2011 municipal budget, an ad valorem tax at the total rate of twenty-five and one thousand four hundred fifty-five ten-thousandths cents ($0.251455) on each One Hundred Dollars ($100.00) of assessed valuation on all property, real, personal, and mixed, within the corporate limits of the City, upon which an ad valorem tax is authorized by law to be levied by the City of Tomball, Texas. All such taxes shall be assessed and collected in current money of the United States of America.

Section 4. Of such total tax levied in Section 2 hereof, $0.111455 is levied to fund maintenance and operation expenditures of the City for the fiscal year 2010-2011. Of the total tax levied in Section 2 hereof, $0.14000 is levied for the purpose of paying the interest on bonds, warrants, certificates of obligation, or other lawfully authorized evidence of indebtedness issued by the City of Tomball, Texas, including the various installments of principal due on the serial bonds, warrants, certificates of obligation, or other lawfully authorized evidence of indebtedness issued by the City as such installments shall respectively mature, in the fiscal year 2010-2011. **THIS TAX RATE WILL LOWER TAXES FOR MAINTENANCE AND OPERATIONS ON A $100,000 HOME BY APPROXIMATELY $10.00.**

GENERAL FUND - TO FUND MAINTENANCE AND OPERATION EXPENDITURES OF THE CITY:	$0.111455
INTEREST & SINKING - FOR DEBT SERVICE:	$0.140000

With reference to the tax rate of $0.140000 for the Interest and Sinking Fund for bonded indebtedness, this rate, representing 55.7% of the total $0.251455 tax, shall apply to the gross amount of current taxes to be collected.

Section 5. All ad valorem taxes levied hereby, in the total amount of $0.251455 on each One Hundred Dollars ($100.00) of assessed valuation, as reflected by Sections 2 and 3 hereof, shall be due and payable on or before January 31, 2011. All ad valorem taxes due the City of Tomball, Texas, and not paid on or before January 31st following the year for which they were levied, shall bear penalty and interest, and if not paid before July 1st shall incur an additional penalty of twenty percent (20%), as prescribed in the Texas Property Tax Code. as prescribed in the Texas Tax Code.

Section 6. That said tax levied reflects an allowance of a $90,000.00 homestead exemption for City of Tomball property owners sixty-five (65) years of age and over, and for those property owners (regardless of age) who qualify for disability benefits under the Federal Old Age, Survivors, and Disability Insurance Program administered by the Social Security Administration. An eligible disabled person who is sixty-five (65) years of age or over may not receive the homestead exemption for both qualifying as "65 or over" and "disabled", but may choose either. Each person desiring such exemption shall file an application with the Harris County Appraisal District, such application being in a form and filed at such time as shall be required by law.

Section 7. All ordinances and parts of ordinances inconsistent or in conflict herewith are hereby repealed to the extent of such conflict.

Section 8. If any provision of this Ordinance is found to be invalid or unconstitutional by a court of competent jurisdiction, the same shall not invalidate or impair the validity, force, or effect of any other provision of this Ordinance.

FIRST READING:

READ, PASSED AND APPROVED AS SET OUT BELOW AT A REGULAR MEETING OF THE CITY COUNCIL OF THE CITY OF TOMBALL, HELD ON THE 20TH DAY OF SEPTEMBER, 2010.

COUNCILMAN QUINN	AYE
COUNCILMAN STOLL	AYE
COUNCILMAN BROWN	AYE
COUNCILMAN TOWNSEND	AYE
COUNCILMAN DODSON	AYE

SECOND READING:

READ, PASSED AND APPROVED AS SET OUT BELOW AT A REGULAR MEETING OF THE CITY COUNCIL OF THE CITY OF TOMBALL, HELD ON THE 4TH DAY OF OCTOBER, 2010.

COUNCILMAN QUINN	
COUNCILMAN STOLL	
COUNCILMAN BROWN	
COUNCILMAN TOWNSEND	
COUNCILMAN DODSON	

_____
GRETCHEN FAGAN, MAYOR
City of Tomball

ATTEST:

_____
DORIS SPEER, City Secretary
City of Tomball

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

Adopt, on Second Reading, Ordinance No. 2010-16, an Ordinance amending the Code of Ordinances of the City of Tomball, Texas, by Deleting all of Chapter 38 Thereof and Substituting Therefore a New Chapter 38; Providing Rules and Regulations Designed to Prevent Damage to Property and Injury to Persons Resulting from Flooding; Providing a Penalty in an Amount not to exceed $2,000 for Each Day of Violation of any Provision Hereof; and Providing for Severability.

Background:

Three major changes were proposed for Tomball's Flood Damage Prevention Ordinance:

1. The City Engineer will be authorized to designate "flood-prone" areas not currently included as special flood hazard areas (Zone AE) on Tomball's Flood Insurance Rate Map (FIRM). These areas will be subject to regulation under Chapter 38 as if they were designated as special flood hazard areas. This proposed change will have no impact on premium rates charged to flood insurance policyholders. [Sections 38-6(b) & 38-26(b)]
2. Mitigation of fill in the flood-prone area will be required. The use of fill which displaces floodplain storage volume will require mitigation through creation of an equivalent storage volume. The City Engineer will require a Fill Mitigation Analysis be submitted with the development permit application to demonstrate mitigation of fill. [Section 38-41(g)]
3. New private development in the floodway will be prohibited. Given the amount of undeveloped land within the existing regulatory floodway, this proposed change is not expected to have a significant prohibitive impact. Public development may be permitted as necessary. [Section 38-44(a)]

In addition to these two major changes, three other changes of note were proposed:

1. Revises the definition of "substantial improvement" to include "repetitive loss" as the term is defined in the ordinance. This change is required for a flood insurance policyholder to qualify for an Increased Cost of Compliance (ICC) claim under the National Flood Insurance Program (NFIP) insurance policy in a case where a flooded structure has incurred "repetitive loss" but has not been "substantially damaged", and is noncompliant with the requirements of Chapter 38. A single substantial damage event will qualify the compliant repair for ICC funding. [Section 38-5]
2. Requires a minimum "freeboard" elevation for new structures constructed in the regulatory floodway. Under this revision, the lowest point of a horizontal member of a structure, such as a bridge, located in the regulatory floodway, must be constructed at least eighteen inches above the base flood elevation at that point. This provision provides a margin of safety for debris being washed downstream during a flood event to pass beneath a structure rather than being lodged against the structure, potentially damaging the structure and/or impeding the flow of flood waters. [Section 38-44 (c)]
3. Various provisions and language are modified to reflect the Texas Model Floodplain Ordinance, which was updated since passage of the current Tomball Ordinance, 2007-07. Inclusion of this material into the Tomball code of ordinances has no impact of the existing or proposed provisions of Chapter 38. The Model Ordinance was provided by the Texas Water Development Board, the state agency responsible for NFIP coordination with FEMA.

Numerous minor adjustments and formatting improvements were also proposed.

During the September 20, 2010 meeting, Council requested an additional change in Section 38-30. Variance Procedures; the following language has been added:

"(d) *Notice of decision.* The Secretary shall give notice of the decision and the right of appeal of the decision to each party personally, by mail or by email not later than the third day after the date of the decision."

Origination:

Engineering and Planning Department

Recommendation:

Adopt Ordinance No. 2010-16 on Second Reading

Funding:

Party(ies) responsible for placing this item on agenda:

City Secretary

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

ATTACHMENTS:

Ordinance No. 2010-16 - Clean Copy
Ordinance No. 2010-16 - Redlined Copy
Overall Floodplain Map

ORDINANCE 2010-16

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF TOMBALL, TEXAS, AMENDING CHAPTER 38. FLOOD DAMAGE PREVENTION BY PROVIDING FOR THE DESIGNATION OF ADDITIONAL FLOOD HAZARD AREAS, REQUIRING THE MITIGATION OF FILL IN FLOOD-PRONE AREAS, PROHIBITING NEW DEVELOPMENT IN THE FLOODWAY, ALTERING APELLATE PROCEDURES, AND MAKING OTHER RELATED CHANGES; PROVIDING A PENALTY IN AN AMOUNT OF NOT MORE THAN $2,000 FOR VIOLATION OF ANY PROVISION HEREOF; PROVIDING FOR SAVINGS AND SEVERABILITY; PROVIDING FOR PUBLICATION; AND MAKING OTHER PROVISIONS AND FINDINGS RELATED THERETO.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF TOMBALL, TEXAS, THAT:

SECTION 1. Chapter 38, Flood Damage Prevention, of the Code of Ordinances of the City of Tomball, Texas, is amended to read:

"Chapter 38

FLOOD DAMAGE PREVENTION

ARTICLE I. IN GENERAL

Sec. 38-1. Statutory authorization.

The Legislature of the State of Texas has in the Flood Control Insurance Act and Texas Water Code (including Section 16.315) delegated the responsibility of local governmental units to adopt regulations designed to minimize flood losses. Therefore, the City of Tomball, Texas, does ordain as follows:

Sec. 38-2. Findings of fact.

(a) The flood hazard areas of the City of Tomball, Texas are subject to periodic inundation, which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

(b) These flood losses are created by the cumulative effect of obstructions in floodplains, which increase flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, or otherwise protected from flood damage

Sec. 38-3. Statement of purpose.

It is the purpose of this chapter to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

(a) Protect human life and health;

(b) Minimize expenditure of public money for costly flood control projects;

(c) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

(d) Minimize prolonged business interruptions;

(e) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in areas of special flood hazard;

(f) Help maintain a stable tax base by providing for the sound use and development of the flood-prone area in such a manner as to minimize future flood blight areas;

(g) Ensure that potential buyers are notified that property is in a flood-prone area; and

(h) Ensure that those who occupy the flood-prone area assume responsibility for their actions.

Sec. 38-4. Methods of reducing flood losses.

In order to accomplish its purposes, this chapter uses the following methods:

(a) Restrict or prohibit uses that are dangerous to health, safety, or property in times of flood, or cause excessive increases in flood heights or velocities;

(b) Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

(c) Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of flood waters;

(d) Control filling, grading, dredging, and other development which may increase flood damage; and

(e) Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or may increase flood hazards in other lands.

Sec. 38-5. Definitions.

Unless specifically defined below, words or phrases used in this chapter shall be interpreted, to give them the meaning they have in common usage and to give this chapter it's most reasonable application.

Accessory structure - means a structure which is located on the same parcel of property as the principle structure, the use of which is incidental to the use of the principle structure, and which is not to be used for human habitation. Types of accessory structures include, but are not limited to, detached garages, boathouses, small pole barns and storage sheds.

Addition - means any alteration to an existing structure that increases its footprint.

Appeal - means a request for a review of the interpretation of any provision of this chapter or a request for a variance.

Area of future conditions flood hazard - means the land area that would be inundated by the 1-percent-annual chance (100 year) flood based on future conditions hydrology.

Area of shallow flooding - means a designated AO or AH Zone on the Flood Insurance Rate Map (FIRM) with a one percent or greater annual chance of flooding to an average depth of one to three feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and, velocity flow may be evident. AO is characterized as sheet flow and AH indicates ponding.

Area of special flood hazard – is the land in the flood plain within a community subject to a one percent (1%) or greater chance of flooding in any given year. The area may be designated as Zone A on the Flood Hazard Boundary Map (FHBM). After detailed rate making has been completed in preparation for publication of the FIRM, Zone A usually is refined into Zones A, AO, AH, A1-30, AE, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE or V.

Base flood - means the flood having a one percent (1%) chance of being equaled or exceeded in any given year.

Base flood elevation (BFE) – The elevation shown on the Flood Insurance Rate Map (FIRM) and found in the accompanying Flood Insurance Study (FIS) for Zones A, AE, AH, A1-A30, AR, V1-V30, or VE that indicates the water surface elevation resulting from the flood that has a 1% chance of equaling or exceeding that level in any given year - also called the "base flood."

Basement - means any area of the building having its floor subgrade (below ground level) on all sides.

Breakaway wall - means open wood lattice, insect screening or any other suitable building material approved by the City Engineer which is not part of the structural support of the associated structure and which is intended to collapse under wind and water loads without causing collapse, displacement or other structural damage to the elevated portion of the structure or damage to the structural integrity of the structure on which breakaway walls are used.

Construction site permit – means a permit issued to a developer by the city for site work and or construction of water, sanitary, or natural gas mains.

Conveyance – means the flow of water during the base flood with a velocity that is greater than one foot per second or a depth that is greater than one foot.

Crawlspace - is an enclosed area below the lowest floor of a building formed when the foundation walls are used to elevate the lowest floor above the base flood elevation.

Critical facilities - includes facilities that materially affect the public health and welfare. Such facilities include, but are not be limited to:

(1) Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a flood;

(2) Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during, and after a flood;

(3) Public and private utility facilities that are vital to maintaining or restoring normal services to flooded areas before, during and after a flood; and

(4) Structures or facilities that produce, use, treat, store, or dispose of highly volatile, flammable, explosive, toxic, and/or water-reactive materials.

Critical feature - means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

Development - means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, clearing, filling, grading, paving, excavation or drilling operations or storage of equipment or materials. Fences or fence-type walls located within the floodplain are included within this definition.

Development permit - means a permit issued under the provisions of this chapter for any development of a site located within a flood-prone area. The term shall also include a permit for the placement of a recreational vehicle for more than 180 days in Zone AE.

Elevated building – means, for insurance purposes, a non-basement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, post, piers, pilings, or columns.

Elevation certificate - means a statement from an engineer or surveyor licensed by the State of Texas on the most current FEMA form certifying that the lowest floor of the structure has been elevated at least as high as required by this chapter.

Existing construction - means for the purposes of determining flood insurance rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date. "Existing construction" may also be referred to as "existing structures."

Existing manufactured home park or subdivision - means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by the City of Tomball.

Expansion to an existing manufactured home park or subdivision -means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads.

Fill - means any material that is placed in an area and increases the elevation of that area or displaces water volume.

Flood or flooding - means a general and temporary condition of partial or complete inundation of normally dry land areas from:

(1) the overflow of inland or tidal waters; and/or

(2) the unusual and rapid accumulation or runoff of surface waters from any source.

Flood elevation study - means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.

Flood Insurance Rate Map (FIRM) - means an official map of a community, on which the Federal Emergency Management Agency has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study (FIS) – see *Flood elevation study*

Flood protection system - means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the area within a community subject to a "special flood hazard" and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

Flood proofing – means any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Flood proofing certificate – means a certificate issued by a registered professional engineer licensed in the State of Texas which states that he has developed and/or reviewed the structural design, specifications, and plans for the construction of the structure or improvements covered by the certificate and that the design and methods of construction are in accordance with accepted standards of practice for meeting the following requirements:

(1) The flood proofing methods used are adequate to withstand the flood depths, pressures, velocities, impact and uplift forces and other factors associated with the base flood; and

(2) Together with attendant utility and sanitary facilities, the structures are designed so that below the base flood level the structures are watertight with walls impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;

Floodplain or flood-prone area - means any land area, including the special flood hazard area, susceptible to being inundated by water from any source (see definition of flooding).

Floodplain management - means the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain management regulations - means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Floodway - see *Regulatory floodway*

Functionally dependent use - means a use, which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

Highest Adjacent Grade - means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historic Structure – means any structure that is:

(1) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;

(2) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

(3) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or

(4) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:

(a) By an approved state program as determined by the Secretary of the Interior or

(b) Directly by the Secretary of the Interior in states without approved programs.

Levee - means a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

Levee system - means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

Lowest floor - means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this chapter found at section 38-42(d).

Manufactured home - means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."

Manufactured home park or subdivision - means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

Mean sea level - means, for purposes of the National Flood Insurance Program, the North American Vertical Datum (NAVD) of 1988 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

New construction - means, for the purpose of determining insurance rates, structures for which the "start of construction" commenced on or after the effective date of an initial FIRM or after December 31, 1974, whichever is later,

and includes any subsequent improvements to such structures. For floodplain management purposes, "new construction" means structures for which the "start of construction" commenced on or after the effective date of a floodplain management regulation adopted by the City of Tomball and includes any subsequent improvements to such structures.

New development- means the initial construction of a structure.

New manufactured home park or subdivision - means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by the City of Tomball.

Recreational vehicle - means a vehicle which is:

(1) built on a single chassis;

(2) 400 square feet or less when measured at the largest horizontal projections;

(3) designed to be self-propelled or permanently towable by a light duty truck; and

(4) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use

Regulatory floodway -means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Riverine - means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

Repetitive loss - means flood-related damages sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25 percent of the market value of the structure before damage occurred.

Special flood hazard area or special area – means the land in the floodplain within the city, that is subject to a one percent or greater chance of flooding in any given year and is designated on the FIRM as Zone AE.

Start of construction – (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97-348)), includes substantial improvement and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure – means, for flood plain management purposes, a walled and roofed building including a gas or liquid storage tank that is principally above ground, as well as a manufactured home.

Substantial damage - means damage of any origin sustained by a structure whereby the cost of restoring the structure to it's before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial improvement - means any repair, reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either:

(1) Before "start of construction" of the improvement or repair; or

(2) If the structure has been damaged and is being restored, before the damage occurred. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

The term includes repetitive loss, as defined in this section; "substantial damage", regardless of the actual repair work performed, but does not include either:

(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or

(2) Any alteration of a "historical structure" provided that the alteration will not preclude the structure's continued designation as a "historical structure".

Utilities - means all building utilities including, but not limited to, electrical, heating, ductwork, ventilating, plumbing, air conditioning equipment, and any other service facilities.

Variance - means a grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter. (See Sec. 38-30 of this chapter and Section 60.6 of the National Flood Insurance Program regulations.)

Violation - means the failure of a structure or other development to be fully compliant with the City of Tomball's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in this chapter is presumed to be in violation until such time as that documentation is provided.

Water Surface Elevation - means the height, in relation to the North American Vertical Datum (NAVD) of 1988 (or other datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine area

Sec. 38-6. General provisions.

(a) *Lands to which this chapter applies*. This chapter shall apply to all flood-prone areas within the jurisdiction of the City of Tomball, Texas.

(b) *Basis for establishing flood-prone areas.* The special flood hazard area identified by the Federal Emergency Management Agency in the current scientific and engineering report entitled, "The Flood Insurance Study for Harris County, Texas," dated June 18, 2007, with accompanying Flood Insurance Rate Maps, dated June 18, 2007, and any revisions thereto, are hereby adopted by reference and declared to be a part of this chapter. In addition to the special flood hazard area, the City Engineer with approval of the City Council by resolution may designate by maps certain other areas to be flood-prone based on flood history or other characteristics that indicate a potential for future flooding events.

(c) *Compliance.* No structure or land shall hereafter be located, altered, or have its use changed without full compliance with the terms of this chapter and other applicable regulations.

(d) *Penalties for noncompliance.* Any person who shall intentionally, knowingly, recklessly, or with criminal negligence, violate any provision of this chapter shall be deemed guilty of a misdemeanor and, upon conviction, shall be fined in an amount not to exceed $2,000. Each day of violation shall constitute a separate offense.

(e) *Abrogation and greater restrictions.* This chapter is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this chapter and another chapter, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

(f) *Interpretation.* In the interpretation and application of this chapter, all provisions shall be:

(1) Considered as minimum requirements;

(2) Liberally construed in favor of the governing body; and

(3) Deemed neither to limit or repeal any other powers granted under State statutes.

(g) *Warning and disclaimer of liability.* The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by manmade or natural causes. This chapter does not imply that land outside the flood-prone areas or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the City of Tomball, any officer or employee thereof for any flood damages that result from reliance on this chapter or any administrative decision lawfully made hereunder.

ARTICLE II. ADMINISTRATION.

Sec. 38-26. Establishment of development permit.

(a) *In general.* No building permit, development permit, construction site permit or other permit required for a structure or development shall be issued, and no plat shall be approved, unless the applicant demonstrates that the permit or plat meets the applicable requirements of this chapter, or unless a variance, excepting such structure or development from the provisions of this chapter, is granted under the terms of this chapter.

(b) *Development permit required.* A development permit shall be obtained before construction or development begins within any special flood hazard area established in section 38-6(b) or within any other flood-prone area designated by the City Engineer. The permit shall be for all structures including manufactured homes, as set forth in the "Definitions," and for all development including fill and other activities, also as set forth in the "Definitions."

(c) *Application for development permit.* Application for a development permit shall be made on forms furnished by the Department of Public Works and may include, but not be limited to, plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities, and the location of the foregoing. Specifically, the following information is required:

(1) The existing topography and the location, dimensions, and elevation of any proposed alterations;

(2) Existing and proposed structures;

(3) The location of the proposed alterations in relation to special flood hazard areas;

(4) Elevation in relation to mean sea level, of the lowest floor (including basement) of all new and substantially improved structures;

(5) Elevation in relation to mean sea level to which any nonresidential structures will be or have been floodproofed.

(6) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in section 38-42(b);

(7) If the site is adjacent to a watercourse or drainage channel, the description of how that watercourse will be impacted as a result of proposed development;

(8) Base flood elevations from effective FIRM data for all structures and substantial improvements; and

(9) Each sheet in the plans on which elevations are marked shall include the vertical datum and adjustment, consistent with the effective FIRM, along with the FIRM benchmark and site benchmark used for vertical control.

(d) *Elevation certificate.* The permit applicant for development of a structure is required to provide the City Engineer with a signed FEMA elevation certificate at three stages during the application and construction process.

(1) When the permit application is submitted;

(2) Prior to forming/ pouring the lowest floor of the structure; and

(3) Prior to receiving the final inspection (photographs required on final certificate).

(e) *Engineering analyses*. Based on the nature of the proposed development, the City Engineer may require the permit applicant to submit one or more of the following studies:

(1) Fill Mitigation Analysis;

(2) Hydraulic Impact Analysis;

(3) Hydrologic Impact (Overland Flow Path & Ponding) Analysis; and or,

(4) Any other technical analysis deemed necessary by the City Engineer in order to protect the community from the impacts of potential flooding events.

Permit applicants are encouraged to discuss proposed development plans with the City Engineer prior to submitting an application in order to determine which analyses may be required to support the application. Technical analyses shall be certified by a professional engineer licensed in the State of Texas.

(f) *Permit approval or denial*. Approval or denial of a development permit by the City Engineer shall be based on all of the provisions of this chapter and the following relevant factors:

(1) The danger to life and property due to flooding or erosion damage;

(2) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;

(3) The danger that materials may be swept onto other lands to the injury of others;

(4) The compatibility of the proposed use with existing and anticipated development;

(5) The safety of access to the property in times of flood for ordinary and emergency vehicles;

(6) The costs of providing governmental services during and after flood conditions including maintenance and repair of streets and bridges, and public utilities and facilities such as sewer, gas, electrical and water systems;

(7) The expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site;

(8) The necessity to the facility of a waterfront location, where applicable; and

(9) The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use.

Sec. 38-27. Designation of the Floodplain Administrator.

The City Engineer is hereby appointed Floodplain Administrator to administer and implement the provisions of this chapter and other appropriate sections of 44 CFR (Emergency Management and Assistance – National Flood Insurance Program Regulations) pertaining to floodplain management by granting or denying development permit applications in accordance with its provisions.

Sec. 38-28. Duties and responsibilities of the Floodplain Administrator.

Duties and responsibilities of the Floodplain Administrator shall include, but not be limited to:

(a) *Permit review.*

(1) Review all development permit applications to determine that the requirements of this chapter have been satisfied.

(2) Review all development permit applications to determine that all necessary permits have been obtained from those Federal, State, or local governmental agencies (including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.

(3) Review all development permit applications to determine if the proposed development is located in the regulatory floodway. If located in the regulatory floodway, assure that the encroachment provisions of section 38-44 are met.

(4) Review all development permit applications to ensure that the proposed building site projects, including the placement of manufactured homes, will be reasonably safe from flooding.

(b) *Use of other base flood data (in A Zones).* When base flood elevation data has not been provided in accordance with section38-6(b), **Basis for establishing flood-prone areas**, the Floodplain Administrator shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, in order to administer sections 38-42, **Specific standards**, and 38-44, **Floodways**.

(c) *Information to be obtained and maintained.*

(1) Where base flood elevation data is provided through the Flood Insurance Study, FIRM, or required as in section 38-28(b), obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.

(2) For all new or substantially improved flood proofed structures where base flood elevation data is provided through the Flood Insurance Study, FIRM, or as required in section 38-28(b):

(i) Verify and record the actual elevation (in relation to mean sea level), and

(ii) Maintain the flood proofing certifications required in section 38-26(c) (6).

(3) Maintain for public inspection all records pertaining to the provisions of this chapter.

(d) *Alteration of watercourses.*

(1) Notify, in riverine situations, adjacent communities and the State Coordinating Agency which is the Texas Water Development Board (TWDB) and also the Texas Commission on Environmental Quality prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency.

(2) Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

(e) *Interpretation of FIRM boundaries.* Make interpretations where needed, as to exact location of the boundaries of the special flood hazard area (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in section 38-30.

(f) *FIRM revision – encroachments*. Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program regulations, a community may approve certain development in Zones A1-30, AE and AH on a community's FIRM which increases the water surface elevation of the base flood by more than one foot, provided that the community first completes all of the provisions required by Section 65.12.

Sec. 38-29. Plat approval; issuance.

(a) Any person who is required or elects to obtain a plat shall also comply with the provisions of this chapter, if applicable.

(b) When a person files an application for approval of a plat, the approval of the plat is subject to the approval of a drainage plan for the property that is the subject of the plat application if the property is located in whole or in part in a flood-prone area within the city. The drainage plan shall include the base flood elevation data for the property certified as true and correct on the face of the drainage plan by a registered professional engineer licensed in the State of Texas.

(c) The City Engineer shall review the drainage plan and determine whether the development will be reasonably safe from flooding and whether such proposed development is:

(1) Consistent with the need to minimize flood damage within the flood-prone area;

(2) To be constructed so that all public utility facilities including, but not limited to, sanitary sewer, gas, water and electrical systems are located and constructed so as to minimize flood damage from the base flood;

(3) To be constructed so that drainage is provided to reduce exposure of such development to flood hazards; and

(4) Would comply with the applicable requirements of Article III of this chapter.

(d) If the proposed development satisfies the criteria in subsection (c) of this section, the City Engineer shall approve the drainage plan and shall so notify the City Planning and Zoning Commission in writing.

(e) The City Planning and Zoning Commission shall not approve a final plat until the City Engineer has approved the drainage plan for that site.

Sec. 38-30. Variance procedures.

(a) *Appeal board.*

(1) The Appeal Board, as established by City Council, shall hear and decide appeals and requests for variances from the requirements of this chapter.

(2) The Appeal Board shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the Floodplain Administrator in the enforcement or administration of this chapter.

(3) In passing upon such applications, the Appeal Board shall consider all technical evaluations, all relevant factors, standards specified in other sections of this chapter, and:

(i) The danger that materials may be swept onto other lands to the injury of others;

(ii) The danger to life and property due to flooding or erosion damage;

(iii) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;

(iv) The importance of the services provided by the proposed facility to the community;

(v) The necessity to the facility of a waterfront location, where applicable;

(vi) The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;

(vii) The compatibility of the proposed use with existing and anticipated development;

(viii) The relationship of the proposed use to the comprehensive plan and flood plain management program for that area;

(ix) The safety of access to the property in times of flood for ordinary and emergency vehicles;

(x) The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and,

(xi) The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

(4) Upon consideration of the factors of section 38-30(a)(3) and the purposes of this chapter, the Appeals Board may attach such conditions to the granting of variances as it deems necessary to further the purposes of this chapter.

(5) The Floodplain Administrator shall maintain the records of all appeal actions and report any variances to the Federal Emergency Management Agency upon request.

(b) *Conditions for variances*.

(1) Variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items (i-xi) in section 38-30(a)(3) have been fully considered. As the lot size increases the technical justification required for issuing the variance increases.

(2) Variances may be issued for the reconstruction, rehabilitation, or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in this section.

(3) Variances shall not be issued within a designated floodway if any increase in flood levels during the base flood discharge would result

(4) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

(5) Variances shall only be issued upon:

(i) A showing of good and sufficient cause;

(ii) A determination that failure to grant the variance would result in exceptional hardship to the applicant;

(iii) A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in section 38-30(a)(3), or conflict with existing local laws or ordinances.

(6) Variances as interpreted in the National Flood Insurance Program are based on the general zoning law principle that they pertain to a physical piece or property; they are not personal in nature and do not pertain to the structure, its inhabitants, economic or financial circumstances. They primarily address small lots in densely populated residential neighborhoods. As such, variances from the flood elevations should be quite rare.

(7) Variances may be issued for nonresidential buildings in very limited circumstances to allow a lesser degree of floodproofing than watertight or dry-floodproofing, where it can be determined that such action will have low damage potential, complies with all other variance criteria except section 38-30(b)(1), and otherwise complies with sections 38-41(a) and (b) of the General standards.

(8) Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that (i) the criteria outlined in Section 38-30 (b) are met, and (ii) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

(9) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

(c) *Appeal of decision.* All decisions of the Board of Adjustments are final and binding and may not be appealed to City Council. However, any person aggrieved by a decision of the Board of Adjustments may present a verified petition that states that the decision of Board is illegal, in whole or in part, and specifying the grounds of the illegality. Such petition must be presented to a court of appropriate jurisdiction within ten calendar days after the date the Board's decision is filed in the office of the Secretary of the Board.

(d) *Notice of decision*. The Secretary shall give notice of the decision and the right of appeal of the decision to each party personally, by mail or by email not later than the third day after the date of the decision.

ARTICLE III. PROVISIONS FOR FLOOD HAZARD REDUCTION

Sec. 38-41. General standards.

In the flood-prone area, the following standards are required:

(a) *Anchoring.*

(1) All new construction or substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads including the effects of buoyancy.

(2) All manufactured homes must likewise be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrostatic and hydrodynamic loads including the effects of buoyancy, and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors. (Reference FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques.)

(b) *Site drainage*. Drainage pathways are required around structures to guide floodwaters around such structures.

(c) *Construction materials and methods.*

(1) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

(2) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

(3) All new construction and substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

(d) *Utilities.*

(1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;

(2) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and

(3) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

(e) *Standards for subdivisions.*

(1) All subdivision proposals, including the placement of manufactured home parks and subdivisions, shall be consistent with the need to minimize flood damage;

(2) All proposals for the development of subdivisions, including the placement of manufactured home parks and subdivisions, shall meet Floodplain Development Permit requirements of this chapter

(3) All subdivision proposals, including the placement of manufactured home parks and subdivisions, shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage;

(4) All subdivision proposals, including the placement of manufactured home parks and subdivisions, shall have adequate drainage provided to reduce exposure to flood damage; and,

(5) Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for subdivision proposals and other proposed developments which contain at least 50 lots or 5 acres (whichever is less).

(f) *Review of building permits*. Where elevation data is not available either through the Flood Insurance Study, FIRM, or from another authoritative source (Section 38-28(b)), applications for building permits shall be reviewed to assure that proposed construction will be reasonably safe from flooding. The test of reasonableness is a local judgment and includes use of historical data, high water marks, photographs of past flooding, etc., where available. Failure to elevate at least two feet above the highest adjacent grade in these zones may result in higher insurance rates.

(g) *Mitigation of Fill*. Fill in the flood-prone area must be mitigated to ensure that the storage volume of such area is not diminished by development. A development permit applicant must submit a Fill Mitigation Analysis demonstrating that the proposed development, if constructed, will not result in a decrease in storage volume within the flood-prone area.

Sec. 38-42. Specific standards.

(a) *Residential construction*. New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated at least 1.5 feet above the base flood elevation. A registered professional engineer or land surveyor shall submit a FEMA Elevation Certificate to the Floodplain Administrator that verifies that the standard of this paragraph is satisfied.

(b) *Nonresidential construction*. New construction and substantial improvements of any commercial, industrial, or other nonresidential structure shall either meet the specific standards for residential construction, or, together with attendant utility and sanitary facilities, shall:

(1) Be floodproofed to at least 1.5 feet above the base flood level so that the structure is watertight with walls substantially impermeable to the passage of water;

(2) Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;

(3) Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the official as set forth in section 38-28(c)(2);

(4) Nonresidential structures that are elevated, not floodproofed, must meet the same standards for space below the lowest floor as described in section 38-42(d);

(5) Applicants floodproofing nonresidential buildings are advised that flood insurance premiums may be based on rates that are greater than those established for buildings with the first floor elevated to the same level.

(c) *Critical facility*. Construction of new critical facilities shall be, to the extent possible, located outside the limits of the flood-prone area. Construction of new critical facilities shall be permissible within the flood-

prone area if no feasible alternative site is available. Critical facilities constructed within the flood-prone area shall have the lowest floor elevated, or the structure shall be flood-proofed to an elevation, at least 1.5 feet above the elevation of the 500-year (0.2% probability) flood event or three feet above the highest adjacent grade of the building site if flood elevation data is not available. Additionally, flood proofing and sealing measures must be taken to ensure that toxic substances will not be displaced by or released into floodwaters. Access to and from the critical facility must be assured under all circumstances. The City Engineer will review and approve all plans for access routes for critical facilities located in the flood-prone area.

(d) *Enclosures.* Fully enclosed areas below the lowest floor that are subject to flooding are prohibited, or shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a professional engineer licensed in the state of Texas or must meet or exceed the following minimum criteria:

(1) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.

(2) The bottom of all openings shall be no higher than one foot above grade.

(3) Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

(4) Below grade crawlspaces shall be designed in accordance with FEMA Technical Bulletin 11-01, *"Crawlspace Construction for Buildings Located in Special Flood Hazard Areas"*, FIA-TB-11, or revisions to this document.

(5) Below grade, crawlspaces are prohibited at sites where the velocity of floodwaters exceeds five (5) feet per second.

(6) All building utility systems within the crawlspace shall be elevated above base flood elevation or be designed so that floodwaters cannot enter or accumulate within the system component during flood conditions.

(7) The interior of a crawlspace below the base flood elevation must not be more than 2 feet below the lowest adjacent exterior grade (LAG) and the height of the below grade crawlspace, measured

from the interior grade of the crawlspace to the top of the crawlspace foundation must not exceed 4 feet at any point.

(8) Below grade, crawlspaces constructed in accordance with the requirements listed in this subsection shall not be considered basements. However, applicants who construct buildings that have below grade crawlspaces are hereby advised that such buildings may have higher flood insurance premiums than buildings that have crawlspaces with interior elevations at or above the lowest adjacent grade. In addition, the building design must include adequate provision for drainage from the crawlspace following a flooding event.

(e) *Manufactured homes*.

(1) All manufactured homes to be placed or substantially improved on sites:

(i) Outside of a manufactured home park or subdivision;

(ii) In a new manufactured home park or subdivision;

(iii) In an expansion to an existing manufactured home park or subdivision; or

(iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood; shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated at 1.5 feet above the base flood elevation and be securely anchored to an adequately designed foundation system to resist flotation, collapse and lateral movement.

(2) Manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within the flood-prone area that are not subject to the above manufactured home provisions shall be elevated so that either:

(i) The lowest floor of the manufactured home is elevated at 1.5 feet above the base flood elevation, or

(ii) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately designed

foundation system to resist flotation, collapse, and lateral movement.

(f) *Recreational vehicles*. Recreational vehicles placed on sites are required to either:

(1) be on the site for fewer than 180 consecutive days;

(2) be fully licensed and ready for highway use, on its wheels or jacking system, attached to the site only by quick disconnect type utilities and security devices, and have no permanently attached additions; or

(3) meet the requirements of section 38-42(e) and the elevation and anchoring requirements for manufactures homes.

(g) *Accessory structures.* Accessory structures shall be constructed and placed on the building site so as to offer minimum resistance to the flow of floodwaters; shall be anchored to prevent floatation which may result in damage to other structures; and service utilities such as electrical and heating equipment shall be elevated or floodproofed.

(h) *Breakaway walls.* Breakaway walls must be designed so that if carried downstream they will not cause damage to any other structure. Breakaway walls must have a design safe loading resistance of not less than ten and no more than twenty pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of twenty pounds per square foot (either by design or when so required by city or state codes) may be permitted only if a registered professional engineer certifies that the proposed design meets the following conditions

(1) Wall collapse shall result from a water load less than that which would occur during the base flood; and,

(2) The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and nonstructural). Maximum wind and water loading values to be used in this determination shall each have a one percent chance of being equaled or exceeded in any given year (100 year mean recurrence interval).

Sec. 38-43. Before regulatory floodway.

In areas where a regulatory floodway has not been designated, no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the city of Tomball's FIRM unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.

Sec. 38-44. Regulatory Floodway.

The regulatory floodway is the designated area within Zone AE of the special flood hazard area established in section 38-6(b). Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles and erosion potential, the following provisions shall apply:

(a) Prohibit new private development in the regulatory floodway. Improvements to existing structures which do not propose an expansion of the existing footprint of such structures may be permitted if all other requirements of this section are fulfilled.

(b) Concerning public development, prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional civil engineer, licensed by the state of Texas, is provided demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge. This requirement may be satisfied by a Conditional Letter of Map Revision issued by the Federal Emergency Management Agency.

(c) Require that the bottom of the lowest horizontal member supporting the proposed structure, including bridges, be elevated at least 18 inches above the base flood elevation.

(d) If sections 38-44(b and c) are satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Article III hereof, Provisions for flood hazard reduction.

Sec. 38-45. Standards for shallow flooding areas (AO/AH Zones).

Located within the special flood hazard area established in Section 38-6(b) are areas designated as shallow flooding.. These areas have special flood hazards associated with flood depths of 1 to 3 feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow

may be evident. Such flooding is characterized by ponding or sheet flow. In these areas, the following provisions apply:

(a) New construction and substantial improvements of residential structures and manufactured homes within AO/AH zones shall have the lowest floor (including basement) elevated above the highest grade adjacent to the building, 1.5 feet or more above the depth number specified on the FIRM (at least two feet if no depth number is specified).

(b) New construction and substantial improvements of nonresidential structures within AO/AH zones shall either:

(1) Have the lowest floor (including basement) elevated above the highest adjacent grade of the building site, 1.5 feet or more above the depth number specified on the FIRM (at least two feet, if no depth number is specified); or

(2) Together with attendant utility and sanitary facilities, be completely flood proofed to or above that level so that any space below that level is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. If this method is used, compliance shall be certified by a registered professional engineer or architect as in section 38-42(b) (3).

(c) Require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures

(d) Recreational vehicles placed on sites within AO/AH Zones on the community's FIRM must either:

(1) be on the site for fewer than 180 consecutive days,

(2) be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or

(3) Meet the requirements of section 38-45 above and the elevation and anchoring requirements for manufactured homes."

SECTION 2. All ordinances or parts of ordinances inconsistent or in conflict herewith are, to the extent of such inconsistency or conflict, hereby repealed.

SECTION 3. It is the intent of the City that this Ordinance shall comply in all respects with the applicable provisions of the United States Constitution, the Texas Constitution, and the Charter of the City of Tomball. In the event any clause, phrase, provision, sentence, or part of this Ordinance or the application of the same to any person or circumstance shall for any reason be adjudged invalid or held unconstitutional by a court of competent jurisdiction, it shall not affect, impair, or invalidate this Ordinance as a whole or any part or provision hereof other than the part declared to be invalid or unconstitutional; and the City Council of the City of Tomball, Texas, declares that it would have passed each and every part of the same notwithstanding the omission of any such part thus declared to be invalid or unconstitutional, whether there be one or more parts.

SECTION 4. Any person, firm or corporation that knowingly violates any of the provisions or terms of this Ordinance shall be subject to the same penalty as provided for in the Code of Ordinances of the City of Tomball, Texas, and, upon conviction, shall be punished by a fine not to exceed two thousand ($2,000.00) dollars for each offense.

SECTION 5. This Ordinance shall take effect immediately from and after its passage and the publication of the caption hereof, as provided by law and the City's home rule Charter.

FIRST READING:

READ, PASSED AND APPROVED AS SET OUT BELOW AT THE MEETING OF THE CITY COUNCIL OF THE CITY OF TOMBALL HELD ON THE 20TH DAY OF SEPTEMBER 2010.

COUNCILMAN QUINN	AYE
COUNCILMAN STOLL	AYE
COUNCILMAN BROWN	AYE
COUNCILMAN TOWNSEND	AYE
COUNCILMAN DRIVER	AYE

SECOND READING:

READ, PASSED AND ADOPTED AS SET OUT BELOW AT THE MEETING OF THE CITY COUNCIL OF THE CITY OF TOMBALL HELD ON THE ___TH DAY OF _____ 2010.

COUNCILMAN QUINN	_____
COUNCILMAN STOLL	_____
COUNCILMAN BROWN	_____
COUNCILMAN TOWNSEND	_____
COUNCILMAN DRIVER	_____

_____
Gretchen Fagan, Mayor

ATTEST:

_____
Doris Speer, City Secretary

ORDINANCE 2010-16

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF TOMBALL, TEXAS, AMENDING CHAPTER 38. FLOOD DAMAGE PREVENTION BY PROVIDING FOR THE DESIGNATION OF ADDITIONAL FLOOD HAZARD AREAS, REQUIRING THE MITIGATION OF FILL IN FLOOD-PRONE AREAS, PROHIBITING NEW DEVELOPMENT IN THE FLOODWAY, ALTERING APELLATE PROCEDURES, AND MAKING OTHER RELATED CHANGES; PROVIDING A PENALTY IN AN AMOUNT OF NOT MORE THAN $2,000 FOR VIOLATION OF ANY PROVISION HEREOF; PROVIDING FOR SAVINGS AND SEVERABILITY; PROVIDING FOR PUBLICATION; AND MAKING OTHER PROVISIONS AND FINDINGS RELATED THERETO.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF TOMBALL, TEXAS, THAT:

SECTION 1. Chapter 38, Flood Damage Prevention, of the Code of Ordinances of the City of Tomball, Texas, is amended to read:

"Chapter 38

FLOOD DAMAGE PREVENTION

ARTICLE I. IN GENERAL

Sec. 38-1. Statutory authorization.

The Legislature of the State of Texas has in the Flood Control Insurance Act and Texas Water Code (including Section 16.315) delegated the responsibility of local governmental units to adopt regulations designed to minimize flood losses. Therefore, the City of Tomball, Texas, does ordain as follows:

Sec. 38-2. Findings of fact.

(a) The flood hazard areas of the City of Tomball, Texas are subject to periodic inundation, which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

(b) These flood losses are created by the cumulative effect of obstructions in floodplains, which increase flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, or otherwise protected from flood damage

Sec. 38-3. Statement of purpose.

It is the purpose of this chapter to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

(a) Protect human life and health;

(b) Minimize expenditure of public money for costly flood control projects;

(c) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

(d) Minimize prolonged business interruptions;

(e) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in areas of special flood hazard;

(f) Help maintain a stable tax base by providing for the sound use and development of the flood-prone area in such a manner as to minimize future flood blight areas;

(g) Ensure that potential buyers are notified that property is in a flood-prone area; and

(h) Ensure that those who occupy the flood-prone area assume responsibility for their actions.

Sec. 38-4. Methods of reducing flood losses.

In order to accomplish its purposes, this chapter uses the following methods:

(a) Restrict or prohibit uses that are dangerous to health, safety, or property in times of flood, or cause excessive increases in flood heights or velocities;

(b) Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

(c) Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of flood waters;

(d) Control filling, grading, dredging, and other development which may increase flood damage; and

(e) Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or may increase flood hazards in other lands.

Sec. 38-5. Definitions.

Unless specifically defined below, words or phrases used in this chapter shall be interpreted, to give them the meaning they have in common usage and to give this chapter it's most reasonable application.

Accessory structure - means a structure which is located on the same parcel of property as the principle structure, the use of which is incidental to the use of the principle structure, and which is not to be used for human habitation. Types of accessory structures include, but are not limited to, detached garages, boathouses, small pole barns and storage sheds.

Addition - means any alteration to an existing structure that increases its footprint.

Appeal - means a request for a review of the interpretation of any provision of this chapter or a request for a variance.

Area of future conditions flood hazard - means the land area that would be inundated by the 1-percent-annual chance (100 year) flood based on future conditions hydrology.

Area of shallow flooding - means a designated AO or AH Zone on the Flood Insurance Rate Map (FIRM) with a one percent or greater annual chance of flooding to an average depth of one to three feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and, velocity flow may be evident. AO is characterized as sheet flow and AH indicates ponding.

Area of special flood hazard – is the land in the flood plain within a community subject to a one percent (1%) or greater chance of flooding in any given year. The area may be designated as Zone A on the Flood Hazard Boundary Map (FHBM). After detailed rate making has been completed in preparation for publication of the FIRM, Zone A usually is refined into Zones A, AO, AH, A1-30, AE, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE or V.

Base flood - means the flood having a one percent (1%) chance of being equaled or exceeded in any given year.

Base flood elevation (BFE) – The elevation shown on the Flood Insurance Rate Map (FIRM) and found in the accompanying Flood Insurance Study (FIS) for Zones A, AE, AH, A1-A30, AR, V1-V30, or VE that indicates the water surface elevation resulting from the flood that has a 1% chance of equaling or exceeding that level in any given year - also called the "base flood."

Basement - means any area of the building having its floor subgrade (below ground level) on all sides.

Breakaway wall - means open wood lattice, insect screening or any other suitable building material approved by the City Engineer which is not part of the structural support of the associated structure and which is intended to collapse under wind and water loads without causing collapse, displacement or other structural damage to the elevated portion of the structure or damage to the structural integrity of the structure on which breakaway walls are used.

Construction site permit – means a permit issued to a developer by the city for site work and or construction of water, sanitary, or natural gas mains.

Conveyance – means the flow of water during the base flood with a velocity that is greater than one foot per second or a depth that is greater than one foot.

Crawlspace - is an enclosed area below the lowest floor of a building formed when the foundation walls are used to elevate the lowest floor above the base flood elevation.

Critical facilities - includes facilities that materially affect the public health and welfare. Such facilities include, but are not be limited to:

(1) Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a flood;

(2) Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during, and after a flood;

(3) Public and private utility facilities that are vital to maintaining or restoring normal services to flooded areas before, during and after a flood; and

(4) Structures or facilities that produce, use, treat, store, or dispose of highly volatile, flammable, explosive, toxic, and/or water-reactive materials.

Critical feature - means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

Development - means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, clearing, filling, grading, paving, excavation or drilling operations or storage of equipment or materials. Fences or fence-type walls located within the floodplain are included within this definition.

Development permit - means a permit issued under the provisions of this chapter for any development of a site located within a flood-prone area. The term shall also include a permit for the placement of a recreational vehicle for more than 180 days in Zone AE.

Elevated building – means, for insurance purposes, a non-basement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, post, piers, pilings, or columns.

Elevation certificate - means a statement from an engineer or surveyor licensed by the State of Texas on the most current FEMA form certifying that the lowest floor of the structure has been elevated at least as high as required by this chapter.

Existing construction - means for the purposes of determining flood insurance rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date. "Existing construction" may also be referred to as "existing structures."

Existing manufactured home park or subdivision - means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by the City of Tomball.

Expansion to an existing manufactured home park or subdivision -means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads.

Fill - means any material that is placed in an area and increases the elevation

of that area or displaces water volume.

Flood or flooding - means a general and temporary condition of partial or complete inundation of normally dry land areas from:

(1) the overflow of inland or tidal waters; and/or

(2) the unusual and rapid accumulation or runoff of surface waters from any source.

Flood elevation study - means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.

Flood Insurance Rate Map (FIRM) - means an official map of a community, on which the Federal Emergency Management Agency has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study (FIS) – see *Flood elevation study*

Flood protection system - means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the area within a community subject to a "special flood hazard" and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

Flood proofing – means any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Flood proofing certificate – means a certificate issued by a registered professional engineer licensed in the State of Texas which states that he has developed and/or reviewed the structural design, specifications, and plans for the construction of the structure or improvements covered by the certificate and that the design and methods of construction are in accordance with accepted standards of practice for meeting the following requirements:

(1) The flood proofing methods used are adequate to withstand the flood depths, pressures, velocities, impact and uplift forces and other factors associated with the base flood; and

(2) Together with attendant utility and sanitary facilities, the structures are designed so that below the base flood level the structures are watertight with walls impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;

Floodplain or flood-prone area - means any land area, including the special flood hazard area, susceptible to being inundated by water from any source (see definition of flooding).

Floodplain management - means the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain management regulations - means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Floodway - see *Regulatory floodway*

Functionally dependent use - means a use, which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

Highest Adjacent Grade - means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historic Structure – means any structure that is:

(1) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;

(2) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

(3) Individually listed on a state inventory of historic places in states with

historic preservation programs which have been approved by the Secretary of the Interior; or

(4) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:

(a) By an approved state program as determined by the Secretary of the Interior or

(b) Directly by the Secretary of the Interior in states without approved programs.

Levee - means a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

Levee system - means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

Lowest floor - means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this chapter found at section 38-42(d).

Manufactured home - means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."

Manufactured home park or subdivision - means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

Mean sea level - means, for purposes of the National Flood Insurance Program, the North American Vertical Datum (NAVD) of 1988 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

New construction - means, for the purpose of determining insurance rates, structures for which the "start of construction" commenced on or after the effective date of an initial FIRM or after December 31, 1974, whichever is later, and includes any subsequent improvements to such structures. For floodplain

management purposes, "new construction" means structures for which the "start of construction" commenced on or after the effective date of a floodplain management regulation adopted by the City of Tomball and includes any subsequent improvements to such structures.

New development- means the initial construction of a structure.

New manufactured home park or subdivision - means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by the City of Tomball.

Recreational vehicle - means a vehicle which is:

(1) built on a single chassis;

(2) 400 square feet or less when measured at the largest horizontal projections;

(3) designed to be self-propelled or permanently towable by a light duty truck; and

(4) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use

Regulatory floodway -means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Riverine - means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

Repetitive loss - means flood-related damages sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25 percent of the market value of the structure before damage occurred.

Special flood hazard area or special area – means the land in the floodplain within the city, that is subject to a one percent or greater chance of flooding in any given year and is designated on the FIRM as Zone AE.

Start of construction – (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97-348)), includes substantial improvement and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure – means, for flood plain management purposes, a walled and roofed building including a gas or liquid storage tank that is principally above ground, as well as a manufactured home.

Substantial damage - means damage of any origin sustained by a structure whereby the cost of restoring the structure to it's before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial improvement - means any repair, reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either:

(1) Before "start of construction" of the improvement or repair; or

(2) If the structure has been damaged and is being restored, before the damage occurred. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

The term includes repetitive loss, as defined in this section; "substantial damage", regardless of the actual repair work performed, but does not include either:

(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code

specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or

(2) Any alteration of a "historical structure" provided that the alteration will not preclude the structure's continued designation as a "historical structure".

Utilities - means all building utilities including, but not limited to, electrical, heating, ductwork, ventilating, plumbing, air conditioning equipment, and any other service facilities.

Variance - means a grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter. (See Sec. 38-30 of this chapter and Section 60.6 of the National Flood Insurance Program regulations.)

Violation - means the failure of a structure or other development to be fully compliant with the City of Tomball's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in this chapter is presumed to be in violation until such time as that documentation is provided.

Water Surface Elevation - means the height, in relation to the North American Vertical Datum (NAVD) of 1988 (or other datum, where specified), of floods of various magnitudes and frequencies in the floodplains of coastal or riverine area

Sec. 38-6. General provisions.

(a) *Lands to which this chapter applies*. This chapter shall apply to all flood-prone areas within the jurisdiction of the City of Tomball, Texas.

(b) *Basis for establishing flood-prone areas.* The special flood hazard area identified by the Federal Emergency Management Agency in the current scientific and engineering report entitled, "The Flood Insurance Study for Harris County, Texas," dated June 18, 2007, with accompanying Flood Insurance Rate Maps, dated June 18, 2007, and any revisions thereto, are hereby adopted by reference and declared to be a part of this chapter. In addition to the special flood hazard area, the City Engineer with approval of the City Council by resolution may designate by maps certain other areas to be flood-prone based on flood history or other characteristics that indicate a potential for future flooding events.

(c) *Compliance.* No structure or land shall hereafter be located, altered, or have its use changed without full compliance with the terms of this chapter and other applicable regulations.

(d) *Penalties for noncompliance.* Any person who shall intentionally, knowingly, recklessly, or with criminal negligence, violate any provision of this chapter shall be deemed guilty of a misdemeanor and, upon conviction, shall be fined in an amount not to exceed $2,000. Each day of violation shall constitute a separate offense.

(e) *Abrogation and greater restrictions.* This chapter is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this chapter and another chapter, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

(f) *Interpretation.* In the interpretation and application of this chapter, all provisions shall be:

(1) Considered as minimum requirements;

(2) Liberally construed in favor of the governing body; and

(3) Deemed neither to limit or repeal any other powers granted under State statutes.

(g) *Warning and disclaimer of liability.* The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by manmade or natural causes. This chapter does not imply that land outside the flood-prone areas or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the City of Tomball, any officer or employee thereof for any flood damages that result from reliance on this chapter or any administrative decision lawfully made hereunder.

ARTICLE II. ADMINISTRATION.

Sec. 38-26. Establishment of development permit.

(a) *In general.* No building permit, development permit, construction site permit or other permit required for a structure or development shall be issued, and no plat shall be approved, unless the applicant demonstrates that the permit or plat meets the applicable requirements of this chapter, or unless a variance, excepting such structure or development from the provisions of this chapter, is granted under the terms of this chapter.

(b) *Development permit required.* A development permit shall be obtained before construction or development begins within any special flood hazard area established in section 38-6(b) or within any other flood-prone area designated by the City Engineer. The permit shall be for all structures including manufactured homes, as set forth in the "Definitions," and for all development including fill and other activities, also as set forth in the "Definitions."

(c) *Application for development permit.* Application for a development permit shall be made on forms furnished by the Department of Public Works and may include, but not be limited to, plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities, and the location of the foregoing. Specifically, the following information is required:

(1) The existing topography and the location, dimensions, and elevation of any proposed alterations;

(2) Existing and proposed structures;

(3) The location of the proposed alterations in relation to special flood hazard areas;

(4) Elevation in relation to mean sea level, of the lowest floor (including basement) of all new and substantially improved structures;

(5) Elevation in relation to mean sea level to which any nonresidential structures will be or have been floodproofed.

(6) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in section 38-42(b);

(7) If the site is adjacent to a watercourse or drainage channel, the description of how that watercourse will be impacted as a result of proposed development;

(8) Base flood elevations from effective FIRM data for all structures and substantial improvements; and

(9) Each sheet in the plans on which elevations are marked shall include the vertical datum and adjustment, consistent with the effective FIRM, along with the FIRM benchmark and site benchmark used for vertical control.

(d) *Elevation certificate.* The permit applicant for development of a structure is required to provide the City Engineer with a signed FEMA elevation certificate at three stages during the application and construction process.

(1) When the permit application is submitted;

(2) Prior to forming/ pouring the lowest floor of the structure; and

(3) Prior to receiving the final inspection (photographs required on final certificate).

(e) *Engineering analyses*. Based on the nature of the proposed development, the City Engineer may require the permit applicant to submit one or more of the following studies:

(1) Fill Mitigation Analysis;

(2) Hydraulic Impact Analysis;

(3) Hydrologic Impact (Overland Flow Path & Ponding) Analysis; and or,

(4) Any other technical analysis deemed necessary by the City Engineer in order to protect the community from the impacts of potential flooding events.

Permit applicants are encouraged to discuss proposed development plans with the City Engineer prior to submitting an application in order to determine which analyses may be required to support the application. Technical analyses shall be certified by a professional engineer licensed in the State of Texas.

(f) *Permit approval or denial*. Approval or denial of a development permit by the City Engineer shall be based on all of the provisions of this chapter and the following relevant factors:

(1) The danger to life and property due to flooding or erosion damage;

(2) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;

(3) The danger that materials may be swept onto other lands to the injury of others;

(4) The compatibility of the proposed use with existing and anticipated development;

(5) The safety of access to the property in times of flood for ordinary and emergency vehicles;

(6) The costs of providing governmental services during and after flood conditions including maintenance and repair of streets and bridges, and public utilities and facilities such as sewer, gas, electrical and water systems;

(7) The expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site;

(8) The necessity to the facility of a waterfront location, where applicable; and

(9) The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use.

Sec. 38-27. Designation of the Floodplain Administrator.

The City Engineer is hereby appointed Floodplain Administrator to administer and implement the provisions of this chapter and other appropriate sections of 44 CFR (Emergency Management and Assistance – National Flood Insurance Program Regulations) pertaining to floodplain management by granting or denying development permit applications in accordance with its provisions.

Sec. 38-28. Duties and responsibilities of the Floodplain Administrator.

Duties and responsibilities of the Floodplain Administrator shall include, but not be limited to:

(a) *Permit review.*

(1) Review all development permit applications to determine that the requirements of this chapter have been satisfied.

(2) Review all development permit applications to determine that all necessary permits have been obtained from those Federal, State, or local governmental agencies (including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.

(3) Review all development permit applications to determine if the proposed development is located in the regulatory floodway. If located in the regulatory floodway, assure that the encroachment provisions of section 38-44 are met.

(4) Review all development permit applications to ensure that the proposed building site projects, including the placement of manufactured homes, will be reasonably safe from flooding.

(b) *Use of other base flood data (in A Zones).* When base flood elevation data has not been provided in accordance with section38-6(b), **Basis for establishing flood-prone areas**, the Floodplain Administrator shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, in order to administer sections 38-42, **Specific standards**, and 38-44, **Floodways**.

(c) *Information to be obtained and maintained.*

(1) Where base flood elevation data is provided through the Flood Insurance Study, FIRM, or required as in section 38-28(b), obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.

(2) For all new or substantially improved flood proofed structures where base flood elevation data is provided through the Flood Insurance Study, FIRM, or as required in section 38-28(b):

(i) Verify and record the actual elevation (in relation to mean sea level), and

(ii) Maintain the flood proofing certifications required in section 38-26(c) (6).

(3) Maintain for public inspection all records pertaining to the provisions of this chapter.

(d) *Alteration of watercourses.*

(1) Notify, in riverine situations, adjacent communities and the State Coordinating Agency which is the Texas Water Development Board (TWDB) and also the Texas Commission on Environmental Quality prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Emergency Management Agency.

(2) Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

(e) *Interpretation of FIRM boundaries.* Make interpretations where needed, as to exact location of the boundaries of the special flood hazard area (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in section 38-30.

(f) *FIRM revision – encroachments*. Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program regulations, a community may approve certain development in Zones A1-30, AE and AH on a community's FIRM which increases the water surface elevation of the base flood by more than one foot, provided that the community first completes all of the provisions required by Section 65.12.

Sec. 38-29. Plat approval; issuance.

(a) Any person who is required or elects to obtain a plat shall also comply with the provisions of this chapter, if applicable.

(b) When a person files an application for approval of a plat, the approval of the plat is subject to the approval of a drainage plan for the property that is the subject of the plat application if the property is located in whole or in part in a flood-prone area within the city. The drainage plan shall include the base flood elevation data for the property certified as true and correct on the face of the drainage plan by a registered professional engineer licensed in the State of Texas.

(c) The City Engineer shall review the drainage plan and determine whether the development will be reasonably safe from flooding and whether such proposed development is:

(1) Consistent with the need to minimize flood damage within the flood-prone area;

(2) To be constructed so that all public utility facilities including, but not limited to, sanitary sewer, gas, water and electrical systems are located and constructed so as to minimize flood damage from the base flood;

(3) To be constructed so that drainage is provided to reduce exposure of such development to flood hazards; and

(4) Would comply with the applicable requirements of Article III of this chapter.

(d) If the proposed development satisfies the criteria in subsection (c) of this section, the City Engineer shall approve the drainage plan and shall so notify the City Planning and Zoning Commission in writing.

(e) The City Planning and Zoning Commission shall not approve a final plat until the City Engineer has approved the drainage plan for that site.

Sec. 38-30. Variance procedures.

(a) *Appeal board.*

(1) The Appeal Board, as established by City Council, shall hear and decide appeals and requests for variances from the requirements of this chapter.

(2) The Appeal Board shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the Floodplain Administrator in the enforcement or administration of this chapter.

(3) In passing upon such applications, the Appeal Board shall consider all technical evaluations, all relevant factors, standards specified in other sections of this chapter, and:

(i) The danger that materials may be swept onto other lands to the injury of others;

(ii) The danger to life and property due to flooding or erosion damage;

(iii) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;

(iv) The importance of the services provided by the proposed facility to the community;

(v) The necessity to the facility of a waterfront location, where applicable;

(vi) The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;

(vii) The compatibility of the proposed use with existing and anticipated development;

(viii) The relationship of the proposed use to the comprehensive plan and flood plain management program for that area;

(ix) The safety of access to the property in times of flood for ordinary and emergency vehicles;

(x) The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and,

(xi) The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

(4) Upon consideration of the factors of section 38-30(a)(3) and the purposes of this chapter, the Appeals Board may attach such conditions to the granting of variances as it deems necessary to further the purposes of this chapter.

(5) The Floodplain Administrator shall maintain the records of all appeal actions and report any variances to the Federal Emergency Management Agency upon request.

(b) *Conditions for variances*.

(1) Variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items (i-xi) in section 38-30(a)(3) have been fully considered. As the lot size increases the technical justification required for issuing the variance increases.

(2) Variances may be issued for the reconstruction, rehabilitation, or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in this section.

(3) Variances shall not be issued within a designated floodway if any increase in flood levels during the base flood discharge would result

(4) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

(5) Variances shall only be issued upon:

(i) A showing of good and sufficient cause;

(ii) A determination that failure to grant the variance would result in exceptional hardship to the applicant;

(iii) A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in section 38-30(a)(3), or conflict with existing local laws or ordinances.

(6) Variances as interpreted in the National Flood Insurance Program are based on the general zoning law principle that they pertain to a physical piece or property; they are not personal in nature and do not pertain to the structure, its inhabitants, economic or financial circumstances. They primarily address small lots in densely

populated residential neighborhoods. As such, variances from the flood elevations should be quite rare.

(7) Variances may be issued for nonresidential buildings in very limited circumstances to allow a lesser degree of floodproofing than watertight or dry-floodproofing, where it can be determined that such action will have low damage potential, complies with all other variance criteria except section 38-30(b)(1), and otherwise complies with sections 38-41(a) and (b) of the General standards.

(8) Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that (i) the criteria outlined in Section 38-30 (b) are met, and (ii) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

(9) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

(c) *Appeal of decision.* All decisions of the Board of Adjustments are final and binding and may not be appealed to City Council. However, any person aggrieved by a decision of the Board of Adjustments may present a verified petition that states that the decision of Board is illegal, in whole or in part, and specifying the grounds of the illegality. Such petition must be presented to a court of appropriate jurisdiction within ten calendar days after the date the Board's decision is filed in the office of the Secretary of the Board.

(d) *Notice of decision.* The Secretary shall give notice of the decision and the right of appeal of the decision to each party personally, by mail or by email not later than the third day after the date of the decision.

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ARTICLE III. PROVISIONS FOR FLOOD HAZARD REDUCTION

Sec. 38-41. General standards.

In the flood-prone area, the following standards are required:

(a) *Anchoring.*

(1) All new construction or substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads including the effects of buoyancy.

(2) All manufactured homes must likewise be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrostatic and hydrodynamic loads including the effects of buoyancy, and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors. (Reference FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques.)

(b) *Site drainage*. Drainage pathways are required around structures to guide floodwaters around such structures.

(c) *Construction materials and methods.*

(1) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

(2) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

(3) All new construction and substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

(d) *Utilities.*

(1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;

(2) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and

(3) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

(e) *Standards for subdivisions.*

(1) All subdivision proposals, including the placement of manufactured home parks and subdivisions, shall be consistent with the need to minimize flood damage;

(2) All proposals for the development of subdivisions, including the placement of manufactured home parks and subdivisions, shall meet Floodplain Development Permit requirements of this chapter

(3) All subdivision proposals, including the placement of manufactured home parks and subdivisions, shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage;

(4) All subdivision proposals, including the placement of manufactured home parks and subdivisions, shall have adequate drainage provided to reduce exposure to flood damage; and,

(5) Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for subdivision proposals and other proposed developments which contain at least 50 lots or 5 acres (whichever is less).

(f) *Review of building permits*. Where elevation data is not available either through the Flood Insurance Study, FIRM, or from another authoritative source (Section 38-28(b)), applications for building permits shall be reviewed to assure that proposed construction will be reasonably safe from flooding. The test of reasonableness is a local judgment and includes use of historical data, high water marks, photographs of past flooding, etc., where available. Failure to elevate at least two feet above the highest adjacent grade in these zones may result in higher insurance rates.

(g) *Mitigation of Fill*. Fill in the flood-prone area must be mitigated to ensure that the storage volume of such area is not diminished by development. A

development permit applicant must submit a Fill Mitigation Analysis demonstrating that the proposed development, if constructed, will not result in a decrease in storage volume within the flood-prone area.

Sec. 38-42. Specific standards.

(a) *Residential construction*. New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated at least 1.5 feet above the base flood elevation. A registered professional engineer or land surveyor shall submit a FEMA Elevation Certificate to the Floodplain Administrator that verifies that the standard of this paragraph is satisfied.

(b) *Nonresidential construction*. New construction and substantial improvements of any commercial, industrial, or other nonresidential structure shall either meet the specific standards for residential construction, or, together with attendant utility and sanitary facilities, shall:

(1) Be floodproofed to at least 1.5 feet above the base flood level so that the structure is watertight with walls substantially impermeable to the passage of water;

(2) Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;

(3) Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the official as set forth in section 38-28(c)(2);

(4) Nonresidential structures that are elevated, not floodproofed, must meet the same standards for space below the lowest floor as described in section 38-42(d);

(5) Applicants floodproofing nonresidential buildings are advised that flood insurance premiums may be based on rates that are greater than those established for buildings with the first floor elevated to the same level.

(c) *Critical facility*. Construction of new critical facilities shall be, to the extent possible, located outside the limits of the flood-prone area. Construction of new critical facilities shall be permissible within the flood-prone area if no feasible alternative site is available. Critical facilities constructed within the flood-prone area shall have the lowest floor

elevated, or the structure shall be flood-proofed to an elevation, at least 1.5 feet above the elevation of the 500-year (0.2% probability) flood event or three feet above the highest adjacent grade of the building site if flood elevation data is not available. Additionally, flood proofing and sealing measures must be taken to ensure that toxic substances will not be displaced by or released into floodwaters. Access to and from the critical facility must be assured under all circumstances. The City Engineer will review and approve all plans for access routes for critical facilities located in the flood-prone area.

(d) *Enclosures.* Fully enclosed areas below the lowest floor that are subject to flooding are prohibited, or shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a professional engineer licensed in the state of Texas or must meet or exceed the following minimum criteria:

(1) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.

(2) The bottom of all openings shall be no higher than one foot above grade.

(3) Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

(4) Below grade crawlspaces shall be designed in accordance with FEMA Technical Bulletin 11-01, *"Crawlspace Construction for Buildings Located in Special Flood Hazard Areas"*, FIA-TB-11, or revisions to this document.

(5) Below grade, crawlspaces are prohibited at sites where the velocity of floodwaters exceeds five (5) feet per second.

(6) All building utility systems within the crawlspace shall be elevated above base flood elevation or be designed so that floodwaters cannot enter or accumulate within the system component during flood conditions.

(7) The interior of a crawlspace below the base flood elevation must not be more than 2 feet below the lowest adjacent exterior grade (LAG) and the height of the below grade crawlspace, measured from the interior grade of the crawlspace to the top of the crawlspace foundation must not exceed 4 feet at any point.

(8) Below grade, crawlspaces constructed in accordance with the requirements listed in this subsection shall not be considered basements. However, applicants who construct buildings that have below grade crawlspaces are hereby advised that such buildings may have higher flood insurance premiums than buildings that have crawlspaces with interior elevations at or above the lowest adjacent grade. In addition, the building design must include adequate provision for drainage from the crawlspace following a flooding event.

(e) *Manufactured homes*.

(1) All manufactured homes to be placed or substantially improved on sites:

(i) Outside of a manufactured home park or subdivision;

(ii) In a new manufactured home park or subdivision;

(iii) In an expansion to an existing manufactured home park or subdivision; or

(iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood; shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated at 1.5 feet above the base flood elevation and be securely anchored to an adequately designed foundation system to resist flotation, collapse and lateral movement.

(2) Manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within the flood-prone area that are not subject to the above manufactured home provisions shall be elevated so that either:

(i) The lowest floor of the manufactured home is elevated at 1.5 feet above the base flood elevation, or

(ii) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately designed foundation system to resist flotation, collapse, and lateral movement.

(f) *Recreational vehicles*. Recreational vehicles placed on sites are required to either:

(1) be on the site for fewer than 180 consecutive days;

(2) be fully licensed and ready for highway use, on its wheels or jacking system, attached to the site only by quick disconnect type utilities and security devices, and have no permanently attached additions; or

(3) meet the requirements of section 38-42(e) and the elevation and anchoring requirements for manufactures homes.

(g) *Accessory structures.* Accessory structures shall be constructed and placed on the building site so as to offer minimum resistance to the flow of floodwaters; shall be anchored to prevent floatation which may result in damage to other structures; and service utilities such as electrical and heating equipment shall be elevated or floodproofed.

(h) *Breakaway walls*. Breakaway walls must be designed so that if carried downstream they will not cause damage to any other structure. Breakaway walls must have a design safe loading resistance of not less than ten and no more than twenty pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of twenty pounds per square foot (either by design or when so required by city or state codes) may be permitted only if a registered professional engineer certifies that the proposed design meets the following conditions

(1) Wall collapse shall result from a water load less than that which would occur during the base flood; and,

(2) The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and nonstructural). Maximum wind and water loading values to be used in this determination shall each have a one percent chance of being equaled or exceeded in any given year (100 year mean recurrence interval).

Sec. 38-43. Before regulatory floodway.

In areas where a regulatory floodway has not been designated, no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the city of Tomball's FIRM unless

it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.

Sec. 38-44. Regulatory Floodway.

The regulatory floodway is the designated area within Zone AE of the special flood hazard area established in section 38-6(b). Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles and erosion potential, the following provisions shall apply:

(a) Prohibit new private development in the regulatory floodway. Improvements to existing structures which do not propose an expansion of the existing footprint of such structures may be permitted if all other requirements of this section are fulfilled.

(b) Concerning public development, prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional civil engineer, licensed by the state of Texas, is provided demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge. This requirement may be satisfied by a Conditional Letter of Map Revision issued by the Federal Emergency Management Agency.

(c) Require that the bottom of the lowest horizontal member supporting the proposed structure, including bridges, be elevated at least 18 inches above the base flood elevation.

(d) If sections 38-44(b and c) are satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Article III hereof, Provisions for flood hazard reduction.

Sec. 38-45. Standards for shallow flooding areas (AO/AH Zones).

Located within the special flood hazard area established in Section 38-6(b) are areas designated as shallow flooding.. These areas have special flood hazards associated with flood depths of 1 to 3 feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow. In these areas, the following provisions apply:

(a) New construction and substantial improvements of residential structures and manufactured homes within AO/AH zones shall have the

lowest floor (including basement) elevated above the highest grade adjacent to the building, 1.5 feet or more above the depth number specified on the FIRM (at least two feet if no depth number is specified).

(b) New construction and substantial improvements of nonresidential structures within AO/AH zones shall either:

(1) Have the lowest floor (including basement) elevated above the highest adjacent grade of the building site, 1.5 feet or more above the depth number specified on the FIRM (at least two feet, if no depth number is specified); or

(2) Together with attendant utility and sanitary facilities, be completely flood proofed to or above that level so that any space below that level is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. If this method is used, compliance shall be certified by a registered professional engineer or architect as in section 38-42(b) (3).

(c) Require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures

(d) Recreational vehicles placed on sites within AO/AH Zones on the community's FIRM must either:

(1) be on the site for fewer than 180 consecutive days,

(2) be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or

(3) Meet the requirements of section 38-45 above and the elevation and anchoring requirements for manufactured homes."

SECTION 2. All ordinances or parts of ordinances inconsistent or in conflict herewith are, to the extent of such inconsistency or conflict, hereby repealed.

SECTION 3. It is the intent of the City that this Ordinance shall comply in all respects with the applicable provisions of the United States Constitution, the Texas Constitution, and the Charter of the City of Tomball. In the event any clause, phrase, provision, sentence, or part of

this Ordinance or the application of the same to any person or circumstance shall for any reason be adjudged invalid or held unconstitutional by a court of competent jurisdiction, it shall not affect, impair, or invalidate this Ordinance as a whole or any part or provision hereof other than the part declared to be invalid or unconstitutional; and the City Council of the City of Tomball, Texas, declares that it would have passed each and every part of the same notwithstanding the omission of any such part thus declared to be invalid or unconstitutional, whether there be one or more parts.

SECTION 4. Any person, firm or corporation that knowingly violates any of the provisions or terms of this Ordinance shall be subject to the same penalty as provided for in the Code of Ordinances of the City of Tomball, Texas, and, upon conviction, shall be punished by a fine not to exceed two thousand ($2,000.00) dollars for each offense.

SECTION 5. This Ordinance shall take effect immediately from and after its passage and the publication of the caption hereof, as provided by law and the City's home rule Charter.

FIRST READING:

READ, PASSED AND APPROVED AS SET OUT BELOW AT THE MEETING OF THE CITY COUNCIL OF THE CITY OF TOMBALL HELD ON THE 20TH DAY OF SEPTEMBER 2010.

COUNCILMAN QUINN	AYE
COUNCILMAN STOLL	AYE
COUNCILMAN BROWN	AYE
COUNCILMAN TOWNSEND	AYE
COUNCILMAN DRIVER	AYE

SECOND READING:

READ, PASSED AND ADOPTED AS SET OUT BELOW AT THE MEETING OF THE CITY COUNCIL OF THE CITY OF TOMBALL HELD ON THE ___TH DAY OF _____ 2010.

COUNCILMAN QUINN _____

COUNCILMAN STOLL _____

COUNCILMAN BROWN _____

COUNCILMAN TOWNSEND _____

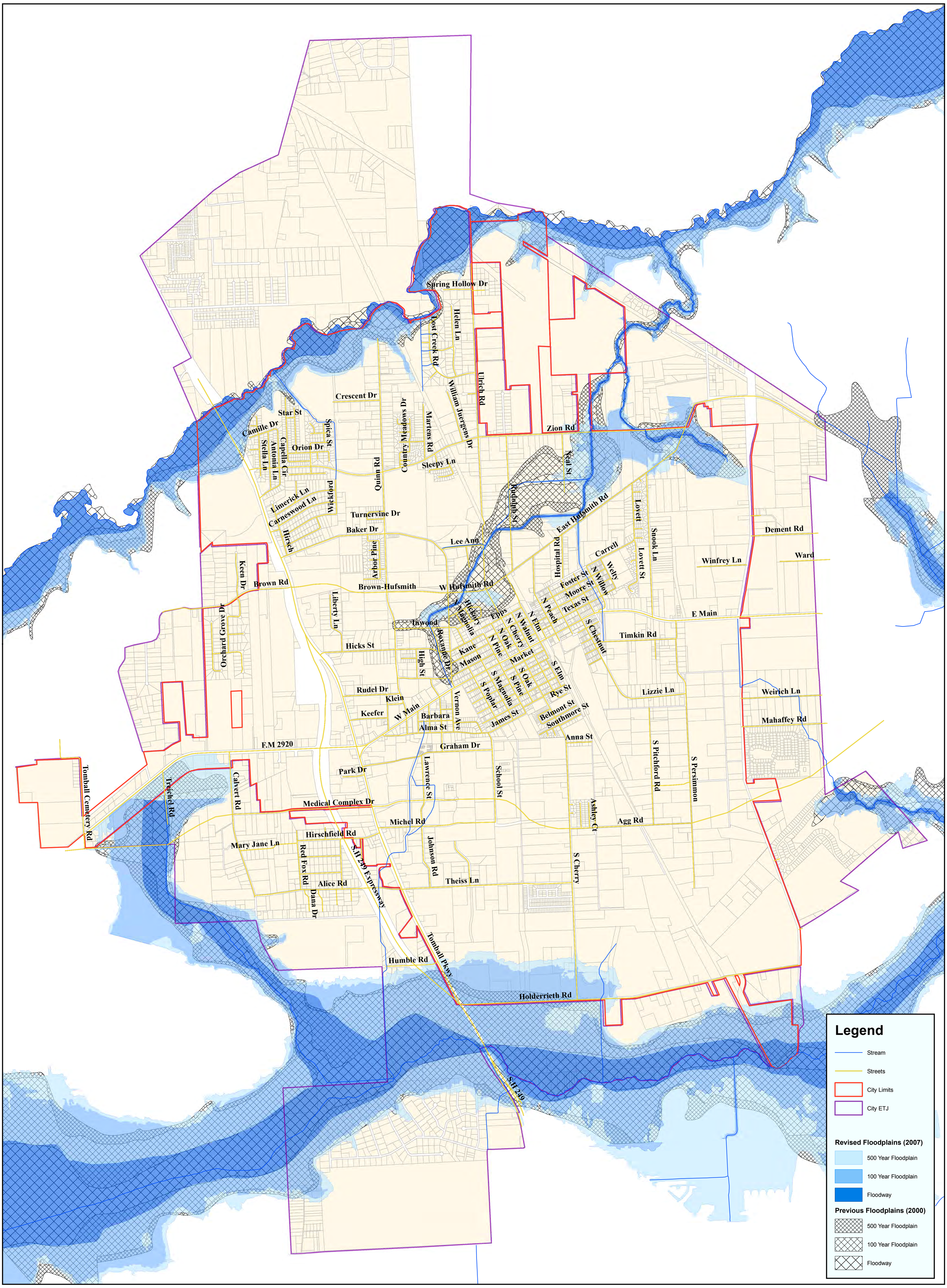
COUNCILMAN DRIVER _____

_____
Gretchen Fagan, Mayor

ATTEST:

_____
Doris Speer, City Secretary

REVISED FEMA FLOODPLAIN



501 James St.
Tomball, Tx. 77375

This is not an official FEMA Flood Insurance Rate Map (FIRM).
This is for information purposes only and allows the user the view the Revised Preliminary FEMA Floodplains.

The Revised FEMA Floodplain is effective as of June 18, 2007.

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Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

Approve Resolution No. 2010-21, a Resolution of the City Council of the City of Tomball, Texas, Supporting the 45th Annual Tomball Holiday Parade, "**Peace, Love, and the Holidays**" to be held in Tomball on Saturday, November 20, 2010 and to Approve Requested Street Closures and In-kind Services.

Background:

The Chamber of Commerce must request approval from TxDOT to close FM 2920 for the annual Holiday Parade; the request must include a Resolution from the City of Tomball supporting the parade.

This is our customary resolution supporting and endorsing the annual Chamber-sponsored Tomball Holiday Parade, scheduled to take place on Saturday, November 20.

In addition to closing FM 2920 from FM 2978 to Business 249 from 9:15 a.m. until 12:30 p.m. for the parade, the Chamber is requesting closure of the following streets on Saturday, November 20, from 7:00 a.m. until noon:

- North Elm between Main Street and Hufsmith Road
- North Walnut between Main Street and Epps
- 100 and 200 Block of Commerce
- 100 and 200 Block of Houston
- 100 and 200 Block of Oxford
- South Elm between Main and Market Streets
- South Walnut between Main and Fannin Streets
- 100 and 200 Block of Market Street.

The Chamber is also requesting the use of Tomball Police, Fire and Public Works personnel. The estimated cost for the use of personnel is $5,000.00.

The annual Holiday Parade is extremely popular with the local community and brings visitors from the surrounding areas who often remain to shop and enjoy our city.

Origination:

Greater Tomball Area Chamber of Commerce

Recommendation:

Adopt Resolution No. 2010-21

Funding:

Party(ies) responsible for placing this item on agenda:

Shawn Cox

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

ATTACHMENTS:

Resolution 2010-21
Chamber Request Letter
Parade Map

RESOLUTION NO. 2010-21

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TOMBALL, TEXAS, SUPPORTING THE 46TH ANNUAL TOMBALL HOLIDAY PARADE, *"PEACE, LOVE, AND THE HOLIDAYS"*, TO BE HELD IN TOMBALL ON SATURDAY, NOVEMBER 20, 2010.

* * * * * * *

WHEREAS the Greater Tomball Area Chamber of Commerce will undertake the 45th Annual Tomball Holiday Parade, to be held in the City of Tomball at 10:00 a.m. on Saturday, November 20, 2010; and

WHEREAS the theme of the 45th Annual Tomball Holiday Parade is **"Peace, Love and the Holidays"**, and the purpose of the 45th Annual Tomball Holiday is to celebrate "all things from the 1960s" and our quality of life and to create an avenue for others outside to come to our fair City to enjoy fun, food and good cheer; and

WHEREAS it is a chance for Tomball area merchants and business people to gain a new customer base through monies spent by those attending the 43rd Annual Tomball Holiday Parade; and

WHEREAS activities celebrating the 45th Annual Tomball Holiday Parade will include the annual parade, food, crafts, and hometown merchants selling from their businesses; and

WHEREAS the Greater Tomball Area Chamber of Commerce desires and requests the support and endorsement of the City of Tomball in this community-wide effort;

NOW, THEREFORE, BE IT RESOLVED that the City of Tomball and its governing body endorses and supports the efforts of the Greater Tomball Area Chamber of Commerce in promoting and undertaking the 45th Annual Tomball Holiday Parade and pledge to encourage this effort to celebrate our heritage and promote our future betterment.

PASSED AND APPROVED AS SET OUT BELOW AT THE MEETING OF THE CITY COUNCIL HELD ON THE 4th DAY OF October, 2010.

_____
GRETCHEN FAGAN, Mayor

ATTEST:

_____
DORIS SPEER, City Secretary

Greater Tomball Area
Chamber of Commerce
www.tomballchamber.org

September 21, 2010

City of Tomball
Mr. George Shackelford
401 Market Street
Tomball, Texas 77375

RE: Tomball Holiday Parade

Dear Mr. Shackelford,

We are anticipating a fabulous Tomball Holiday Parade at 10 a.m. on Saturday, November 20, 2010 with help from our city, police and fire departments, as well as from numerous volunteers. The popular attraction is a Tomball tradition that has continued for 45 years. We are looking forward again to the expertise of the Tomball Police Department for crowd control and as visual deterrents from any negative activity.

To insure the safety of the many visitors and Parade participants who will be in Tomball on November 20, we are asking for street closures for the following streets on Saturday morning only from 7:00 a.m. until noon:

- North Elm between Main Street and Hufsmith Rd.
- North Walnut between Main Street and Epps
- 100 & 200 block of Commerce
- 100 & 200 block of Houston
- 100 & 200 block of Oxford
- South Elm between Main Street and Market Street
- South Walnut between Main Street and Fannin
- 100 & 200 block of Market Street

From 9:15 a.m. until 12:30 p.m.

- FM 2920 from FM 2978 to Business 249

Enclosed is a map for your review. Residents of these streets will still have access to and from their homes.

We appreciate the City of Tomball, its special partnership with the chamber and the assistance always offered for our events. Should you have any questions or concerns, please contact Brandy Beyer or myself at 281-351-7222.

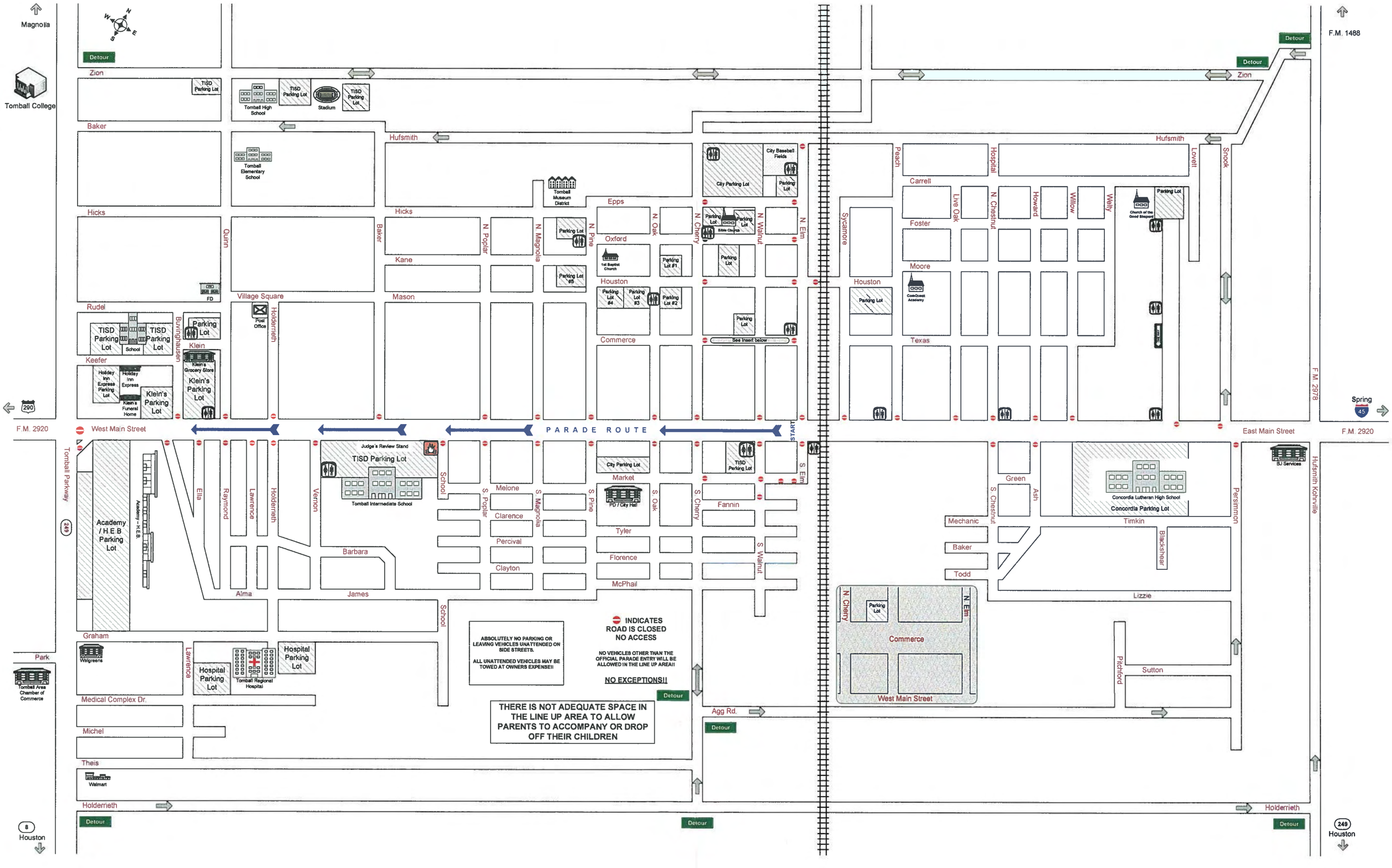
Thank ya, George!!

Sincerely,

Bruce Hillegeist
President

Encl: Map

P.O. Box 516 • Tomball, TX 77377-0516
281.351.7222 • fax: 281.351.7223 • admin@tomballchamber.org


Magnolia
Tomball College
F.M. 2920
290
West Main Street
Tomball Parkway
249
Park
Tomball Area Chamber of Commerce
8
Houston
Detour
Zion
Baker
Hicks
Rudel
Keefer
Buxkamp
Klein
Quinn
Village Square
Holderrieth
Michel
Theis
Graham
Medical Complex Dr.
Lawrence
Ella
Raymond
Lawrence
Holderrieth
Vernon
Alma
James
School
Barbara
Academy / H.E.B Parking Lot
Academy - H.E.B.
Walgreens
Walmart
Tomball Regional Hospital
Hospital Parking Lot
Hufsmith
Kane
Mason
Houston
Commerce
Epps
Oxford
Tomball Museum District
Tomball Elementary School
Tomball High School
Stadium
TISD Parking Lot
TISD Parking Lot
TISD Parking Lot
TISD Parking Lot
TISD Parking Lot
School
Holiday Inn Express Parking Lot
Holiday Inn Express
Klein's Funeral Home
Klein's Parking Lot
Klein's Grocery Store
Klein's Parking Lot
Parking Lot
Post Office
FD
Parking Lot #5
Parking Lot #4
Parking Lot #3
Parking Lot #2
Parking Lot #1
1st Baptist Church
N. Pine
N. Oak
N. Poplar
N. Magnolia
N. Cherry
N. Walnut
N. Elm
Judge's Review Stand
TISD Parking Lot
Tomball Intermediate School
S. Poplar
S. Magnolia
S. Pine
S. Oak
S. Cherry
S. Walnut
S. Elm
Melone
Clarence
Percival
Clayton
Market
Tyler
Florence
McPhail
Fannin
City Parking Lot
PD / City Hall
City Baseball Fields
City Parking Lot
Parking Lot
Parking Lot
Bible Church
Parking Lot
Parking Lot
Parking Lot
Parking Lot
See Insert below
PARADE ROUTE
START
INDICATES ROAD IS CLOSED NO ACCESS
NO VEHICLES OTHER THAN THE OFFICIAL PARADE ENTRY WILL BE ALLOWED IN THE LINE UP AREA!!
NO EXCEPTIONS!!
ABSOLUTELY NO PARKING OR LEAVING VEHICLES UNATTENDED ON SIDE STREETS.
ALL UNATTENDED VEHICLES MAY BE TOWED AT OWNERS EXPENSE!!
THERE IS NOT ADEQUATE SPACE IN THE LINE UP AREA TO ALLOW PARENTS TO ACCOMPANY OR DROP OFF THEIR CHILDREN
Agg Rd.
Detour
Detour
Detour
Detour
Detour
F.M. 1488
Detour
Zion
Hufsmith
Peach
Carrell
Foster
Moore
Texas
Hospital
Live Oak
N. Chestnut
Howard
Willow
Welly
Lovett
Snook
Sycamore
Houston
Parking Lot
CrossQuest Academy
Church of the Good Shepard
Parking Lot
F.M. 2978
East Main Street
F.M. 2920
Spring
45
Tomball Intermediate School
Concordia Lutheran High School
Concordia Parking Lot
BJ Services
Green
Ash
Timkin
Persimmon
Hufsmith Kohrville
S. Chestnut
Mechanic
Baker
Todd
Lizzie
Blackshear
Pitchford
Sutton
N. Cherry
N. Elm
Parking Lot
Commerce
West Main Street
Holderrieth
249
Houston

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

Approve Request by Tomball Fire Department to Close School Street between Main and Malone on Friday Night, October 29, and Saturday Night, October 30, 2010 in Conjunction with the Fire Department's Annual Fall Festival and Haunted House Event and to Allow the Safe Passage of Pedestrians from the School Parking Lot across School Street to the Event Site.

Background:

For the past several years, the Tomball Fire Department has hosted a haunted house/fall festival event. The event is free to the public, but donations are accepted to assist in the Department's benevolence programs for Thanksgiving and Christmas.

Council has approved this closure each year it has been requested; the closure of School Street provides additional protection for pedestrians and does not affect traffic on Main Street.

Origination:

Fire Chief

Recommendation:

Staff recommends approval

Funding:

Party(ies) responsible for placing this item on agenda:

Fire Chief

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

Approve Proposal from Momentum Construction for the Expansion of Tomball Fire Station #1 (Project No. 2010-08) and Authorize the City Manager to Negotiate and Execute a Contract with Momentum Construction

Background:

The Tomball Fire Department needs to expand its Station 1 facility to accomodate its move to a 24-hour per day operation. Presently, the Department has no separate sleeping or bathing facilities for male and female firefighters. Additionally, the Department has very limited office space for administration and operation functions. This design will rectify this problem by adding approximately 2,700 square feet of bathroom, sleeping dorm, dayroom/kitchen and office areas.

Origination:

Fire Department

Recommendation:

Staff recommends acceptance of the proposal

Funding:

Party(ies) responsible for placing this item on agenda:

Fire Chief

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

ATTACHMENTS:

Recommendation - Joiner Partnership
Proposal Tabulation
Selection Criteria
Station 1 Funding

JP inc.

Architects • Planners • Interior Designers

September 29, 2010

Mr. Randy Parr
Fire Chief
City of Tomball
1200 Rudel
Tomball, TX 77375

RE: EXPANSION OF FIRE STATION NO. 1

Dear Chief Parr:

On September 28, 2010 bid proposals were received from ten (10) general contractors for the above referenced project. Based on our selection criteria, the apparent best value contractor is Momentum Constructors. See attached proposal tab and selection criteria point tabulation.

Although Teal Construction scored more points, on the basis of price, Momentum is best value due to saving the City $103,001.00.

Joiner Partnership, Inc. recommends that the expansion of Fire Station No. 1 be awarded to Momentum Constructors, Base Bid and Alternate No. 1 and No. 2. Once awarded, we can proceed to contract and start construction later this month. Completion should be in approximately seven months.

We appreciate our business with you very much and we look forward to a successful project.

Sincerely,

Carl A. Joiner, AIA
President

CAJ:sjs

Cc: City Manager – George Shackelford

Joiner Partnership, Inc.
Two Kingwood Place
700 Rockmead • Suite 265
Kingwood, TX 77339
(281) 359-6401

PROPOSAL TABULATION

Competitive Sealed Proposals for
Tomball Central Fire Station Addition
September 28, 2010 at 9:00 a.m.

Joiner Partnership, Inc.
Architects • Planners • Interior Designers

Contractor	Base Proposal	Alternate No. 1	Alternate No. 2	Addendum	Total
FROST CONST.	$589,000	$2,600	$40,000	3	$631,600
GCC BUILDERS	$480,107	$4,500	$45,000	3	$529,607
MAPP CONST.	$518,300	$6,400	$56,900	3	$581,600
MOMENTUM CONT.	**$399,999**	**$6,000**	**$35,000**	**3**	**$440,999**
PARALLAX BUILDERS	$526,000	$24,000	$30,000	3	$580,000
RAM DESIGN	$451,000	$19,636	$28,405	3	$496,041
STRATUS CONTRACTING	$477,000	$3,800	$25,000	1	$505,800
TEAL CONST.	$493,000	$4,000	$47,000	3	$544,000
URBAN CONST.	$500,591.70	$9,698.95	$43,735	3	$554.025,65
WATLEE CONST.	$583,884	$25,000	$43,500	3	$652,384

Alternate No. 1 – Coordinate, excavate and install detention pond as designed by CLR. Connect to existing storm water drainage system.

Alternate No. 2 – Provide and install sprinkler system compliant with NFPA 13 at existing facility. System shall be compatible and tied to new sprinkler system and alarm notification.

SELECTION CRITERIA
POINT TABULATION

Competitive Sealed Proposals for
Tomball Central Fire Station Addition
September 28, 2010 at 9:00 a.m.

Joiner Partnership, Inc.
Architects • Planners • Interior Designers

Contractor	Experience 20 pts	Past Performance 10 pts.	Quality/ Personnel 10 pts.	References 20 pts.	Past Relationship 10 pts.	Price 20 pts.	Other Factors 10 pts	Total
FROST CONST.	20	8	9	17	7	4	8	**73**
GCC BUILDERS	14	8	7	15	5	14	7	**70**
MAPP CONST.	12	8	6	16	7	6	8	**63**
MOMENTUM CONT.	**14**	**8**	**7**	**16**	**5**	**20**	**7**	**77***
PARALLAX BUILDERS	12	8	6	16	7	8	9	**66**
RAM DESIGN	12	8	6	16	5	18	7	**72**
STRATUS CONTRACT.	12	8	6	16	5	16	6	**69**
TEAL CONST.	**20**	**9**	**9**	**17**	**8**	**12**	**8**	**83***
URBAN CONST.	12	8	6	16	5	10	7	**64**
WATLEE CONST.	14	8	7	16	5	2	7	**59**

*Price/Points – Momentum vs. Teal saves the City $103,001.00

Funding for the expansion to Tomball Fire Station 1 will come from a re-appropriation of the money left in the budget as of September 30, 2010, the $75,000 included in the 2010-2011 budget, cost reductions in the Tomball Fire Department operations, and requested funding from City reserves.

Estimated cost from proposal submitted by Momentum Construction	$440,999
Estimated remaining balance of Architects inspection and reimbursable costs	10,000
Estimated total	$450,999

Funding:

Estimated balance of budgeted amounts at September 30, 2010	$335,000
Budgeted amount from the 2010-2011 budget	75,000
Estimated funding available	$410,000
Balance to fund	$ 40,999
To be funded from TFD Operation cost reductions	15,999
Requesting funding from City Reserves	25,000

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

Authorize the City Manager to Negotiate a Memorandum of Understanding (MOU) with Northwest EMS, whereby Northwest EMS would Purchase Fuel for Ambulances and Vehicles from the City of Tomball.

Background:

At this time, Northwest EMS purchases fuel for ambulances and other vehicles on the open market at various gas stations in the area. In doing so, NWEMS pays market rate for the fuel. During disaster incidents, the City has allowed the EMS service to obtain fuel from the City's system.

The City's daily purchase rate is based on the Oil Production Data Information Standard (OPIS) PAD-3 Report, which is the daily wholesale rack rate paid by our wholesale distributor, Pumpelly Oil, plus the contracted fixed differential rate. For instance, in August 2010, the City's daily purchase rate for regular unleaded gasoline averaged $2.22 per gallon, versus the average retail/market rate paid by NWEMS of $2.59 per gallon.

It is estimated that this agreement will save the taxpayers of HC ESD#8 and NWEMS approximately $600 per month; those funds could then be used to fund additional EMS programs. The MOU would allow the City to bill NWEMS monthly for the amount of fuel purchased, plus and additional $0.01 per gallon to cover billing services.

While the City will not realize any immediate savings under this agreement, it is possible that the increased purchase volume will result in contractors offering a lower fixed differential rate per gallon when the City bids out fuel purchases in fiscal year 2011.

Origination:

Fire Chief

Recommendation:

Staff recommends approval

Funding:

Party(ies) responsible for placing this item on agenda:

Fire Chief

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

Discussion and Possible Action to Authorize the Tomball Fire Department to Submit a Staffing for Adequate Fire and Emergency Response (SAFER) Grant Application for Two Firefighters under the SAFER Program.

Background:

The Federal government has revised the Staffing for Adequate Fire and Emergency Response (SAFER) Grant Program. Under the revised terms, the Federal government will provide 100% of the cost of newly hired firefighters for two years. The jurisdiction hiring the firefighters commits to retaining them for one year after the two-year grant period. The Fire Department is seeking permission from Council to apply for two firefighters under this program. The financial exposure to the City would not begin until sometime in 2013, depending upon the timing of the award, if received. It is estimated that the financial exposure for the one-year commitment would be approximately $140,000.

The City of Tomball has two full-time firefighters at this time. Council approved the hiring of two more full-time firefighters in the 2010-2011 budget year. With the current total of four full-time firefighters, working a standard 24 hours on, 48 hours off cycle, the Central Fire Station will have a person on duty 24 hours per day, seven days per week and Station 2 will have a full-time firefighter every third day. The goal, with the SAFER grant-funded firefighters, would be to fill the remaining two full-time positions to allow Station 2 to be manned 24 hours per day, seven days a week. The additional two positions will further enhance the safety of the firefighters responding to emergency incidents for the City.

Origination:

Fire Department

Recommendation:

Staff recommends approval

Funding:

Party(ies) responsible for placing this item on agenda:

Fire Chief

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

Discussion and Possible Action regarding the Establishment of a Hotel Occupancy Tax Funds Board (HOT Board)

Background:

As directed by Council, staff has conducted research regarding the creation of a Hotel Occupancy Tax Fund Board (HOT Board) for the City of Tomball. The board would be responsible for reviewing grant applications and making recommendations to Council regarding the distribution of the City's Hotel Occupancy Tax funds.

Based on the research, there are a number of areas to look into before the ordinance creating the board can be written. Those include:

- Number of board members
    1. 5 to 7 Members (Many of the boards surveyed had 7 members)
- Requirements for board eligibility
    1. Tomball Resident
    2. Tomball Business Owner
    3. Hotel/Motel Manager or Owner
    4. Recipient
- Composition of board
    1. Number of each qualifying group desired, ex: 4 residents, 2 business owners, 1 hotel representative
- Term length for board members
    1. Should member serve two- or three-year terms
    2. Should the terms be staggered, concurrent with the position of Mayor, etc. . . .
- Authority of the board
    1. Advisory only, with recommendations brought to Council and Council having the only say/vote of approval
    2. Similar to the the P&Z Board, with the board having the authority to vote to approve or deny applications and bringing applications to Council for final approval or denial

Based on Council desires, staff recommends that Council authorize the City Attorney to draft an ordinance creating the HOT Board and establishing its authority, duties and responsibilities, terms of office, and composition of members.

Origination:

City Manager's Office

Recommendation:

Funding:

Party(ies) responsible for placing this item on agenda:

Shawn Cox - Assistant to the City Manager

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	

Regular City Council
Agenda Item
Data Sheet

Meeting Date: October 4, 2010

Topic:

Executive Session: The City Council will meet in Executive Session as Authorized by Title 5, Chapter 551, Government Code, the Texas Open Meetings Act, for the Following Purpose:

- Sec. 551.072 – Deliberations Regarding Real Property

Background:

Origination:

City Manager

Recommendation:

N/A

Funding:

Party(ies) responsible for placing this item on agenda:

City Secretary

ACTION TAKEN

APPROVAL	READINGS PASSED	OTHER
☐ YES ☐ NO	☐ 1ST ☐ 2ND	