

# ERIE COMMONS FILING NO. 4 – SKETCH PLAN

SK-000710-2015

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## LAND USE APPLICATION



**TOWN OF ERIE**

Community Development Department – Planning Division  
645 Holbrook Street – PO Box 750 – Erie, CO 80516  
Tel: 303.926.2770 – Fax: 303.926.2706 – Web: [www.erieco.gov](http://www.erieco.gov)

**LAND USE APPLICATION**

*Please fill in this form completely. Incomplete applications will not be processed.*

STAFF USE ONLY		
FILE NAME:		
FILE NO:	DATE SUBMITTED:	FEES PAID:

**PROJECT/BUSINESS NAME:** ERIE COMMONS FILING 4  
**PROJECT ADDRESS:** SOUTHEAST CORNER OF BRIGGS ST. & ERIE PARKWAY  
**PROJECT DESCRIPTION:** 95 Townhome units proposed on approx. 7 acres. See enclosed for additional description.

**LEGAL DESCRIPTION** *(attach legal description if Metes & Bounds)*

Subdivision Name: ERIE COMMONS

Filing #: 4 Lot #: 1,2 & 3 Block #: 6, 7, & 8 Section: 19 Township: 1 NORTH Range: 68 WEST

**OWNER** *(attach separate sheets if multiple)*

Name/Company: COMMUNITY DEVELOPMENT GROUP  
Contact Person: JON LEE  
Address: 2500 ARAPAHOE AVE STE 200  
City/State/Zip: BOULDER, CO 80302  
Phone: (303) 442-2299 Fax: (303) 442-1241  
E-mail: info@cdgcolorado.com

**AUTHORIZED REPRESENTATIVE**

Company/Firm: ARSENAULT HOLDINGS  
Contact Person: BRIAN MULQUEEN  
Address: 371 Centennial Parkway, Suite 200  
City/State/Zip: Louisville, CO 80027  
Phone: 303-466-2500 Fax: 303-466-3008  
E-mail: info@realcapitalsolutions.com

**MINERAL RIGHTS OWNER** *(attach separate sheets if multiple)*

Name/Company: Union Pacific Resources Company  
Address: P. O. Box 1257  
City/State/Zip: Englewood, Colorado 80150

**MINERAL LEASE HOLDER** *(attach separate sheets if multiple)*

Name/Company: Vessels Oil & Gas Company  
Address: 1050 17th St. Suite 2000  
City/State/Zip: Denver, Colorado 80265

**LAND-USE & SUMMARY INFORMATION**

Present Zoning: PD	Gross Site Density (du/ac): 14
Proposed Zoning: PD	# Lots/Units Proposed: 95
Gross Acreage: 6.75 (5.42 outside of R.O.W.)	Gross Floor Area: 146,000 sf, approx.

**SERVICE PROVIDERS**

Electric: UNITED POWER	Gas: XCEL
Metro District: ERIE COMMONS METRO #2	Fire District: MOUNTAIN VIEW
Water <i>(if other than Town)</i> :	Sewer <i>(if other than Town)</i> :

**PAGE TWO MUST BE SIGNED AND NOTARIZED**

DEVELOPMENT REVIEW FEES			
<b>ANNEXATION</b>		<b>SUBDIVISION</b>	
<input type="checkbox"/> Major (10+ acres)	\$ 4000.00	<input checked="" type="checkbox"/> Sketch Plan	\$ 1000.00 + 10.00 per lot
<input type="checkbox"/> Minor (less than 10 acres)	\$ 2000.00	<input type="checkbox"/> Preliminary Plat	\$ 2000.00 + 40.00 per lot
<input type="checkbox"/> Deannexation	\$ 1000.00	<input type="checkbox"/> Final Plat	\$ 2000.00 + 20.00 per lot
<b>COMPREHENSIVE PLAN AMENDMENT</b>		<input type="checkbox"/> Minor Subdivision Plat	\$ 2000.00
<input type="checkbox"/> Major	\$ 3000.00	<input type="checkbox"/> Minor Amendment Plat	\$ 1000.00 + 10.00 per lot
<input type="checkbox"/> Minor	\$ 1200.00	<input type="checkbox"/> Road Vacation (constructed)	\$ 1000.00
<b>ZONING/REZONING</b>		<input type="checkbox"/> Road Vacation (paper)	\$ 100.00
<input type="checkbox"/> Rezoning	\$ 1700.00 + 10.00 per acre	<b>SITE PLAN</b>	
<input type="checkbox"/> PUD Rezoning	\$ 1700.00 + 10.00 per acre	<input type="checkbox"/> Residential	\$ 1400.00 + 10.00 per unit
<input type="checkbox"/> PUD Amendment	\$ 1700.00 + 10.00 per acre	<input type="checkbox"/> Non-Resi. (>10,000 sq. ft.)	\$ 2200.00
<input type="checkbox"/> Major PD Amendment	\$ 3700.00 + 10.00 per acre	<input type="checkbox"/> Non-Resi. (>2,000 sq. ft.)	\$ 1000.00
<input type="checkbox"/> Minor PD Amendment	\$ 500.00	<input type="checkbox"/> Non-Resi. (<2,000 sq. ft.)	\$ 200.00
<b>SPECIAL REVIEW USE</b>		<input type="checkbox"/> Amendment (major)	\$ 1100.00
<input type="checkbox"/> Major	\$ 1000.00	<input type="checkbox"/> Amendment (minor)	\$ 350.00
<input type="checkbox"/> Minor	\$ 400.00	<b>VARIANCE</b> \$ 600.00	
<input type="checkbox"/> Oil & Gas	\$ 1200.00	<b>SERVICE PLAN</b> \$ 10,000.00	
All fees <b>include</b> both Town of Erie Planning & Engineering review. These fees <b>do not include</b> referral agency review fees, outside consultant review fees, or review fees incurred by consultants acting on behalf of staff. See Town of Erie Municipal Code, Title 2-10-5 for all COMMUNITY DEVELOPMENT FEES.			

The undersigned is fully aware of the request/proposal being made and the actions being initiated on the referenced property. The undersigned understand that the application must be found to be complete by the Town of Erie before the request can officially be accepted and the development review process initiated. The undersigned is aware that the applicant is fully responsible for all reasonable costs associated with the review of the application/request being made to the Town of Erie. Pursuant to Chapter 7 (Section 7.2.B.5) of the Unified Development Code (UDC) of the Town of Erie, applicants shall pay all costs billed by the Town for legal, engineering and planning costs incurred by staff, including consultants acting on behalf of staff, necessary for project review. By this acknowledgement, the undersigned hereby certify that the above information is true and correct.

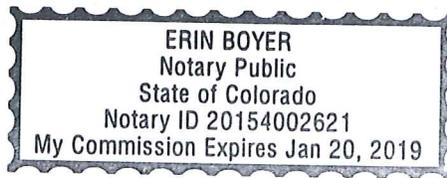
Owner: \_\_\_\_\_ Date: \_\_\_\_\_

Owner: \_\_\_\_\_ Date: \_\_\_\_\_

Applicant: Sharon K. Eshima, Manager Date: \_\_\_\_\_

STATE OF COLORADO )  
County of Boulder ) ss.

The foregoing instrument was acknowledged before me this 15 day of October, 2015, by Sharon K. Eshima.



My commission expires: 1-20-19  
Witness my hand and official seal.

Erin Boyer  
Notary Public

NARRATIVE

March 29, 2016

**RE: Erie Commons Filing No. 4 Sketch Plan Narrative**

Please see below for our revised project narrative for the Erie Commons Filing No. 4 Sketch Plan.

**Project Concept**

The Filing No. 4 Sketch Plan of Erie Commons is a 6.75 acre parcel located on the southeast corner of Erie Parkway and South Briggs Street, adjacent to the Blue Mountain Montessori School. The site is proposed for a high quality attached residential development with 92 townhome units of 2- & 3-bedrooms, with attached 2-car garages that are alley-loaded, ranging from 1,400 to 1,800 square feet per unit. The proposed density is 13.3 units per acre. Lot sizes range from 1,480 to 3,663 square feet, and the average lot size is 2,380 square feet. Twenty-five percent of the site will be preserved as open space. The open space will be distributed throughout the site to serve and be within close proximity to units. Front doors, stoops, and front porches will be oriented to public streets, open spaces, and the on-site Coal Creek open space and trail. A 54' ROW street is proposed to complete the connection between Erie Parkway and Briggs. The street will include on-street guest parking and a detached sidewalk and tree lawn.

The parcel is an infill site within the surrounding Erie Commons development. As such, existing infrastructure is in place to serve the site including street access to Erie Parkway and Briggs, existing storm drainage improvements, existing water mains and fire hydrants, and existing sewer mains. The site has been platted for a previous development, and some of the infrastructure was installed for the adjacent private school site. The proposed development intends to incorporate the existing infrastructure and some aspects of the approved plat, including the proposed 54' wide street. However, the residential lots, tracts, alleys, and some utility easements that don't have existing installations will require adjustments for the proposed new residences.

Ample guest parking will be provided along the proposed street, Briggs Street, and additional spaces within the tracts to accommodate the 200-foot distance requirement to front doors. A total of 65 guest spaces are potentially available where 32 spaces are required. One of these spaces could be ADA accessible to meet requirements. Up to 12 end units are being shown as handicapped accessible units, which are 3-bedroom units on 2 floors, with at-grade front door access and one ground level bedroom (Units #1, and #10, for example).

The project intends to enter the Erie Commons Metro District #2, and all common tracts will be owned and maintained within the Metro District.

Feel free to contact me should you have any comments, questions or requests for additional information.

Sincerely,  
**Norris Design**

Don Ryan  
Senior Associate



Tuscany

Tuscany

## LETTER OF AUTHORIZATION

# Community Development Group of Erie, Inc.

October 13, 2015

Town of Erie  
Attn: Marty Ostholthoff  
645 Holbrook  
Erie, CO 80516

Re: Erie Commons  
Sketch Plan Submittal from Arsenault Holdings, LLC

Dear Marty:

As the owners of the property known as Erie Commons, Filing 4, Block 6, Lots 2 and 3; Block 7, Lots 1 and 2; Block 8, Lot 1; and Tract D, please accept this letter as our authorization that representatives of Arsenault Holdings, LLC may submit and work with the Town to process a Sketch Plan for development of the property.

Sincerely,

COMMUNITY DEVELOPMENT GROUP OF ERIE, INC.

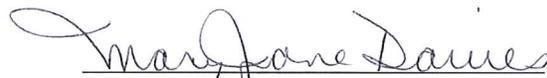
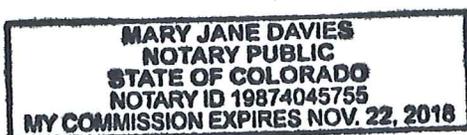


Jon Lee  
Authorized Representative

STATE OF COLORADO    )  
COUNTY OF BOULDER    )

The foregoing instrument was acknowledged before me this 13th day of October, 2015 by Jon R. Lee as Authorized Representative of Community Development Group of Erie, Inc.

My commission expires: 11/22/2018  
Witness my hand and official seal.

  
Notary Public

2500 Arapahoe Avenue, Suite 220, Boulder, Colorado 80302  
(303) 442-2299 ... Fax (303) 442-1241  
[www.communitydevelopmentgroup.com](http://www.communitydevelopmentgroup.com)

ALTA SURVEY

# ALTA/ACSM LAND TITLE SURVEY

## LOTS 2 & 3, BLOCK 6; LOTS 1 & 2, BLOCK 7; LOT 1, BLOCK 8; TRACT D

### ERIE COMMONS FILING NO. 3

LOCATED IN THE NORTHEAST QUARTER OF SECTION 19,  
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN,  
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO

**PARCEL DESCRIPTION (FROM COMMITMENT):**

LOTS 2 AND 3, BLOCK 6,  
LOTS 1 AND 2, BLOCK 7,  
LOT 1, BLOCK 8,  
TRACT D,  
ERIE COMMONS FILING NO. 4, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO

**COMMITMENT NOTES:**

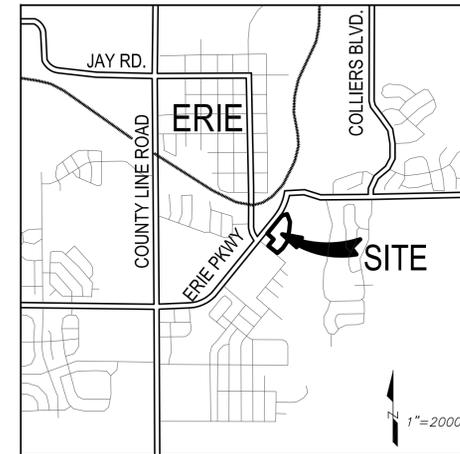
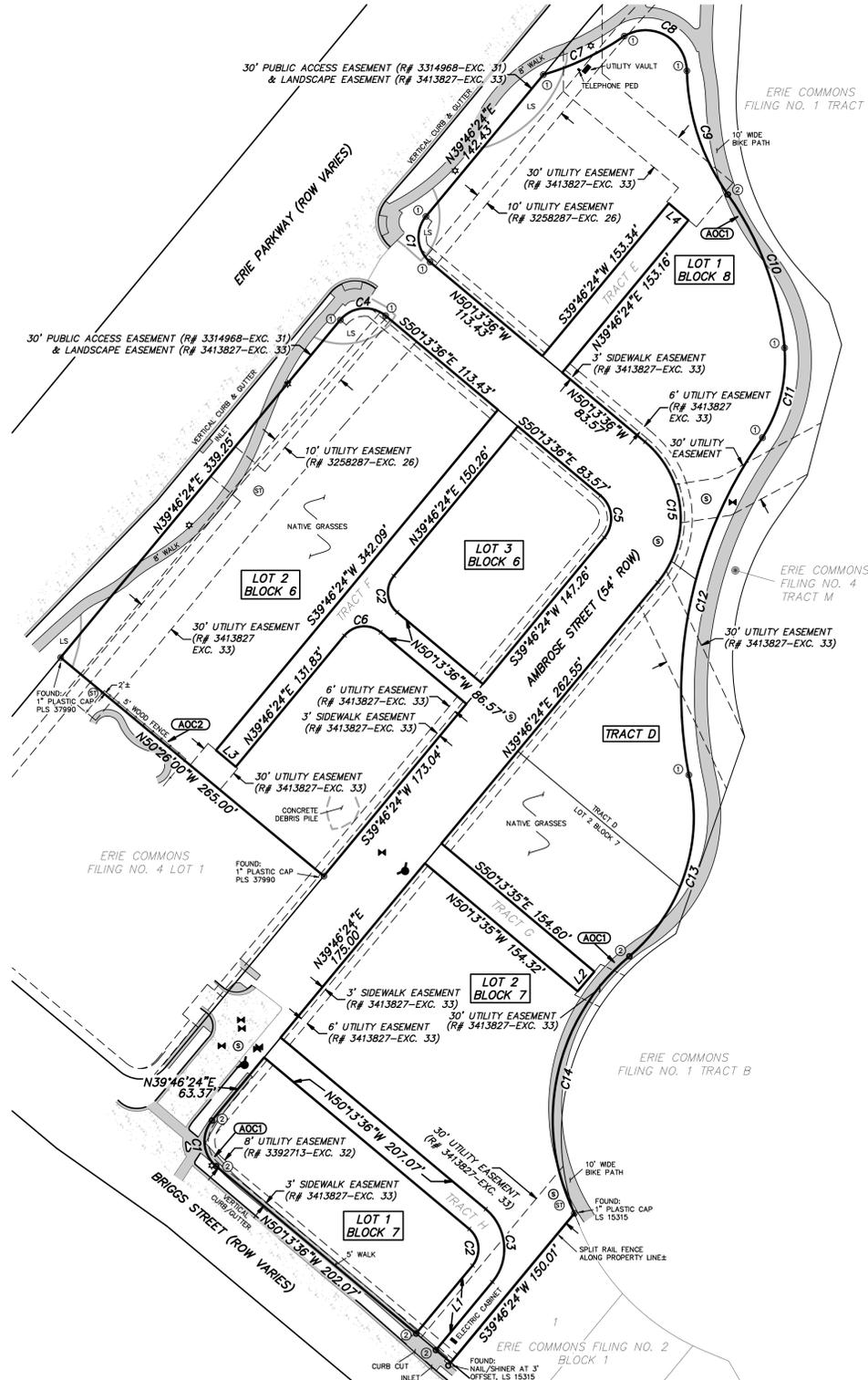
THIS SURVEY IS BASED UPON TITLE COMMITMENT NO. NCS-745134-CO, PREPARED BY LAND TITLE GUARANTEE COMPANY, WITH AN EFFECTIVE DATE OF JULY 29, 2015. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH OR EASEMENT RESEARCH BY HURST & ASSOCIATES. RATHER, ALL INFORMATION REGARDING TITLE AND EASEMENT MATTERS SHOULD BE OBTAINED FROM THE TITLE COMMITMENT. UNLESS OTHERWISE NOTED, ALL EXCEPTIONS LISTED AFFECT THE SUBJECT BY BEING INCLUDED IN DESCRIPTIONS CONTAINED IN DOCUMENT.

(EXCEPTIONS 1 THROUGH 5 ARE STANDARD EXCEPTIONS AND CANNOT BE SHOWN)

SCHEDULE B SECTION 2 EXCEPTIONS					
EXC. NO.	DOCUMENT	DATE	RECEPTION NO.	NOTES	
6	EASEMENT DEED	12/22/1950	BOOK 1289 PAGE 521	DOES NOT AFFECT, LOCATED S. OF PROPERTY	
7	MINERAL DEED	11/30/1972	1602712	NOTHING TO SHOW	
8	EASEMENT DEED	08/08/1983	1936290	DOES NOT AFFECT, LOCATED S. OF PROPERTY	
9	OIL & GAS LEASE	11/01/1988	2160408	NOTHING TO SHOW	
10	AGREEMENT	11/17/2000	2807515	NOTHING TO SHOW	
11	DEED	11/17/2000	2807516	NOTHING TO SHOW	
12	ASSIGNMENT	11/17/2000	2807517	NOTHING TO SHOW	
13	ORDINANCE #769	04/22/2002	2944813	NOTHING TO SHOW	
14	ANNEXATION AGREEMENT & RELATED DOCS	04/22/2002	2944815	NOTHING TO SHOW	
15	ERIE COMMONS DEVELOPMENT GUIDE & AMENDMENTS	04/22/2002 09/16/2004 08/23/2006	2944816 3219273 3413825	NOTHING TO SHOW; SEE GENERAL NOTE 6	
16	GENERAL DISCLOSURE	12/04/2003	3132240	NOTHING TO SHOW	
17	ORDER & DECREE	01/09/2004	3142951	DOES NOT AFFECT; PARCEL DESCRIBED IS S. OF PROPERTY	
18	ORDER & DECREE	01/09/2004	3142952	NOTHING TO SHOW	
19	EASEMENT DEED RELEASE OF ROW	02/13/1986 11/12/2004	2042898 3235030	DOES NOT AFFECT; LOCATED N. OF PROPERTY	
20	EASEMENT DEED	05/29/1998	2616046	DOES NOT AFFECT; LOCATED N. OF PROPERTY	
21	AGREEMENT & RELATED DOCS	08/18/2004	3210533	NOTHING TO SHOW; DITCH REFERRED TO IN AGREEMENT LOCATED S. OF PROPERTY	
22	GRANT OF PERMANENT AVIGATION EASEMENT	09/16/2004	3219272	CANNOT SHOW; BLANKET EASEMENT	
23	WAIVER, RELEASE & COVENANT	11/12/2004	3235029	DOES NOT AFFECT; RELEASES PORTION OF R# 1936290 (EXC. NO. 8)	
24	RIGHT OF WAY GRANT	11/12/2004	3235031	DOES NOT AFFECT; LOCATED S. OF PROPERTY	
25	SURFACE USE AGREEMENT & RELATED DOCS	01/13/2005	3252946 3252947 3252948	NOTHING TO SHOW	
26	GRANT OF EASEMENT	02/02/2005	3258287	SHOWN	
27	RIGHT OF WAY GRANT	04/13/2005	3277126	DOES NOT AFFECT; LOCATED W. OF PROPERTY	
28	RIGHT OF WAY GRANT	04/13/2005	3277127	DOES NOT AFFECT; LOCATED SW OF PROPERTY	
29	EASEMENT AGREEMENT	07/19/2005	3304238	DOES NOT AFFECT; LOCATED SW OF PROPERTY	
30	EASEMENT AGREEMENT	07/19/2005	3304240	DOES NOT AFFECT; LOCATED S. OF PROPERTY	
31	GRANT OF PERMANENT PUBLIC ACCESS ESMT	08/19/2005	3314968	SHOWN	
32	GRANT OF EASEMENT	06/01/2006	3392713	SHOWN	
33	ERIE COMMONS FILING NO. 4 FINAL PLAT	08/23/2006	3413827	EASEMENTS SHOWN	
34	DEVELOPMENT ACMT. FIRST AMENDMENT	08/23/2006 10/01/2010	3413826 3722545	NOTHING TO SHOW	
35	GRANT OF PERMANENT PUBLIC ACCESS ESMT	12/18/2006	3442494	DOES NOT AFFECT; LOCATED SW OF PROPERTY	
36	MASTER DECLARATION AND AMENDMENTS	03/03/2005	3265467	NOTHING TO SHOW	
37	ERIE COMMONS DEVELOPMENT GUIDE AMENDMENT NO. 5	09/20/2010 05/11/2012	3719635 3845029	NOTHING TO SHOW	
38	EXISTING LEASES	-	-	NOTHING TO SHOW	

**GENERAL NOTES:**

- NOTICE: ACCORDING TO COLORADO LAW, YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.
- BEARINGS ARE BASED ON THE SOUTHEASTERLY LINE OF LOT 2, BLOCK 7, BEING S39°46'24"W BETWEEN THE NORTHERLY CORNER OF LOT 1, BLOCK 1 ERIE COMMONS FILING NO. 4 (1" PLASTIC CAP, PLS 15315) AND THE WESTERLY CORNER OF SAID LOT 1 (NAIL/SHINER LS 15315 AT 3' OFFSET IN WALK). BEARING TO MATCH ERIE COMMONS FILING NO. 4 PLAT.
- PROPERTY CORNER MONUMENTATION IS NOTED HEREON. NO PROPERTY CORNERS WERE FOUND OR SET INSIDE EXTERIOR BOUNDARY IN ANTICIPATION OF OVERLOT GRADING AND CONSTRUCTION ACTIVITIES.
- NO BUILDINGS EXISTING ON THE SURVEYED PROPERTY, UNLESS OTHERWISE SHOWN, PROPERTY IS UNDEVELOPED, CURRENTLY BEING NATIVE GRASSES. WITH THE EXCEPTION OF THE SOUTHERLY END, NO ROAD IS CONSTRUCTED IN RIGHT OF WAY OF AMBROSE STREET.
- GROSS LAND AREA: 5.42 ACRES.
- ERIE COMMONS GENERAL DEVELOPMENT PLAN AMENDMENT NO. 2 RECORDED AT RECEPTION NO. 3413825 (EXCEPTION NO. 15) SHOWS PROPERTY TO HAVE LAND USE RESIDENTIAL AND PLANNING AREA OF MIXED USE RESIDENTIAL.
- DUE TO HIGH GRASSES, ADDITIONAL ABOVE GROUND UTILITIES MAY EXIST THAT WERE NOT OBSERVED.
- ALL LINEAR DISTANCES IN U.S. SURVEY FEET.



VICINITY MAP

LINE TABLE		
LINE	BEARING	LENGTH
L1	S39°46'24"W	68.37'
L2	S40°34'11"W	20.00'
L3	N50°13'36"W	20.00'
L4	N49°42'44"W	20.00'

CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	CHORD	BEARING
C1	39.27'	25.00'	90°00'00"	35.36'	S05°13'36"E
C2	31.42'	20.00'	90°00'00"	28.28'	N05°13'36"W
C3	62.83'	40.00'	90°00'00"	56.57'	N05°13'36"W
C4	39.27'	25.00'	90°00'00"	35.36'	S04°46'24"W
C5	36.13'	23.00'	90°00'00"	32.53'	N05°13'36"W
C6	31.42'	20.00'	90°00'00"	28.28'	S04°46'24"W
C7	69.82'	217.90'	18°21'34"	69.52'	N64°36'44"E
C8	67.06'	32.09'	119°44'10"	55.51'	N61°04'17"W
C9	102.11'	170.00'	34°24'54"	100.58'	S18°24'39"E
C10	122.91'	240.46'	30°28'58"	126.40'	N20°22'47"W
C11*	72.82'	109.65'	38°25'56"	71.48'	N13°35'00"E
C12	274.01'	339.16'	46°17'20"	266.62'	S12°22'09"W
C13	155.26'	140.26'	63°24'57"	147.44'	N18°13'57"E
C14	218.99'	163.42'	76°46'31"	202.97'	S12°07'39"W
C15	120.95'	77.00'	90°00'00"	108.89'	N05°13'36"W

\*C11 IS MISLABELED ON PLAT BASED ON REVIEW OF ORIGINAL DRAWING FILE AND SHOULD BE LABELED AS SHOWN HERE.

**LEGEND**

- ⊙ Sanitary Sewer Manhole
- ⊕ Storm Sewer Manhole
- ⚡ Fire Hydrant
- ⋄ Water Valve
- ⋆ Light Post
- LS Landscaping
- ① Set 1" plastic cap on #4 rebar, PLS 37990
- ② Set nail/shiner, PLS 37990 in concrete
- AOC Area Of Concern (see below)

Concrete  
Asphalt

**AREAS OF CONCERN:**  
AOC1: CONCRETE WALK NOT BEING IN AN RECORDED EASEMENT  
AOC2: SCHOOL FENCING CROSSING PROPERTY LINE

**SURVEY CERTIFICATION:**

CERTIFIED TO:  
COMMUNITY DEVELOPMENT GROUP OF ERIE MOUNTAIN VISTA HOLDINGS, LLC  
FIRST AMERICAN TITLE INSURANCE COMPANY

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2011 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 4, 8 & 11a OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED 10/07/2015.

DATE OF PLAT OR MAP: 10/08/2015

FOR AND ON BEHALF OF HURST AND ASSOCIATES:  
BO BAIZE, COLORADO PLS NO. 37990  
EMAIL ADDRESS: bo@hurst-assoc.com

SCALE VERIFICATION  
BAR IS ONE INCH ON ORIGINAL DRAWING  
IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY

NO.	DESCRIPTION	DATE	BY
1			

**HURST**  
CIVIL ENGINEERING  
PLANNING  
SURVEYING

HURST & ASSOCIATES, INC.  
25100 Broadway, Suite B  
Boulder, CO 80304  
303.449.9105

ALTA/ACSM LAND TITLE SURVEY  
LOTS 2 & 3, BL 6; LOTS 1 & 2, BL 7;  
LOT 1, BL 8 & TRACT D  
ERIE COMMONS FILING NO. 4  
ERIE, COLORADO

DRAWN BY:	BO
DESIGNED BY:	BO
APPROVED BY:	
JOB NUMBER:	2539-01
DATE:	10/08/15
SCALE:	1"=60'
SHEET NO:	1 OF 1

## SKETCH PLAN

**ERIE COMMONS FILING NO.4 SKETCH PLAN**  
 LOCATED IN THE NORTHEAST QUARTER OF SECTION 19, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH PRINCIPLE  
 MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO  
 6.75 ACRES - 95 LOTS / 14 TRACTS  
 SK-000710-2015



1101 Bannock Street  
 Denver, Colorado 80204  
 P 303.892.1166  
 F 303.892.1186

**Erie Commons**  
 Filing 4 - Sketch Plan

**Owner:**  
 Community Development Group

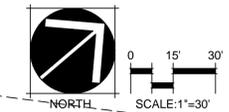
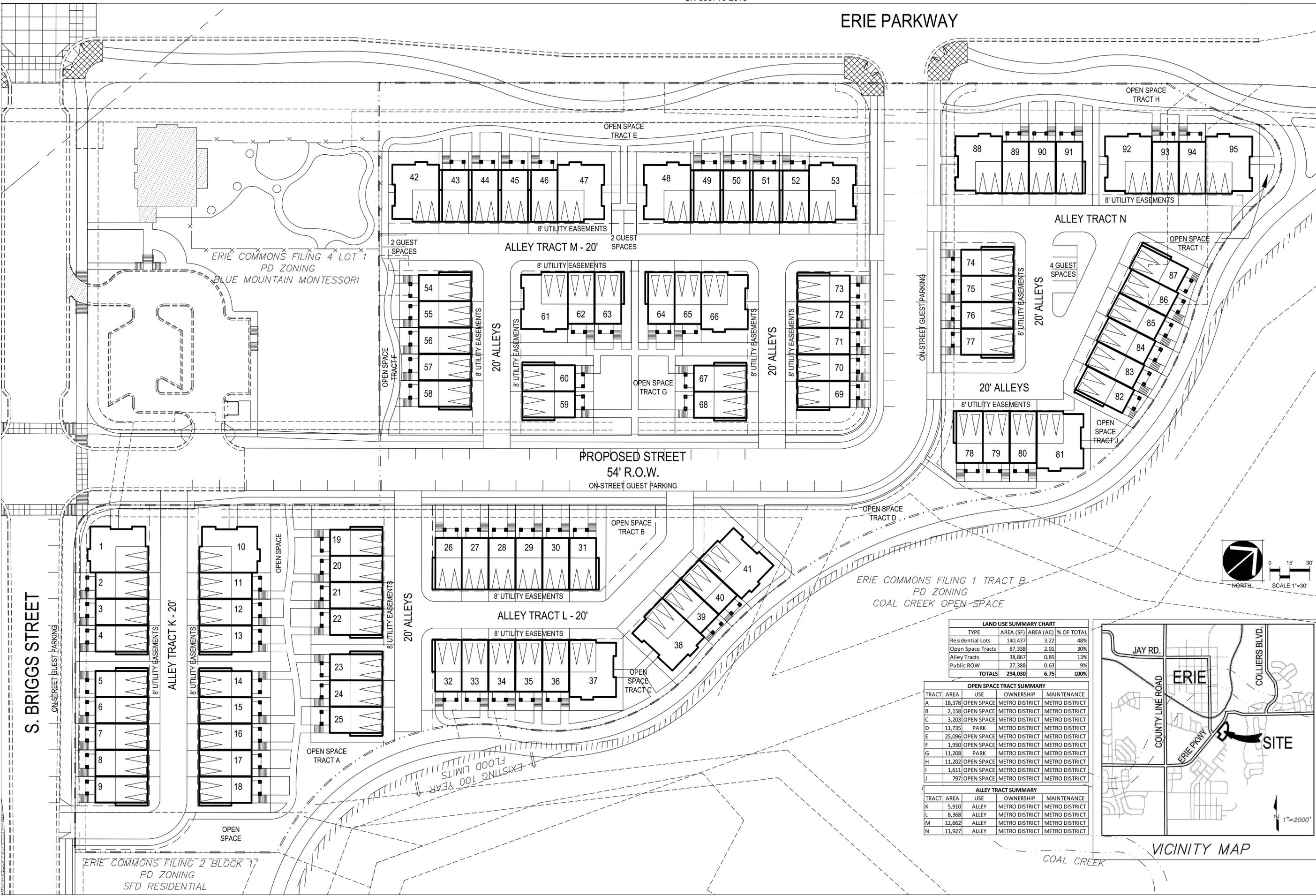
**Applicant:**  
 Arsenault Holdings, LLC  
 371 Centennial Pkwy, 200  
 Louisville, CO 80027  
 303-466-2500

**Issue Date**  
 October 14, 2015

**Revision Date**

**Sheet Title**  
 SKETCH PLAN EXHIBIT

**Sheet Number**  
 1 OF 1



**LAND USE SUMMARY CHART**

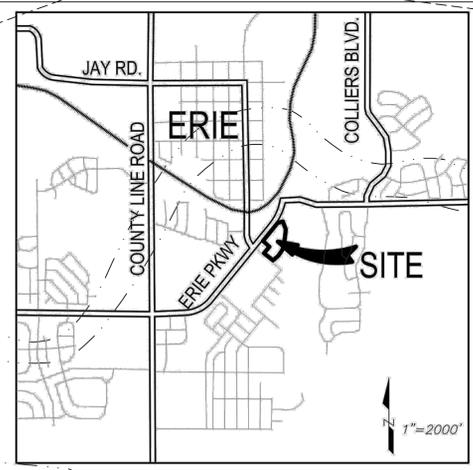
TYPE	AREA (SF)	AREA (AC)	% OF TOTAL
Residential Lots	140,437	3.22	48%
Open Space Tracts	87,338	2.01	30%
Alley Tracts	38,867	0.89	13%
Public ROW	27,388	0.63	9%
<b>TOTALS</b>	<b>294,030</b>	<b>6.75</b>	<b>100%</b>

**OPEN SPACE TRACT SUMMARY**

TRACT	AREA	USE	OWNERSHIP	MAINTENANCE
A	18,378	OPEN SPACE	METRO DISTRICT	METRO DISTRICT
B	2,158	OPEN SPACE	METRO DISTRICT	METRO DISTRICT
C	3,203	OPEN SPACE	METRO DISTRICT	METRO DISTRICT
D	11,735	PARK	METRO DISTRICT	METRO DISTRICT
E	25,096	OPEN SPACE	METRO DISTRICT	METRO DISTRICT
F	1,950	OPEN SPACE	METRO DISTRICT	METRO DISTRICT
G	11,208	PARK	METRO DISTRICT	METRO DISTRICT
H	11,202	OPEN SPACE	METRO DISTRICT	METRO DISTRICT
I	1,611	OPEN SPACE	METRO DISTRICT	METRO DISTRICT
J	797	OPEN SPACE	METRO DISTRICT	METRO DISTRICT

**ALLEY TRACT SUMMARY**

TRACT	AREA	USE	OWNERSHIP	MAINTENANCE
K	5,910	ALLEY	METRO DISTRICT	METRO DISTRICT
L	8,368	ALLEY	METRO DISTRICT	METRO DISTRICT
M	12,662	ALLEY	METRO DISTRICT	METRO DISTRICT
N	11,927	ALLEY	METRO DISTRICT	METRO DISTRICT



**VICINITY MAP**

## REPORTS AND PLANS



CIVIL ENGINEERING  
LAND PLANNING  
SURVEYING

October 14, 2015

Matt Weiderspahn, P.E.  
Town of Erie  
645 Holbrook  
Erie, CO 80516

RE: Erie Commons Filing 4 Blocks 6-8  
Phase I Drainage Report for Sketch Plan

Dear Matt:

We have reviewed the proposed sketch plan for the Erie Commons Filing 4 Block 6 – 8. The land use and new multi-family layout does not significantly vary from the previous multi-family layout completed in 2006. The drainage patterns conform to the Final Drainage Report (Phase III) for Filing 4 Blocks 6 – 8, August 6, 2006 prepared by Hurst & Associates, Inc. and the Master Drainage Report for Erie Commons, May 2004 prepared by Hurst & Associates, Inc.

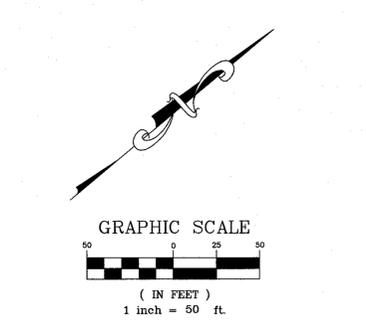
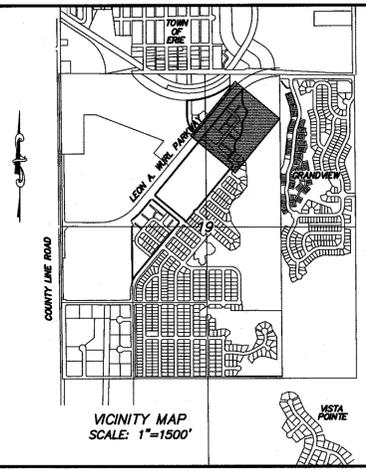
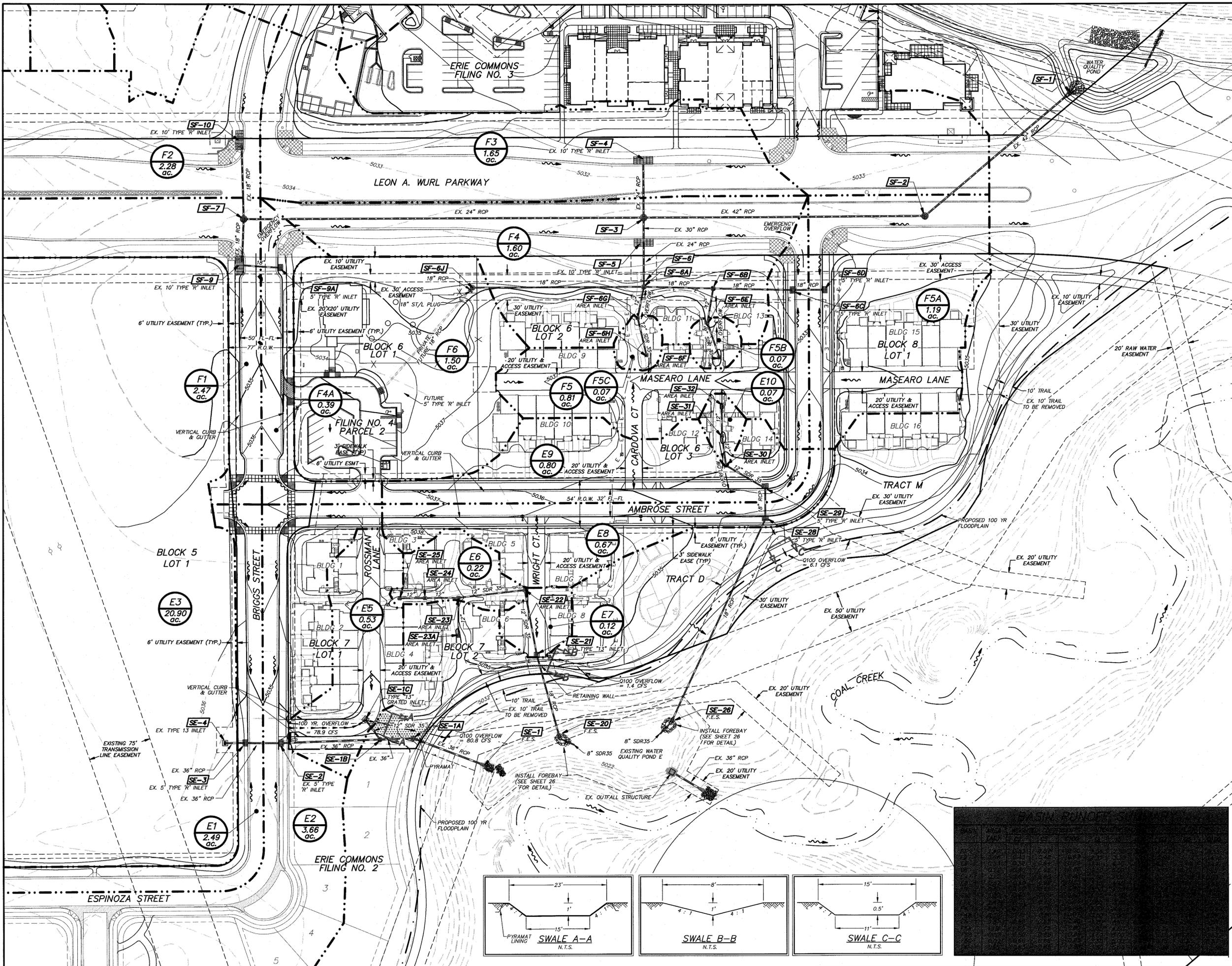
An updated Phase II and III Drainage Report will be submitted with the future Preliminary Plat and Final Plat for the updated layout. Attached is this approved Drainage Plan for the previous Final Plat (2006) for comparison.



Sincerely,  
HURST & ASSOCIATES, INC.

John Jorgenson, P.E.  
Project Manager

JWJ/ct



**BENCHMARK:**  
NGS STATION 'JR 53':  
USGS 3.5" BRASS CAP SET IN CONCRETE MONUMENT LOCATED  
AT NORTHEAST CORNER OF WCR B & UPRR TRACKS  
ELEV: 5028.66 (NAVD 88 DATUM)

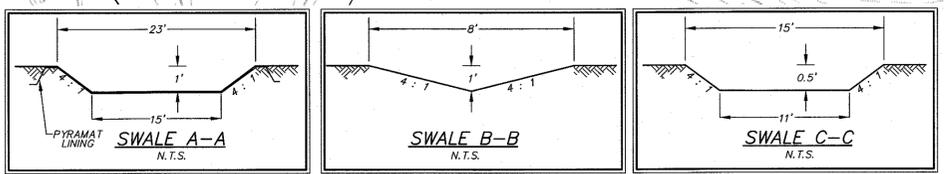
**NOTE:**  
THE SHOWN AREA INLETS AND 12" SDR 35 PIPES WILL BE  
PRIVATELY OWNED AND MAINTAINED.

LEGEND	
	Manhole
	Existing Manhole
	5' Type 'R' Inlet
	10' Type 'R' Inlet
	Flared End Section
	Storm Pipe
	Existing Storm Pipe
	Existing Contours
	Proposed Contours
	Master Basin Boundary
	Basin Boundary
	Flow Arrow
	Structure Number
	Basin Designation

72 HOURS BEFORE YOU DIG  
CALL THE UTILITY NOTIFICATION  
CENTER OF COLORADO (U.N.C.C.)  
1-800-922-1987

GAS, ELECTRIC, TELEPHONE, CATV AND  
PANHANDLE EASTERN PIPELINE LOCATIONS

**ERIE COMMONS  
FILING NO. 4 (PHASE II)  
MASTER DRAINAGE PLAN**



June 28, 2010

Shea Homes  
9135 South Ridgeline Boulevard  
Suite 100  
Highlands Ranch, Colorado 80129

Attention: Mr. Ryan McDermed

Subject: Preliminary Geotechnical Investigation  
Erie Commons  
County Line Road and Leon Wurl Parkway  
Erie, Colorado  
Job No. DN38,548

CTL | Thompson, Inc. performed a Preliminary Geotechnical Investigation for four parcels in Erie Commons subdivision (Job No. 38,548; report dated May 18, 2004) to assist Shea Homes in planning and development of the site. We understand Shea Homes is replatting portions of the site. We were requested by Shea Homes to review our 2004 investigation to determine whether the report is still valid. We have reviewed our report and believe the findings and recommendations presented in the report are still valid. Ground water may fluctuate with seasons and years. The borings are widely spaced. Subsoil conditions will likely vary between borings. Site specific investigations of pavement subgrade and foundation for each lot should be performed by our firm after grading. Swelling or compressible soils may be encountered during lots specific investigation and may require sub-excavation to allow the use of footings. Construction testing and observation during site development, including compaction testing of site grading fill, utility trench backfill, pavements, concrete tests, and foundation installation observations should be performed by our firm.

If we can be of further service, please call.

Respectfully Yours,

CTL | THOMPSON, INC.

  
Nan-Ping Hsieh, P.E.  
Principal



NPH/nt  
(2 copies)

via email: [ryan.mcdermed@sheahomes.com](mailto:ryan.mcdermed@sheahomes.com)



**PRELIMINARY  
GEOTECHNICAL INVESTIGATION  
ERIE COMMONS  
COUNTY LINE ROAD  
AND LEON WURL PARKWAY  
ERIE, COLORADO**

**Prepared For:**

**SHEA HOMES  
9135 South Ridgeline Boulevard  
Suite 100  
Highlands Ranch, Colorado 80129**

**Attention: Mr. David Vasquez**

**Job No. 38,548**

**May 18, 2004**



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## SCOPE

This report presents the results of our Preliminary Geotechnical Investigation of four parcels of Erie Commons Subdivision generally located east and northeast of the intersection of County Line Road and Leon Wurl Parkway in Erie, Colorado (Fig. 1). The parcels consist of about 48 acres and are planned for single and multi-family residential development. Our purpose was to evaluate the subsurface conditions to assist in planning and development of the site. The report includes descriptions of subsoil and ground water conditions found in our exploratory borings, and discussions of site development as influenced by geotechnical considerations. The scope was described in our proposal (04-0187) dated March 9, 2004. Environmental and mine subsidence investigations are not included with this report.

The report was prepared based on conditions disclosed by our exploratory borings, results of laboratory tests, engineering analysis of field and laboratory data and our experience with similar conditions. The criteria presented in the report are intended for preliminary planning purposes. Additional investigations will be required to design building foundations and pavements. A summary of our conclusions is presented below with more complete descriptions and results of field and laboratory tests included in the report.

## SUMMARY OF FINDINGS AND CONCLUSIONS

1. The site is judged suitable for the planned development. The primary geotechnical concern for this site is the presence of relatively shallow ground water and expansive soils. We believe these concerns can be mitigated with proper planning, engineering, design and construction. We believe there are no geotechnical constraints at this site that would preclude the proposed construction.
2. Subsurface conditions found in the borings generally consisted of slightly silty to clayey sands and sandy clays underlain by weathered and comparatively unweathered claystone bedrock. Bedrock was found in 23 of the 30 borings at depths ranging from about 8 to 26 feet. The sand is considered low swelling or non-expansive. Some sands are loose. Select clay samples exhibited slight compression to very high swell. Samples of the claystone showed moderate and high swell.



3. Ground water was encountered in all borings during our investigation at depths ranging from 7 to 24.5 feet below the existing ground surface. Estimated areas of shallow ground water are shown on Fig. 2. Ground water levels are expected to vary seasonally and may rise after development as irrigation of landscaping begins. All of our borings caved between depths of 10.5 and 23.5 feet. Current ground water conditions may affect site grading, sub-excavation, utility installation and limit the depth of basement excavations. We generally recommend basement excavations be limited to at least 3 feet, and preferably 5 feet, above measured ground water levels. Where ground water is estimated comparatively shallow, multi-family buildings without below-grade basement construction should be considered. An underdrain system below the sanitary sewer is recommended to help control ground water and provide a gravity outlet for basement foundation drains.

4. Preliminary information indicates the proposed single or multi-family residences can be constructed on spread footings, footings with minimum deadload, post-tensioned, slab-on-grade foundations, or drilled piers bottomed in bedrock. Cuts and fills during site grading may influence the type of foundation recommended for each lot. Footings with low design soil pressures should be anticipated in areas where soft clays or loose sands are present. Drilled piers may be recommended if thick layers of moderate or high swelling clay and claystone bedrock are encountered near anticipated foundation levels. Caving-prone sands and ground water would make pier installation at this site very difficult and costly. Helical piers may be used as an alternative to drilled piers.

Ground modifications consisting of either sub-excavation or moisture injection can be used to reduce swell potential for areas with moderate and high swelling soils or bedrock. We believe moisture injection of expansive, upper clays would likely allow use of footings or pads provided the injected soil exhibits low swell. Sub-excavation (if selected) in areas of TH-19 and TH-20 will likely encounter ground water above the expansive claystone bedrock. Ground water control during sub-excavation may be difficult and costly. If the builder wishes to consider ground modification, further investigation should be performed to better delineate potential sub-excavation or moisture injection areas and evaluate the effect of ground water on sub-excavation.

5. Based on the preliminary investigation, we judge the risk of poor slab performance will be low or moderate/high for single-family residences with basement construction at this site (Fig. 6). The preliminary data suggest risk may be low for about 90 percent of the site, and moderate/high for the remaining 10 percent. For multi-family buildings without basement construction, the risk will be lower due to a greater depth to moderately to highly expansive clay and claystone bedrock.



6. We recommend foundation drains be installed around the perimeter of below-grade living areas. Foundation drains with gravity discharge to an underdrain is a preferred system. Foundation drain also can outfall to a sump pit provided with a pump to remove water. The pump should discharge beyond the limits of the foundation backfill.
7. The near-surface sand and clay soils possess good to poor pavement support qualities. We anticipate about 5 to 6 inches of asphalt pavement for residential streets. Thicker pavements should be anticipated for collector streets. A subgrade investigation and pavement design should be performed after site grading is complete.
8. Overall surface drainage should be designed to provide rapid run-off away from the proposed structures. Water should not be allowed to pond near the crest of slopes, on or adjacent to pavements. Permanent slopes should be re-vegetated to reduce erosion.

## SITE CONDITIONS

The four parcels of Erie Commons Subdivision included in our investigation are generally located northeast and east of the intersection of County Line Road and Leon Wurl Parkway in Erie, Colorado (Fig. 1). The parcels contain about 48 acres. Portions of the site have been used as farmland. Coal Creek is located to the east of the site. Water was flowing in the drainage at the time of this investigation. Commercial development is located on the southeast corner of County Line Road and Leon Wurl Parkway. The ground surface slopes downward towards the east and northeast. Total relief across the site is about 30 feet, from elevation 5029 to 5058. Existing ground surface contours are shown on Fig. 1.

## PROPOSED DEVELOPMENT

Plans are preliminary at this time. The site is proposed for development and construction of single and multi-family residences. We anticipate one to two-story, wood framed structures with attached garages for the single family and 3 to 8-plex, wood framed structures for the multi-family. Attached and unattached garages are anticipated for multi-family. Paved streets will be included in the development.



## **SUBSURFACE CONDITIONS**

Subsurface conditions were investigated by drilling 30 borings to depths of 25 to 35 feet at the approximate locations shown on Fig. 1. Prior to drilling, Aztec Consultants, Inc. staked and surveyed boring locations and elevations. Borings were drilled using 4-inch diameter, continuous-flight auger and a truck-mounted drill rig. The drilling operations were observed by our field representative who logged the soils and obtained samples for laboratory testing. Summary logs of the soils and bedrock found in the borings and results of field penetration resistance tests are presented in Appendix A. Samples obtained during drilling were returned to our laboratory where they were visually classified and samples were selected for testing. The results of laboratory testing are presented in Appendix B and summarized on Table B-1.

Subsurface conditions found in the borings varied but generally consisted of slightly silty to clayey sands and sandy clays underlain by weathered and comparatively unweathered claystone bedrock. Bedrock was found in 23 of the 30 borings at depths ranging from about 8 to 26 feet (elevation 5007 to 5034).

The sands were loose to very dense based on field penetration resistance tests. Sands were encountered in 29 of the 30 borings, at the ground surface or interlayered within the clay. Thickness ranged from 2 to greater than 25 feet. Ten sand samples tested for swell-consolidation exhibited compression (1.6 percent) to low swell (0.5 percent) when wetted under an applied pressure of 1,000 psf. Sand samples contained 6 to 43 percent silt and clay sized particles (passing No. 200 sieve). The sands are considered non-to low expansive. Swell tests conducted after wetting under an applied pressure of about 1,000 psf are summarized in Table A.

Clays were encountered in 26 of the 30 borings either at the ground surface or interlayered with the sands. The clays were medium stiff to very stiff based on field penetration resistance tests. Samples of the clays exhibited slight compression (0.3 percent) to very high swell (6.3 percent); with 94 percent showing compression or low swell. The clays are generally considered low expansive.



Weathered and relatively unweathered claystone bedrock was encountered in 23 of the 30 borings at depths between about 8 and 26 feet (elevation 5007 to 5034) below existing ground surface. The depth to bedrock after site grading and our estimates of elevation of the unweathered bedrock surface are shown on Figs. 4 and 5; respectively. Lignite seams may be encountered within the bedrock profile. The bedrock was weathered to very hard. Samples of the bedrock exhibited moderate to high swell (2.3 to 5.8 percent) when wetted under an applied pressure of 1,000 psf. The bedrock is considered moderate to high swell risk. One claystone sample exhibited high plasticity.

**TABLE A**  
**SUMMARY OF SWELL TEST RESULTS**

Soil Type	Compression	Range of Measured Swell (%)*			
		Low 0 to <2	Moderate 2 to <4	High 4 to <6	Very High ≥6
Number of Samples and Percent					
Clayey Sand	7 70%	3 30%	0 0%	0 0%	0 0%
Sandy Clay	3 10%	25 84%	1 3%	0 0%	1 3%
Weathered Claystone	0 0%	0 0%	2 40%	3 60%	0 0%
Claystone Bedrock	0 0%	0 0%	1 50%	1 50%	0 0%
Overall Sample Number	10	28	4	4	1
Overall Percent	21%	60%	8.5%	8.5%	2%

\*Swell measured after wetting under an applied pressure of about 1,000 psf.

Ground water was encountered all borings at depths ranging from 7 to 24.5 feet (elevation 5018 to 5040). The depth to ground water after site grading and estimated ground water surface elevation are shown on Figs. 2 and 3; respectively. Ground water



levels are anticipated to be shallow (12 feet or less of final grades) in portions of the site. Ground water levels are expected to vary seasonally and may rise after development as irrigation of landscaping begins. Site grading and installation of underdrains below the sanitary sewer will change ground water depth. Caving caused by ground water and sands occurred at all test holes at depths between 10.5 and 23 feet. Current ground water conditions may affect planning and design of site grading, utility installation, and may limit depth of excavations. Design of site grading should consider the impacts of ground water on basement construction. We generally recommend excavations be limited to at least 3 feet, are preferably 5 feet, above measured ground water levels. An underdrain system below the sanitary sewer is recommended to help control ground water and provide a gravity outlet for basement foundation drains.

#### **ESTIMATED SWELL POTENTIAL**

Based on the subsoil profiles, swell test results, and our experience, we have prepared Fig. 6 indicating preliminary estimate of swell potential or slab performance risk. Based on laboratory data, we calculated potential heave at the existing ground surface on the order of 1 inch with 15 to 20-foot depth of wetting for most of the borings. Potential heave of 2 to 4 inches is possible if thick moderate or high swell layers of clay are encountered. Due to widely spaced borings and limited testing, variation between borings should be anticipated. Site grading with fill or cut will affect the estimated swell potential. In addition to swelling soils, some of the sands were loose. The loose sands may compress or settle under footings and slabs.

#### **SITE DEVELOPMENT**

The primary geotechnical concerns we believe will influence development of this site are the presence of relatively shallow ground water and expansive soils. We believe these impacts can be mitigated with proper planning, engineering, design and construction.



## **Overlot Grading**

Grading plans prepared by Hurst and Associates indicate cut/fills on the order of 5 feet or less will be required to reach final grades. Preliminary data shows about 90 percent of the site is likely underlain by low swelling to non-expansive sand and low swelling clay at depths likely to influence foundations and slabs-on-grade. We estimate the remaining 10 percent of the site may have moderate/high swell risk. It is possible a higher percentage of moderate or high swelling clays may be found in the detailed, design level investigation when test holes are drilled on each lot and more swell tests are performed.

Relatively shallow ground water can be mitigated with proper planning of proposed grades. Where feasible, proposed grades should be adjusted so the ground surface is at least 12 feet above measured water elevations, this would result in about 5 to 6 feet of difference between anticipated basement levels and measured ground water levels.

Sub-excavation or moisture injection are ground modification methods commonly used to reduce the swell potential for areas with moderate/high swelling soils. Our experience suggests sub-excavation or moisture injection would likely allow wider use of footing or pad foundations as well as enhance performance of slab-on-grade garage floors provided the processed fill or injected soils exhibit low swell. These techniques are discussed in the following sections of this report (Sub-Excavation and Moisture Injection).

The ground surface in areas to be filled should be stripped of vegetation, scarified, and moisture conditioned and compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D 698). We anticipate stripping will require cuts of 4 to 6 inches. Permanent cut and fill slopes should be no steeper than 3:1 (horizontal:vertical) and be seeded or mulched to reduce erosion.

The properties of the fill will affect the performance of foundations, slabs-on-grade, utilities, and pavements. The on-site soils can be used as site grading fill provided deleterious, organic materials are removed. Fill should be placed in thin loose lifts, moisture conditioned and densely compacted prior to placement of the next lift. Our



experience has shown clay fill moisture treated to optimum moisture content or above will likely exhibit lower swell compared to clay fill receiving the same compactive effort but moisture treated below optimum moisture content. Fill should be compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D 698). Clay fill should be moistened to between optimum and 3 percent above optimum moisture content and sand fill should be moistened to within 2 percent of optimum moisture content. The placement and compaction of site grading fill should be observed and tested by a representative of our firm during construction. Guideline overlot grading specifications are presented in Appendix C.

### Sub-Excavation

Based on field and laboratory test data and our experience in the area, we believe about 10 percent of the site contains moderate/high swell soils at depths likely to influence foundation systems, as shown on Fig. 6. The risk will be lower for buildings without basement construction. Drilled piers are normally recommended for moderate/high swell lots. Drilled pier installation may be costly and difficult due to the presence of caving soils and ground water above bedrock. Sub-excavation of the areas of expansive clay and re-working the excavated material as moisture conditioned fill to reduce the impacts of swelling on the proposed construction. Sub-excavation in areas near TH-19 and TH-20 (Fig. 2) will likely encounter ground water. Ground water control during sub-excavation may be difficult and costly. If the builder wishes to consider sub-excavation, further investigation should be performed to better delineate potential sub-excavation areas and evaluate impacts of ground water on sub-excavation. Construction schedule will be affected by sub-excavation.

Typical sub-excavation involving removal of the expansive soils to depths of about 10 feet below bottom of foundations (16 to 18 feet from the ground surface) and replacement with fill at above optimum moisture contents. The subsoil profiles and ground water at Erie Commons indicate the depth of sub-excavation may be reduced if thick non-expansive sands are present below the upper expansive clays. We believe ground modification involving sub-excavation and replacement could be used on portions



of this site to enhance foundation and concrete flatwork performance. Our experience suggests sub-excavation would likely allow wider use of footing or pad foundations as well as enhance performance of slab-on-grade garage floors provided the processed fill possesses low swell.

Sub-excavation does not produce a non-swelling site. The degree of success in lowering swell is dependent on contractor procedures in processing and moisture conditioning the soils. The process is slower than "normal" cut/fill operations and requires an experienced contractor and full-time observation/testing.

The bottom of the sub-excavated area should extend laterally at least 5 feet and preferably 10 feet beyond building footprints at the limits of the excavation to ensure foundation elements are constructed over moisture conditioned, compacted fill. The remaining areas under driveway, curb, gutter, sidewalk and street pavement can be sub-excavated to about 3 to 5 feet or greater to improve performance. The contractor should provide a construction disc to break down fill materials and anticipate use of push-pull scraper operations and dozer assistance. The operation will be relatively slow. Special precautions should be taken to compact the fill at corners, edges, ends, and access ramps of the sub-excavation because it is difficult for large construction equipment to reach these areas. The contractor should use proper equipment to compact fill at these locations.

Clay fill in sub-excavation areas should be moisture conditioned to between 1 and 4 percent above optimum moisture content, with an average moisture content each day of at least 1.5 percent above optimum. Sand fill should be moisture conditioned to within 2 percent of optimum and not included within the daily average. The fill should be compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D 698). Our representative should observe and test compaction of the fill on a full-time basis. The swell of the moisture conditioned fill should be tested during and after fill placement to evaluate swelling characteristics of the fill and appropriate foundation systems. The sub-excavation limit and depth should be periodically surveyed by a surveyor and "as-built" sub-excavation plans should be prepared. The "as-built" sub-excavation plans should be



provided to sales and construction staff for proper selection of models and siting houses inside the sub-excavation limits. Appendix D contains guideline specifications for sub-excavation.

Once fill is placed, it is important that measures be planned to reduce drying of the near-surface materials. For example, covering portions of the site planned for construction during later dates with a thin, loose lift of fill, or regular watering of the fill surface should be considered. If the fill dries excessively prior to building and pavement construction, it may be necessary to rework the drier materials just prior to paving and installing foundations.

The high moisture content requirement normally associated with this procedure results in higher initial costs. However, these costs may be partially recaptured or savings realized due to reduced construction cost for normal foundations and slabs-on-grade versus deep drilled piers. The process will also likely enhance performance of concrete flatwork such as driveways, sidewalks, and pavements, potentially reducing long-term maintenance. In order for the procedure to perform properly, close control of fill placement to specifications is required. The placement and compaction of fill should be observed and density tested by a representative of our firm during construction.

### Moisture Injection

Moisture injection can be used in the area of TH-2 or other areas to reduce the swell of soils. The technique involves pushing rods into the ground and injecting water. Like sub-excavation, the goal is to achieve low swelling soil conditions to possibly allow the use of footing or pad foundations as well as enhance performance of slab-on-grade garage floors. We recommend injection of the upper expansive clays. Further subsurface exploration and laboratory testing may be conducted to refine the boundaries of the injection areas and the depth to which moisture injection would prove most beneficial, if desired. Moisture injection is not suitable for areas of relative shallow claystone bedrock, such as in areas of TH-19 and TH-20.



The injection grid should extend at least 5 feet beyond the limits of all foundations. The moisture injection areas should be staked by a surveyor. An “as-built” moisture injection plan should be prepared and provided to the construction and sales staff to properly sit the houses. Building foundations should be at least 5 feet inside the limits of the moisture injected area. Moisture injection is not recommended where loose or soft soils are present and areas where bedrock is relatively shallow.

**Underdrain**

We believe current ground water levels may affect site grading, sub-excavation, utility installation, and limit depth of basement excavations. Ground water levels will fluctuate with change in seasons and will likely rise after development. The use of underdrain systems below sanitary sewer mains and services is a common method to control ground water in response to development and, in some cases, to lower ground water. We believe installation of underdrains also helps to control deep wetting, which can lead to higher frequency of heave-related foundation problems. We recommend plans for this site include underdrains incorporated into sanitary sewer design. Underdrains should also be installed below sewer service lines to each residence planned in this area so that foundation drains can be connected to the underdrain system as a gravity outlet (Fig. 7). Recommended underdrain sizes are shown in the table below.

**UNDERDRAIN SIZING**

Slope = 0.005 (0.5 percent)				
Pipe Size (inches)	4	6	8	10
Maximum Number of Residences	50	100	200	400
Slope = 0.01 (1.0 percent)				
Pipe Size (inches)	4	6	8	10
Maximum Number of Residences	75	150	300	600
Slope = 0.02 (2.0 percent)				
Pipe Size (inches)	4	6	8	
Maximum Number of Residences	100	300	600	

Note: Minimum slope of the underdrain will govern pipe size and maximum number of residences serviced.



The underdrain should consist of 3/4 to 1.5-inch clean, free draining gravel surrounding a perforated PVC pipe (Fig. 8). We believe use of perforated pipe below sanitary sewer mains is the most effective approach to control ground water. The pipe should be sized for anticipated flow (see table above). The line should consist of smooth, perforated or slotted rigid PVC pipe placed at a grade of at least 0.5 percent. A positive cutoff (concrete) should be constructed around the sewer pipe and underdrain pipe immediately downstream of the point where the underdrain pipe leaves the sewer trench (Fig. 9). Solid pipe should be used down gradient of this cutoff wall. The underdrains should be designed to discharge to a gravity outfall and be provided with a permanent concrete headwall and trash rack. The underdrain should be provided with clean-outs and be maintained by the homeowner's association or another entity.

#### Utility Construction

We believe excavations for utility installation can be performed with normal heavy-duty equipment. Ground water will likely be encountered, and bracing or temporary dewatering may be required during utility construction. Dewatering may be accomplished by sloping excavations to occasional sumps where water can be removed by pumping. The sumps should be several feet below the bottom of the excavations so that water is pumped down through the soils rather than up through the bottom of the excavations, which could potentially compromise the bearing capacity of the subsoils.

Utility trenches should be sloped or shored to meet local, State and Federal safety regulations. Based on our investigation, we believe the sand classifies as Type C soil, the clay classifies as Type B soil, and bedrock classifies as Type B soil based on OSHA standards. Excavation slopes specified by OSHA are dependent upon soil types and ground water conditions encountered. Seepage and ground water conditions in trenches may downgrade the soil type. Contractors should identify the soils encountered in the excavation and refer to OSHA standards to determine appropriate slopes. Excavations deeper than 20 feet should be designed by a professional engineer.



Water and sewer lines are usually constructed beneath paved roads. Compaction of trench backfill can have a significant effect on the life and serviceability of pavements. We believe trench backfill should be placed in thin, loose lifts, and moisture conditioned to between optimum and 3 percent above optimum moisture content for clays and within 2 percent of optimum moisture content for sands. Trench backfill should be compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D 698). The placement and compaction of fill and backfill should be observed and tested by our firm during construction.

### Pavements

The soils found on-site possess good to poor pavement support qualities. We anticipate about 5 to 6 inches of asphalt pavement for residential streets. Thicker pavements should be anticipated for collector streets; we estimate 8 to 10 inches of asphalt may be required. A subgrade investigation and pavement design should be performed after overlot grading is complete.

### **BUILDING CONSTRUCTION CONSIDERATIONS**

The following discussions are preliminary and are not intended for design or construction. After grading is completed, design-level investigations should be performed on a lot-specific basis.

### Foundations

Preliminary information indicates single-family structures on the site can be constructed on footings or drilled pier foundations. We anticipate post-tensioned, slab-on-grade foundation systems for the multi-family structures with no basements. Cuts and fills during site grading may influence the type of foundation recommended on each lot. We estimate about 90 percent of the lots can utilize shallow foundations such as footings with minimum deadload, spread footings, or post-tensioned slab-on-grade. Footing design soil pressures may range between 1,500 and 3,000 psf considering the presence of



some loose sands at the site. Ground water may affect the depth of basement excavation. We generally recommend basement excavation be 3 feet, are preferable 5 feet, above measured ground water levels. About 10 percent of site is estimated to contain moderate to high swell soils that could require drilled pier foundations. Caving-prone sands and ground water would make pier installation difficult and costly. Casing should be anticipated for proper installation. Helical piers may be used as an alternative to drilled piers.

Ground modification consisting of either sub-excavation or moisture injection can be used to reduce swell of moderate and high swelling soils. Our experience suggests sub-excavation or moisture injection would likely allow use of footing or pad foundations provided the processed fill or injected soil exhibits low swell. If the builder wishes to consider sub-excavation or moisture injection, further investigation should be performed to better delineate potential sub-excavation or moisture injection areas.

#### Floor System and Slab-on-Grade Construction

Our preliminary investigation indicates the risk of poor slab performance will be low or moderate/high for this site (Fig. 6). The preliminary data suggest risk may be low for about 90 percent of the site and moderate/high for the remaining 10 percent, if normal overlot grading occurs. Sub-excavation or moisture injection may be considered to enhance performance of slab-on-grade floors on moderate or high risk sites.

#### Surface Drainage

The performance of this development will be significantly influenced by surface drainage. When developing an overall drainage scheme, consideration should be given to drainage around each structure. Drainage should be planned so that surface runoff is directed away from foundations and is not allowed to pond adjacent to or between structures, or over pavements. Attention should be paid to compact the soils behind curb and gutter adjacent to the streets and in utility trenches. If surface drainage between preliminary development and construction phases is neglected, future performance of the



roadways, flatwork and foundations may be poor. When considering landscaping for common areas, we recommend the use of xeriscaping that requires little watering.

## **CONCRETE**

Concrete that comes into contact with soils can be subject to sulfate attack. We measured water-soluble sulfate concentrations between 0.006 and 0.026 percent in four samples from this site. Sulfate concentrations less than 0.1 percent indicate Class 0 exposure to sulfate attack for concrete that comes into contact with the subsoils, according to the American Concrete Institute (ACI). ACI indicates any type of cement can be used for concrete that comes into contact with the subsoils. In our experience, superficial damage may occur to the exposed surfaces of highly permeable concrete, even though sulfate levels are relatively low. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious material ratio should not exceed 0.50 for concrete in contact with soils that are likely to stay moist due to surface drainage or high water tables. Higher sulfate concentrations may be found during design level investigations.

## **RECOMMENDED FUTURE INVESTIGATIONS**

Based on the results of this investigation and the proposed development, we recommend the following investigations be performed by our firm:

1. Further investigation of specific areas to better delineate areas that would benefit from sub-excavation or moisture injection (if considered);
2. Subgrade Investigation and Pavement Design after grading;
3. Design-level Soils and Foundation Investigation for each lot after site grading; and,
4. Construction testing and observation during site development, including compaction testing of site grading fill, utility trench backfill, pavements, concrete tests, and foundation installation observations.



**LIMITATIONS**

Our borings were widely spaced to provide a general characterization of subsurface conditions for preliminary assessment and planning of site development and residence construction. Conditions between borings will likely vary. We believe this investigation was conducted in a manner consistent with that level of care and skill ordinarily used by geotechnical engineers practicing in this area at this time. No warranty, express or implied, is made.

If we can be of further service in discussing either the contents of this report or the analysis of the influence of subsurface conditions on the design of the proposed development, please call:

CTL | THOMPSON

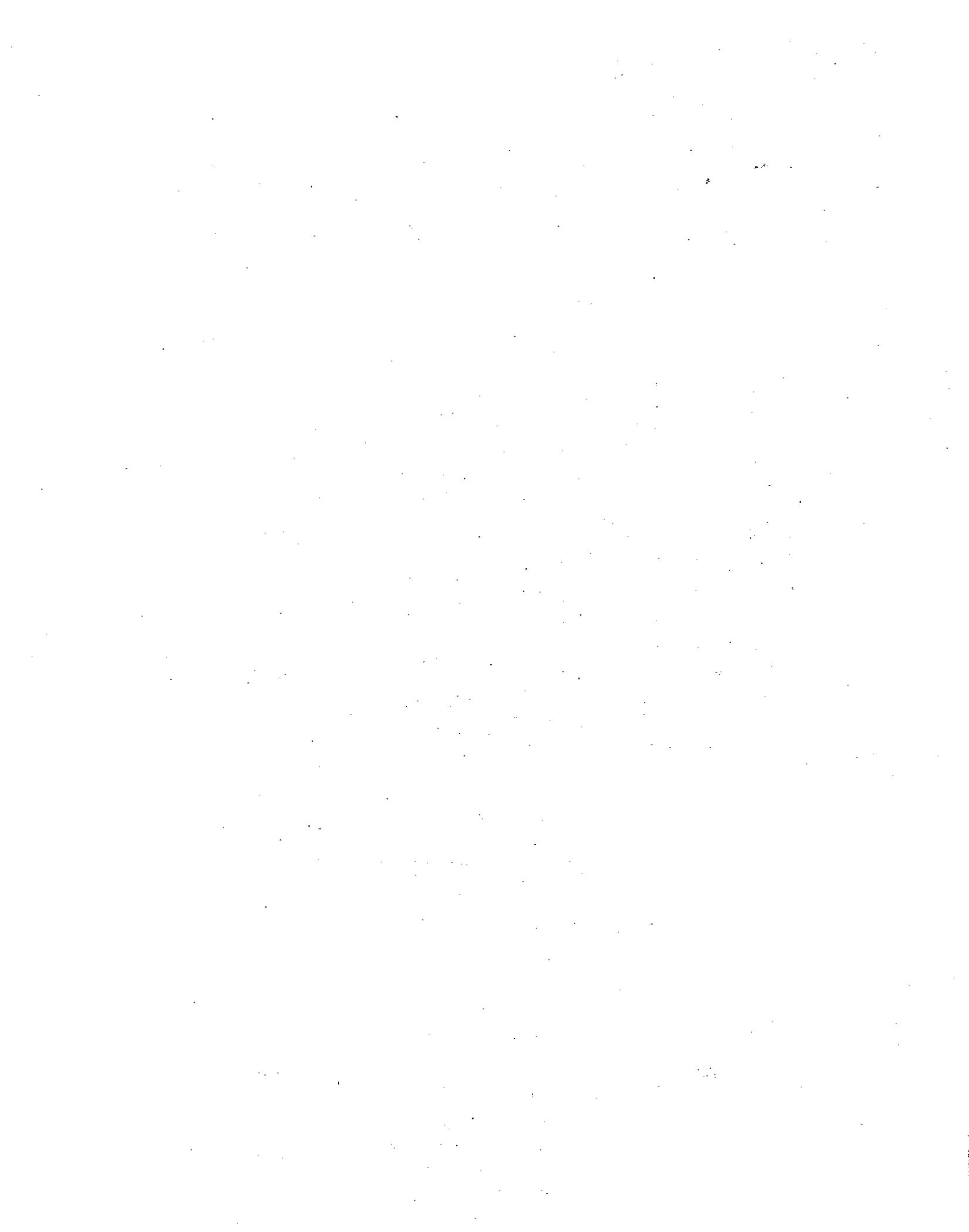


*Shawn Fitzhugh*  
Shawn Fitzhugh, P.E.  
Project Engineer

Reviewed by:

*Nan-Ping Hsieh*  
Nan-Ping Hsieh, P.E.  
Associate

SF:NPH/sf/rh  
(5 copies sent)

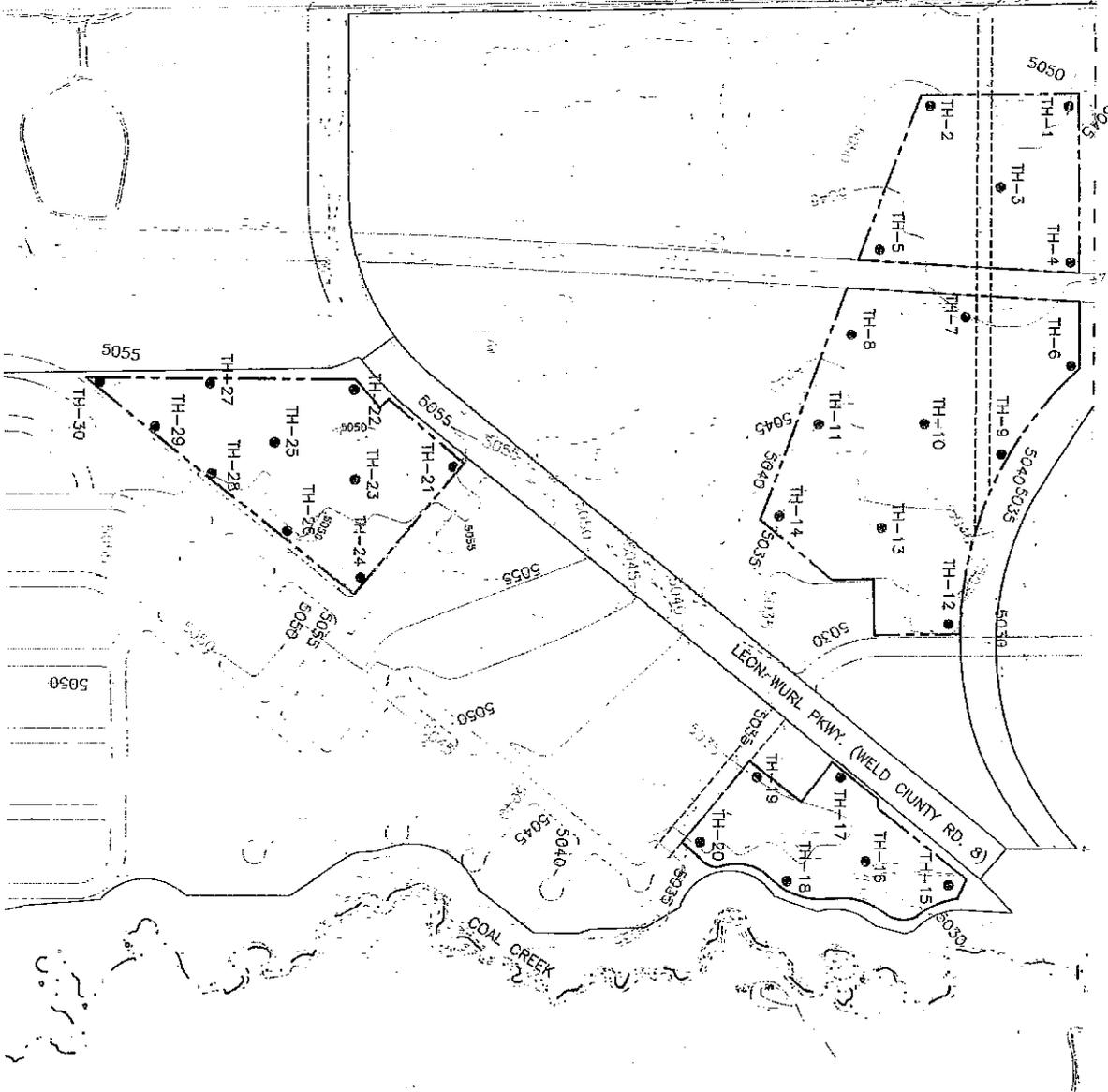


Shea Thomas  
 EIR Consultant  
 Job No. 38,548

SCALE: 1" = 400'



COUNTY LINE RD. 1



**LEGEND:**

- TH-1 ● INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING
- 5035 ——— INDICATES EXISTING GROUND SURFACE ELEVATION (FEET)
- 5040 - - - - - INDICATES PROPOSED GROUND SURFACE ELEVATION (FEET)

NOTE:  
 TEST HOLE LOCATIONS AND ELEVATIONS WERE SURVEYED BY AZTEC CONSULTANTS, INC.

**Locations of  
 Exploratory  
 Borings**

**VICINITY MAP  
 NOT TO SCALE**

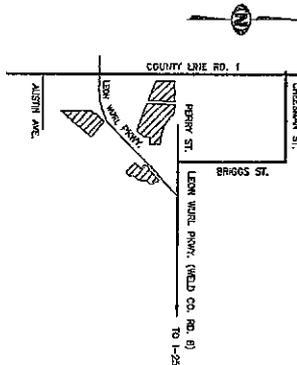
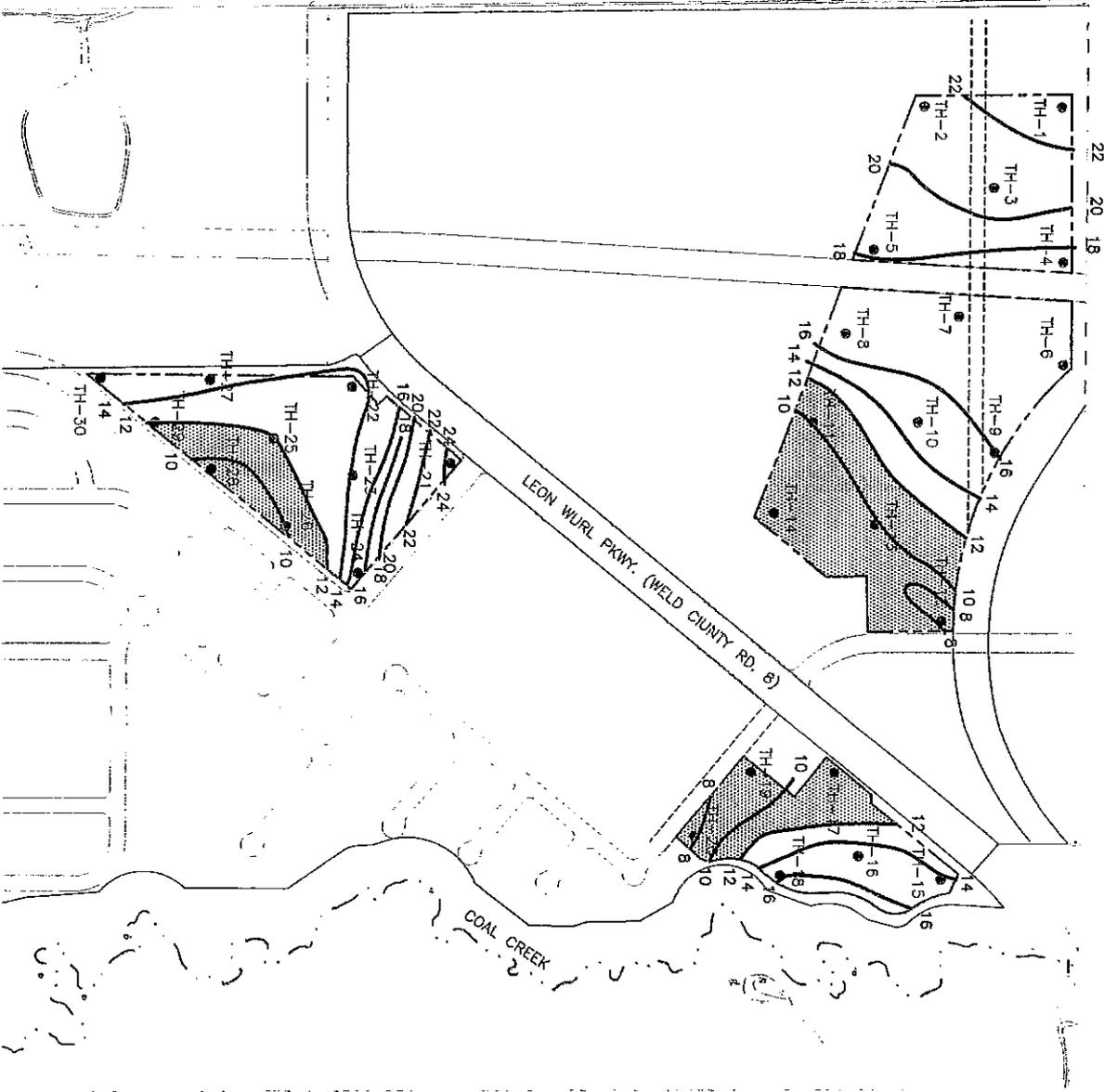


Fig. 1

SCALE: 1"=400'



COUNTY LINE RD. 1



**LEGEND:**

- TH-1  
INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING
- 8 ——— INDICATES DEPTH TO GROUND WATER AFTER SITE GRADING (FEET)
- ▨ INDICATES AREAS WHERE RELATIVELY SHALLOW GROUND WATER (12 FEET OR LESS) ARE ANTICIPATED AFTER SITE GRADING IS COMPLETE

NOTE:  
THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS AND SEASONAL FLUCTUATIONS.

**Depth to  
Ground Water  
After Site Grading**

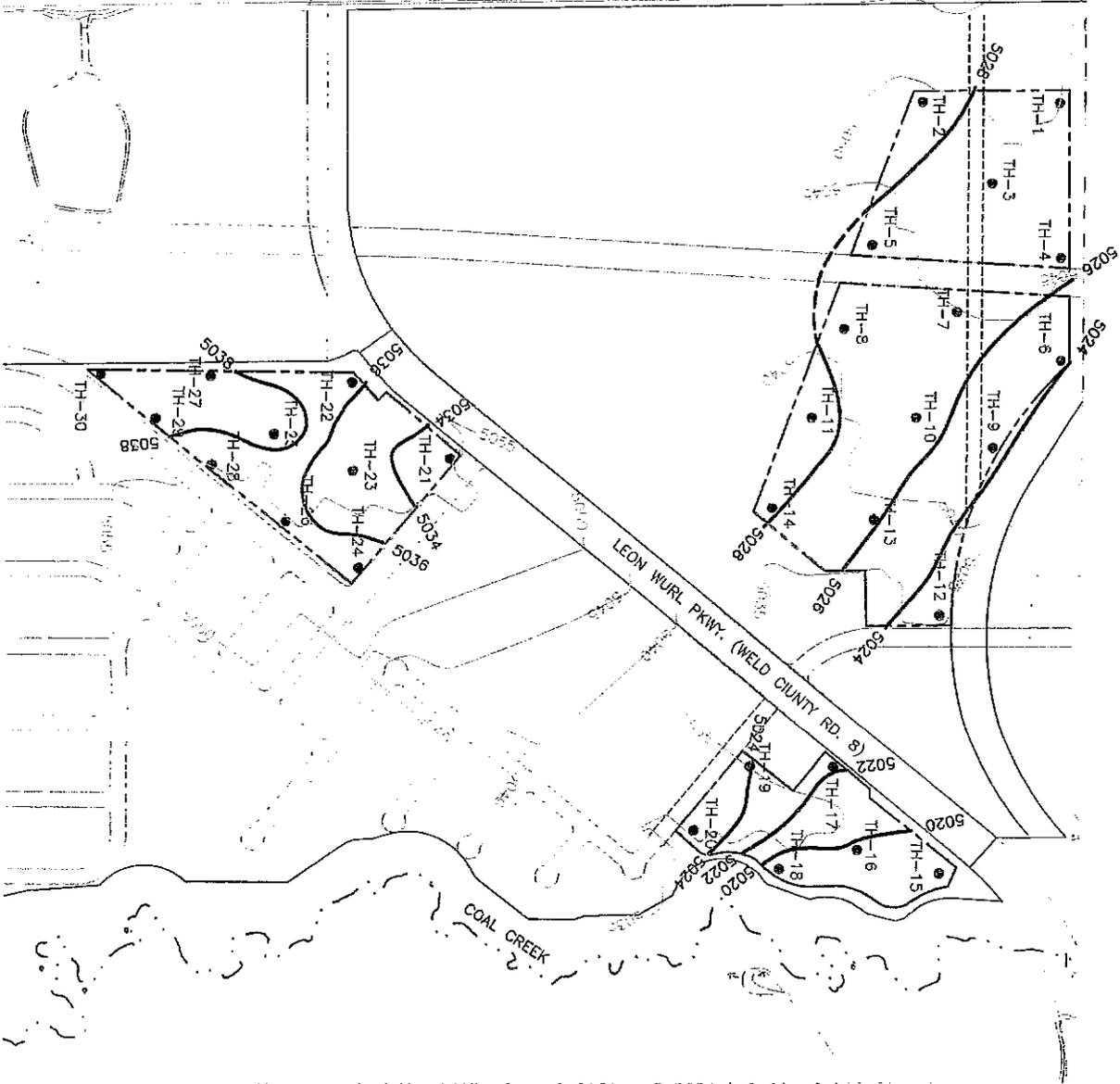
Fig. 2



SCALE: 1" = 400'



COUNTY LINE RD. 1



- LEGEND:
- TH-1 ● INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING
  - INDICATES PROPOSED GROUND SURFACE ELEVATION (FEET)
  - S024 — INDICATES ESTIMATED GROUND WATER SURFACE ELEVATION (FEET)

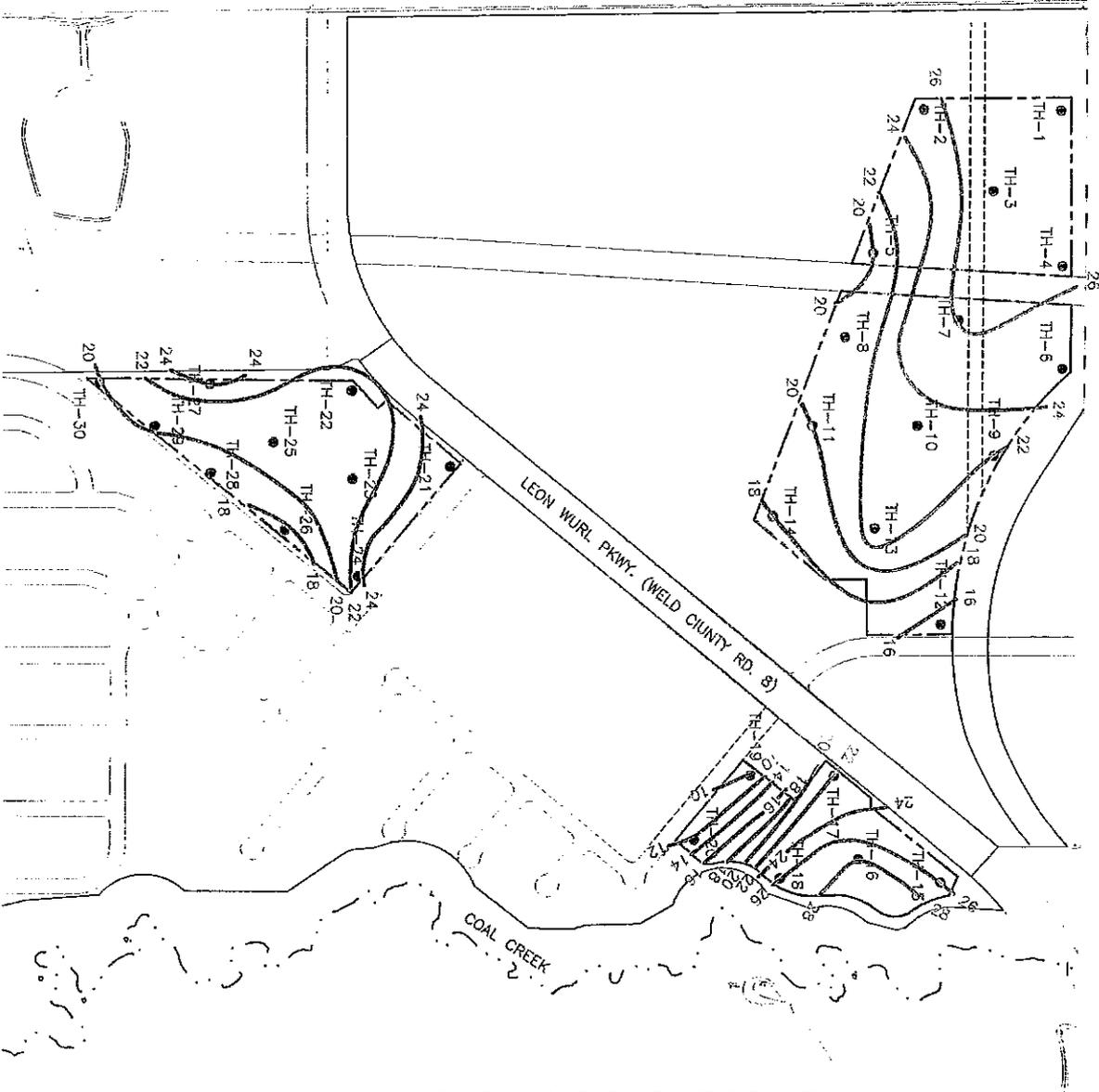
NOTE:  
 THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS AND SEASONAL FLUCTUATIONS.

**Estimated  
 Ground Water  
 Surface Elevation**

SCALE: 1" = 400'



COUNTY LINE RD. 1



LEGEND:

- TH-1 INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING
- 10 ——— INDICATES DEPTH TO BEDROCK AFTER SITE GRADING (FEET)

NOTE:  
THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS.

Shae Holmes  
Site Coroner  
Job No. 38,548

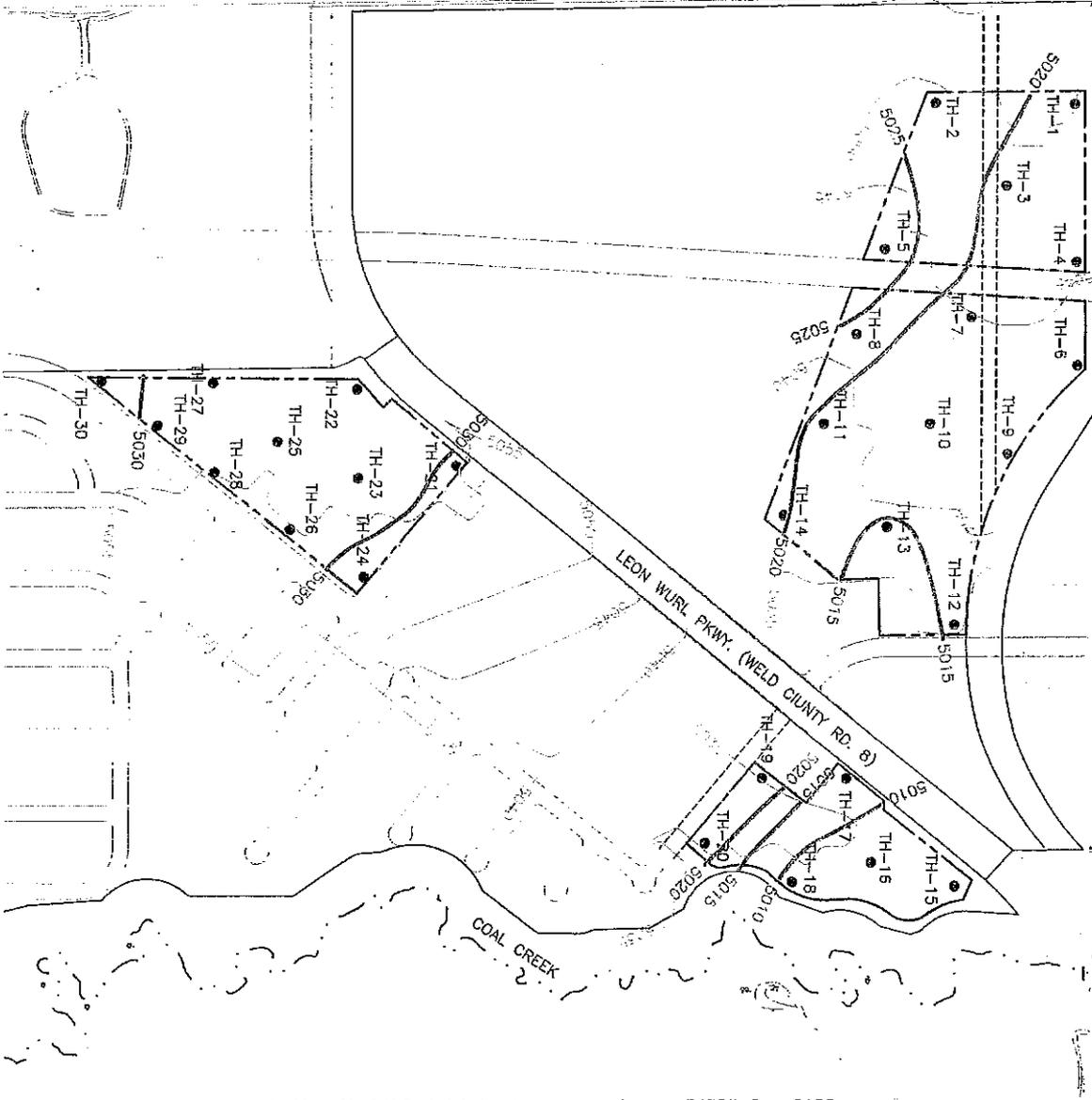
**Depth to Bedrock  
After Site Grading**

Fig. 4

SCALE: 1" = 400'



COUNTY LINE RD. 1



LEGEND:  
 TH-1 ● INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING

— INDICATES PROPOSED GROUND SURFACE ELEVATION (FEET)  
 — S024 — INDICATES ESTIMATED BEDROCK SURFACE ELEVATION (FEET)

NOTE:  
 THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS.

**Estimated Bedrock  
 Surface Elevation**

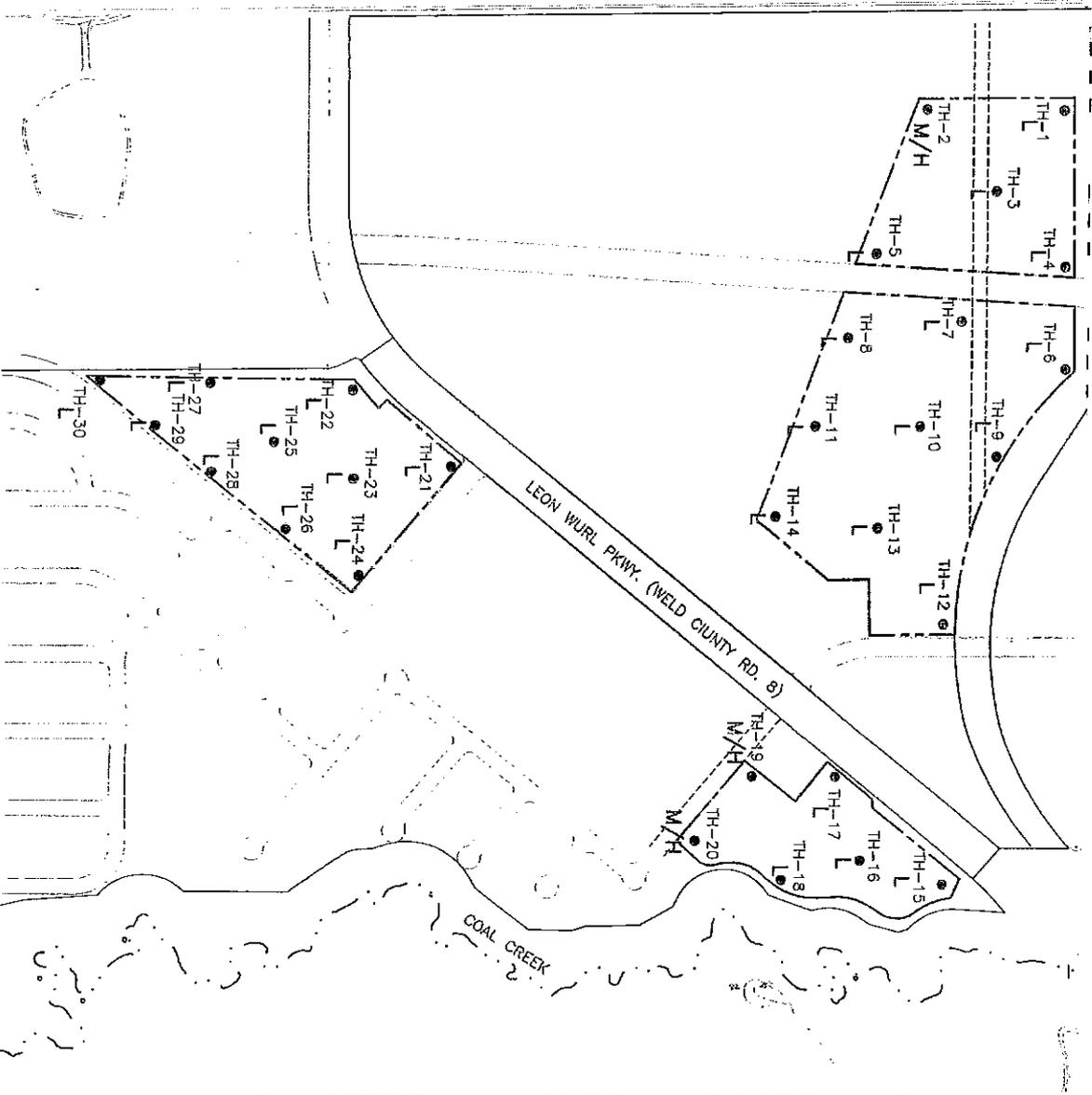
Fig. 5





SCALE: 1" = 400'

COUNTY LINE RD. 1



**LEGEND:**

TH-1 ● INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING

L ○ LOW RISK

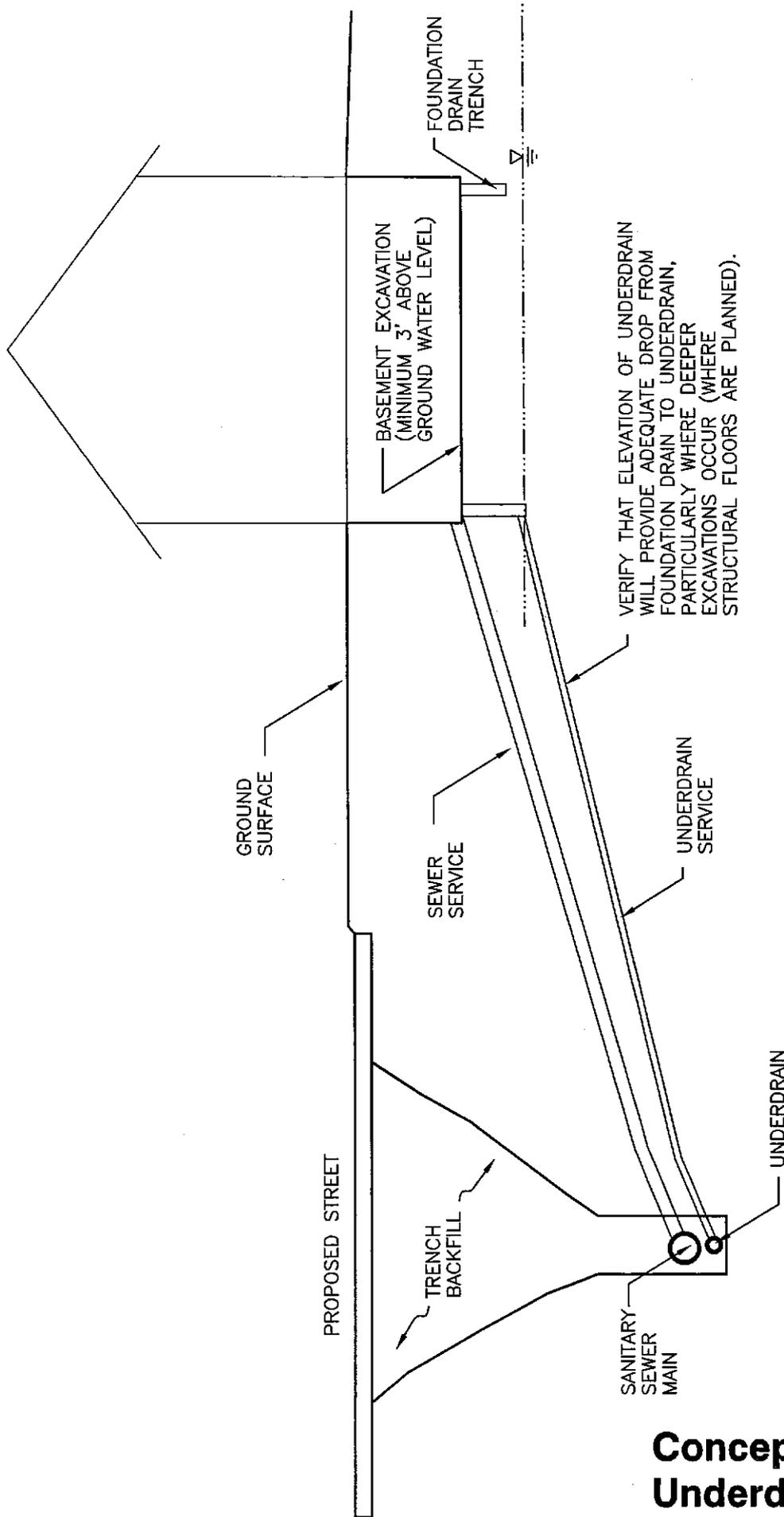
M/H ● MODERATE TO HIGH RISK\*

\*THE RISK WILL BE LOWER (LOW OR MODERATE) FOR MULTI-FAMILY BUILDINGS WITHOUT BASEMENT CONSTRUCTION BECAUSE OF GREATER DEPTH TO THE EXPANSIVE CLAYS AND CLAYSTONE BEDROCK.

NOTE:  
THIS EVALUATION WAS BASED UPON A SUBJECTIVE ANALYSIS OF LABORATORY TEST RESULTS AND DRILL HOLE DATA.

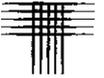
**Swell Risk Evaluation**

Fig. 6

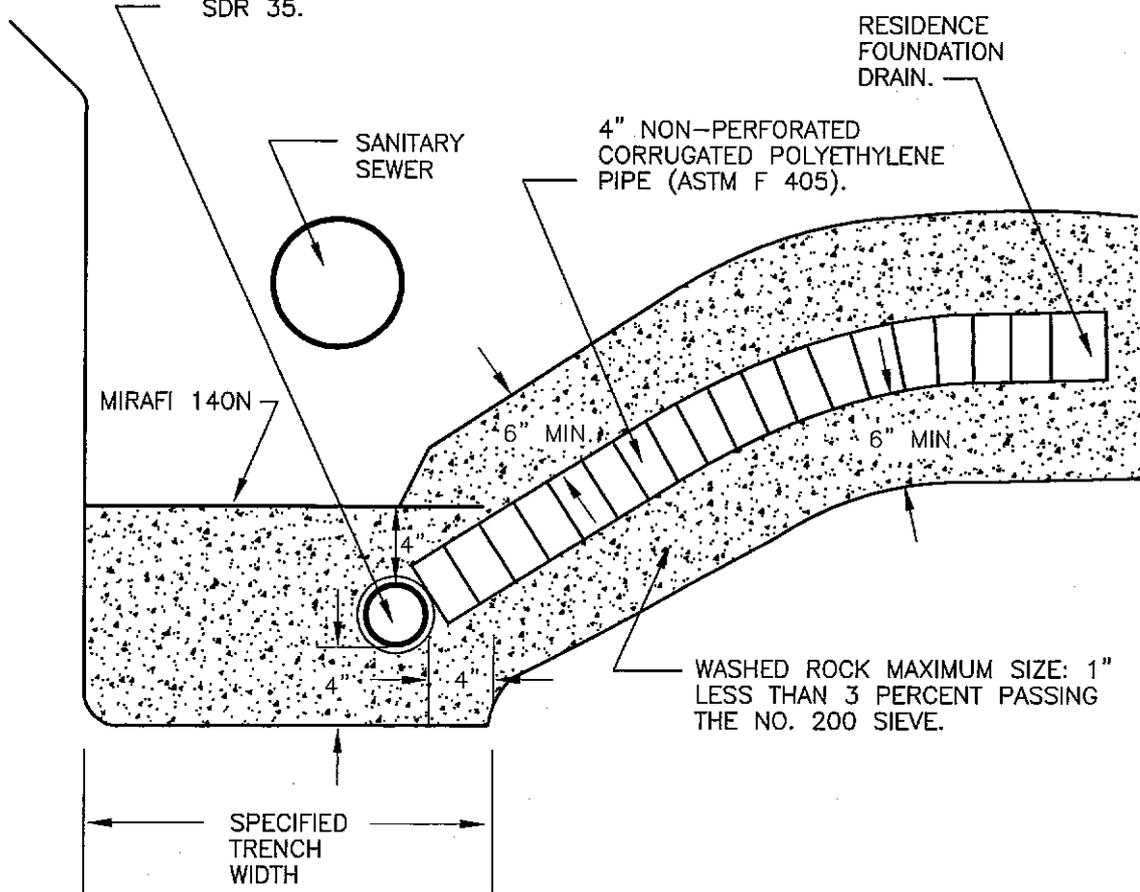


NOT TO SCALE

# Conceptual Underdrain Service Profile



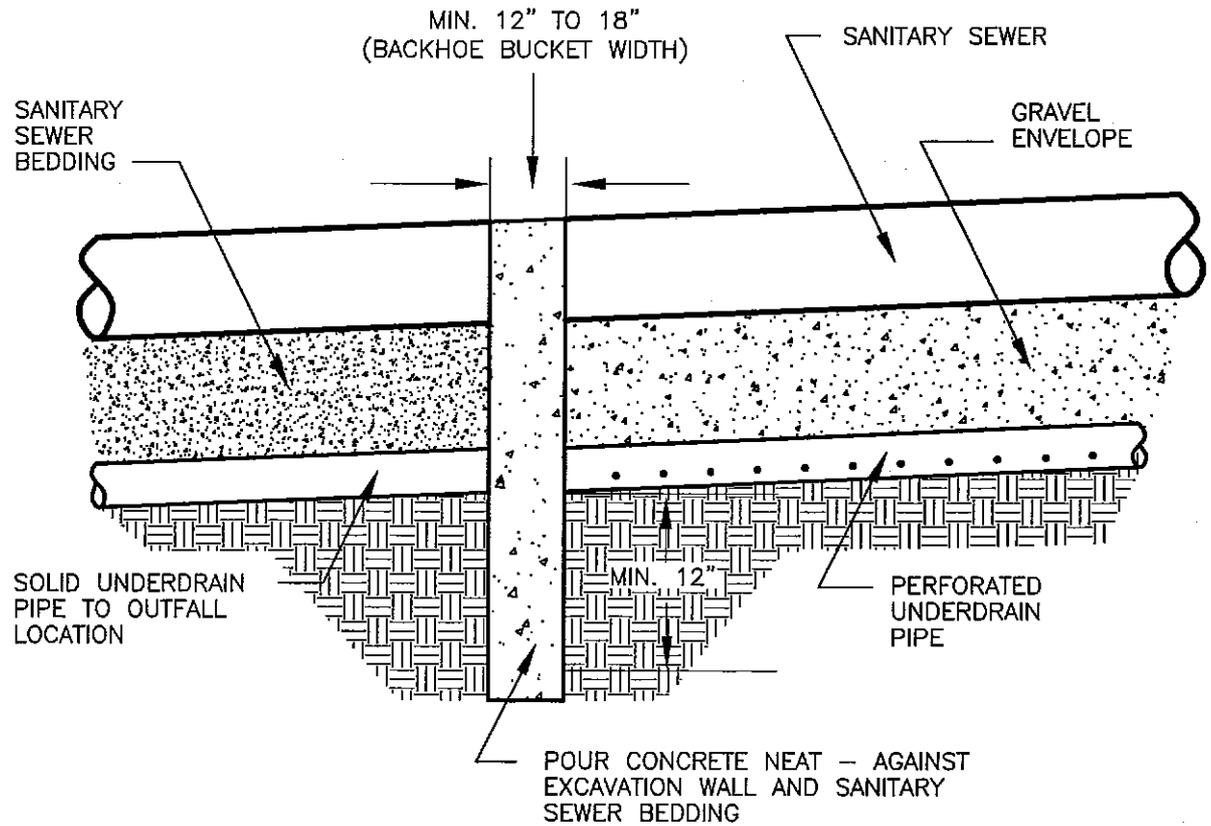
PVC PERFORATED UNDERDRAIN PIPE (WRAPPED WITH GEOTEXTILE FABRIC). SIZE VARIES. PERFORATIONS (3/8" DIAMETER) AT 5" O.C. TWO ROWS AT 60° FROM VERTICAL. PVC PIPE AND FITTINGS CONFORMING TO ASTM 3034, SDR 35.



NOTE: NOT TO SCALE.

50-UNDERDRAIN\_02

## Sewer Underdrain Detail



NOTE:  
THE CONCRETE CUTOFF WALL SHOULD EXTEND INTO THE UNDISTURBED SOILS OUTSIDE THE UNDERDRAIN AND SANITARY SEWER TRENCH A MINIMUM DISTANCE OF 12 INCHES.

50-UNDERDRAIN\_05

## Underdrain Cutoff Wall Detail