Print Form

TOWN OF ERIE

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

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

PROJECT ADDRESS: Southeast corner of Briggs Street and Erie Parkway

PROJECT DESCRIPTION: A redevelopment of Erie Commons Filing 4 to propose a residential development of 83 alley-loaded townhomes, open spaces connections, and a series of small recreation activity nodes. 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)***	**AUTHORIZED REPRESENTATIVE**
Name/Company: Community Development Group of Erie	Company/Firm: Century Communities
Contact Person: Jon Lee	Contact Person: Cynthia Myers
Address: 2500 Arapahoe Avenue, Suite 220	Address: 8390 E. Crescent Parkway, Suite 650
City/State/Zip: Boulder, CO 80302	City/State/Zip: Greenwood Village, Colorado 80111
Phone: 303-442-2299 Fax: 303-442-1241	Phone: 303-268-8375 Fax: 909-770-8320
E-mail: jonrlee@cdgcolorado.com	E-mail: cynthia.myers@centurycommunities.com

MINERAL RIGHTS OWNER ***(attach separate sheets if multiple)***	**MINERAL LEASE HOLDER** ***(attach separate sheets if multiple)***
Name/Company: Union Pacific Resources Company	Name/Company: Vessels Oil & Gas Company
Address: P.O. Box 1257	Address: 1050 17th St. Suite 2000
City/State/Zip: Englewood, Colorado 80150	City/State/Zip: Denver, Colorado 80265

LAND-USE & SUMMARY INFORMATION

Present Zoning: PD	Gross Site Density (du/ac): 12.3 du/ac
Proposed Zoning: PD	# Lots/Units Proposed: 83
Gross Acreage: 6.75 acres	Gross Floor Area: N/A

SERVICE PROVIDERS

Electric: United Power	Gas: XCEL
Metro District: Erie Commons Metro #2	Fire District: Mountain View
Water ***(if other than Town)***:	Sewer ***(if other than Town)***:

PAGE TWO MUST BE SIGNED AND NOTARIZED

DEVELOPMENT REVIEW FEES

ANNEXATION	
☐ Major (10+ acres)	$ 4000.00
☐ Minor (less than 10 acres)	$ 2000.00
☐ Deannexation	$ 1000.00
COMPREHENSIVE PLAN AMENDMENT	
☐ Major	$ 3000.00
☐ Minor	$ 1200.00
ZONING/REZONING	
☐ Rezoning	$ 1700.00 + 10.00 per acre
☐ PUD Rezoning	$ 1700.00 + 10.00 per acre
☐ PUD Amendment	$ 1700.00 + 10.00 per acre
☑ Major PD Amendment $3,770	$ 3700.00 + 10.00 per acre
☐ Minor PD Amendment	$ 500.00
SPECIAL REVIEW USE	
☐ Major	$ 1000.00
☐ Minor	$ 400.00
☐ Oil & Gas	$ 1200.00

SUBDIVISION	
☐ Sketch Plan	$ 1000.00 + 10.00 per lot
☑ Preliminary Plat $5,320	$ 2000.00 + 40.00 per lot
☐ Final Plat	$ 2000.00 + 20.00 per lot
☐ Minor Subdivision Plat	$ 2000.00
☐ Minor Amendment Plat	$ 1000.00 + 10.00 per lot
☐ Road Vacation (constructed)	$ 1000.00
☐ Road Vacation (paper)	$ 100.00
SITE PLAN	
☑ Residential $2,230	$ 1400.00 + 10.00 per unit
☐ Non-Resi. (>10,000 sq. ft.)	$ 2200.00
☐ Non-Resi. (>2,000 sq. ft.)	$ 1000.00
☐ Non-Resi. (<2,000 sq. ft.)	$ 200.00
☐ Amendment (major)	$ 1100.00
☐ Amendment (minor)	$ 350.00
VARIANCE	$ 600.00
SERVICE PLAN	$ 10,000.00

*All fees **include** both Town of Erie Planning & Engineering review. These fees **do not include** 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: Steve Kane   Date: 4/20/2017

Owner: ____________   Date: ____________

Applicant: B Mul[illegible]   Date: 4/24/17

STATE OF COLORADO)
) ss.
County of Boulder)

The foregoing instrument was acknowledged before me this 20 day of April, 2017,
by Steve Kane
Authorized Representative of Community Development Group of Erie Inc.

My commission expires: 11-22-2018

Witness my hand and official seal.

Mary Jane Davies
Notary Public

MARY JANE DAVIES
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 19874045755
MY COMMISSION EXPIRES NOV. 22, 2018

1101 Bannock Street
Denver, CO 80204
303.892.1166

NORRIS DESIGN
Planning | Landscape Architecture

April 5, 2018

Ms. Deborah Bachelder
Town of Erie Community Development
645 Holbrook Street
Erie, Colorado 80506

Re: Erie Commons Filing No.4 Preliminary Plat – Letter of Introduction

Dear Ms. Bachelder,

Following please find our letter of introduction and project description for the Erie Commons Filing No.4 Preliminary Plat. This is a replat of Erie Commons Final Plat Filing No. 4 which was originally approved in 2006. This parcel was a part of a larger site submitted as Filing No. 4 which included Ambrose Street and a similar overall circulation and layout.

The preliminary plat presented with this application includes vacation of several approved utility easements. These vacations will be completed with the Final Plat documentation.

The general purpose for this application to provide a comprehensive overview of the proposed preliminary plat application.

General
Erie Commons Filing No. 4 is a 6.75 acre Mixed Use Residential development within the larger Erie Commons P.U.D. Filing No. 4 intends to bring additional townhome residential products to the Erie Commons community. The development proposes 77 single-family attached residences. Theses townhome units will be arranged in buildings with three to eight units. Both two-story and single-story ranch products will be offered to accommodate all potential buyers. Single-family lots will be upwards of 1,130 sf. All products are offered as for sale properties.

The density of the development is 11.4 dwelling units per acre (77 units over 6.75 acres). This density is within the allowed maximum density specified in the Erie Commons PD and Development Standards for Mixed Use Residential (maximum 13 dwelling units/acre).

Access & Circulation
All residences are accessed from the rear alleys via a two-car garage. Pedestrian and guest access is provided via detached sidewalks and front elevation porches/covered entries. All buildings within the community are oriented to front adjacent streets, interior common parks / open space, or adjacent, dedicated open spaces such as the Coal Creek Open Space.

Primary access into the site is provided by a full movement western access point off of S. Briggs Street. A secondary right-in-right-out access is provided off of Erie Parkway along the northern property boundary. The continuation of Ambrose Street is proposed to serve the internal circulation of the development. Additional internal circulation is provided through private alleys.

Parking
A combination of on-street and off-street guest spaces, in addition to the two, in-unit garage spaces provided with each residence, meet the Town of Erie parking requirements set forth in Section 10.6.6. Eighteen off-street spaces are provided, plus 38 parallel spaces on Ambrose Street, and 7 parallel spaces on Briggs Street, for a total of 63 guest spaces.

Parks & Open Space
Private landscaping, maintained by the overseeing Homeowners Association or Metro District, will be provided along all buildings to create a cohesive landscape character that is reflective of other built areas within the Erie Commons

1101 Bannock Street
Denver, CO 80204
303.892.1166

development as well as adjacent communities. The landscape character will evoke a Colorado prairie theme and use water-wise plant material consistent with the region.

A series of park spaces are proposed to meet the pocket park requirements for this site. The spaces will consist of multiple activity nodes located adjacent to the Coal Creek Open Space. Each activity node will provide elements for both active and passive recreation and will be evenly distributed along the south and eastern edges of the property so that all residents will have easy access to the amenities provided.

Other landscape spaces are provided to buffer from existing adjacent land uses and provide privacy between buildings. There are no qualified open spaces provided within this filing. Open space requirements are met over the larger Erie Commons P.U.D.

The project site had previously been altered for development and therefore has no existing trees. A Native Tree and Vegetation Survey and Protection Plan as required by Section 6.2.C of the Unified Development Code is not applicable with this Site Plan submittal.

<u>Adjacent Land Uses</u>
Adjacent land uses to Erie Commons Filing No. 4 include:

To the north – Erie Parkway and existing Erie Commons Filings (Parcel A-4). The primary land use in this area is retail and commercial.
To the south and east – Coal Creek Open Space and trail
To the west – Blue Mountain Montessori School and undeveloped area within the Erie Commons P.U.D. (Parcel B-4A)

<u>Utilities, Services & Infrastructure</u>
Utilities will be provided through Xcel Energy and United Power. Existing infrastructure for water, storm drainage and sewer is located at Erie Parkway, South Briggs Street, and the initial construction of the Ambrose Street right-of-way. Some drainage and sewer improvements that serve Erie Commons and the existing Montessori School are located within the site. Onsite improvements will be made for water, sewer, and storm drainage. Please see the Site Plan submittal and related reports for more details regarding utilities. Services such as fire protection and police will be extended for the residents of the Erie Commons Filing No.4 community. School services will be provided for residents through the St. Vrain School District.

<u>Phasing</u>
This proposed P.U.D. Amendment will not have any effect on the currently proposed phasing outlined with the Site Plan accompanying this minor amendment application. The project is planned to be built in one phase, beginning with proposed model units which are planned to be located near the east/southeast corner of Briggs Street and Abrose Street. Phasing of construction for the project will begin with improvements with begin with the model area and continue to the north and east. Completion of the project will be determined based on future market conditions.

We hope that this provides a comprehensive summary of the Preliminary Plat for Erie Commons Filing 4. Feel free to contact me directly should you have any comments, questions and/or requests for additional information.

Sincerely,
Norris Design

Eva Mather

Eva Mather
Principal

MEETING NOTES

Project:	Erie Commons	Date:	10/18/2017
Subject:	Public Meeting	Time:	6:00 pm-8:00 pm
Minutes by:	Dominique Raymond	Location:	Erie Community Center 450 Powers St, Erie, CO 80516

Neighborhood Attendees	Email
Helen Hoekstray	hlhoekstra@gamil.com
Mary Lou Taylor	Maryloutaylor263@gmail.com

Project Team Attendees	Email
Sean Malone	smalone@norris-design.com
Eva Mather	emather@norris-design.com
Dominique Raymond	draymond@norris-design.com
Cindy Myers	Cindy.myers@centurycommunities.com

Agenda

- Informal introduction of project
- Q&A Session

Questions and answers listed below.

Q&A Session

Are these buildings similar to the project by Boulder Creek?
No, that is a different developer.

Are they 2 car garages?
Yes, all units have a 2-car garage.

Are any of the buildings 2-stories?
Some, then showed locations.

What are the traffic patterns of the proposed development?
Reviewed traffic patterns with resident.

Is the public meeting a part of the process?
Yes, explained planning process and how one meeting is required.

What kind of services will the residents get? Snow plowing?
There will be plowing on main road (Ambrose Street) and HOA will handle snow removal on interior streets of neighborhood.

This looks too crammed. Doesn't look like it fits into current neighborhood character without consideration of the Erie Communities. We don't have businesses to support residents here, we have to go to Arapahoe for groceries.
Usually residents come before business. The more homes you have, the more business you attract, and those businesses are able to be supported by the community.

Traffic concern about waiting at light at Erie Pkwy & S Briggs St.
Cindy says signals can be adjusted.

What is the SF?
It is about 1800-2400 SF per unit.

What is the price range?
Starts in the lower 300's, being sold as townhomes, no renters.

Townhomes on Powers plan is very similar, yet less dense.
These are actually alley-loaded, spacious units compared to what's being built in Denver/Stapleton.
Cindy from Century Communities explains how zoning densities work. You put Single Family Detached out away from main roads and put Single Family Attached closer to main roads, like Erie Parkway.

What is dividing my neighbor's property from this site?
Property owner's fence.

People are speeding down Briggs Street – speed bump requested – people end up in her yard in the winter… with the more traffic, will there be more people in my yard?
Development slows people down, when it looks like a race track, people speed, but when it looks like a neighborhood, people inherently slow down.

Is this a part of a Master Plan?
Yes; Erie Commons.

83 Units?
Yes, it was zoned for 95 units and we're providing 83.

How was number of units decided?
Approved/zoned for 95 units.

Has it always been planned?
Yes, in 2006 it was planned to be a Single Family Attached subdivision. Roads and alleys were platted in 2006.

Where are these residents going to park?
There is on-street parking and guest spots, and 2 car garages for everyone.

We're going to inherit all this noise, parking problems, more activity, dogs etc.
Residents who live here will most likely be either downsizing older couples or young families. No promises, but in past experiences, working with HOA's we have not found there to be many noise complaints. There are multiple entrances to trail, which members of Erie Commons have access to. There will be some separation from the trail with fencing as well to maintain privacy. R.O.W. changed and allowed us to have tree lawns and on-street parking.

Will there be more public meetings?
No, this is the only one but you can call Cindy to discuss more concerns.

Will these residents all have access to the Erie Pool?
These residents will be paying 2 dues, one to HOA and Master Erie Commons, so yes.

Explain traffic patterns/reasoning behind alleys.

Fire department has rules about needing access points into the site.

Maintenance of grass is a concern.
The HOA will be maintaining the grass.

Is 83 units set in stone?
Yes, we're in the process of approval.

What is the order of construction?
Roads go in first, then model homes. Then rest of buildings.

When will you be starting construction?
Late next Spring.

Will it be built in phases?
"Let us know what buildings (side of site) you want to build first and we'll make it happen" -Cindy from Century Communities.

Only 7 ranch units?
Yes.

There are coal mines under the site.
There will be a second set of soil tests done prior to construction. There will be no basements, so not a lot of earthwork.

Other notes:
Norris gave a copy of the boards to Mary Lou for neighbor (Cherry and Bruce Bailey)
Cindy from Century Communities offered putting taller shrubs near south owner's fences and trees in yards

ERIE COMMONS - FILING 4

PHASE III DRAINAGE REPORT

APRIL 2018

For:
Century Communities
8390 E. Crescent Parkway, Suite 650
Greenwood Village, CO 80111

Contact: Lisa Evans
303.268.8376

Prepared By:
Calibre Engineering, Inc.
9090 S. Ridgeline Blvd. Suite 105
Highlands Ranch, CO 80129

Contact: Todd Johnson
303.339.5409
TAJ@Calibre.us.com

ENGINEER'S STATEMENT:

I hereby state that this Erie Commons Filing 4 Phase III Drainage Report was prepared by me (or under my direct supervision) in general accordance with the *Town of Erie Standards and Specifications* and the *Urban Storm Drainage Criteria Manual* for the owners thereof. I understand that the Town of Erie does not and will not assume liability for drainage facilities designed by others, including the designs presented in this report.

____

Todd A. Johnson, P.E. Date
State of Colorado No. 37660
For and on behalf of Calibre Engineering, Inc.

This report has been reviewed and found to be in general compliance with the Town of Erie Standards and Specifications for Design and Construction and other Town requirements. **THE ACCURACY AND VALIDITY OF THE ENGINEERING DESIGN, DETAILS, DIMENSIONS, QUANTITIES, AND CONCEPTS IN THIS REPORT REMAINS THE SOLE RESPONSIBILITY OF THE PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE APPEAR HEREON.**

Accepted by: ______________________________________ ______________

Town Engineer Date

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SCOPE

The purpose of this report is to support the projected patterns of the Master Drainage Plan for the Erie Commons development. This report includes analysis and design of locations of proposed inlets and storm systems in general accordance with the standards and specifications of the Town of Erie and Urban Drainage Flood Control District (UDFCD). The existing *Town of Erie Outfall Systems Plan (West of Coal Creek)* (referred to as OSP in this report), published January 2014 is also referenced in this report.

I. INTRODUCTION

A. Location

- Erie Commons Filing 4 is bound on the northwest by Erie Parkway and on the southwest by South Briggs Street. Ambrose Street will cut through the approximate middle of the property and connect to South Briggs Street on the southwest part of the property and Erie Parkway on the northwest side of the property. The property borders the west bank of Coal Creek.
- Within Section 19, Township 1 North, Range 68 of the Sixth Principle Meridian, Town of Erie, County of Weld, State of Colorado.
- As stated above, Coal Creek runs north to south along the eastern border of the property.
- Erie Commons Filing 2 sits on the south border of the property. To the northwest of the property, across Erie Parkway, sits Erie Commons Filing 3.

B. Description of Property

- Erie Commons – Filing 4 is approximately 6.74 acres of multi-family development and some associated open space.
- The multi-family development will consist of 18 groups of townhomes, open space and associate parking and roadways.
- The existing ground cover is native grasses and soils.
- There are no major drainageways on the property, but as stated above, the property borders Coal Creek.
- The site has gentle to moderate slopes between 1.5% and 10% up to the bank of Coal Creek.
- The site is overlain with a combination of Aquolls and Aquepts, hydrologic soil group (HSG) D, Ascalon Sandy Loam, HSG B and Columbo Clay Loam, HSG C.

II. DRAINAGE BASINS

A. Major Basin Description

- Erie Commons - Filing 4 is located within the limits of the *Town of Erie Outfall Systems Plan (West of Coal Creek)* by Respec Consulting & Services, dated January 2014. Filing 12 is within the OSP Major Basin 915. The OSP indicates this basin will drain to Coal Creek.
- The site is found on FEMA Flood Insurance Rate Map (FIRM) panels 08123C2066E. None of the proposed site is within the mapped Zone AE floodplain.
- There are two water quality ponds located near the site that will both be utilized by the site for the Water Quality Capture Volume from the site. Both ponds drain to Coal Creek.

B. Sub-Basin Description

- There are no Master Plan improvements designated for the site. The proposed regional detention pond (1046) is proposed to be upstream of the proposed site.
- Currently a large portion of the site drains overland towards Coal Creek. The remaining portions drain overland to Erie Parkway and Briggs Street.

III. DRAINAGE DESIGN CRITERIA

A. Development Criteria Reference and Constraints

- Criteria and references used in the development of this Phase III Drainage Report include:
  - The Town of Erie Standards for Design and Construction of Public Improvements.
  - The Urban Drainage and Flood Control District's *Urban Storm Drainage Criteria Manual* was also used as a reference and guide for criteria.
  - The Town of Erie Outfall Systems Plan (West of Coal Creek) prepared by RESPEC Consulting and Services, January 2014.
  - Erie Commons Filing 4, Blocks 6-8 Final Drainage Report prepared by Hurst and Associates, Inc, August 2, 2006.
- No wetlands will be impacted by the development of this site.

B. Hydrological Criteria

- The Rational Method will be used for all hydrologic calculations.
- The minor event is the 2-year storm with a one-hour design rainfall depth of 1.01 inches.
- The major event is the 100-year storm with a one-hour design rainfall depth of 2.70 inches.
- Per the *Town of Erie Standards and Specifications Storm Criteria*, table 800-3 will be used to determine appropriate runoff coefficients.

C. Hydraulic Criteria

- Per *Town of Erie Standards and Specifications Storm Criteria*, Tables 800-7 and 800-8, allowable flow depths within the streets are:
  - To the top of curb, flow may spread to crown of street (no curb overtopping) for the minor event. In Collectors, flow spread must leave one 10' driving lane clear of water.
  - Residential dwellings should be no less than 12" above the 100-year flood at the ground line or lowest water entry of the building. The depth of water over the gutter flow line will not exceed 18" for the major storm. For this report, a more conservative condition is assumed where spread of flow is restricted to the R.O.W.
- The proposed storm system will include two separate lines. The north line will discharge to the existing storm system located in Erie Parkway. The southern line will discharge to the existing water quality pond E.
- New inlet design and street capacity were calculated using the UDFCD Inlet Spreadsheet. Hydraulic calculations for the streets and inlets will be included in a later report.

- Hydraflow Storm Sewer 2015 was used to size storm pipes. The minor storm HGLs will be within the pipe and the major storm HGL's will be below the ground surface. The hydraulic calculations for the storm system will be included in a later report.
- The project will be following the recommendations set forth in the OSP and the *Final Drainage Report, Erie Commons Filing No. 1* that in the major event flows are routed to Coal Creek and flows in the minor event will be treated for water quality in the existing water quality ponds.
- Per the Filing 4, Blocks 6-8 Final Drainage Report, two existing water quality ponds have been sized for the water quality capture volume coming from this site and will be utilized.
- Water quality pond revisions will be limited to maintenance of the existing structures and verification that the current development characteristics (Area and % Impervious) are within the assumptions set forth for the parcel within previous reports.

IV. DRAINAGE FACILITY DESIGN

A. General Concept

- The proposed drainage patterns will follow existing drainage patterns as closely as possible. Runoff will flow from the southwest to the northeast, either by the streets, natural drainage ways or the proposed storm sewer system.
- Runoff from the site will be routed to the existing water quality ponds, one east of the site and the other north of the site across Erie Parkway. Runoff from the northern part of the site will utilize the existing storm sewer infrastructure that also serves Erie Parkway east of the Briggs Street intersection.
- To ensure that the design is meeting the intent of the Filing 4 Blocks 6-8 Final Drainage Report, a comparison of direct discharges was performed for runoff being received by the two water quality ponds from the site. See Appendix D. Design information for the north WQ pond has still not been located. Further work is required to determine if the design of pond is adequate for the water quality needs of Filing 4.
- As stated earlier, the Rational Method was used for hydrologic analysis. Even though the site has HSG B, C and D soils, for this effort HSG C soils were assumed for the entire site.
- The FEMA Flood Insurance Rate Map (FIRM) shows the 100-year base flood elevation to the east of the existing concrete trail. However, the November 2014 Coal Creek and Rock Creek Flood Hazard Area Delineation (FHAD) projects the 100-year base flood elevation encroaching into the proposed residential areas. Residential units are set a minimum of 1' above the Base Flood Elevation (BFE) shown with the FHAD. If necessary at the time of update to the FIRM developer will furnish elevation certificate(s) showing buildings 1' above the BFE.

B. Specific Details

- Proposed drainage basins have been broken down further on site to calculate street capacity, inlet capacity and size the storm system. Additionally, the buildings have been shown as individual drainage basins to size the roof drains for each building. Each building will connect directly to the storm system instead of utilizing downspouts and surface routing to the storm system.
- For Filing 4:

- Basin A consists of roadway, open space and sidewalks. Runoff generated in this basin is routed via reverse crown roadway to a pair of Type – 13 grated inlets in sag at Design Point 1. The major and minor events are captured at this point.
- Basin B consists of open space, walkway and roadway. The basin includes a portion of Erie Parkway. Runoff from this basin is routed via curb and gutter to the existing Type-R inlet in sump condition located in Erie Parkway. The major and minor events are captured at this point.
- Basin C1 includes open space, roadway and sidewalks. The runoff generated in this basin is routed to a proposed Type-R inlet on grade at Design Point 2. The major and minor events are captured here with some bypass flow going to the existing Type R inlet on Erie Parkway.
- Basin C2 includes open space, walkway and roadway. Runoff from this basin is routed via curb and gutter to a proposed Type R inlet on grade at Design Point 3. The major and minor events are captured here with some bypass flow going to the existing Type R inlet on Erie Parkway.
- Basin D includes roadway, open space and sidewalk. The runoff generated by this basin is routed via curb and gutter to a proposed Type R inlet in sump at Design Point 4. The major and minor events are captured at this point.
- Basin E includes roadway, open space and sidewalk. The runoff generated by this basin are routed via curb and gutter to a proposed Type R inlet in sump at design point 5. The major and minor events are captured at this point.
- Basin F includes open space and sidewalk. Runoff from this basin is routed through a grass swale to a PVC area inlet in sag at Design Point 6. The major and minor events are captured at this point.
- Basin G1 includes open space, sidewalk and roadway. Runoff generated by this basin are routed via curb and gutter to a proposed Type R inlet in sag at design point 7. The major and minor events are captured at this point.
- Basin G2 includes open space, sidewalk and roadway. Runoff from this basin is routed via curb and gutter to a proposed Type R inlet at Design Point 8. The major and minor events are captured at this point.
- Basin H includes roadway. The runoff from this basin is routed via reverse crown roadway to an inlet at the south of the site. The minor and major events are captured at this point.
- Basins R1, R2, R3, R7, R8 and R9 include the northern and western most proposed buildings. The runoff generated by the roofs of these facility will be routed by roof drains directly to the storm system and the northern water quality pond. The major and minor events are captured by the roof drains. Flow rates for all R-basins were determined using current plumbing code. All R-basins were assumed to have a 5-minute time of concentration.
- Basins R4, R5, R6, R10, R11, R12, R13, R14, R15, R16, R17, and R18 include the southern and eastern most buildings. The runoff generated by the roof of these facilities will be routed via roof drain directly to the southeastern storm line and will discharge to the southeastern water quality pond. Flow rates for all R-basins were determined using current plumbing code. All R-basins were assumed to have a 5-minute time of concentration.
- Basins AD-1 thru AD-16 are small basins to be served by area drains. These basins were all assumed to have a 5-minute time of concentration. Each will tie to proposed

building drains and will discharge to the proposed storm system. See Appendix C for discharge locations.

- Storm sewer systems will be accessed from the proposed roads onsite.
- There should be no impacts to downstream properties from the development on this site.
- There will be no impacts to the adjacent 100-year flood plain.

V. SUMMARY

A. Compliance with Criteria

- This drainage report is in general compliance with the Town of Erie Standards and Specifications for Design and Construction of Public Improvements.
- The Urban Drainage and Flood Control District's *Urban Storm Drainage Criteria Manual* was also used as a reference and guide for criteria.
- Construction and Permanent Best Management Practices will be utilized for the development of Erie Commons Filing 4 and will be discussed further in a separate Storm Water Management Plan (SWMP).

B. Drainage Concept

- Runoff will flow from the west to the east, either by the streets, natural drainage ways or the proposed storm sewer system.
- All drainage from the proposed site will be routed through one of two existing water quality ponds and ultimately enter Coal Creek.
- The project will be following the recommendations set forth in the OSP and the *Final Drainage Report, Erie Commons Filing No. 1* that in the major event flows are routed to Coal Creek and flows in the minor event will be treated for water quality in the existing water quality ponds.
- Water Quality pond revisions will be limited to maintenance of the existing structures and verification that the current development characteristics (Area and % Impervious) are within the assumptions set forth for the parcel within previous reports.

VI. LIST OF REFERENCES

1. *The Town of Erie, Standards and Specifications for Design and Construction of Public Improvements, Section 800, Storm Drainage Facilities,* 2012 Edition.
2. *Urban Storm Drainage Criteria Manuals,* Urban Drainage Flood Control District, Mar 2017.
3. *Town of Erie Outfall Systems Plan (West of Coal Creek) Alternatives Analysis Report (referred to as OSP in this report),* prepared by RESPEC Consulting and Services, January 2014.
4. *Coal Creek and Rock Creek Flood Hazard Area Delineation,* RESPEC Consulting and Services, November 2014
5. *Flood Insurance Rate Map, Map Number 08123C2066E,* Effective Date January 20, 2016, Federal Emergency Management Agency.
6. *Erie Commons Filing 4, Blocks 6-8 Final Drainage* Report, Hurst and Associates, Inc., August 2, 2006.

APPENDIX A.

MAPS AND EXHIBITS

Map Scale: 1:2,160 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Weld County, Colorado, Southern Part
Survey Area Data: Version 15, Sep 22, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 30, 2014—Sep 18, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Weld County, Colorado, Southern Part (CO618)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
4	Aquolls and Aquepts, flooded	D	10.9	43.5%
5	Ascalon sandy loam, 0 to 3 percent slopes	B	6.5	26.1%
20	Colombo clay loam, 1 to 3 percent slopes	C	7.3	29.3%
77	Vona sandy loam, 3 to 5 percent slopes	A	0.3	1.2%
Totals for Area of Interest			**25.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

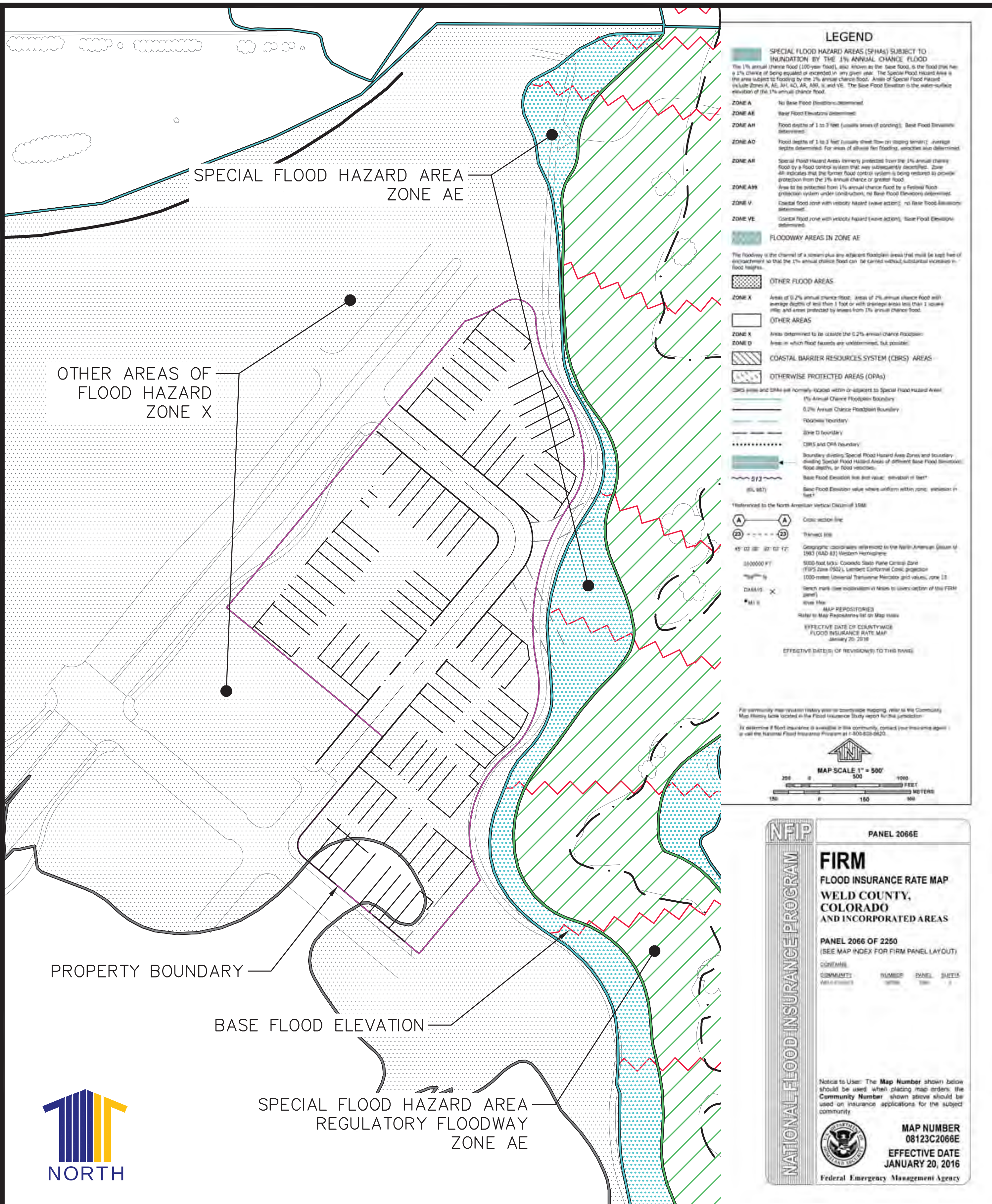
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



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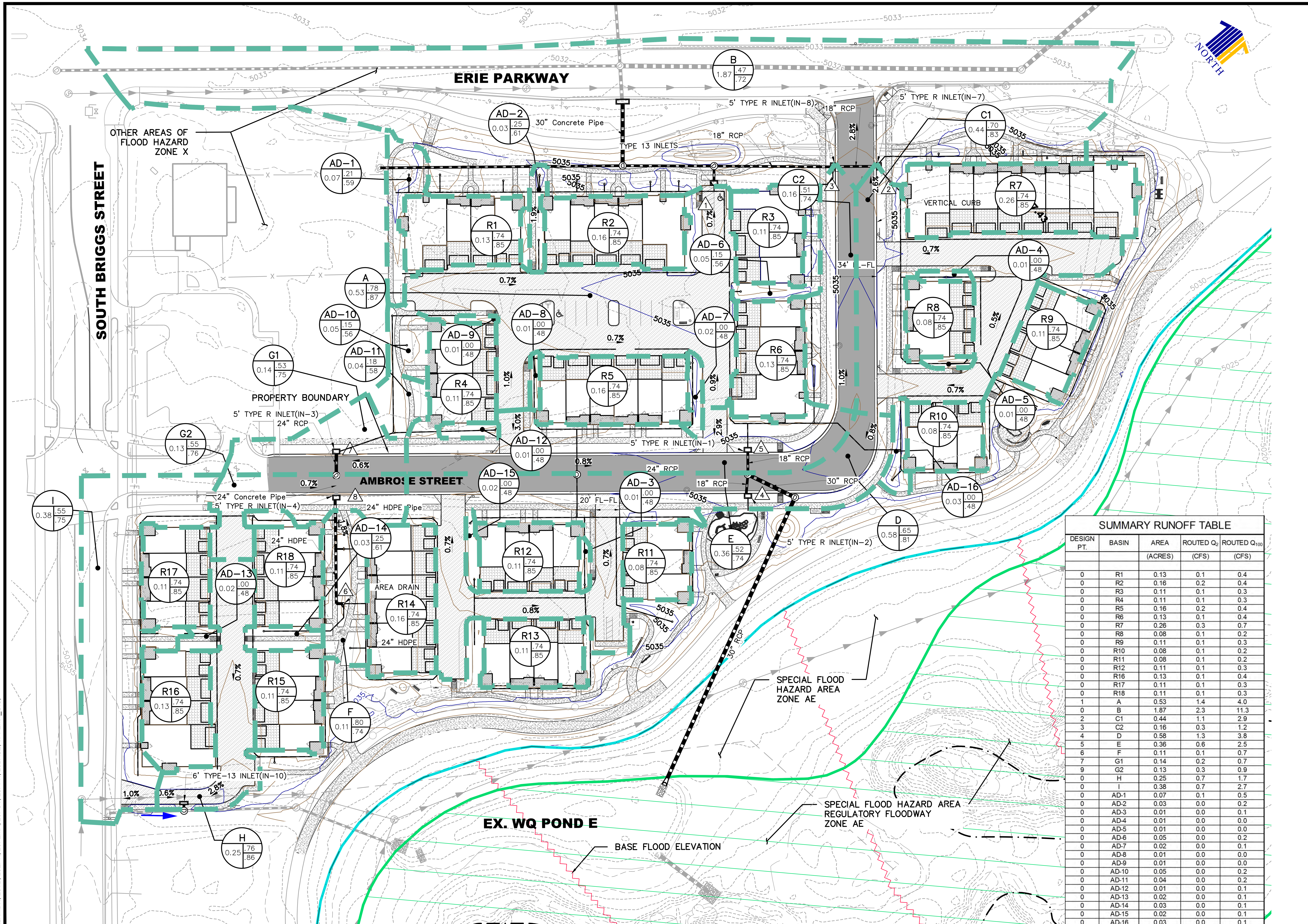
Construction Management Civil Engineering Surveying

CENTURY COMMUNITIES
ERIE COMMONS
FLOOD INSURANCE RATE MAP

Sheet
-

Scale 1" = 200"
Date MAY 2017

P:\CENTURY EC\CADD\EXHIBITS\X-PDR.dwg, 2/27/2017 9:00:34 AM, KHouse, 1:1
P:\CENTURY EC\CADD\EXHIBITS\X-PDR.dwg



LEGEND:

- PROPOSED MAJOR CONTOUR (5') — 5250
- PROPOSED MINOR CONTOUR (1')
- EXISTING MAJOR CONTOUR (5') — 5250
- EXISTING MINOR CONTOUR (1')
- PROPOSED STORM DRAIN PIPE
- EXISTING STORM DRAIN PIPE
- PROPOSED SWALE
- PROPERTY LINE
- OVERFLOW DIRECTION ARROW
- PROPOSED BASIN LINE
- EXISTING BASIN LINE
- DESIGN POINT
- PROPOSED BASIN LABEL: A1 — BASIN DESIGNATION; .40 — MINOR RUNOFF COEF.; .60 — MAJOR RUNOFF COEF.; 1.00 — AREA (AC.)

NOTES:

1. STORM WITHIN PUBLIC UTILITY EASEMENT IS PUBLIC AND RCP. ALL OTHER PIPES ARE PRIVATE.
2. ALL STORM IS SIZED FOR THE 2-YEAR EVENT UNLESS OTHERWISE NOTED.
3. ALL LANDSCAPE DRAIN LINES ARE PVC.
4. SEE CROSS SECTIONS IN APPENDIX C OF DRAINAGE REPORT

THE MINIMUM BUILDING FINISHED FLOOR ELEVATIONS HAVE BEEN SET AT LEAST 1-FOOT ABOVE THE BASE FLOOD ELEVATIONS (BFES) ADJACENT TO THE PROPERTY AS DEFINED IN THE FLOOD HAZARD AREA DELINEATION FOR COAL CREEK AND ROCK CREEK DATED NOVEMBER 2014. AT THE TIME OF THESE CONSTRUCTION DOCUMENTS THIS STUDY AND ASSOCIATED BFES HAVE NOT RESULTED IN A FIRM MAP REVISION PLACING ANY PORTION OF THE SITE IN A SPECIAL FLOOD HAZARD AREA. BECAUSE THE BUILDING FINISHED FLOOR ELEVATIONS HAVE BEEN SET AT LEAST 1-FOOT ABOVE THE BFE THEY WILL REMAIN OUTSIDE THE SFHA AND 100-YEAR FLOODPLAIN WITH ANY FUTURE MAPPING REVISION BASED ON THE NOTED FLOOD HAZARD AREA DELINEATION FOR COAL CREEK AND ROCK CREEK.

- 1% FLOODWAY
- 1% FLOODPLAIN
- SHALLOW FLOODING <3 FT (1% EVENT)
- BASE FLOOD ELEVATION (1%)

FROM: FIRM PANEL 08013C0602J REVISED DECEMBER 18, 2012

SUMMARY RUNOFF TABLE

DESIGN PT.	BASIN	AREA	ROUTED Q_2	ROUTED Q_{100}
		(ACRES)	(CFS)	(CFS)
0	R1	0.13	0.1	0.4
0	R2	0.16	0.2	0.4
0	R3	0.11	0.1	0.3
0	R4	0.11	0.1	0.3
0	R5	0.16	0.2	0.4
0	R6	0.13	0.1	0.4
0	R7	0.26	0.3	0.7
0	R8	0.08	0.1	0.2
0	R9	0.11	0.1	0.3
0	R10	0.08	0.1	0.2
0	R11	0.08	0.1	0.2
0	R12	0.11	0.1	0.3
0	R16	0.13	0.1	0.4
0	R17	0.11	0.1	0.3
0	R18	0.11	0.1	0.3
1	A	0.53	1.4	4.0
0	B	1.87	2.3	11.3
2	C1	0.44	1.1	2.9
3	C2	0.16	0.3	1.2
4	D	0.58	1.3	3.8
5	E	0.36	0.6	2.5
6	F	0.11	0.1	0.7
7	G1	0.14	0.2	0.7
9	G2	0.13	0.3	0.9
0	H	0.25	0.7	1.7
0	I	0.38	0.7	2.7
0	AD-1	0.07	0.1	0.5
0	AD-2	0.03	0.0	0.2
0	AD-3	0.01	0.0	0.1
0	AD-4	0.01	0.0	0.0
0	AD-5	0.01	0.0	0.0
0	AD-6	0.05	0.0	0.2
0	AD-7	0.02	0.0	0.1
0	AD-8	0.01	0.0	0.0
0	AD-9	0.01	0.0	0.0
0	AD-10	0.05	0.0	0.2
0	AD-11	0.04	0.0	0.2
0	AD-12	0.01	0.0	0.1
0	AD-13	0.02	0.0	0.1
0	AD-14	0.03	0.0	0.1
0	AD-15	0.02	0.0	0.1
0	AD-16	0.03	0.0	0.1

PROJECT BENCHMARK:

VERTICAL DATUM: BENCHMARK: CITY OF LONGMONT VERTICAL BENCHMARK NO. 113

ELEVATION=5065.18 (NAVD 88 DATUM) APPROXIMATELY 90' NORTH OF THE INTERSECTION OF HIGHWAY 66 AND THE BNSF RAILROAD TRACKS

811

UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

PATH: P:\CENTURY EC\CADD\EXHIBITS\X-PDR2.DWG
PLOTTED BY: PEARSON, ERIC PLOT DATE: 4/1/2018 7:07 PM
XREFS: 10PPN, 10EUT, 21KMDR, 20TB, 10EPN, 20FEMA, 20PUT, 20PPN, 20BASE, W-FEMA_GIS,

DATE	REVISION DESCRIPTION

Drawing Name: X-PDR2.dwg
Job Number: CENTURY EC
Prepared For: CENTURY

0 20 40 80
1 inch = 1 ft. Horizontal

Designer: KLB | Drafter: KLB | Checked: KLH

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www.calibre-engineering.com
Construction Management Civil Engineering Surveying

ERIE COMMONS

FILING NO. 4 - IMPROVEMENT PLANS

PROPOSED DRAINAGE PLAN

Sheet: DR1 — 1 of 1

Date: APRIL 2018

APPENDIX B.

HYDROLOGIC COMPUTATIONS

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COMPOSITE 'C' FACTORS

LOCATION: TOWN OF ERIE DATE : 4/1/2018

BASIN DESIGNATION	PAVED	LAWNS	ROOF	WALK	TOTAL	TOTAL (SQ MI)	SOIL TYPE	PAVED %I	PAVED 2YR	PAVED 100 YR	LAWNS %I	LAWNS 2YR	LAWNS 100 YR	ROOF %I	ROOF 2YR	ROOF 100 YR	WALK %I	WALK 2YR	WALK 100 YR	COMP. C FACTOR %I	COMP. C FACTOR 2YR	COMP. C FACTOR 5 YR	COMP. C FACTOR 100 YR
R1			0.13		0.13		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R2			0.16		0.16		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R3			0.11		0.11		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R4			0.11		0.11		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R5			0.16		0.16		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R6			0.13		0.13		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R7			0.26		0.26		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R8			0.08		0.08		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R9			0.11		0.11		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R10			0.08		0.08		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R11			0.08		0.08		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R12			0.11		0.11		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R13			0.11		0.11		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R14			0.16		0.16		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R15			0.11		0.11		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R16			0.13		0.13		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R17			0.11		0.11		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
R18			0.11		0.11		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	90	0.74	0.77	0.85
A	0.50	0.03			0.53		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	94	0.78	0.81	0.87
B	0.84	0.78		0.25	1.87		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	58	0.47	0.50	0.72
C1	0.37	0.07			0.44		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	84	0.70	0.72	0.83
C2	0.08	0.06		0.02	0.16		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	62	0.51	0.54	0.74
D	0.40	0.12		0.06	0.58		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	79	0.65	0.68	0.81
E	0.19	0.13		0.04	0.36		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	64	0.52	0.55	0.74
F		0.08		0.03	0.11		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	26	0.20	0.24	0.58
G1	0.09	0.05			0.14		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	65	0.53	0.56	0.75
G2	0.06	0.04		0.03	0.13		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	68	0.55	0.58	0.76
H	0.23	0.02			0.25		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	92	0.76	0.79	0.86
I	0.25	0.13			0.38		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	66	0.55	0.57	0.75
AD-1		0.05		0.02	0.07		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	27	0.21	0.25	0.59
AD-2		0.02		0.01	0.03		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	31	0.25	0.28	0.61
AD-3		0.01			0.01		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.04	0.48
AD-4		0.01			0.01		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.04	0.48
AD-5		0.01			0.01		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.04	0.48
AD-6		0.04		0.01	0.05		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	20	0.15	0.18	0.56

COMPOSITE 'C' FACTORS

LOCATION: TOWN OF ERIE DATE : 4/1/2018

BASIN DESIGNATION	PAVED	LAWNS	ROOF	WALK	TOTAL	TOTAL (SQ MI)	SOIL TYPE	PAVED			LAWNS			ROOF			WALK			COMP. C FACTOR			
								%I	2YR	100 YR	%I	2YR	100 YR	%I	2YR	100 YR	%I	2YR	100 YR	%I	2YR	5 YR	100 YR
AD-7		0.02			0.02		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.04	0.48
AD-8		0.01			0.01		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.04	0.48
AD-9		0.01			0.01		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.04	0.48
AD-10		0.04		0.01	0.05		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	20	0.15	0.18	0.56
AD-11		0.03		0.01	0.04		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	24	0.18	0.22	0.58
AD-12		0.01			0.01		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.04	0.48
AD-13		0.02			0.02		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.04	0.48
AD-14		0.02		0.01	0.03		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	31	0.25	0.28	0.61
AD-15		0.02			0.02		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.00	0.48
AD-16		0.03			0.03		C	100	0.83	0.89	2	0.00	0.48	90	0.74	0.85	90	0.74	0.85	2	0.00	0.04	0.48

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TIME OF CONCENTRATION																						REMARKS
LOCATION:	ERIE COMMONS						ULTIMATE				BY: KLB							DATE:	4/1/2018			* V=Cv(Sw^1/2)
BASIN DATA				INIT./OVERLAND TIME (Ti)			TRAVEL TIME (Tt)										TOTAL	Tc Check			FINAL Tc	** Ti = 0.395 (1.1-C5)L^0.5/S^1/3
DESIGNATION	% Imperv	C5	AREA (AC)	LENGTH (FT)	SLOPE %	Ti (Min.)*	GRASS/ PAVED	LENGTH (FT)	SLOPE %	VEL. (FPS)**	Tt(Min.)	GRASS/ PAVED	LENGTH (FT)	SLOPE %	VEL. (FPS)**	Tt(Min.)	Ti+Tt(Min.)	LENGTH (FT)	Average Slope	Urbanized Basins Tc (min)***	(minutes)	*** Tc = (18-15i)+L/[60*(24i+12)i*So^0.5} where Cv=15 for grassed waterways and 20 for paved areas
A	94	0.81	0.53	100	0.5	6.7	PAVED	341	0.8	1.8	3.2						9.9	341	0.80	5.7	5.7	
B	58	0.50	1.87	39	0.9	7.1	PAVED	369	0.5	1.4	4.3						11.4	369	0.50	12.7	11.4	
C1	84	0.72	0.44	14	2.0	2.0	PAVED	263	1.3	2.3	1.9						4.0	263	1.30	6.5	5.0	
C2	62	0.54	0.16	20	5.7	2.6	PAVED	180	1.3	2.3	1.3						3.9	180	1.30	9.7	5.0	
D	79	0.68	0.58	11	1.5	2.2	PAVED	384	1.1	2.1	3.1						5.3	384	1.10	8.2	5.3	
E	64	0.55	0.36	35	3.7	3.9	PAVED	260	0.8	1.8	2.4						6.3	260	0.80	10.3	6.3	
F	26	0.24	0.11	23	5.8	0.2	LAWN	11	9.4	2.1	0.1						0.3	11	9.40	14.1	5.0	
G1	65	0.56	0.14	56	1.4	6.6	PAVED	30	0.6	1.5	0.3						6.9	30	0.60	8.5	6.9	
G2	68	0.58	0.13	22	2.0	3.5	PAVED	78	0.8	1.8	0.7						4.2	78	0.80	8.4	5.0	
H	92	0.79	0.25	19	1.9	2.0	PAVED	301	1.0	2.0	2.5						4.5	301	1.00	5.6	5.0	

Calibre

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

DESIGN STORM: 2-YEAR DEVELOPED

KLB

KLH

LOCATION: ERIE COMMONS — ULTIMATE — TOWN OF ERIE — 4/1/2018

		DIRECT RUNOFF							TOTAL RUNOFF					REMARKS
STRUCTURE	DESIGN POINT	BASIN	AREA (AC)	COEFF. (C)	Tc (Min.)	C*A	I (in./ hr.)	Q (cfs)	SUM AREA	SUM Tc (min.)	I (in./hr.)	SUM CA	TOTAL Q (cfs)	
		0												
IN-9	1	A	0.53	0.78	6	0.42	3.31	1.4						A
EX. IN-1		B	1.87	0.47	11	0.88	2.59	2.3						B
IN-7	2	C1	0.44	0.70	5	0.31	3.43	1.1						C1
IN-8	3	C2	0.16	0.51	5	0.08	3.43	0.3						C2
IN-2	4	D	0.58	0.65	5	0.38	3.37	1.3						D
IN-1	5	E	0.36	0.52	6	0.19	3.21	0.6						E
IN-5	6	F	0.11	0.20	5	0.02	3.43	0.1						F
IN-3	7	G1	0.14	0.53	7	0.07	3.12	0.2						G1
IN-4	8	G2	0.13	0.55	5	0.07	3.43	0.2						G2
IN-10	9	H	0.25	0.76	5	0.19	3.43	0.7						H
Ex. IN-2		I	0.38	0.55	7	0.21	3.13	0.7						I
		AD-1	0.07	0.21	5	0.01	3.43	0.1						AD-1
		AD-2	0.03	0.25	5	0.01	3.43	0.0						AD-2

Calibre

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

DESIGN STORM: 2-YEAR DEVELOPED

KLB

KLH

LOCATION: ERIE COMMONS ULTIMATE TOWN OF ERIE 4/1/2018

		DIRECT RUNOFF							TOTAL RUNOFF					REMARKS
STRUCTURE	DESIGN POINT	BASIN	AREA (AC)	COEFF. (C)	Tc (Min.)	C*A	I (in./ hr.)	Q (cfs)	SUM AREA	SUM Tc (min.)	I (in./hr.)	SUM CA	TOTAL Q (cfs)	
		AD-3	0.01	0.00	5	0.00	3.43	0.0						AD-3
		AD-4	0.01	0.00	5	0.00	3.43	0.0						AD-4
		AD-5	0.01	0.00	5	0.00	3.43	0.0						AD-5
		AD-6	0.05	0.15	5	0.01	3.43	0.0						AD-6
		AD-7	0.02	0.00	5	0.00	3.43	0.0						AD-7
		AD-8	0.01	0.00	5	0.00	3.43	0.0						AD-8
		AD-9	0.01	0.00	5	0.00	3.43	0.0						AD-9
		AD-10	0.05	0.15	5	0.01	3.43	0.0						AD-10
		AD-11	0.04	0.18	5	0.01	3.43	0.0						AD-11
		AD-12	0.01	0.00	5	0.00	3.43	0.0						AD-12
		AD-13	0.02	0.00	5	0.00	3.43	0.0						AD-13
		AD-14	0.03	0.25	5	0.01	3.43	0.0						AD-14
		AD-15	0.02	0.00	5	0.00	3.43	0.0						AD-15
		AD-16	0.03	0.00	5	0.00	3.43	0.0						AD-16

Calibre

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

DESIGN STORM: 100-YEAR DEVELOPED

KLB

KLH

LOCATION: ERIE COMMONS ULTIMATE TOWN OF ERIE 4/1/2018

		DIRECT RUNOFF							TOTAL RUNOFF					REMARKS
STRUCTURE	DESIGN POINT	BASIN	AREA (AC)	COEFF. (C)	Tc (Min.)	C*A	I (in./ hr.)	Q (cfs)	SUM AREA	SUM Tc (min.)	I (in./hr.)	SUM CA	Total Q (cfs)	
		0												
IN-9	1	A	0.53	0.85	6	0.45	8.85	4.0						A
EX. IN-1		B	1.87	0.87	11	1.63	6.92	11.3						B
IN-7	2	C1	0.44	0.72	5	0.32	9.16	2.9						C1
IN-8	3	C2	0.16	0.83	5	0.13	9.16	1.2						C2
IN-2	4	D	0.58	0.74	5	0.43	9.02	3.8						D
IN-1	5	E	0.36	0.81	6	0.29	8.59	2.5						E
IN-5	6	F	0.11	0.74	5	0.08	9.16	0.7						F
IN-3	7	G1	0.14	0.58	7	0.08	8.33	0.7						G1
IN-4	8	G2	0.13	0.75	5	0.10	9.16	0.9						G2
IN-10	9	H	0.25	0.75	5	0.19	9.16	1.7						H
Ex. IN-2		I	0.38	0.86	7	0.33	8.37	2.7						I
		AD-1	0.07	0.75	5	0.05	9.16	0.5						AD-1
		AD-2	0.03	0.59	5	0.02	9.16	0.2						AD-2

Calibre

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

DESIGN STORM: 100-YEAR DEVELOPED

KLB

KLH

LOCATION: ERIE COMMONS ULTIMATE TOWN OF ERIE 4/1/2018

		DIRECT RUNOFF							TOTAL RUNOFF					REMARKS
STRUCTURE	DESIGN POINT	BASIN	AREA (AC)	COEFF. (C)	Tc (Min.)	C*A	I (in./ hr.)	Q (cfs)	SUM AREA	SUM Tc (min.)	I (in./hr.)	SUM CA	Total Q (cfs)	
		AD-3	0.01	0.61	5	0.01	9.16	0.1						AD-3
		AD-4	0.01	0.48	5	0.00	9.16	0.0						AD-4
		AD-5	0.01	0.48	5	0.00	9.16	0.0						AD-5
		AD-6	0.05	0.48	5	0.02	9.16	0.2						AD-6
		AD-7	0.02	0.56	5	0.01	9.16	0.1						AD-7
		AD-8	0.01	0.48	5	0.00	9.16	0.0						AD-8
		AD-9	0.01	0.48	5	0.00	9.16	0.0						AD-9
		AD-10	0.05	0.48	5	0.02	9.16	0.2						AD-10
		AD-11	0.04	0.56	5	0.02	9.16	0.2						AD-11
		AD-12	0.01	0.58	5	0.01	9.16	0.1						AD-12
		AD-13	0.02	0.48	5	0.01	9.16	0.1						AD-13
		AD-14	0.03	0.48	5	0.01	9.16	0.1						AD-14
		AD-15	0.02	0.61	5	0.01	9.16	0.1						AD-15
		AD-16	0.03	0.48	5	0.01	9.16	0.1						AD-16

STORM DRAINAGE SYSTEM DESIGN

ROOF DRAIN CALCULATIONS

Calibre

KLB

APR

LOCATION: TOWN OF ERIE

1/10/2018

	DIRECT RUNOFF								
DESIGN POINT	BASIN	AREA (AC)	INTENSITY (IN/HR)	INTENSITY (IN/HR)	Q2 (cfs)	Q2 (gpm)	Q100 (cfs)	Q100 (gpm)	
DEVELOPED									
	R1	0.13	1.01	2.70	0.13	59	0.35	159	
	R2	0.16	1.01	2.70	0.16	73	0.44	196	
	R3	0.11	1.01	2.70	0.11	50	0.30	134	
	R4	0.11	1.01	2.70	0.11	50	0.30	134	
	R5	0.16	1.01	2.70	0.16	73	0.44	196	
	R6	0.13	1.01	2.70	0.13	59	0.35	159	
	R7	0.26	1.01	2.70	0.26	119	0.71	318	
	R8	0.08	1.01	2.70	0.08	37	0.22	98	
	R9	0.11	1.01	2.70	0.11	50	0.30	134	
	R10	0.08	1.01	2.70	0.08	37	0.22	98	
	R11	0.08	1.01	2.70	0.08	37	0.22	98	
	R12	0.11	1.01	2.70	0.11	50	0.30	134	
	R13	0.11	1.01	2.70	0.11	50	0.30	134	
	R14	0.16	1.01	2.70	0.16	73	0.44	196	
	R15	0.11	1.01	2.70	0.11	50	0.30	134	
	R16	0.13	1.01	2.70	0.13	59	0.35	159	
	R17	0.11	1.01	2.70	0.11	50	0.30	134	
	R18	0.11	1.01	2.70	0.11	50	0.30	134	

Notes: Peak storm runoff for the roof areas was determined according to the International Plumbing Code, and is based on the head of water above the roof drain and the hourly rainfall rate for the minor and major event.

APPENDIX C.

HYDRAULIC COMPUTATIONS

Version 4.05 Released March 2017

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet 2	Inlet 4	Inlet 7	Inlet 3	Inlet 1	Inlet 8
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade	In Sump	In Sump	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.1	0.3	1.1	0.2	1.4	0.3
Major Q_{Known} (cfs)	3.7	0.9	2.9	1.0	4.0	1.2

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						

Watershed Profile

Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**1.1**	**0.3**	**1.1**	**0.2**	**1.4**	**0.3**
Major Total Design Peak Flow, Q (cfs)	**3.7**	**0.9**	**2.9**	**1.0**	**4.0**	**1.2**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.0	N/A	N/A	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.7	N/A	N/A	0.0

Minor Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Version 4.05 Released March 2017

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet 1 and 2 Street Cap	Inlet 3 and 4 Street Cap	Inlet 10
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	In Sump
Inlet Type			CDOT/Denver 13 Combination

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.4	0.2	0.7
Major Q_{Known} (cfs)	4.0	1.0	1.7

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

Overland Slope (ft/ft)			
Overland Length (ft)			
Channel Slope (ft/ft)			
Channel Length (ft)			

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**1.4**	**0.2**	**0.7**
Major Total Design Peak Flow, Q (cfs)	**4.0**	**1.0**	**1.7**
Minor Flow Bypassed Downstream, Q_b (cfs)			N/A
Major Flow Bypassed Downstream, Q_b (cfs)			N/A

Minor Storm (Calculated) Analysis of Flow Ti

C	N/A	N/A	N/A
C_5	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow Ti

C	N/A	N/A	N/A
C_5	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A

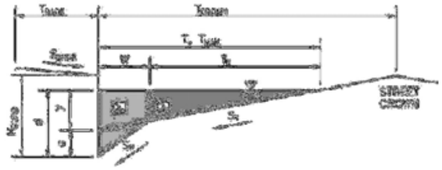
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Erie Commons

Inlet ID: Inlet 1 and 2 Street Cap



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.008		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**9.7**	**9.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

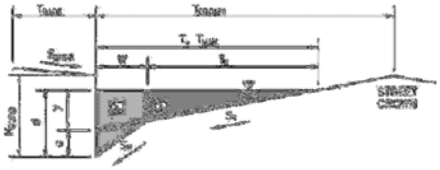
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Erie Commons
Inlet ID: Inlet 3 and 4 Street Cap



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.020		ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083		ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.006		ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016		
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	9.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes
MINOR STORM Allowable Capacity is based on Spread Criterion		Minor Storm	Major Storm	
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**8.4**	**8.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

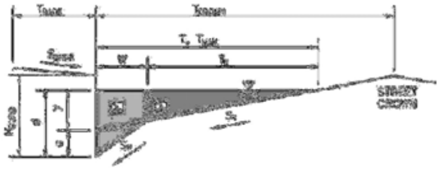
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Erie Commons

Inlet ID: Inlet 1 at DP-5



Gutter Geometry (Enter data in the blue cells)

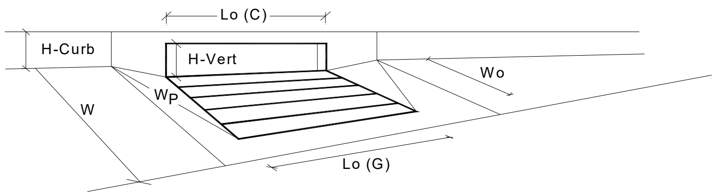
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	9.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.58	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.72	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**4.6**	**10.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.4	4.0	cfs

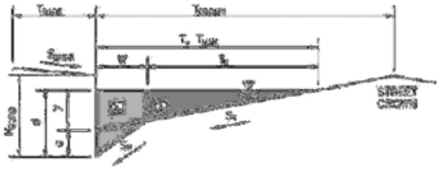
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Erie Commons

Inlet ID: Inlet 2 at DP-4



Gutter Geometry (Enter data in the blue cells)

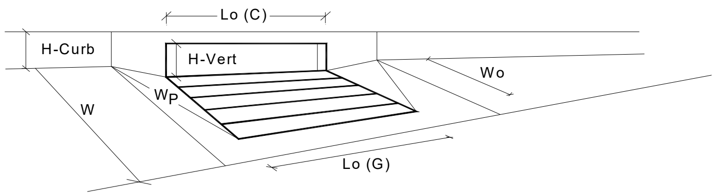
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	9.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.58	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.72	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**4.6**	**10.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.1	3.7	cfs

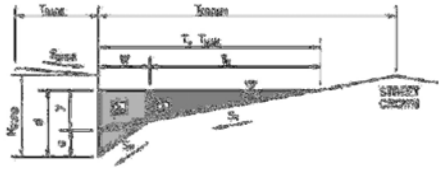
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Erie Commons

Inlet ID: Inlet 3 at DP-7



Gutter Geometry (Enter data in the blue cells)

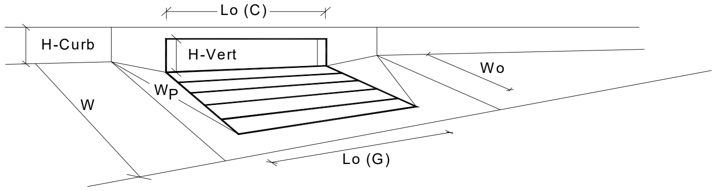
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	9.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.58	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.72	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**4.6**	**10.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.2	1.0	cfs

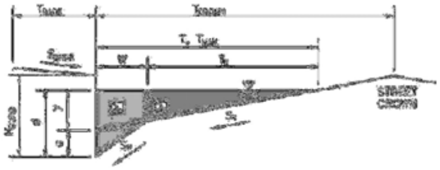
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Erie Commons

Inlet ID: Inlet 4 at DP-8



Gutter Geometry (Enter data in the blue cells)

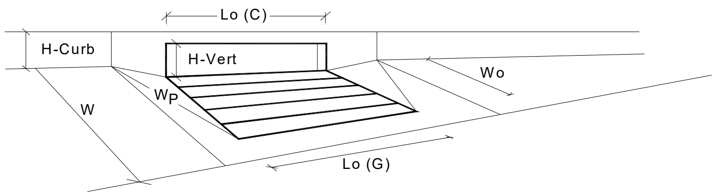
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	5.6	9.0	inches
Grate Information			MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.30	0.58	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.72	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**4.6**	**10.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	0.3	0.9	cfs

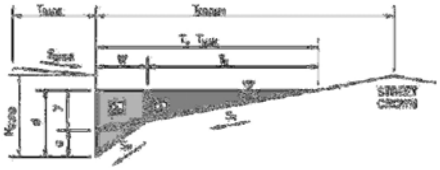
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Erie Commons

Inlet ID: Inlet 7 at DP-2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.026	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

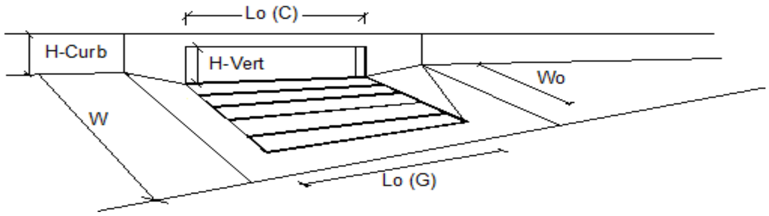
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**17.5**	**17.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**1.1**	**2.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.7**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**75**	**%**

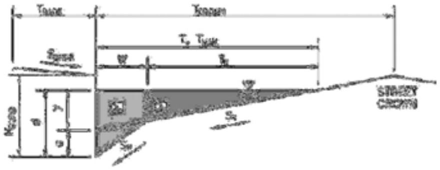
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Erie Commons

Inlet ID: Inlet 8 at DP-3



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	13.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.018	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.026	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.018	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	17.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

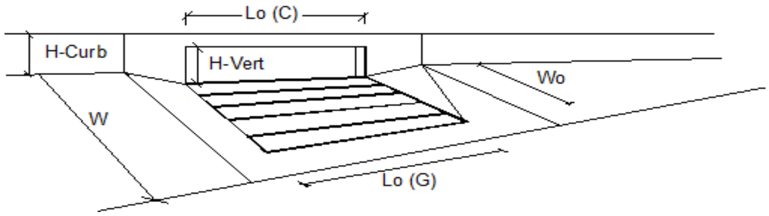
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**15.6**	**15.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')		a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)		No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)		L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)		W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)		C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)		C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'			MINOR	MAJOR	
Total Inlet Interception Capacity		**Q =**	**0.3**	**1.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)		**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =		**C% =**	**100**	**100**	**%**

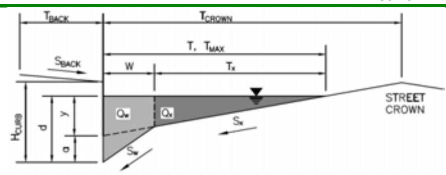
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Erie Commons

Inlet ID: Inlet 10



Gutter Geometry (Enter data in the blue cells)

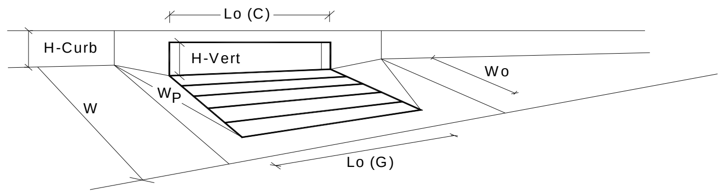
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	4.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	12.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	12.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



			MINOR	MAJOR	
Design Information (Input)	CDOT/Denver 13 Combination		MINOR	MAJOR	
Type of Inlet		Type =	CDOT/Denver 13 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	2	2	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	4.4	4.4	inches
Grate Information			MINOR	MAJOR	Override Depths
Length of a Unit Grate		L_o (G) =	3.00	3.00	feet
Width of a Unit Grate		W_o =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	0.60	0.60	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.66	0.66	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	0.389	0.389	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.20	0.20	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.52	0.52	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	0.52	0.52	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		Q_a =	**2.2**	**2.2**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	0.7	1.7	cfs

Calibre

INLET 9 CAPACITY CALCULATION

TYPE 13 INLET

Open Area Percentage

Total Grate area	6.13	SQ FT
Open Area	2.61	SQ FT
Ao	42.51%	

INLET 9 SUMP CONDITION CAPACITY CALCULATION

$Q_{orifice} =$ $N_o C_o W_g L_e (2g*D)^{\wedge}(1/2)$

$Q_{weir} =$ $N_w C_w (2W_g + L_e)*D^{\wedge}(3/2)$

$Q_{mixed} =$ $C_m (Q_w Q_o)^{\wedge}.5$

Capacity Required 4.00 cfs

Orifice Flow (2 inlets in line)			Type 13 Sump Condition Coefficients
W	6.06	ft	N_w= 0.7
Le	1.92	ft	C_w= 3.30
D	0.39	ft	N_o= 0.43
Q_o	9.40	cfs	C_o= 0.60
			C_m= 0.93

Weir Flow (2 inlets in line)		
W	6.06	ft
Le	1.92	ft
D	0.39	ft
Q_w	4.94	cfs

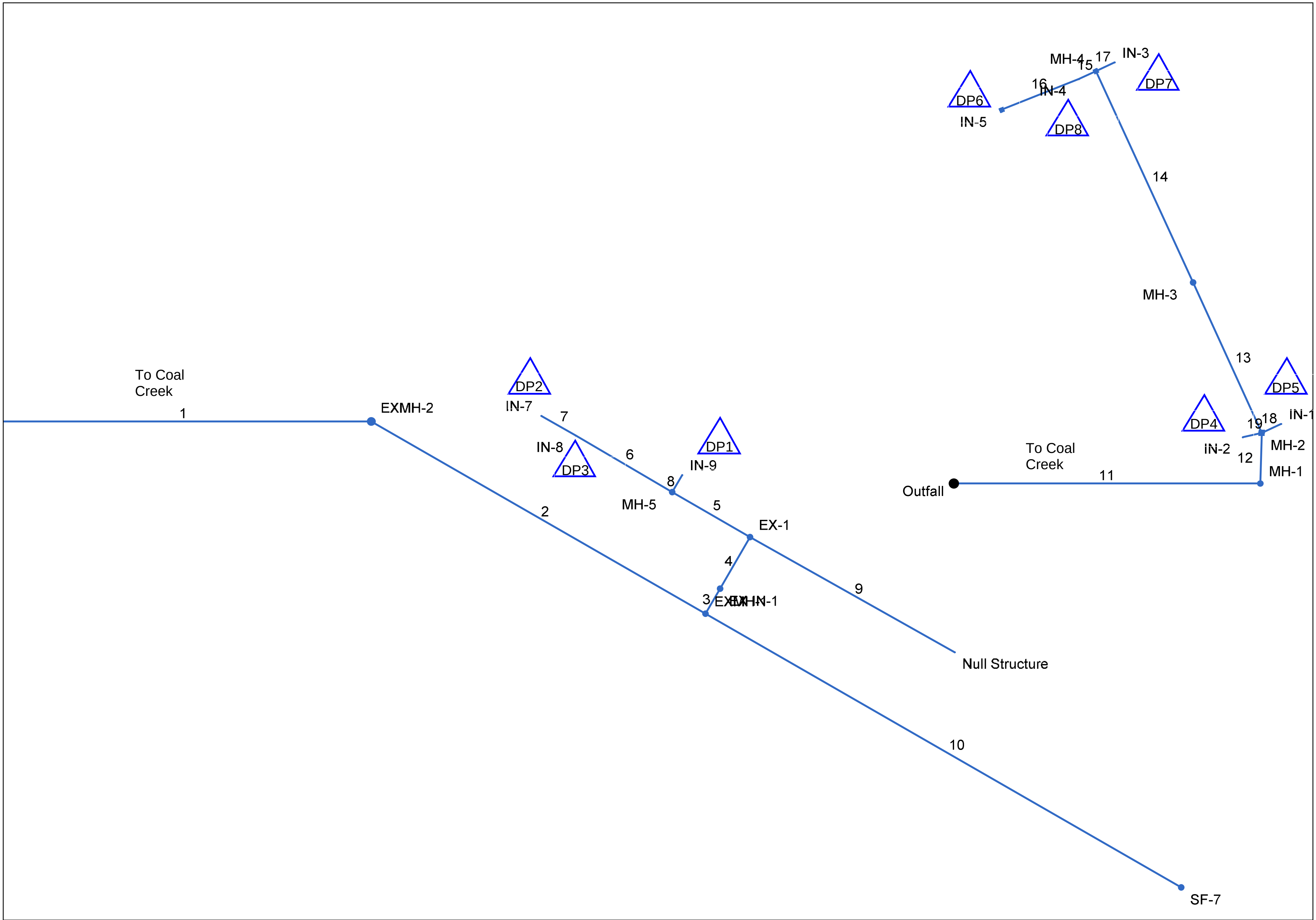
Mixed Flow (2 inlets in line)		
Q_m	6.34	cfs

Inlet Capacity, Qw is greater than Qrequired, so inlet is ok.

Where Wg is grate width
Le is effective length
D is water depth in feet at Flowline
Clogging factor is 37.5% for 2 inlets in line
Per UDFCD Technical Memo March 21, 2011

Roof/Area Drain Injection Point	Basins	Q_2 (cfs)	Q_{100} (cfs)
MH EX-1	R1	0.13	0.35
	R2	0.16	0.44
	AD-1	0.05	0.48
	AD-2	0.03	0.16
	AD-9	0.00	0.04
	AD-10	0.03	0.22
Totals		**0.40**	**1.70**
MH-5	R3	0.11	0.30
	AD-6	0.03	0.22
Totals		**0.14**	**0.52**
IN-7	R7	0.26	0.71
	R8	0.08	0.22
	R9	0.11	0.30
	AD-4	0.00	0.04
	AD-5	0.00	0.04
Totals		**0.46**	**1.31**
MH-1	R10	0.08	0.22
	AD-16	0.00	0.13
Totals		**0.08**	**0.35**
IN-1	R6	0.13	0.35
	AD-7	0.00	0.10
Totals		**0.13**	**0.46**
MH-3	R5	0.16	0.44
	R4	0.11	0.30
	R11	0.08	0.22
	R12	0.11	0.30
	R13	0.11	0.30
	AD-8	0.00	0.04
	AD-11	0.03	0.20
	AD-12	0.00	0.05
	AD-3	0.00	0.06
	AD-15	0.00	0.11
Totals		**0.61**	**2.02**
IN-5	R14	0.16	0.44
	R15	0.11	0.30
	R16	0.13	0.35
	R17	0.11	0.30
	R18	0.11	0.30
	AD-13	0.00	0.09
	AD-14	0.03	0.13
Totals		**0.66**	**1.91**

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: 2-yr.stm	Number of lines: 19	Date: 1/10/2018

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	1	23.38	42	Cir	322.200	5023.00	5023.90	0.279	5025.78	5025.96	0.14	5026.10	End	Manhole
2	2	23.38	42	Cir	331.600	5024.40	5026.10	0.513	5026.10	5027.58	n/a	5027.58 j	1	Manhole
3	3	10.02	30	Cir	24.970	5026.20	5026.40	0.800	5027.58	5027.46	n/a	5027.46	2	Curb-Horiz
4	4	7.72	30	Cir	51.287	5026.60	5026.80	0.389	5027.54	5027.74	0.32	5028.07	3	Manhole
5	5	2.94	18	Cir	77.348	5027.00	5028.11	1.435	5028.07	5028.76	n/a	5028.76 j	4	Manhole
6	6	1.40	18	Cir	96.235	5028.31	5029.45	1.185	5028.76	5029.89	n/a	5029.89 j	5	Curb-Horiz
7	7	1.10	18	Cir	34.000	5029.65	5029.90	0.735	5030.00	5030.29	n/a	5030.29	6	Curb-Horiz
8	8	1.40	18	Cir	16.965	5028.31	5028.51	1.177	5028.76	5028.95	n/a	5028.95 j	5	None
9	9	4.38	18	Cir	201.775	5027.00	5027.30	0.149	5028.50	5028.80	0.10	5028.89	4	None
10	10	13.36	24	Cir	471.680	5026.89	5028.92	0.430	5028.28	5030.31	0.51	5030.82	2	Manhole
11	11	3.90	30	Cir	263.221	5022.03	5025.43	1.292	5024.08	5026.08	n/a	5026.08 j	End	Manhole
12	12	3.90	30	Cir	43.664	5025.63	5025.99	0.825	5026.18	5026.64	0.23	5026.64	11	Manhole
13	13	1.87	24	Cir	142.389	5026.19	5027.43	0.871	5026.64	5027.90	n/a	5027.90	12	Manhole
14	14	1.26	24	Cir	200.409	5027.63	5029.05	0.709	5027.98	5029.44	0.14	5029.44	13	Manhole
15	15	1.06	24	Cir	16.221	5029.25	5029.35	0.617	5029.58	5029.71	0.02	5029.71	14	None
16	16	0.76	24	Cir	71.000	5029.55	5029.90	0.493	5029.85	5030.20	n/a	5030.20	15	Manhole
17	17	0.20	18	Cir	17.779	5029.25	5029.35	0.563	5029.44	5029.52	n/a	5029.57 j	14	None
18	18	0.73	18	Cir	18.000	5026.19	5027.16	5.390	5026.64	5027.48	n/a	5027.48 j	12	None
19	19	1.30	18	Cir	16.683	5026.19	5026.61	2.517	5026.64	5027.04	n/a	5027.04 j	12	None
20	20	0.70	18	Cir	43.904	5025.50	5026.07	1.298	5025.81	5026.38	0.11	5026.38	End	Manhole

Project File: 2-yr.stm	Number of lines: 20	Run Date: 4/1/2018

NOTES: Known Qs only ; j - Line contains hyd. jump.

Hydraulic Grade Line Computations

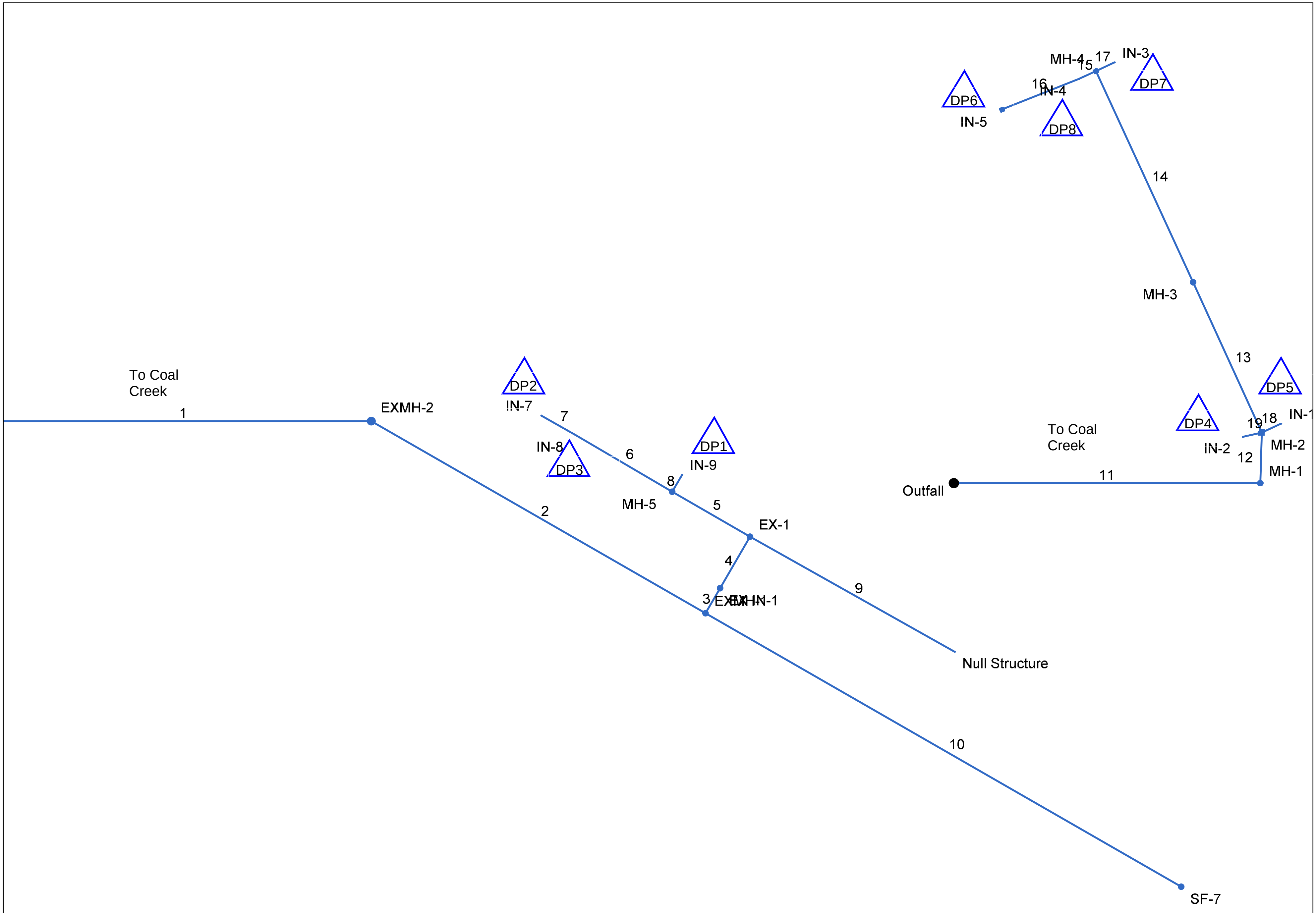
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	42	23.38	5023.00	5025.78	2.78	8.19	2.85	0.13	5025.91	0.057	322.200	5023.90	5025.96	2.06	5.89	3.97	0.25	5026.21	0.127	0.092	0.297	0.56	0.14
2	42	23.38	5024.40	5026.10	1.70	3.88	5.06	0.56	5026.66	0.000	331.600	5026.10	5027.58 j	1.48**	3.88	6.02	0.56	5028.15	0.000	0.000	n/a	1.00	n/a
3	30	10.02	5026.20	5027.58	1.38	1.97	3.59	0.40	5027.99	0.000	24.970	5026.40	5027.46	1.06**	1.97	5.08	0.40	5027.86	0.000	0.000	n/a	0.50	n/a
4	30	7.72	5026.60	5027.54	0.94*	1.69	4.56	0.32	5027.87	0.388	51.287	5026.80	5027.74	0.94	1.69	4.57	0.32	5028.07	0.391	0.389	0.200	1.00	0.32
5	18	2.94	5027.00	5028.07	1.07	0.74	2.19	0.25	5028.31	0.000	77.348	5028.11	5028.76 j	0.65**	0.74	4.00	0.25	5029.01	0.000	0.000	n/a	1.00	n/a
6	18	1.40	5028.31	5028.76	0.45	0.44	3.13	0.16	5028.92	0.000	96.235	5029.45	5029.89 j	0.44**	0.44	3.21	0.16	5030.05	0.000	0.000	n/a	0.50	n/a
7	18	1.10	5029.65	5030.00	0.35*	0.32	3.45	0.14	5030.15	0.000	34.000	5029.90	5030.29	0.39**	0.37	3.00	0.14	5030.43	0.000	0.000	n/a	1.00	n/a
8	18	1.40	5028.31	5028.76	0.45	0.44	3.13	0.16	5028.92	0.000	16.965	5028.51	5028.95 j	0.44**	0.44	3.21	0.16	5029.11	0.000	0.000	n/a	1.00	n/a
9	18	4.38	5027.00	5028.50	1.50*	1.77	2.48	0.10	5028.60	0.174	201.775	5027.30	5028.80	1.50	1.77	2.48	0.10	5028.89	0.167	0.171	0.344	1.00	0.10
10	24	13.36	5026.89	5028.28	1.39*	2.33	5.72	0.51	5028.79	0.430	471.680	5028.92	5030.31	1.39	2.34	5.72	0.51	5030.82	0.429	0.430	2.027	1.00	0.51
11	30	3.90	5022.03	5024.08	2.05	1.01	0.91	0.23	5024.31	0.000	263.221	5025.43	5026.08 j	0.65**	1.01	3.85	0.23	5026.31	0.000	0.000	n/a	1.00	0.23
12	30	3.90	5025.63	5026.18	0.55*	0.79	4.92	0.23	5026.41	0.000	43.664	5025.99	5026.64	0.65**	1.01	3.85	0.23	5026.87	0.000	0.000	n/a	1.00	0.23
13	24	1.87	5026.19	5026.64	0.45	0.53	3.54	0.17	5026.81	0.000	142.389	5027.43	5027.90	0.47**	0.57	3.29	0.17	5028.07	0.000	0.000	n/a	0.15	n/a
14	24	1.26	5027.63	5027.98	0.35*	0.37	3.43	0.14	5028.11	0.000	200.409	5029.05	5029.44	0.39**	0.43	2.95	0.14	5029.57	0.000	0.000	n/a	1.00	0.14
15	24	1.06	5029.25	5029.58	0.33*	0.34	3.10	0.12	5029.71	0.000	16.221	5029.35	5029.71	0.35**	0.38	2.82	0.12	5029.83	0.000	0.000	n/a	0.15	0.02
16	24	0.76	5029.55	5029.85	0.30*	0.29	2.60	0.10	5029.95	0.000	71.000	5029.90	5030.20	0.30**	0.29	2.58	0.10	5030.30	0.000	0.000	n/a	1.00	n/a
17	18	0.20	5029.25	5029.44	0.19	0.11	1.57	0.04	5029.48	0.331	17.779	5029.35	5029.52 j	0.17**	0.11	1.86	0.05	5029.57	0.533	0.432	0.077	1.00	0.05
18	18	0.73	5026.19	5026.64	0.45	0.27	1.64	0.11	5026.75	0.000	18.000	5027.16	5027.48 j	0.32**	0.27	2.68	0.11	5027.59	0.000	0.000	n/a	1.00	n/a
19	18	1.30	5026.19	5026.64	0.45	0.41	2.92	0.15	5026.79	0.000	16.683	5026.61	5027.04 j	0.43**	0.41	3.14	0.15	5027.19	0.000	0.000	n/a	1.00	0.15
20	18	0.70	5025.50	5025.81	0.31	0.26	2.65	0.11	5025.92	0.000	43.904	5026.07	5026.38	0.31**	0.26	2.65	0.11	5026.49	0.000	0.000	n/a	1.00	0.11

Project File: 2-yr.stm | Number of lines: 20 | Run Date: 4/1/2018

Notes: * Normal depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewers v12.00

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: 100-yr.stm	Number of lines: 19	Date: 1/10/2018

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	EX42-1	64.44	42	Cir	322.200	5023.49	5024.40	0.282	5026.40	5027.80	0.40	5028.20	End	Manhole
2	EX42-2	64.44	42	Cir	331.600	5024.40	5026.10	0.513	5028.20	5029.45	0.72	5030.17	1	Manhole
3	EX30-1	49.45	30	Cir	24.970	5026.20	5026.40	0.800	5030.17*	5030.54*	0.79	5031.32	2	Curb-Horiz
4	4	23.31	30	Cir	51.287	5026.60	5026.80	0.389	5031.32*	5031.49*	0.35	5031.84	3	Manhole
5	5	9.23	18	Cir	77.348	5027.00	5028.11	1.435	5031.84*	5032.44*	0.42	5032.86	4	Manhole
6	6	4.71	18	Cir	96.235	5028.31	5029.45	1.185	5032.86*	5033.06*	0.02	5033.07	5	None
7	7	3.51	18	Cir	34.000	5029.65	5029.90	0.735	5033.07*	5033.11*	0.06	5033.17	6	None
8	P-29	4.00	18	Cir	16.965	5028.31	5028.51	1.177	5032.86*	5032.89*	0.08	5032.97	5	None
9	9	12.38	18	Cir	201.775	5027.00	5027.30	0.149	5031.84*	5034.65*	0.76	5035.41	4	None
10	EX24-1	14.99	24	Cir	471.680	5026.20	5028.30	0.445	5030.17*	5031.94*	0.35	5032.29	2	Manhole
11	11	12.64	30	Cir	263.221	5022.03	5025.43	1.292	5033.00*	5033.25*	0.10	5033.35	End	Manhole
12	12	12.29	30	Cir	43.664	5025.63	5025.99	0.825	5033.35*	5033.39*	0.10	5033.49	11	Manhole
13	13	5.53	24	Cir	142.389	5026.19	5027.43	0.871	5033.49*	5033.58*	0.01	5033.58	12	Manhole
14	14	3.51	24	Cir	200.409	5027.63	5029.05	0.709	5033.58*	5033.63*	0.02	5033.65	13	Manhole
15	15	2.81	24	Cir	16.000	5029.25	5029.35	0.626	5033.65*	5033.65*	0.00	5033.65	14	None
16	16	1.91	24	Cir	71.000	5029.55	5029.90	0.493	5033.65*	5033.66*	0.01	5033.67	15	Manhole
17	17	0.70	18	Cir	18.000	5029.25	5029.35	0.556	5033.65*	5033.65*	0.00	5033.65	14	None
18	18	2.96	18	Cir	18.358	5026.19	5027.16	5.285	5033.49*	5033.50*	0.04	5033.55	12	None
19	19	3.80	18	Cir	16.683	5026.19	5026.61	2.517	5033.49*	5033.51*	0.07	5033.58	12	None
20		1.70	18	Cir	5.650	5025.50	5026.07	10.085	5025.99	5026.56	n/a	5026.56	End	Manhole

Project File: 100-yr.stm	Number of lines: 20	Run Date: 4/1/2018

NOTES: Known Qs only ; *Surcharged (HGL above crown).

Storm Sewers v12.00

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	42	64.44	5023.49	5026.40	2.91	8.55	7.54	0.88	5027.28	0.400	322.200	5024.40	5027.80	3.40	9.55	6.75	0.71	5028.51	0.362	0.381	1.229	0.56	0.40
2	42	64.44	5024.40	5028.20	3.50	9.62	6.70	0.70	5028.90	0.410	331.600	5026.10	5029.45	3.35	9.48	6.80	0.72	5030.17	0.357	0.384	1.272	1.00	0.72
3	30	49.45	5026.20	5030.17	2.50	4.91	10.08	1.58	5031.75	1.454	24.970	5026.40	5030.54	2.50	4.91	10.07	1.58	5032.11	1.454	1.454	0.363	0.50	0.79
4	30	23.31	5026.60	5031.32	2.50	4.91	4.75	0.35	5031.67	0.323	51.287	5026.80	5031.49	2.50	4.91	4.75	0.35	5031.84	0.323	0.323	0.166	1.00	0.35
5	18	9.23	5027.00	5031.84	1.50	1.77	5.22	0.42	5032.26	0.773	77.348	5028.11	5032.44	1.50	1.77	5.22	0.42	5032.86	0.773	0.773	0.598	1.00	0.42
6	18	4.71	5028.31	5032.86	1.50	1.77	2.67	0.11	5032.97	0.201	96.235	5029.45	5033.06	1.50	1.77	2.67	0.11	5033.17	0.201	0.201	0.194	0.15	0.02
7	18	3.51	5029.65	5033.07	1.50	1.77	1.99	0.06	5033.13	0.112	34.000	5029.90	5033.11	1.50	1.77	1.99	0.06	5033.17	0.112	0.112	0.038	1.00	0.06
8	18	4.00	5028.31	5032.86	1.50	1.77	2.26	0.08	5032.94	0.145	16.965	5028.51	5032.89	1.50	1.77	2.26	0.08	5032.97	0.145	0.145	0.025	1.00	0.08
9	18	12.38	5027.00	5031.84	1.50	1.77	7.01	0.76	5032.60	1.390	201.775	5027.30	5034.65	1.50	1.77	7.01	0.76	5035.41	1.390	1.390	2.805	1.00	0.76
10	24	14.99	5026.20	5030.17	2.00	3.14	4.77	0.35	5030.52	0.374	471.680	5028.30	5031.94	2.00	3.14	4.77	0.35	5032.29	0.374	0.374	1.766	1.00	0.35
11	30	12.64	5022.03	5033.00	2.50	4.91	2.58	0.10	5033.10	0.095	263.221	5025.43	5033.25	2.50	4.91	2.58	0.10	5033.35	0.095	0.095	0.250	1.00	0.10
12	30	12.29	5025.63	5033.35	2.50	4.91	2.50	0.10	5033.45	0.090	43.664	5025.99	5033.39	2.50	4.91	2.50	0.10	5033.49	0.090	0.090	0.039	1.00	0.10
13	24	5.53	5026.19	5033.49	2.00	3.14	1.76	0.05	5033.54	0.060	142.389	5027.43	5033.58	2.00	3.14	1.76	0.05	5033.62	0.060	0.060	0.085	0.15	0.01
14	24	3.51	5027.63	5033.58	2.00	3.14	1.12	0.02	5033.60	0.024	200.409	5029.05	5033.63	2.00	3.14	1.12	0.02	5033.65	0.024	0.024	0.048	1.00	0.02
15	24	2.81	5029.25	5033.65	2.00	3.14	0.89	0.01	5033.66	0.015	16.000	5029.35	5033.65	2.00	3.14	0.89	0.01	5033.67	0.015	0.015	0.002	0.15	0.00
16	24	1.91	5029.55	5033.65	2.00	3.14	0.61	0.01	5033.66	0.007	71.000	5029.90	5033.66	2.00	3.14	0.61	0.01	5033.67	0.007	0.007	0.005	1.00	0.01
17	18	0.70	5029.25	5033.65	1.50	1.77	0.40	0.00	5033.65	0.004	18.000	5029.35	5033.65	1.50	1.77	0.40	0.00	5033.65	0.004	0.004	0.001	1.00	0.00
18	18	2.96	5026.19	5033.49	1.50	1.77	1.68	0.04	5033.53	0.079	18.358	5027.16	5033.50	1.50	1.77	1.68	0.04	5033.55	0.079	0.079	0.015	1.00	0.04
19	18	3.80	5026.19	5033.49	1.50	1.77	2.15	0.07	5033.56	0.131	16.683	5026.61	5033.51	1.50	1.77	2.15	0.07	5033.58	0.131	0.131	0.022	1.00	0.07
20	18	1.70	5025.50	5025.99	0.49	0.50	3.39	0.18	5026.17	0.000	5.650	5026.07	5026.56	0.49**	0.50	3.39	0.18	5026.74	0.000	0.000	n/a	1.00	n/a

Project File: 100-yr.stm	Number of lines: 20	Run Date: 4/1/2018

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Storm Sewers v12.00

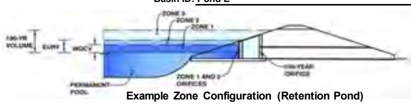
APPENDIX D.
WATER QUALITY CALCULATIONS

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Erie Commons

Basin ID: Pond E



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	3.47	acres
Watershed Length =	384	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	76.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Desired WQCV Drain Time =	24.0	hours
Location for 1-hr Rainfall Depths =	Denver - Capitol Building	
Water Quality Capture Volume (WQCV) =	0.088	acre-feet
Excess Urban Runoff Volume (EURV) =	0.258	acre-feet
2-yr Runoff Volume (P1 = 0.83 in.) =	0.172	acre-feet
5-yr Runoff Volume (P1 = 1.09 in.) =	0.247	acre-feet
10-yr Runoff Volume (P1 = 1.33 in.) =	0.311	acre-feet
25-yr Runoff Volume (P1 = 1.69 in.) =	0.426	acre-feet
50-yr Runoff Volume (P1 = 1.99 in.) =	0.514	acre-feet
100-yr Runoff Volume (P1 = 2.31 in.) =	0.620	acre-feet
500-yr Runoff Volume (P1 = 3.14 in.) =	0.878	acre-feet
Approximate 2-yr Detention Volume =	0.161	acre-feet
Approximate 5-yr Detention Volume =	0.233	acre-feet
Approximate 10-yr Detention Volume =	0.280	acre-feet
Approximate 25-yr Detention Volume =	0.330	acre-feet
Approximate 50-yr Detention Volume =	0.354	acre-feet
Approximate 100-yr Detention Volume =	0.391	acre-feet

Drain Time Too Short

Optional User Override 1-hr Precipitation

	inches
	inches
	inches
	inches
	inches
	inches
	inches

Stage-Storage Calculation

Select Zone 1 Storage Volume (Required) =		acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =		acre-feet
Initial Surcharge Volume (ISV) =	12	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		
Initial Surcharge Area (A_{ISV}) =		ft^2
Surcharge Volume Length (L_{ISV}) =		ft
Surcharge Volume Width (W_{ISV}) =		ft
Depth of Basin Floor (H_{FLOOR}) =		ft
Length of Basin Floor (L_{FLOOR}) =		ft
Width of Basin Floor (W_{FLOOR}) =		ft
Area of Basin Floor (A_{FLOOR}) =		ft^2
Volume of Basin Floor (V_{FLOOR}) =		ft^3
Depth of Main Basin (H_{MAIN}) =		ft
Length of Main Basin (L_{MAIN}) =		ft
Width of Main Basin (W_{MAIN}) =		ft
Area of Main Basin (A_{MAIN}) =		ft^2
Volume of Main Basin (V_{MAIN}) =		ft^3
Calculated Total Basin Volume (V_{total}) =		acre-feet

Depth Increment = ft

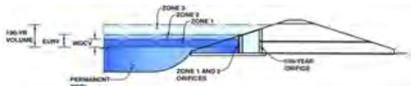
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Erie Commons

Basin ID: North WQ Pond



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	**EDB**			
Watershed Area =	4.08	acres		
Watershed Length =	495	ft		
Watershed Slope =	0.010	ft/ft		
Watershed Imperviousness =	70.00%	percent		
Percentage Hydrologic Soil Group A =	0.0%	percent		
Percentage Hydrologic Soil Group B =	0.0%	percent		
Percentage Hydrologic Soil Groups C/D =	100.0%	percent		
Desired WQCV Drain Time =	24.0	hours	**Drain Time Too Short**	
Location for 1-hr Rainfall Depths =	Denver - Capitol Building			
Water Quality Capture Volume (WQCV) =	0.094	acre-feet	Optional User Override	
Excess Urban Runoff Volume (EURV) =	0.278	acre-feet	1-hr Precipitation	
2-yr Runoff Volume (P1 = 0.83 in.) =	0.184	acre-feet		inches
5-yr Runoff Volume (P1 = 1.09 in.) =	0.269	acre-feet		inches
10-yr Runoff Volume (P1 = 1.33 in.) =	0.342	acre-feet		inches
25-yr Runoff Volume (P1 = 1.69 in.) =	0.477	acre-feet		inches
50-yr Runoff Volume (P1 = 1.99 in.) =	0.581	acre-feet		inches
100-yr Runoff Volume (P1 = 2.31 in.) =	0.707	acre-feet		inches
500-yr Runoff Volume (P1 = 3.14 in.) =	1.008	acre-feet		inches
Approximate 2-yr Detention Volume =	0.173	acre-feet		
Approximate 5-yr Detention Volume =	0.253	acre-feet		
Approximate 10-yr Detention Volume =	0.303	acre-feet		
Approximate 25-yr Detention Volume =	0.359	acre-feet		
Approximate 50-yr Detention Volume =	0.386	acre-feet		
Approximate 100-yr Detention Volume =	0.432	acre-feet		

Stage-Storage Calculation

Select Zone 1 Storage Volume (Required) =		acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =		acre-feet
Initial Surcharge Volume (ISV) =	12	ft^3
Initial Surcharge Depth (ISD) =		ft
Total Available Detention Depth (H_{total}) =		ft
Depth of Trickle Channel (H_{TC}) =		ft
Slope of Trickle Channel (S_{TC}) =		ft/ft
Slopes of Main Basin Sides (S_{main}) =		H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =		
Initial Surcharge Area (A_{ISV}) =		ft^2
Surcharge Volume Length (L_{ISV}) =		ft
Surcharge Volume Width (W_{ISV}) =		ft
Depth of Basin Floor (H_{FLOOR}) =		ft
Length of Basin Floor (L_{FLOOR}) =		ft
Width of Basin Floor (W_{FLOOR}) =		ft
Area of Basin Floor (A_{FLOOR}) =		ft^2
Volume of Basin Floor (V_{FLOOR}) =		ft^3
Depth of Main Basin (H_{MAIN}) =		ft
Length of Main Basin (L_{MAIN}) =		ft
Width of Main Basin (W_{MAIN}) =		ft
Area of Main Basin (A_{MAIN}) =		ft^2
Volume of Main Basin (V_{MAIN}) =		ft^3
Calculated Total Basin Volume (V_{total}) =		acre-feet

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool									

APPENDIX E

REFERENCED REPORTS, GRAPHS, TABLES, AND NOMOGRAPHS USED

Table 6-5. Runoff coefficients, *c*

Total or Effective % Impervious	NRCS Hydrologic Soil Group A						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
2%	0.01	0.01	0.01	0.01	0.04	0.13	0.27
5%	0.02	0.02	0.02	0.03	0.07	0.15	0.29
10%	0.04	0.05	0.05	0.07	0.11	0.19	0.32
15%	0.07	0.08	0.08	0.1	0.15	0.23	0.35
20%	0.1	0.11	0.12	0.14	0.2	0.27	0.38
25%	0.14	0.15	0.16	0.19	0.24	0.3	0.42
30%	0.18	0.19	0.2	0.23	0.28	0.34	0.45
35%	0.21	0.23	0.24	0.27	0.32	0.38	0.48
40%	0.25	0.27	0.28	0.32	0.37	0.42	0.51
45%	0.3	0.31	0.33	0.36	0.41	0.46	0.54
50%	0.34	0.36	0.37	0.41	0.45	0.5	0.58
55%	0.39	0.4	0.42	0.45	0.49	0.54	0.61
60%	0.43	0.45	0.47	0.5	0.54	0.58	0.64
65%	0.48	0.5	0.51	0.54	0.58	0.62	0.67
70%	0.53	0.55	0.56	0.59	0.62	0.65	0.71
75%	0.58	0.6	0.61	0.64	0.66	0.69	0.74
80%	0.63	0.65	0.66	0.69	0.71	0.73	0.77
85%	0.68	0.7	0.71	0.74	0.75	0.77	0.8
90%	0.73	0.75	0.77	0.79	0.79	0.81	0.84
95%	0.79	0.81	0.82	0.83	0.84	0.85	0.87
100%	0.84	0.86	0.87	0.88	0.88	0.89	0.9
Total or Effective % Impervious	**NRCS Hydrologic Soil Group B**						
	2-Year	**5-Year**	**10-Year**	**25-Year**	**50-Year**	**100-Year**	**500-Year**
2%	0.01	0.01	0.07	0.26	0.34	0.44	0.54
5%	0.03	0.03	0.1	0.28	0.36	0.45	0.55
10%	0.06	0.07	0.14	0.31	0.38	0.47	0.57
15%	0.09	0.11	0.18	0.34	0.41	0.5	0.59
20%	0.13	0.15	0.22	0.38	0.44	0.52	0.61
25%	0.17	0.19	0.26	0.41	0.47	0.54	0.63
30%	0.2	0.23	0.3	0.44	0.49	0.57	0.65
35%	0.24	0.27	0.34	0.47	0.52	0.59	0.66
40%	0.29	0.32	0.38	0.5	0.55	0.61	0.68
45%	0.33	0.36	0.42	0.53	0.58	0.64	0.7
50%	0.37	0.4	0.46	0.56	0.61	0.66	0.72
55%	0.42	0.45	0.5	0.6	0.63	0.68	0.74
60%	0.46	0.49	0.54	0.63	0.66	0.71	0.76
65%	0.5	0.54	0.58	0.66	0.69	0.73	0.77
70%	0.55	0.58	0.62	0.69	0.72	0.75	0.79
75%	0.6	0.63	0.66	0.72	0.75	0.78	0.81
80%	0.64	0.67	0.7	0.75	0.77	0.8	0.83
85%	0.69	0.72	0.74	0.78	0.8	0.82	0.85
90%	0.74	0.76	0.78	0.81	0.83	0.84	0.87
95%	0.79	0.81	0.82	0.85	0.86	0.87	0.88
100%	0.84	0.86	0.86	0.88	0.89	0.89	0.9

Table 6-5. Runoff coefficients, *c* (continued)

Total or Effective % Impervious	NRCS Hydrologic Soil Group C						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
2%	0.01	0.05	0.15	0.33	0.40	0.49	0.59
5%	0.03	0.08	0.17	0.35	0.42	0.5	0.6
10%	0.06	0.12	0.21	0.37	0.44	0.52	0.62
15%	0.1	0.16	0.24	0.4	0.47	0.55	0.64
20%	0.14	0.2	0.28	0.43	0.49	0.57	0.65
25%	0.18	0.24	0.32	0.46	0.52	0.59	0.67
30%	0.22	0.28	0.35	0.49	0.54	0.61	0.68
35%	0.26	0.32	0.39	0.51	0.57	0.63	0.7
40%	0.3	0.36	0.43	0.54	0.59	0.65	0.71
45%	0.34	0.4	0.46	0.57	0.62	0.67	0.73
50%	0.38	0.44	0.5	0.6	0.64	0.69	0.75
55%	0.43	0.48	0.54	0.63	0.66	0.71	0.76
60%	0.47	0.52	0.57	0.65	0.69	0.73	0.78
65%	0.51	0.56	0.61	0.68	0.71	0.75	0.79
70%	0.56	0.61	0.65	0.71	0.74	0.77	0.81
75%	0.6	0.65	0.68	0.74	0.76	0.79	0.82
80%	0.65	0.69	0.72	0.77	0.79	0.81	0.84
85%	0.7	0.73	0.76	0.79	0.81	0.83	0.86
90%	0.74	0.77	0.79	0.82	0.84	0.85	0.87
95%	0.79	0.81	0.83	0.85	0.86	0.87	0.89
100%	0.83	0.85	0.87	0.88	0.89	0.89	0.9

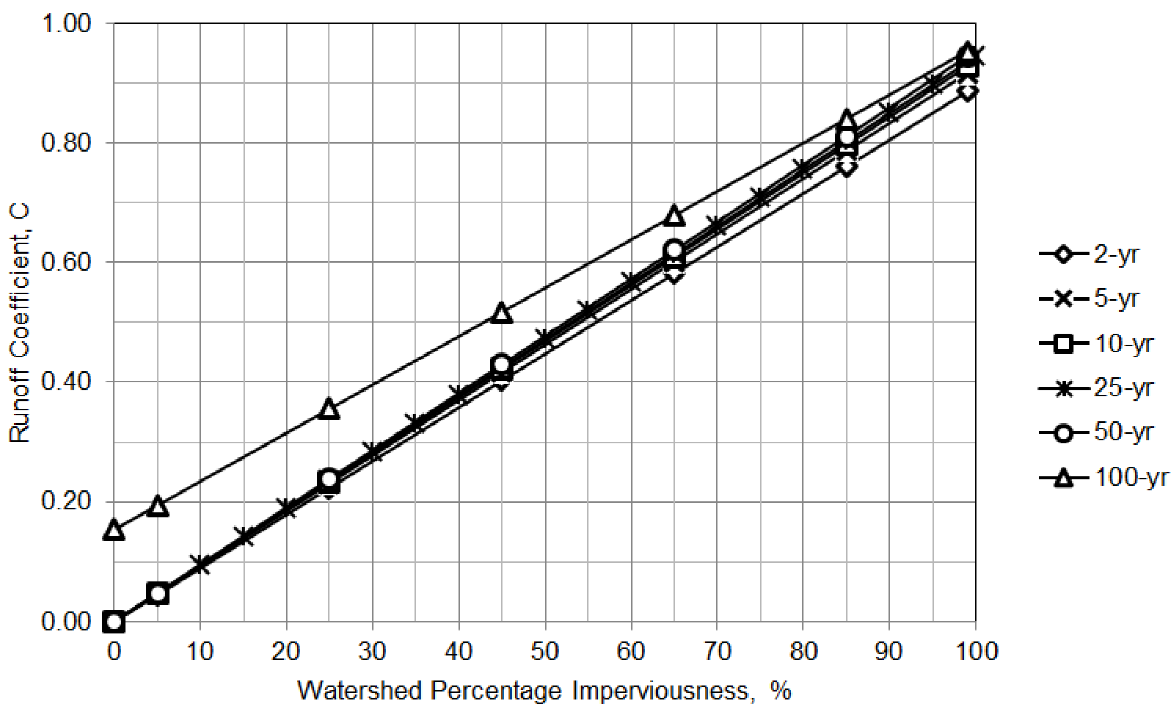


Figure 6-1. Runoff coefficient vs. watershed imperviousness NRCS HSG A

FINAL DRAINAGE REPORT
ERIE COMMONS FILING NO. 1
ERIE, COLORADO

Prepared For:
Community Development Group
2500 Arapahoe Avenue
Suite 220
Boulder, CO 80302

Prepared By:
Hurst and Associates, Inc.
4999 Pearl East Circle
Suite 106
Boulder, Colorado, 80301

Job Number 2020-40
July 30, 2004
Revised August 5, 2004
Revised November 3, 2004
Revised January 4, 2005
Revised January 7, 2005
Revised February 8, 2005

WQCV Storage = (WQCV / 12) * Area * 1.2

Water Quality Ponds
Erie Commons
Job Number: 2020-40

$$WQCV = 0.9 * (0.91i^3 - 1.19i^2 + 0.78i)$$

	Basins	% Impervious	WQCV (inches)	Drainage Area (acres)	Required Storage (acre-feet)	Required Storage (cubic feet)	Release Rate (cfs)
POND A	A1-A3, I4	33.8%	0.15	6.67	0.10	**4,259**	0.05
POND B	B1-B15	29.2%	0.13	61.88	0.83	**36,110**	0.42
POND C	C1-C15	47.6%	0.18	64.06	1.15	**50,182**	0.58
POND D	D1-D4	33.5%	0.15	5.76	0.08	**3,657**	0.04
POND E	E1-E4	70.3%	0.25	29.38	0.73	**31,821**	0.37

Note 1: Used 24-hour drain time.

FINAL DRAINAGE REPORT
ERIE COMMONS FILING NO. 4
BLOCKS 6-8
ERIE, COLORADO

Prepared For:
Community Development Group
2500 Arapahoe Avenue
Suite 220
Boulder, CO 80302

Prepared By:
Hurst and Associates, Inc.
4999 Pearl East Circle
Suite 106
Boulder, Colorado, 80301

Job Number 2020-45
September 30, 2005
Revised May 26, 2006
Revised August 2, 2006

DRAINAGE FACILITY DESIGN

The drainage concept for Erie Commons Filing No. 4, Blocks 6-8 is to convey the developed runoff from the project site to the existing Water Quality Pond E or the existing drainage channel along the southern border of the Union Pacific Railroad. Water Quality Pond E was designed to incorporate the flows from Erie Commons Filing No. 4, Blocks 6-8 and outfalls into Coal Creek. A future water quality pond will be constructed in the existing drainage channel along the southern border of the Union Pacific Railroad. Its design will accomodate those flows from Erie Commons which enter the drainage channel. The minor storm flows will be conveyed by the prososed storm sewer system to either Water Quality Pond E or the existing storm pipes in Leon A. Wurl Parkway. See Appendix B for the minor storm pipe analysis and Appendix C for the inlet analysis. The minor storm street capacity analysis is located in Appendix D. During the major storm event, runoff exceeding the capacities of the upstream inlets and pipes will collect at the existing low point in Leon A. Wurl Parkway. The existing 10 foot type 'R' inlets at the low point and the downstream storm pipes have adequate capacity to convey the 100-year excess flows collecting at the low point in Leon A. Wurl Parkway. The major storm street capacity analysis is located in Appendix E. See Appendix F for an analysis of the existing storm sewer system in Leon A. Wurl Parkway during the 100-year storm event.

EROSION CONTROL

Temporary erosion control will be provided during construction and grading of the project. This includes silt fencing, inlet protection, the seeding and mulching of disturbed areas.

Runoff Coefficients 24-May-06
Erie Commons Filing No. 4, Blocks 6-8
Job Number 2020-45

Land Use Characteristics	C_2	C_5		C_{100}
Single-Family	0.40	0.45		0.60
Lawns, Clay Soil	0.15	0.25		0.50
Streets, Paved	0.87	0.88		0.93
Multi-Unit (Attached)	0.60	0.65		0.80

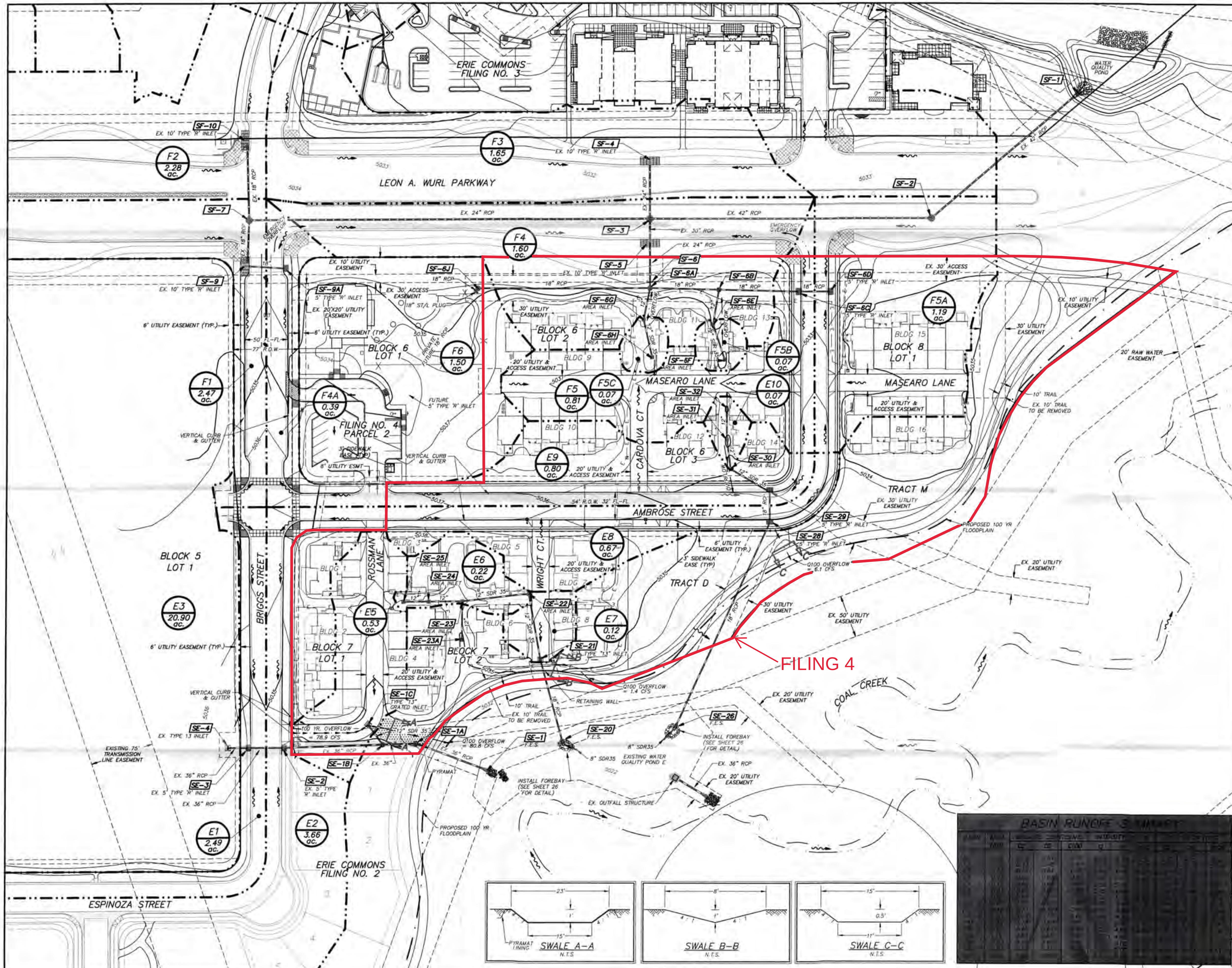
Basin	Area (acres)	SFR (acres)	Lawns (acres)	Streets (acres)	Commercial (acres)	Multi-Unit Attached (acres)	Runoff Coefficients		
							C_2	C_5	C_{100}
E1	2.49	1.49	0.19	0.81	0.00	0.00	**0.53**	**0.57**	**0.70**
E2	3.66	3.13	0.00	0.00	0.00	0.53	**0.43**	**0.48**	**0.63**
E3	20.90	0.00	0.78	0.00	20.12	0.00	**0.84**	**0.86**	**0.88**
E5	0.53	0.03	0.00	0.00	0.00	0.50	**0.59**	**0.64**	**0.79**
E6	0.22	0.00	0.00	0.00	0.00	0.22	**0.60**	**0.65**	**0.80**
E7	0.12	0.00	0.00	0.00	0.00	0.12	**0.60**	**0.65**	**0.80**
E8	0.67	0.00	0.00	0.00	0.00	0.67	**0.60**	**0.65**	**0.80**
E9	0.80	0.00	0.00	0.00	0.00	0.80	**0.60**	**0.65**	**0.80**
E10	0.07	0.00	0.00	0.00	0.00	0.07	**0.60**	**0.65**	**0.80**
F1	2.47	0.00	0.50	1.97	0.00	0.00	**0.73**	**0.75**	**0.84**
F4	1.60	0.00	0.21	0.68	0.00	0.71	**0.66**	**0.70**	**0.82**
F4A	0.39	0.00	0.06	0.33	0.00	0.00	**0.76**	**0.78**	**0.86**
F5	0.81	0.00	0.00	0.00	0.00	0.81	**0.60**	**0.65**	**0.80**
F5A	1.19	0.00	0.00	0.00	0.00	1.19	**0.60**	**0.65**	**0.80**
F5B	0.07	0.00	0.00	0.00	0.00	0.07	**0.60**	**0.65**	**0.80**
F5C	0.07	0.00	0.00	0.00	0.00	0.07	**0.60**	**0.65**	**0.80**
F6	1.50	0.00	0.00	0.00	1.30	0.20	**0.83**	**0.85**	**0.88**

TABLE 800-3
RUNOFF COEFFICIENTS (C) FOR RATIONAL METHOD

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY 2	5	10	100
Business					
Commercial Areas	95	.87	.87	.88	.89
Neighborhood Areas	70	.60	.65	.70	.80
Residential					
Single-Family	*	.40	.45	.50	.60
Multi-Unit (detached)	50	.45	.50	.60	.70
Multi-Unit (attached)	70	.60	.65	.70	.80
1/2 Acre Lot or Larger	*	.30	.35	.40	.60
Apartments	70	.65	.70	.70	.80
Industrial					
Light Areas	80	.71	.72	.76	.82
Heavy Areas	90	.80	.80	.85	.90
Parks, Cemeteries	7	.10	.18	.25	.45
Playgrounds	13	.15	.20	.30	.50
Schools	50	.45	.50	.60	.70
Railroad Yard Areas	20	.20	.25	.35	.45
Undeveloped Areas					
Historic Flow Analysis	2	(See "Lawns")			
Greenbelts, Agricultural					
Offsite Flow Analysis					
(when land use not defined)	45	.43	.47	.55	.65
Streets					
Paved	100	.87	.88	.90	.93
Gravel	40	.40	.45	.50	.60
Drives and Walks	96	.87	.87	.88	.89
Roofs	90	.80	.85	.90	.90
Lawns, Sandy Soil	0	.00	.01	.05	.20
Lawns, Clay Soil	0	.05	.15	.25	.50

Note: These Rational Formula coefficients may not be valid for large basins.

* Refer to Urban Storm Drainage Criteria Manual for percent impervious values.



BENCHMARK:
NGS STATION 'JR 53'
USGS 3.5" BRASS CAP SET IN CONCRETE MONUMENT LOCATED AT NORTHEAST CORNER OF WCR 8 & 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
- S-28 Structure Number
- C12 2.83 ac. 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

SCALE HOR. 1"=50' VERT. N/A
DESIGN/APPR. JJ
DRAWN BY CT
DATE 10/20/06
HURST & ASSOCIATES, INC.
CONSULTING ENGINEERS
FILE G:\202045\CONST F-4\PARCEL2\045-F4-MD SHEET 5 OF 2

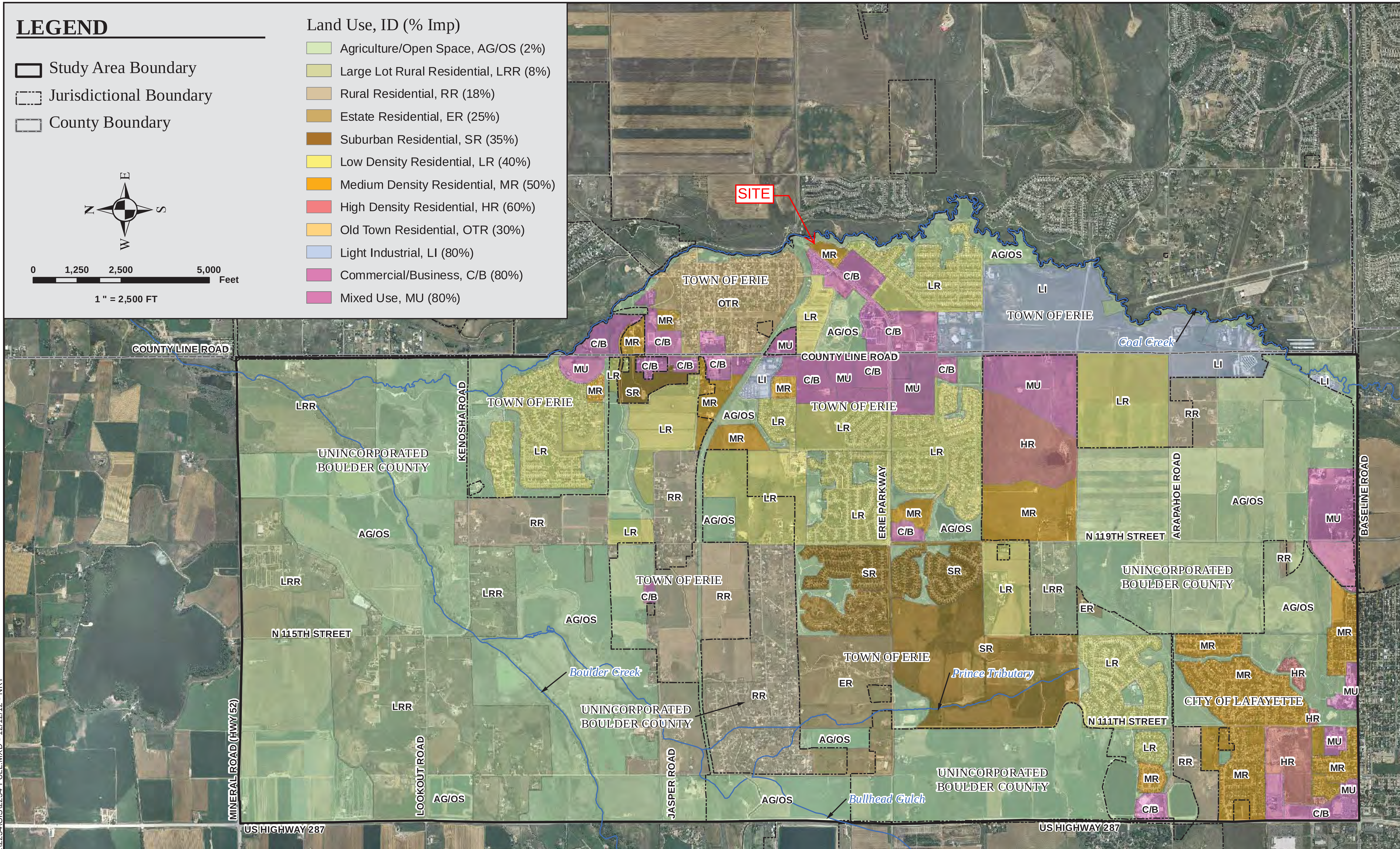
TOWN OF ERIE

OUTFALL SYSTEMS PLAN (WEST OF COAL CREEK)

JANUARY 2014

PREPARED FOR: URBAN DRAINAGE & FLOOD CONTROL DISTRICT
TOWN OF ERIE
BOULDER COUNTY
CITY OF LAFAYETTE

PREPARED BY: RESPEC CONSULTING AND SERVICES
720 SOUTH COLORADO BLVD, SUITE 410S
DENVER, CO 80246



M:\2234\GIS\2234 FULL.MXD - 12/12/12 - NRT

WRC ENGINEERING, INC.

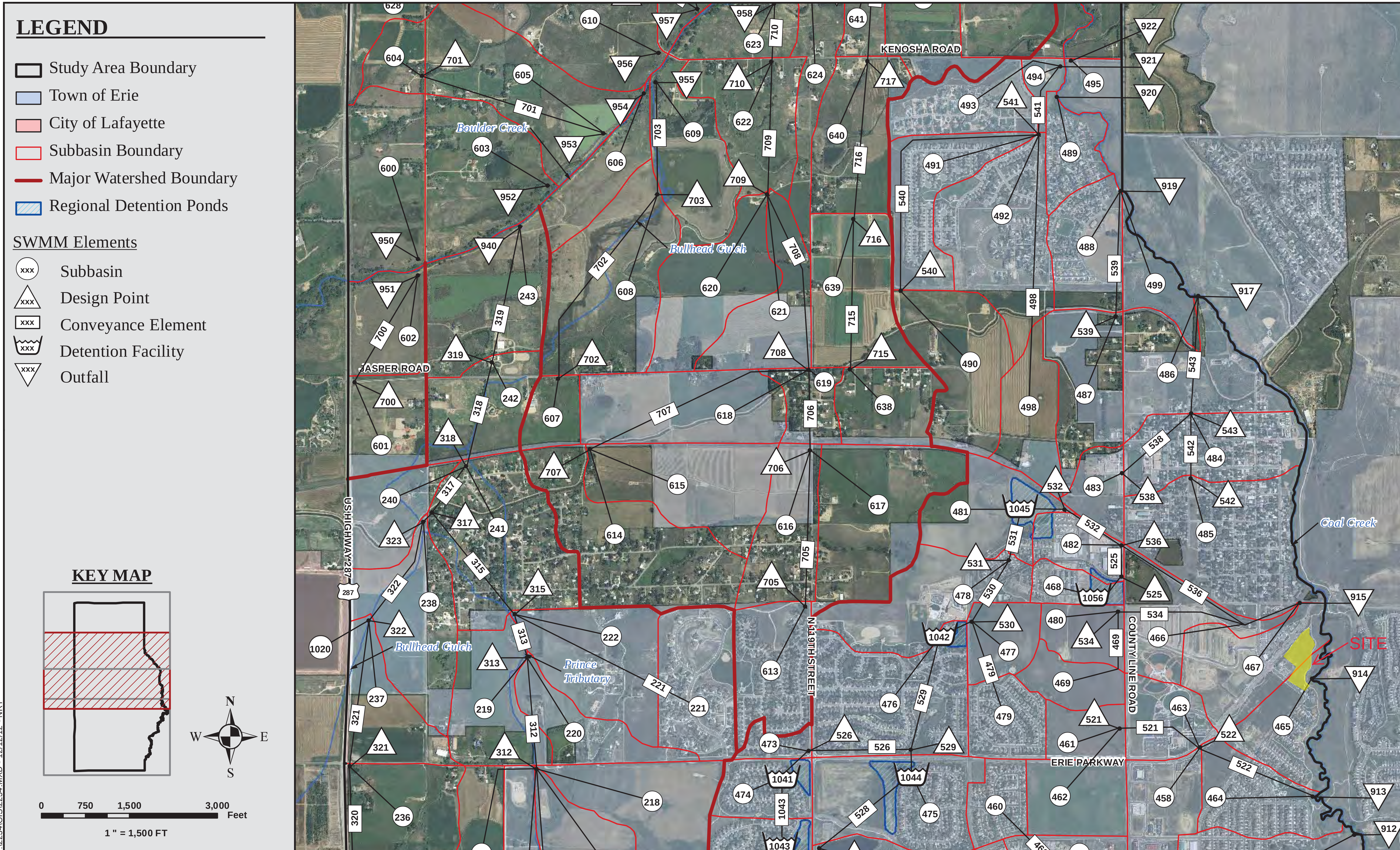
WRC ENGINEERING, INC.
950 SOUTH CHERRY STREET, SUITE 404
DENVER, COLORADO 80246
PHONE: 303-757-8513
FAX: 303-758-3208

TOWN OF ERIE
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

TOWN OF ERIE OUTFALL SYSTEMS PLAN
(WEST OF COAL CREEK)

FUTURE LAND USE/
IMPERVIOUSNESS MAP

FIGURE
B-15



WRC ENGINEERING, INC.	TOWN OF ERIE / URBAN DRAINAGE AND FLOOD CONTROL DISTRICT	TOWN OF ERIE OUTFALL SYSTEMS PLAN (WEST OF COAL CREEK)	SWMM ROUTING MAP	FIGURE B-7

WRC ENGINEERING, INC.
950 SOUTH CHERRY STREET, SUITE 404
DENVER, COLORADO 80246
PHONE: 303-757-8513
FAX: 303-758-3208

Subbasin	Area (mi^2)	Distance to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness		Depression Storage		Horton's Infiltration Parameters		
					Existing Land Use	Future Land Use	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/sec)	Final Rate (in/hr)
424	0.100	0.259	0.608	0.024	2.0	3.7	0.38	0.10	4.50	0.0018	0.60
425	0.199	0.541	1.000	0.015	2.7	2.7	0.38	0.10	4.34	0.0018	0.59
426	0.120	0.539	0.911	0.013	49.0	49.0	0.38	0.10	4.14	0.0018	0.58
427	0.071	0.359	0.756	0.008	24.1	24.1	0.38	0.10	4.19	0.0018	0.58
428	0.008	0.056	0.136	0.021	31.0	31.0	0.38	0.10	4.44	0.0018	0.60
429	0.048	0.236	0.368	0.017	58.5	58.5	0.38	0.10	4.45	0.0018	0.60
430	0.173	0.378	0.724	0.024	10.8	10.8	0.38	0.10	4.50	0.0018	0.60
431	0.166	0.361	0.728	0.017	2.0	2.1	0.38	0.10	4.50	0.0018	0.60
432	0.105	0.198	0.511	0.013	11.4	32.2	0.38	0.10	4.50	0.0018	0.60
433	0.029	0.130	0.271	0.026	16.1	74.2	0.38	0.10	4.50	0.0018	0.60
435	0.088	0.236	0.545	0.021	2.2	2.2	0.38	0.10	4.50	0.0018	0.60
436	0.199	0.632	1.068	0.016	2.0	11.1	0.38	0.10	4.50	0.0018	0.60
437	0.043	0.097	0.253	0.029	2.0	66.2	0.38	0.10	4.50	0.0018	0.60
440	0.162	0.187	0.353	0.014	2.7	2.7	0.38	0.10	4.50	0.0018	0.60
441	0.065	0.229	0.520	0.014	2.0	2.0	0.38	0.10	4.50	0.0018	0.60
442	0.154	0.446	0.837	0.021	2.0	4.2	0.38	0.10	4.50	0.0018	0.60
443	0.033	0.347	0.634	0.027	2.0	2.8	0.38	0.10	4.50	0.0018	0.60
444	0.095	0.265	0.651	0.019	2.0	36.9	0.38	0.10	4.50	0.0018	0.60
445	0.022	0.096	0.241	0.030	2.0	77.7	0.38	0.10	4.50	0.0018	0.60
446	0.186	0.372	0.852	0.022	2.0	30.7	0.38	0.10	4.50	0.0018	0.60
447	0.026	0.134	0.283	0.025	2.0	74.9	0.38	0.10	4.50	0.0018	0.60
448	0.102	0.177	0.400	0.023	2.0	64.6	0.38	0.10	4.36	0.0018	0.59
449	0.137	0.436	0.673	0.011	19.9	71.5	0.38	0.10	4.49	0.0018	0.60
450	0.066	0.243	0.521	0.026	2.0	37.3	0.38	0.10	4.50	0.0018	0.60
451	0.178	0.237	0.545	0.033	2.0	71.7	0.38	0.10	4.50	0.0018	0.60
452	0.102	0.386	0.649	0.016	2.0	79.7	0.38	0.10	4.05	0.0018	0.57
453	0.073	0.282	0.592	0.015	2.1	38.8	0.38	0.10	4.49	0.0018	0.60
454	0.194	0.288	0.538	0.026	2.5	52.1	0.38	0.10	4.50	0.0018	0.60
455	0.101	0.393	0.734	0.020	39.6	39.6	0.38	0.10	4.50	0.0018	0.60
456	0.122	0.366	0.742	0.022	2.3	65.3	0.38	0.10	4.50	0.0018	0.60
457	0.082	0.170	0.465	0.019	33.4	34.4	0.38	0.10	4.50	0.0018	0.60
458	0.084	0.267	0.570	0.009	78.2	79.4	0.38	0.10	4.50	0.0018	0.60
459	0.134	0.294	0.623	0.013	30.1	30.1	0.38	0.10	4.25	0.0018	0.58
460	0.046	0.121	0.276	0.012	39.9	40.2	0.38	0.10	4.50	0.0018	0.60
461	0.044	0.159	0.294	0.028	2.4	79.5	0.38	0.10	4.50	0.0018	0.60
462	0.079	0.204	0.404	0.023	2.8	79.1	0.38	0.10	4.50	0.0018	0.60
463	0.064	0.175	0.355	0.010	45.3	50.1	0.38	0.10	4.50	0.0018	0.60
464	0.093	0.249	0.499	0.013	24.4	31.9	0.38	0.10	4.07	0.0018	0.57
465	0.080	0.166	0.388	0.018	16.2	42.2	0.38	0.10	4.50	0.0018	0.60
466	0.095	0.460	0.711	0.012	2.3	32.7	0.38	0.10	4.42	0.0018	0.59
467	0.107	0.320	0.627	0.012	10.9	45.6	0.38	0.10	4.17	0.0018	0.58

STORMWATER MANAGEMENT PLAN (SWMP)

ERIE COMMONS FILING NO. 4

APRIL 2018

For:
CENTURY COMMUNITIES
8390 East Crescent Parkway, Suite 650
Greenwood Village, CO 80111

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C. CDPHE FORMS

D. FIELD NOTES, CONTACTS, ETC.

STORMWATER MANAGEMENT PLAN CHECKLIST

Permit Part I.C.1...	SWMP Site Description Required Element	Location
a.	The nature of the construction activity at the site.	Part 2.0.b
b.	The proposed sequence for major activities.	Part 2.0.b
c.	Estimates of the total area of the site, and the area and location expected to be disturbed by clearing, excavation, grading, or other construction activities.	Part 2.0.b
d.	A summary of any existing data used in the development of the site construction plans or SWMP that describe the soil or existing potential for soil erosion.	Part 2.0.b
e.	A description of the existing vegetation at the site and an estimate of the percent vegetative ground cover.	Part 2.0.b
f.	The location and description of all potential pollution sources, including ground surface disturbing activities, vehicle fueling, storage of fertilizers or chemicals, etc.	Part 2.0.b
g.	The location and description of any anticipated allowable sources of non-stormwater discharge at the site, e.g., uncontaminated springs, landscape irrigation return flow, construction dewatering, and concrete washout.	Part 2.0.b
h.	The name of the receiving water(s) and the size, type and location of any outfall(s). If the stormwater discharge is to a municipal separate storm sewer system, the name of that system, the location of the storm sewer discharge, and the ultimate receiving water(s).	Part 2.0.b
Permit Part I.C.2…	**Site map, to include locations of the following:**	**Location**
a.	construction site boundaries;	Sheets GE1-GE4 / BMP1-BMP4
b.	all areas of ground surface disturbance;	
c.	areas of cut and fill;	
d.	areas used for storage of building materials, equipment, soil, or waste;	
e.	locations of dedicated asphalt or concrete batch plants;	N/A
f.	locations of all structural BMPs;	Sheets GE1-GE4 / BMP1-BMP4
g.	locations of non-structural BMPs as applicable; and	
h.	locations of springs, streams, wetlands and other surface waters.	N/A
Permit Part I.C.3…	**The following sources and activities have been evaluated for the potential to contribute pollutants to stormwater discharges:**	**Potential Pollutant**
1.	Disturbed and stored soils;	Yes
2.	vehicle tracking of sediments;	Yes
3.	management of contaminated soils;	N/A
4.	loading and unloading operations;	Yes
5.	outdoor storage activities (building materials, fertilizers, chemicals, etc.);	Yes
6.	vehicle and equipment maintenance and fueling;	Yes
7.	significant dust or particulate generating processes;	Yes
8.	routine maintenance activities involving fertilizers, pesticides, detergents, fuels, solvents, oils, etc.	Yes
9.	on-site waste management practices (waste piles, liquid wastes, dumpsters, etc.)	Yes
10.	concrete truck/equipment washing, including the concrete truck chute and associated fixtures and equipment;	Yes
11.	dedicated asphalt and concrete batch plants;	N/A
12.	non-industrial waste sources such as worker trash and portable toilets; and	Yes
13.	other areas or procedures where potential spills can occur.	N/A

1.0 PURPOSE OF STORMWATER MANAGEMENT PLAN

The purpose of this Stormwater Management Plan (SWMP) is to identify possible pollutant sources that may contribute pollutants to stormwater, and identify Best Management Practices (BMPs) that, when implemented, will reduce or eliminate any possible water quality impacts. The SWMP must be completed and implemented at the time the project breaks ground and shall be located on site.

The plan has been prepared to meet the common requirements of the CDPS General Permit, Stormwater Discharges Associated With Construction Activity, Permit No, COR-030000. The plan incorporates elements that can be found in construction plans and specifications, as well as the following documents:

Urban Drainage & Flood Control District

Urban Storm Drainage Criteria Manual – Volume 3 Best Management Practices

Revised November 2010

2.0 NARRATIVE SITE DESCRIPTION

a. Site Location

The Erie Commons Filing No. 4 property is located as follows:

- Within 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.
- East of Briggs Street.
- South of Erie Parkway.
- East of Coal Creek.
- North of Erie Commons Filing No. 1.
- Surrounding developments include Erie Commons Filing No. 1 and Erie Commons Filing No. 4, Lot 1.
- At an approximate latitude of 40°02’28” and longitude of 105°02’41”.

b. Site Description

- This SWMP covers Erie Commons Filing No. 4 construction activities including:
  - Preliminary grading of the multi-family residential development.
  - Utility placement within the roads where needed.
  - Erosion control and landscaping.
- The proposed sequence for major activities will be:

- Placement of erosion control measures.
- Clearing and grubbing.
- Rough roadway grading, single family grading.
- Utility excavation, utility placement.
- Street and single family fine grading, street construction, and seeding and mulching around unpaved areas.
- Additional erosion control measures may be added at any time during the construction process if the measures in place are not sufficient. Please refer to the contractor's schedule on site for final detailed schedule of all construction activities.

- Erie Commons Filing No. 4 consists of approximately 7 acres, historically used for agricultural purposes.
- 7 acres of the site will be disturbed with construction.
- According to the *Natural Resources Conservation Service Web Soil Survey* for the Weld County area, Colorado, the site is dominantly Hydrologic Soil Group B as Ascalon Sandy Loam.
- The existing ground cover is native grasses with agricultural soils.
- Potential pollution will come from the land disturbance caused with the construction activities.
- The proposed site is located within the limits of the Town of Erie Outfall Systems Plan (West of Coal Creek) (OSP).

3.0 SWMP ADMINISTRATOR

The SWMP Administrator can be an individual(s), position or title responsible for developing, implementing, maintaining, and revising the SWMP. The SWMP Administrator is the contact for all SWMP-related issues and is the person responsible for its accuracy, completeness, and implementation. Therefore, the SWMP Administrator should be a person with authority to adequately manage and direct day-to-day stormwater quality management activities at the site. The SWMP Administrator for this site shall be recorded in Appendix B.

4.0 STORMWATER MANAGEMENT CONTROLS

a. Identification of Potential Pollutant Sources

The following sources and activities have been identified as having potential to contribute pollutants to stormwater discharges:

- Disturbed and stored soils;
- Vehicle tracking of sediments;
- Management of contaminated soils;

- Loading and unloading operations;
- Outdoor storage activities (building materials, fertilizers, chemicals, etc.);
- Vehicle and equipment maintenance and fuelling;
- Significant dust or particulate generating processes;
- Routine maintenance activities involving fertilizers, pesticides, detergents, fuels, solvents, oils, etc.;
- On-site waste management practices (waste piles, liquid wastes, dumpsters, etc.);
- Concrete truck/equipment washing, including the concrete truck chute and associated fixtures and equipment;
- Dedicated asphalt and concrete batch plants;
- Non-industrial waste sources such as worker trash and portable toilets;
- Other areas or procedures where potential spills can occur.

b. BMPs for Stormwater Pollution Prevention

1) Structural Practices for Erosion and Sediment Control

- A Stabilized Staging Area (SSA) consists of stripping topsoil and spreading a layer of granular material in the area to be used for a trailer, parking, storage, unloading and loading. A stabilized staging area reduces the likelihood that the vehicles most frequently entering a site are going to come in contact with mud.
- Silt Fence (SF) is a temporary sediment barrier constructed of woven fabric stretched across supporting posts. The bottom edge of the fabric is placed in an anchor trench that is backfilled with compacted soil.
- Inlet Protection (IP) consists of a reinforced rock berm placed in front of (but not blocking) a curb-opening inlet or around an area inlet to reduce sediment in runoff approaching the inlet.
- Culvert Inlet Protection (CIP) consists of a reinforced rock berm placed in front of (but not blocking) a culvert opening to reduce sediment in runoff approaching the inlet.
- Outlet Protection (OP) consists of riprap pad placed in front of (but not blocking) a culvert outlet to reduce sediment in runoff and erosion from pipe or culvert outlet.
- A Sediment Control Log (SCL) consists of a cylindrical bundle of wood, coconut, compost, excelsior, or straw fiber designed to form a semi-porous filter, able to withstand overtopping. The log can be staked into the ground and promotes sediment deposition on its upstream side.
- Construction Fence (CF) consists of orange plastic or other accepted material to delineate limits of construction and control the access to the site.

- A Diversion Ditch (DD) is a small earth channel used to divert and convey runoff.
- Reinforced Check Dam (RCD) is a small reinforced rock dam, designed to withstand overtopping, that is placed in a stream or drainageway. The purpose of the check dam is to trap water-borne sediment in the backwater zone upstream if the check.
- Rough Cut Street Control (RCS) are rock or earthen berms placed along dirt roadways that are under construction or used for construction access. These temporary berms intercept sheet flow and divert runoff from the roadway, and control erosion by minimizing concentration of flow and reducing runoff velocity.
- A Sediment Basin (SB) is an impoundment that captures sediment-laden runoff and releases it slowly, providing prolonged settling times to capture coarse and fine-grained soil particles.
- Details for the construction of these BMPs are included in the construction documents for the site.

2) Non-Structural Practices for Erosion and Sediment Control

- Surface Roughening (SR) consists of creating a series of grooves or furrows on the contour in disturbed, graded areas to trap rainfall and reduce the formation of rill and gully erosion. It will be required on all slopes greater than 4:1.
- Temporary Seeding and Mulching (TS) consists of drill seeding disturbed areas with grasses and crimping in straw mulch to provide immediate protection against raindrop and wind erosion and, as the grass cover becomes established, to provide long-term stabilization of exposed soils. It will be required in all areas not to be paved after completion of the finished grade.
- Enhanced Native Turf is required in the pond, swales and other select areas after completion of the finished grade. See Temporary Seeding Plan for details.
- All tributary bare areas will be seeded and stabilized prior to the removal of sediment control.
- Scraping and Sweeping (SS) of roadways will occur to remove mud tracking as needed.
- Water trucks will be used for Dust Control on disturbed areas not yet ready to be seeded, landscaped, or paved to preclude visible dust emissions.

3) Phased BMP Implementation

- Construction for Erie Commons Filing No. 4 will occur in three major stages. Stage 1 consists of over-lot grading. Stage 2 consists of the construction of streets, curb and gutter and utility improvements. Stage 3 consists of stabilization in preparation of construction of the single homes and final landscaping.
- Stage 1 of development consists of over-lot grading and construction of temporary sediment basins. The location of each erosion control measure is outlined on the

Grading and Erosion Control Sheets GE1-GE2 for Erie Commons Filing No. 4. These sheets are located in Appendix A and will be updated as necessary. Erosion control measures provided on that sheet for the site are summarized below.

  - Installation of Silt Fence
  - Construction of Temporary Sediment Basin
  - Construction of a Stabilized Staging Area
  - Installation of Vehicle Tracking Control
  - Installation of Concrete Washout Area
  - Construction Fence
  - Surface Roughen exposed soil areas that will be exposed for a period greater than 30 days prior to building construction.
  - All soil stockpiles shall be protected from sediment transport by surface roughening, watering and perimeter silt fencing. Any soil stockpile remaining after 30 days shall be seeded and mulched.
  - All BMPs shall be properly maintained.

- During Stage 2 of construction, the site infrastructure (roads and utilities) will be built and installed. Storm drains will be placed under pavement prior to the road construction and inlet protection will be required. The location of each erosion control measure is outlined on the Grading and Erosion Control Sheets GE1 for Erie Commons Filing No. 4. That sheet is located in Appendix A and will be updated as necessary. Erosion control measures provided in those sheets for the site are summarized below.
  - Seed and Mulch open areas.
  - Install and maintain Inlet/Oulet Protection
  - Maintain all BMPs constructed with Stage 1 that are to remain
  - Remove Vehicle Tracking Control after paving of all interior roads is complete
- Stage 3 consists of stabilization in preparation of the construction of the single-family homes. The location of each erosion control measure is outlined on the BMP Map for Erie Commons Filing No. 4. The sheet is located in Appendix A and will be updated as construction progresses. The master developer is responsible for all common areas including Tracts. Erosion control measures provided in those sheets for the site are summarized below.
  - Install and maintain Silt Fence at the perimeter of the lots as shown
  - Maintain streets by scraping and sweeping to remove mud tracking as needed
  - Permanent landscaping in all common areas

  - Remove sediment basin, and exterior silt fence and construction fence when 70% stabilization is complete.

4) Materials Handling and Spill Prevention

- All chemical substances on site shall be identified.
- All of the chemical substances used in the workplace shall be listed, and the Material Safety Data Sheet (MSDS) obtained for each. The MSDSs will be readily available for use; i.e., posted at the locations where the materials are stored and handled.
- All containers shall be labelled to show the name and type of substance, stock number, expiration date, health hazards including reactivity, corrosivity, ignitability and toxicity, suggestions for handling, and first aid information. (This information can usually be found on the MSDS. Unlabelled chemicals and chemicals with deteriorated labels are often disposed of unnecessarily or improperly).
- In the event of a chemical spill from service trucks, Chemtrek shall be contacted at 1-800-424-9300. The local emergency center shall be contacted through a 911 call.
- Bulk storage structures for petroleum products and other chemicals shall have adequate protection so as to contain all spills and prevent any spilled material from the storm sewer system.

5) Dedicated Concrete or Asphalt Batch Plants

- There are no dedicated concrete or asphalt batch plants associated with this project.

6) Vehicle Tracking Control

- Off-site vehicle tracking of sediments shall be minimized.
- Vehicle Tracking Control (VTC) consists of a pad of 3” to 6” angular rock at all entrance/exit points for a site that is intended to help strip mud from tires prior to vehicles leaving the construction site.
- Vehicle Tracking Control will be placed at the job site entrance with a Concrete Washout Area and Stabilized Staging Area.

7) Waste Management and Disposal, Including Concrete Washout

- All trash receptacles and dumpsters will have covers preventing precipitation from entering.
- Regular trash pick-up is to occur when receptacles are near full capacity.
- Portable toilets will be cleaned regularly and securely pinned down to the ground.
- All wastes composed of building materials must be removed from the site for disposal in licensed disposal facilities. No building material wastes or unused building materials shall be buried, dumped, or discharged at the site.

- A Concrete Washout Area (CWA) is a shallow excavation with a small perimeter berm to isolate concrete washout operations. Concrete wash water shall not be discharged into the storm sewer system. Unused concrete shall be discharged in a designated Concrete Washout Area.

8) Groundwater and Stormwater Dewatering

- Dewatering of groundwater and/or stormwater is not anticipated for the Erie Commons Filing No. 4 site at this time.

c. Revising BMPs and the SWMP

- The pollutant sources and management practices at the site must be reviewed on an ongoing basis see part 6.0 Inspection and Maintenance Procedures.
- When BMPs or other site conditions change, the SWMP must be modified to accurately reflect the actual field conditions.
- SWMP revisions must be made immediately after changes are made in the field to address BMP installation and/or implementation issues; or
- SWMP revisions must be made as soon as practicable, but in no case more than 72 hours, after change(s) in BMP installation and/or implementation occur at the site that requires development of materials to modify the SWMP.

5.0 FINAL STABALIZATION AND LONGTERM STORMWATER MANAGEMENT

- Final stabilization will be achieved by seeding all areas not paved, sodded, or covered by other erosion resistant material. See Erie Commons Filing No. 4 GESC Plans for approved seed mixtures.
- Final stabilization is reached when all ground surface disturbing activities at the site have been completed, and uniform vegetative cover has been established with an individual plant density of at least 70 percent of pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed.
- Sediment that collects within the site's drainage system and permanent water quality or quantity controls is also considered unstabilized soil, and must be removed prior to the site being considered finally stabilized.
- Permanent long-term (post-construction) stormwater management controls for the site include the regional detention pond which will provide detention and water quality for Erie Commons Filing No. 4.

6.0 INSPECTION AND MAINTENANCE PROCEDURES

a. Inspection Schedule

- All vegetation, erosion control measures, and other protective measures identified in this SWMP will be inspected at least every 14 days and within 24 hours after any precipitation or snowmelt event causing surface runoff or erosion.

b. Inspection Procedures

Inspection must include observation of:

- The construction site perimeter and discharge points (including discharges into a storm sewer system);
- All disturbed areas;
- Areas used for material/waste storage that are exposed to precipitation;
- Other areas determined to have a significant potential for stormwater pollution, such as demolition areas or concrete washout locations, or locations where vehicles enter or leave the site;
- Erosion and sediment control measures identified in the SWMP; and
- Any other structural BMPs that may require maintenance, such as secondary containment around fuel tanks, or the condition of spill response kits.
- The inspection must determine if there is evidence of, or the potential for, pollutants entering the drainage system. BMPs should be reviewed to determine if they still meet the design and operational criteria in the SWMP, and if they continue to adequately control pollutants at the site. Any BMPs not operating in accordance with the SWMP must be addressed as soon as possible, immediately in most cases, to minimize the discharge of pollutants, and the SWMP must be updated as described in Section 4.0 c. above. Inspections must be documented as discussed in the Record Keeping section, below.

c. BMP Maintenance/Replacement and Failed BMPs

- All erosion and sediment control practices and other protective measures identified in the SWMP shall be maintained in effective operating condition and in accordance with good engineering, hydrologic and pollution control practices.
- Sediment that has been collected by sediment controls, such as silt fence and inlet protection, should be removed on a regular basis, to prevent failure of BMPs. Removed sediment must be moved to an appropriate location where it will not become an additional pollutant source, and should never be placed in ditches or streams.
- Maintenance activities to correct problems noted during inspections must be documented as discussed in the Record Keeping section, below.

- BMPs that have been identified through inspection to have failed or the potential to fail without maintenance or modifications must be addressed as soon as possible, immediately in most cases, to prevent the discharge of pollutants.

d. Record Keeping and Document Inspection

- Keeping records of spills, leaks, inspections, etc. is a requirement of the Stormwater Construction Permit. Therefore enforcement action, including fines, could result if records are not adequate. Keeping accurate and detailed records also provides documentation of events which could prove invaluable should complications arise concerning the permit, lawsuits, etc.
- The permittee must document inspection results and maintain a record of the results for a period of 3 years following expiration or inactivation of permit coverage. These records must be made available to the Division or EPA upon request.
- A sample inspection report has been included in Appendix B. The following items must be documented as part of the site inspections:
    - The inspection date;
    - Name(s) and title(s) of personnel making the inspection;
    - Location(s) of discharges of sediment or other pollutants from the site;
    - Location(s) of BMPs that need to be maintained;
    - Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
    - Location(s) where additional BMPs are needed that were not in place at the time of inspection;
    - Deviations from the minimum inspection schedule as provided above;
    - Description of corrective action for items above, dates corrective action(s) taken, and measures taken to prevent future violations, including requisite changes to the SWMP, as necessary; and
    - After adequate corrective action(s) has been taken, or where a report does not identify any incidents requiring corrective action, the report shall contain a signed statement indicating the site is in compliance with the permit to the best of the signer's knowledge and belief.
- In addition to inspection records, a log book may be kept for use in tracking other items related to the SWMP such as those listed below. Additional information such as dated photographs, field notebooks, drawings and maps, and the items below, etc. can also be included where appropriate.
    - BMP operation and maintenance

- Contacts with suppliers, regulatory agencies and personnel
- Implementation of specific items in this SWMP
- Training events (given or attended)
- Events involving materials handling and storage
- Preventive maintenance activities

- Records of spills, leaks, or overflows that result in the discharge of pollutants must be documented and maintained. Other spills that are responded to, even if they do not result in a discharge of pollutants may be recorded. Information that should be recorded for all occurrences includes the time and date, weather conditions, reasons for the spill, etc.
- A release of any chemical, oil, petroleum product, sewage, etc., which may enter waters of the State of Colorado (which include surface water, ground water and dry gullies or storm sewers leading to surface water) must be reported. More guidance is available on the web at www.cdphe.state.co.us/hm/spillsandreleases.htm. The Division's toll-free 24-hour number for environmental hazards and chemical spills and releases is 1-877-518-5608.

7.0 REFERENCES

1. *CDPS General Permit No. COR-03-0000, Stormwater Discharges Associated with Construction Activity, Authorization to Discharge Under the Colorado Discharge Permit System*, Administratively continued effective July 1, 2012.

2. Colorado Department of Public Health and Environment

   Water Quality Control Division – Stormwater Program

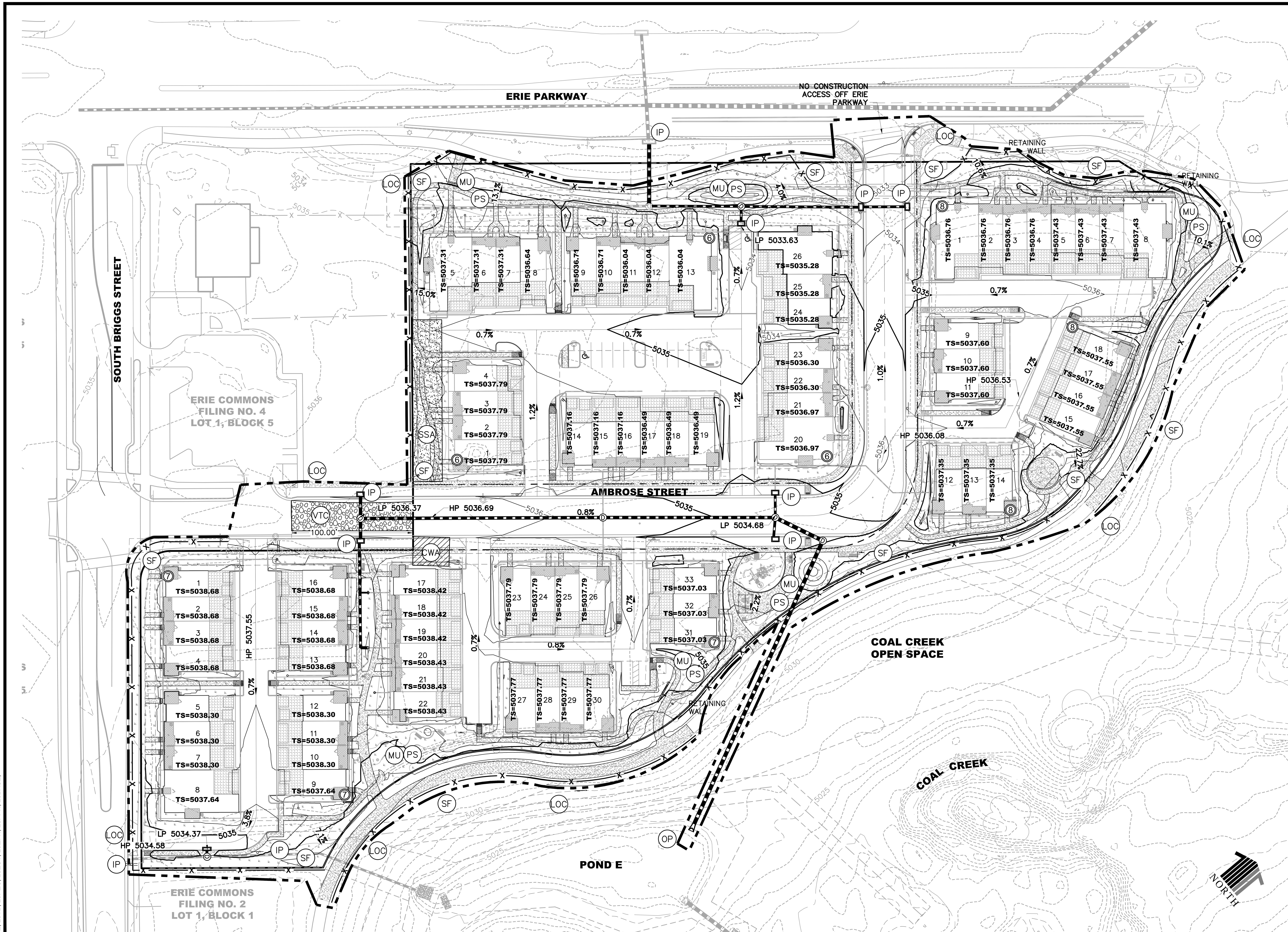
   General Permit Application and Stormwater Management Plan Preparation Guidance

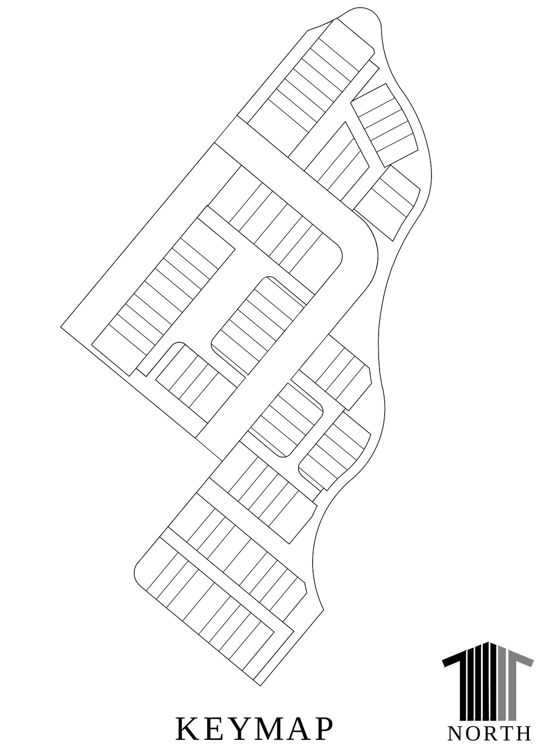
   Revised April 2011

3. *Urban Storm Drainage Criteria Manual – Volume 3 Best Management Practices*, Urban Drainage & Flood Control District, Revised November 2010

APPENDIX A

MAPS AND PLANS





CONSTRUCTION NOTES:

1. SEE EROSION CONTROL DETAILS ON DT SHEETS.
3. THE CONTRACTOR SHALL PROTECT NATURAL VEGETATION PER TOWN OF ERIE STANDARDS AND SPECIFICATIONS.

LEGNED:

VTC	TRACKING CONTROL PAD
CWA	CONCRETE WASHOUT AREA PER DETAIL ON DT SHEETS.
SSA	STABILIZED STAGING AREA PER DETAIL ON DT SHEETS.
IP CIP OP	INLET, CULVERT INLET, AND OUTLET PROTECTION
CM	CONSTRUCTION MARKERS
SF	SILT FENCE EROSION BARRIER
RCS	ROUGH CUT STREET CONTROL
MU	MULCHING
PS	PERMANENT SEEDING (PER TOWN REQUIREMENTS)
LOC	LIMITS OF CONSTRUCTION

PROPOSED CONTOURS 4925
EXISTING CONTOURS 4925
PROPOSED STORM DRAIN MANHOLE D
PROPOSED STORM DRAIN PIPE
PROPOSED STORM DRAIN INLET
PROPOSED STORM END SECTION
FLOW ARROW

12 A1 LOT NUMBER / LOT TYPE

A	"A" TYPE LOT	W	"W" TYPE LOT
T	TRANSITIONAL LOT	G	GARDEN LEVEL LOT
B	"B" TYPE LOT	HP=	HIGH POINT
		LP=	LOW POINT

811
UNCC
CALL BEFORE YOU DIG
811
OR
1-800-922-1987
Utility Notification Center of Colorado

PATH: P:\CENTURY EC\CADD\CIVIL\21 CD\21GE1.DWG
PLOTTED BY: PEARSON, ERIC PLOT DATE: 4/1/2018 9:27 PM
XREFS: 20ANNO, 21KMGE, 20TB, 20PEC, 10EUT, 10EPN, 20PPN, 20BASE,

DATE	REVISION DESCRIPTION

Drawing Name: 21GE1.dwg
Job Number: CENTURY EC
Prepared For: CENTURY

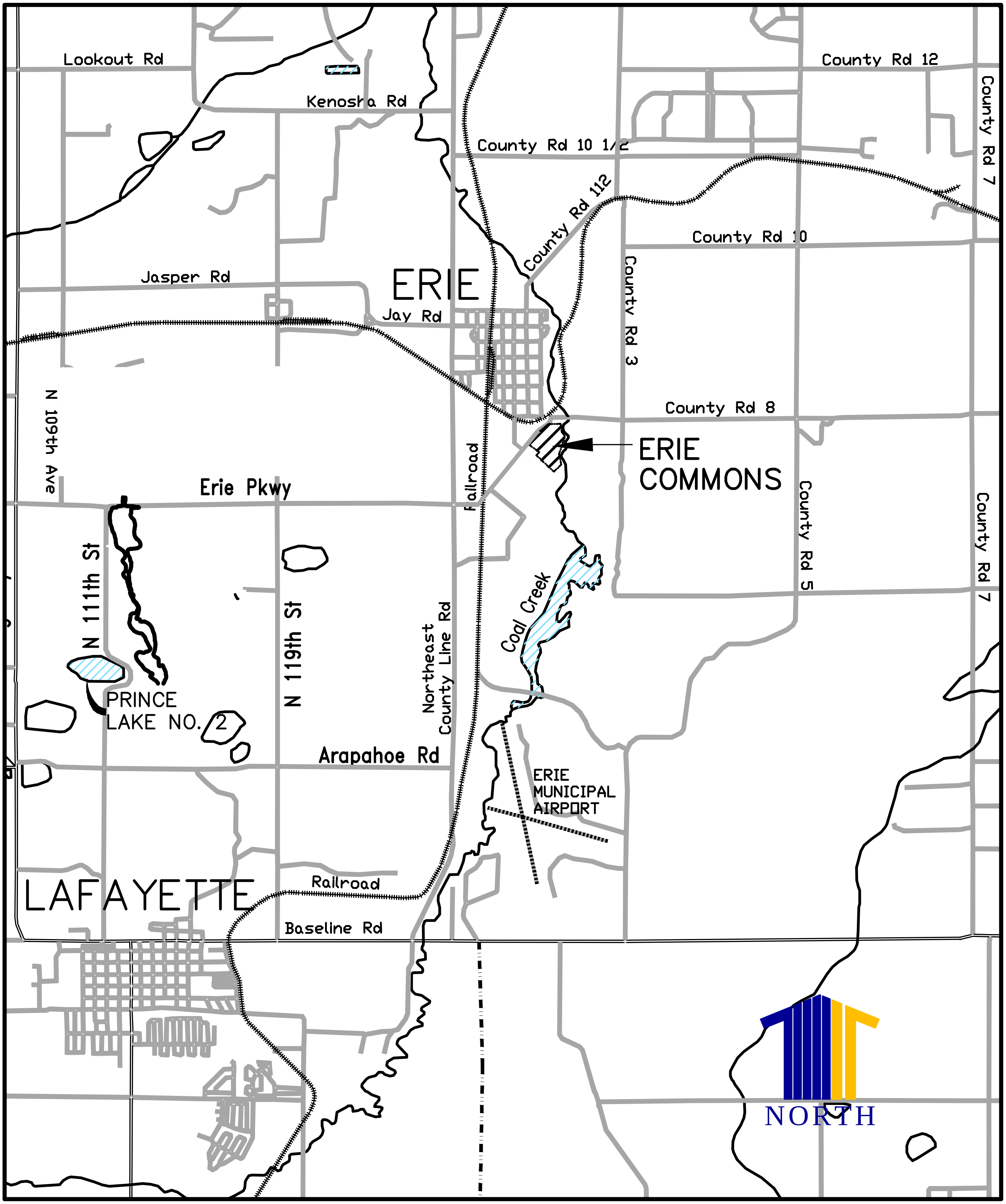
Designer	Drafter	Checked
CAP	ETG	TAJ

0 20 40 80
1 inch = 40 ft. Horizontal

Calibre
Calibre Engineering, Inc.
9090 South Ridgeline Boulevard, Suite 105
Highlands Ranch, CO 80129 (303) 730-0434
www.calibre-engineering.com
Construction Management Civil Engineering Surveying

ERIE COMMONS
FILING NO. 4 - IMPROVEMENT PLANS
GRADING AND EROSION CONTROL PLAN

Sheet GE1
7 of 37
Date APRIL 02, 2018



Calibre

Calibre Engineering, Inc.
9090 South Ridgeline Boulevard, Suite 105
Highlands Ranch, CO 80129 (303) 730-0434
www.calibre-engineering.com
Construction Management Civil Engineering Surveying

ERIE COMMONS
VICINITY MAP

SHEET
VM1

SCALE: N.T.S.

DATE: MAY 2017

DRAWING NAME: VICINITY MAP-ALAN WORKING.dwg P:\CENTURY EC\SWMP\ PLOTTED BY: APagan-Rivera XREFS:

APPENDIX B
SITE FORMS AND REPORTS

THE SWMP ADMINISTRATOR FOR THE (DEVELOPMENT) SITE IS:

Individual(s), Position or Title: ______________________________

Company: ______________________________

Address: ______________________________

____

Telephone: ______________________________

E-mail: ______________________________

ALTERNATE:

Individual(s), Position or Title: ______________________________

Company: ______________________________

Address: ______________________________

____

Telephone: ______________________________

E-mail: ______________________________

CONSTRUCTION SITE INSPECTION REPORT:

General Information			
Project Name:			
Date of Inspection:		**Start/End Time:**	
Inspector's Name(s) / Title(s):			
Inspector's Contact Information:			
Describe present phase of construction:			
Type of Inspection: ❑ Regular – Every 14 days ❑ Post-storm event – within 24 hours after precipitation or snowmelt event ❑ Deviation from minimum inspection schedule			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: **Temperature:**			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWMP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated (due to BMP failing to operate as designed or proves inadequate for a particular location); date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP / Location	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed / Completed and Notes
1		❑Yes ❑No	❑Yes ❑No	
2		❑Yes ❑No	❑Yes ❑No	
3		❑Yes ❑No	❑Yes ❑No	
4		❑Yes ❑No	❑Yes ❑No	
5		❑Yes ❑No	❑Yes ❑No	
6		❑Yes ❑No	❑Yes ❑No	
7		❑Yes ❑No	❑Yes ❑No	

	BMP / Location	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed / Completed and Notes
8		❑Yes ❑No	❑Yes ❑No	
9		❑Yes ❑No	❑Yes ❑No	
10		❑Yes ❑No	❑Yes ❑No	
11		❑Yes ❑No	❑Yes ❑No	
12		❑Yes ❑No	❑Yes ❑No	
13		❑Yes ❑No	❑Yes ❑No	
14		❑Yes ❑No	❑Yes ❑No	
15		❑Yes ❑No	❑Yes ❑No	

Overall Site Issues

- *Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at the site.*

	BMP / Activity	Implemented?	Maintenance Required?	Corrective Action Needed / Completed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
12	Any additional BMPs needed?	❑Yes ❑No	❑Yes ❑No	

Certification Statement

"The information documented heron is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title____

Signature and date____

CHEMICAL SUBSTANCES KEPT ON SITE:

List chemical substances expected to be on site and the reportable quantity of each. Copy and attach multiple sheets as needed.

1. ________________________________
2. ________________________________
3. ________________________________
4. ________________________________
5. ________________________________
6. ________________________________
7. ________________________________
8. ________________________________
9. ________________________________
10. ________________________________
11. ________________________________
12. ________________________________
13. ________________________________
14. ________________________________
15. ________________________________
16. ________________________________
17. ________________________________
18. ________________________________
19. ________________________________
20. ________________________________

SPILL/RELEASE INCIDENT REPORTING FORM:

1. Date of spill/release:____
2. Location:____
3. Time of spill/release:____________________________________a.m. / p.m.
4. Material spilled/released:______________________________________
5. Amount spilled/released:______________________________________
6. Cause of spill/release:____
7. Description of scene (e.g., type of media contaminated (e.g., soil), distance to storm sewers, if spill/release was contained):______________________________________
8. Description of clean-up actions taken (e.g., how spill/release was contained (e.g., absorbent pillows), where recovered material was placed, how much material was not recovered, remaining actions to be taken:____
9. List of offsite emergency responders contacted:
10. List of offsite emergency responders at scene:
11. Action taken to prevent recurrence: ______________________________________
12. Signature: Printed Name:

Use back of form for additional space as needed. Completed forms should be kept onsite.

STORMWATER POLLUTION PREVENTION TRAINING LOG

Instructor's Title (s): ______________________________________

Course Location: Date: ______________________

Course Length (hours): ___________________________________

Stormwater Training Topic: *(check as appropriate)*

- ☐ **Sediment and Erosion Controls**
- ☐ **Stabilization Controls**
- ☐ **Emergency Procedures**
- ☐ **Pollution Prevention Measures**
- ☐ **Inspections/Corrective Actions**

Specific Training Objective:____

____

____

____

Attendee Roster: *(attach additional pages as necessary)*

No.	Name of Attendee	Company
1		
2		
3		
4		
5		
6		
7		
8		

SUBCONTRACTOR CERTIFICATION:

Operator(s): ____

As a subcontractor, you are required to comply with the Stormwater Management Plan (SWMP) for any work that you perform on-site. Any person or group who violates any condition of the SWMP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWMP. A copy of the SWMP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify that I have read and understand the terms and conditions of the SWMP for the above designated project and agree to follow the practices described in the SWMP.

This certification is hereby signed in reference to the above named project:

Company: ______________________________

Address: ______________________________

Telephone Number: ______________________

Type of construction service to be provided: ______________________________________

____

____

Signature: ______________________________

Title: __________________________________

Date: __________________________________

APPENDIX C

CDPHE FORMS

COLORADO
Department of Public Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

ASSIGNED PERMIT NUMBER

____

Date Received _____/_____/_____
MM DD YYYY

Revised: 3-2016

STORMWATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITIES APPLICATION

COLORADO DISCHARGE PERMIT SYSTEM (CDPS)

PHOTO COPIES, FAXED COPIES, PDF COPIES OR EMAILS WILL NOT BE ACCEPTED.

For Applications submitted on paper - Please print or type. Original signatures are required.
All items must be completed accurately and in their entirety for the application to be deemed complete. Incomplete applications will not be processed until all information is received which will ultimately delay the issuance of a permit. If more space is required to answer any question, please attach additional sheets to the application form. Applications or signature pages for the application may be submitted by mail or hand delivered to:

Colorado Department of Public Health and Environment, 4300 Cherry Creek Drive South, WQCD-P-B2, Denver, CO 80246-1530

For Applications submitted electronically
Please note that you can ONLY complete the feedback form by downloading it to a PC or Mac/Apple computer and opening the Application with Adobe Reader or a similar PDF reader. The form will NOT work with web browsers, Google preview, Mac preview software or on mobile devices using iOS or Android operating systems.

If application is submitted electronically, processing of the application will begin at that time and not be delayed for receipt of the signed document.

Any additional information that you would like the Division to consider in developing the permit should be provided with the application. Examples include effluent data and/or modeling and planned pollutant removal strategies.

Beginning July 1, 2016, invoices will be based on acres disturbed.
DO NOT PAY THE FEES NOW - Invoices will be sent after the receipt of the application.
Disturbed Acreage for this application (see page 4)

- ☐ Less than 1 acre ($83 initial fee, $165 annual fee)
- ☐ 1-30 acres ($175 initial fee, $350 annual fee)
- ☐ Greater than 30 acres ($270 initial fee, $540 annual fee)

PERMIT INFORMATION

Reason for Application: ☐ NEW CERT ☐ RENEW CERT EXISTING CERT# ______________________

Applicant is: ☐ Property Owner ☐ Contractor/Operator

A. CONTACT INFORMATION - *indicates required

*** PERMITTED ORGANIZATION FORMAL NAME:** ______________________

1) * PERMIT OPERATOR - the party that has operational control over day to day activities - may be the same as owner.

Responsible Person (Title): ______________________

Currently Held By (Person): FirstName: ______________ LastName: ______________

Telephone: ______________ Email Address: ______________________

Organization: ______________________

Mailing Address: ______________________

City: ______________________ State: ________ Zip Code: ______________

Per Regulation 61 : All reports required by permits, and other information requested by the Division shall be signed by the permittee or by a duly authorized representative of that person. A person is a duly authorized representative only if:
(i) The authorization is made in writing by the permittee
(ii) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
(iii) The written authorization is submitted to the Division

2) OWNER - party has ownership or long term lease of property - may be the same as the operator.

☐ Same as 1) Permit Operator

Responsible Person (Title): ______

Currently Held By (Person): FirstName: ______ LastName: ______

Telephone: ______ Email Address: ______

Organization: ______

Mailing Address: ______

City: ______ State: ______ Zip Code: ______

Per Regulation 61 : All reports required by permits, and other information requested by the Division shall be signed by the permittee or by a duly authorized representative of that person. A person is a duly authorized representative only if:

i. The authorization is made in writing by the permittee.

ii. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a **named individual** or any individual occupying a **named position);** and

iii. The written authorization is submitted to the Division.

3) *SITE CONTACT local contact for questions relating to the facility & discharge authorized by this permit for the facility

☐ Same as 1) Permit Operator

Responsible Person (Title): ______

Currently Held By (Person): FirstName: ______ LastName: ______

Telephone: ______ Email Address: ______

Organization: ______

Mailing Address: ______

City: ______ State: ______ Zip Code: ______

4) *BILLING CONTACT if different than the permittee.

☐ Same as 1) Permit Operator

Responsible Person (Title): ______

Currently Held By (Person): FirstName: ______ LastName: ______

Telephone: ______ Email Address: ______

Organization: ______

Mailing Address: ______

City: ______ State: ______ Zip Code: ______

5) OTHER CONTACT TYPES (check below) Add pages if necessary:

Responsible Person (Title): ______

Currently Held By (Person): FirstName: ______ LastName: ______

Telephone: ______ Email Address: ______

Organization: ______

Mailing Address: ______

City: ______ State: ______ Zip Code: ______

☐ Environmental Contact ☐ Consultant ☐ Stormwater MS4 Responsible Person

☐ Inspection Facility Contact ☐ Compliance Contact ☐ Stormwater Authorized Representative

B) PERMITTED PROJECT/FACILITY INFORMATION

Project/Facility Name ______________________________

Street Address or Cross Streets ______________________________

(e.g., Park St and 5 Ave; CR 21 and Hwy 10; 44 Ave and Clear Creek) ; A street name without an address, intersection, mile marker, or other identifying information describing the location of the project is not adequate. For **linear projects**, the route of the project should be described as best as possible using the starting point for the address and latitude and longitude - more clearly defined in the required map)

City: ______________________ County: ______________ Zip Code: ______________

Facility Latitude/Longitude - List the latitude and longitude of the excavation(s) resulting in the discharge(s). If the exact soil disturbing location(s) are not known, list the latitude and longitude of the center point of the construction project. If using the center point, be sure to specify that it is the center point of construction activity. The preferred method is GPS and Decimal Degrees.

Latitude ________ . ________ Longitude ________ . ________ (e.g., 39.70312°, 104.93348°)

Decimal Degrees (to 5 decimal places) Decimal Degrees (to 5 decimal places)

This information may be obtained from a variety of sources, including:

- **Surveyors or engineers** for the project should have, or be able to calculate, this information.
- **U.S. Geological Survey topographical map(s)**, available at area map stores.
- Using a **Global Positioning System (GPS) unit** to obtain a direct reading.
- **Google** - enter address in search engine, select the map, right click on location, and select "what's here".

***Note**: the latitude/longitude required above is not the directional degrees, minutes, and seconds provided on a site legal description to define property boundaries.*

C) MAP (Attachment) If no map is submitted, the application cannot be submitted.

Map: Attach a map that indicates the site location and that CLEARLY shows the boundaries of the area that will be disturbed. A vicinity map is not adequate for this purpose.

D) LEGAL DESCRIPTION - only for Subdivisions

Legal description: If subdivided, provide the legal description below, or indicate that it is not applicable (**do not** supply Township/Range/Section or metes and bounds description of site)

Subdivision(s): ______________ Lot(s): ______________ Block(s) ______________

OR ☐ Not applicable (site has not been subdivided)

E) AREA OF CONSTRUCTION SITE - SEE PAGE 1 - WILL DETERMINE FEE

Provide both the total area of the construction site, and the area that will undergo disturbance, in acres.

Total area of project disturbance site (acres): __________

Note: aside from clearing, grading and excavation activities, disturbed areas also include areas receiving overburden (e.g., stockpiles), demolition areas, and areas with heavy equipment/vehicle traffic and storage that disturb existing vegetative cover.

☐ Part of Larger Common Plan of Development or Sale, (i.e., total, including all phases, filings, lots, and infrastructure not covered by this application)

F) NATURE OF CONSTRUCTION ACTIVITY

Check the appropriate box(es) or provide a brief description that indicates the general nature of the construction activities. (The full description of activities must be included in the Stormwater Management Plan.)

☐ Commercial Development

☐ Residential Development

☐ Highway and Transportation Development

☐ Pipeline and Utilities (including natural gas, electricity, water, and communications)

☐ Oil and Gas Exploration and Well Pad Development

☐ Non-structural and other development (i.e. parks, trails, stream realignment, bank stabilization, demolition, etc.)

G) ANTICIPATED CONSTRUCTION SCHEDULE

Construction Start Date: ____________________ Final Stabilization Date: ____________________

- *Construction Start Date* - This is the day you expect to begin ground disturbing activities, including grubbing, stockpiling, excavating, demolition, and grading activities.
- *Final Stabilization Date* - in terms of permit coverage, this is when the site is finally stabilized. This means that all ground surface disturbing activities at the site have been completed, and all disturbed areas have been either built on, paved, or a uniform vegetative cover has been established with an individual plant density of at least 70 percent of pre-disturbance levels. **Permit coverage must be maintained until the site is finally stabilized. Even if you are only doing one part of the project, the estimated final stabilization date must be for the <u>overall</u> project**.
If permit coverage is still required once your part is completed, the permit certification may be transferred or reassigned to a new responsible entity(s).

H) RECEIVING WATERS (If discharge is to a ditch or storm sewer, include the name of the ultimate receiving waters)

Immediate Receiving Water(s): ____________________

Ultimate Receiving Water(s): ____________________

Identify the receiving water of the stormwater from your site. Receiving waters are any waters of the State of Colorado. This includes all water courses, even if they are usually dry. If stormwater from the construction site enters a ditch or storm sewer system, identify that system and indicate the ultimate receiving water for the ditch or storm sewer. **Note:** a stormwater discharge permit does <u>not</u> allow a discharge into a ditch or storm sewer system without the approval of the owner/ operator of that system.

I) SIGNATURE PAGE

1. **You may print and sign this document and mail the hard copy to the State along with required documents (address on page one).**

2. **Electronic Submission Signature**
   You may choose to submit your application electronically, along with required attachments. To do so, click the SUBMIT button below which will direct you, via e-mail , to sign the document electronically using the DocuSign Electronic Signature process. Once complete, you will receive via e-mail, an electronically stamped Adobe pdf of this application. Print the signature page from the electronically stamped pdf, sign it and mail it to the WQCD Permits Section to complete the application process (address is on page one of the application).
   - **The Division encourages use of the electronic submission of the application and electronic signature. This method meets signature requirements as required by the State of Colorado.**
   - **The ink signed copy of the electronically stamped pdf signature page is also required to meet Federal EPA Requirements.**
   - **Processing of the application will begin with the receipt of the valid electronic signature.**

☐ **STORMWATER MANAGEMENT PLAN CERTIFICATION**

By checking this box "I certify under penalty of law that a complete Stormwater Management Plan, as described in the stormwater management plan guidance, has been pre-pared for my activity. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the Stormwater Management Plan is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for falsely certifying the completion of said SWMP, including the possibility of fine and imprisonment for knowing violations."

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."
"I understand that submittal of this application is for coverage under the State of Colorado General Permit for Stormwater Discharges Associated with Construction Activity **for the entirety of the construction site/project described and applied for, until such time as the application is amended or the certification is transferred, inactivated, or expired**." [Reg 61.4(1)(h)]

For Docusign
Electronic Signature ____________________ Ink Signature ____ Date: ____________________

Signature of Legally Responsible Person or Authorized Agent (submission must include original signature)

Name (printed) ________________________________ Title ________________________________

Signature: The applicant must be either the owner and operator of the construction site. Refer to Part B of the instructions for additional information.
The application <u>must be signed</u> by the applicant to be considered complete. In all cases, it shall be signed as follows:
(Regulation 61.4 (1ei)
a) In the case of corporations, by the responsible corporate officer is responsible for the overall operation of the facility from which the discharge described in the form originates
b) In the case of a partnership, by a general partner.
c) In the case of a sole proprietorship, by the proprietor.
d) In the case of a municipal, state, or other public facility, by either a principal executive officer, ranking elected official, (a principal executive officer has responsibility for the overall operation of the facility from which the discharge originates).

3rd Party Preparer: If this form was prepared by an authorized agent on behalf of the Permittee, please complete the field below.

Preparer Name (printed) ________________________________ Email Address ________________________________

DO NOT INCLUDE A COPY OF THE STORMWATER MANAGEMENT PLAN
DO NOT INCLUDE PAYMENT—AN INVOICE WILL BE SENT AFTER THE CERTIFICATION IS ISSUED.

Attach Map

Attach File

Attach File

Attach File

Attach File

Submit

APPENDIX D

FIELD NOTES, CONTACTS, ETC.

January 19, 2017

Chad Schroeder, PE
Town of Erie
345 Holbrook Street
P.O. Box 750
Erie, CO 80234

Erie Commons Filing No. 4
Water Quality Pond Maintenance Letter

Dear Mr. Schroeder,

The purpose of this letter is to provide a maintenance task list and maintenance schedule for the existing water quality ponds within the Erie Commons development. The water quality ponds were constructed with previous phases of the development. Erie Commons Filing No. 4 is located at the northeast corner of Erie Parkway and South Briggs Street. Portions of this site will direct storm water through existing and proposed storm sewer networks to Water Quality Pond E and the water quality pond locate northwest of the Site on the west side of Erie Parkway. All runoff follows the previously approved drainage report titled 'Final Drainage Report; Erie Commons Filing No 4; Blocks 6-8; Erie, Colorado', prepared by Hurst and Associates, Inc., revised August 2, 2006.

The following maintenance tasks shall be done to ensure the water quality ponds are functioning as proposed with the previously approved design.

- Remove dirt and debris from the outlet structures, forebays and storm pipes
- Remove the overgrowth from ponds (Do not disturb wetlands that have been established within the pond limits)
- Remove trash from ponds
- Seed and mulched disturbed areas

The following maintenance activities and schedules shall be followed to ensure the ponds continue to function as designed.

ROUTINE MAINTENANCE ACTIVITIES

The majority of this work consists of regularly scheduled mowing and trash and debris pickups for stormwater management facilities during the growing season. This includes items such as the removal of debris/material that may be clogging the outlet structure well screens and trash racks. It also includes activities such as includes weed control, mosquito treatment, and algae treatment. These activities normally will be performed numerous times during the year. These items can be completed without any prior correspondence with the Town.

The Maintenance Activities are summarized below, and further described in the following sections.

Mowing
Occasional mowing is necessary to limit unwanted vegetation and to improve the overall appearance of the water quality pond. Native vegetation should be mowed to a height of 4-to-6 inches tall. Grass clippings should be collected and disposed of properly.

Frequency: Routine - Minimum of twice annually or depending on aesthetics.

Trash/Debris Removal
Trash and debris must be removed from the entire water quality pond area to minimize outlet clogging and to improve aesthetics. This activity must be performed prior to mowing operations.

Frequency: Routine – Prior to mowing operations and minimum of twice annually.

Outlet Works Cleaning
Debris and other materials can clog the outlet work's well screen, orifice plate(s) and trash rack. This activity must be performed anytime other maintenance activities are conducted to ensure proper operation.

Frequency: Routine – After significant rainfall event or concurrently with other maintenance activities.

Weed Control
Noxious weeds and other unwanted vegetation must be treated as needed throughout the water quality pond. This activity can be performed either through mechanical means (mowing/pulling) or with herbicide. Consultation with the local Weed Inspector is highly recommended prior to the use of herbicide.

Frequency: Routine – As needed based on inspections.

Mosquito/Algae Treatment
Treatment of permanent pools is necessary to control mosquitoes and undesirable aquatic vegetation that can create nuisances. Only EPA approved chemicals/materials can be used in areas that are warranted.

Frequency: As needed.

MINOR MAINTENANCE ACTIVITIES

This work consists of a variety of isolated or small-scale maintenance or operational problems. Most of this work can be completed by a small crew, tools, and small equipment. These items require prior approval from the Town of Erie. Completed inspection and maintenance forms shall be submitted to the Town for each inspection and maintenance period.

Sediment Removal
Sediment removal is necessary to maintain the original design volume of the water quality pond and to ensure proper function of the infrastructure. Regular sediment removal (minor) from the forebay and inflow(s) can significantly reduce the frequency of major sediment removal activities (dredging) in the upper and lower stages. The minor sediment removal activities can typically be addressed with shovels and smaller equipment. Major sediment removal activities will require larger and more specialized equipment. The major sediment activities will also require surveying with an engineer's level, and consultation with the Town of Erie Staff to ensure design volumes/grades are achieved.

Stormwater sediments removed from water quality ponds do not meet the criteria of "hazardous waste". However, these sediments are contaminated with a wide array of organic and inorganic pollutants and handling must be done with care. Sediments from permanent pools must be carefully removed to minimize turbidity, further sedimentation, or other adverse water quality impacts. Sediments should be transported by motor vehicle only after they are dewatered. All sediments must be taken to a landfill for proper disposal. Prompt and thorough cleanup is important should a spill occur during transportation.

Frequency: Nonroutine – As necessary based upon inspections.

Erosion Repair

The repair of eroded areas is necessary to ensure the proper function of the water quality pond, minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs to trickle channels, energy dissipaters, and rilling to major gullies in the embankments and spillways. The repair of eroded areas may require the use of excavators, earthmoving equipment, riprap, concrete, erosion control blankets, and turf reinforcement mats. Major erosion repair to the pond embankments, spillways, and adjacent to structures will require consultation with the Town of Erie Staff.

Frequency: Nonroutine – As necessary based upon inspections.

Vegetation Removal/Tree Thinning

Dense stands of woody vegetation (willows, shrubs, etc.) or trees can create maintenance problems for the infrastructure within a water quality pond. Tree roots can damage structures and invade pipes/channels thereby blocking flows. Also, trees growing in the upper and lower stages of the water quality pond will most likely have to be removed when sediment/dredging operations occur. A small tree is easier to remove than a large tree, therefore, regular removal/thinning is imperative. All trees and woody vegetation that is growing in the bottom of the water quality pond or near structures (inflows, trickle channels, outlet works, emergency spillways, etc.) should be removed. Any trees or woody vegetation in the water quality pond should be limited to the upper portions of the pond banks.

Frequency: Nonroutine – As necessary based upon inspections.

Clearing Drains/Jet-Vac

A water quality pond contains many structures, openings, and pipes that can be frequently clogged with debris. These blockages can result in a decrease of hydraulic capacity and create standing water in areas outside of the micro-pool. Many times the blockage to this infrastructure can be difficult to access and/or clean. Specialized equipment (jet-vac machines) may be necessary to clear debris from these difficult areas.

Frequency: Nonroutine – As necessary based upon inspections.

MAJOR MAINTENANCE ACTIVITIES

This work consists of larger maintenance/operational problems and failures within the stormwater management facilities. All of this work requires consultation with the Town of Erie to ensure the proper maintenance is performed. This work requires that the Town Staff review the original design and construction drawings to assess the situation and assign the necessary maintenance. This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants.

Major Sediment Removal

Major sediment removal consists of removal of large quantities of sediment or removal of sediment from vegetated areas. Care shall be given when removing large quantities of sediment and sediment deposited in vegetated areas. Large quantities of sediment need to be carefully removed, transported and disposed of. Vegetated areas need special care to ensure design volumes and grades are preserved.

Frequency: Nonroutine – Repair as needed based upon inspections.

Major Erosion Repair

Major erosion repair consists of filling and revegetating areas of severe erosion. Determining the cause of the erosion as well as correcting the condition that caused the erosion should also be part of the erosion repair. Care should be given to ensure design grades and volumes are preserved.

Frequency: Nonroutine – Repair as needed based upon inspections.

Structural Repair

A water quality pond includes a variety of structures that can deteriorate or be damaged during the course of routine maintenance. These structures are constructed of steel and concrete that can degrade or be damaged and may need to be repaired or re-constructed from time to time. These structures include items like outlet works, trickle channels, forebays, inflows and other features. In-house operations staff can perform some of the minor structural repairs. Major repairs to structures may require input from a structural engineer and specialized contractors. Consultation with the Town of Erie Staff should take place prior to all structural repairs.

Frequency: Nonroutine – Repair as needed based upon inspections.

If there are any remaining questions on the maintenance letter please contact me at 303-339-5406.

Sincerely,

CALIBRE ENGINEERING, INC.

Brian Moss

Brian Moss, P.E.

Project Manager

Calibre

5/1/2017

Matt Wiederspahn, PE
Town of Erie
345 Holbrook Street
P.O. Box 750
Erie, CO 80234

RE: Blocks 7, 8, and Lots 2-3 of Block 6 of Erie Commons Filing 4 Drainage Conformance Letter

Dear Mr. Wiederspahn,

The purpose of this letter is to illustrate the intended drainage design for the abovementioned development is in general conformance with the existing drainage plans covering Filing 4. These include:

- *Final Drainage Report for Erie Commons Filing No. 1* by Hurst and Associates, revised February 2005
- *Final Drainage Report for Erie Commons Filing No. 4 Blocks 6-8* by Hurst and Associates, revised August 2006
- *Town of Erie Outfall Systems Plan (West of Coal Creek)* by Respec, dated January 2014

These reports will be referred to as the *Filing 1 report*, *Filing 4 report*, and the *OSP* within this letter.

Filing 1 and Filing 4 report conformance:

The *Filing 4* report assumed commercial land use in Lot 1 of Block 6, and multi-family use with associated parking, walk, lawn, and open space for the remainder of Blocks 6-8. Land use for the current proposed 6.70-acre site is multi-family with associated parking, walk, lawn, and 1.35 acres of open space. This is consistent with the *Filing 4 report* assumptions. Lot 1 of Block 6, not part of this development, is a preschool with significant areas of impervious landscaping and has an impervious value lower than the 70% assumed in the *Filing 4* report.

Portions of the site will drain via overland flow to existing inlet SE-2 in Briggs Street and existing inlet SF-3 in Erie Parkway (Leon. A Wurl Parkway). Runoff produced in northern portion of the site will be captured onsite by a proposed storm system which will tie into the back of existing inlet SF-3. Because proposed drainage patterns and land uses are consistent with the *Filing 4* report, the existing system will be adequate for the proposed development. Runoff calculations will be provided with the final report to confirm this assumption.

Runoff produced by southern portion of the site corresponding to Basins E5-E10 of the Filing 4 report (Basin E4 of the Filing 1 report) will be conveyed via proposed storm sewer system to the existing Water Quality Pond E constructed with Filing 1. Per the text of the *Filing 4 report*, water quality for the northern portion of the site roughly corresponding with Basin F4, F5, F5A, F5B, and F5C of the *Filing 4* report will be provided by a Water Quality Pond within the channel along the southern border of the Union Pacific Railroad.

Total area and impervious values are less than or equal to those assumed in the *Filing 1* and *Filing 3* reports, so the existing water quality ponds will be adequate for the proposed development.

Drainage basin areas and impervious values confirming this assumption will be presented in the drainage report.

OSP Conformance:

The site is included in Basin 465 and 467 of the 2014 *OSP*. These basins were assumed to drain directly to Coal Creek without detention. The 2014 *OSP* assumed Medium Density Residential use at 50% impervious for the site; this is a lower impervious rate than provided in the *Filing 4 report* approved in 2006.

In the interim condition where surrounding future commercial areas are not yet developed, the total imperviousness of basins 465 and 467 will be less than the final condition assumed in the CUHP/SWMM models of the 2014 *OSP*. Updated impervious value for the site will need to be accounted for when the upstream future Detention Pond 1046 is designed and constructed.

Floodplain:

The site is adjacent to, but not within, the floodplain of Coal Creek.

It is our opinion that the proposed development of Blocks 7, 8, and Lots 2-3 of Block 6 of Erie Commons Filing 4 are in accordance with the previously mentioned reports, and will be adequately served by the existing storm infrastructure. Please feel free to contact me if additional information is needed.

Sincerely,

Todd Johnson, P.E.
Calibre Engineering, Inc.
9090 S Ridgeline Blvd, Suite 105
Highlands Ranch, CO 80129
303-339-5409

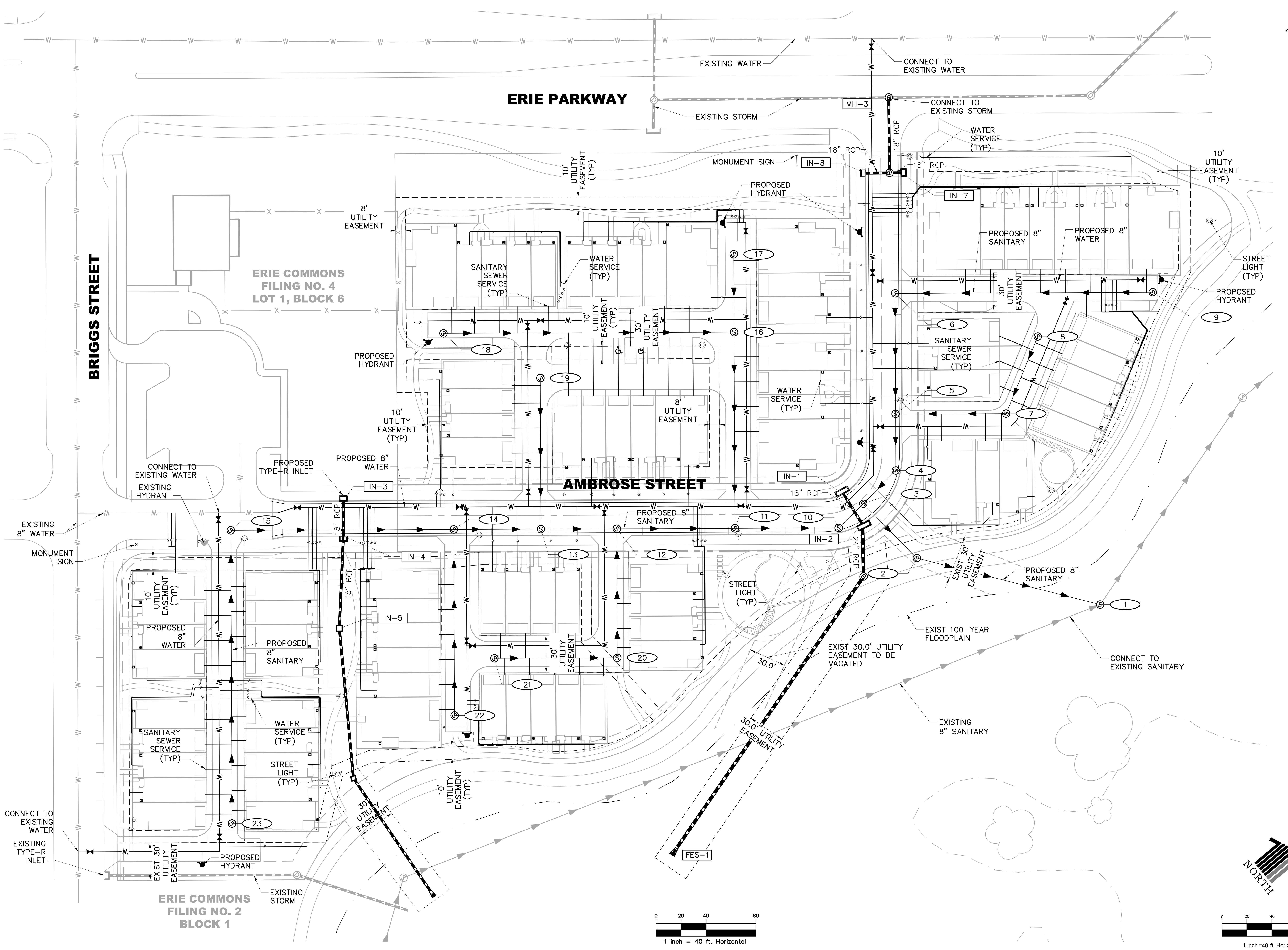
Enclosures:

1) Concept utility plan
2) FEMA exhibit
3) Excerpts from the *Final Drainage Report for Erie Commons Filing No. 1* by Hurst and Associates, revised February 2005
4) Excerpts from the *Final Drainage Report for Erie Commons Filing No. 4 Blocks 6-8* by Hurst and Associates, revised August 2006
5) Excerpts from the *Town of Erie Outfall Systems Plan (West of Coal Creek)* by Respec, dated January 2014

ERIE COMMONS - FILING 4

SITE DEVELOPMENT PLAN

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
6.742 ACRES - 83 LOTS, 7 TRACTS - SP-000886-2017



LEGEND

- WATER MAIN
- SANITARY SEWER MAIN
- STORM DRAINAGE MAIN
- STORM DRAINAGE INLET
- FIRE HYDRANT
- WATER VALVE
- EXISTING STORM DRAINAGE
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- EXISTING GAS
- EXISTING TELEPHONE
- EXISTING ELECTRIC
- EXISTING FIBER OPTIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING RAW WATER

811

UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987
Utility Notification Center of Colorado
Administrative Office 303-232-1991
16361 Table Mountain Parkway
Golden, Co. 80403

CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

CALIBRE ENGINEERING, INC. ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS (HORIZONTAL AND VERTICAL). THE EXISTING UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE LOCATIONS OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.

Calibre
Calibre Engineering, Inc.
9090 South Ridgeline Boulevard, Suite 105
Highlands Ranch, CO 80129 (303) 730-0434
www.calibre-engineering.com
Construction Management Civil Engineering Surveying

CHECKED BY: BKM
DRAWN BY: CAP

NORRIS DESIGN
Planning | Landscape Architecture | Project Promotion
1101 Bannock Street
Denver, CO 80204
P 303.892.1166
www.norris-design.com

ERIE COMMONS
FILING NO. 4 - SITE DEVELOPMENT PLAN
ERIE, COLORADO

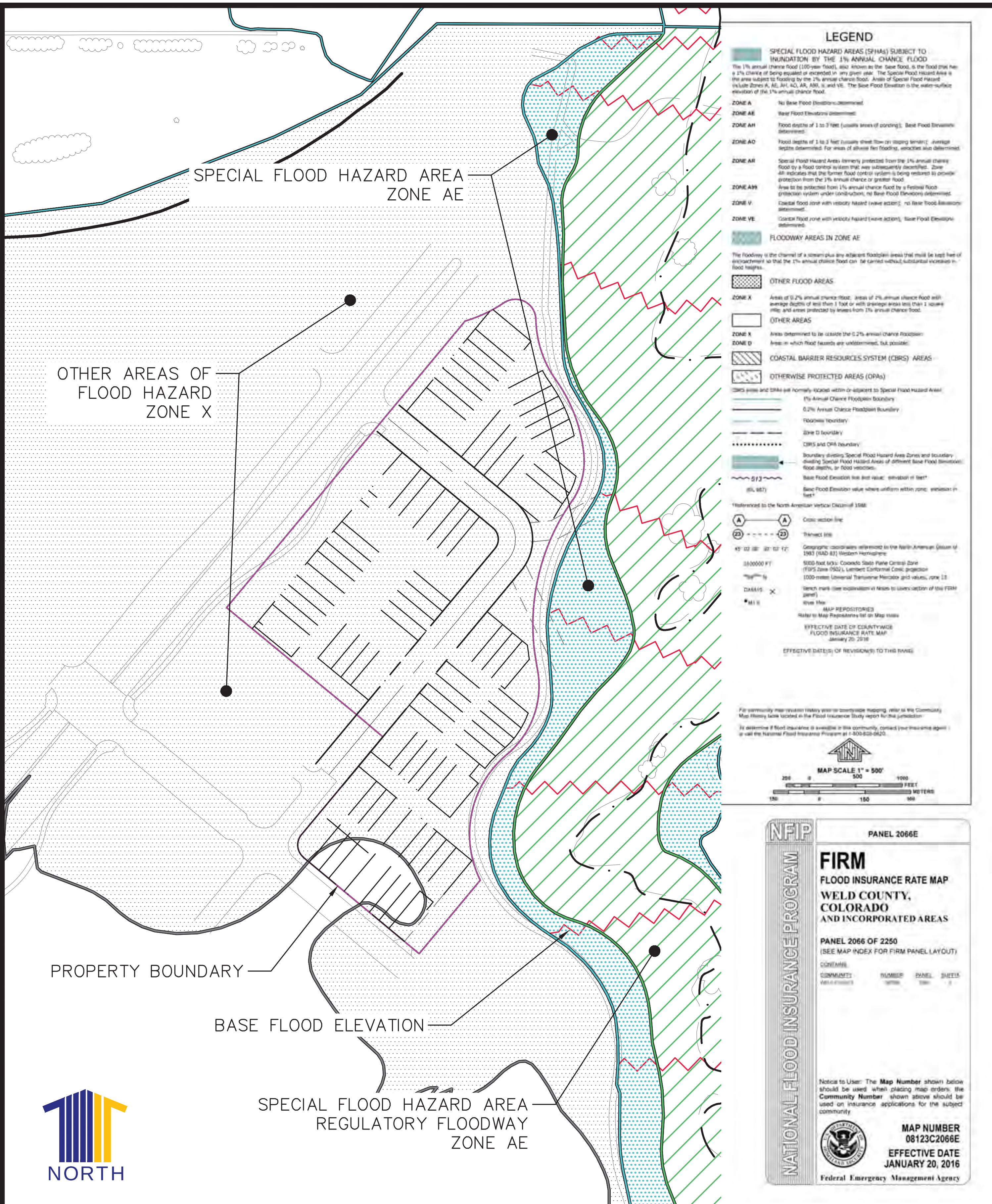
OWNER:
CENTURY COMMUNITIES
CINDY MYERS
8390 E. CRESCENT PKWY
SUITE 650
GREENWOOD VILLAGE, CO 80111

811 Know what's below. Call before you dig.

NOT FOR CONSTRUCTION

DATE:
06/01/2017: SUBMITTAL 01

SHEET TITLE:
OVERALL UTILITY PLAN



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Calibre

Calibre Engineering, Inc.
9090 South Ridgeline Boulevard, Suite 105
Highlands Ranch, CO 80129 (303) 730-0434
www.calibre-engineering.com
Construction Management Civil Engineering Surveying

CENTURY COMMUNITIES
ERIE COMMONS
FLOOD INSURANCE RATE MAP

Sheet
-
Scale 1" = 200"
Date MAY 2017

FINAL DRAINAGE REPORT
ERIE COMMONS FILING NO. 1
ERIE, COLORADO

Prepared For:
Community Development Group
2500 Arapahoe Avenue
Suite 220
Boulder, CO 80302

Prepared By:
Hurst and Associates, Inc.
4999 Pearl East Circle
Suite 106
Boulder, Colorado, 80301

Job Number 2020-40
July 30, 2004
Revised August 5, 2004
Revised November 3, 2004
Revised January 4, 2005
Revised January 7, 2005
Revised February 8, 2005

WQCV Storage = (WQCV / 12) * Area * 1.2

$$WQCV = 0.9 * (0.91i^3 - 1.19i^2 + 0.78i)$$

Water Quality Ponds
Erie Commons
Job Number: 2020-40

	Basins	% Impervious	WQCV (inches)	Drainage Area (acres)	Required Storage (acre-feet)	Required Storage (cubic feet)	Release Rate (cfs)
POND A	A1-A3, I4	33.8%	0.15	6.67	0.10	**4,259**	0.05
POND B	B1-B15	29.2%	0.13	61.88	0.83	**36,110**	0.42
POND C	C1-C15	47.6%	0.18	64.06	1.15	**50,182**	0.58
POND D	D1-D4	33.5%	0.15	5.76	0.08	**3,657**	0.04
POND E	E1-E4	70.3%	0.25	29.38	0.73	**31,821**	0.37

Note 1: Used 24-hour drain time.

FINAL DRAINAGE REPORT
ERIE COMMONS FILING NO. 4
BLOCKS 6-8
ERIE, COLORADO

Prepared For:
Community Development Group
2500 Arapahoe Avenue
Suite 220
Boulder, CO 80302

Prepared By:
Hurst and Associates, Inc.
4999 Pearl East Circle
Suite 106
Boulder, Colorado, 80301

Job Number 2020-45
September 30, 2005
Revised May 26, 2006
Revised August 2, 2006

DRAINAGE FACILITY DESIGN

The drainage concept for Erie Commons Filing No. 4, Blocks 6-8 is to convey the developed runoff from the project site to the existing Water Quality Pond E or the existing drainage channel along the southern border of the Union Pacific Railroad. Water Quality Pond E was designed to incorporate the flows from Erie Commons Filing No. 4, Blocks 6-8 and outfalls into Coal Creek. A future water quality pond will be constructed in the existing drainage channel along the southern border of the Union Pacific Railroad. Its design will accomodate those flows from Erie Commons which enter the drainage channel. The minor storm flows will be conveyed by the prososed storm sewer system to either Water Quality Pond E or the existing storm pipes in Leon A. Wurl Parkway. See Appendix B for the minor storm pipe analysis and Appendix C for the inlet analysis. The minor storm street capacity analysis is located in Appendix D. During the major storm event, runoff exceeding the capacities of the upstream inlets and pipes will collect at the existing low point in Leon A. Wurl Parkway. The existing 10 foot type 'R' inlets at the low point and the downstream storm pipes have adequate capacity to convey the 100-year excess flows collecting at the low point in Leon A. Wurl Parkway. The major storm street capacity analysis is located in Appendix E. See Appendix F for an analysis of the existing storm sewer system in Leon A. Wurl Parkway during the 100-year storm event.

EROSION CONTROL

Temporary erosion control will be provided during construction and grading of the project. This includes silt fencing, inlet protection, the seeding and mulching of disturbed areas.

Runoff Coefficients 24-May-06
Erie Commons Filing No. 4, Blocks 6-8
Job Number 2020-45

Land Use Characteristics	C_2	C_5		C_{100}
Single-Family	0.40	0.45		0.60
Lawns, Clay Soil	0.15	0.25		0.50
Streets, Paved	0.87	0.88		0.93
Multi-Unit (Attached)	0.60	0.65		0.80

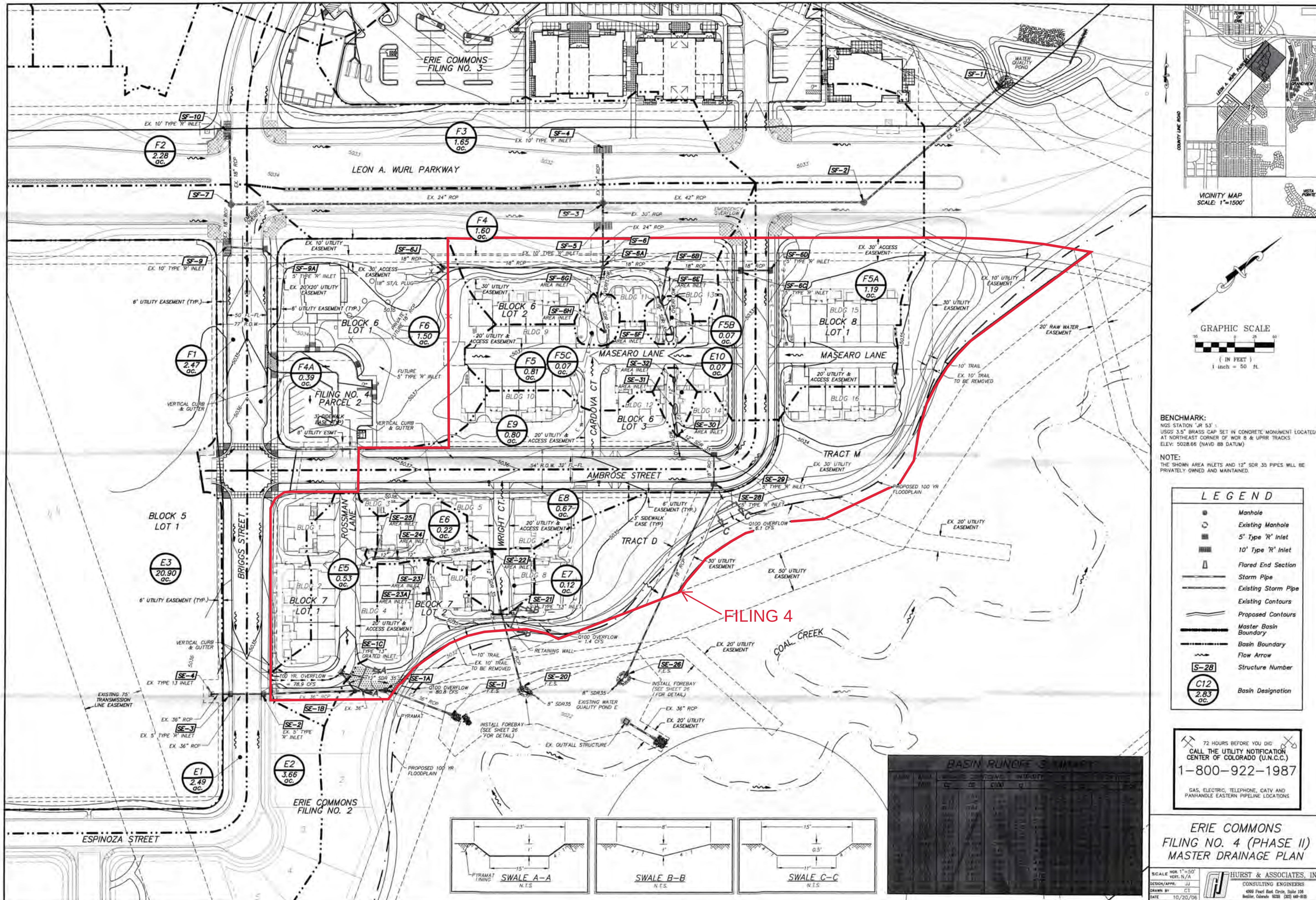
Basin	Area (acres)	SFR (acres)	Lawns (acres)	Streets (acres)	Commercial (acres)	Multi-Unit Attached (acres)	Runoff Coefficients		
							C_2	C_5	C_{100}
E1	2.49	1.49	0.19	0.81	0.00	0.00	0.53	0.57	0.70
E2	3.66	3.13	0.00	0.00	0.00	0.53	0.43	0.48	0.63
E3	20.90	0.00	0.78	0.00	20.12	0.00	0.84	0.86	0.88
E5	0.53	0.03	0.00	0.00	0.00	0.50	0.59	0.64	0.79
E6	0.22	0.00	0.00	0.00	0.00	0.22	0.60	0.65	0.80
E7	0.12	0.00	0.00	0.00	0.00	0.12	0.60	0.65	0.80
E8	0.67	0.00	0.00	0.00	0.00	0.67	0.60	0.65	0.80
E9	0.80	0.00	0.00	0.00	0.00	0.80	0.60	0.65	0.80
E10	0.07	0.00	0.00	0.00	0.00	0.07	0.60	0.65	0.80
F1	2.47	0.00	0.50	1.97	0.00	0.00	0.73	0.75	0.84
F4	1.60	0.00	0.21	0.68	0.00	0.71	0.66	0.70	0.82
F4A	0.39	0.00	0.06	0.33	0.00	0.00	0.76	0.78	0.86
F5	0.81	0.00	0.00	0.00	0.00	0.81	0.60	0.65	0.80
F5A	1.19	0.00	0.00	0.00	0.00	1.19	0.60	0.65	0.80
F5B	0.07	0.00	0.00	0.00	0.00	0.07	0.60	0.65	0.80
F5C	0.07	0.00	0.00	0.00	0.00	0.07	0.60	0.65	0.80
F6	1.50	0.00	0.00	0.00	1.30	0.20	0.83	0.85	0.88

TABLE 800-3
RUNOFF COEFFICIENTS (C) FOR RATIONAL METHOD

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY 2	5	10	100
Business					
Commercial Areas	95	.87	.87	.88	.89
Neighborhood Areas	70	.60	.65	.70	.80
Residential					
Single-Family	*	.40	.45	.50	.60
Multi-Unit (detached)	50	.45	.50	.60	.70
Multi-Unit (attached)	70	.60	.65	.70	.80
1/2 Acre Lot or Larger	*	.30	.35	.40	.60
Apartments	70	.65	.70	.70	.80
Industrial					
Light Areas	80	.71	.72	.76	.82
Heavy Areas	90	.80	.80	.85	.90
Parks, Cemeteries	7	.10	.18	.25	.45
Playgrounds	13	.15	.20	.30	.50
Schools	50	.45	.50	.60	.70
Railroad Yard Areas	20	.20	.25	.35	.45
Undeveloped Areas					
Historic Flow Analysis	2	(See "Lawns")			
Greenbelts, Agricultural					
Offsite Flow Analysis					
(when land use not defined)	45	.43	.47	.55	.65
Streets					
Paved	100	.87	.88	.90	.93
Gravel	40	.40	.45	.50	.60
Drives and Walks	96	.87	.87	.88	.89
Roofs	90	.80	.85	.90	.90
Lawns, Sandy Soil	0	.00	.01	.05	.20
Lawns, Clay Soil	0	.05	.15	.25	.50

Note: These Rational Formula coefficients may not be valid for large basins.

* Refer to Urban Storm Drainage Criteria Manual for percent impervious values.


ERIE COMMONS FILING NO. 3
LEON A. WURL PARKWAY
AMBROSE STREET
MASEARO LANE
CARDOVA CT
ROSSMAN LANE
WRIGHT CT.
BRIGGS STREET
ESPINOZA STREET
TRACT M
TRACT D
BLOCK 5 LOT 1
BLOCK 6 LOT 1
BLOCK 6 LOT 2
BLOCK 6 LOT 3
BLOCK 7 LOT 1
BLOCK 7 LOT 2
BLOCK 8 LOT 1
FILING NO. 4 PARCEL 2
ERIE COMMONS FILING NO. 2
COAL CREEK
FILING 4
PROPOSED 100 YR FLOODPLAIN
BASIN RUNOFF SUMMARY
SWALE A-A
SWALE B-B
SWALE C-C
N.T.S.
VICINITY MAP
SCALE: 1"=1500'
GRAPHIC SCALE
(IN FEET)
1 inch = 50 ft.
BENCHMARK:
NGS STATION 'JR 53'
USGS 3.5" BRASS CAP SET IN CONCRETE MONUMENT LOCATED AT NORTHEAST CORNER OF WCR 8 & 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
HURST & ASSOCIATES, INC.
CONSULTING ENGINEERS
DRAWN BY CT
DATE 10/20/06

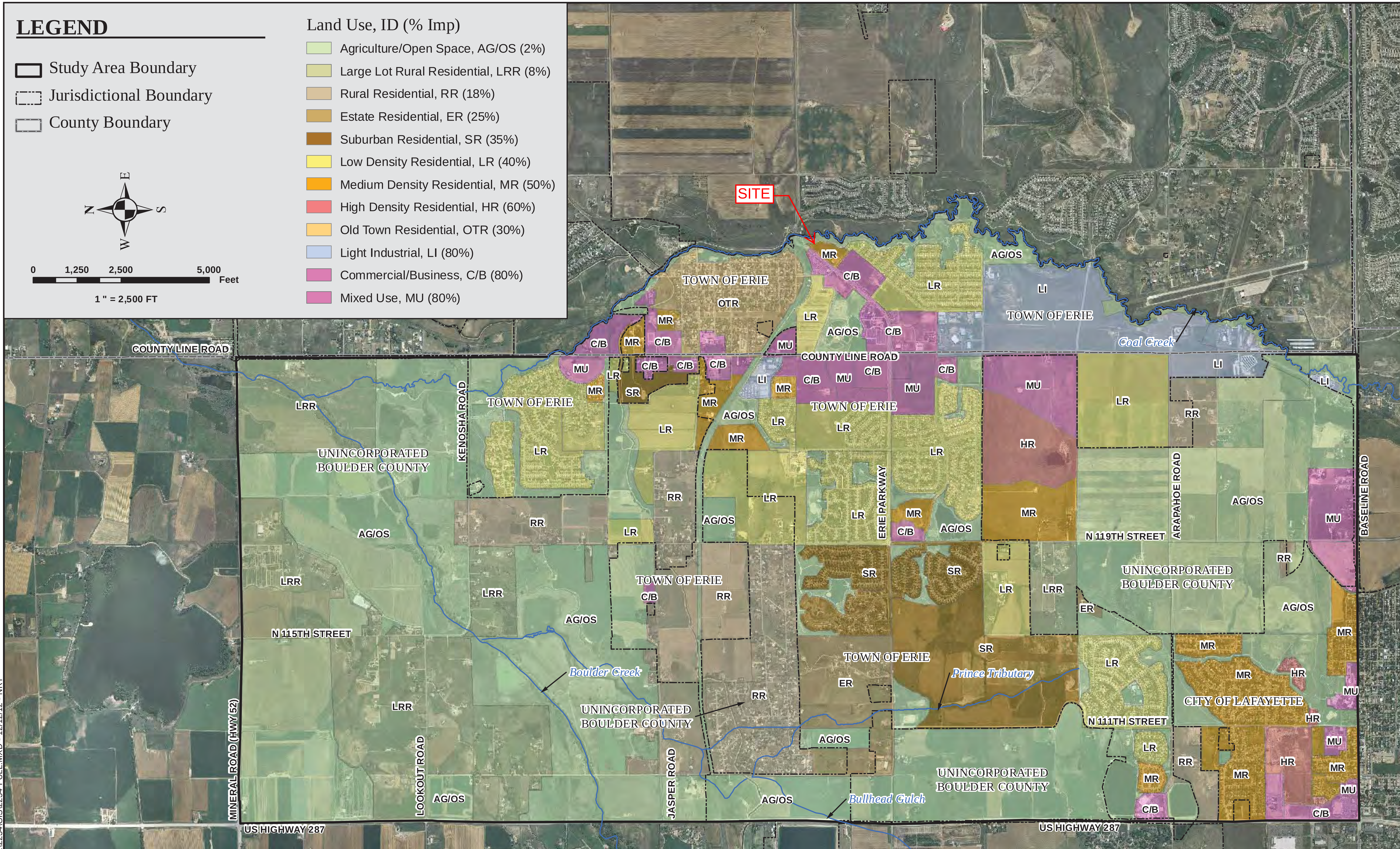
TOWN OF ERIE

OUTFALL SYSTEMS PLAN (WEST OF COAL CREEK)

JANUARY 2014

PREPARED FOR: URBAN DRAINAGE & FLOOD CONTROL DISTRICT
TOWN OF ERIE
BOULDER COUNTY
CITY OF LAFAYETTE

PREPARED BY: RESPEC CONSULTING AND SERVICES
720 SOUTH COLORADO BLVD, SUITE 410S
DENVER, CO 80246



M:\2234\GIS\2234 FULL.MXD - 12/12/12 - NRT

WRC ENGINEERING, INC.
950 SOUTH CHERRY STREET, SUITE 404
DENVER, COLORADO 80246
PHONE: 303-757-8513
FAX: 303-758-3208

TOWN OF ERIE
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

TOWN OF ERIE OUTFALL SYSTEMS PLAN
(WEST OF COAL CREEK)

FUTURE LAND USE/
IMPERVIOUSNESS MAP

FIGURE
B-15

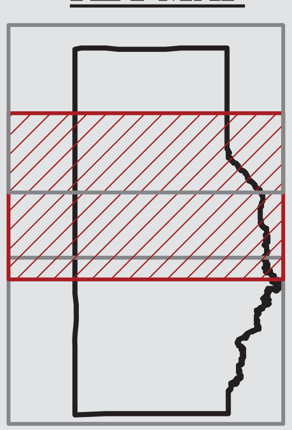
LEGEND

- Study Area Boundary
- Town of Erie
- City of Lafayette
- Subbasin Boundary
- Major Watershed Boundary
- Regional Detention Ponds

SWMM Elements

- xxx Subbasin
- xxx Design Point
- xxx Conveyance Element
- xxx Detention Facility
- xxx Outfall

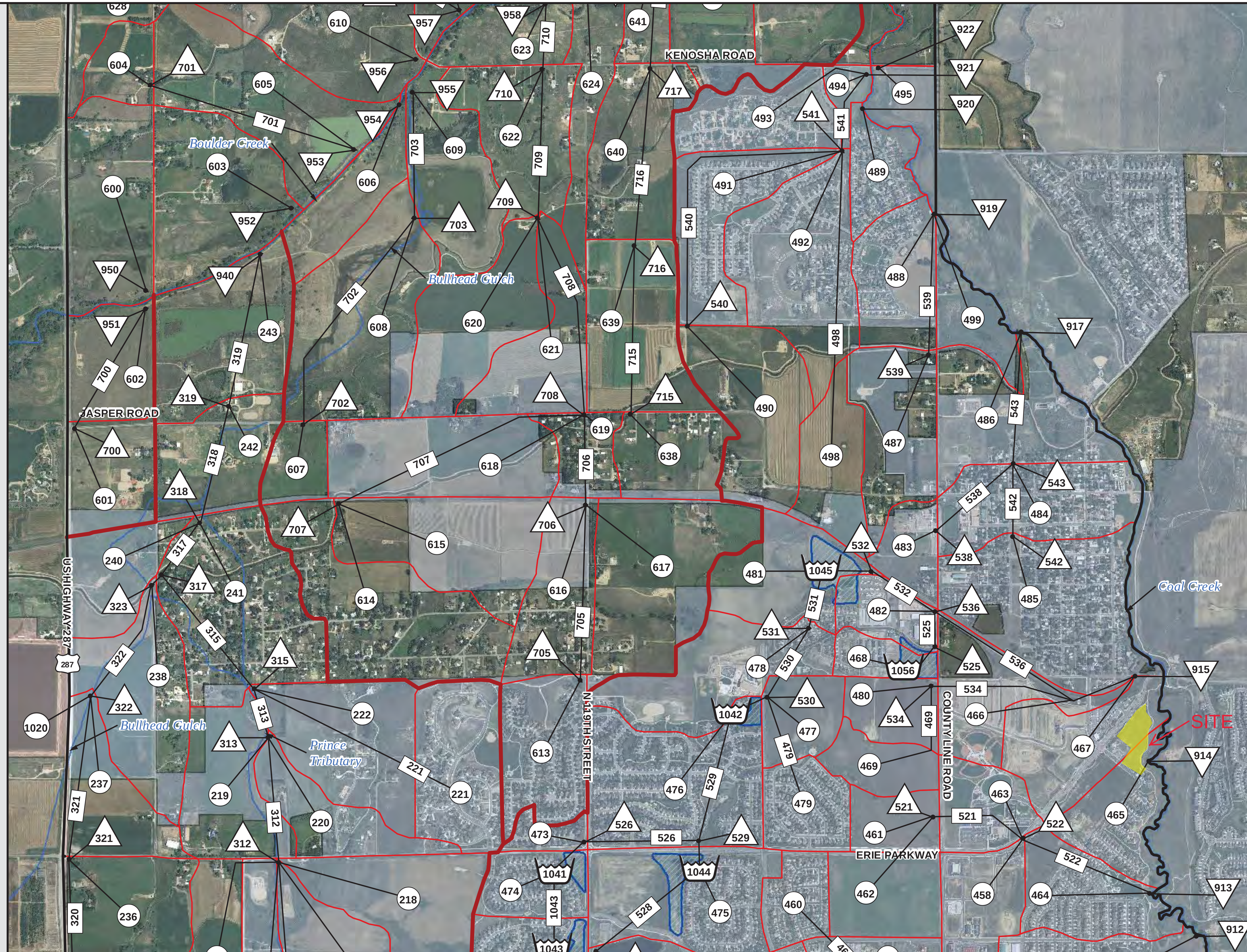
KEY MAP



N W E S

0 750 1,500 3,000 Feet

1 " = 1,500 FT



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TOWN OF ERIE
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

TOWN OF ERIE OUTFALL SYSTEMS PLAN
(WEST OF COAL CREEK)

SWMM ROUTING MAP

FIGURE
B-7

Table B-1
CUHP Input

Subbasin	Area (mi^2)	Distance to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness		Depression Storage		Horton's Infiltration Parameters		
					Existing Land Use	Future Land Use	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/sec)	Final Rate (in/hr)
424	0.100	0.259	0.608	0.024	2.0	3.7	0.38	0.10	4.50	0.0018	0.60
425	0.199	0.541	1.000	0.015	2.7	2.7	0.38	0.10	4.34	0.0018	0.59
426	0.120	0.539	0.911	0.013	49.0	49.0	0.38	0.10	4.14	0.0018	0.58
427	0.071	0.359	0.756	0.008	24.1	24.1	0.38	0.10	4.19	0.0018	0.58
428	0.008	0.056	0.136	0.021	31.0	31.0	0.38	0.10	4.44	0.0018	0.60
429	0.048	0.236	0.368	0.017	58.5	58.5	0.38	0.10	4.45	0.0018	0.60
430	0.173	0.378	0.724	0.024	10.8	10.8	0.38	0.10	4.50	0.0018	0.60
431	0.166	0.361	0.728	0.017	2.0	2.1	0.38	0.10	4.50	0.0018	0.60
432	0.105	0.198	0.511	0.013	11.4	32.2	0.38	0.10	4.50	0.0018	0.60
433	0.029	0.130	0.271	0.026	16.1	74.2	0.38	0.10	4.50	0.0018	0.60
435	0.088	0.236	0.545	0.021	2.2	2.2	0.38	0.10	4.50	0.0018	0.60
436	0.199	0.632	1.068	0.016	2.0	11.1	0.38	0.10	4.50	0.0018	0.60
437	0.043	0.097	0.253	0.029	2.0	66.2	0.38	0.10	4.50	0.0018	0.60
440	0.162	0.187	0.353	0.014	2.7	2.7	0.38	0.10	4.50	0.0018	0.60
441	0.065	0.229	0.520	0.014	2.0	2.0	0.38	0.10	4.50	0.0018	0.60
442	0.154	0.446	0.837	0.021	2.0	4.2	0.38	0.10	4.50	0.0018	0.60
443	0.033	0.347	0.634	0.027	2.0	2.8	0.38	0.10	4.50	0.0018	0.60
444	0.095	0.265	0.651	0.019	2.0	36.9	0.38	0.10	4.50	0.0018	0.60
445	0.022	0.096	0.241	0.030	2.0	77.7	0.38	0.10	4.50	0.0018	0.60
446	0.186	0.372	0.852	0.022	2.0	30.7	0.38	0.10	4.50	0.0018	0.60
447	0.026	0.134	0.283	0.025	2.0	74.9	0.38	0.10	4.50	0.0018	0.60
448	0.102	0.177	0.400	0.023	2.0	64.6	0.38	0.10	4.36	0.0018	0.59
449	0.137	0.436	0.673	0.011	19.9	71.5	0.38	0.10	4.49	0.0018	0.60
450	0.066	0.243	0.521	0.026	2.0	37.3	0.38	0.10	4.50	0.0018	0.60
451	0.178	0.237	0.545	0.033	2.0	71.7	0.38	0.10	4.50	0.0018	0.60
452	0.102	0.386	0.649	0.016	2.0	79.7	0.38	0.10	4.05	0.0018	0.57
453	0.073	0.282	0.592	0.015	2.1	38.8	0.38	0.10	4.49	0.0018	0.60
454	0.194	0.288	0.538	0.026	2.5	52.1	0.38	0.10	4.50	0.0018	0.60
455	0.101	0.393	0.734	0.020	39.6	39.6	0.38	0.10	4.50	0.0018	0.60
456	0.122	0.366	0.742	0.022	2.3	65.3	0.38	0.10	4.50	0.0018	0.60
457	0.082	0.170	0.465	0.019	33.4	34.4	0.38	0.10	4.50	0.0018	0.60
458	0.084	0.267	0.570	0.009	78.2	79.4	0.38	0.10	4.50	0.0018	0.60
459	0.134	0.294	0.623	0.013	30.1	30.1	0.38	0.10	4.25	0.0018	0.58
460	0.046	0.121	0.276	0.012	39.9	40.2	0.38	0.10	4.50	0.0018	0.60
461	0.044	0.159	0.294	0.028	2.4	79.5	0.38	0.10	4.50	0.0018	0.60
462	0.079	0.204	0.404	0.023	2.8	79.1	0.38	0.10	4.50	0.0018	0.60
463	0.064	0.175	0.355	0.010	45.3	50.1	0.38	0.10	4.50	0.0018	0.60
464	0.093	0.249	0.499	0.013	24.4	31.9	0.38	0.10	4.07	0.0018	0.57
465	0.080	0.166	0.388	0.018	16.2	42.2	0.38	0.10	4.50	0.0018	0.60
466	0.095	0.460	0.711	0.012	2.3	32.7	0.38	0.10	4.42	0.0018	0.59
467	0.107	0.320	0.627	0.012	10.9	45.6	0.38	0.10	4.17	0.0018	0.58

TRANSPORTATION CONSULTANTS, INC.

LSC TRANSPORTATION CONSULTANTS, INC.

1889 York Street
Denver, CO 80206
(303) 333-1105
FAX (303) 333-1107
E-mail: lsc@lscdenver.com

June 8, 2018

Ms. Cindy Myers
Century Communities
8390 E. Crescent Parkway, Suite 650
Greenwood Village, CO 80111

Re: Erie Commons - Filing 4
Traffic Impact Analysis
Erie, CO
LSC #170510

Dear Ms. Myers:

In response to your request, LSC Transportation Consultants, Inc. has prepared this updated traffic impact analysis for the proposed Erie Commons Filing 4 development to respond to Town comments. As shown on Figure 1, the site is located south of Erie Parkway and east of S. Briggs Street in Erie, Colorado.

REPORT CONTENTS

The report contains the following: the existing roadway and traffic conditions in the vicinity of the site including the lane geometries, traffic controls, posted speed limits, etc.; the existing weekday peak-hour traffic volumes; the existing daily traffic volumes in the area; the typical weekday site-generated traffic volume projections for the site; the assignment of the projected traffic volumes to the area roadways; the projected short-term and long-term background and resulting total traffic volumes on the area roadways; the site's projected traffic impacts; and any recommended roadway improvements to mitigate the site's traffic impacts.

LAND USE AND ACCESS

The site is proposed to include about 83 townhome dwelling units. Access is proposed from one existing right-in/right-out access to Erie Parkway and one existing and one proposed full movement access to S. Briggs Street as shown in the conceptual site plan in Figure 2.

ROADWAY AND TRAFFIC CONDITIONS

Area Roadways

The major roadways in the site's vicinity are shown on Figure 1 and are described below.

- **Erie Parkway** is an east-west, four-lane, minor arterial roadway north of the site. The intersection with S. Briggs Street is signalized with auxiliary turn lanes. The posted speed limit in the vicinity of the site is 40 mph. The 2030 Roadway System Plan in the *Town of Erie Master Transportation Plan* shows Erie Parkway as a four-lane principal arterial. The *Buildout Roadway Network* shows a six-lane principal arterial.

- **S. Briggs Street** is a north-south, two-lane roadway east of the site. The intersection with Erie Parkway is signalized. The posted speed limit is 25 mph.

Existing Traffic Conditions

Figure 3 shows the existing lane geometries, traffic controls, posted speed limits, and traffic volumes in the site's vicinity on a typical weekday. The weekday peak-hour traffic volumes and daily traffic counts are from the attached traffic counts conducted by Counter Measures in June, 2016. The Blue Mountain Montessori Pre-School on Briggs Street was out of session when the traffic counts were conducted. The trip generation potential from a 60-student pre-school was included in the 2020 and 2037 background traffic estimates. Updated traffic counts were conducted at the school access on Briggs Street in April, 2018 which confirmed the estimated trip assumption was appropriate.

2020 and 2037 Background Traffic

Figure 4 shows the estimated 2020 background traffic and Figure 5 shows the estimated 2037 background traffic. The projected 2020 and 2037 background traffic volumes are based on an annual growth rate of four percent for the peak direction Erie Parkway through movements and five percent for the off-peak direction Erie Parkway through movements. Low growth was assumed on all side roads with higher growth assumed on Briggs Street north of Erie Parkway consistent with prior studies in the area. Both Figures 4 and 5 assume the development of the vacant property southwest of the site and the vacant property west of the site across Erie Parkway.

Existing, 2020, and 2037 Background Levels of Service

Level of service (LOS) is a quantitative measure of the level of congestion or delay at an intersection. Level of service is indicated on a scale from "A" to "F." LOS A is indicative of little congestion or delay and LOS F is indicative of a high level of congestion or delay. Attached are specific level of service definitions for signalized and unsignalized intersections.

The intersections in Figures 3, 4, and 5 were analyzed as appropriate to determine the existing, 2020, and 2037 background levels of service using Synchro. Table 1 shows the level of service analysis results. The level of service reports are attached.

- **Erie Parkway/S. Briggs Street:** This signalized intersection currently operates at an overall LOS "A" during both morning and afternoon peak-hours. By 2020, the intersection is expected to operate at LOS "B" during both peak-hours. By 2037, the intersection is expected to operate at LOS "C" during the afternoon peak-hour.

- **S. Briggs Street/North Site Access:** All movements at this unsignalized intersection currently operate at LOS "A" during both morning and afternoon peak-hours. By 2020, all movements are expected to operate at LOS "B" or better and are expected to do so through 2037.

TRIP GENERATION

Table 2 shows the estimated average weekday, morning peak-hour, and afternoon peak-hour trip generation for the proposed site based on the rates from *Trip Generation, 9th Edition, 2012* by the Institute of Transportation Engineers (ITE) for the proposed land use.

The proposed land use is projected to generate about 482 one-way vehicle-trips on the average weekday, with about half entering and half exiting during a 24-hour period. During the morning peak-hour, which generally occurs for one hour between 6:30 and 8:30 a.m., about six vehicles would enter and about 30 vehicles would exit the site. During the afternoon peak-hour, which generally occurs for one hour between 4:00 and 6:00 p.m., about 29 vehicles would enter and about 14 vehicles would exit.

TRIP DISTRIBUTION

Figure 6 shows the estimated directional distribution of the site-generated traffic volumes on the area roadways. The estimates were based on the location of the site with respect to the regional population, employment, and activity centers; and the site's proposed land use.

TRIP ASSIGNMENT

Figure 7 shows the estimated site-generated traffic volumes based on the directional distribution percentages (from Figure 6) and the trip generation estimate (from Table 2).

2020 and 2037 TOTAL TRAFFIC

Figure 8 shows the 2020 total traffic which is the sum of the 2020 background traffic volumes (from Figure 4) and the site-generated traffic volumes (from Figure 7). Figure 8 also shows the recommended 2020 lane geometry and traffic control.

Figure 9 shows the 2037 total traffic which is the sum of 2037 background traffic volumes (from Figure 5) and the site-generated traffic volumes (from Figure 7). Figure 9 also shows the recommended 2037 lane geometry and traffic control.

PROJECTED LEVELS OF SERVICE

The intersections in Figures 8 and 9 were analyzed to determine the 2020 and 2037 total levels of service. Table 1 shows the level of service analysis results. The level of service reports are attached.

- **Erie Parkway/RIRO Site Access:** All movements at this unsignalized intersection are expected to operate at LOS "C" or better during both morning and afternoon peak-hours through 2037.

- **Erie Parkway/S. Briggs Street:** This signalized intersection is expected to operate at an overall LOS “B” during both morning and afternoon peak-hours through 2020. By 2037, the intersection is expected to operate at LOS “B” during the morning peak-hour and LOS “C” during the afternoon peak-hour.

- **S. Briggs Street/North Site Access:** All movements at this unsignalized intersection are expected to operate at LOS “B” or better through 2037.

- **S. Briggs Street/South Site Access:** All movements at this unsignalized intersection are expected to operate at LOS “A” through 2037.

CONCLUSIONS AND RECOMMENDATIONS

Trip Generation

1. The proposed land use is projected to generate about 482 one-way vehicle-trips on the average weekday, with about half entering and half exiting during a 24-hour period. During the morning peak-hour, about six vehicles would enter and about 30 vehicles would exit the site. During the afternoon peak-hour, about 29 vehicles would enter and about 14 vehicles would exit.

Projected Levels of Service

2. All movements at the intersections analyzed are expected to operate at acceptable levels of service during both morning and afternoon peak-hours through 2037.

Conclusions

3. The impact of the Erie Commons - Filing 4 development can be accommodated by the existing roadway network.

Recommendations

4. The proposed access to Erie Parkway should be stop-sign controlled.

* * * * *

We trust our findings will assist you in gaining approval of the proposed Erie Commons - Filing 4 development. Please contact me if you have any questions or need further assistance.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

COLORADO LICENSED
CHRISTOPHER S. MCGRANAHAN
39018
PROFESSIONAL ENGINEER

By________________________
Christopher S. McGranahan, PE, PTOE
Principal

6-8-18

CSM/wc

Enclosures: Tables 1 and 2
Figures 1 - 9
Traffic Count Reports
Level of Service Definitions
Level of Service Reports

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Table 1
Intersection Levels of Service Analysis
Erie Commons Filing 4
Erie, CO
LSC #170510; June, 2018

Intersection Location	Traffic Control	Existing Traffic Level of Service AM	Existing Traffic Level of Service PM	2020 Background Traffic Level of Service AM	2020 Background Traffic Level of Service PM	2020 Total Traffic Level of Service AM	2020 Total Traffic Level of Service PM	2037 Background Traffic Level of Service AM	2037 Background Traffic Level of Service PM	2037 Total Traffic Level of Service AM	2037 Total Traffic Level of Service PM
Erie Parkway/RIRO Site Access	TWSC										
NWB Right		--	--	--	--	A	B	--	--	B	C
Critical Movement Delay		--	--	--	--	9.9	12.9	--	--	11.6	21.2
Erie Parkway/S. Briggs Street	Signalized										
SEB Left		C	C	C	C	C	C	C	C	C	C
SEB Through/Right		D	C	C	C	C	C	C	C	C	C
NWB Left		D	D	C	C	C	C	C	C	C	C
NWB Through/Right		C	C	C	C	C	C	C	C	C	C
NEB Left		A	A	B	B	B	B	B	B	B	B
NEB Through		A	A	A	A	A	A	A	C	A	C
NEB Right		A	A	A	A	A	A	A	A	A	A
SWB Left		A	A	b	B	A	B	A	B	A	B
SWB Through		A	A	A	A	A	A	B	B	B	B
SWB Right		A	A	A	A	A	A	A	B	A	B
Entire Intersection Delay (sec /veh)		8.5	7.7	12.1	11.9	12.5	12.1	17.6	20.7	17.9	22.1
Entire Intersection LOS		A	A	B	B	B	B	B	C	B	C
Briggs Street/North Site Access	TWSC										
NEB Approach		--	--	B	B	B	B	B	B	B	B
NWB Approach		--	--	A	A	A	A	A	A	A	A
SEB Approach		A	A	--	--	--	--	--	--	--	--
SWB Approach		A	A	A	A	A	A	A	A	A	A
Critical Movement Delay		8.5	8.5	11.6	11.6	12.1	12.5	11.6	11.6	12.1	12.5
Briggs Street/South Site Access	TWSC										
SEB Approach		--	--	--	--	A	A	--	--	A	A
SWB Approach		--	--	--	--	A	A	--	--	A	A
Critical Movement Delay		--	--	--	--	8.5	8.6	--	--	8.5	8.6

Table 2
ESTIMATED TRAFFIC GENERATION
Erie Commons - Filing 4
Erie, CO
LSC #170510; June, 2018

		Trip Generation Rates [1]					Vehicle-Trips Generated				
		Average	AM Peak-Hour		PM Peak-Hour		Average	AM Peak-Hour		PM Peak-Hour	
Trip Generating Category	Quantity	Weekday	In	Out	In	Out	Weekday	In	Out	In	Out
Townhomes [2]	83 DU [3]	5.81	0.075	0.365	0.348	0.172	482	6	30	29	14

Notes:
(1) Source: *Trip Generation*, Institute of Transportation Engineers, 9th Edition, 2012.
(2) ITE Land Use No. 230 - Residential Condominium/Townhouse.
(3) DU - Dwelling Units

Figure 1

Vicinity Map

Erie Commons Filing 4 (LSC #170510)

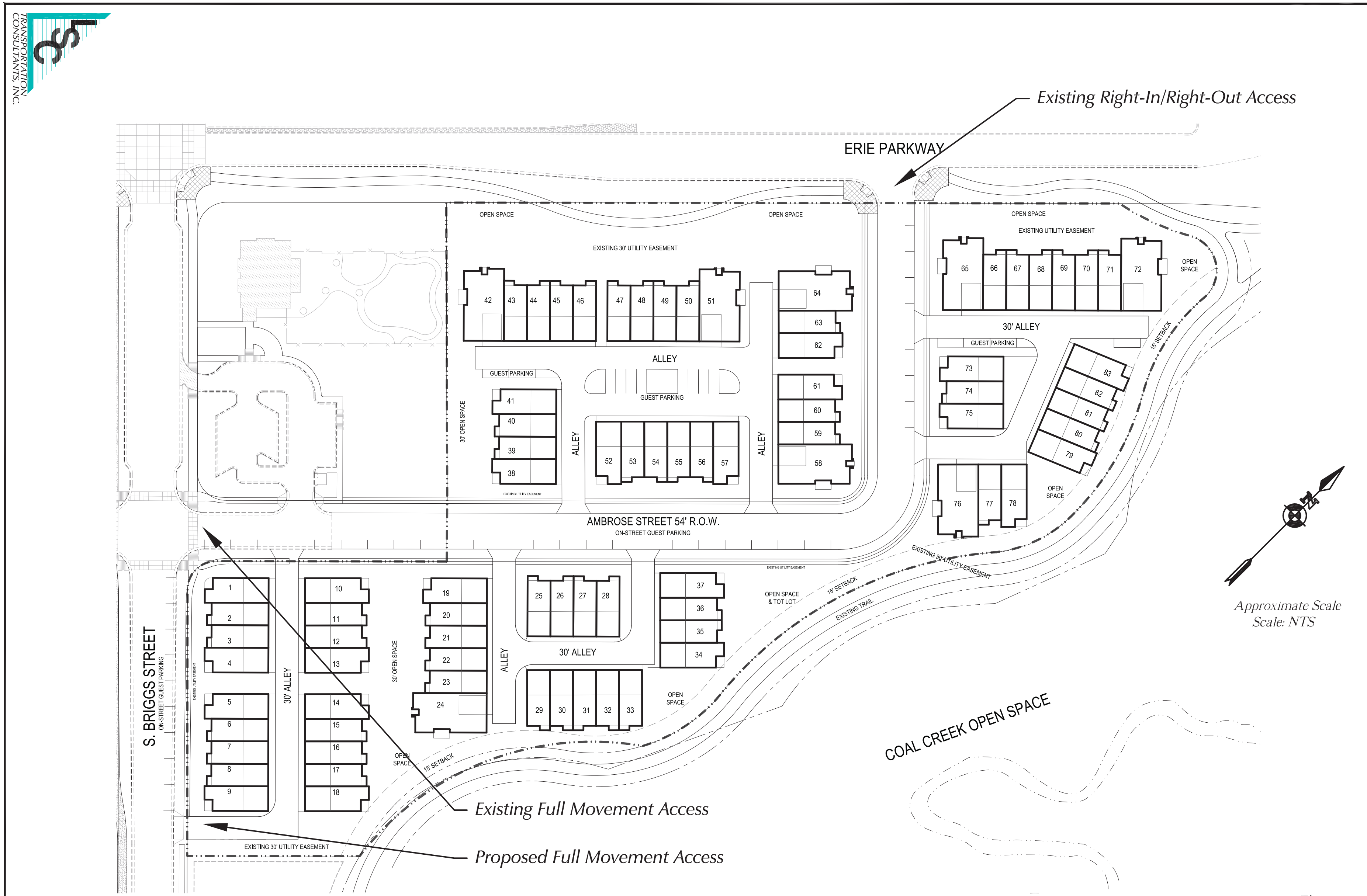
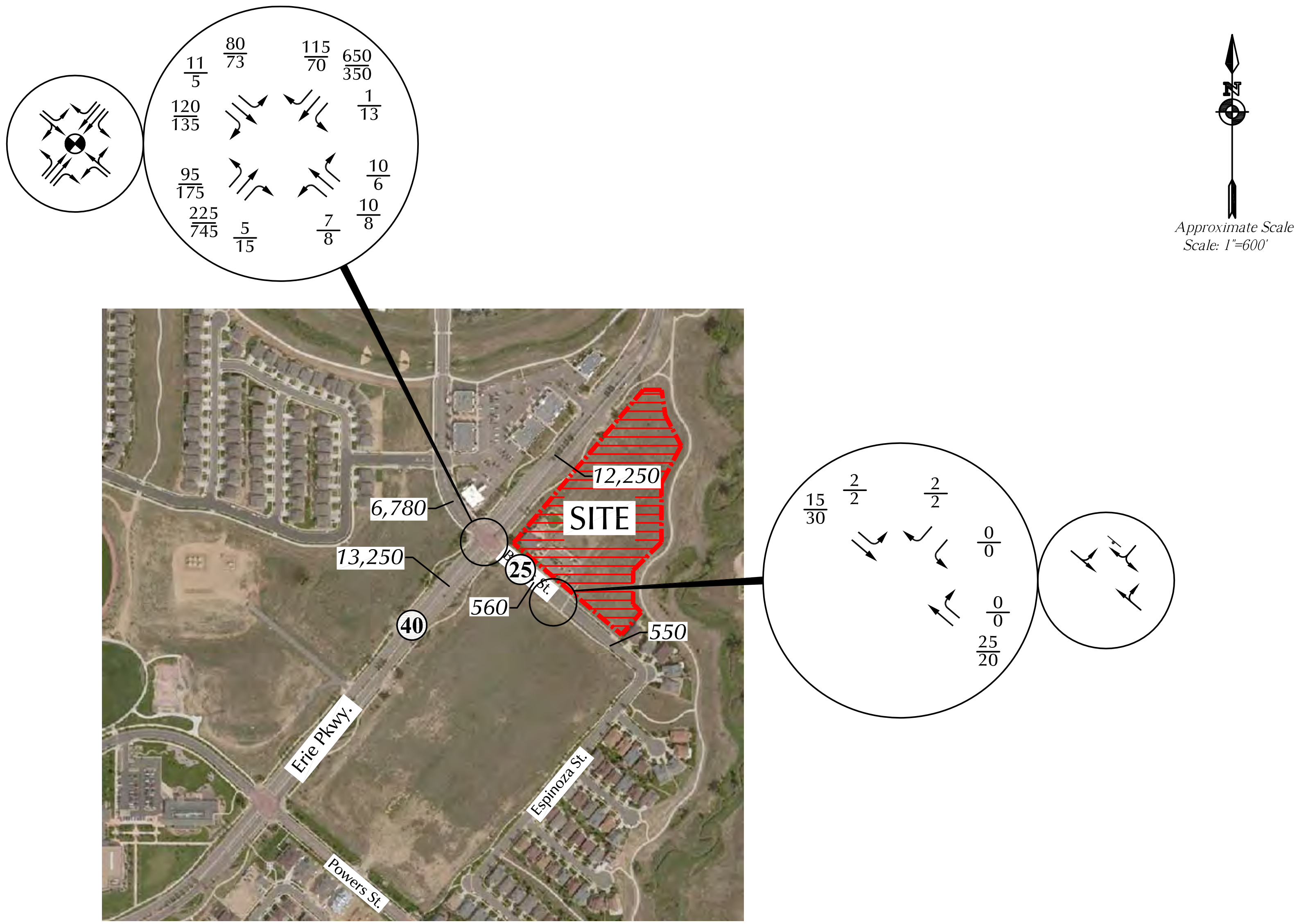


Figure 2

Site Plan

Erie Commons Filing 4 (LSC #170510)



LEGEND:

= Stop Sign

= Traffic Signal

(30) = Speed Limit

26/35 = AM Peak Hour Traffic / PM Peak Hour Traffic

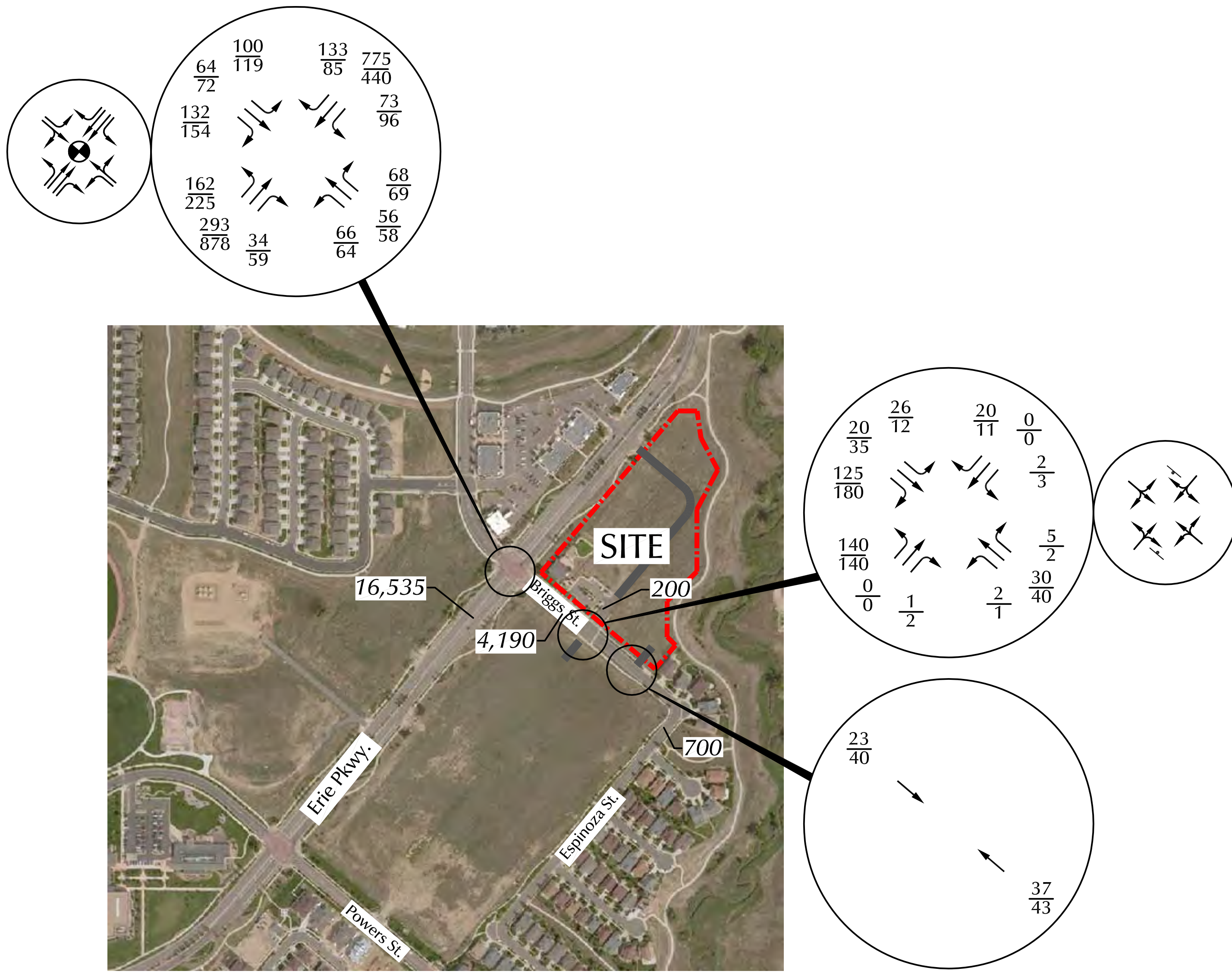
1,000 = Average Daily Traffic

Note: Traffic counts were conducted in the summer of 2016 when the Blue Mountain Montessori Preschool on Briggs Street was out of session. Estimated traffic from the 60 student school is included in the 2020 and 2037 background traffic. Updated traffic counts in April, 2018 confirmed the estimated trip assignment was appropriate.

Figure 3

Existing Traffic, Lane Geometry and Traffic Control

Erie Commons Filing 4 (LSC #170510)



LEGEND:

= Stop Sign

= Traffic Signal

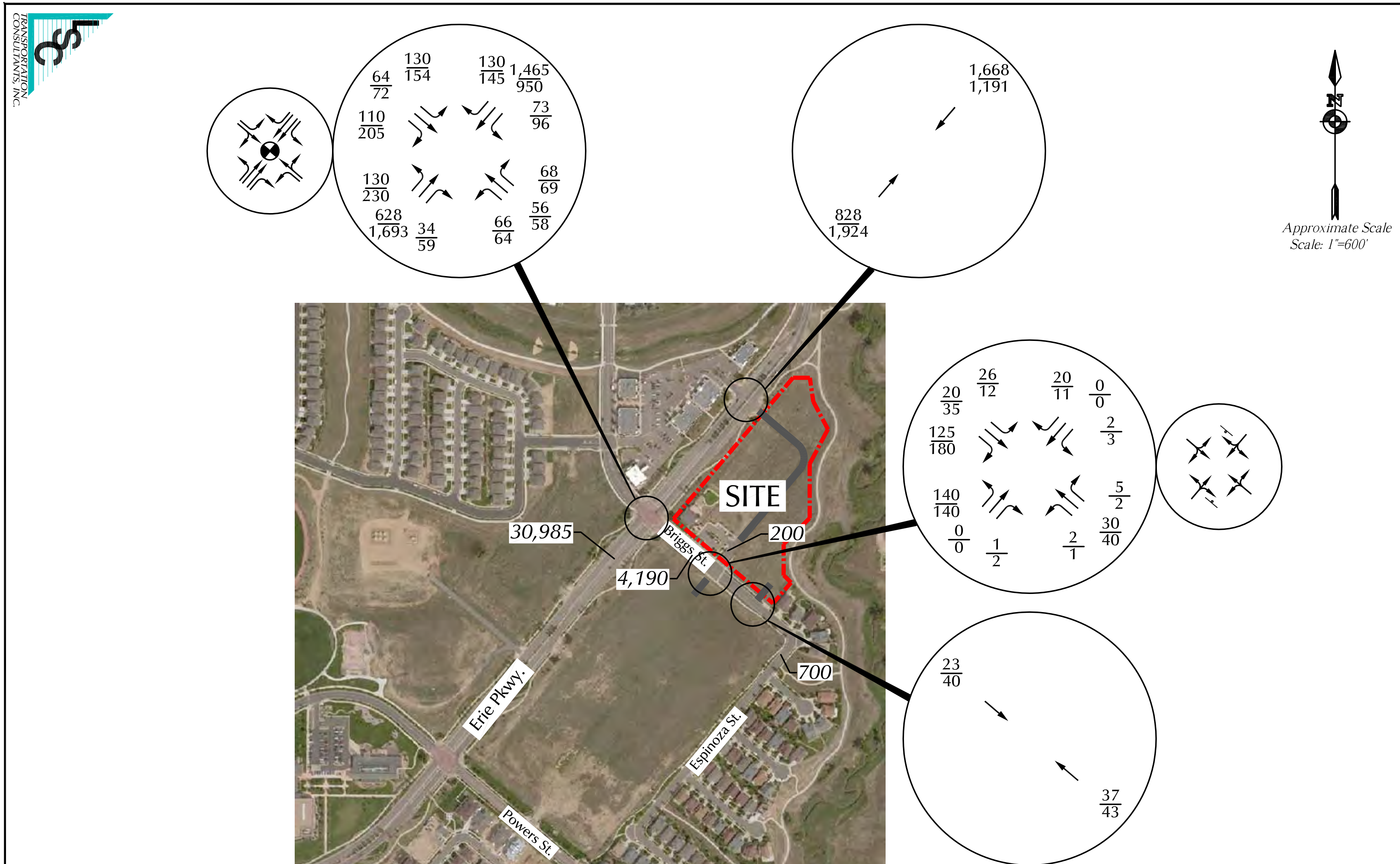
26/35 = AM Peak Hour Traffic / PM Peak Hour Traffic

1,000 = Average Daily Traffic

Figure 4

Year 2020 Background Traffic, Lane Geometry and Traffic Control

Erie Commons Filing 4 (LSC #170510)



LEGEND:

= Stop Sign

= Traffic Signal

$\frac{26}{35}$ = $\frac{\text{AM Peak Hour Traffic}}{\text{PM Peak Hour Traffic}}$

1,000 = Average Daily Traffic

Figure 5

Year 2037 Background Traffic, Lane Geometry and Traffic Control

Erie Commons Filing 4 (LSC #170510)

Approximate Scale
Scale: 1"=1,200'

LEGEND:

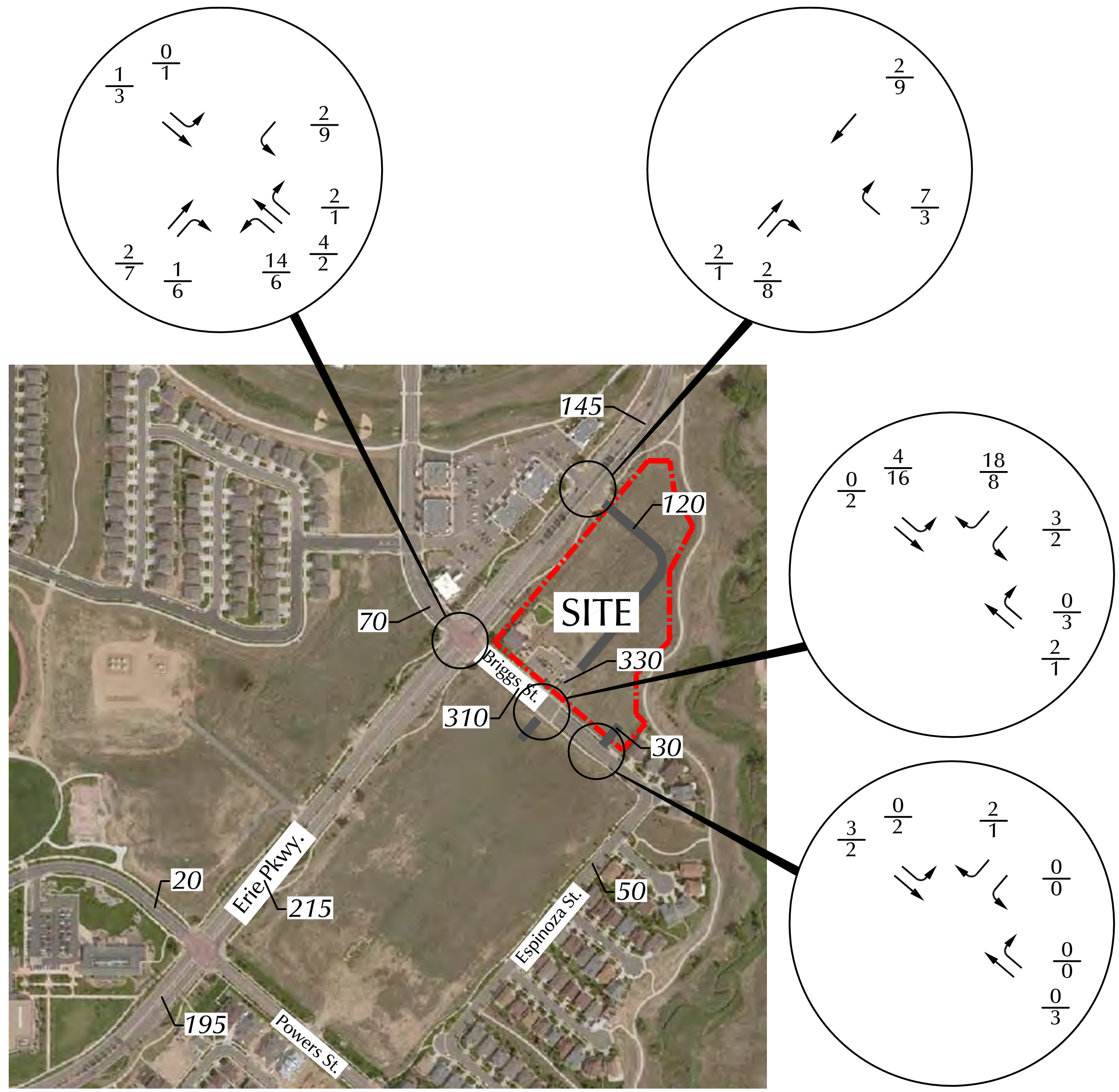
5% = Residential Percent Directional Distribution

Figure 6

Directional Distribution of Site-Generated Traffic

Erie Commons Filing 4 (LSC #170510)

TRANSPORTATION CONSULTANTS, INC.



Approximate Scale
Scale: 1"=600'

LEGEND:

26/35 = AM Peak Hour Traffic / PM Peak Hour Traffic

1,000 = Average Daily Traffic

Figure 7

Assignment of Site-Generated Traffic

Erie Commons Filing 4 (LSC #170510)

LEGEND:

| = Stop Sign

= Traffic Signal

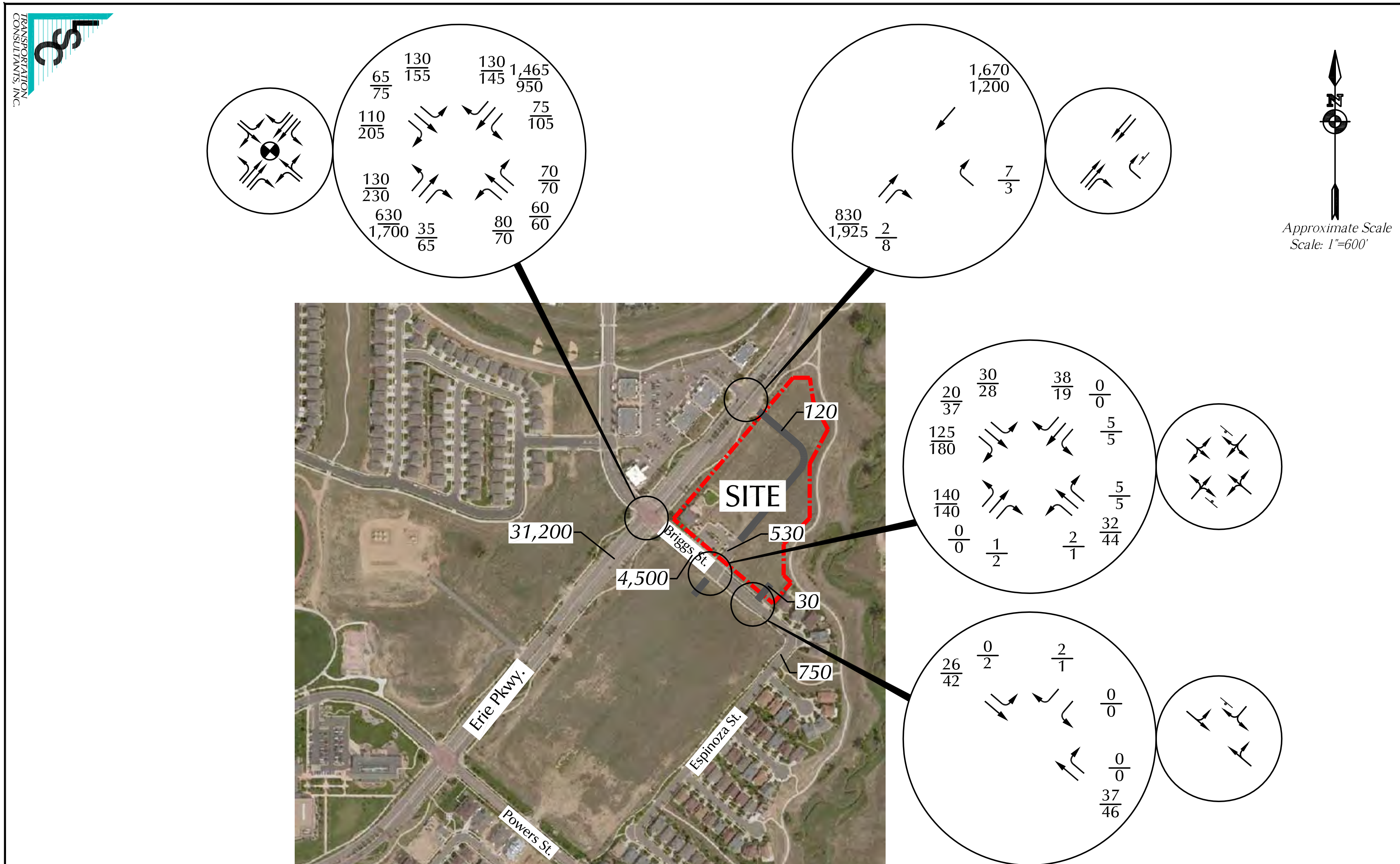
26/35 = AM Peak Hour Traffic / PM Peak Hour Traffic

1,000 = Average Daily Traffic

Figure 8

Year 2020 Total Traffic, Lane Geometry and Traffic Control

Erie Commons Filing 4 (LSC #170510)



LEGEND:

= Stop Sign

= Traffic Signal

26/35 = AM Peak Hour Traffic / PM Peak Hour Traffic

1,000 = Average Daily Traffic

Figure 9

Year 2037 Total Traffic, Lane Geometry and Traffic Control

Erie Commons Filing 4 (LSC #170510)

COUNTER MEASURES INC.
1889 YORK STREET
DENVER.COLORADO
303-333-7409

N/S STREET: BRIGGS ST
E/W STREET: ERIE PKWY
CITY: ERIE
COUNTY: WELD

File Name : BRIGERIE
Site Code : 00000010
Start Date : 6/28/2016
Page No : 1

Groups Printed- VEHICLES

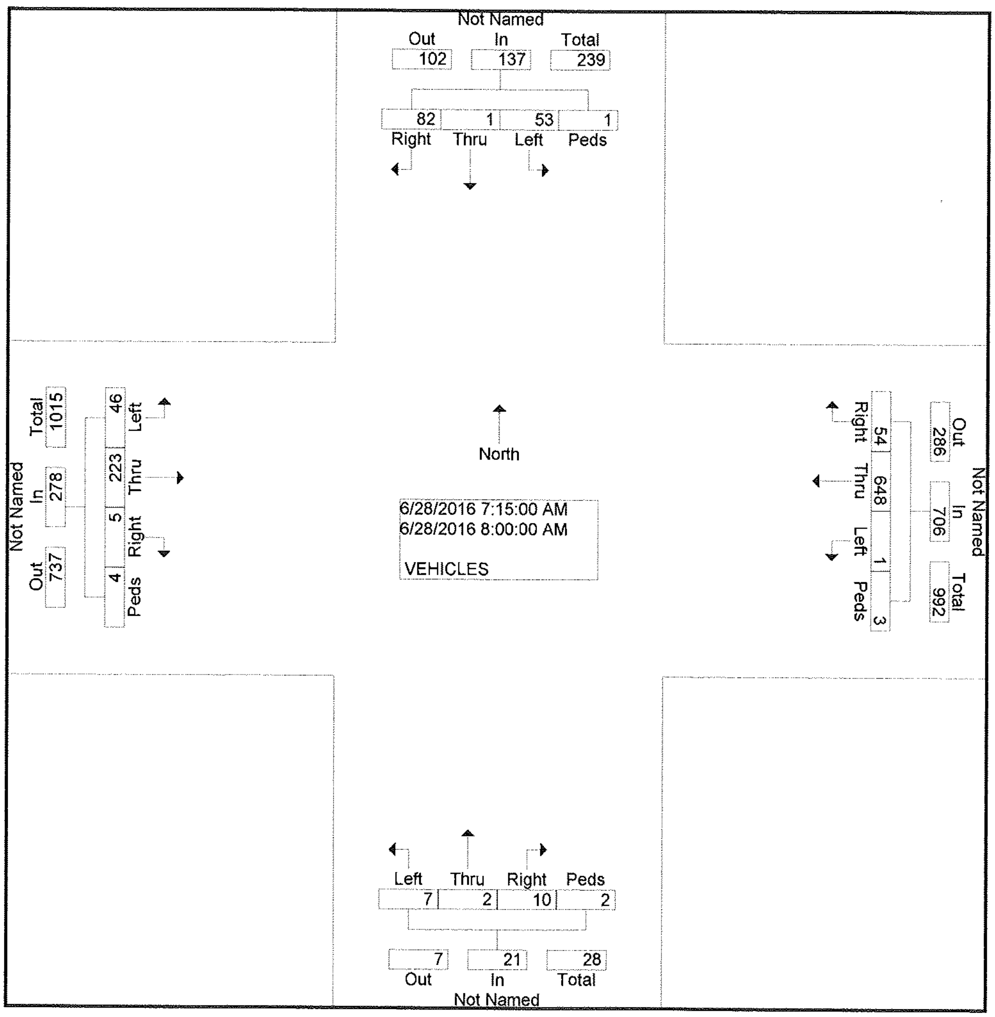
	Southbound				Westbound				Northbound				Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:30 AM	10	0	16	0	1	130	4	1	1	0	1	0	3	44	0	0	211
06:45 AM	14	1	13	0	1	167	9	1	3	0	2	0	5	65	0	1	282
Total	24	1	29	0	2	297	13	2	4	0	3	0	8	109	0	1	493
07:00 AM	10	1	19	2	1	113	11	0	5	1	6	0	7	33	0	1	210
07:15 AM	10	0	16	0	0	137	8	1	1	1	3	0	8	58	1	2	246
07:30 AM	13	0	19	0	1	199	13	0	3	1	3	0	11	58	1	2	324
07:45 AM	8	1	26	1	0	184	16	0	0	0	3	0	14	62	2	0	317
Total	41	2	80	3	2	633	48	1	9	3	15	0	40	211	4	5	1097
08:00 AM	22	0	21	0	0	128	17	2	3	0	1	2	13	45	1	0	255
08:15 AM	10	0	15	2	0	115	10	0	1	1	5	0	17	70	2	1	249
Total	32	0	36	2	0	243	27	2	4	1	6	2	30	115	3	1	504
04:00 PM	12	0	36	0	0	70	13	0	1	0	1	0	30	121	2	0	286
04:15 PM	20	3	34	0	0	64	18	0	0	1	2	0	28	160	4	0	334
04:30 PM	20	2	29	2	0	75	19	0	1	2	2	0	28	148	3	0	331
04:45 PM	19	0	34	0	3	86	23	1	2	0	0	0	47	135	4	1	355
Total	71	5	133	2	3	295	73	1	4	3	5	0	133	564	13	1	1306
05:00 PM	20	2	43	0	8	88	12	0	4	0	3	0	59	187	3	0	429
05:15 PM	22	0	37	0	1	90	18	1	2	0	1	0	43	204	2	2	423
05:30 PM	14	0	26	1	1	103	13	1	1	2	0	0	37	180	4	0	383
05:45 PM	17	0	29	0	3	67	15	0	1	1	2	0	34	173	6	0	348
Total	73	2	135	1	13	348	58	2	8	3	6	0	173	744	15	2	1583
Grand Total	241	10	413	8	20	1816	219	8	29	10	35	2	384	1743	35	10	4983
Apprch %	35.9	1.5	61.5	1.2	1.0	88.0	10.6	0.4	38.2	13.2	46.1	2.6	17.7	80.2	1.6	0.5	
Total %	4.8	0.2	8.3	0.2	0.4	36.4	4.4	0.2	0.6	0.2	0.7	0.0	7.7	35.0	0.7	0.2	

COUNTER MEASURES INC.
1889 YORK STREET
DENVER.COLORADO
303-333-7409

N/S STREET: BRIGGS ST
E/W STREET: ERIE PKWY
CITY: ERIE
COUNTY: WELD

File Name : BRIGERIE
Site Code : 00000010
Start Date : 6/28/2016
Page No : 2

	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Intersection	07:15 AM																				
Volume	53	1	82	1	137	1	648	54	3	706	7	2	10	2	21	46	223	5	4	278	1142
Percent	38.7	0.7	59.9	0.7		0.1	91.8	7.6	0.4		33.3	9.5	47.6	9.5		16.5	80.2	1.8	1.4		
07:30 Volume	13	0	19	0	32	1	199	13	0	213	3	1	3	0	7	11	58	1	2	72	324
Peak Factor																					0.881
High Int.	08:00 AM					07:30 AM					07:30 AM					07:45 AM					
Volume	22	0	21	0	43	1	199	13	0	213	3	1	3	0	7	14	62	2	0	78	
Peak Factor					0.797					0.829					0.750					0.891	

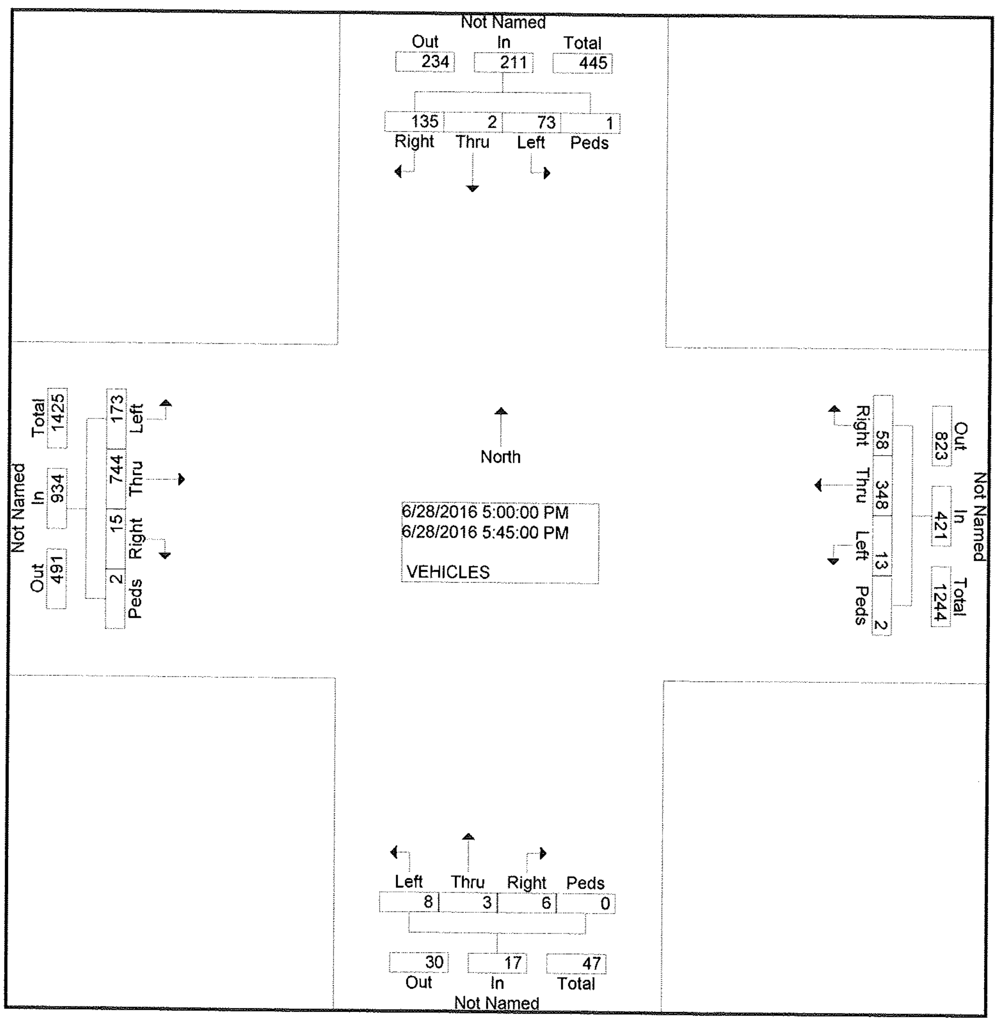


COUNTER MEASURES INC.
1889 YORK STREET
DENVER.COLORADO
303-333-7409

N/S STREET: BRIGGS ST
E/W STREET: ERIE PKWY
CITY: ERIE
COUNTY: WELD

File Name : BRIGERIE
Site Code : 00000010
Start Date : 6/28/2016

	Southbound					Westbound					Northbound					Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 05:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	05:00 PM																				
Volume	73	2	135	1	211	13	348	58	2	421	8	3	6	0	17	173	744	15	2	934	1583
Percent	34.6	0.9	64.0	0.5		3.1	82.7	13.8	0.5		47.1	17.6	35.3	0.0		18.5	79.7	1.6	0.2		
05:00 Volume	20	2	43	0	65	8	88	12	0	108	4	0	3	0	7	59	187	3	0	249	429
Peak Factor																					0.922
High Int.	05:00 PM					05:30 PM					05:00 PM					05:15 PM					
Volume	20	2	43	0	65	1	103	13	1	118	4	0	3	0	7	43	204	2	2	251	
Peak Factor					0.812					0.892					0.607					0.930	



COUNTER MEASURES INC.

1889 YORK STREET
DENVER.COLORADO
303-333-7409

N/S STREET: BRIGGS ST
E/W STREET: SCHOOL ACCESS
CITY: ERIE
COUNTY: WELD

File Name : BRIGSCHO
Site Code : 00000011
Start Date : 6/28/2016
Page No : 1

Groups Printed- VEHICLES

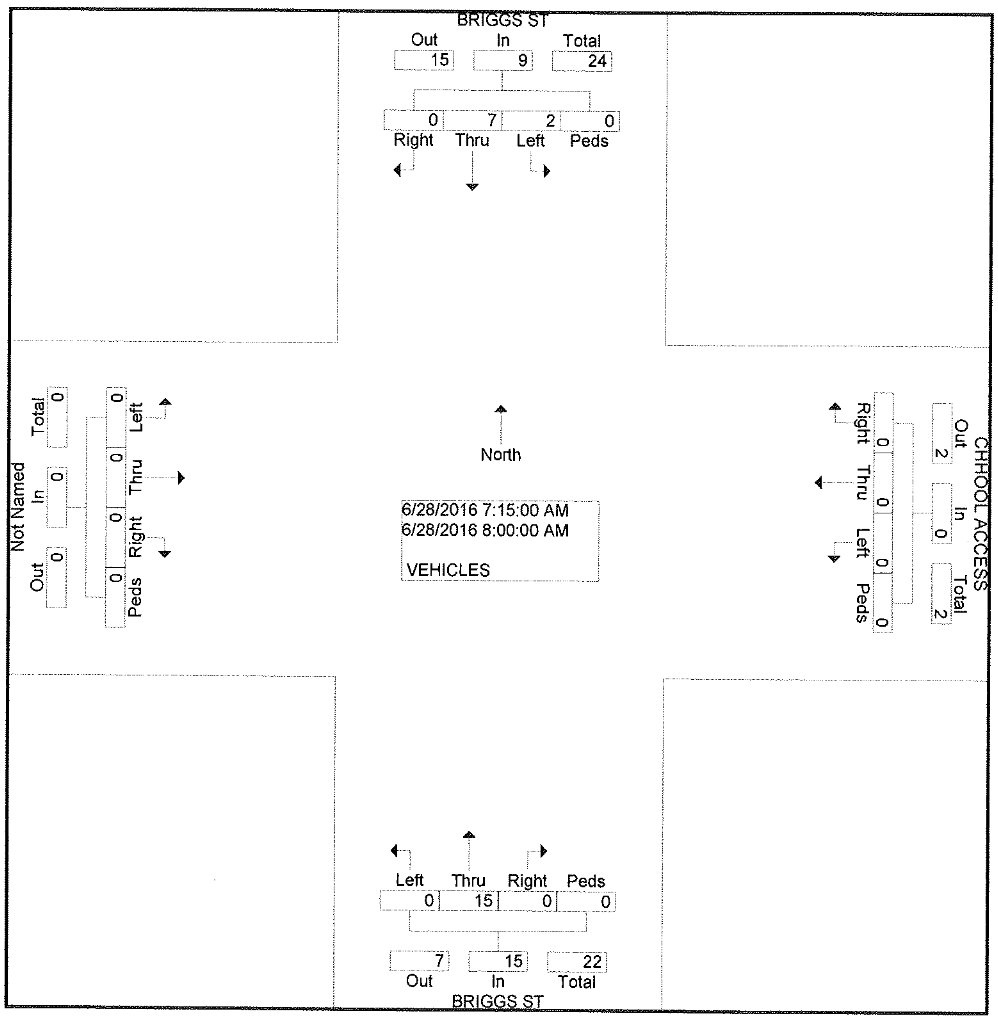
	BRIGGS ST Southbound				CHHOOL ACCESS Westbound				BRIGGS ST Northbound				Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:30 AM	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3
06:45 AM	0	2	0	0	0	0	0	0	0	8	0	0	0	0	0	0	10
Total	0	3	0	0	0	0	0	0	0	10	0	0	0	0	0	0	13
07:00 AM	0	2	0	0	0	0	0	0	0	13	0	0	0	0	0	0	15
07:15 AM	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4
07:30 AM	0	2	0	0	0	0	0	0	0	6	0	0	0	0	0	0	8
07:45 AM	1	2	0	0	0	0	0	0	0	4	0	0	0	0	0	0	7
Total	1	8	0	0	0	0	0	0	0	25	0	0	0	0	0	0	34
08:00 AM	1	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	5
08:15 AM	1	0	0	0	0	0	1	0	0	6	0	0	0	0	0	0	8
Total	2	1	0	0	0	0	1	0	0	9	0	0	0	0	0	0	13
04:00 PM	0	3	0	0	1	0	0	0	0	2	0	0	0	0	0	0	6
04:15 PM	0	6	0	0	0	0	0	0	0	3	0	0	0	0	0	0	9
04:30 PM	0	4	0	0	0	0	0	0	0	5	0	0	0	0	0	0	9
04:45 PM	0	8	0	0	0	0	0	0	0	4	0	0	0	0	0	0	12
Total	0	21	0	0	1	0	0	0	0	14	0	0	0	0	0	0	36
05:00 PM	1	11	0	0	0	0	0	0	0	6	0	0	0	0	0	0	18
05:15 PM	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	5
05:30 PM	0	5	0	1	0	0	0	0	0	3	0	0	0	0	0	0	9
05:45 PM	0	8	0	0	0	0	0	0	0	4	0	0	0	0	0	0	12
Total	1	26	0	1	0	0	0	0	0	16	0	0	0	0	0	0	44
Grand Total	4	59	0	1	1	0	1	0	0	74	0	0	0	0	0	0	140
Apprch %	6.3	92.2	0.0	1.6	50.0	0.0	50.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	2.9	42.1	0.0	0.7	0.7	0.0	0.7	0.0	0.0	52.9	0.0	0.0	0.0	0.0	0.0	0.0	

N/S STREET: BRIGGS ST
E/W STREET: SCHOOL ACCESS
CITY: ERIE
COUNTY: WELD

COUNTER MEASURES INC.
1889 YORK STREET
DENVER.COLORADO
303-333-7409

File Name : BRIGSCHO
Site Code : 00000011
Start Date : 6/28/2016
Page No : 2

	BRIGGS ST Southbound					CHHOOL ACCESS Westbound					BRIGGS ST Northbound					Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Intersection	07:15 AM																				
Volume	2	7	0	0	9	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	24
Percent	22.2	77.8	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
07:30 Volume	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	8
Peak Factor																					0.750
High Int.	07:45 AM										07:30 AM										
Volume	1	2	0	0	3	0	0	0	0	0	0	6	0	0	6						
Peak Factor					0.750										0.625						



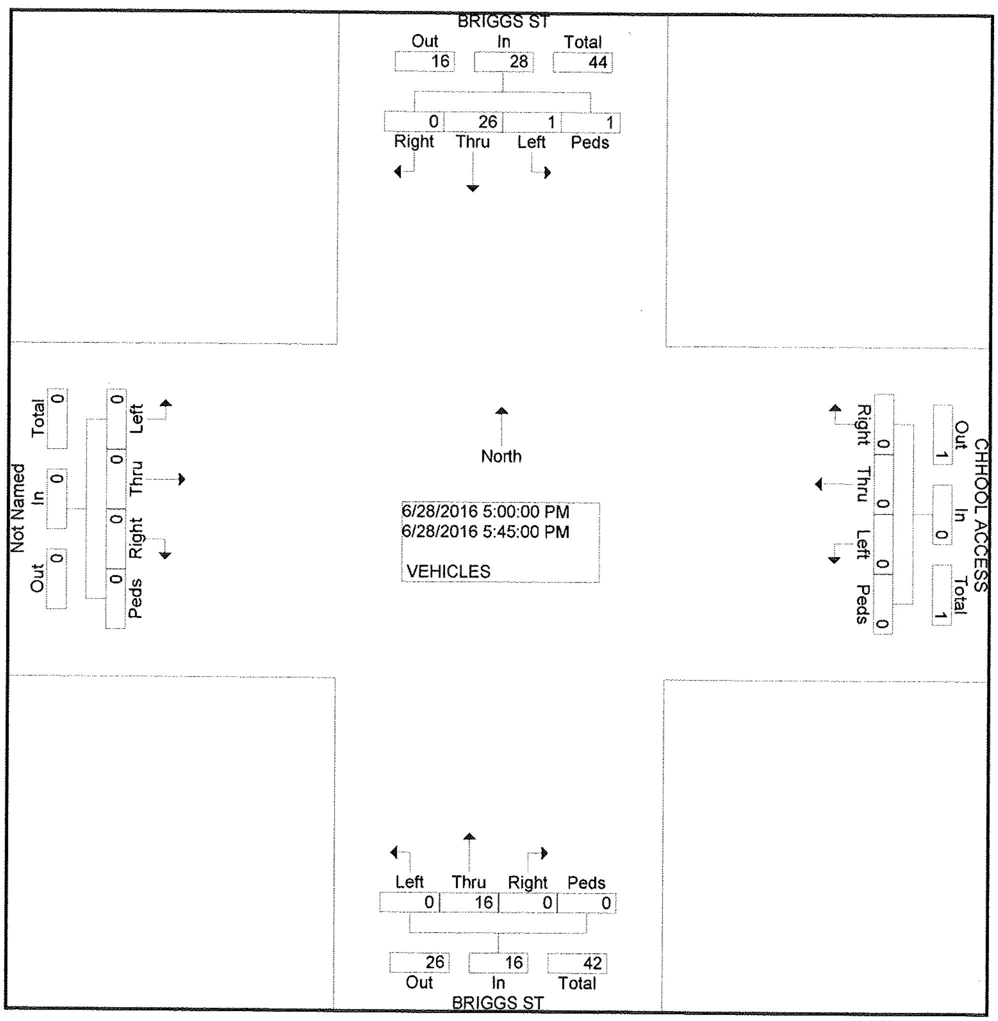
N/S STREET: BRIGGS ST
E/W STREET: SCHOOL ACCESS
CITY: ERIE
COUNTY: WELD

COUNTER MEASURES INC.

1889 YORK STREET
DENVER.COLORADO
303-333-7409

File Name : BRIGSCHO
Site Code : 00000011
Start Date : 6/28/2016

	BRIGGS ST Southbound					CHHOOL ACCESS Westbound					BRIGGS ST Northbound					Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 05:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	05:00 PM																				
Volume	1	26	0	1	28	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	44
Percent	3.6	92.9	0.0	3.6		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
05:00 Volume	1	11	0	0	12	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	18
Peak Factor																					0.611
High Int.	05:00 PM										05:00 PM										
Volume	1	11	0	0	12	0	0	0	0	0	0	6	0	0	6						
Peak Factor					0.583										0.667						



N/S STREET: MONTESSORI ACCESS
E/W STREET: BRIGGS ST
CITY: ERIE
COUNTY: WELD

COUNTER MEASURES INC.
1889 YORK STREET
DENVER.COLORADO
303-333-7409

File Name : MONTBRIG
Site Code : 00000014
Start Date : 4/3/2018
Page No : 1

Groups Printed- VEHICLES

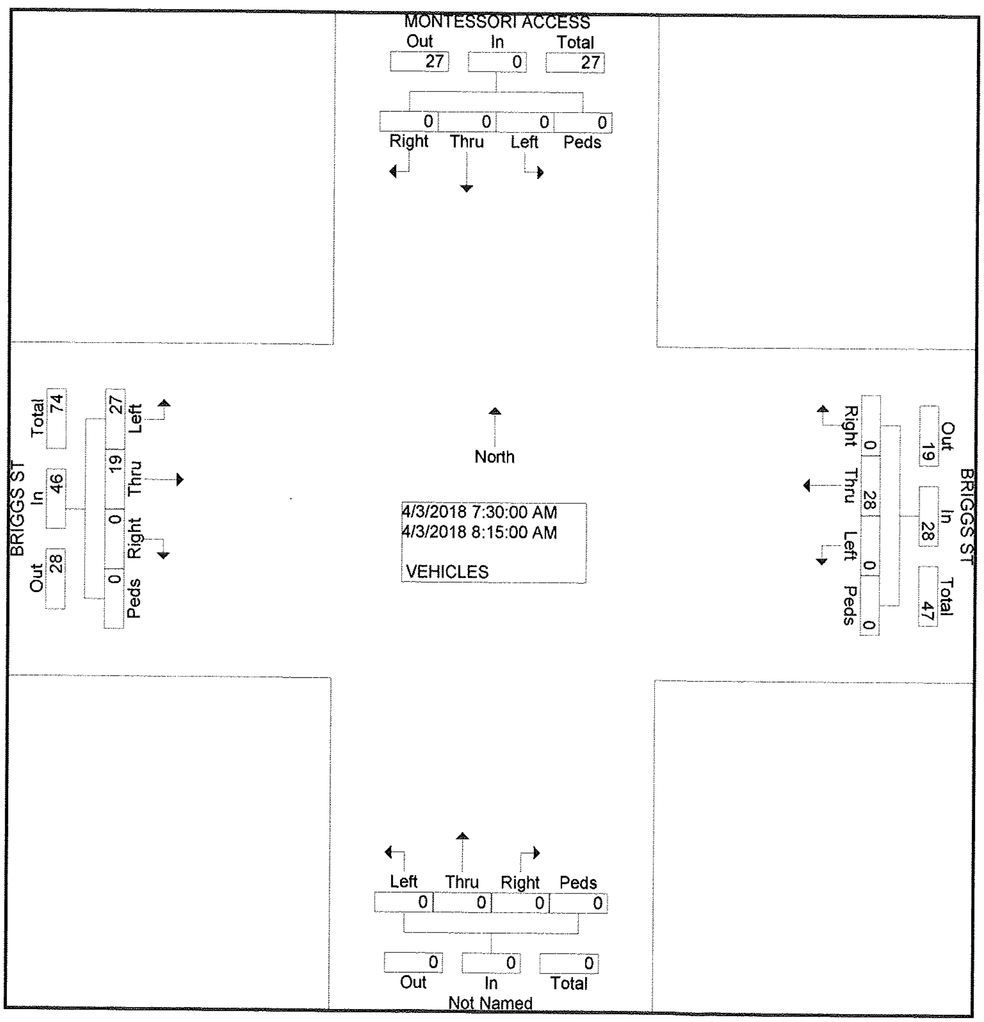
	MONTESSORI ACCESS Southbound				BRIGGS ST Westbound				Northbound				BRIGGS ST Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:30 AM	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	1	4
06:45 AM	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7
Total	0	0	0	0	0	9	0	0	0	0	0	0	0	1	0	1	11
07:00 AM	0	0	1	0	0	10	0	2	0	0	0	1	1	0	0	0	15
07:15 AM	0	0	0	0	0	6	0	0	0	0	0	0	1	3	0	0	10
07:30 AM	0	0	0	0	0	10	0	0	0	0	0	0	1	3	0	0	14
07:45 AM	0	0	0	0	0	11	0	0	0	0	0	0	3	6	0	0	20
Total	0	0	1	0	0	37	0	2	0	0	0	1	6	12	0	0	59
08:00 AM	0	0	0	0	0	3	0	0	0	0	0	0	2	7	0	0	12
08:15 AM	0	0	0	0	0	4	0	0	0	0	0	0	21	3	0	0	28
Total	0	0	0	0	0	7	0	0	0	0	0	0	23	10	0	0	40
04:00 PM	0	0	0	0	0	6	0	1	0	0	0	0	1	9	0	0	17
04:15 PM	0	0	0	0	0	3	0	1	0	0	0	0	2	2	0	0	8
04:30 PM	0	0	1	0	0	5	0	0	0	0	0	0	1	3	0	0	10
04:45 PM	0	0	1	0	0	6	1	1	0	0	0	0	4	11	0	1	25
Total	0	0	2	0	0	20	1	3	0	0	0	0	8	25	0	1	60
05:00 PM	0	0	3	0	0	2	0	4	0	0	0	0	1	13	0	0	23
05:15 PM	0	0	0	0	0	9	0	0	0	0	0	0	1	6	0	0	16
05:30 PM	0	0	0	0	0	5	0	1	0	0	0	0	0	10	0	0	16
05:45 PM	0	0	0	0	0	6	0	0	0	0	0	0	0	4	0	0	10
Total	0	0	3	0	0	22	0	5	0	0	0	0	2	33	0	0	65
Grand Total	0	0	6	0	0	95	1	10	0	0	0	1	39	81	0	2	235
Apprch %	0.0	0.0	100.0	0.0	0.0	89.6	0.9	9.4	0.0	0.0	0.0	100.0	32.0	66.4	0.0	1.6	
Total %	0.0	0.0	2.6	0.0	0.0	40.4	0.4	4.3	0.0	0.0	0.0	0.4	16.6	34.5	0.0	0.9	

COUNTER MEASURES INC.
1889 YORK STREET
DENVER.COLORADO
303-333-7409

N/S STREET: MONTESSORI ACCESS
E/W STREET: BRIGGS ST
CITY: ERIE
COUNTY: WELD

File Name : MONTBRIG
Site Code : 00000014
Start Date : 4/3/2018

	MONTESSORI ACCESS Southbound					BRIGGS ST Westbound					Northbound					BRIGGS ST Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 06:30 AM to 08:30 AM - Peak 1 of 1																					
Intersection	07:30 AM																				
Volume	0	0	0	0	0	0	28	0	0	28	0	0	0	0	0	27	19	0	0	46	74
Percent	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		58.7	41.3	0.0	0.0		
08:15 Volume	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	21	3	0	0	24	28
Peak Factor																					0.661
High Int.	6:15:00 AM					07:45 AM					6:15:00 AM					08:15 AM					
Volume	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	21	3	0	0	24	
Peak Factor										0.636										0.479	

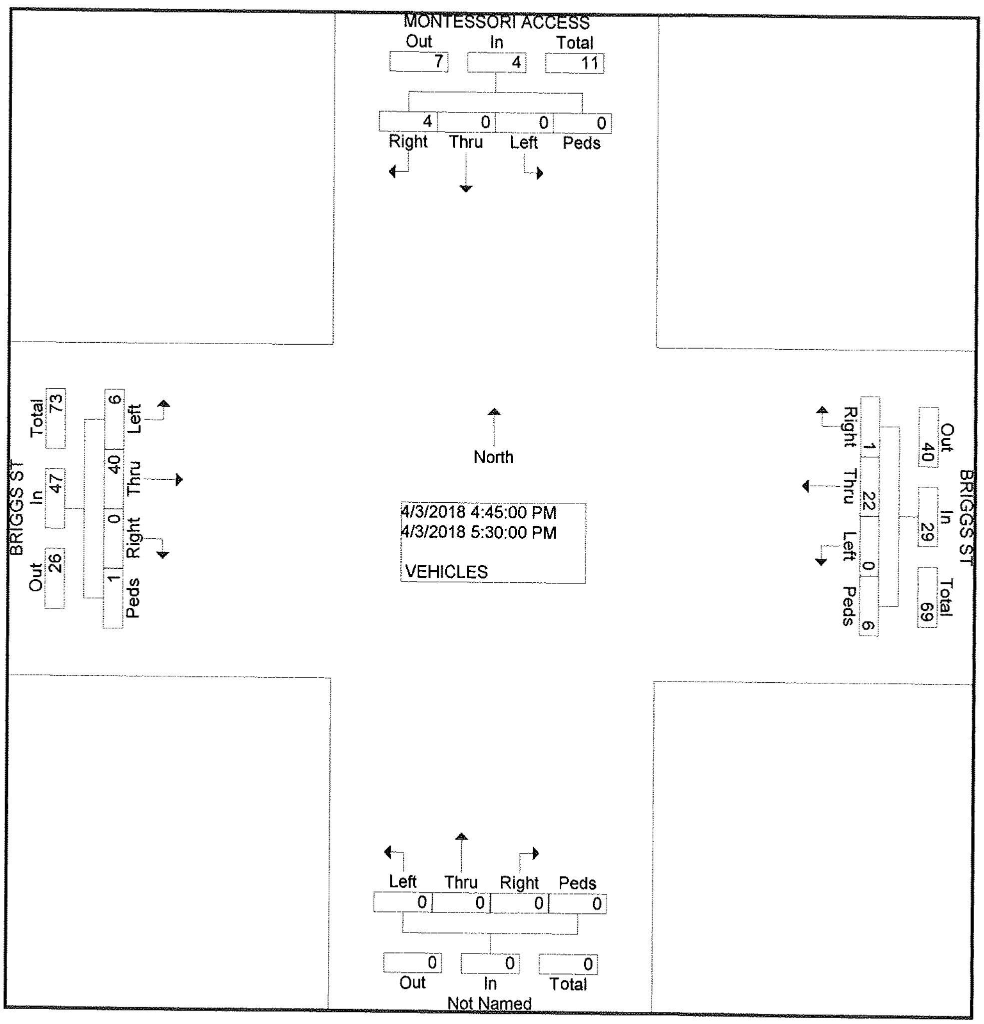


COUNTER MEASURES INC.
1889 YORK STREET
DENVER.COLORADO
303-333-7409

N/S STREET: MONTESSORI ACCESS
E/W STREET: BRIGGS ST
CITY: ERIE
COUNTY: WELD

File Name : MONTBRIG
Site Code : 00000014
Start Date : 4/3/2018
Page No : 2

	MONTESSORI ACCESS Southbound					BRIGGS ST Westbound					Northbound					BRIGGS ST Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:45 PM																				
Volume	0	0	4	0	4	0	22	1	6	29	0	0	0	0	0	6	40	0	1	47	80
Percent	0.0	0.0	100.0	0.0		0.0	75.9	3.4	20.7		0.0	0.0	0.0	0.0		12.8	85.1	0.0	2.1		
04:45 Volume	0	0	1	0	1	0	6	1	1	8	0	0	0	0	0	4	11	0	1	16	25
Peak Factor																					0.800
High Int.	05:00 PM					05:15 PM										04:45 PM					
Volume	0	0	3	0	3	0	9	0	0	9	0	0	0	0	0	4	11	0	1	16	
Peak Factor					0.333					0.806										0.734	



COUNTER MEASURES INC.

1889 YORK STREET
DENVER,COLORADO 80206
303-333-7409

Location: BRIGGS ST NE/O ESPINOZA ST
City: ERIE
County: WELD
Direction: SOUTHEAST-NORTHWEST

Site Code: 062805
Station ID: 062805

Start Time	29-Jun-16 Wed	SE	NW							Total
12:00 AM		3	1							4
01:00		1	0							1
02:00		0	0							0
03:00		1	0							1
04:00		1	1							2
05:00		2	6							8
06:00		6	15							21
07:00		8	18							26
08:00		7	**24**							31
09:00		13	18							31
10:00		14	14							28
11:00		**15**	22							**37**
12:00 PM		18	17							35
01:00		12	13							25
02:00		18	20							38
03:00		14	17							31
04:00		**32**	**26**							**58**
05:00		28	24							52
06:00		25	22							47
07:00		19	14							33
08:00		17	9							26
09:00		9	7							16
10:00		3	2							5
11:00		2	0							2
Total		268	290							558
Percent		48.0%	52.0%							
AM Peak	-	11:00	08:00	-	-	-	-	-	-	11:00
Vol.	-	15	24	-	-	-	-	-	-	37
PM Peak	-	16:00	16:00	-	-	-	-	-	-	16:00
Vol.	-	32	26	-	-	-	-	-	-	58
Grand Total		268	290							558
Percent		48.0%	52.0%							

ADT | ADT 558 | AADT 558

COUNTER MEASURES INC.
1889 YORK STREET
DENVER,COLORADO 80206
303-333-7409

Location: ERIE PKWY NE/O POWERS ST
City: ERIE
County: WELD
Direction: NORTHEAST-SOUTHWEST

Site Code: 062809
Station ID: 062809

Start Time	29-Jun-16 Wed	NE	SW							Total
12:00 AM		13	9							22
01:00		23	17							40
02:00		9	13							22
03:00		12	12							24
04:00		9	26							35
05:00		68	92							160
06:00		201	444							645
07:00		248	**734**							**982**
08:00		314	594							908
09:00		367	394							761
10:00		**382**	341							723
11:00		364	438							802
12:00 PM		412	393							805
01:00		401	368							769
02:00		325	344							669
03:00		551	400							951
04:00		677	398							1075
05:00		**938**	**464**							**1402**
06:00		517	324							841
07:00		369	235							604
08:00		242	195							437
09:00		148	133							281
10:00		88	72							160
11:00		38	29							67
Total		6716	6469							13185
Percent		50.9%	49.1%							
AM Peak	-	10:00	07:00	-	-	-	-	-	-	07:00
Vol.	-	382	734	-	-	-	-	-	-	982
PM Peak	-	17:00	17:00	-	-	-	-	-	-	17:00
Vol.	-	938	464	-	-	-	-	-	-	1402
Grand Total		6716	6469							13185
Percent		50.9%	49.1%							

ADT   ADT 13,185   AADT 13,185

COUNTER MEASURES INC.
1889 YORK STREET
DENVER,COLORADO 80206
303-333-7409

Location: POWERS ST SE/O ERIE PKWY
City: ERIE
County: WELD
Direction: NORTHWEST-SOUTHEAST

Site Code: 062817
Station ID: 062817

Start Time	29-Jun-16 Wed	NW	SE							Total
12:00 AM		0	1							1
01:00		5	2							7
02:00		0	1							1
03:00		1	0							1
04:00		2	4							6
05:00		17	3							20
06:00		38	32							70
07:00		65	50							**115**
08:00		**72**	38							110
09:00		62	38							100
10:00		41	48							89
11:00		51	**55**							106
12:00 PM		51	53							104
01:00		36	46							82
02:00		38	38							76
03:00		63	60							123
04:00		**72**	72							**144**
05:00		62	**76**							138
06:00		34	56							90
07:00		19	46							65
08:00		19	45							64
09:00		8	20							28
10:00		4	10							14
11:00		3	5							8
Total		763	799							1562
Percent		48.8%	51.2%							
AM Peak	-	08:00	11:00	-	-	-	-	-	-	07:00
Vol.	-	72	55	-	-	-	-	-	-	115
PM Peak	-	16:00	17:00	-	-	-	-	-	-	16:00
Vol.	-	72	76	-	-	-	-	-	-	144
Grand Total		763	799							1562
Percent		48.8%	51.2%							

ADT ADT 1,562 AADT 1,562

LEVEL OF SERVICE DEFINITIONS

From *Highway Capacity Manual*, Transportation Research Board, 2010

SIGNALIZED INTERSECTION LEVEL OF SERVICE (LOS)

LOS	**Average Vehicle Delay** sec/vehicle	**Operational Characteristics**
A	<10 seconds	Describes operations with low control delay, up to 10 sec/veh. This LOS occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all. Short cycle lengths may tend to contribute to low delay values.
B	10 to 20 seconds	Describes operations with control delay greater than 10 seconds and up to 20 sec/veh. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of delay.
C	20 to 35 seconds	Describes operations with control delay greater than 20 and up to 35 sec/veh. These higher delays may result from only fair progression, longer cycle length, or both. Individual cycle failures may begin to appear at this level. Cycle failure occurs when a given green phase does not serve queued vehicles, and overflows occur. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.
D	35 to 55 seconds	Describes operations with control delay greater than 35 and up to 55 sec/veh. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	55 to 80 seconds	Describes operations with control delay greater than 55 and up to 80 sec/veh. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent.
F	>80 seconds	Describes operations with control delay in excess of 80 sec/veh. This level, considered unacceptable to most drivers, often occurs with over-saturation, that is, when arrival flow rates exceed the capacity of lane groups. It may also occur at high v/c ratios with many individual cycle failures. Poor progression and long cycle lengths may also contribute significantly to high delay levels.

LEVEL OF SERVICE DEFINITIONS

From *Highway Capacity Manual*, Transportation Research Board, 2010

UNSIGNALIZED INTERSECTION LEVEL OF SERVICE (LOS)

Applicable to Two-Way Stop Control, All-Way Stop Control, and Roundabouts

LOS	**Average Vehicle Control Delay**	**Operational Characteristics**
A	<10 seconds	Normally, vehicles on the stop-controlled approach only have to wait up to 10 seconds before being able to clear the intersection. Left-turning vehicles on the uncontrolled street do not have to wait to make their turn.
B	10 to 15 seconds	Vehicles on the stop-controlled approach will experience delays before being able to clear the intersection. The delay could be up to 15 seconds. Left-turning vehicles on the uncontrolled street may have to wait to make their turn.
C	15 to 25 seconds	Vehicles on the stop-controlled approach can expect delays in the range of 15 to 25 seconds before clearing the intersection. Motorists may begin to take chances due to the long delays, thereby posing a safety risk to through traffic. Left-turning vehicles on the uncontrolled street will now be required to wait to make their turn causing a queue to be created in the turn lane.
D	25 to 35 seconds	This is the point at which a traffic signal may be warranted for this intersection. The delays for the stop-controlled intersection are not considered to be excessive. The length of the queue may begin to block other public and private access points.
E	35 to 50 seconds	The delays for all critical traffic movements are considered to be unacceptable. The length of the queues for the stop-controlled approaches as well as the left-turn movements are extremely long. There is a high probability that this intersection will meet traffic signal warrants. The ability to install a traffic signal is affected by the location of other existing traffic signals. Consideration may be given to restricting the accesses by eliminating the left-turn movements from and to the stop-controlled approach.
F	>50 seconds	The delay for the critical traffic movements are probably in excess of 100 seconds. The length of the queues are extremely long. Motorists are selecting alternative routes due to the long delays. The only remedy for these long delays is installing a traffic signal or restricting the accesses. The potential for accidents at this intersection are extremely high due to motorist taking more risky chances. If the median permits, motorists begin making two-stage left-turns.

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	80	11	120	7	10	10	95	225	5	1	650	115
Future Volume (veh/h)	80	11	120	7	10	10	95	225	5	1	650	115
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	91	12	136	8	11	11	108	256	6	1	739	131
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	269	18	203	155	118	118	534	2684	1201	916	2684	1201
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.76	0.76	0.76	0.76	0.76	0.76
Sat Flow, veh/h	1384	130	1473	1235	856	856	634	3539	1583	1113	3539	1583
Grp Volume(v), veh/h	91	0	148	8	0	22	108	256	6	1	739	131
Grp Sat Flow(s),veh/h/ln	1384	0	1603	1235	0	1712	634	1770	1583	1113	1770	1583
Q Serve(g_s), s	4.7	0.0	6.8	0.5	0.0	0.9	4.8	1.5	0.1	0.0	4.9	1.7
Cycle Q Clear(g_c), s	5.6	0.0	6.8	7.2	0.0	0.9	9.7	1.5	0.1	1.5	4.9	1.7
Prop In Lane	1.00		0.92	1.00		0.50	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	0	221	155	0	236	534	2684	1201	916	2684	1201
V/C Ratio(X)	0.34	0.00	0.67	0.05	0.00	0.09	0.20	0.10	0.00	0.00	0.28	0.11
Avail Cap(c_a), veh/h	761	0	791	595	0	845	534	2684	1201	916	2684	1201
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.4	0.0	31.5	35.0	0.0	29.0	4.3	2.4	2.3	2.6	2.8	2.5
Incr Delay (d2), s/veh	0.7	0.0	3.5	0.1	0.0	0.2	0.9	0.1	0.0	0.0	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	3.2	0.2	0.0	0.4	1.0	0.7	0.0	0.0	2.5	0.8
LnGrp Delay(d),s/veh	32.2	0.0	35.0	35.1	0.0	29.2	5.2	2.5	2.3	2.6	3.1	2.6
LnGrp LOS	C		D	D		C	A	A	A	A	A	A
Approach Vol, veh/h		239			30			370			871	
Approach Delay, s/veh		33.9			30.7			3.3			3.0	
Approach LOS		C			C			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		14.6		62.4		14.6		62.4				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		38.0		31.0		38.0		31.0				
Max Q Clear Time (g_c+I1), s		9.2		11.7		8.8		6.9				
Green Ext Time (p_c), s		1.4		7.8		1.4		8.6				
Intersection Summary												
HCM 2010 Ctrl Delay			8.5									
HCM 2010 LOS			A									

Intersection	
Int Delay, s/veh	0.7

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	2	15	25	0	0	2
Future Vol, veh/h	2	15	25	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	20	33	0	0	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	33	0	-	0	58	33
Stage 1	-	-	-	-	33	-
Stage 2	-	-	-	-	25	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1579	-	-	-	949	1041
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	998	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1579	-	-	-	947	1041
Mov Cap-2 Maneuver	-	-	-	-	947	-
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	996	-

Approach	SE	NW	SW
HCM Control Delay, s	0.9	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1579	-	1041
HCM Lane V/C Ratio	-	-	0.002	-	0.003
HCM Control Delay (s)	-	-	7.3	0	8.5
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	73	5	135	8	8	6	175	745	15	13	350	70
Future Volume (veh/h)	73	5	135	8	8	6	175	745	15	13	350	70
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	79	5	147	9	9	7	190	810	16	14	380	76
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	278	7	217	155	137	107	769	2673	1196	544	2673	1196
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.76	0.76	0.76	0.76	0.76	0.76
Sat Flow, veh/h	1392	52	1539	1230	973	757	931	3539	1583	661	3539	1583
Grp Volume(v), veh/h	79	0	152	9	0	16	190	810	16	14	380	76
Grp Sat Flow(s),veh/h/ln	1392	0	1591	1230	0	1729	931	1770	1583	661	1770	1583
Q Serve(g_s), s	4.0	0.0	7.0	0.5	0.0	0.6	5.4	5.6	0.2	0.5	2.3	1.0
Cycle Q Clear(g_c), s	4.6	0.0	7.0	7.5	0.0	0.6	7.7	5.6	0.2	6.1	2.3	1.0
Prop In Lane	1.00		0.97	1.00		0.44	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	278	0	224	155	0	244	769	2673	1196	544	2673	1196
V/C Ratio(X)	0.28	0.00	0.68	0.06	0.00	0.07	0.25	0.30	0.01	0.03	0.14	0.06
Avail Cap(c_a), veh/h	769	0	785	589	0	853	769	2673	1196	544	2673	1196
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.7	0.0	31.4	35.0	0.0	28.7	3.6	3.0	2.3	4.0	2.6	2.4
Incr Delay (d2), s/veh	0.6	0.0	3.6	0.2	0.0	0.1	0.8	0.3	0.0	0.1	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	3.3	0.2	0.0	0.3	1.5	2.8	0.1	0.1	1.1	0.4
LnGrp Delay(d),s/veh	31.2	0.0	35.0	35.1	0.0	28.8	4.4	3.3	2.4	4.1	2.7	2.5
LnGrp LOS	C		C	D		C	A	A	A	A	A	A
Approach Vol, veh/h		231			25			1016			470	
Approach Delay, s/veh		33.7			31.1			3.5			2.7	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		14.9		62.1		14.9		62.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		38.0		31.0		38.0		31.0
Max Q Clear Time (g_c+I1), s		9.5		9.7		9.0		8.1
Green Ext Time (p_c), s		1.4		9.7		1.4		10.0

Intersection Summary	
HCM 2010 Ctrl Delay	7.7
HCM 2010 LOS	A

Intersection	
Int Delay, s/veh	0.6

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	2	30	20	0	0	2
Future Vol, veh/h	2	30	20	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	61	61	61	61	61	61
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	49	33	0	0	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	33	0	-	0	89	33
Stage 1	-	-	-	-	33	-
Stage 2	-	-	-	-	56	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1579	-	-	-	912	1041
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	967	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1579	-	-	-	910	1041
Mov Cap-2 Maneuver	-	-	-	-	910	-
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	965	-

Approach	SE	NW	SW
HCM Control Delay, s	0.5	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1579	-	1041
HCM Lane V/C Ratio	-	-	0.002	-	0.003
HCM Control Delay (s)	-	-	7.3	0	8.5
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	100	64	132	66	56	68	162	293	34	73	775	133
Future Volume (veh/h)	100	64	132	66	56	68	162	293	34	73	775	133
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	114	73	150	75	64	77	184	333	39	83	881	151
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	283	121	250	212	172	207	401	2383	1066	737	2383	1066
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.67	0.67	0.67	0.67	0.67	0.67
Sat Flow, veh/h	1243	545	1120	1153	771	928	544	3539	1583	1006	3539	1583
Grp Volume(v), veh/h	114	0	223	75	0	141	184	333	39	83	881	151
Grp Sat Flow(s),veh/h/ln	1243	0	1665	1153	0	1699	544	1770	1583	1006	1770	1583
Q Serve(g_s), s	6.6	0.0	9.3	4.8	0.0	5.4	17.1	2.6	0.6	2.5	8.3	2.7
Cycle Q Clear(g_c), s	12.0	0.0	9.3	14.1	0.0	5.4	25.4	2.6	0.6	5.1	8.3	2.7
Prop In Lane	1.00		0.67	1.00		0.55	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	283	0	371	212	0	379	401	2383	1066	737	2383	1066
V/C Ratio(X)	0.40	0.00	0.60	0.35	0.00	0.37	0.46	0.14	0.04	0.11	0.37	0.14
Avail Cap(c_a), veh/h	619	0	822	524	0	838	401	2383	1066	737	2383	1066
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.4	0.0	26.9	33.2	0.0	25.4	11.0	4.5	4.2	5.5	5.5	4.5
Incr Delay (d2), s/veh	0.9	0.0	1.6	1.0	0.0	0.6	3.7	0.1	0.1	0.3	0.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	4.4	1.6	0.0	2.6	3.0	1.3	0.3	0.8	4.2	1.2
LnGrp Delay(d),s/veh	31.4	0.0	28.4	34.2	0.0	26.0	14.8	4.7	4.3	5.8	5.9	4.8
LnGrp LOS	C		C	C		C	B	A	A	A	A	A
Approach Vol, veh/h		337			216			556			1115	
Approach Delay, s/veh		29.4			28.8			8.0			5.8	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		21.2		55.8		21.2		55.8
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		38.0		31.0		38.0		31.0
Max Q Clear Time (g_c+I1), s		16.1		27.4		14.0		10.3
Green Ext Time (p_c), s		1.1		1.3		1.9		6.9

Intersection Summary	
HCM 2010 Ctrl Delay	12.1
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	5.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	26	20	125	2	30	5	140	0	1	2	0	20
Future Vol, veh/h	26	20	125	2	30	5	140	0	1	2	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	31	24	147	2	35	6	165	0	1	2	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	41	0	0	171	0	0	214	205	98	202	275	38
Stage 1	-	-	-	-	-	-	160	160	-	42	42	-
Stage 2	-	-	-	-	-	-	54	45	-	160	233	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1568	-	-	1406	-	-	743	691	958	756	632	1034
Stage 1	-	-	-	-	-	-	842	766	-	972	860	-
Stage 2	-	-	-	-	-	-	958	857	-	842	712	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1568	-	-	1406	-	-	713	675	958	742	617	1034
Mov Cap-2 Maneuver	-	-	-	-	-	-	713	675	-	742	617	-
Stage 1	-	-	-	-	-	-	823	749	-	951	859	-
Stage 2	-	-	-	-	-	-	935	856	-	822	696	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.1	0.4	11.6	8.7
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	714	1406	-	-	1568	-	-	998
HCM Lane V/C Ratio	0.232	0.002	-	-	0.02	-	-	0.026
HCM Control Delay (s)	11.6	7.6	0	-	7.3	0	-	8.7
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.9	0	-	-	0.1	-	-	0.1

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	119	72	154	64	58	69	225	878	59	96	440	85
Future Volume (veh/h)	119	72	154	64	58	69	225	878	59	96	440	85
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	129	78	167	70	63	75	245	954	64	104	478	92
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	298	123	263	205	180	214	606	2351	1052	392	2351	1052
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.66	0.66	0.66	0.66	0.66	0.66
Sat Flow, veh/h	1246	529	1133	1130	776	924	838	3539	1583	552	3539	1583
Grp Volume(v), veh/h	129	0	245	70	0	138	245	954	64	104	478	92
Grp Sat Flow(s),veh/h/ln	1246	0	1663	1130	0	1700	838	1770	1583	552	1770	1583
Q Serve(g_s), s	7.4	0.0	10.2	4.6	0.0	5.2	12.3	9.5	1.1	8.2	4.0	1.6
Cycle Q Clear(g_c), s	12.7	0.0	10.2	14.8	0.0	5.2	16.4	9.5	1.1	17.8	4.0	1.6
Prop In Lane	1.00		0.68	1.00		0.54	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	298	0	385	205	0	394	606	2351	1052	392	2351	1052
V/C Ratio(X)	0.43	0.00	0.64	0.34	0.00	0.35	0.40	0.41	0.06	0.27	0.20	0.09
Avail Cap(c_a), veh/h	624	0	821	501	0	839	606	2351	1052	392	2351	1052
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.0	0.0	26.6	33.3	0.0	24.7	8.2	5.9	4.5	10.0	5.0	4.6
Incr Delay (d2), s/veh	1.0	0.0	1.7	1.0	0.0	0.5	2.0	0.5	0.1	1.7	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	4.9	1.5	0.0	2.5	3.1	4.8	0.5	1.4	2.0	0.7
LnGrp Delay(d),s/veh	31.0	0.0	28.4	34.3	0.0	25.3	10.2	6.5	4.6	11.7	5.2	4.8
LnGrp LOS	C		C	C		C	B	A	A	B	A	A
Approach Vol, veh/h		374			208			1263			674	
Approach Delay, s/veh		29.3			28.3			7.1			6.1	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		21.9		55.1		21.9		55.1
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		38.0		31.0		38.0		31.0
Max Q Clear Time (g_c+I1), s		16.8		18.4		14.7		19.8
Green Ext Time (p_c), s		1.0		6.4		2.1		3.3

Intersection Summary			
HCM 2010 Ctrl Delay			11.9
HCM 2010 LOS			B

Intersection	
Int Delay, s/veh	4.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	12	35	180	1	40	2	140	0	2	3	0	11
Future Vol, veh/h	12	35	180	1	40	2	140	0	2	3	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	41	212	1	47	2	165	0	2	4	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	49	0	0	253	0	0	232	226	147	226	331	48
Stage 1	-	-	-	-	-	-	175	175	-	50	50	-
Stage 2	-	-	-	-	-	-	57	51	-	176	281	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1558	-	-	1312	-	-	723	673	900	729	588	1021
Stage 1	-	-	-	-	-	-	827	754	-	963	853	-
Stage 2	-	-	-	-	-	-	955	852	-	826	678	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1558	-	-	1312	-	-	707	665	900	720	581	1021
Mov Cap-2 Maneuver	-	-	-	-	-	-	707	665	-	720	581	-
Stage 1	-	-	-	-	-	-	818	746	-	952	852	-
Stage 2	-	-	-	-	-	-	942	851	-	815	671	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.4	0.2	11.6	8.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	709	1312	-	-	1558	-	-	937
HCM Lane V/C Ratio	0.236	0.001	-	-	0.009	-	-	0.018
HCM Control Delay (s)	11.6	7.7	0	-	7.3	0	-	8.9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.9	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	0	7	465	2	0	985
Future Vol, veh/h	0	7	465	2	0	985
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	150	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	8	505	2	0	1071

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	253	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	746	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	746	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	9.9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWT
Capacity (veh/h)	-	-	746	-
HCM Lane V/C Ratio	-	-	0.01	-
HCM Control Delay (s)	-	-	9.9	-
HCM Lane LOS	-	-	A	-
HCM 95th %tile Q(veh)	-	-	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	0	26	37	0	0	2
Future Vol, veh/h	0	26	37	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	31	44	0	0	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	44	0	-	0	75	44
Stage 1	-	-	-	-	44	-
Stage 2	-	-	-	-	31	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1564	-	-	-	928	1026
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	992	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1564	-	-	-	928	1026
Mov Cap-2 Maneuver	-	-	-	-	928	-
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	992	-

Approach	SE	NW	SW
HCM Control Delay, s	0	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1564	-	1026
HCM Lane V/C Ratio	-	-	-	-	0.002
HCM Control Delay (s)	-	-	0	-	8.5
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	100	65	132	80	60	70	162	295	35	75	775	133
Future Volume (veh/h)	100	65	132	80	60	70	162	295	35	75	775	133
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	114	74	150	91	68	80	184	335	40	85	881	151
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	295	130	263	229	184	217	392	2337	1045	720	2337	1045
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.66	0.66	0.66	0.66	0.66	0.66
Sat Flow, veh/h	1235	550	1116	1152	781	919	544	3539	1583	1003	3539	1583
Grp Volume(v), veh/h	114	0	224	91	0	148	184	335	40	85	881	151
Grp Sat Flow(s),veh/h/ln	1235	0	1666	1152	0	1701	544	1770	1583	1003	1770	1583
Q Serve(g_s), s	6.6	0.0	9.1	5.8	0.0	5.6	17.8	2.7	0.7	2.7	8.7	2.8
Cycle Q Clear(g_c), s	12.2	0.0	9.1	15.0	0.0	5.6	26.5	2.7	0.7	5.4	8.7	2.8
Prop In Lane	1.00		0.67	1.00		0.54	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	295	0	393	229	0	401	392	2337	1045	720	2337	1045
V/C Ratio(X)	0.39	0.00	0.57	0.40	0.00	0.37	0.47	0.14	0.04	0.12	0.38	0.14
Avail Cap(c_a), veh/h	613	0	822	525	0	839	392	2337	1045	720	2337	1045
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.7	0.0	26.0	32.6	0.0	24.6	11.9	4.9	4.6	5.9	5.9	4.9
Incr Delay (d2), s/veh	0.8	0.0	1.3	1.1	0.0	0.6	4.0	0.1	0.1	0.3	0.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	4.3	1.9	0.0	2.7	3.1	1.3	0.3	0.8	4.3	1.3
LnGrp Delay(d),s/veh	30.5	0.0	27.3	33.7	0.0	25.2	15.9	5.0	4.6	6.3	6.4	5.2
LnGrp LOS	C		C	C		C	B	A	A	A	A	A
Approach Vol, veh/h		338			239			559			1117	
Approach Delay, s/veh		28.4			28.4			8.6			6.2	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		22.2		54.8		22.2		54.8
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		38.0		31.0		38.0		31.0
Max Q Clear Time (g_c+I1), s		17.0		28.5		14.2		10.7
Green Ext Time (p_c), s		1.2		1.0		1.9		6.8

Intersection Summary	
HCM 2010 Ctrl Delay	12.5
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	5.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	30	20	125	2	32	5	140	0	1	5	0	38
Future Vol, veh/h	30	20	125	2	32	5	140	0	1	5	0	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	35	24	147	2	38	6	165	0	1	6	0	45

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	44	0	0	171	0	0	236	216	98	213	286	41
Stage 1	-	-	-	-	-	-	168	168	-	45	45	-
Stage 2	-	-	-	-	-	-	68	48	-	168	241	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1564	-	-	1406	-	-	718	682	958	744	623	1030
Stage 1	-	-	-	-	-	-	834	759	-	969	857	-
Stage 2	-	-	-	-	-	-	942	855	-	834	706	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1564	-	-	1406	-	-	673	664	958	728	607	1030
Mov Cap-2 Maneuver	-	-	-	-	-	-	673	664	-	728	607	-
Stage 1	-	-	-	-	-	-	813	740	-	945	856	-
Stage 2	-	-	-	-	-	-	900	854	-	812	688	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.3	0.4	12.1	8.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	674	1406	-	-	1564	-	-	983
HCM Lane V/C Ratio	0.246	0.002	-	-	0.023	-	-	0.051
HCM Control Delay (s)	12.1	7.6	0	-	7.4	0	-	8.9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	0	3	1065	8	0	630
Future Vol, veh/h	0	3	1065	8	0	630
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	150	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3	1158	9	0	685

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	579	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	458	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	458	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NW		NE		SW
HCM Control Delay, s	12.9		0		0
HCM LOS	B				

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWT
Capacity (veh/h)	-	-	458	-
HCM Lane V/C Ratio	-	-	0.007	-
HCM Control Delay (s)	-	-	12.9	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	2	42	46	0	0	1
Future Vol, veh/h	2	42	46	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	49	54	0	0	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	54	0	-	0	107	54
Stage 1	-	-	-	-	54	-
Stage 2	-	-	-	-	53	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1551	-	-	-	891	1013
Stage 1	-	-	-	-	969	-
Stage 2	-	-	-	-	970	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1551	-	-	-	890	1013
Mov Cap-2 Maneuver	-	-	-	-	890	-
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	970	-

Approach	SE	NW	SW
HCM Control Delay, s	0.3	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1551	-	1013
HCM Lane V/C Ratio	-	-	0.002	-	0.001
HCM Control Delay (s)	-	-	7.3	0	8.6
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	120	75	154	70	60	70	225	885	65	105	440	85
Future Volume (veh/h)	120	75	154	70	60	70	225	885	65	105	440	85
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	130	82	167	76	65	76	245	962	71	114	478	92
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	305	131	267	212	187	219	600	2327	1041	381	2327	1041
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.66	0.66	0.66	0.66	0.66	0.66
Sat Flow, veh/h	1243	549	1117	1126	784	917	838	3539	1583	544	3539	1583
Grp Volume(v), veh/h	130	0	249	76	0	141	245	962	71	114	478	92
Grp Sat Flow(s),veh/h/ln	1243	0	1666	1126	0	1701	838	1770	1583	544	1770	1583
Q Serve(g_s), s	7.5	0.0	10.3	5.0	0.0	5.3	12.6	9.8	1.2	9.6	4.1	1.6
Cycle Q Clear(g_c), s	12.8	0.0	10.3	15.3	0.0	5.3	16.7	9.8	1.2	19.5	4.1	1.6
Prop In Lane	1.00		0.67	1.00		0.54	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	305	0	398	212	0	406	600	2327	1041	381	2327	1041
V/C Ratio(X)	0.43	0.00	0.63	0.36	0.00	0.35	0.41	0.41	0.07	0.30	0.21	0.09
Avail Cap(c_a), veh/h	621	0	822	499	0	839	600	2327	1041	381	2327	1041
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.6	0.0	26.2	33.1	0.0	24.3	8.5	6.2	4.7	10.8	5.2	4.8
Incr Delay (d2), s/veh	0.9	0.0	1.6	1.0	0.0	0.5	2.1	0.5	0.1	2.0	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	4.9	1.6	0.0	2.5	3.2	4.9	0.6	1.6	2.1	0.7
LnGrp Delay(d),s/veh	30.6	0.0	27.9	34.1	0.0	24.8	10.6	6.7	4.9	12.8	5.4	5.0
LnGrp LOS	C		C	C		C	B	A	A	B	A	A
Approach Vol, veh/h		379			217			1278			684	
Approach Delay, s/veh		28.8			28.1			7.4			6.6	
Approach LOS		C			C			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.4		54.6		22.4		54.6				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		38.0		31.0		38.0		31.0				
Max Q Clear Time (g_c+I1), s		17.3		18.7		14.8		21.5				
Green Ext Time (p_c), s		1.1		6.4		2.1		3.1				
Intersection Summary												
HCM 2010 Ctrl Delay			12.1									
HCM 2010 LOS			B									

Intersection	
Int Delay, s/veh	4.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	28	37	180	1	41	5	140	0	2	5	0	19
Future Vol, veh/h	28	37	180	1	41	5	140	0	2	5	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	44	212	1	48	6	165	0	2	6	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	54	0	0	256	0	0	280	272	150	270	375	51
Stage 1	-	-	-	-	-	-	216	216	-	53	53	-
Stage 2	-	-	-	-	-	-	64	56	-	217	322	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1551	-	-	1309	-	-	672	635	896	683	556	1017
Stage 1	-	-	-	-	-	-	786	724	-	960	851	-
Stage 2	-	-	-	-	-	-	947	848	-	785	651	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1551	-	-	1309	-	-	644	618	896	668	542	1017
Mov Cap-2 Maneuver	-	-	-	-	-	-	644	618	-	668	542	-
Stage 1	-	-	-	-	-	-	766	706	-	936	850	-
Stage 2	-	-	-	-	-	-	925	847	-	763	635	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.8	0.2	12.5	9.1
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	647	1309	-	-	1551	-	-	917
HCM Lane V/C Ratio	0.258	0.001	-	-	0.021	-	-	0.031
HCM Control Delay (s)	12.5	7.8	0	-	7.4	0	-	9.1
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	0.1

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	130	64	110	66	56	68	130	628	34	73	1465	130
Future Volume (veh/h)	130	64	110	66	56	68	130	628	34	73	1465	130
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	141	70	120	72	61	74	141	683	37	79	1592	141
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	285	136	234	238	169	206	244	1987	889	502	1933	865
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.06	0.56	0.56	0.04	0.55	0.55
Sat Flow, veh/h	1249	617	1058	1188	767	931	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	141	0	190	72	0	135	141	683	37	79	1592	141
Grp Sat Flow(s),veh/h/ln	1249	0	1676	1188	0	1698	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	8.3	0.0	7.7	4.4	0.0	5.2	2.6	8.1	0.8	1.5	28.6	3.4
Cycle Q Clear(g_c), s	13.5	0.0	7.7	12.0	0.0	5.2	2.6	8.1	0.8	1.5	28.6	3.4
Prop In Lane	1.00		0.63	1.00		0.55	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	285	0	370	238	0	375	244	1987	889	502	1933	865
V/C Ratio(X)	0.49	0.00	0.51	0.30	0.00	0.36	0.58	0.34	0.04	0.16	0.82	0.16
Avail Cap(c_a), veh/h	537	0	707	477	0	717	269	1987	889	553	1933	865
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.1	0.0	26.4	31.6	0.0	25.4	15.7	9.2	7.6	7.2	14.4	8.7
Incr Delay (d2), s/veh	1.3	0.0	1.1	0.7	0.0	0.6	2.5	0.5	0.1	0.1	4.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	3.6	1.5	0.0	2.5	1.8	4.0	0.4	0.7	14.8	1.6
LnGrp Delay(d),s/veh	32.4	0.0	27.5	32.4	0.0	26.0	18.2	9.6	7.7	7.3	18.5	9.1
LnGrp LOS	C		C	C		C	B	A	A	A	B	A
Approach Vol, veh/h		331			207			861			1812	
Approach Delay, s/veh		29.6			28.2			11.0			17.3	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.5	7.8	47.7		21.5	8.9	46.6
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		32.5	5.5	25.5		32.5	5.5	25.5
Max Q Clear Time (g_c+I1), s		14.0	3.5	10.1		15.5	4.6	30.6
Green Ext Time (p_c), s		1.0	0.0	4.0		1.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.6
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	5.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	26	20	125	2	30	5	140	0	1	2	0	20
Future Vol, veh/h	26	20	125	2	30	5	140	0	1	2	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	31	24	147	2	35	6	165	0	1	2	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	41	0	0	171	0	0	214	205	98	202	275	38
Stage 1	-	-	-	-	-	-	160	160	-	42	42	-
Stage 2	-	-	-	-	-	-	54	45	-	160	233	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1568	-	-	1406	-	-	743	691	958	756	632	1034
Stage 1	-	-	-	-	-	-	842	766	-	972	860	-
Stage 2	-	-	-	-	-	-	958	857	-	842	712	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1568	-	-	1406	-	-	713	675	958	742	617	1034
Mov Cap-2 Maneuver	-	-	-	-	-	-	713	675	-	742	617	-
Stage 1	-	-	-	-	-	-	823	749	-	951	859	-
Stage 2	-	-	-	-	-	-	935	856	-	822	696	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.1	0.4	11.6	8.7
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	714	1406	-	-	1568	-	-	998
HCM Lane V/C Ratio	0.232	0.002	-	-	0.02	-	-	0.026
HCM Control Delay (s)	11.6	7.6	0	-	7.3	0	-	8.7
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.9	0	-	-	0.1	-	-	0.1

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	154	72	205	64	58	69	230	1693	59	96	950	145
Future Volume (veh/h)	154	72	205	64	58	69	230	1693	59	96	950	145
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	162	76	216	67	61	73	242	1782	62	101	1000	153
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	344	113	321	206	204	244	401	1938	867	220	1825	817
Arrive On Green	0.26	0.26	0.25	0.26	0.26	0.25	0.08	0.55	0.55	0.06	0.52	0.52
Sat Flow, veh/h	1250	429	1219	1083	774	926	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	162	0	292	67	0	134	242	1782	62	101	1000	153
Grp Sat Flow(s),veh/h/ln	1250	0	1648	1083	0	1699	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.2	0.0	12.3	4.6	0.0	4.9	4.7	35.3	1.4	2.0	14.7	4.0
Cycle Q Clear(g_c), s	14.1	0.0	12.3	16.8	0.0	4.9	4.7	35.3	1.4	2.0	14.7	4.0
Prop In Lane	1.00		0.74	1.00		0.54	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	344	0	434	206	0	448	401	1938	867	220	1825	817
V/C Ratio(X)	0.47	0.00	0.67	0.32	0.00	0.30	0.60	0.92	0.07	0.46	0.55	0.19
Avail Cap(c_a), veh/h	428	0	546	279	0	563	401	1938	867	277	1825	817
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.3	0.0	25.7	32.9	0.0	22.9	9.9	15.9	8.2	16.9	12.6	10.0
Incr Delay (d2), s/veh	1.0	0.0	2.3	0.9	0.0	0.4	2.5	8.6	0.2	1.5	1.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	5.8	1.4	0.0	2.3	2.6	19.4	0.7	1.2	7.4	1.9
LnGrp Delay(d),s/veh	29.3	0.0	28.0	33.8	0.0	23.3	12.4	24.5	8.4	18.4	13.8	10.5
LnGrp LOS	C		C	C		C	B	C	A	B	B	B
Approach Vol, veh/h		454			201			2086			1254	
Approach Delay, s/veh		28.5			26.8			22.6			13.7	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.8	7.6	45.7		23.8	10.0	43.2
Change Period (Y+Rc), s		4.5	4.0	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		24.5	6.0	33.5		24.5	5.5	33.5
Max Q Clear Time (g_c+I1), s		18.8	4.0	37.3		16.1	6.7	16.7
Green Ext Time (p_c), s		0.5	0.0	0.0		1.6	0.0	6.7

Intersection Summary	
HCM 2010 Ctrl Delay	20.7
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	4.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	12	35	180	1	40	2	140	0	2	3	0	11
Future Vol, veh/h	12	35	180	1	40	2	140	0	2	3	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	41	212	1	47	2	165	0	2	4	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	49	0	0	253	0	0	232	226	147	226	331	48
Stage 1	-	-	-	-	-	-	175	175	-	50	50	-
Stage 2	-	-	-	-	-	-	57	51	-	176	281	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1558	-	-	1312	-	-	723	673	900	729	588	1021
Stage 1	-	-	-	-	-	-	827	754	-	963	853	-
Stage 2	-	-	-	-	-	-	955	852	-	826	678	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1558	-	-	1312	-	-	707	665	900	720	581	1021
Mov Cap-2 Maneuver	-	-	-	-	-	-	707	665	-	720	581	-
Stage 1	-	-	-	-	-	-	818	746	-	952	852	-
Stage 2	-	-	-	-	-	-	942	851	-	815	671	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.4	0.2	11.6	8.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	709	1312	-	-	1558	-	-	937
HCM Lane V/C Ratio	0.236	0.001	-	-	0.009	-	-	0.018
HCM Control Delay (s)	11.6	7.7	0	-	7.3	0	-	8.9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.9	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	0	7	830	2	0	1670
Future Vol, veh/h	0	7	830	2	0	1670
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	150	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	8	902	2	0	1815

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	451	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	556	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	556	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	11.6	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWT
Capacity (veh/h)	-	-	556	-
HCM Lane V/C Ratio	-	-	0.014	-
HCM Control Delay (s)	-	-	11.6	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	0	26	37	0	0	2
Future Vol, veh/h	0	26	37	0	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	31	44	0	0	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	44	0	-	0	75	44
Stage 1	-	-	-	-	44	-
Stage 2	-	-	-	-	31	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1564	-	-	-	928	1026
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	992	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1564	-	-	-	928	1026
Mov Cap-2 Maneuver	-	-	-	-	928	-
Stage 1	-	-	-	-	978	-
Stage 2	-	-	-	-	992	-

Approach	SE	NW	SW
HCM Control Delay, s	0	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1564	-	1026
HCM Lane V/C Ratio	-	-	-	-	0.002
HCM Control Delay (s)	-	-	0	-	8.5
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	130	65	110	80	60	70	130	630	35	75	1465	130
Future Volume (veh/h)	130	65	110	80	60	70	130	630	35	75	1465	130
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	141	71	120	87	65	76	141	685	38	82	1592	141
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	285	140	236	241	176	206	243	1973	883	498	1920	859
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.06	0.56	0.56	0.04	0.54	0.54
Sat Flow, veh/h	1243	623	1054	1187	784	917	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	141	0	191	87	0	141	141	685	38	82	1592	141
Grp Sat Flow(s),veh/h/ln	1243	0	1677	1187	0	1701	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	8.3	0.0	7.7	5.3	0.0	5.4	2.7	8.2	0.8	1.5	28.8	3.4
Cycle Q Clear(g_c), s	13.7	0.0	7.7	13.0	0.0	5.4	2.7	8.2	0.8	1.5	28.8	3.4
Prop In Lane	1.00		0.63	1.00		0.54	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	285	0	376	241	0	382	243	1973	883	498	1920	859
V/C Ratio(X)	0.49	0.00	0.51	0.36	0.00	0.37	0.58	0.35	0.04	0.16	0.83	0.16
Avail Cap(c_a), veh/h	531	0	708	476	0	718	267	1973	883	548	1920	859
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.1	0.0	26.1	31.8	0.0	25.3	15.9	9.4	7.7	7.3	14.6	8.8
Incr Delay (d2), s/veh	1.3	0.0	1.1	0.9	0.0	0.6	2.6	0.5	0.1	0.2	4.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	3.7	1.8	0.0	2.6	1.8	4.1	0.4	0.8	15.1	1.6
LnGrp Delay(d),s/veh	32.4	0.0	27.2	32.7	0.0	25.9	18.5	9.8	7.8	7.5	19.0	9.3
LnGrp LOS	C		C	C		C	B	A	A	A	B	A
Approach Vol, veh/h		332			228			864			1815	
Approach Delay, s/veh		29.4			28.5			11.2			17.7	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.8	7.8	47.4		21.8	9.0	46.3
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		32.5	5.5	25.5		32.5	5.5	25.5
Max Q Clear Time (g_c+I1), s		15.0	3.5	10.2		15.7	4.7	30.8
Green Ext Time (p_c), s		1.0	0.0	4.0		1.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.9
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	5.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	30	20	125	2	32	5	140	0	1	5	0	38
Future Vol, veh/h	30	20	125	2	32	5	140	0	1	5	0	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	35	24	147	2	38	6	165	0	1	6	0	45

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	44	0	0	171	0	0	236	216	98	213	286	41
Stage 1	-	-	-	-	-	-	168	168	-	45	45	-
Stage 2	-	-	-	-	-	-	68	48	-	168	241	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1564	-	-	1406	-	-	718	682	958	744	623	1030
Stage 1	-	-	-	-	-	-	834	759	-	969	857	-
Stage 2	-	-	-	-	-	-	942	855	-	834	706	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1564	-	-	1406	-	-	673	664	958	728	607	1030
Mov Cap-2 Maneuver	-	-	-	-	-	-	673	664	-	728	607	-
Stage 1	-	-	-	-	-	-	813	740	-	945	856	-
Stage 2	-	-	-	-	-	-	900	854	-	812	688	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	1.3	0.4	12.1	8.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	674	1406	-	-	1564	-	-	983
HCM Lane V/C Ratio	0.246	0.002	-	-	0.023	-	-	0.051
HCM Control Delay (s)	12.1	7.6	0	-	7.4	0	-	8.9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	0

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	0	3	1925	8	0	1200
Future Vol, veh/h	0	3	1925	8	0	1200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	150	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3	2092	9	0	1304

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	1046	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	225	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	225	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	21.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWT
Capacity (veh/h)	-	-	225	-
HCM Lane V/C Ratio	-	-	0.014	-
HCM Control Delay (s)	-	-	21.2	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0	-

Intersection	
Int Delay, s/veh	0.2

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	2	42	46	0	0	1
Future Vol, veh/h	2	42	46	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	49	54	0	0	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	54	0	-	0	107	54
Stage 1	-	-	-	-	54	-
Stage 2	-	-	-	-	53	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1551	-	-	-	891	1013
Stage 1	-	-	-	-	969	-
Stage 2	-	-	-	-	970	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1551	-	-	-	890	1013
Mov Cap-2 Maneuver	-	-	-	-	890	-
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	970	-

Approach	SE	NW	SW
HCM Control Delay, s	0.3	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1551	-	1013
HCM Lane V/C Ratio	-	-	0.002	-	0.001
HCM Control Delay (s)	-	-	7.3	0	8.6
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	-	0

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	155	75	205	70	60	70	230	1700	65	105	950	145
Future Volume (veh/h)	155	75	205	70	60	70	230	1700	65	105	950	145
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	163	79	216	74	63	74	242	1789	68	111	1000	153
Adj No. of Lanes	1	1	0	1	1	0	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	350	119	326	213	211	248	397	1901	850	221	1802	806
Arrive On Green	0.27	0.27	0.26	0.27	0.27	0.26	0.08	0.54	0.54	0.06	0.51	0.51
Sat Flow, veh/h	1247	442	1208	1080	782	919	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	163	0	295	74	0	137	242	1789	68	111	1000	153
Grp Sat Flow(s),veh/h/ln	1247	0	1650	1080	0	1701	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.2	0.0	12.3	5.0	0.0	5.0	4.8	36.4	1.6	2.2	14.9	4.0
Cycle Q Clear(g_c), s	14.2	0.0	12.3	17.3	0.0	5.0	4.8	36.4	1.6	2.2	14.9	4.0
Prop In Lane	1.00		0.73	1.00		0.54	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	350	0	446	213	0	459	397	1901	850	221	1802	806
V/C Ratio(X)	0.47	0.00	0.66	0.35	0.00	0.30	0.61	0.94	0.08	0.50	0.56	0.19
Avail Cap(c_a), veh/h	426	0	546	279	0	563	397	1901	850	271	1802	806
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.9	0.0	25.3	32.7	0.0	22.5	10.2	16.7	8.6	17.2	12.9	10.3
Incr Delay (d2), s/veh	1.0	0.0	2.2	1.0	0.0	0.4	2.7	10.8	0.2	1.8	1.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.0	5.9	1.6	0.0	2.4	2.7	20.5	0.7	1.3	7.5	1.9
LnGrp Delay(d),s/veh	28.9	0.0	27.5	33.7	0.0	22.9	12.9	27.4	8.8	18.9	14.2	10.8
LnGrp LOS	C		C	C		C	B	C	A	B	B	B
Approach Vol, veh/h		458			211			2099			1264	
Approach Delay, s/veh		28.0			26.7			25.2			14.2	
Approach LOS		C			C			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		24.3	7.8	44.9		24.3	10.0	42.7
Change Period (Y+Rc), s		4.5	4.0	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		24.5	6.0	33.5		24.5	5.5	33.5
Max Q Clear Time (g_c+I1), s		19.3	4.2	38.4		16.2	6.8	16.9
Green Ext Time (p_c), s		0.5	0.0	0.0		1.6	0.0	6.7

Intersection Summary	
HCM 2010 Ctrl Delay	22.1
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	4.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	28	37	180	1	41	5	140	0	2	5	0	19
Future Vol, veh/h	28	37	180	1	41	5	140	0	2	5	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	44	212	1	48	6	165	0	2	6	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	54	0	0	256	0	0	280	272	150	270	375	51
Stage 1	-	-	-	-	-	-	216	216	-	53	53	-
Stage 2	-	-	-	-	-	-	64	56	-	217	322	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1551	-	-	1309	-	-	672	635	896	683	556	1017
Stage 1	-	-	-	-	-	-	786	724	-	960	851	-
Stage 2	-	-	-	-	-	-	947	848	-	785	651	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1551	-	-	1309	-	-	644	618	896	668	542	1017
Mov Cap-2 Maneuver	-	-	-	-	-	-	644	618	-	668	542	-
Stage 1	-	-	-	-	-	-	766	706	-	936	850	-
Stage 2	-	-	-	-	-	-	925	847	-	763	635	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.8	0.2	12.5	9.1
HCM LOS			B	A

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	647	1309	-	-	1551	-	-	917
HCM Lane V/C Ratio	0.258	0.001	-	-	0.021	-	-	0.031
HCM Control Delay (s)	12.5	7.8	0	-	7.4	0	-	9.1
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	0.1

ERIE COMMONS DEVELOPMENT, WELD COUNTY, COLORADO: RESULTS OF AN INTENSIVE CULTURAL RESOURCES INVENTORY

Prepared for

Community Development Group of Erie
2500 Arapahoe Avenue, Suite 220
Boulder, CO 80302

November 27, 2002

URS

8181 E. Tufts Avenue
Denver, Colorado 80237

ABSTRACT

The Community Development Group (CDG) of Erie proposes to build the Erie Commons Development. The development encompasses 367 acres of cultivated farmland near the Town of Erie in southwestern Weld County, Colorado. An intensive pedestrian cultural resources inventory of the property resulted in the discovery and recording of eight cultural resource localities. These locations include a prehistoric camp and isolated metate fragment, two historic ditches, a railroad grade, two trash deposits, and a coal mine. The prehistoric localities document a pattern of seasonal transhumance focused upon the exploitation of locally available plants and animals. The historic sites manifest the regionally pervasive themes of railroads, irrigated farming, and coal mining. The prehistoric camp, **5WL4308**, is likely to yield important information about the regional local history and is considered eligible for listing in the National Register of Historic Places. It should be avoided by project activities. If avoidance cannot be accomplished, then a treatment plan to mitigate potential adverse project effects to the site should be prepared and implemented. The other six sites and the isolated find are judged to be not eligible for the National Register. Further archaeological work at these locations is considered unnecessary.

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Colorado Historical Society – Office of Archaeology and Historic Preservation

Colorado Cultural Resource Survey

Cultural Resource Survey Management Information Form

Please complete this form and attach a copy behind the Table of Contents of each standard survey repot.

I. PROJECT SIZE

Total federal acres in project:		Acres surveyed:	
Total state acres in project:		Acres surveyed:	
Total private acres of project:	**367.1**	Acres surveyed:	**367.1**
Other ________ :		Acres surveyed:	
Total acres surveyed:			**367.1**

II. PROJECT LOCATION

County: **Weld** Principal Meridian: **6th**

USGS Quad map name(s) and date(s): **Erie, Colo. 7.5' (1967; photorevised 1979)**

NOTE: The legal location information below is meant to summarize the location of the survey and does not need to be precise.

Township:	**1N**	Range:	**68W**	Sec:	**19**	1/4s					
Township:		Range:		Sec:		1/4s					
Township:		Range:		Sec:		1/4s					
Township:		Range:		Sec:		1/4s					
Township:		Range:		Sec:		1/4s					
Township:		Range:		Sec:		1/4s					
Township:		Range:		Sec:		1/4s					
Township:		Range:		Sec:		1/4s					
Township:		Range:		Sec:		1/4s					
Township:		Range:		Sec:		1/4s					
Township:		Range:		Sec:		1/4s					

III. SITES

Smithsonian Number	Resource Type				Eligibility				Management Recommendations						
	Prehistoric	Historical	Paleontological	Unknown	Eligible	Not Eligible	Need Data	Contributes to National Register District	No Further Work	Preserve/Avoid	Monitor	Test	Excavate	Archival Research	Other
5WL1423.10		X				X			X						
5WL2248.9		X				X			X						
5WL4305		X				X			X						
5WL4306		X				X			X						
5WL4307		X				X			X						
5WL4308	X				X					X					
5WL4310.1		X				X			X						

ISOLATED FINDS

Please note that by definition IFs are not eligible to the National Register and require no further work.

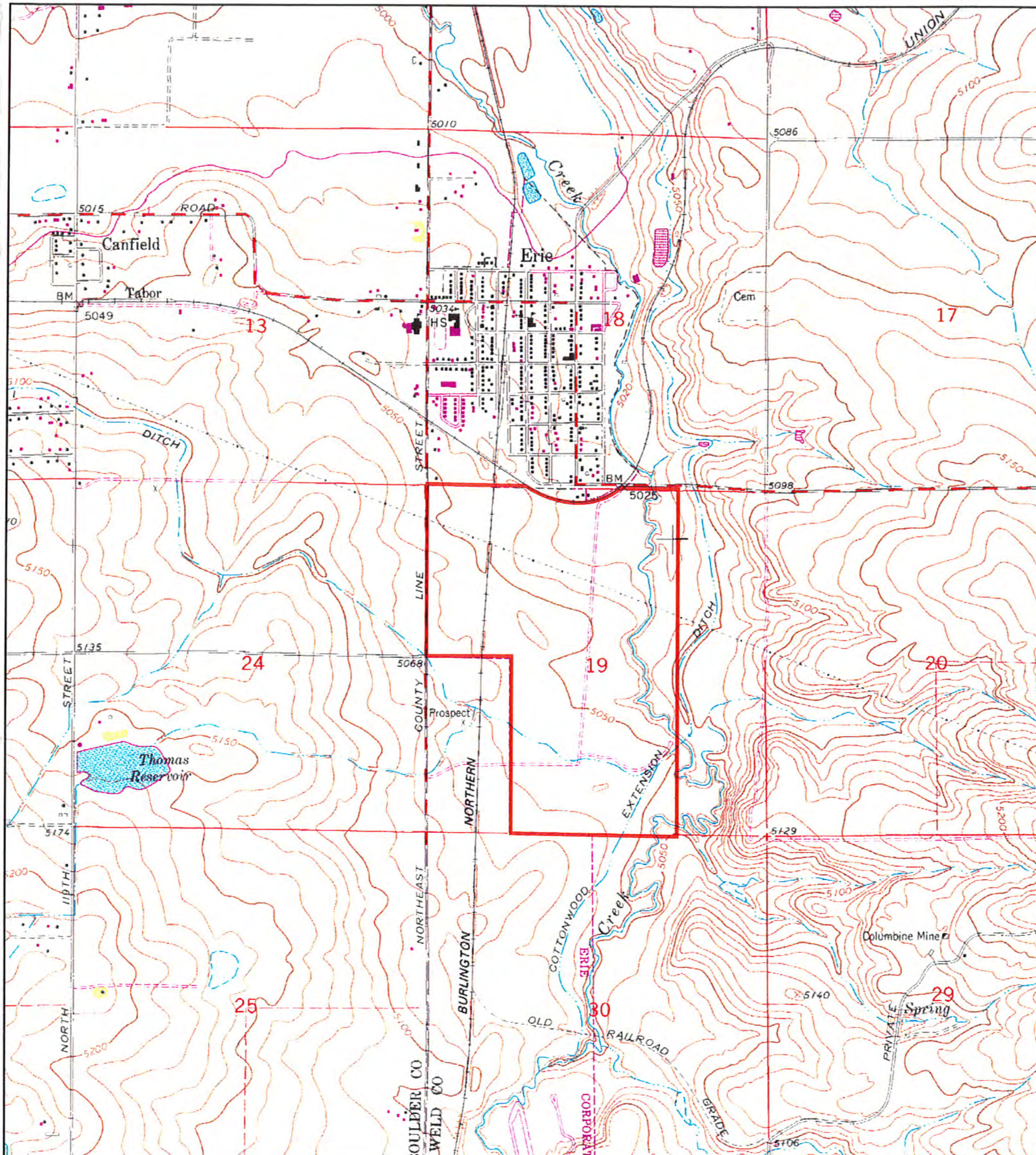
Smithsonian Number	Resource Type			
	Prehistoric	Historical	Paleontological	Unknown
5WL4309	X			

The Community Development Group (CDG) of Erie proposes to build the Erie Commons Development. The development is being considered for entry into the Northern Colorado Water Conservancy District (District), a public agency created in 1937 to provide water for agricultural, municipal, domestic, and industrial uses in northeastern Colorado. The District acquires this water from the Colorado-Big Thompson Project, which is administered by the USDI Bureau of Reclamation (Reclamation). In compliance with the provisions of Section 106 of the National Historic Preservation Act of 1966 (16 USC 470, as amended) and implementing regulations (36 CFR 800), the District must take into account the effects of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. The District is directed to consult with the State Historic Preservation Officer (SHPO), local governments, organizations, and individuals to ensure that historic properties are taken into consideration at all levels of planning and development. The District required that CDG comply with these regulations.

CDG hired URS Corporation (URS) to conduct a cultural resources inventory of the area of potential effects (APE, hereafter, the project area). The project area encompasses 367 acres, which will eventually support commercial establishments, churches, a community center, open space, and hundreds of residential dwellings. Open and public space encompasses 42 percent of the total area. The project area is located in the southwestern corner of Weld County, Colorado, on the southern edge of the Town of Erie. The legal location is given as a portion of Section 19, Township 1 North, Range 68 West, 6th Principal Meridian (Figure 1).

The project area was intensively surveyed on October 2 and 4, 2002. The Project Principal Investigator is Robert J. Mutaw, URS Cultural Resources Team Leader. The field crew consisted of Dr. Mutaw, Juston Fariello and Gordon C. Tucker Jr. Mr. Fariello prepared the inventory forms and Dr. Tucker wrote the summary report.

This report describes the background, methods, and results of an intensive cultural resources inventory of the project area. The report complies in form and content with guidelines issued by the Colorado Historical Society, Office of Archaeology and Historic Preservation (1998).



SCALE 1:24,000

½ mile 0mile 1mile

1000ft 0ft 1000ft

1km 0km 1km

N W E S

Figure 1.
Project Area Location Map
Erie, Colorado

USGS TOPOGRAPHIC MAP
Erie, CO
1979

Human use of an area, today and in the past, is conditioned to some extent by environmental parameters. The environment does not determine how and to what extent human groups will respond; rather, it provides opportunities for, and imposes constraints upon, human behavior, ameliorated to a greater or lesser extent by culture. To understand how human groups in an area adapted to the local situation, the regional environmental milieu should be understood. A description of the modern environment is followed by a discussion on past environmental conditions, necessary because the regional and local environmental conditions have changed dramatically during the 12,000+ years that humans have inhabited eastern Colorado.

2.1 MODERN ENVIRONMENT

The project area is located in the South Platte River drainage system, within the Colorado Piedmont section of the Great Plains physiographic province. Elevations range from 5,050 feet above mean sea level (amsl) at the northwest corner to 5,060 feet amsl on the western side of the project area. Coal Creek runs along the eastern edge of the property. The local landform is characterized as rolling upland, with terraces and bottomlands along Coal Creek (Crosby 1978).

Climate in the area is typical of that on the Colorado Plains and is characterized by low humidity, sparse rainfall, moderate to high winds, abundant sunshine, and a wide range in daily temperatures. As recorded at Greeley, Colorado, approximately 32 miles (mi.) northeast of the project area, the average annual precipitation is 12.27 inches for the period 1951-1974 (Crabb 1980: Table 1). Most of the precipitation falls as rain from April through September, the growing season for most crops. Average snowfall is 35.7 inches. The average daily maximum and daily minimum temperatures are 63.9°F and 33.6°F, respectively. The growing season—the number of days between the last freeze in the spring and first freeze in the fall, at a daily minimum temperature of 32°F, for 9 years in 10—is 122 days (Crabb 1980: Table 3). The prevailing wind is from the south, with an average wind speed of 10.4 miles per hour in April (Crabb 1980: 2).

The bedrock geology of the area generally dates to the Cretaceous Period and consists of sedimentary rocks that were formed in a large inland sea. A thick mantle of Pleistocene and Holocene eolian sand overlies the bedrock deposits (Colton and Anderson 1977). The Holocene Piney Creek Alluvium, a dark to light gray-brown clay to gravel alluvium, is found along Coal Creek.

Underlying soils consist mostly of Olney fine sandy loam, a deep, well-drained soil on 1-3 percent slopes (Crabb 1980: 32). Volna sandy loam, a deep, well-drained soil that formed in eolian deposits, is found along shallow tributary drainages to Coal Creek (Crabb 1980: 49). Colombo clay loam occurs on the floodplain and terraces of Coal Creek (Crabb 1980: 16).

The potential native vegetation is dominated by western wheatgrass. Also present are Blue grama, switchgrass, sand reedgrass, big bluestem, slender wheatgrass, indiangrass, and green needlegrass (Crabb 1980: 17). The project area has been cultivated, mostly recently sown with cereal rye.

A number of birds and animals inhabit the area. The birds include hawks, eagles, meadowlarks, owls, and sparrows. For animals, native carnivores include coyotes, wolves, badgers, foxes, and weasels, all of which except wolves are still present in the project area. Rabbits, mice, raccoons, and other small mammals are plentiful in the area. Native grazing animals no longer present in the area include mule deer, elk, bison, and pronghorn antelope.

The project area is currently, and has been for some time, used for agriculture. The coal beds that abound in the area have been mined commercially since the nineteenth century. Two historic railroad lines, the Burlington Northern and Union Pacific, cross or are adjacent to the project area.

2.2 PALEOENVIRONMENT

The climate of eastern Colorado has undergone dramatic climate changes over the last 10,000 years since the end of the Pleistocene epoch. These changes affected the distribution of plants and animals on the landscape and the human populations that exploited them. A general pattern of warming and drying followed the end of full glacial conditions with episodes of cooling during the Late Pleistocene/Early Holocene between 12,000 and 8000 years before present (B.P.) (Tate and Gilmore 1999:31). Although climatic conditions were warmer and drier than those of the previous glacial episode, they were cooler and wetter than modern conditions. Pine-spruce woodlands retreated to be replaced by tall grass/short grass prairies during the period from ca. 11,000 to 10,000 B.P. (Tate and Gilmore 1999:32). As the pattern of warming and drying continued, short grass and sagebrush/yucca prairies replaced the tall grass prairies from 10,000-7500 B.P. (Tate and Gilmore 1999: 33). A period of very dry, arid conditions, generally referred to as the Altithermal, occurred between 7500 and 5000 B.P. Benedict (1979) has suggested that rather than one long period of arid conditions, there were two short periods of drought separated by a period of increased precipitation. Following the Altithermal, post-5000 B.P., climatic conditions gradually approached modern levels except for brief episodes of cooler and wetter conditions (Tate and Gilmore 1999: 35). The climate has been relatively dry after ca. A.D. 1850, following the Little Ice Age (or Neo-Boreal) episode (A.D. 1650-1850) of substantially cooler and moister conditions (Painter et al. 1999: 24).

Humans have inhabited eastern Colorado for at least 12,000 years. The culture history of the region is described briefly, followed by a summary of previous investigations and known sites.

3.1 REGIONAL CULTURE HISTORY

3.1.1 Prehistoric Era

The prehistoric era in Colorado is divided into four chronologically ordered stages: Paleoindian, Archaic, Late Prehistoric, and Protohistoric. Each stage encompasses one or more periods, which are generally distinguished by technological attributes and subsistence strategies (Chenault 1999a: 1).

The Paleoindian Stage (ca. 12,000-7500 BP) is a specialized adaptation to late Pleistocene/early Holocene environments and characterized by the hunting of now-extinct species of large game such as mammoth, camels, and bison (Chenault 1999b: 51). Paleoindian components are recognized by the presence of large, well-made, flaked stone tools that distinguish three cultural periods: large, fluted lanceolate points for the *Clovis* period; smaller, finely pressure-flaked and fluted lanceolate dart points for the *Folsom* period; and lanceolate and stemmed dart points for the *Plano* period. Most Paleoindian sites are camps, animal kill sites, animal processing sites, or a combination of those types.

The succeeding Archaic Stage (ca. 7500-1800 BP) was a time of changing environmental conditions that required modifications of the Paleoindian lifestyle. Archaic people broadened their resource base by hunting both large and small game animals, as well as increasing their emphasis upon plant resources (Tate 1999: 91). Archaic components are recognized by a diversified tool kit, ground stone artifacts, smaller stemmed and notched projectile points, firepits, storage cists, and architectural features. The Archaic stage includes three periods, distinguished primarily by distinctive artifacts: large, side- and corner-notched dart points during the *Early Archaic* period; stemmed, indented-base projectile points; as well as several large side-notched, corner-notched, and stemmed points during the *Middle Archaic* period; and large, corner-notched and side-notched dart points during the *Late Archaic* period (Tate 1999: 95).

The Late Prehistoric Stage (ca. 1800-400 BP) represents a continuation of an Archaic lifestyle, with several important technological innovations: the introduction of the bow and arrow, ceramics, and limited horticulture (Gilmore 1999: 175). The stage is divided into two periods based upon the presence of distinctive artifacts: the *Early Ceramic* period, characterized by small, corner-notched arrow points and cord-marked pottery; and the *Middle Ceramic* period, characterized by small, side-notched arrow points and shouldered, globular pottery vessels with partially to completely obliterated cord marks (Gilmore 1999: 177-180). Early Ceramic period campsites appear to have been occupied for longer periods of time and/or with greater regularity than the preceding Late Archaic period, and this pattern continues into Middle Ceramic period.

The concluding Protohistoric Stage (ca. 400-100 BP) begins with European contact and ends with the period of permanent settlement by non-aboriginal groups (Clark 1999: 309). The introduction of the horse and guns resulted in dramatic cultural and territorial changes throughout the High Plains, resulting in a period of cultural dynamism. Protohistoric components are often identified through diagnostic artifacts, especially those of European and/or

American manufacture, unique features (e.g., peeled trees, wikiups, and tipi rings), or ethnographic analogy (Clark 1999: 310).

It is generally accepted that except for occasional hunting forays onto the plains by the Utes, Apaches dominated the eastern plains of Colorado from the 1500s to the 1700s (Clark 1999). Starting in the early 1700s, the Apache were beginning to have conflicts with the Comanche, who had recently acquired the horse. The Comanche, with assistance from the Utes, were able to force the Apache into New Mexico by 1730. In the early 1700s, a splinter group of Apaches began living among the Kiowas. The Kiowa-Apaches maintained their linguistic identity, but lived as Kiowas. Ethnohistoric records and oral history indicate that the Arapahos, who were quickly followed by the Cheyenne, occupied the Platte River Basin after the Comanche. Although they formerly lived near the Black Hills, by the early 1800s, the Cheyenne had begun to winter along the South Platte and Arkansas rivers. Ethnohistoric sources also reveal that seasonal hunting parties of various groups of Lakota Sioux entered northeastern Colorado.

3.1.2 Historic Era

After the removal of the Arapaho and Cheyenne to reservations in Oklahoma, an expanse of unoccupied grassland was available for Europeans and Americans to claim. Historic themes that are relevant to the project area include: Trappers and Traders (1800-1870), Trails and Transportation (1859-1870), Development and Expansion of the Rail Network (1865-1895), Early High Plains Irrigation and Farming to 1900, and Post-1900 Agriculture-Dryland Farming.

Euro-Americans traversed the area that would become Colorado as early as 1541 (Mehls 1984: 1-1). However, extensive settlement in Colorado did not occur until the mid-nineteenth century with the arrival of thousands of people seeking gold. While many failed at mining, many others stayed on and were responsible for the development of early ranching and farming on the eastern plains after the late 1850s (Mehls 1984: 4-1). The primary routes of travel to the gold fields in the mountains included (1) The Overland Trail (a branch from the Oregon Trail), which ran southward along the southeast side of the South Platte River from Julesburg and Greeley to Denver, and (2) the southern part of the Fort Morgan Cutoff, which as a bypass of the Overland Trail, went essentially straight southwestward form Fort Morgan to Denver, thus saving nearly 40 miles of travel. Coming in from Kansas across the dry plains of eastern Colorado were the...Smoky Hill North, Smoky Hill Middle (Starvation Trail), and the Smoky Hill South Trails (Scott 1999: 1).

The Old Cherokee Trail originated near Bent's Fort on the Santa Fe Trail and headed west-northwest to Denver. From Denver, it continued north following the Front Range. None of these trails, or their offshoots, passed through or near the project area, however. The development and expansion of the railroad network would have a greater impact upon the region. By the end of 1870, the Denver Pacific Railway had completed an extension line between Denver and Cheyenne and the Kansas Pacific Railway Company (formerly the Union Pacific Railway Company, Eastern Division) completed construction of tracks from the Colorado-Kansas border to Denver. With the completion of these railroad lines, the region began to grow rapidly (Mehls 1984: 7-1). In 1880, both the DPRR and KPRR were acquired by the Union Pacific Railroad (UPRR).

According to Shwayder (1983), the Boulder Valley Railroad was constructed in 1870-1873 and connected the DPRR (later, the UPRR) at Brighton with Boulder. Stations on the line included

Erie. In 1898, the line became the Boulder Branch of the UPRR. The line curls around the south end of Erie, on the northern and outside edge of the project area. The eastern end of the line (to St. Vrain Junction) was abandoned by 1966, while service on the rest of the line was only recently discontinued. Bisecting the western portion of the project area is the abandoned route of the Burlington Northern (BN) Railroad, formerly known as the Burlington and Missouri River (B&MR) Railroad (Lyons Branch), which acquired the line in 1889 from the Colorado Northern (CN) Railroad (City and County of Broomfield 2002). The CN was built as a narrow-gauge in 1883-1884 to service local coal mines. The B&MR converted the line to standard gauge rail.

The Town of Erie was settled about 1867 by the Rev. Richard Van Valkenburg, a Methodist minister who named the town after his hometown in Erie, Pennsylvania (Boulder Daily Camera 2001). The town was incorporated in 1874. As the coal mining industry in the region grew, Erie attracted hundreds of miners, and at one time was the third-largest town in Weld County. The town was surrounded by coal mines, of which two, the Garfield and Lehigh, were located in the project area. The Garfield Coal Mine No. 2, a shaft mine for lignite coal, was opened in 1892 on the UPRR near Erie and operated by the Garfield Fuel Company of Denver (Shwayder 1983: 159). It closed in 1905. The Lehigh Coal Mine opened on the UPRR in 1903 and produced lignite coal (Shwayder 1983: 262). It was owned and operated by the Northern Coal & Coke Company of Denver. It closed in 1910. Coal mining continued until 1978 when the Eagle Mine, located about 3 miles east of Erie, closed.

With the closure of the mines, local residents turned (or returned) to other means of livelihood, farming and ranching being the most common economic pursuits. The success of such pursuits was ultimately linked to the ability (or lack thereof) of the farmers/ranchers to obtain water for their fields and animals. The Union Colony at Greeley marked the first attempt to irrigate large tracts of land (Mehls 1984: 10-1). Out of an agreement between Greeley and Fort Collins came the Colorado doctrine of prior appropriation for water rights, characterized by a "first-in-time, first-in-right" principle and a system of priorities of use, ideas that were later copied by other western states. According to the Boulder Area Sustainability Information Network (Dyni 2002), irrigation in the Boulder Valley began as early as 1859 when the Lower Boulder Ditch (Boulder Creek section) was filed on October 1, 1859 for a fee of $25.00 (Dyni 1989). Ditch decrees were filed in the South Boulder Creek section for the Leyner Ditch (reduced by decree in Cottonwood Ditch) on April 1, 1865 (Priority Number 13), and the Cottonwood Ditch #1 on April 1, 1866 (Priority Number 16). The decree for the first enlargement of Cottonwood Ditch #1 was filed on October 1, 1870 (Priority Number 22). The Leyner and Cottonwood Ditches were consolidated on October 28, 1899 (K. Schwartz, personal communication 11/2002). The Leyner-Cottonwood Consolidated Ditch Company, with headquarters in Lafayette, Colorado, presently owns direct flow water rights for diversion of water from South Boulder Creek and Dry Creek into the Leyner-Cottonwood No. 1 Ditch. The decree for the Erie-Coal Creek Ditch (incorrectly labeled on the 1967 Erie, Colo. 7.5' USGS topographic quadrangle map as the Cottonwood Extension Ditch) was issued on February 20, 1894 (Erie Coal Creek Ditch and Reservoir Company 1894). The Erie-Coal Creek Ditch and Reservoir Company, with headquarters in Erie, Colorado, presently owns direct flow water rights for diversion of water form South Boulder Creek and Dry Creek into the Erie-Coal Creek Ditch. The Leyner-Cottonwood No. 1 Ditch and the Erie-Coal Creek/Cottonwood Extension Ditch cross the southern portion of the project area.

3.2 PREVIOUS WORK

On October 2, 2002, URS requested of the Colorado Historical Society, Office of Archaeology and Historic Preservation a search of the Colorado Inventory of Cultural Resources for Township 1 North, Range 68 West, Section 19. The results, as summarized in Tables 1 and 2, show that four surveys and four sites have been recorded in Section 19. Previous surveys have been completed for farms and ranches in Weld County, an overhead transmission line, and two residential developments. The documented resources include an archaeological site (with at least eight features and animal bones, some of which may be bison) and three segments of the Cottonwood Extension Ditch. Three sites have been determined officially not eligible for the National Register of Historic Places and one site is considered field eligible.

Table 1

PREVIOUS SURVEYS IN PROJECT AREA.

Report Id	Report Title	Author(S)	Institution	Completion Date (S)	Total Acres	Sites	Isolated Finds
MC.CPO.R27	Survey Report, Weld County, Colorado: Farm and Ranch Inventory	Steven Mehls and Carol Mehls	Western Historical Studies, Inc.	3/15/1989	143,200	52	0
MC.E.R18	Flatiron-Erie Transmission Line	Jane Anderson, Melissa Taylor, Marilyn Martorano, and Ted Hoeffer	Foothill Engineering Consultants, Inc.	5/10/1995	287	92	6
WL.R.R10	Intensive Cultural Resource Survey of Coal Creek Heights PUD	James Brechtel	James M. Brechtel, Consulting Archaeologist	3/30/1998 5/15/2002	156	2	0
WL.R.R20	A Class III Cultural Resource Inventory of the Vista Pointe Subdivision	Collette Chambellan and Steven Mehls	Western Cultural Resource Management, Inc.	8/3/2002 4/10/2002	332	9	13

Table 2

KNOWN SITES IN PROJECT AREA.

Site No.	Site Name	Recording Date	Doc. Id	Site Type	Estimated Age	Nrhp Eligiblity*
5WL2224	---	7/1995	---	Camp	post - 0 BP**	FNE
5WL2248.1	Cottonwood Extension Ditch—Erie and Coal Creek Ditch	7/12/1995	MC.E.R18	Canal/ditch	Unknown	ONE
5WL2248.3	Cottonwood Extension Ditch	3/30/1998	WL.R.R10	Irrigation ditch	1894-1905	ONE
5WL2248.4	Cottonwood Extension Ditch	3/30/1998	WL.R.R10	Irrigation ditch	1894-1905	ONE

Notes: *NRHP Eligibility: ONE, officially not eligible; FNE, field not eligible.

**Charcoal collected from an ash stain returned a radiocarbon age estimate that was essentially modern.

The purpose of these investigations is to identify and document all cultural (prehistoric and historic) resources within the proposed CDG Erie Commons property and to evaluate the eligibility of each recorded locality for listing in the National Register of Historic Places, according to the criteria of evaluation described at 36 CFR 60.4:

> The quality of significance in American history, architecture, archeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) that have yielded, or may be likely to yield, information important in prehistory or history.

Integrity is the "ability of a property to convey its significance" and "to retain historic integrity a property will always possess several, and usually most, of the aspects." (Townsend et al. 1993: 17). Eligible sites are those that retain integrity and satisfy one or more of the aforementioned criteria. Non-eligible sites (including all isolated finds) are those that lack integrity and/or do not satisfy any of the evaluation criteria.

The results of previous investigations and background research suggest that both prehistoric and historic resources may be present in the project area. Given the presence of a perennial stream (Coal Creek) on the edge of the property, prehistoric site types may range from task-specific localities where plants and/or animals were obtained or processed to campsites of greater or lesser intensity of occupation. Historic sites may be related to one or more of the following socioeconomic themes (Mehls 1984): Development and Expansion of the Rail Network (1865-1895) and Early High Plains Irrigation and Farming to 1900, as well as Coal Mining (King 1984).

An intensive pedestrian cultural resources inventory of the 367 acres in the proposed CDG Erie Commons development property was conducted on October 2 and 4, 2002. Three archaeologists walked parallel transects, spaced no more than 30 m (100 ft.) apart, across the project area. As they walked, the archaeologists carefully inspected the ground surface for any evidence of past, patterned human activity, prehistoric or historic. The exposed cut banks along Coal Creek were also inspected for buried cultural materials. When cultural evidence was found, the area around the initial find was quickly reconnoitered to determine if the find is isolated or the locus of more intensive or prolonged activity, i.e., a site, and then properly documented.

An **isolated find** is defined as one artifact, unassociated with any other cultural materials. It was recorded on the Colorado Cultural Resource Survey (CCRS) Isolated Find Record Form. The location of the find was plotted on the project map and the artifact sketched or photographed. A **site** consists of two or more artifacts in close association (less than 10 m [33 ft.], a cultural feature, or structural remains. General details about the site, such as location and setting, were recorded on the CCRS Management Data Form. Prehistoric sites were recorded on the CCRS Prehistoric Archaeological Component Form. Historic sites were recorded on the CCRS Historic Archaeological Component Form. In addition, if the historic site has buildings or structures, those features were recorded on the CCRS Historical Architectural Component Form. Linear features (e.g., a railroad, ditch, trail, or road) were recorded on the CCRS Linear Component Form. The location of the site was plotted on the project map, sketched in plan view, and photographed from several directions to illustrate its setting. The eligibility of each site for listing in the National Register was evaluated against the criteria shown at 36 CFR 60.4. No artifacts were collected.

All data were returned to the lab where site forms and maps were prepared in final form and photographs were developed and printed. A report was prepared that summarizes the background, methods, and results of the survey. This report complies with the guidelines issued by the Colorado Historical Society, Office of Archaeology and Historic Preservation (1998). Field notes and photographic negatives are on file at the Denver office of URS Corporation.

The intensive survey of the CDG Erie Commons residential development resulted in the identification and documentation of seven sites and one isolated find (IF). The IF and one of the sites are prehistoric, while the remaining seven sites are historic. Details about the IF and each site are briefly summarized below. A map showing the locations or all recorded properties is included as Appendix A. More details about the sites and IF are contained in the CCRS forms, included in Appendix B.

6.1 PREHISTORIC RESOURCES

Isolated Find **5WL4309** is a metate fragment, made of pink quartzitic sandstone. One surface is smoothed. The artifact measures 17 cm long by 12 cm wide by 3.5 cm thick. It was found in a disturbed area near a two-track road, approximately 90 m (300 ft.) west of Coal Creek. Its age and cultural affiliation cannot be determined. It was probably used by prehistoric inhabitants to process locally available vegetal, or possibly faunal, resources.

Site **5WL4308** appears to be a buried campsite that is exposed in the west cut bank of Coal Creek, near the northeastern corner of the project area. At least three cultural horizons are visible at approximately 32 cm, 90 cm, and 120 cm below the present ground surface. The topmost layer is 10-15 cm thick, the middle layer is 5 cm thick, and the lower layer is 4-5 cm thick. These horizons are visible as brick red lenses containing ash and charcoal. The horizons contain several bone fragments of medium-sized mammals. They probably represent three occupational episodes, separated by periods of alluvial deposition of unknown duration. No artifacts were observed on the ground surface, nor were any visible in the cut bank. The age(s) and cultural affiliation(s) of the site occupation(s) are unknown.

6.2 HISTORIC RESOURCES

Site **5WL1423.10** is the former grade of the Burlington Northern Railroad, formerly called the Burlington and Missouri River Railroad (Lyons Branch). The grade is generally visible as a low, narrow berm, except where it makes a shallow cut through a low hill. The total width of the railroad right-of-way (ROW) is about 50 ft., but the rail bed itself is about 10 ft. wide and identified by angular orange ballast. The rails and most of the ties are missing. Five deteriorated ties are located at the southern end of the recorded portion of the grade. Several circular concrete posts are aligned parallel with the grade on the eastern edge of the ROW. Each post is about 40 inches high, 4 inches in diameter at the base and tapering to 3 inches at the top. Eight holes have been drilled along the sides of each post, presumably for the attachment of barbed wire, remnants of which are still attached to a few poles. This fence must have been built to prevent cattle from wandering across the tracks from where they had been grazing to the east. The railroad line is depicted on the 1904 Edition of the Niwot, Colo. 15' USGS topographic quadrangle map and may have been present perhaps as early as 1883-1884.

Site **5WL2248.9** is a segment of the Erie-Coal Creek/Cottonwood Extension Ditch. It is a maintained irrigation ditch, through which water was flowing at the time of the survey. The ditch is made of 6-inch thick concrete, about 16 ft. wide and 6 ft. deep, with earthen berms on either side. Total width of the site, including ditch and berms, is about 55 ft. A concrete head gate at the northern end of the canal diverts water through two channels into Coal Creek. The walls of the head gate are slotted to accept several 2" by 12" planks for impeding water flow. A metal grate over each channel allows one to cross from one side to the other. The Erie-Coal

Creek Dam and Reservoir Company was incorporated on February 20, 1894. The ditch was presumably built sometime after this date to convey water for irrigation and domestic purposes.

Site **5WL4305** is a dispersed scatter of historic artifacts, spread over an area of about 2.5 hectares (6 acres). It is located in a cultivated field on a low rise at the northern end of the project area. Artifacts found in the scatter include bottle glass fragments, pieces of ceramics, brick fragments, railroad ballast, and a railroad tie plate. The site location corresponds very closely to the route of a spur from the UPRR mainline at Erie to the Lehigh Coal Mine at the southern end of Section 19, as depicted on the 1904 Edition of the Niwot, Colo. 15' USGS topographic quadrangle map. The artifacts could be associated with either the railroad or an unpaved road that parallels the western side of the railroad. The Lehigh Coal Mine was in operation from 1903 to 1910, so the spur line and the associated artifacts are probably contemporaneous.

Site **5WL4306** is a deposit of large, medium, and small mammal bones, mostly concentrated between two stone and brick walls in the western cut bank of Coal Creek. At least two cow skulls are visible in this concentration. Extending north and south on either side of this concentration, approximately 6 to 12 inches below the present ground surface, is a one-foot thick layer of animal bones. It appears that the bones were purposely dumped in or near this location and Coal Creek has re-deposited the bones. One piece of aqua bottle glass was found at the northern end of the bone layer. Isolated animal bone fragments found at different locations in the cut bank of Coal Creek suggest that the disposal of animal carcasses in the drainage may have been a common practice. The purpose of the stone and brick walls is unknown, but they may be the remnants of some structure built next to the creek. The age of the site is unknown.

Site **5WL4307** is the Lehigh Coal Mine. It consists of a large tailings pile, a collapsed shaft, and a small scatter of artifacts. The tailings pile is oriented east-west and measures about 310 ft. long and 165 ft. wide (north-south), with a maximum height of about 20 ft. The pile is composed a gray to dark gray shale-like sedimentary rock fragments and light reddish-brown sandstone fragments. The collapsed shaft is about 50 ft. west of the tailings pile and is visible as a shallow depression, 80 ft. long by 33 ft. wide and 6 ft. deep. On the south side of the depression are 16 upright metal pipes. Each pipe measures 3" in diameter, in the center of which is a threaded rod, 1" in diameter. The pipes form a rectangle, approximately 10 ft. long and 5 ft. wide, that probably supported a mine-related structure. The depression is filled with modern trash, including tires and concrete chunks. A large wooden frame, which measures 20 ft. long and 10 ft. wide and is made of 4" by 12" side pieces and 4" by 8" cross members, is found at the western end of the tailings pile. The cross members are attached to the sides with pieces of metal angle iron. A 4" by 6" plank is bolted to the frame on a diagonal. This would appear to be the remains of a head frame or part of a tipple associated with the coal mine. Historic artifacts are widely dispersed over a large area immediately north of the tailings pile. The assemblage includes fragments of bottle glass, ceramics (stoneware, whiteware, and porcelain), and bricks (red and beige). The Northern Coal and Coke Company of Denver operated the mine from 1903 to 1910. A spur line from the UPRR serviced the mine. Modern trash, mostly bottle glass and fragments of clay pigeons, are scattered on the sides and top of the tailings pile. The nature and distribution of these recent artifacts suggest that the site may have been informally used as a shooting range. The Vessels Minerals 19-15 gas well, owned by the North American Resources Co., is located immediately west of the mine.

Site **5WL4310.1** is the Leyner-Cottonwood No. 1 Ditch. It is an unlined channel, approximately 15 ft. wide at the top and 6 ft. wide at the bottom, which flows southeast to join the Erie-Coal Creek/Cottonwood Extension Ditch (**5WL2248.9**). Water in the ditch is carried under a small, two-tracked road through a round, concrete culvert, which is about 4 ft. in diameter and 8-10 ft. long. Inscribed at the top of one end of the culvert is "TOP 8-23-19." From this evidence, it is concluded that the culvert was fabricated on August 23, 1919, and was probably placed in the ditch sometime soon thereafter. Priority rights for the Leyner Ditch and the Cottonwood Ditch #1were appropriated on April 1, 1865 and April 1, 1866, respectively. The Leyner and Cottonwood Ditches were consolidated on October 28, 1899. The Leyner-Cottonwood No. 1 Ditch is presently owned by the Leyner-Cottonwood Consolidated Ditch Company of Lafayette, Colorado.

An eligible property is one that retains the ability to convey its significance and meet at least one of the four National Register criteria. Table 3 summarizes aspects of integrity for the sites recorded in the project area.

Table 3

ASPECTS OF INTEGRITY FOR SITES RECORDED IN THE CDG ERIE COMMONS PROJECT AREA.

SITE NO.	ASPECT OF INTEGRITY						
	Location	Design	Setting	Materials	Workmanship	Feeling	Association
5WL1423.10	X	X					
5WL2248.9	X	X		X	X		X
5WL4305	X						
5WL4306	X						
5WL4307	X						
5WL4308	X	X		X	X		
5WL4310.1	X	X		X	X	X	X

The historic Burlington Northern Railroad (**5WL1423.10**) is in the same location as its predecessor, the Burlington and Missouri River Railroad (Lyons Branch), and it thereby retains integrity of location and setting. The grade is intact and retains integrity of design. Because the rails and ties have been removed, however, the site lacks integrity of materials and workmanship. It lacks integrity of setting, feeling, and association because much of the rural character has been compromised by new residential developments and the coal mines that the railroad once serviced have closed. The site is unlikely to yield additional information important to a greater understanding of the local history and is therefore considered **not eligible** for listing in the National Register.

The historic Erie-Coal Creek/Cottonwood Extension Ditch (**5WL2248.9**) is in its original location and presently functions for its original purpose—to convey water for irrigation and domestic purposes—and thereby retains integrity of location, design, materials, workmanship, and association. The site lacks integrity of setting and feeling, however, because the addition of new residences and upgraded road has changed the area's rural character. Despite retaining most aspects of integrity, the site is unlikely to yield additional important information about the local history and is therefore considered **not eligible** for listing in the National Register.

Site **5WL4305** is a historic trash dump that may have been associated with a spur of the UPRR, direct evidence of which (e.g., grade, ballast, or ties) no longer exists. It retains integrity of location, but lacks integrity of design, setting, materials, and workmanship, as well as feeling and association. The site is unlikely to yield additional important information about the local history and is therefore considered **not eligible** for listing in the National Register.

Site **5WL4306** is a concentration of domesticated animal bones, plus remnants of stone and brick walls, which manifest a rural practice of dumping of dead farm animals in a drainage channel. It retains, therefore, integrity of location. Because Coal Creek has scattered the bones, the site lacks integrity of design, materials, and workmanship. The site also lacks integrity of setting, feeling, and association due to the attenuation of the area's rural character. The site is unlikely to yield additional important information about the local history and is therefore considered **not eligible** for the National Register.

The historic Lehigh Coal Mine **(5WL4307)** retains integrity of location. It lacks integrity of setting, feeling, and association because the rural character of the area has waned, and the railroad spur line that once serviced the mine has been removed. The present features on the site (tailings pile, collapsed shaft, and trash scatter) provide only a hint of the mine's original layout and structure, so it lacks integrity of design, materials, and workmanship. The site is unlikely to yield additional important information about the local history and is therefore considered **not eligible** for the National Register.

Site **5WL4308** is a prehistoric campsite exposed in a cut bank of Coal Creek. At least three discrete occupational episodes are evident in the exposure. The site retains integrity of location, design, materials, and workmanship, but lacks integrity of setting, feeling, and association. It is likely, however, to yield important data about the regional culture history and is therefore considered **eligible** for the National Register.

The historic Leyner-Cottonwood No. 1 Ditch **(5WL4310.1)** is in its original location and presently functions for its original purpose—to convey water for irrigation and domestic purposes—and thereby retains integrity of location, design, materials, workmanship, and association. The site lacks integrity of setting and feeling, however, because the addition of new residences and upgraded road has changed the area's rural character. Despite retaining most aspects of integrity, the site is unlikely to yield additional important information about the local history and is therefore considered **not eligible** for listing in the National Register.

5WL4309, an isolated metate fragment, is considered **not eligible** for the National Register.

It was expected that both prehistoric and historic resources would be found in the project area, and this expectation has been corroborated. The prehistoric resources include an isolated metate fragment and presumably a buried site. The metate affirms that aboriginal inhabitants were collecting and processing vegetal and/or meat resources. The site appears to be a camp that was occupied briefly by aboriginal hunters at least three different times. It bears some physical similarities to previously recorded Site 5WL2224, which is located about one-half mile south on Coal Creek. The latter exhibited several ash stains and animal bone fragments, some of which were identified as bison. The age of the site is equivocal, however, because a radiocarbon date of post-0 BP obtained on charcoal collected from an ash stain suggests that the sample was contaminated or the site is more recent in age. These two sites and the isolated metate may document an aboriginal pattern of seasonal transhumance focused upon the exploitation of locally available plants and animals.

Historic resources include two irrigation ditches, a railroad grade, coal mine, trash scatter, and buried animal bone and trash. These sites document the regionally pervasive themes of Development and Expansion of the Rail Network (1865-1895), Early High Plains Irrigation and Farming to 1900, and Coal Mining. The railroad and coal mining themes are interrelated because the timely export of coal from the mine and import of necessary supplies demanded an efficient means of transportation. Coal mines and railroads were common features on the local landscape at the beginning of the twentieth century. Successful farming in the region was—and is—heavily dependent upon water, which has been conveyed through a sophisticated system of ditches and canals since the mid-nineteenth century. All of these sites attest to the abilities of the human inhabitants to extract necessary sustenance from a sometimes-marginal environment.

An intensive pedestrian cultural resources inventory of 367 acres proposed for residential development near the Town of Erie in Weld County, Colorado, resulted in the discovery and recording of eight cultural resource localities. These locations include a prehistoric camp and isolated metate fragment, as well as two historic ditches, a railroad grade, two trash deposits, and a coal mine. The prehistoric localities document a pattern of seasonal transhumance focused upon the exploitation of locally available plants and animals. The historic sites manifest the regionally pervasive themes of railroads, irrigated farming, and coal mining.

The six historic sites and the prehistoric isolated find are judged to be not eligible for the National Register of Historic Places. Further archaeological work at these locations is considered unnecessary.

The prehistoric camp, **5WL4308**, is likely to yield important information about the regional local history and is considered eligible for listing in the National Register. It should be avoided by project activities. If avoidance cannot be accomplished, then a plan to mitigate adverse effects to the site should be prepared and implemented.

General Geologic Hazard Assessment

Erie Commons Filing 4
Blocks 6, 7 and 8 Including Tracts D and M
Erie, Colorado

Prepared For:

CENTURY COMMUNITIES

8309 East Crescent Parkway, Suite 650
Greenwood Village, Colorado 80111

WESTERN ENVIRONMENT AND ECOLOGY, INC.
2217 West Powers Avenue
Littleton, Colorado 80120
303-730-3452
303-730-3461 (fax)
www.westernenvironment.com

General Geologic Hazard Assessment

Erie Commons Filing 4
Blocks 6, 7 and 8 Including Tracts D and M
Erie, Colorado

Western Environment and Ecology, Inc.
Project Number **729-002-01**

April 18, 2017

Prepared For:

CENTURY
COMMUNITIES
8309 East Crescent Parkway, Suite 650
Greenwood Village, Colorado 80111

Prepared by:

Greg D. Sherman, P.G.
President

WESTERN ENVIRONMENT AND ECOLOGY, INC.
2217 West Powers Avenue
Littleton, Colorado 80120
303-730-3452
303-730-3461 (fax)
www.westernenvironment.com

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APPENDIX

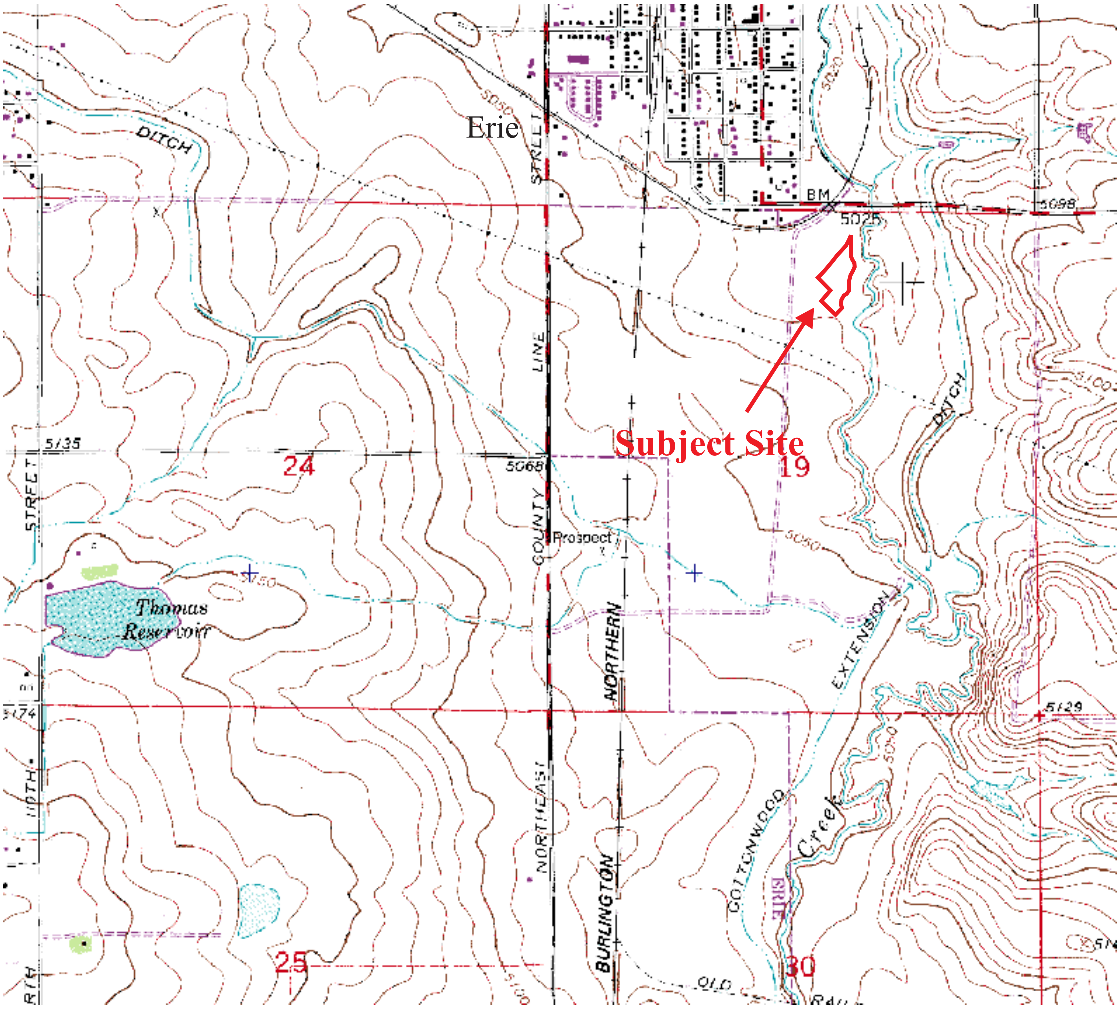
FEMA FLOOD MAP

1.0 INTRODUCTION

Western Environment and Ecology, Inc. (Western Environment) was retained by Mr. Mike Cooper of Century Communities, Inc. to conduct a general geologic hazard assessment survey on approximately 6.218 acres in Section 19, Township 1 North, Range 68 West, Erie, Colorado (Figure 1). The purpose of this study is to fulfill the requirement of the Town of Erie Planning Commission. At the time of this investigation all the commercial lots were vacant. The site occurs at an elevation of approximately 5,030 feet with gradual to slopes to the northeast toward Coal Creek (USGS Erie Quadrangle, 1979). The results of several investigations performed by Western Environment on the Erie Commons Development, on behalf of Community Development Group, were used in this assessment.

The site is bordered by Erie Parkway to the north and Briggs Street to the west. Coal Creek forms the eastern boundary with single family residences to the south (Figure 2). A retail and commercial development is present to the north across Eire Parkway, and vacant commercial lots are present west of Briggs Street. New residential development is occurring to the east across Coal Creek.

View to north toward Erie Parkway commercial development



Scale 1 Inch = 2,000 feet

1,000 0 1,000 2,000

WESTERN ENVIRONMENT AND ECOLOGY, INC. 2217 West Powers Avenue Littleton, Colorado 80120	Figure 1 - Project Location Map Erie Commons Filing 4 Lots 2 and 3 Block 6 and Lots 1 and 2 Block 7 Erie, Colorado

Scale 1 Inch = 300 feet

150 0 150 300

WESTERN ENVIRONMENT
AND ECOLOGY, INC.
2217 West Powers Avenue
Littleton, Colorado 80120

Figure 2 - Site Map
Erie Commons Filing 4
Lots 2 and 3 Block 6 and Lots 1 and 2 Block 7
Erie, Colorado

2.0 REGIONAL GEOLOGY

The subject site lies in Section 19, Township 1 North, Range 68 West, Erie, Colorado. Outcropping units within and surrounding the study area are the Pierre Shale, the Fox Hills Sandstone, the Laramie Formation, and Quaternary gravels and soils. The Pierre Shale is a lead gray to brown and black shale of marine origin. Total thickness in the area is greater than 7,000 feet (Blair 1951) with the majority of the formation made of shale. Near the top the shale becomes increasingly sandy and contains beds of fine sandstones and siltstone as it grades into the Fox Hills Sandstone.

The Fox Hills Sandstone is a massive to cross bedded sandstone. It was deposited in a beach or delta front environment and conformably overlies the Pierre Shale. The lower two-thirds of the formation is a fine to coarse-grained bluff colored sandstone that weathers to a light tan to tan color. Numerous iron-colored calcareous concretions are present, ranging in size from fractions of an inch to several feet in thickness. The upper one-third of the Fox Hills Formation at this location is about 140 feet. Thicknesses vary from 60 feet near Ralston Creek (as described by Van Horn, 1957) to 250 feet near the Baseline Reservoir.

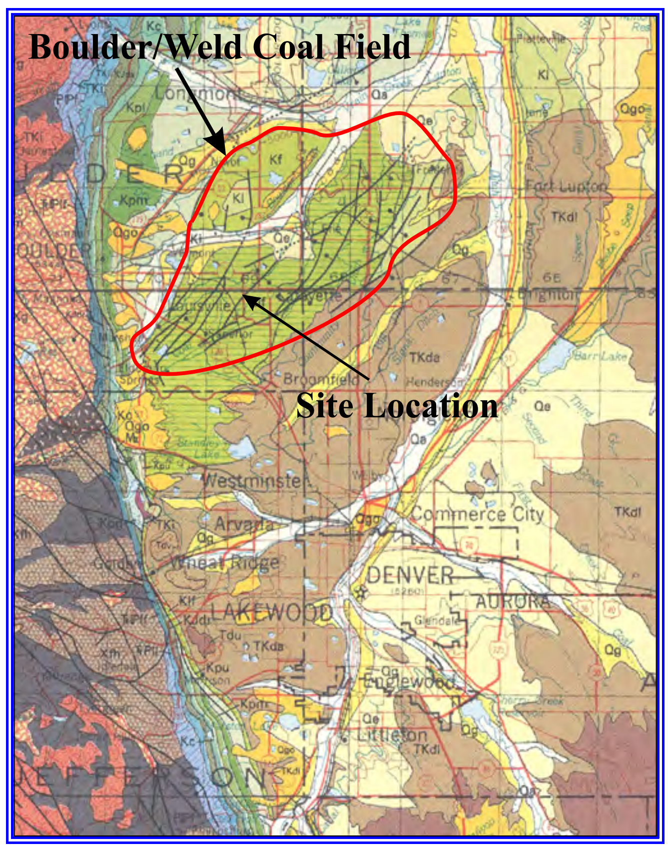
The Laramie Formation is predominantly fresh water coastal plain in origin, consisting of coal swamps, back-levee oxidized and leached claystone, river channel sandstone, splay delta sandstone, and fresh to brackish water lake and bay claystone. The lower portion is approximately 100 feet thick and is composed of sandstones, sandy shales, claystones, and coal beds. These coal beds have been economically mined in the past. The upper unit has a thickness of approximately 600 feet and is made of mostly clay, shales, very fine sandy shales, and lenticular beds of sandstones. The shales are largely carbonaceous, and in places, become lignitic. The Laramie Formation lies conformably on the Fox Hills Sandstone.

2.1 Structure

The subject property lies on the western edge of the Denver-Julsburg Basin against the Front Range uplift. This basin contains up to 13,000 feet of sediments derived from the ancestral Rocky Mountains that laid to the west. A basement-controlled late Cretaceous Laramide faulting is most prevalent and is the result of deformation associated with uplift. The second has been described by Davis and Weimer (1976) as growth faulting as a result of over-pressuring of the deltaic sequence at the time of deposition.

Growth faulting is the major structural feature seen in the project area. A zone is present with dominant faults trending in a northeast direction. This system is ten miles wide and thirty miles long. These faults are high angle normal structures near the surface, but seismic work has shown that they tend to flatten and die out at depth. Work by Davis and Weimer (1976) shows that these listric normal faults do not continue below the Hygiene member of the Pierre Shale. Antithetic faults resulting from tension then formed horsts and grabens. This effect has resulted in increased thickness of sediments in the graben areas. The Fox Hills Sandstone has been reported as having a total thickness near a growth fault of 484 feet (Spencer 1961). The Laramie Formation also has increased thicknesses in these zones, and this is believed to be the reason for increased thicknesses in the coal seams in the Boulder-Weld Coal Field.

Recently investigators have recognized low angle reverse faults in the Boulder-Weld area. Kittleson (2009) describes the Longmont Detachment and identifies the Romero Fault as the footwall to the Detachment. These detachments are analogous to undersea landslides, on a vastly larger scale, and occur in rocks exhibiting incomplete lithification. The footwalls to these detachments are low angle reverse faults seen on several projects near the subject site.



Boulder/Weld Coal Field

3.0 SITE GEOLOGY

Five distinct geologic units were encountered during drilling performed by Western Environment on the Eire Commons Subdivision. The first and uppermost unit is a sandy clay soil approximately 3 to 5 feet thick. The composition of this material is extremely variable across the site and will require additional geo-technical investigation.

The next lower unit consists of light brown, medium to fine-grained sands, possibly of aeolian origin. These sands occur between 5 and 10 feet in depth and average approximately 5 to 8 feet thick. Their composition, like the soils, are highly variable across the site. The engineering characteristics of this unit will need evaluation due to the potential for consolidation and loss of bearing capacity upon saturation. Beneath the aeolian sands, are gravels ranging from 10 to 20 feet in thickness. These gravels are water saturated and range in diameter from approximately 1/4 inch to 1 inch.

The next unit encountered is the clays, silts, fine-grained sands and coals of the Cretaceous-age Laramie Formation. The contact between the Laramie and the recent deposits occurs between 15 and 40 feet in depth. Several discontinuous coal seams occur near the Filing 4 lots. These range in thickness from 1 to over 6 feet when present. The depth to these seams when range from 55 to 125 feet below grade.

The lowest stratigraphically significant unit was the Laramie/ Fox Hills Contact. It's depth ranged between 110 to 140 feet. The upper Fox Hills Formation is characterized by light gray fine to very fine-grained quartzose sandstone.

4.0 RESULTS

Western Environment utilized readily available published information developed by the Colorado Geological Survey (CGS), the United States Geological Survey (USGS), the United States Department of Agriculture, the Federal Emergency Management Agency, and a site inspection. **No direct investigations involving drilling or sampling was performed in preparation of this document**.

Specific hazards reviewed using readily available documents for the Filing 4 property included - flooding, landslides, seismic activity/earthquakes, shrinking/swelling soils and bedrock, and undermining.

4.1 Flood Hazards

Western Environment personnel reviewed maps prepared by the Federal Emergency Management Agency for Erie, Colorado (U.S. Federal Emergency Management Agency FIRM, Erie, Colorado, 12/18/2012). **This review (see attached map) indicated that the Filing 4 site is located within the FEMA Zone X which indicates a 0.2% annual chance of flood and/or a 1% annual chance of flooding with a depth of less than 1 foot**.

4.2 Landslides

The United States Geological Survey defines landslides as “a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows.” A review of the USGS Erie Quadrangle (Figure 1) indicated that the site generally contains gentle less than 1% slopes. This was verified during the site visit. It is the opinion of Western Environment that landslide events on the Filing 4 lots are unlikely.

4.3 Seismic Activity / Earthquakes

Colorado contains several Quaternary faults with several documented seismic events, generally located from the Front Range west. The largest recorded earthquake in Colorado was magnitude 6.6. This earthquake occurred north of Estes Park in 1882, and caused variable amounts of damage as far away as Denver. A CGS study indicated that a repeat of the 1882 earthquake could cause damages of $240 million dollars. Prior to 2000, most Colorado municipalities used the Uniform Building Code (UBC) for requirements of earthquake-resistant designs of buildings. At that time, the subject site was located within Seismic Zone 1 (note: the higher the Zone number, the more stringent the seismic design criteria). This rating was in place due to a relatively low seismic risk for the area. In 2000, the International Building Code (IBC) replaced the UBC. This code called for considerably less stringent mitigation controls in relation to building techniques and earthquakes within the Front Range Urban Corridor. However, most municipalities and building departments in Colorado have not adopted the IBC. Development of the site should conform to the current building codes used by the Town of Erie.

4.4 Shrinking /Swelling Potentials of Soils and Bedrock

Western Environment utilized the Soil Survey of Southern Weld County, Colorado prepared by the United States Department of Agriculture, Resource Conservation Service to help identify potential hazards associated with soils located on the site. One soil type was identified within the Filing 4 property. A table indicating map designation number, soil name, slope occurrence and shrink/swell potential is located below.

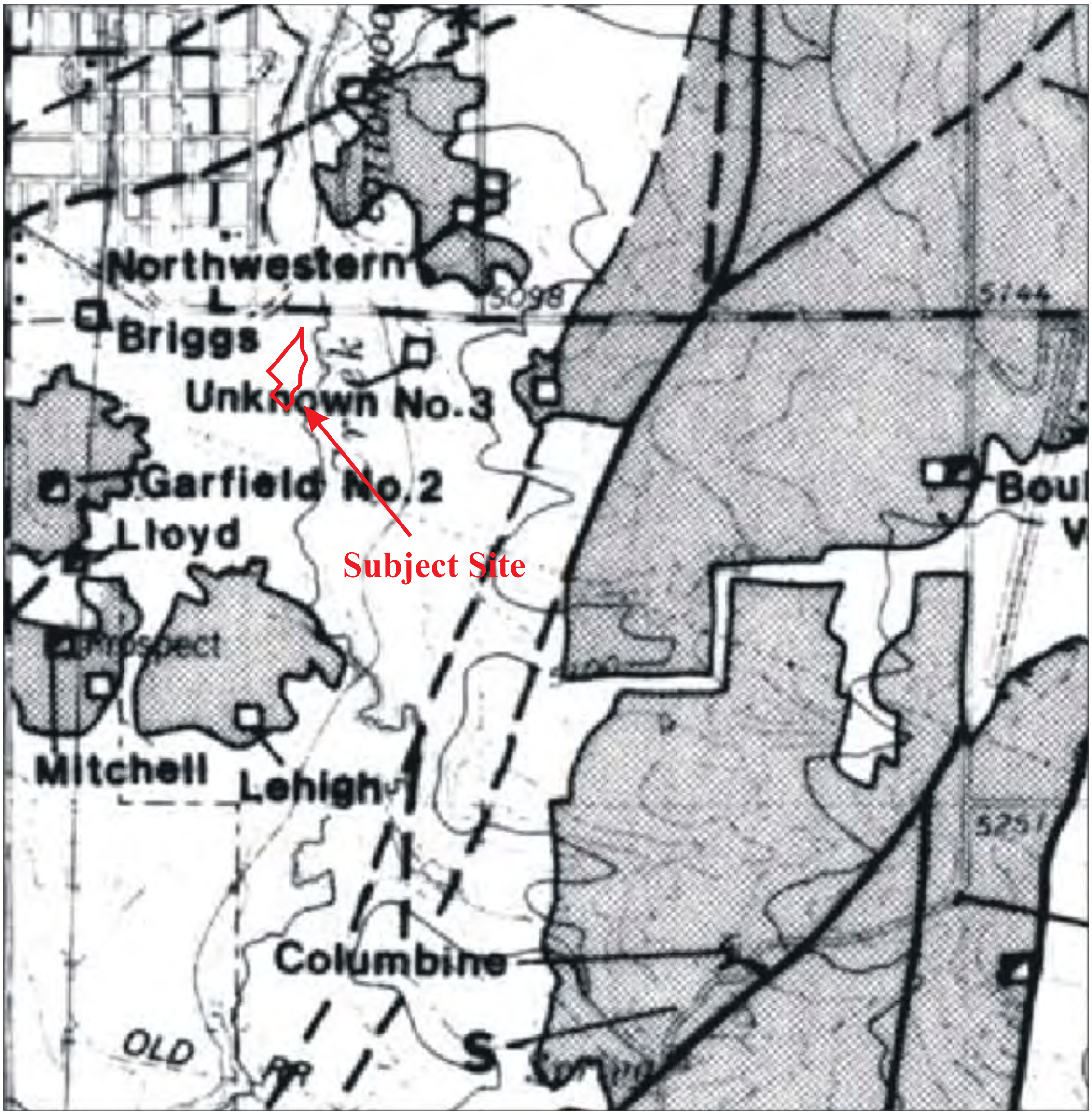
Map Designation Number	Soil Name	Slope Occurrence (in percent)	Shrink / Swell Potential
47	Olney fine sandy loam	1-3	low to moderate

The Conservation Service classifies this soil as a deep well drained soil formed in mixed out-wash deposits. Permeability and available water capacity are moderate with a low erosion hazard. The shrink swell potential is low to moderate with a low potential for corrosion of concrete and a high potential of bare steel corrosion. However, the soil survey of the area was originally prepared in 1980. Since then significant over-lot grading has likely modified the profile. Therefor, significant variability of soil on the site can be expected. A detailed investigation by a qualified geo-technical engineer should be performed on the site prior to development.

4.5 Undermining

Files with the Colorado Geological Survey (CGS) show that the site is located within the Boulder/Weld Coal Field. Extensive investigations performed by Western Environment have located workings of three mines beneath the Erie Commons Subdivision. However, these studies have confirmed that **no mining is present beneath the Filing 4 properties referenced in this assessment.** The CGS records show that workings of the Mitchell, Lloyd and Garfield Mines are present to the west and south of the subject site (Figure 3). Workings of the Mitchell Mine are approximately 3000 feet to the southwest. Records on file with the Colorado Division of Mines and the Colorado Geological Survey show it began operations in 1883 and continued through 1891. Total production was placed at 35,976 tons. Extraction occurred through a 110 foot deep two compartment shaft. An air shaft occurs further south of the site beneath Austin Avenue. Production records indicated that the coal ranges in thickness from four feet six inches to five feet. The mine was officially closed and abandoned in June, 1891.

Props and Caps roof support, from the Denver Public Library Western History Collection



From Colorado Front Range Inactive Coal Mine Data and Subsidence Information, Weld County, Colorado. Colorado Geological Survey, 1983.

WESTERN ENVIRONMENT AND ECOLOGY, INC.
2217 West Powers Avenue
Littleton, Colorado 80120

Figure 3 - CGS Inactive Coal Mine Map
Erie Commons Filing 4
Lots 2 and 3 Block 6 and Lots 1 and 2 Block 7
Erie, Colorado

The records of the Garfield Mine, 2000 feet to the west, show that production occurred from 1892 through 1905. The mine was officially closed in June 1905. Total production as of 1896 was shown to be 181,174 tons. However, no total mine life production records are available. Extraction occurred through an 84 foot double compartment shaft located to the north of the Erie Recreation Center. No air shaft location for the Garfield Mine was shown on the original mine map. The Garfield's average coal seam thickness was five feet. Mine maps and investigations on adjacent properties indicate that production occurred from two levels. The Lower Garfield workings were accessed from the Garfield Shaft No. 1 in Section 24, west of subject project. The multi-level mining occurred north of Erie Parkway and west of County Line Road. The Lloyd Shaft is shown on mine maps from adjacent mines and is recorded with the Colorado Division of Mines. However, no production records or mine maps are available. The Lloyd Shaft is located 1500 feet west of the site.

Thick coal seam from the Garfield Mine

4.0 CONCLUSIONS

Based on the findings of this survey, it is the opinion of Western Environment that no significant geologic hazards occur on the Filing 4 properties. However, the FEMA designation of the lots as within Flood Zone X (**0.2% annual chance of flood and/or a 1% annual chance of flooding with a depth of less than 1 foot**) may require engineering controls including, but not limited to placement of fill.

5.0 LITERATURE CITED

Federal Emergency Management Agency. Flood Insurance Rate Map, Erie, Colorado, 12/18/2012.

Matthews III, Vincent. Colorado Geological Survey Publication. The Challenges of Evaluating Earthquake Hazard in Colorado. 2003.

United States Department of Agriculture, Soil Conservation Service. Soil Survey of Weld County, Colorado, Southern Part. September, 1980.

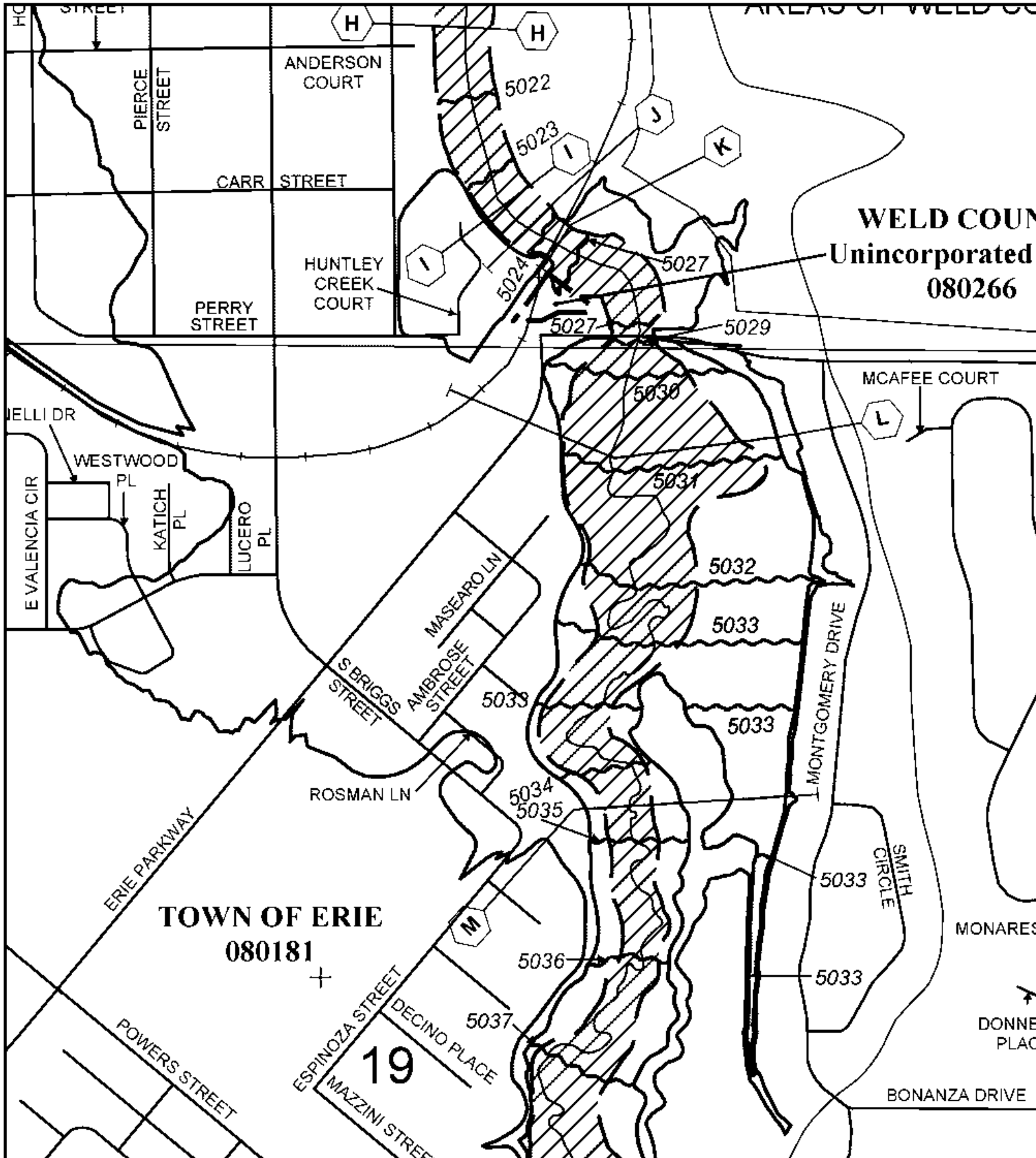
Turney, J.E.; Murray-Williams, L. Colorado Geological Survey. Colorado Front Range Inactive Coal Mine Data and Subsidence Information, Weld County. 1983.

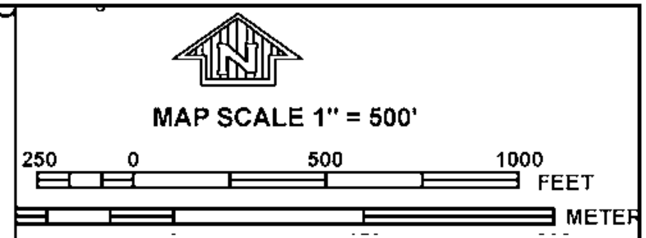
Tweto, Ogden. Geologic Map of Colorado. United States Geological Survey. 1979.

United States Geological Survey. Erie, Colorado 7.5 Minute Quadrangle. 1994.

Western Environment and Ecology, Inc. Summary Report Mine Subsidence Investigations of the Erie Commons Development September 16th, 2004.

APPENDIX





NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0441J

FIRM

FLOOD INSURANCE RATE MAP

BOULDER COUNTY, COLORADO

AND INCORPORATED AREAS

PANEL 441 OF 615

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOULDER COUNTY	080023	0441	J
ERIE, TOWN OF	080181	0441	J

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

MAP NUMBER
08013C0441J

MAP REVISED
DECEMBER 18, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0441J

FIRM

FLOOD INSURANCE RATE MAP

BOULDER COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 441 OF 615

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

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

MAP NUMBER
08013C0441J

MAP REVISED
DECEMBER 18, 2012

Federal Emergency Management Agency

WESTERN ENVIRONMENT AND ECOLOGY, INC

August 23, 2010

Jon Lee
Community Development Group
288 Arapahoe Street, Suite 200
Boulder, Colorado 80531

Subject: Review of Erie Commons Filing #4, 1st Amendment- Final Plat, Town of Erie, Colorado. Western Environment and Ecology, Inc. Project Number 134-001-05.

Dear Mr. Lee:

At your request, Western Environment and Ecology, Inc. (Western Environment) reviewed the mine subsidence related comments contained in a letter from Jill Carlson, Engineering Geologist with the Colorado Geological Survey (CGS) to Deborah Bachelder of the Town of Erie, dated July 30, 2010. This letter presented the opinion of the CGS regarding the proposed amendments to Filing 4 of the Erie Commons Subdivision. Ms Carlson referenced the Western Environment and Ecology, Inc. report entitled "Mine Subsidence Investigations, Summary Report, Erie Commons Subdivision", September 16, 2004.

The Summary Report indicated the extent of mining from the Lehigh Mine and presented a 0% strain line beyond which no mine subsidence related development restrictions were required. At the suggestion of Ms Carlson, Western Environment prepared a Filing 4, 1st Amendment Plat map that superimposed the proposed lot layout presented in the amendment with the workings of the Lehigh Mine and the 0% strain line documented in the Summary Report. The attached Figure 1 shows that the 0% strain line "does encroach slightly into the southeastern property boundary". The two lots that are in contact with the strain line are Lot 3, Block 2, Track B and Lot 5, Block 1, Track A. However, the buildable area of the Lots are outside of the 0% strain line and therefor not impacted by the subsidence related development restrictions placed on Filing 4.

Ms Carlson was correct in her assessment that not all of the mine workings potentially located beneath Filing 4 were shown on the September 16th, 2004 Summary Report. A small portion of what currently is Tract A of Filing 4 may be undermined by working of the Mitchell Mine. This area of potential mining is also indicated on Figure 1. Subsidence investigations performed by Western Environment on the adjacent Erie Commercial Center (Western Environment and Ecology, Inc. Project Number 149-003-01, dated January 20, 2006) recommended that development within Subsidence Zone C, which is directly adjacent to Tract A to the west, limit building length to 66 feet.

Based upon these observations, it is the opinion of Western Environment that no mine subsidence related development restrictions are required on Tract B Lots. Although, we are unconvinced about the presence of Mitchell workings beneath Filing 4, we would recommend that structures proposed for Lots 1-5, Track A be limited to 66 feet or less in length and incorporate a strain isolation trench around the perimeter of the foundation.

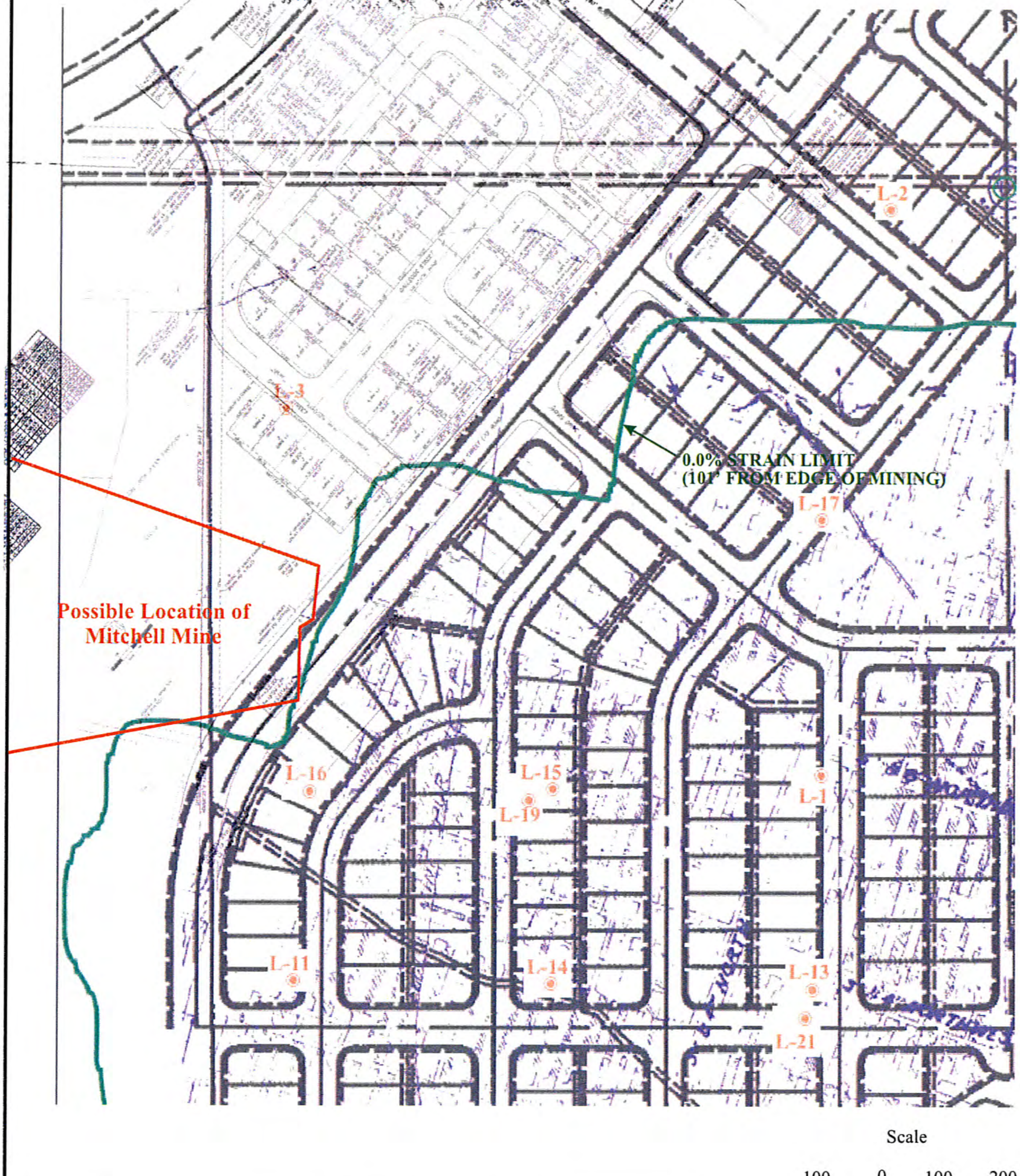
Please feel free to contact us with any questions you may have.

Sincerely

Greg D. Sherman P.G.
President

att.

2217 WEST POWERS AVENUE • LITTLETON, COLORADO 80120
PHONE (303)730-3452 • FAX (303)730-3461
WWW.WESTERNENVIRONMENT.COM



WESTERN ENVIRONMENT AND ECOLOGY, INC. 2217 WEST POWERS AVENUE LITTLETON, COLORADO 80120	FIGURE 1 - SITE LOCATION ERIE COMMONS FILING NO. 4, 1ST AMENDMENT FINAL PLAT ERIE, COLORADO

CTL | THOMPSON
INCORPORATED

PHASE I ENVIRONMENTAL SITE ASSESSMENT
ERIE COMMONS, FILING NO. 4
SOUTH OF ERIE PARKWAY
AND BRIGGS STREET
ERIE, COLORADO

Prepared for:

CENTURY COMMUNITIES
8390 East Crescent Parkway, Suite 650
Greenwood Village, Colorado 80111

Attention: Mr. Michael Lee

Project No. DN48,805-200

February 23, 2017

1971 West 12th Avenue | Denver, Colorado 80204 | Phone: 303-825-0777 | Fax: 303-825-4252

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EXECUTIVE SUMMARY

This report presents the results of the Phase I Environmental Site Assessment (ESA) that was performed by CTL | Thompson, Inc. for Erie Commons Subdivision, Filing No. 4 in Erie, Colorado. The Site consists of five lots and one Tract within an approximately 9-acre parcel.

The Phase I ESA was conducted in general conformance with the methods and procedures described in the American Society for Testing and Materials (ASTM) E 1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.

The site appears to have remained in agricultural use since at least the late 1930s until approximately 2000 when overlot grading activities took place as part of the development of Erie Commons. The site has remained vacant since that time.

We did not find evidence of a recognized environmental condition in connection with the site.

This executive summary does not contain all the information that is found in the full report. The report should be read in its entirety to obtain a more complete understanding of the information provided and to aid in any decisions made or actions taken based on this information.

1.0 INTRODUCTION

This report was prepared by CTL | Thompson, Inc. (CTL) for Century Communities and presents the results of the Phase I Environmental Site Assessment (ESA) for select lots of Erie Commons Subdivision, Filing No. 4 in Erie, Colorado. The Site consists of five lots and one tract within an approximately 9-acre parcel. The Phase I ESA was conducted in general accordance with our Proposal Number DN 16-0632 dated December 20, 2016, and subsequent authorization by Mr. Michael Lee.

1.1 Purpose

The purpose of the Phase I ESA was to identify Recognized Environmental Conditions (REC), to the extent feasible, pursuant to the methods and procedures described in the American Society for Testing and Materials (ASTM) Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessments, E 1527-13.

An REC is defined as the presence or likely presence of hazardous substances or petroleum products on a site under conditions that indicate an existing release, a past release, or a material threat of a release of hazardous substances or petroleum products into the ground, groundwater, or surface water of the site. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

ASTM Standard E1527-13 also has separate definitions for past conditions that would otherwise be considered an REC but have been addressed to the satisfaction of the applicable regulatory agencies and would either allow for generally unrestricted use of the site (referred to as a Historic Recognized Environmental Condition, or HREC) or for use of the site with various restrictions (referred to as a Controlled Recognized Environmental Condition, or CREC).

1.2 Scope of Services

The scope of services for this assessment consisted of a records review, a Site reconnaissance, historical research, interviews, and documentation of findings in a report.

1.3 Limitations

This Phase I ESA was prepared in general accordance with ASTM Standard E 1527-13. There may be additional environmental issues present at the Site that are outside the scope of this practice that include, but are not limited to, the following:

- Asbestos-containing materials;
- Radon;
- Lead-based paint;
- Lead in drinking water;
- Cultural and historic resources;
- Mold and fungi;
- Industrial hygiene;
- Indoor air quality;
- Health & safety;
- Ecological resources;
- Endangered species;
- Biological or infectious agents and pathogens;
- Wetlands;
- Jurisdictional waters of the U.S;
- Regulatory compliance;
- High voltage power lines; and,
- Mine subsidence.

CTL provided an opinion based upon the condition of the Site on the day it was observed and a review of existing and reasonably ascertainable regulatory records and historical information. Our scope did not include chemical testing of soil, groundwater, air, or building materials. The opinion, conclusions, and recommendations of this report are not intended to be used or relied upon by a third party to this Agreement. With the written consent of our client, CTL may be available to contract with other parties to provide an opinion or conduct additional environmental assessment services. Due to latent conditions and other contingencies which may become evident in the future, the current assessment does not result in any guarantee the subject Site is free and clear of hazardous materials. Should additional surface, subsurface or chemical data become available, the conclusions and recommendations contained in this report shall not be considered valid unless the data is reviewed and the conclusions of this report are modified or approved in writing by our firm.

We believe that this investigation was conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the locality of the project. No warranty, express or implied, is made.

2.0 SITE DESCRIPTION AND LOCATION

2.1 Location and Legal Description

The Site is located in Erie Commons Subdivision within an approximately 9-acre parcel. The site is located southeast of the intersection of Erie Parkway and Briggs Street in Erie, Colorado.

The site is legally described as Lots 2 and 3, Block 6; Lots 1 and 2, Block 7; Lot 1, Block 8 and Tract D, Erie Commons, Filing No. 4, Town of Erie in the West Half of Section 19, Township 1 North, Range 68 West of the 6th Principal Meridian, in

Erie, Colorado. The site location and plan are shown on Figure 1 (Area Map) and Figure 2 (Site Plan).

2.2 General Description of Site and Improvements

The site consists of vacant residential subdivision lots, which generally are sparsely vegetated except for native grass and weeds. The Site is bordered by Erie Parkway on the northwest (a.k.a. Leon A. Wurl Parkway), Briggs Street on the west, Coal Creek on the east, and residences to the south.

The site has been partially developed for construction of multi-family housing. Overlot grading and installation of underground utilities are partially complete and some of the streets are paved. A photographic record of our site reconnaissance is presented in Appendix A.

2.3 General Uses of Adjoining Properties

The site is located in a developing residential area in Erie, Colorado. An open space lies to the west and east, with Coal Creek beyond, and a community center and library lie to the north. A daycare, and then vacant residential lots are to the west. Single family residences are constructed to the south. Additional details regarding our observations of adjacent properties are presented in Section 7.4 of this report.

3.0 USER PROVIDED INFORMATION

Mr. Michael Lee of Century Communities (Century) completed our environmental questionnaire on February 20, 2017. Mr. Lee indicated that Mr. Jon Lee of the Community Development Group was the owner's representative. Mr. Lee did not return our questionnaire and we have not reached him by phone. Century's answers are detailed below.

3.1 Environmental Liens/Title Records

An environmental lien is a charge, security, or encumbrance upon title to a property to secure the payment of a cost, damage, debt, obligation, or duty arising out of response actions, cleanup, or other remediation of hazardous material or petroleum products upon a property. Century was not aware of existing environmental liens on the site.

Title records were provided by Century. We reviewed a Commitment for Title Insurance, dated January 24, 2017, Order Number NCS-832603-CO, prepared by First American Title Insurance Company-NCS. We reviewed Section 2 (Exceptions) of Schedule B, where environmental liens would be expected, if present. We are not title experts, but did not find obvious evidence of environmental liens in this title document. We assume the buyer of the property will perform adequate title review.

3.2 Activity and Use Limitations

Environmental AULs are legal or physical restrictions or limitations on the use of, or access to, a site or facility to: 1) reduce or eliminate potential exposure to hazardous substances or petroleum products in the soil or groundwater on the property, or 2) prevent activities that could interfere with the effectiveness of a response action, in order to ensure maintenance of a condition of no significant risk to public health or the environment. These legal or physical restrictions may include engineering controls, institutional controls, or land use restrictions. Century was not aware of recorded environmental AULs related to the site.

3.3 Specialized Knowledge

Century was not aware of specialized knowledge or experience related to previous environmental activities on the site.

3.4 Valuation Reduction for Environmental Issues

Century was not aware of valuation reduction of the site because of environmental issues.

3.5 Commonly Known or Reasonably Ascertainable Information

Century was not aware of commonly known or reasonably ascertainable information regarding environmental issues related to the site.

3.6 Owner, Site Manager, and Occupant Information

Century indicated that the site is currently owned by Community Development Group. Mr. Jon Lee is the owner's representative. We have not yet reached him for input. The site is unoccupied.

3.7 Reason for Performing a Phase I ESA

Century requested a Phase I ESA prior to acquisition of the site.

3.8 Previous Environmental Site Assessments

Century provided copies of previous environmental studies on the site. We reviewed copies of previous reports for the site and adjacent properties, and these are very briefly mentioned below. These reports should be read for additional details.

Phase I ESA, Erie Commons, 388 Acres in Section 19, Township 1 North, Range 68 West, Erie, Colorado, Project Number 134-001-07, prepared by Western Environment and Ecology, Inc., report dated June 4, 2004. No RECs were found.

Phase I ESA, Erie Commons, Filings #4, #5 in Section 19, Township 1 North, Range 68 West, Erie, Colorado, 80516, Project Number 134-020-02, prepared by Western Environment and Ecology, Inc., report dated July 9, 2010. No RECs were found.

Phase I ESA, Including Natural Resources Assessment For: Erie Commons, Filings 4 & 5, Erie, Colorado, prepared by Kitchell Environmental Services, report dated October 29, 2010. This report covered lots immediately adjacent the site, but not the subject lots. No RECs were found.

4.0 RECORDS REVIEW

CTL reviewed existing sources listed in the **REFERENCES** section to assess the soils, geologic and hydrogeologic conditions of the general vicinity of the site.

4.1 Physiography

The site is located on flat terrain, as presented on the topographic map (Figure 1). The site is approximately 5,050 to 5,060 feet above mean sea level. The area slopes downward to the east toward Coal Creek, the predominant surface water feature in the vicinity. Coal Creek is located approximately 100 feet east of the site. Coal Creek generally flows from south to north.

4.2 Geology and Soils

A geotechnical concurrent investigation was performed by CTL for the site (DN 48,805-115, not yet dated). Subsoils found in our borings generally consisted of clean, silty and clayey sand, sandy clay and interlayered clay and sand underlain by claystone bedrock. Claystone bedrock was encountered in four borings at depths between 23 and 28 feet below the existing ground surface.

4.3 Groundwater

It is our experience that the flow direction of shallow, unconfined groundwater is generally controlled by topography. Based on topography, we estimate the general direction of groundwater flow below the site is to the east towards Coal Creek. Topographic data suggests areas up-gradient of the site are generally to the west. During our geotechnical study (DN 48,805-115), groundwater was measured in borings during this investigation at depths of 19.5 to 27 feet.

4.4 Water Wells

Water wells are generally identified through the Colorado Division of Water Resources online water well permit database. The database did not indicate the presence of wells located on or adjacent the site.

4.5 Oil/Gas Wells

Oil and gas wells are identified through the Colorado Oil and Gas Conservation Commission online database. The database did not indicate the presence of oil/gas wells on or adjacent the site. The nearest oil/gas wells are located approximately 400-feet east of the site lots. The Encana Coal Creek C1 well is across Coal Creek and is lower in elevation than the Site. We do not consider this well to be an REC for the site.

4.6 Physical Setting Analysis of Migration of Hazardous/Petroleum Substances

A hypothetic spill of a hazardous or petroleum substance on the site would be expected to migrate along the ground surface towards storm drains in the streets. Off-site surface spills on the adjoining parcels to the west appear to have the highest potential to migrate on-site. Based on local topography, we estimate groundwater generally flows to the east. Sources of contamination to groundwater beneath the site, if present, would most likely be located to the west.

5.0 HISTORICAL USE INFORMATION

5.1 Historical Aerial Photographs and Topographic Maps

Historical aerial photographs of the site and surrounding area were reviewed for 1937, 1972, 1969, 1979, 1991, 2000, 2005 and 2015; a copy of the 2015 photograph is presented in Appendix B. USGS topographic maps were reviewed for 1948, 1971 and 1979. An interpretation of the aerial photographs and maps is presented, as follows:

- 1937-1979: The site appears as farmed agricultural land. A railroad and then County Line Road were present within approximately ¼ mile to the west. The Town of Erie was present approximately ½ mile to the north. The area was generally in agricultural use.

- 1991: The site and immediate area are generally unchanged. An industrial building was now present to the southwest along County Line Road.

- 2000: The site and immediate area are generally unchanged. An oil well was now present within ¼ mile to the east.

- 2005: The site and immediate area are generally unchanged. Additional commercial buildings were now present to the northwest along County Line Road.

- 2005-2015: Development of Erie Commons is apparent. Streets and residences are completed to the south and east of the site during this time period. The streets and lots of the site are not yet apparent. By 2011 an additional oil well and associated equipment are present within ¼ mile to the north.

5.2 Sanborn Fire Insurance Maps

Sanborn fire insurance maps were a tool used by the fire insurance industry to evaluate property risk. The maps often show details of historic dwellings, commercial buildings, and factories, indicate property uses and addresses, and show locations of items such as wells, cisterns, and fuel storage tanks. Sanborn Fire Insurance Map coverage was not available for the site and surrounding area.

5.3 Cultural Features Map

The 1938/41 cultural features map shows the site as vacant or agricultural land. The railroads and County Line Road are shown on the map. The Town of Erie is shown approximately ½ mile north of the site. "Coal Camps" are depicted in the vicinity of Erie, reflecting a dominant industry in the vicinity at that time.

5.4 Historical City Directories

Due to the lack of address information, and the predominant use of the site for agricultural use, historic city directories were not reviewed for the site.

5.5 Assessor Records

We reviewed Weld County Assessor online files for the site. Records indicate that the site is owned by Community Development group of Erie. No deed information is listed. There are no records of buildings.

6.0 REGULATORY AGENCY RECORDS

Regulatory agency records were provided by GeoSearch. The report, dated February 16, 2017, is presented in Appendix C. There are three mapped findings and eight unmapped findings.

6.1 Summary of Findings

No mapped findings are considered significant to this Site based on location and classification. The findings, one leaking underground tank installation, an oil and gas well and a historic brick clay mine, are either located at a distance of at least ¼ mile, and/or are down gradient. We do not believe these three findings are RECs for the Site.

Eight findings presented in the GeoSearch Report, are unmapped findings that are unaddressed but potentially in the vicinity of the site. These findings are six solid waste/dump site findings and two leaking storage tank findings which do not have specific address information. It is unlikely that these are permitted, confirmed landfills, but more likely may be reports of dumping and/or suspected dump sites based on historical aerial photographs and/or older county and state records. We believe if these listings were on or adjacent the site, they would have been discovered during site development activities. Otherwise, these solid waste and tank listings could not be more fully assessed due to incomplete address information.

6.2 Local Government Records

We contacted Mountain View Fire Protection District in regards to hazardous material records pertaining to the site. We previously spoke with Mr. Chuck Boyse, Fire Prevention Specialist, on September 6, 2012. Mr. Boyse indicated that he did not recall hazardous material spills in the immediate vicinity of Erie Commons. He had worked at Mountain View FPD for 21 years at that time.

We contacted Weld County Health Department in regards to hazardous material records pertaining to the site. They responded on February 21, 2017 that they found no records of hazardous material incidents at Erie Commons. Ms. Marcela Swain responded that a street detailed address or parcel description may better facilitate future requests.

7.0 SITE RECONNAISSANCE

The following section discusses observations made during our site reconnaissance.

7.1 Methodology and Limiting Conditions

Our Mr. Grant R. Emery conducted a site visit on February 20, 2017. The site was accessed by walking. A photographic record of the site reconnaissance is presented in Appendix A.

7.2 Description of Site Structures and Roads

The site contains vacant, undeveloped residential subdivision lots, unvegetated but seeded and covered with straw mulch. The area consists of dispersed single and multi-family building lots. There are no residences or structures on the site, but there are multiple residences on similar lots to the south as well as a daycare. Adjacent to the site are developed lots, streets, a small park and some residences. Large residential subdivisions and recreational use areas are to the north across Erie Parkway, and developed residential lots, rural residential uses and ranch land are to the south.

7.3 Site Observations

During our reconnaissance, we specifically looked for obvious evidence of the site features listed in Table II. An "X" located within the table indicates that the feature was readily observable. Those features which were observed on the site are discussed in further detail within the following subsection(s).

Table II
Site Features

	Aboveground Storage Tanks		Stained Soil and/or Pavement
	Air Emissions Sources	X	Stockpiles of Soil or Debris
	Cultivated Land/Crops		Stressed Vegetation
	Drains, Sumps, Pits		Surface Water, Streams, Ponds, Lagoons
	Hazardous Material Storage	X	Transformers (Potential PCB)
	High Power Transmission Lines		Underground Storage Tanks
	Natural Gas Pipelines		Unidentified Piping Below Grade
	Odors		Unidentified Substance Containers
	Petroleum Pipelines		Vehicle Maintenance Areas
	Physical Irregularities		Waste Water Discharge
X	Placed Fill or Imported Soils		Waste Treatment Processes
	Railroad Lines		Wells (Agricultural, Water Supply)
	Septic Systems or Leach Fields		Wells (Monitoring)
	Solid Waste or Disposal Areas		Wells (Oil or Natural Gas)

7.3.1 Placed Fill or Imported Soils

We observed that the area containing and adjacent the site lots appeared to be graded. It appears to be an extension of the overlot grading performed during the development of the Filing 4 lots. It is difficult to determine if the graded area contains imported soils or placed fill. We do not believe the grading represents an REC in connection with the site.

7.3.2 Stockpiles of Soil or Debris

We observed piles of debris that appeared to be actively forming as a result of site cleanup work or dumping. The debris pile consisted of construction materials such as torn out concrete, pavement and landscaping debris. We do not believe these debris piles are an REC for the site. These items should be removed properly.

7.3.3 Transformers

We observed relatively new appearing transformers on site that were labeled “No PCBs”. We also did not observe staining or leakage from the transformers and therefore do not believe them to be an REC in connection with the site.

7.4 Review of Adjacent Properties

General observations of properties adjacent to the site were performed in conjunction with on-site observations made on February 20, 2017. Developed property in the vicinity of the site consists of transportation corridors, single-family and multi-family residences, commercial property and vacant land. Properties immediately adjacent to the site are described below, based on outdoor observations from the site or nearby public streets.

- North: The site is generally bounded by Erie Parkway, and then a community center and library.
- East: The site is generally bounded by a bike path, vacant land and Coal Creek beyond.
- South: The site is bounded by residences within Erie Commons.
- West: The site is bounded by Briggs Street and undeveloped lots, and a small strip mall, primarily with medical-office tenants.

Observation of adjacent properties did not reveal obvious visual indications of environmental concern. We did not observe obvious evidence of landfills, lagoons, pits, or other waste treatment or disposal operations; underground storage tanks, spills, releases, or discharge of hazardous material which could negatively impact the site.

8.0 INTERVIEWS

8.1 Owner, Site Manager and/or Occupants

Information regarding the representative of the current owner of the site was provided and the owner's representative, Mr. Jon Lee, was not yet interviewed. The site has historically remained vacant, fallow land. There are no buildings and the Site is vacant.

9.0 DEVIATIONS

9.1 Exceptions and Deletions

ASTM Standard E 1527-13 for Phase I Environmental Site Assessments, Section 8.3.2, states that “all obvious uses of the site shall be identified from the present, back to the site’s obvious first developed use, or back to 1940, whichever is earlier.” The term “developed use” includes agricultural uses (i.e., cultivated land / agricultural crops) and placement of fill. In our opinion, livestock rangeland is not a developed use.

The historical documentation for this assessment went back to 1937 on the basis of an historical aerial photograph from 1937, which showed the property as agricultural land. We were not able to ascertain the date of first agricultural use thus the historical documentation was not fully satisfied for the ASTM standard.

It is the opinion of CTL that obtaining earlier historical information would not be sufficiently useful, reasonably ascertainable, or change the likelihood for the presence of an REC on the site.

9.2 Data Gaps

Based on the information presented in this report, we do not believe that the lack of owner interview is a significant data gap which would affect our ability to identify recognized environmental conditions associated with the site.

10.0 FINDINGS AND OPINION

10.1 Summary of Site Historical Use

The site is currently developed platted lots of a residential neighborhood and has historically been used for farming. Based on our understanding of the area from previous studies, dryland wheat may have been the primary crop. The use of pesticides and herbicides presents a potential concern for these chemicals to adversely impact the soil and groundwater beneath the site. However, typical forage crops grown in Colorado did not normally undergo intensive use of banned chemicals (e.g. DDT, Dieldrin). Concentrated waste cleanups of pesticides and herbicides in Colorado are rare. As such, we believe that normal application of agricultural chemicals at the site is a *de minimis* environmental condition.

10.2 Nearby Environmental Concerns

There are no RECs identified from adjacent properties. An oil and gas well is located approximately 400 feet east of the site, but is topographically separate from the Site and is not considered an REC for this site.

10.3 Storm Water Discharges Associated with Construction Activity

Under current Federal/state regulations, construction sites that disturb one acre, or are part of a larger development in which total disturbed area is equal to or greater than one acre, are required to apply for a General Permit for Storm Water Discharges Associated with Construction Activity (General Permit) from the Colorado Department of Public Health and Environment (CDPHE). Some Municipal Separate Storm Sewer Systems (MS4s) also require additional permitting for construction sites within their jurisdiction.

The General Permit application must be submitted to the CDPHE at least 10 days prior to the start of construction activities. The General Permit requires a Storm Water Management Plan (SWMP) to be developed, implemented, and modified as needed from before commencement of construction activities until final stabilization is complete and a Notice of Termination has been submitted to the CDPHE. Furthermore, the General Permit requires that site inspections be performed at least every 14 calendar days and within 24 hours following a storm event that causes significant movement of sediment on-site. The local MS4 may require more frequent inspections. Complete and current storm water management plans should be kept on-site. CTL can assist with your storm water management and compliance needs, if desired.

11.0 CONCLUSIONS

We have performed a Phase I Environmental Site Assessment (ESA) in general conformance with the scope and limitations of ASTM Practice E 1527-13 of Erie Commons Subdivision, Filing 4, select lots, in Erie, Colorado, the site. Any exceptions to, or deletions from, this practice are described in Section 9.1 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the property.

12.0 QUALIFICATIONS

This Phase I ESA was supervised by, and the report reviewed by, Mr. Matthew Wardlow, a licensed Professional Engineer (P.E.) registered in the State of Colorado. Mr. Wardlow has performed or reviewed over 1,000 Phase I ESAs in the State of Colorado, and has been practicing within the local environmental consulting profession for at least 20 years. The resumes of the individuals conducting this Phase I ESA are included in Appendix D.

Mr. Wardlow declares that, to the best of his professional knowledge and belief, he meets the definition of an Environmental Professional as defined in §312.10 of 40 CFR 312. I have the specific qualifications based on education, training and experience to assess a property of the nature, history and setting of the subject site. I have developed and performed all appropriate inquiries in general conformance with the standards and practices set forth in 40 CFR Part 312.

We believe that this ESA was conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the locality of the project. No warranty, express or implied, is made.

If we can be of further service in discussing the contents of this report, please call.

CTL | THOMPSON, INC.

Grant R. Emery
Environmental Scientist

Reviewed by:

Matthew Wardlow

Matthew L. Wardlow, P.E.
Environmental Department Manager

GRE:MLW/nn

Via e-mail: michael.lee@centurycommunities.com
inspre-co@centurycommunities.com

REFERENCES

Colorado Aerial Photo Service, Aerial Photographs, Stereo Pairs, from 1937, 1969, 1979, 1991 and 2000.

Colorado Division of Water Resources, online Water Well Permit Database, http://165.127.23.116/website/lttools/

Colorado Oil and Gas Conservation Commission, online Oil/Gas Well Permit Database, http://www.oil-gas.state.co.us

Cultural Feature Map, 1938/41, Satisfi, Inc.

Phase I ESA, Erie Commons, 388 Acres in Section 19, Township 1 North, Range 68 West, Erie, Colorado, Project Number 134-001-07, prepared by Western Environment and Ecology, Inc., report dated June 4, 2004.

Phase I ESA, Erie Commons, Filings #4, #5 in Section 19, Township 1 North, Range 68 West, Erie, Colorado, 80516, Project Number 134-020-02, prepared by Western Environment and Ecology, Inc., report dated July 9, 2010.

Phase I ESA, Including Natural Resources Assessment For: Erie Commons, Filings 4 & 5, Erie, Colorado, prepared by Kitchell Environmental Services, report dated October 29, 2010.

Soils and Foundation Investigation, Erie Commons, Filing 4, 2nd Amendment, Blocks 9-18, South of Erie Parkway and Powers Street, Erie, Colorado, Project No. DN46,174-120, prepared by CTL/Thompson, Inc., report dated August 28, 2012

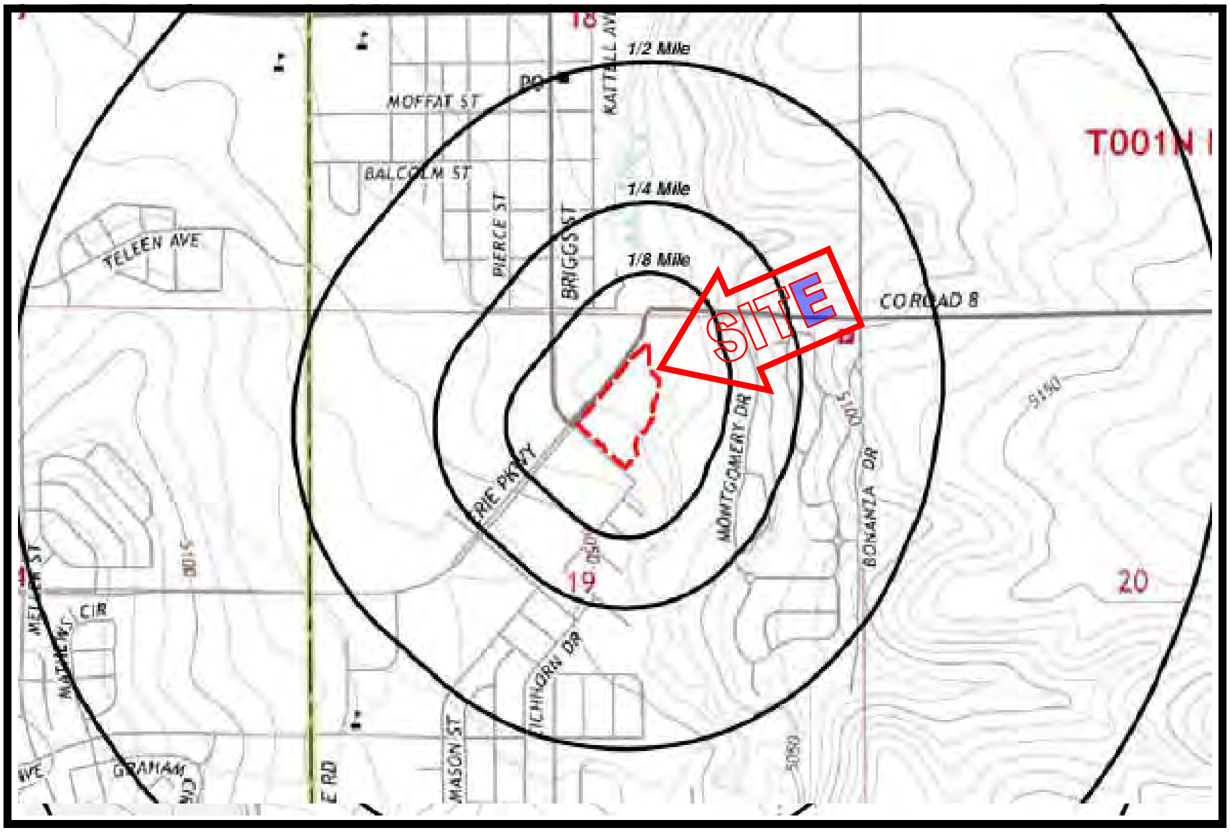
Environmental Database Search, GeoSearch Report. (Report #DN48805-200, dated February 16, 2017).

GoogleEarth Image, Aerial Photograph, 1999, 2005 and 2015 www.googleearth.com

Returned Environmental Questionnaire, Mr. Michael Lee, Century Communities, February20, 2017.

U.S. Geological Survey Topographic Map, Erie, Colorado (1967, and 1967 revised 1979).

R 68 W

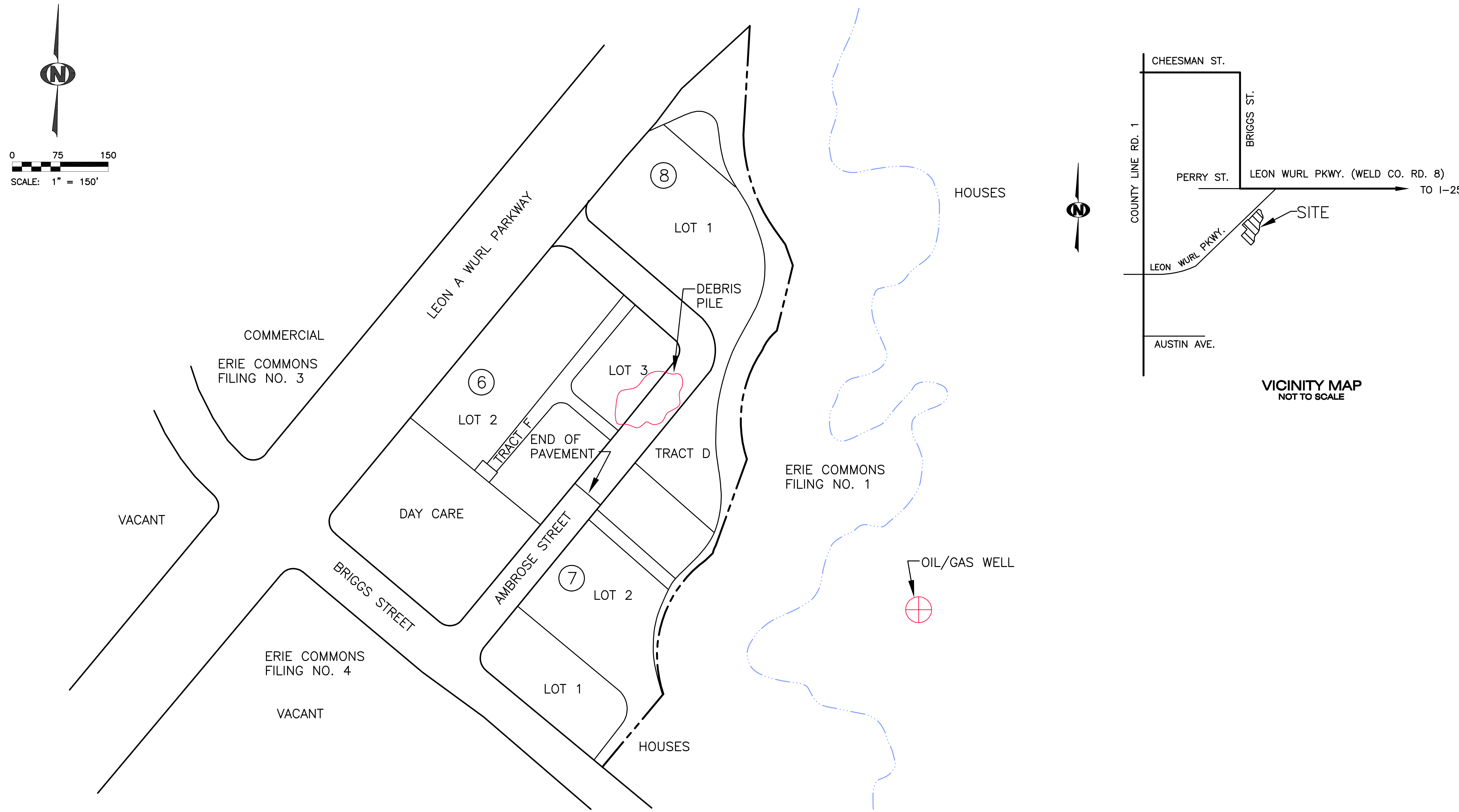


N

T 1 N

1” ~ 2000’

Source:
U.S.G.S. Topographic Map
Erie Quadrangle, Colorado
2013



CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL\T Project No. DN48,805-200-R1

Site Plan Fig. 2

APPENDIX A

SITE PHOTOGRAPHS

Description: Debris pile just off end of pavement
Direction: East

Description: Unmown portion of the Site
Direction: West

Description: Mown area of the Site
Direction: Northeast

Description: From southeast corner of the Site
Direction: Northeast

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SITE PHOTOGRAPHS

Erie Commons, Filing 4
February 20, 2017

CTL Project No. DN 48805-200

Description: Eastern boundary of Site
Direction: South

Description: Site general conditions
Direction: Southwest

Description: Lone small tree
Direction: South

Description: Rough road through uncut grasses
Direction: Southwest

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SITE PHOTOGRAPHS

Erie Commons, Filing 4
February 20, 2017

CTL Project No. DN 48805-200

APPENDIX B

AERIAL PHOTOGRAPH

CTL | T PROJECT NO. DN 48805-200

2015 AERIAL PHOTOGRAPH
Approximate Site Location

APPENDIX C

ENVIRONMENTAL GEOSEARCH REPORT

Radius Report

Satellite view

Target Property:

Erie Commons Filing 4

201 S Briggs St

Erie, Weld County, Colorado 80516

Prepared For:

CTL Thompson- Denver

Order #: 81494

Job #: 176511

Project #: DN48805-200

Date: 02/16/2017

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Disclaimer

This report was designed by GeoSearch to meet or exceed the records search requirements of the All Appropriate Inquiries Rule (40 CFR §312.26) and the current version of the ASTM International E1527, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process or, if applicable, the custom requirements requested by the entity that ordered this report. The records and databases of records used to compile this report were collected from various federal,state and local governmental entities. It is the goal of GeoSearch to meet or exceed the 40 CFR §312.26 and E1527 requirements for updating records by using the best available technology. GeoSearch contacts the appropriate governmental entities on a recurring basis. Depending on the frequency with which a record source or database of records is updated by the governmental entity, the data used to prepare this report may be updated monthly, quarterly, semi-annually, or annually.

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Target Property Summary

Target Property Information

Erie Commons Filing 4
201 S Briggs St
Erie, Colorado 80516

Coordinates
Area centroid (-105.04498, 40.0413274)
5,037 feet above sea level

USGS Quadrangle
Erie, CO

Geographic Coverage Information

County/Parish: Weld (CO) , Boulder (CO)
ZipCode(s):
Erie CO: 80516

Radon
* Target property is located in Radon Zone 1.
Zone 1 areas have a predicted average indoor radon screening level greater than 4 pCi/L (picocuries per liter).

Database Summary

FEDERAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
FEDERAL ENGINEERING INSTITUTIONAL CONTROL SITES	EC	0	0	TP/AP
LAND USE CONTROL INFORMATION SYSTEM	LUCIS	0	0	TP/AP
RCRA SITES WITH CONTROLS	RCRASC	0	0	TP/AP
EMERGENCY RESPONSE NOTIFICATION SYSTEM	ERNSCO	0	0	0.1250
NO LONGER REGULATED RCRA GENERATOR FACILITIES	NLRRCRAG	0	0	0.2500
RESOURCE CONSERVATION & RECOVERY ACT - GENERATOR	RCRAGR08	0	0	0.2500
RESOURCE CONSERVATION & RECOVERY ACT - NON-GENERATOR	RCRANGR08	0	0	0.2500
BROWNFIELDS MANAGEMENT SYSTEM	BF	0	0	0.5000
NO LONGER REGULATED RCRA NON-CORRACTS TSD FACILITIES	NLRRCRAT	0	0	0.5000
RESOURCE CONSERVATION & RECOVERY ACT - NON-CORRACTS TREATMENT, STORAGE & DISPOSAL FACILITIES	RCRAT	0	0	0.5000
SUPERFUND ENTERPRISE MANAGEMENT SYSTEM	SEMS	0	0	0.5000
SUPERFUND ENTERPRISE MANAGEMENT SYSTEM ARCHIVED SITE INVENTORY	SEMSARCH	0	0	0.5000
DELISTED NATIONAL PRIORITIES LIST	DNPL	0	0	1.0000
NATIONAL PRIORITIES LIST	NPL	0	0	1.0000
NO LONGER REGULATED RCRA CORRECTIVE ACTION FACILITIES	NLRRCRAC	0	0	1.0000
PROPOSED NATIONAL PRIORITIES LIST	PNPL	0	0	1.0000
RESOURCE CONSERVATION & RECOVERY ACT - CORRECTIVE ACTION FACILITIES	RCRAC	0	0	1.0000
RESOURCE CONSERVATION & RECOVERY ACT - SUBJECT TO CORRECTIVE ACTION FACILITIES	RCRASUBC	0	0	1.0000
SUB-TOTAL		0	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
CERCLIS LIENS	SFLIENS	0	0	TP/AP
EPA DOCKET DATA	DOCKETS	0	0	TP/AP
MATERIAL LICENSING TRACKING SYSTEM	MLTS	0	0	TP/AP
TOXIC SUBSTANCE CONTROL ACT INVENTORY	TSCA	0	0	TP/AP
AEROMETRIC INFORMATION RETRIEVAL SYSTEM / AIR FACILITY SUBSYSTEM	AIRSAFS	1	0	0.1250
CLANDESTINE DRUG LABORATORY LOCATIONS	CDL	0	0	0.1250

Database Summary

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
HAZARDOUS MATERIALS INCIDENT REPORTING SYSTEM	HMIRSR08	0	0	0.1250
TOXICS RELEASE INVENTORY	TRI	0	0	0.1250
BIENNIAL REPORTING SYSTEM	BRS	0	0	0.2500
HISTORICAL GAS STATIONS	HISTPST	0	0	0.2500
MINE SAFETY AND HEALTH ADMINISTRATION MASTER INDEX FILE	MSHA	0	0	0.2500
MINERAL RESOURCE DATA SYSTEM	MRDS	1	0	0.2500
OPEN DUMP INVENTORY	ODI	0	0	0.5000
DEPARTMENT OF DEFENSE SITES	DOD	0	0	1.0000
FORMER MILITARY NIKE MISSILE SITES	NMS	0	0	1.0000
FORMERLY USED DEFENSE SITES	FUDS	0	0	1.0000
RECORD OF DECISION SYSTEM	RODS	0	0	1.0000

SUB-TOTAL		2	0	

Database Summary

STATE (CO) LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
ENVIRONMENTAL REAL COVENANTS LIST	COVENANTS	0	0	TP/AP
ABOVEGROUND STORAGE TANK FACILITIES	AST	0	0	0.2500
HAZARDOUS WASTE SITES- GENERATOR	HWSG	0	0	0.2500
UNDERGROUND STORAGE TANK FACILITIES	UST	0	0	0.2500
HISTORICAL SOLID WASTE LANDFILLS	HISTSWLF	0	6	0.5000
LEAKING STORAGE TANK FACILITIES	LST	2	0	0.5000
LEAKING UNDERGROUND STORAGE TANKS TRUST FUND SITES	LUSTTRUST	0	2	0.5000
SOLID WASTE FACILITIES	SWF	0	0	0.5000
VOLUNTARY CLEANUP AND REDEVELOPMENT PROGRAM SITES	VCRA	0	0	0.5000
HAZARDOUS WASTE SITES- CORRECTIVE ACTION	HWSCA	0	0	1.0000
SUPERFUND SITES	SF	0	0	1.0000
SUB-TOTAL		2	8	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
ASBESTOS ABATEMENT AND DEMOLITION PROJECTS	ASBESTOS	0	0	TP/AP
URANIUM MILL TAILINGS SITES	UMTS	0	0	TP/AP
AIR POLLUTION CONTROL DIVISION PERMITTED FACILITIES	APCDP	1	0	0.1250
CLANDESTINE DRUG LABORATORY LOCATIONS	CDL	0	0	0.1250
DRY CLEANING FACILITIES	CLEANERS	0	0	0.1250
SPILLS LISTING	SPILLS	0	0	0.1250
HAZARDOUS WASTE SITES- TREATMENT, STORAGE & DISPOSAL	HWSTSD	0	0	0.5000
METHANE GAS STUDY SITES	METHANESITES	0	0	0.5000
SUB-TOTAL		1	0	

Database Summary

LOCAL LISTING

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
WELD COUNTY SOLID WASTE FACILITIES	WCSWF	0	0	0.5000

SUB-TOTAL		0	0	

TRIBAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
UNDERGROUND STORAGE TANKS ON TRIBAL LANDS	USTR08	0	0	0.2500
LEAKING UNDERGROUND STORAGE TANKS ON TRIBAL LANDS	LUSTR08	0	0	0.5000
OPEN DUMP INVENTORY ON TRIBAL LANDS	ODINDIAN	0	0	0.5000
SUB-TOTAL		0	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
INDIAN RESERVATIONS	INDIANRES	0	0	1.0000
SUB-TOTAL		0	0	

TOTAL		5	8	

Database Radius Summary

FEDERAL LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
DOCKETS	0.0200	0	NS	NS	NS	NS	NS	0
EC	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
LUCIS	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
MLTS	0.0200	0	NS	NS	NS	NS	NS	0
RCRASC	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
SFLIENS	0.0200	0	NS	NS	NS	NS	NS	0
TSCA	0.0200	0	NS	NS	NS	NS	NS	0
AIRSAFS	0.1250	0	1	NS	NS	NS	NS	1
CDL	0.1250	0	0	NS	NS	NS	NS	0
ERNSCO	**0.1250**	**0**	**0**	**NS**	**NS**	**NS**	**NS**	**0**
HMIRSR08	0.1250	0	0	NS	NS	NS	NS	0
TRI	0.1250	0	0	NS	NS	NS	NS	0
BRS	0.2500	0	0	0	NS	NS	NS	0
HISTPST	0.2500	0	0	0	NS	NS	NS	0
MRDS	0.2500	0	0	1	NS	NS	NS	1
MSHA	0.2500	0	0	0	NS	NS	NS	0
NLRRCRAG	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
RCRAGR08	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
RCRANGR08	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
BF	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
NLRRCRAT	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
ODI	0.5000	0	0	0	0	NS	NS	0
RCRAT	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
SEMS	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
SEMSARCH	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
DNPL	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
DOD	1.0000	0	0	0	0	0	NS	0
FUDS	1.0000	0	0	0	0	0	NS	0
NLRRCRAC	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
NMS	1.0000	0	0	0	0	0	NS	0
NPL	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
PNPL	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
RCRAC	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
RCRASUBC	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
RODS	1.0000	0	0	0	0	0	NS	0

SUB-TOTAL		*0*	*1*	*1*	*0*	*0*	*0*	*2*

Database Radius Summary

STATE (CO) LISTING

Standard environmental records are displayed in ***bold****.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
ASBESTOS	0.0200	0	NS	NS	NS	NS	NS	0
COVENANTS	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
UMTS	0.0200	0	NS	NS	NS	NS	NS	0
APCDP	0.1250	0	1	NS	NS	NS	NS	1
CDL	0.1250	0	0	NS	NS	NS	NS	0
CLEANERS	0.1250	0	0	NS	NS	NS	NS	0
SPILLS	0.1250	0	0	NS	NS	NS	NS	0
AST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
HWSG	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
UST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
HISTSWLF	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
HWSTSD	0.5000	0	0	0	0	NS	NS	0
LST	**0.5000**	**0**	**0**	**0**	**2**	**NS**	**NS**	**2**
LUSTTRUST	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
METHANESITES	0.5000	0	0	0	0	NS	NS	0
SWF	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
VCRA	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
HWSCA	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
SF	**1.0000**	**0**	**0**	**0**	**0**	**0**	**NS**	**0**
SUB-TOTAL		0	1	0	2	0	0	3

LOCAL LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
WCSWF	0.5000	0	0	0	0	NS	NS	0

SUB-TOTAL		0	0	0	0	0	0	0

Database Radius Summary

TRIBAL LISTING

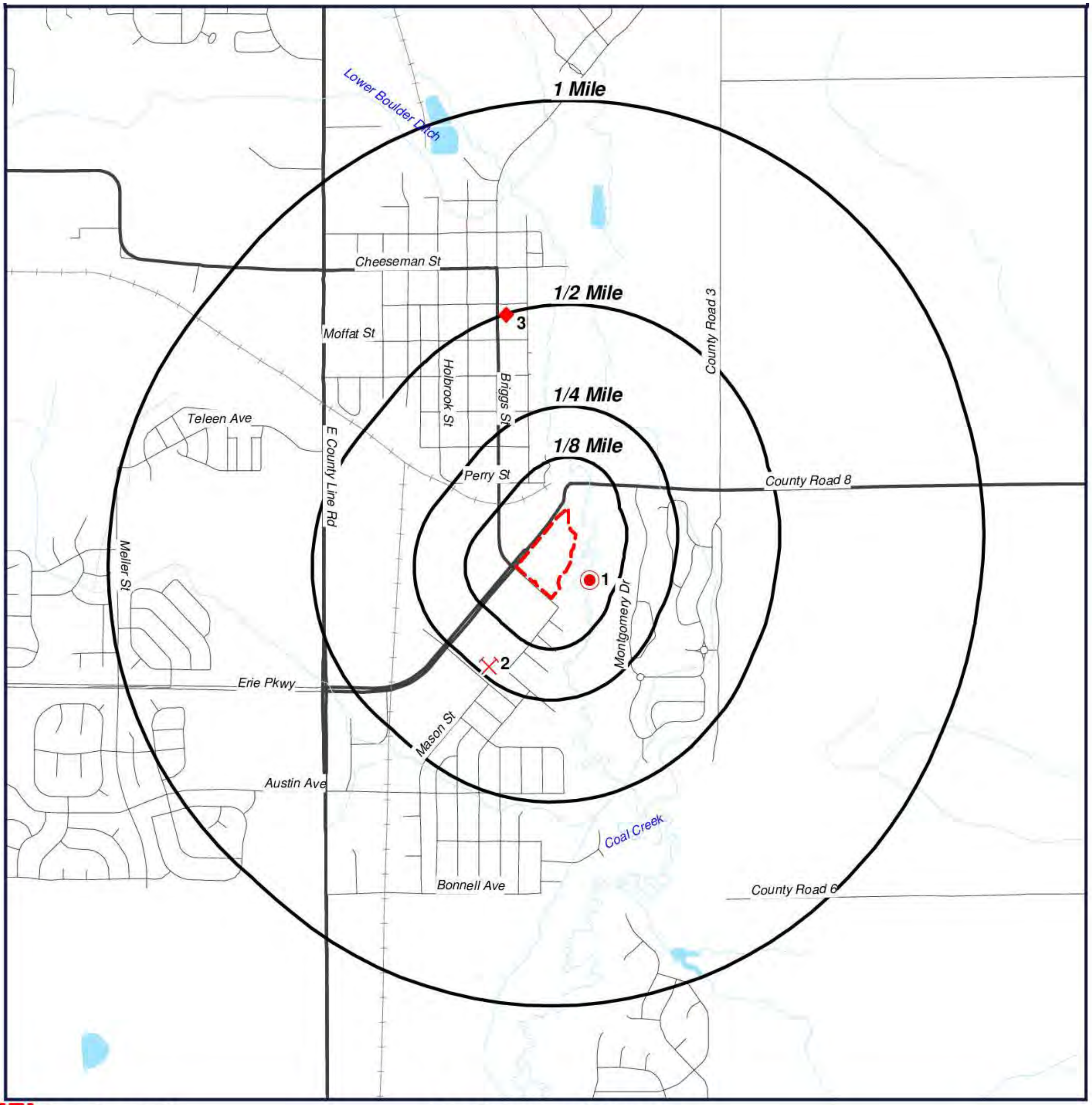
*Standard environmental records are displayed in **bold**.*

Acronym	*Search Radius (miles)*	*TP/AP (0 - 0.02)*	*1/8 Mile (> TP/AP)*	*1/4 Mile (> 1/8)*	*1/2 Mile (> 1/4)*	*1 Mile (> 1/2)*	*> 1 Mile*	*Total*
USTR08	***0.2500***	***0***	***0***	***0***	***NS***	***NS***	***NS***	***0***
LUSTR08	***0.5000***	***0***	***0***	***0***	***0***	***NS***	***NS***	***0***
ODINDIAN	***0.5000***	***0***	***0***	***0***	***0***	***NS***	***NS***	***0***
INDIANRES	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
SUB-TOTAL		*0*	*0*	*0*	*0*	*0*	*0*	*0*

TOTAL		*0*	*2*	*1*	*2*	*0*	*0*	*5*

NOTES:
NS = NOT SEARCHED
TP/AP = TARGET PROPERTY/ADJACENT PROPERTY

Radius Map 1

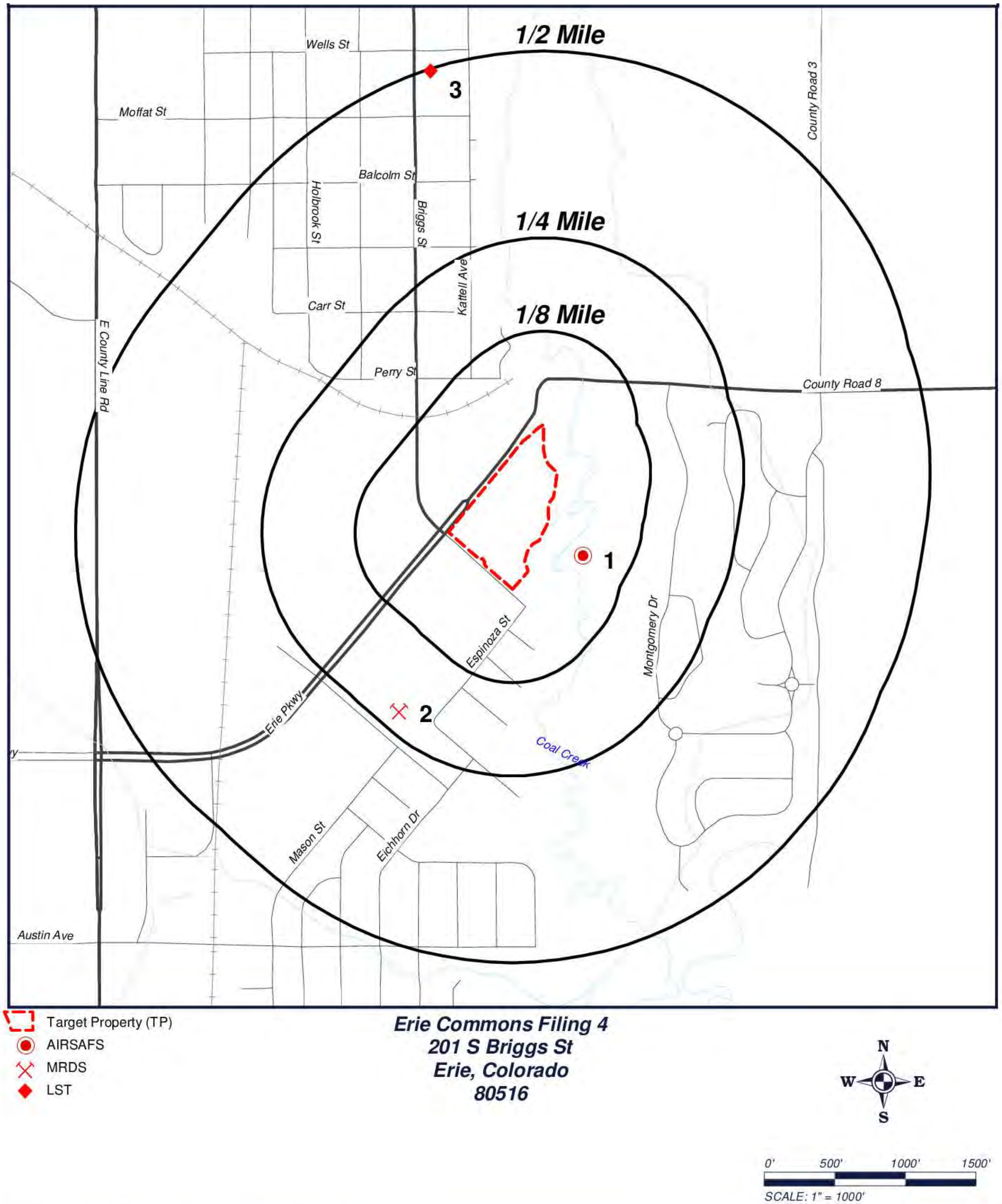


Target Property (TP)
AIRSAFS
MRDS
LST

Erie Commons Filing 4
201 S Briggs St
Erie, Colorado
80516

[Click here to access Satellite view]

Radius Map 2



Erie Commons Filing 4
201 S Briggs St
Erie, Colorado
80516

Click here to access Satellite view

Ortho Map

Target Property (TP)
AIRSAFS
MRDS
LST

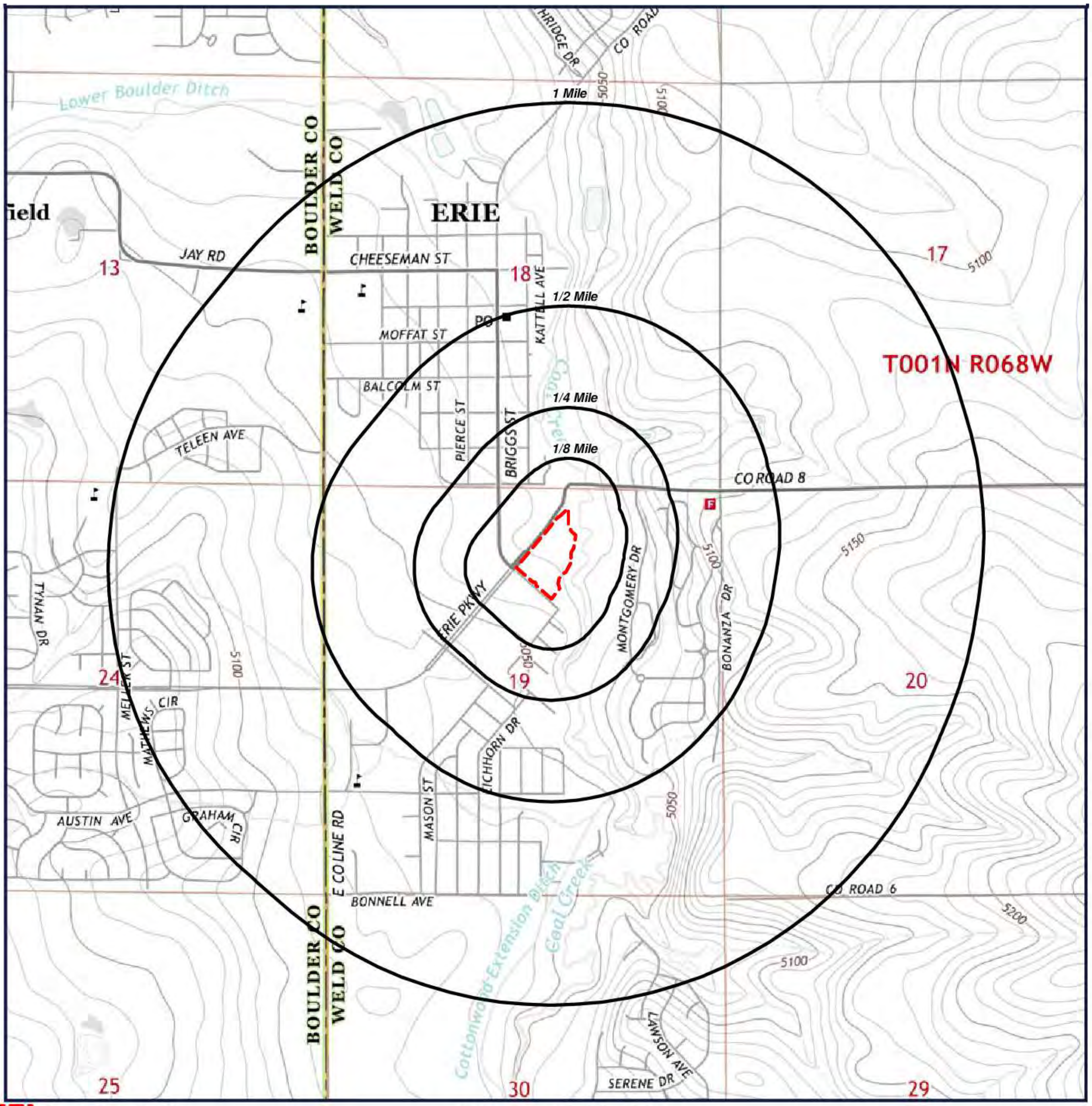
Quadrangle(s): Erie
Erie Commons Filing 4
201 S Briggs St
Erie, Colorado
80516

N W E S

0' 500' 1000' 1500'
SCALE: 1" = 1000'

[Click here to access Satellite view]

Topographic Map



Target Property (TP)

Quadrangle(s): Erie
Source: USGS, 07/23/2013
Erie Commons Filing 4
201 S Briggs St
Erie, Colorado
_80516_

N W E S

0' 1000' 2000' 3000'
SCALE: 1" = 2000'

[Click here to access Satellite view]

Located Sites Summary

*NOTE: Standard environmental records are displayed in **bold**.*

Map ID#	Database Name	Site ID#	Relative Elevation	Distance From Site	Site Name	Address	PAGE #
1	AIRSAFS	1061926	Lower (5,035 ft.)	0.07 mi. NE (370 ft.)	ENCANA - COAL CREEK C1	NWNE SEC 19 T1N R68W, ERIE, CO 80516	18
1	APCDP	123-6370	Lower (5,035 ft.)	0.07 mi. NE (370 ft.)	ENCANA - COAL CREEK C1	NWNE SEC 19 T1N R68W, ERIE, CO 80516	21
2	MRDS	10091345	Higher (5,047 ft.)	0.23 mi. SW (1214 ft.)	UNKNOWN	WELD COUNTY, ERIE, CO 80516	31
3	***LST***	***15249LST***	***Lower (5,019 ft.)***	***0.49 mi. N (2587 ft.)***	***CITY OF ERIE***	***545 BRIGGS ST, ERIE, CO 80516***	***32***
3	***LST***	***15165LST***	***Lower (5,019 ft.)***	***0.5 mi. N (2640 ft.)***	***US POST OFFICE***	***150 WELD ST, ERIE, CO 80516***	***33***

Elevation Summary

Elevations are collected from the USGS 3D Elevation Program 1/3 arc-second (approximately 10 meters) layer hosted at the NGTOC. .

Target Property Elevation: 5037 ft.

NOTE: Standard environmental records are displayed in ***bold****.*

EQUAL/HIGHER ELEVATION

Map ID#	Database Name	Elevation	Site Name	Address	Page #
2	MRDS	5,047 ft.	UNKNOWN	WELD COUNTY, ERIE, CO 80516	31

LOWER ELEVATION

Map ID#	Database Name	Elevation	Site Name	Address	Page #
1	AIRSAFS	5,035 ft.	ENCANA - COAL CREEK C1	NWNE SEC 19 T1N R68W, ERIE, CO 80516	18
1	APCDP	5,035 ft.	ENCANA - COAL CREEK C1	NWNE SEC 19 T1N R68W, ERIE, CO 80516	21
3	***LST***	***5,019 ft.***	***CITY OF ERIE***	***545 BRIGGS ST, ERIE, CO 80516***	***32***
3	***LST***	***5,019 ft.***	***US POST OFFICE***	***150 WELD ST, ERIE, CO 80516***	***33***

MAP ID# 1

Distance from Property: 0.07 mi. (370 ft.) NE
Elevation: 5,035 ft. (Lower than TP)

SITE INFORMATION

UNIQUE ID: **1061926**
PLANT ID: **1061926**
NAME: **ENCANA - COAL CREEK C1**
ADDRESS: **NWNE SEC 19 T1N R68W**
ERIE, CO 80516
CLASSIFICATION: **POTENTIAL UNCONTROLLED EMISSIONS <100 TONS/YEAR**
OPERATION STATUS: **OPERATING**
STATE COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**
FACILITY TYPE: **PRIVATELY OWNED/OPERATED**
CURRENT HIGH PRIORITY VIOLATOR: **NOT REPORTED**
SIC DESCRIPTION: **ESTABLISHMENTS PRIMARILY ENGAGED IN PRODUCING LIQUID HYDROCARBONS FROM OIL AND GAS FIELD GASES.**

ENFORCEMENT ACTIONS NO ENFORCEMENT ACTIONS REPORTED

AIR PROGRAM

AIR PROGRAM STATUS: **OPERATING**
EPA COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**
POLLUTANT COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**
POLLUTANT: **VOLATILE ORGANIC COMPOUNDS**

HISTORICAL COMPLIANCE AIR PROGRAM LEVEL

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1301**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1004**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1202**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1102**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1001**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**

COMPLIANCE DATE (YYYQ): **1403**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1003**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1304**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1103**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1402**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1204**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **0904**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1302**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1101**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1303**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **0903**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1201**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1203**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1401**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1002**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

AIR PROGRAM: **SIP SOURCE**
COMPLIANCE DATE (YYYQ): **1104**
HISTORICAL COMPLIANCE STATUS: **IN COMPLIANCE WITH PROCEDURAL REQUIREMENTS**

Back to Report Summary

Air Pollution Control Division Permitted Facilities (APCDP)

MAP ID# 1

Distance from Property: 0.07 mi. (370 ft.) NE
Elevation: 5,035 ft. (Lower than TP)

SITE INFORMATION

SITE ID: **123-6370**

FACILITY NAME: **ENCANA - COAL CREEK C1**

ADDRESS: **NWNE SEC 19 T1N R68W**
ERIE, CO 80516

PERMIT NAME: **ENCANA - COAL CREEK C1**

FACILITY CLASSIFICATION: **0**

AIR PROGRAM

AIR PROGRAM CLASSIFICATION: 'A'=Major, 'B'=Minor, 'SM'=Synthetic Minor, 'ND'=No Major Source Threshold Defined, 'C'=Unknown, 'BLANK'= BLANK FIELD

AIR PROGRAM CLASS: **MINOR**

ACID PRECIPITATION: **BLANK** APEN EXEMPT: **BLANK** CFC TRACKING: **BLANK**

CONDENSATE STORAGE TANK: **B** FESOP (NON-TITLE V): **BLANK** MACT (SEC. 63 NESHAPS): **BLANK**

NESHAP: **BLANK** NON FEDERALLY REPORTABLE SOURCE: **BLANK** FEDERAL NSPS: **BLANK**

STATE NSPS: **BLANK** NSR: **BLANK** PSD: **BLANK** SIP SOURCE UNDER FEDERAL JURISDICTION: **BLANK**

SIP SOURCE: **BLANK** TITLE V PERMITS: **BLANK** NATIVE AMERICAN: **BLANK**

PLANT AIR PROGRAM: **OZONE, AREA N2081**

PROPERTY AREA: **NOT REPORTED**

COMPLIANCE MONITORING SYSTEM: **NOT REPORTED**

DATE COMPLIANCE MONITORING SYSTEM: **05/03/07**

STANDARD INDUSTRIAL DESCRIPTION:

OIL AND GAS EXTRACTION - NATURAL GAS LIQUIDS

SITE CONTACT INFORMATION

CONTACT NAME: **CINDY ALLEN**

CONTACT PHONE: **(720)876-5474**

SITE DESCRIPTION:**CONDENSATE STORAGE TANK BATTERY**

COMMENTS:

NOT REPORTED

OWNER INFORMATION

OWNER CUSTOMER #: **9920105742**

OWNER NAME: **ENCANA OIL & GAS (USA) INC.**

ADDRESS: **370 17TH ST.**
DENVER, 08 80202

OWNER MAIL NAME: **ADAM BERIG**

OWNER MAIL PHONE: **(720)876-3884**

SITE OWNER DESCRIPTION: **OGCC#100160 OIL & GAS**

SITE POLLUTANT INFORMATION

EFFECTIVE YEAR OF INVENTORY: **2016**

POLLUTANT NAME: **110543 - HEXANE,N-**

EMISSION DATA SUBMITTED YEAR: **2011**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **NO**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: UNCONTROLLED ESTIMATED EMISSIONS: EMISSIONS LIMIT:
(TONS PER YEAR): *(TONS PER YEAR):* *(TONS PER YEAR):*
0.05845 **1.16918** **0.00000**
ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**
POLLUTANT NAME: **71432 - BENZENE**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **NO**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**
ESTIMATED EMISSIONS: UNCONTROLLED ESTIMATED EMISSIONS: EMISSIONS LIMIT:
(TONS PER YEAR): *(TONS PER YEAR):* *(TONS PER YEAR):*
0.00668 **0.13362** **0.00000**
ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**
POLLUTANT NAME: **CO - CARBON MONOXIDE**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**
ESTIMATED EMISSIONS: UNCONTROLLED ESTIMATED EMISSIONS: EMISSIONS LIMIT:
(TONS PER YEAR): *(TONS PER YEAR):* *(TONS PER YEAR):*
0.71698 **0.71698** **0.00000**
ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**
POLLUTANT NAME: **VOC - VOLATILE ORGANIC COMPOUNDS**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**
ESTIMATED EMISSIONS: UNCONTROLLED ESTIMATED EMISSIONS: EMISSIONS LIMIT:
(TONS PER YEAR): *(TONS PER YEAR):* *(TONS PER YEAR):*
5.00951 **77.47053** **0.00000**
ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:

(TONS PER YEAR)

0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**

POLLUTANT NAME: **NOX - NITROGEN OXIDES**

EMISSION DATA SUBMITTED YEAR: **2011**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **YES**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS:	UNCONTROLLED ESTIMATED EMISSIONS:	EMISSIONS LIMIT:
(TONS PER YEAR):	*(TONS PER YEAR):*	*(TONS PER YEAR):*
0.28221	**0.28221**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:

(TONS PER YEAR)

0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**

POLLUTANT NAME: **NOX - NITROGEN DIOXIDE**

EMISSION DATA SUBMITTED YEAR: **2011**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **YES**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS:	UNCONTROLLED ESTIMATED EMISSIONS:	EMISSIONS LIMIT:
(TONS PER YEAR):	*(TONS PER YEAR):*	*(TONS PER YEAR):*
0.28221	**0.28221**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:

(TONS PER YEAR)

0.00000

EFFECTIVE YEAR OF INVENTORY: **2015**

POLLUTANT NAME: **110543 - HEXANE,N-**

EMISSION DATA SUBMITTED YEAR: **2011**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **NO**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS:	UNCONTROLLED ESTIMATED EMISSIONS:	EMISSIONS LIMIT:
(TONS PER YEAR):	*(TONS PER YEAR):*	*(TONS PER YEAR):*
0.05845	**1.16918**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:

(TONS PER YEAR)

0.00000

EFFECTIVE YEAR OF INVENTORY: **2015**

POLLUTANT NAME: **71432 - BENZENE**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **NO**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
0.00668	**0.13362**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2015**
POLLUTANT NAME: **CO - CARBON MONOXIDE**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
0.71698	**0.71698**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2015**
POLLUTANT NAME: **NOX - NITROGEN DIOXIDE**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
0.28221	**0.28221**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2015**
POLLUTANT NAME: **VOC - VOLATILE ORGANIC COMPOUNDS**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
5.00951	**77.47053**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2011**

POLLUTANT NAME: **110543 - HEXANE,N-**

EMISSION DATA SUBMITTED YEAR: **2008**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **NO**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
0.05845	**1.16918**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2011**

POLLUTANT NAME: **71432 - BENZENE**

EMISSION DATA SUBMITTED YEAR: **2008**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **NO**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
0.00668	**0.13362**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2011**

POLLUTANT NAME: **CO - CARBON MONOXIDE**

EMISSION DATA SUBMITTED YEAR: **2008**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **YES**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: UNCONTROLLED ESTIMATED EMISSIONS: EMISSIONS LIMIT:

(TONS PER YEAR):	(TONS PER YEAR):	(TONS PER YEAR):
0.71698	**0.71698**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2011**
POLLUTANT NAME: **NOX - NITROGEN DIOXIDE**
EMISSION DATA SUBMITTED YEAR: **2008**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: (TONS PER YEAR):	UNCONTROLLED ESTIMATED EMISSIONS: (TONS PER YEAR):	EMISSIONS LIMIT: (TONS PER YEAR):
0.28221	**0.28221**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

EFFECTIVE YEAR OF INVENTORY: **2011**
POLLUTANT NAME: **VOC - VOLATILE ORGANIC COMPOUNDS**
EMISSION DATA SUBMITTED YEAR: **2008**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: (TONS PER YEAR):	UNCONTROLLED ESTIMATED EMISSIONS: (TONS PER YEAR):	EMISSIONS LIMIT: (TONS PER YEAR):
3.81374	**76.27476**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)
0.00000

STACK

EFFECTIVE YEAR OF INVENTORY: **2016**
EMISSION DATA SUBMITTED YEAR: **2011**
EMISSION RELEASE POINT (STACK): **FLASH EMISSIONS CONTROLLED BY FLARE**

STACK GAS FLOW RATE: (CUBIC FEET PER MINUTE):	STACK GAS FLOW RATE (NEI COMPATIBLE): (CUBIC FEET PER MINUTE):
5916.00000	**98.00000**

STACK HEIGHT:	STACK DIAMETER:	PLUME HEIGHT:
20.00000	**2.00000**	**0.00000**

STACK TYPE DESCRIPTION:
A STACK WITH AN UNOBSTRUCTED OPENING DISCHARGING IN A VERTICAL DIRECTION

EFFECTIVE YEAR OF INVENTORY: **2016**

EMISSION DATA SUBMITTED YEAR: **2011**

EMISSION RELEASE POINT (STACK): **PRODUCED WATER TANK**

STACK GAS FLOW RATE: STACK GAS FLOW RATE (NEI COMPATIBLE):
(CUBIC FEET PER MINUTE): *(CUBIC FEET PER MINUTE):*

2314.00000 **38.00000**

STACK HEIGHT: STACK DIAMETER: PLUME HEIGHT:

17.00000 **1.42000** **0.00000**

STACK TYPE DESCRIPTION:

A STACK WITH AN UNOBSTRUCTED OPENING DISCHARGING IN A VERTICAL DIRECTION

EFFECTIVE YEAR OF INVENTORY: **2011**

EMISSION DATA SUBMITTED YEAR: **2008**

EMISSION RELEASE POINT (STACK): **FLASH EMISSIONS CONTROLLED BY FLARE**

STACK GAS FLOW RATE: STACK GAS FLOW RATE (NEI COMPATIBLE):
(CUBIC FEET PER MINUTE): *(CUBIC FEET PER MINUTE):*

5916.00000 **98.00000**

STACK HEIGHT: STACK DIAMETER: PLUME HEIGHT:

20.00000 **2.00000** **0.00000**

STACK TYPE DESCRIPTION:

A STACK WITH AN UNOBSTRUCTED OPENING DISCHARGING IN A VERTICAL DIRECTION

STACK POLLUTANT

EFFECTIVE YEAR OF INVENTORY: **2015**

POLLUTANT NAME: **71432 - BENZENE**

EMISSION DATA SUBMITTED YEAR: **2011**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **NO**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: UNCONTROLLED ESTIMATED EMISSIONS: EMISSIONS LIMIT:
(TONS PER YEAR): *(TONS PER YEAR):* *(TONS PER YEAR):*

0.03194 **0.03194** **0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)

0.00000

EFFECTIVE YEAR OF INVENTORY: **2015**

POLLUTANT NAME: **110543 - HEXANE,N-**

EMISSION DATA SUBMITTED YEAR: **2011**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **NO**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: UNCONTROLLED ESTIMATED EMISSIONS: EMISSIONS LIMIT:
(TONS PER YEAR): *(TONS PER YEAR):* *(TONS PER YEAR):*

0.10040 **0.10040** **0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)

0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**
POLLUTANT NAME: **NO2 - NITROGEN DIOXIDE**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
0.28221	**0.28221**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS: *(TONS PER YEAR)*
0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**
POLLUTANT NAME: **VOC - VOLATILE ORGANIC COMPOUNDS**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
1.19577	**1.19577**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS: *(TONS PER YEAR)*
0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**
POLLUTANT NAME: **NOX - NITROGEN OXIDES**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**
POLLUTANT IS A CRITERIA POLLUTANT: **YES**
POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**
POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
0.28221	**0.28221**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS: *(TONS PER YEAR)*
0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**
POLLUTANT NAME: **VOC - VOLATILE ORGANIC COMPOUNDS**
EMISSION DATA SUBMITTED YEAR: **2011**
POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **YES**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
3.81374	**76.27476**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS: *(TONS PER YEAR)*

0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**

POLLUTANT NAME: **CO - CARBON MONOXIDE**

EMISSION DATA SUBMITTED YEAR: **2011**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **YES**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **NO**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
0.71698	**0.71698**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS: *(TONS PER YEAR)*

0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**

POLLUTANT NAME: **71432 - BENZENE**

EMISSION DATA SUBMITTED YEAR: **2011**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **NO**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*
0.00668	**0.13362**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS: *(TONS PER YEAR)*

0.00000

EFFECTIVE YEAR OF INVENTORY: **2016**

POLLUTANT NAME: **110543 - HEXANE,N-**

EMISSION DATA SUBMITTED YEAR: **2011**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT UNDER COLORADO SECTION 25-7-109.3 C.R.S: **NO**

POLLUTANT IS A CRITERIA POLLUTANT: **NO**

POLLUTANT IS REPORTABLE AS EPCRA (SARA TITLE III) COMPOUND ONLY: **NO**

POLLUTANT IS A HAZARDOUS AIR POLLUTANT LISTED UNDER THE FEDERAL CAAA SECTION 112: **YES**

POLLUTANT IS A OZONE DEPLETING COMPOUND LISTED UNDER COLORADO AQCC REGULATION 15 SECTION II.11.: **NO**

ESTIMATED EMISSIONS: *(TONS PER YEAR):*	UNCONTROLLED ESTIMATED EMISSIONS: *(TONS PER YEAR):*	EMISSIONS LIMIT: *(TONS PER YEAR):*

0.05845	**1.16918**	**0.00000**

ESTIMATED EMISSIONS WITH RULE EFFECTIVENESS:
(TONS PER YEAR)

0.00000

UNIT COMMENT

-NO COMMENTS REPORTED

Back to Report Summary

Mineral Resource Data System (MRDS)

MAP ID# 2

Distance from Property: 0.23 mi. (1,214 ft.) SW
Elevation: 5,047 ft. (Higher than TP)

FACILITY INFORMATION

GEOSEARCH ID: **10091345**

DEP ID: **10091345**

MINE NAME: **UNKNOWN**

ADDRESS: **WELD COUNTY**
ERIE, CO 80516

DEVELOPMENT STATUS: **OCCURRENCE**

COMMODITY DETAILS

COMMODITY: **FIRE CLAY (REFRACTORY**

COMMODITY TYPE: **NON-METALLIC**

COMMODITY GROUP: **CLAYS**

IMPORTANCE: **PRIMARY**

MATERIAL DETAILS NO MATERIAL DETAILS REPORTED

NAME DETAILS

SITE NAME: **UNKNOWN**

STATUS: **CURRENT**

Back to Report Summary

Leaking Storage Tank Facilities (LST)

MAP ID# 3

Distance from Property: 0.49 mi. (2,587 ft.) N
Elevation: 5,019 ft. (Lower than TP)

FACILITY INFORMATION

UNIQUE ID: **15249LST**

FACILITY ID: **15249**

NAME: **CITY OF ERIE**

ADDRESS: **545 BRIGGS ST**
ERIE, CO 80516

SITE NAME: **CITY OF ERIE**

LOCATION: **545 BRIGGS ST, ERIE 80516**

LEAKING INFORMATION

EVENT ID:	STATUS:	RELEASE DATE:	ALTERNATE NAME:
8325	**CLOSED**	**9/5/2000**	**CITY OF ERIE**

COSTIS LINK: http://costis.cdle.state.co.us/event.asp?h_id=8325

Back to Report Summary

Leaking Storage Tank Facilities (LST)

MAP ID# 3

Distance from Property: 0.5 mi. (2,640 ft.) N
Elevation: 5,019 ft. (Lower than TP)

FACILITY INFORMATION

UNIQUE ID: **15165LST**

FACILITY ID: **15165**

NAME: **US POST OFFICE**

ADDRESS: **150 WELD ST**
ERIE, CO 80516

SITE NAME: **US POST OFFICE**

LOCATION: **150 WELD ST, ERIE 80516**

LEAKING INFORMATION

EVENT ID:	STATUS:	RELEASE DATE:	ALTERNATE NAME:
8163	**CLOSED**	**4/17/2000**	**US POST OFFICE**

COSTIS LINK: http://costis.cdle.state.co.us/event.asp?h_id=8163

Back to Report Summary

Unlocated Sites Summary

This list contains sites that could not be mapped due to limited or incomplete address information.

Database Name	Site ID#	Site Name	Address	City/State/Zip/County
HISTSWLF	00070-0002198	AL CARTON DUMP	UNKNOWN	ERIE 80516 Weld
HISTSWLF	00070-0000396	COLORADO LANDFILL	NO ADDRESS REPORTED	ERIE 80516 Weld
HISTSWLF	00070-0002200	HORST/DEAMIN	UNKNOWN	ERIE 80516 Weld
HISTSWLF	00070-0000397	LANDFILL SYSTEMS, INC.	NO ADDRESS REPORTED	ERIE 80516 Weld
HISTSWLF	00070-0002201	NEWHAUSER DUMP	UNKNOWN	ERIE 80516 Weld
HISTSWLF	00070-0002197	OLD ERIE LANDFILL	UNKNOWN	ERIE 80516 Weld
LUSTTRUST	00023-0000048	ERIE	ERIE	ERIE 80000
LUSTTRUST	00023-0000265	ERIE #1	ERIE #1	ERIE 80000

DOCKETS	EPA Docket Data
VERSION DATE: 12/22/05	

The United States Environmental Protection Agency Docket data lists Civil Case Defendants, filing dates as far back as 1971, laws broken including section, violations that occurred, pollutants involved, penalties assessed and superfund awards by facility and location. Please refer to ICIS database as source of current data.

EC	Federal Engineering Institutional Control Sites
VERSION DATE: 08/03/15	

This database includes site locations where Engineering and/or Institutional Controls have been identified as part of a selected remedy for the site as defined by United States Environmental Protection Agency official remedy decision documents. A site listing does not indicate that the institutional and engineering controls are currently in place nor will be in place once the remedy is complete; it only indicates that the decision to include either of them in the remedy is documented as of the completed date of the document. Institutional controls are actions, such as legal controls, that help minimize the potential for human exposure to contamination by ensuring appropriate land or resource use. Engineering controls include caps, barriers, or other device engineering to prevent access, exposure, or continued migration of contamination.

LUCIS	Land Use Control Information System
VERSION DATE: 09/01/06	

The LUCIS database is maintained by the U.S. Navy and contains information for former Base Realignment and Closure (BRAC) properties across the United States.

MLTS	Material Licensing Tracking System
VERSION DATE: 02/12/16	

MLTS is a list of approximately 8,100 sites which have or use radioactive materials subject to the United States Nuclear Regulatory Commission (NRC) licensing requirements.

RCRASC	RCRA Sites with Controls
VERSION DATE: 02/23/16	

This list of Resource Conservation and Recovery Act sites with institutional controls in place is provided by the U.S. Environmental Protection Agency.

SFLIENS	CERCLIS Liens
VERSION DATE: 06/08/12	

A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which United States

Environmental Protection Agency has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties. This database contains those CERCLIS sites where the Lien on Property action is complete.

TSCA Toxic Substance Control Act Inventory

VERSION DATE: 12/31/06

The Toxic Substances Control Act (TSCA) was enacted in 1976 to ensure that chemicals manufactured, imported, processed, or distributed in commerce, or used or disposed of in the United States do not pose any unreasonable risks to human health or the environment. TSCA section 8(b) provides the United States Environmental Protection Agency authority to "compile, keep current, and publish a list of each chemical substance that is manufactured or processed in the United States." This TSCA Chemical Substance Inventory contains non-confidential information on the production amount of toxic chemicals from each manufacturer and importer site.

AIRSAFS Aerometric Information Retrieval System / Air Facility Subsystem

VERSION DATE: 10/20/14

The United States Environmental Protection Agency (EPA) modified the Aerometric Information Retrieval System (AIRS) to a database that exclusively tracks the compliance of stationary sources of air pollution with EPA regulations: the Air Facility Subsystem (AFS). Since this change in 2001, the management of the AIRS/AFS database was assigned to EPA's Office of Enforcement and Compliance Assurance.

CDL Clandestine Drug Laboratory Locations

VERSION DATE: 07/01/16

The U.S. Department of Justice ("the Department") provides this information as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments. The Department does not establish, implement, enforce, or certify compliance with clean-up or remediation standards for contaminated sites; the public should contact a state or local health department or environmental protection agency for that information.

ERNSCO Emergency Response Notification System

VERSION DATE: 10/04/16

This National Response Center database contains data on reported releases of oil, chemical, radiological, biological, and/or etiological discharges into the environment anywhere in the United States and its territories. The data comes from spill reports made to the U.S. Environmental Protection Agency, U.S. Coast Guard, the National Response Center and/or the U.S. Department of Transportation.

HMIRSR08	Hazardous Materials Incident Reporting System
VERSION DATE: 11/29/16	

The HMIRS database contains unintentional hazardous materials release information reported to the U.S. Department of Transportation located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

TRI	Toxics Release Inventory
VERSION DATE: 12/31/14	

The Toxics Release Inventory, provided by the United States Environmental Protection Agency, includes data on toxic chemical releases and waste management activities from certain industries as well as federal and tribal facilities. This inventory contains information about the types and amounts of toxic chemicals that are released each year to the air, water, and land as well as information on the quantities of toxic chemicals sent to other facilities for further waste management.

BRS	Biennial Reporting System
VERSION DATE: 12/31/11	

The United States Environmental Protection Agency (EPA), in cooperation with the States, biennially collects information regarding the generation, management, and final disposition of hazardous wastes regulated under the Resource Conservation and Recovery Act of 1976 (RCRA), as amended. The Biennial Report captures detailed data on the generation of hazardous waste from large quantity generators and data on waste management practices from treatment, storage and disposal facilities. Currently, the EPA states that data collected between 1991 and 1997 was originally a part of the defunct Biennial Reporting System and is now incorporated into the RCRAInfo data system.

HISTPST	Historical Gas Stations
VERSION DATE: NR	

This historic directory of service stations is provided by the Cities Service Company. The directory includes Cities Service filling stations that were located throughout the United States in 1930.

MRDS	Mineral Resource Data System
VERSION DATE: 03/15/16	

MRDS (Mineral Resource Data System) is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. This database contains the records previously provided in the Mineral Resource Data System (MRDS) of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS.

MSHA Mine Safety and Health Administration Master Index File

VERSION DATE: 08/05/16

The Mine dataset lists all Coal and Metal/Non-Metal mines under MSHA's jurisdiction since 1/1/1970. It includes such information as the current status of each mine (Active, Abandoned, NonProducing, etc.), the current owner and operating company, commodity codes and physical attributes of the mine. Mine ID is the unique key for this data. This information is provided by the United States Department of Labor - Mine Safety and Health Administration (MSHA).

NLRRCRAG No Longer Regulated RCRA Generator Facilities

VERSION DATE: 12/12/16

This database includes RCRA Generator facilities that are no longer regulated by the United States Environmental Protection Agency or do not meet other RCRA reporting requirements. This listing includes facilities that formerly generated hazardous waste.

Large Quantity Generators: Generate 1,000 kg or more of hazardous waste during any calendar month; or Generate more than 1 kg of acutely hazardous waste during any calendar month; or Generate more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, or acutely hazardous waste during any calendar month; or Generate 1 kg or less of acutely hazardous waste during any calendar month, and accumulate more than 1kg of acutely hazardous waste at any time; or Generate 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulated more than 100 kg of that material at any time.

Small Quantity Generators: Generate more than 100 and less than 1000 kilograms of hazardous waste during any calendar month and accumulate less than 6000 kg of hazardous waste at any time; or Generate 100 kg or less of hazardous waste during any calendar month, and accumulate more than 1000 kg of hazardous waste at any time.

Conditionally Exempt Small Quantity Generators: Generate 100 kilograms or less of hazardous waste per calendar month, and accumulate 1000 kg or less of hazardous waste at any time; or Generate one kilogram or less of acutely hazardous waste per calendar month, and accumulate at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, or acutely hazardous waste; or Generate 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, or acutely hazardous waste during any calendar month, and accumulate at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste.

RCRAGR08 Resource Conservation & Recovery Act - Generator

VERSION DATE: 12/12/16

This database includes sites listed as generators of hazardous waste (large, small, and exempt) in the RCRAInfo system. The United States Environmental Protection Agency defines RCRAInfo as the comprehensive information system which provides access to data supporting the Resource Conservation and Recovery Act

(RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRAInfo replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). This database includes sites located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.
Large Quantity Generators: Generate 1,000 kg or more of hazardous waste during any calendar month; or Generate more than 1 kg of acutely hazardous waste during any calendar month; or Generate more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, or acutely hazardous waste during any calendar month; or Generate 1 kg or less of acutely hazardous waste during any calendar month, and accumulate more than 1kg of acutely hazardous waste at any time; or Generate 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulated more than 100 kg of that material at any time.
Small Quantity Generators: Generate more than 100 and less than 1000 kilograms of hazardous waste during any calendar month and accumulate less than 6000 kg of hazardous waste at any time; or Generate 100 kg or less of hazardous waste during any calendar month, and accumulate more than 1000 kg of hazardous waste at any time.
Conditionally Exempt Small Quantity Generators: Generate 100 kilograms or less of hazardous waste per calendar month, and accumulate 1000 kg or less of hazardous waste at any time; or Generate one kilogram or less of acutely hazardous waste per calendar month, and accumulate at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, or acutely hazardous waste; or Generate 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, or acutely hazardous waste during any calendar month, and accumulate at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste.

RCRANGR08 Resource Conservation & Recovery Act - Non-Generator

VERSION DATE: 12/12/16

This database identifies RCRAInfo system sites that only handle hazardous waste, such as transporters, without generating any amount hazardous waste. The United States Environmental Protection Agency defines RCRAInfo as the comprehensive information system which provides access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRAInfo replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS). This database includes sites located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

BF Brownfields Management System

VERSION DATE: 02/02/17

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. The United States Environmental Protection Agency maintains this database to track activities in the various brown field grant programs including grantee assessment, site cleanup and site redevelopment. This database included tribal brownfield sites.

NLRRCRAT	No Longer Regulated RCRA Non-CORRACTS TSD Facilities
VERSION DATE: 12/12/16	

This database includes RCRA Non-Corrective Action TSD facilities that are no longer regulated by the United States Environmental Protection Agency or do not meet other RCRA reporting requirements. This listing includes facilities that formerly treated, stored or disposed of hazardous waste.

ODI	Open Dump Inventory
VERSION DATE: 06/01/85	

The open dump inventory was published by the United States Environmental Protection Agency. An “open dump” is defined as a facility or site where solid waste is disposed of which is not a sanitary landfill which meets the criteria promulgated under section 4004 of the Solid Waste Disposal Act (42 U.S.C. 6944) and which is not a facility for disposal of hazardous waste. This inventory has not been updated since June 1985.

RCRAT	Resource Conservation & Recovery Act - Non-CORRACTS Treatment, Storage & Disposal Facilities
VERSION DATE: 12/12/16	

This database includes Non-Corrective Action sites listed as treatment, storage and/or disposal facilities of hazardous waste in the RCRAInfo system. The United States Environmental Protection Agency defines RCRAInfo as the comprehensive information system which provides access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRAInfo replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS).

SEMS	Superfund Enterprise Management System
VERSION DATE: 12/05/16	

The U.S. Environmental Protections Agency's (EPA) Office of Solid Waste and Emergency Response, Office of Superfund Remediation and Technology Innovation (OSRTI), has implemented The Superfund Enterprise Management System (SEMS), formerly known as CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) to track and report on clean-up and enforcement activities taking place at Superfund sites. SEMS represents a joint development and ongoing collaboration between Superfund's Remedial, Removal, Federal Facilities, Enforcement and Emergency Response programs.

SEMSARCH	Superfund Enterprise Management System Archived Site Inventory
VERSION DATE: 12/05/16	

The Superfund Enterprise Management System Archive listing (SEMS-ARCHIVE) has replaced the CERCLIS NFRAP reporting system in 2015. This listing reflect sites that have been assessed and no further remediation is planned and is of no further interest under the Superfund program.

DNPL	Delisted National Priorities List
VERSION DATE: 12/05/16	

This database includes sites from the United States Environmental Protection Agency's Final National Priorities List (NPL) where remedies have proven to be satisfactory or sites where the original analyses were inaccurate, and the site is no longer appropriate for inclusion on the NPL, and final publication in the Federal Register has occurred.

DOD	Department of Defense Sites
VERSION DATE: 06/21/10	

This information originates from the National Atlas of the United States Federal Lands data, which includes lands owned or administered by the Federal government. Army DOD, Army Corps of Engineers DOD, Air Force DOD, Navy DOD and Marine DOD areas of 640 acres or more are included.

FUDS	Formerly Used Defense Sites
VERSION DATE: 06/01/15	

The Formerly Used Defense Sites (FUDS) inventory includes properties previously owned by or leased to the United States and under Secretary of Defense Jurisdiction, as well as Munitions Response Areas (MRAs). The remediation of these properties is the responsibility of the Department of Defense. This data is provided by the U.S. Army Corps of Engineers (USACE), the boundaries/polygon data are based on preliminary findings and not all properties currently have polygon data available. DISCLAIMER: This data represents the results of data collection/processing for a specific USACE activity and is in no way to be considered comprehensive or to be used in any legal or official capacity as presented on this site. While the USACE has made a reasonable effort to insure the accuracy of the maps and associated data, it should be explicitly noted that USACE makes no warranty, representation or guaranty, either expressed or implied, as to the content, sequence, accuracy, timeliness or completeness of any of the data provided herein. For additional information on Formerly Used Defense Sites please contact the USACE Public Affairs Office at (202) 528-4285.

NLRRCRAC	No Longer Regulated RCRA Corrective Action Facilities
VERSION DATE: 12/12/16	

This database includes RCRA Corrective Action facilities that are no longer regulated by the United States Environmental Protection Agency or do not meet other RCRA reporting requirements.

NMS	Former Military Nike Missile Sites
VERSION DATE: 12/01/84	

This information was taken from report DRXTH-AS-IA-83A016 (Historical Overview of the Nike Missile System, 12/1984) which was performed by Environmental Science and Engineering, Inc. for the U.S. Army Toxic and Hazardous Materials Agency Assessment Division. The Nike system was deployed between 1954 and the mid-1970's. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDKH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte. The quantities of material a disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites.

During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

NPL National Priorities List

VERSION DATE: 12/05/16

This database includes United States Environmental Protection Agency (EPA) National Priorities List sites that fall under the EPA's Superfund program, established to fund the cleanup of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action.

PNPL Proposed National Priorities List

VERSION DATE: 12/05/16

This database contains sites proposed to be included on the National Priorities List (NPL) in the Federal Register. The United States Environmental Protection Agency investigates these sites to determine if they may present long-term threats to public health or the environment.

RCRAC Resource Conservation & Recovery Act - Corrective Action Facilities

VERSION DATE: 12/12/16

This database includes all hazardous waste sites with ongoing corrective action activity and where corrective action is statutorily required to be address but have not had corrective action imposed in the RCRAInfo system. The Corrective Action Program requires owners or operators of RCRA facilities (or treatment, storage, and disposal facilities) to investigate and cleanup contamination in order to protect human health and the environment. The United States Environmental Protection Agency defines RCRAInfo as the comprehensive information system which provides access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRAInfo replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS).

RCRASUBC Resource Conservation & Recovery Act - Subject to Corrective Action Facilities

VERSION DATE: 12/12/16

This database includes hazardous waste sites which are potentially subject to corrective action regardless of whether they have correction action underway, plus any sites showing a corrective action event of RFI or beyond in the RCRAInfo system. Sites conducting corrective action under analogous state authorities are also included. The United States Environmental Protection Agency defines RCRAInfo as the comprehensive information system which provides access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. RCRAInfo replaces the data recording and reporting abilities of the Resource Conservation and Recovery Information System (RCRIS) and the Biennial Reporting System (BRS).

RODS Record of Decision System

VERSION DATE: 07/01/13

These decision documents maintained by the United States Environmental Protection Agency describe the chosen remedy for NPL (Superfund) site remediation. They also include site history, site description, site characteristics, community participation, enforcement activities, past and present activities, contaminated media, the contaminants present, and scope and role of response action.

ASBESTOS Asbestos Abatement and Demolition Projects

VERSION DATE: 11/03/16

The Colorado Department of Public Health and Environment's Air Pollution Control Division assists schools and businesses to comply with air pollution laws regulating asbestos and asbestos containing materials. The regulation that governs asbestos in Colorado is the Colorado Air Quality Control Commission s Regulation No. 8, Part B, "Emission Standards for Asbestos." Notification is required for all demolitions of all facilities and all asbestos abatement projects that exceed the trigger levels, whatever is the lesser quantity. The notification requirements apply to both friable and non-friable asbestos materials. This database contains those related projects since January 2008.

COVENANTS Environmental Real Covenants List

VERSION DATE: 08/25/15

Senate Bill 01-145 gave authority to the Colorado Department of Public Health and Environment to approve requests to restrict the future use of a property using an enforceable agreement called an environmental covenant. These covenants, which are recorded with the deed and run with the land, provide a mechanism to ensure that institutional controls that are part of environmental remediation projects are properly implemented and that engineered structures are protected and maintained, so that implemented remedies continue to be protective of human health and the environment for as long as any residual contamination remains a risk.

UMTS Uranium Mill Tailings Sites

VERSION DATE: 08/09/02

There were nine uranium mill tailings sites in Colorado designated for cleanup under the federal Uranium Mill Tailings Radiation Control Act. These nine sites, know commonly as UMTRA sites, were remediated jointly by the State of Colorado and the U.S. Department of Energy during the late 1980's and early 1990's. Mill tailings were removed from 8 of the mill sites and relocated in engineered disposal cells. A disposal cell is designed to encapsulate the material, reduce radon emanation, and prevent the movement of water through the material. At one site, Maybell, CO, the tailings were stabilized in-place at the mill site. After remediation of the tailings was completed, the State and DOE began to investigate the residual impacts to groundwater at the mill sites. The groundwater phase of the UMTRA program is on-going. This database was provided by the Colorado Department of Public Health and Environment.

APCDP Air Pollution Control Division Permitted Facilities

VERSION DATE: 11/01/16

The Stationary Sources Program, located within the Air Pollution Control Division of the Colorado Department of Public Health and Environment, evaluates and develops air permits for stationary sources in Colorado. The program inspects sources to determine compliance with air regulations and permit conditions, and maintains a computerized inventory of air pollution emissions throughout the state.

CDL Clandestine Drug Laboratory Locations

VERSION DATE: 01/05/17

This list of Methamphetamine lab seizures is provided by multiple sources: the North Metro Task Force, FACTS (Forensic Applications Consulting Technologies, Inc) and the Colorado Springs Police Department. The North Metro Task Force list of Methamphetamine labs were seized between 2001 and 2010. The North Metro area includes the following Cities and Counties of Colorado: Adams County, Broomfield, Brighton, Commerce City, Federal Heights, Northglenn, Thornton, and Westminster. According to Section 2 of Colorado Revised Statutes: "25-18.5-103. Discovery of an illegal drug laboratory - property owner - clean-up - liability. (1) (a) Upon notification from a peace officer that chemicals, equipment, or supplies indicative of an illegal drug laboratory are located on a property, or when an illegal drug laboratory used to manufacture methamphetamine is otherwise discovered and the property owner has received notice, the owner of any contaminated property shall meet the cleanup standards for property established by the board in section 25-18.5-102". The FACTS and Colorado Springs Police Department Methamphetamine labs were seized between 2001 and 2014.

CLEANERS Dry Cleaning Facilities

VERSION DATE: 02/01/17

This database contains dry cleaners which have obtained an air permit through the Air Pollution Control Division at the Colorado Department of Public Health and Environment.

SPILLS Spills Listing

VERSION DATE: 10/31/16

The Colorado Department of Public Health and Environment's Division of Emergency Preparedness and Response maintains this listing of chemical spills and/or releases.

AST Aboveground Storage Tank Facilities

VERSION DATE: 01/18/17

The Oil and Public Safety Division of the Colorado Department of Labor and Employment maintains this list of aboveground storage tank (AST) facilities. This AST database also includes other types of storage tank facilities such as liquefied petroleum gas (LPG), vehicle tank meters (VTM), and compressed natural gas facilities.

HWSG Hazardous Waste Sites- Generator

VERSION DATE: 06/30/03

The Resource Conservation and Recovery Act (RCRA) was enacted by congress in 1976, followed by the promulgation of implementing regulations in 1980. In 1984, the State was authorized by EPA to implement the RCRA program in Colorado on their behalf. This facility listing includes RCRA sites listed as generators of hazardous waste (Small Quantity Generators and Large Quantity Generators) and was provided by the Colorado Department of Public Health and Environment.

Small Quantity Generators (SQG) generate, in any calendar month, more than 100 kg (220 lbs.) but less than 1,000 kg (2,200 lbs.) of RCRA hazardous waste; and generate, in any calendar month, or accumulate at any time, no more than 1 kg (2.2 lbs.) of acute hazardous waste and no more than 100 kg (220 lbs.) of material from the cleanup of a spill of acute hazardous waste; and accumulate on-site no more than 6000 kg (13,200 lbs) of hazardous waste at any one time; or, the site is a Small Quantity Generator if the site met all other criteria for a Conditionally Exempt Small Quantity Generator, but accumulated, at any time, more than 1,000 kg (2,200 lbs.) of RCRA hazardous waste.
Large Quantity Generators (LQG) generate, in any calendar month, 1,000 kg (2,200 lbs.) or more of RCRA hazardous waste; or generate, in any calendar month, or accumulated at any time, more than 1 kg (2.2 lbs.) of RCRA acute hazardous waste; or generate, in any calendar month, or accumulated at any time, more than 100 kg (220 lbs.) of spill cleanup material contaminated with RCRA acute hazardous waste.

UST Underground Storage Tank Facilities

VERSION DATE: 01/18/17

The Oil and Public Safety Division of the Colorado Department of Labor and Employment maintains this list of underground storage tank facilities.

HISTSWLF Historical Solid Waste Landfills

VERSION DATE: NR

This historical solid waste landfills database contains data from the Hazardous Materials Waste Management Division (HMWMD) of the Colorado Department of Public Health and other various state and local agencies. In the early 1980s, the HMWMD conducted a survey of staff members and local agencies to compile this listing of sites that were known or thought to have waste issues. This Solid Waste Historical Data is not considered complete or verifiable and has not been maintained since the late 1980s. The HMWMD is not responsible and shall not be liable to the used for damages of any kind arising out of the use of this data or information.

HWSTSD Hazardous Waste Sites- Treatment, Storage & Disposal

VERSION DATE: 06/30/03

The Resource Conservation and Recovery Act (RCRA) was enacted by congress in 1976, followed by the promulgation of implementing regulations in 1980. In 1984, the State was authorized by EPA to implement the RCRA program in Colorado on their behalf. TSD facilities treat, store, dispose, or recycle hazardous waste on site in units and therefore are subject to RCRA permitting requirements. Historic TSDs are facilities that have completed closure and/or post-closure of the RCRA Subtitle C Regulated Unit(s) or the Treatment/Storage/Disposal Unit is no longer regulated. This database was provided by the Colorado Department of Public Health and Environment.

LST Leaking Storage Tank Facilities

VERSION DATE: 01/18/17

The Oil and Public Safety Division of the Colorado Department of Labor and Employment maintains this list of leaking aboveground and underground storage tank facilities.

LUSTTRUST	Leaking Underground Storage Tanks Trust Fund Sites
VERSION DATE: 01/01/00	

Suspected tank leaks have been discovered at the sites included in this database, but the facility responsible for the leak has not been identified. The state's investigtion and search for responsible parties is paid for out of the state's Leaking Underground Storage Tank (LUST) Trust Fund. This database was provided by the Colorado Department of Labor & Employment, Division of Oil and Public Safety, State Fund Section and is no longer updated.

METHANESITES	Methane Gas Study Sites
VERSION DATE: 01/01/81	

This Investigation of Methane Gas Hazards report was prepared by the Denver Office of Emergency Preparedness in 1981. The purpose of this study was to assess the actual and potential generation, migration, explosive and related problems associated with specified landfills, and to identify existing and potential problems, suggested strategies to prevent, abate, and control such problems and recommend investigative and monitoring functions as may be deemed necessary. The Colorado Department of Health selected eight landfills as priorities due to population density and potential hazards to population and property.

SWF	Solid Waste Facilities
VERSION DATE: 12/29/16	

The Colorado Department of Public Health and Environment maintains this database of solid waste disposal facilities, transfer stations, recyclers, waste tire registrants, and waste grease registrants.

VCRA	Voluntary Cleanup and Redevelopment Program Sites
VERSION DATE: 11/07/16	

This site listing is provided by the Colorado Department of Public Health and Environment (CDPHE) and includes both voluntary cleanup and brownfield properties. The Voluntary Cleanup and Redevelopment program was created in 1994. The objective of the program is to facilitate the redevelopment and transfer of contaminated properties. Properties that sit untouched because of their real or perceived contamination can be rehabilitated using the CDPHE's Brownfields Program in conjunction with the Voluntary Cleanup Program. Cleanup decisions are based on existing standards and the proposed use of the property. The actual cleanup and verification is the owner's responsibility.

HWSCA	Hazardous Waste Sites- Corrective Action
VERSION DATE: 06/30/03	

The Resource Conservation and Recovery Act (RCRA) was enacted by congress in 1976, followed by the promulgation of implementing regulations in 1980. In 1984, the Hazardous and Solid Waste Amendments (HSWA) were added to RCRA providing for corrective action at facilities subject to RCRA. That same year, the State was authorized by EPA to implement the RCRA program in Colorado on their behalf. Corrective action may be implemented as part of a RCRA Hazardous Waste Permit, an Order, or a Corrective Action Plan pursuant to the Colorado Hazardous Waste Regulations. Corrective action is the process by which regulated facilities investigate and remediate, as necessary, all contamination (soil, ground water, surface water, air) associated with their releases into the environment. Historic Corrective Action Sites are facilities that have completed the RCRA Subtitle C corrective Action process. This database was provided by the Colorado Department of Public Health and Environment.

SF Superfund Sites

VERSION DATE: 06/01/03

This listing contains active, deleted and proposed "Superfund" hazardous waste sites, as well as those sites identified through the Natural Resource Damages section of Superfund legislation and one Private Non-Superfund Cleanup site. A site qualifies for the National Priorities List (NPL or Superfund list) when the U.S. Environmental Protection Agency (EPA) determines there is a release or threatened release of hazardous substances that may endanger public health, welfare or the environment. In Colorado, the lead agency for Superfund remediation may be either the EPA or the Colorado Department of Public Health and Environment.

WCSWF Weld County Solid Waste Facilities

VERSION DATE: 01/04/16

This listing of solid waste facilities is provided by the Weld County Public Health Department.

USTR08 Underground Storage Tanks On Tribal Lands

VERSION DATE: 10/17/16

This database, provided by the United States Environmental Protection Agency (EPA), contains underground storage tanks on Tribal lands located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

LUSTR08 Leaking Underground Storage Tanks On Tribal Lands

VERSION DATE: 10/17/16

This database, provided by the United States Environmental Protection Agency (EPA), contains leaking underground storage tanks on Tribal lands located in EPA Region 8. This region includes the following states: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

ODINDIAN Open Dump Inventory on Tribal Lands

VERSION DATE: 11/08/06

This Indian Health Service database contains information about facilities and sites on tribal lands where solid waste is disposed of, which are not sanitary landfills or hazardous waste disposal facilities, and which meet the criteria promulgated under section 4004 of the Solid Waste Disposal Act (42 U.S.C. 6944).

INDIANRES Indian Reservations

VERSION DATE: 01/01/00

The Department of Interior and Bureau of Indian Affairs maintains this database that includes American Indian Reservations, off-reservation trust lands, public domain allotments, Alaska Native Regional Corporations and Recognized State Reservations.

APPENDIX D

RESUMES

Resume

GRANT EMERY
Environmental Staff Scientist

EDUCATION

B.S. Geology
Minor in Biology
Mansfield State University of Pennsylvania, 1984

Post Graduate Studies
Various Ecology and Environmental Science courses, Colorado School of Mines and University of Colorado in Denver

PROFESSIONAL SUMMARY

Mr. Grant Emery joined CTL|Thompson, Inc in 2008 as an Environmental Staff Scientist. Prior to joining our firm, Mr. Emery had eighteen years of Land Development, Biological Evaluations, and Erosion/Sediment Control experience.

Mr. Emery has previous experience conducting Endangered Species Surveys and Wetland Delineations as a self-employed consultant. Mr. Emery performed field surveys, plant sampling and identification, report writing and submittal to the Corps of Engineers for 404 permits.

Mr. Emery currently provides environmental consulting and assistance on different projects throughout the company, including biological evaluations, stormwater management plans and observations, and Phase I and II ESAs for various residential and commercial projects throughout the Front Range.

PROJECT EXPERIENCE

Community Development Project Manager, Village Homes of Colorado
Managed all aspects of assigned development projects from due diligence through construction and local government approval/acceptance. Developed plans, permitted and insured regulatory compliance for State stormwater, endangered species, local erosion control and Federal 404 permits.

Preble's mouse and burrowing owl were evaluated at the main development project – "Idyllwilde" – later named "Community of the Year" in 2005 and 2006. Mr. Emery worked with the consultant and USFWS to demonstrate that the development was not connected to mouse habitat, and that the burrowing owl was unlikely to be found on the project. Also managed environmental compliance for Reata North, Granby Ranch, and Belle Creek projects.

Project Manager and Erosion Control Inspector, Douglas County Public Works, Colorado
Responsible for detail review, comment and acceptance of development proposals. Inspected and administrated contracts for routine maintenance of district drainageways.

Urban Drainage and Flood Control District
Researched hydrology and assisted in the design of urban drainage systems and wetlands. Evaluated maintenance needs for delineated wetlands, inspected dams and detention facilities. Evaluated, studied and certified proposed projects for presence of the Ute ladies'-tresses orchid.

Standard Pacific Homes, various sites, Colorado
Storm water inspection and consultation.

Castle Keep Development, Castle Rock, Colorado
Performed Phase I ESA on land that a nearby historic landfill has encroached upon.

CTL|THOMPSON

Matthew L. Wardlow, P.E.

Environmental Department Manager

Office Location

Denver, Colorado

Years of Experience

20 Years

Professional Registration

Registered Professional Engineer: Colorado

Education

B.S. Engineering and Policy, Washington University, St. Louis, MO, 1993

Training & Certifications

40 Hour OSHA Training

Confined Space Training

Mold Remediation Technician

Training Principals of Forced Air Remediation

Asbestos Inspector
Air Monitoring Specialist
Designer

Professional Affiliations

American Society of Civil Engineers

American Society of Foundation Engineers

Colorado Environmental Management Society

Urban Land Institute

Mr. Wardlow has a variety of technical expertise in Phase I and II Environmental Site Assessments, CDPHE Voluntary Cleanup (VCP) applications, asbestos consultation, underground storage tank removals, site characterizations, and assessments under the National Environmental Policy Act. Mr. Wardlow reviews all environmental deliverables, making sure that the latest practices are followed. He has developed a reputation as a consistent and reliable consultant for his clients, which include the City & County of Denver, Auraria Campus and its colleges, and Boulder County. He encompasses a variety of project experience including brownfields, historical mine sites, medical facilities, and wastewater treatment plants.

Project Experience

Regency Athletic Complex at MSU Denver, Denver Colorado
2016 ACEC CO GRAND CONCEPTOR AWARD – Highest Engineering Honor
This former brownfield, located at the southern end of Auraria Campus, was the site of geotechnical and environmental issues from past industrial use. There was also the potential for settlement due to undocumented fill. Mr. Wardlow devised an idea using Deep Dynamic Compaction (DDC), which is a ground improvement technique that densifies the majority of soils and fills in-place by using a drop weight. CTL then provided on-site geotechnical and environmental inspection services, management of contaminants excavated, and also successfully entered the client into the State of Colorado Voluntary Cleanup Program. Measures were also taken to monitor air quality and vibrations from the impact. The solution was about 25% of the removal and replacement costs, and there has been no noticeable settlement.

Other Redevelopment/Voluntary Cleanup Projects:
Prepared Overall 2016 Auraria Campus Materials Management Plan
New Breckenridge Brewery – VCP – Remediation of Pesticides
Community College of Denver Confluence Building
Metro State Hotel and Hospitality Learning Center
Metro State Student Success Building
AHEC 5th Street Parking Garage – VCP – Coal Ash and Asbestos
Gold Hill Mesa - VCP - Subdivision Constructed on Mine Tailings
4th and Santa Fe – VCP Remediation of Chrome Plating Site
ConocoPhillips - Purchase/Redevelopment of 400-acre StorageTek

Other Major Projects and Clients
Denver Department of Environmental Health - 20+ P1 and P2 ESAs
CDOT - Over 30 Asbestos Surveys, Air Clearances of Buildings
Land Developers - Due Diligence Studies and SWMP Consultation
Urban Land Conservancy - P1 and P2 ESAs, IAQ Concerns
CU Boulder - Asbestos Consultant - Ketchum Hall, Hallett Hall
Homebuilders - Due Diligence, Mold and Moisture Consultation
Boulder County Risk Management - On-Call Industrial Hygienist
Boulder Valley School District - On-Call Asbestos Consultant
Regis University - P1 ESA of 7 Parcels of Campus

March 13, 2017

Century Communities
8390 East Crescent Parkway, Suite 650
Greenwood Village, Colorado 80111

Attention: Michael Lee - Director of Land Acquisition

Subject: Supplemental Preliminary Geotechnical Investigation
Erie Commons, Filing No. 4
County Line Road and Leon Wurl Parkway
Erie, Colorado
Project No. DN48,805-115

This letter confirms the results of our Supplementary Geotechnical Evaluation for Erie Commons, Filing No. 4 in Erie, Colorado (Fig. 1). The purpose of the supplemental evaluation was to provide a more thorough indication of soil conditions for your due diligence assessment; specifically, to aid in estimating potential extent of sub-excavation. This letter contains descriptions of subsoil conditions and groundwater levels encountered in our exploratory borings and our opinions of potential sub-excavation measures to mitigate potential movements. The letter was prepared based on conditions found in our borings, results of laboratory tests, engineering analysis of field and laboratory data, previous investigation, preliminary grading plans, and our experience. Additional investigations to develop foundation design criteria will be necessary.

PREVIOUS INVESTIGATION

We performed a Preliminary Geotechnical Investigation (CTL Project No. DN83,548-115; report dated May 18, 2004) that included the subject site. Six borings were drilled within Erie Commons, Filing No. 4 (TH-15 through TH-20). We encountered 7 to 22.5 feet of silty to clayey sand and sandy clay underlain by weathered and comparatively unweathered claystone bedrock. Samples of the clay and claystone were expansive. Groundwater was encountered at depths of 7 to 11.5 feet in the six borings. TH-19 and TH-20 were rated as moderate to high risk for expansive soils. We recommended sub-excavation or moisture injection to mitigate expansive soils. Alternatively, we indicated a deep foundation system, such as drilled piers, could be used in lieu of expansive soil mitigation.

PROPOSED CONSTRUCTION

We understand the site may be developed for seventeen multi-story townhome buildings with attached garages. No below-grade areas are planned. We understand the buildings will likely be supported on footing foundations with crawl spaces. Grading plans were not available at the time of our investigation. We should be provided these plans once they are available for our review.

INVESTIGATION

Subsurface conditions were investigated by drilling six additional borings (TH-101 through TH-106) at the locations shown on Fig. 1 to supplement data from the six borings previously drilled. Prior to drilling, the test hole locations were surveyed by others. The supplemental borings were drilled to depths of 25 to 30 feet using 4-inch diameter, continuous-flight auger and a truck-mounted drill rig. A representative of CTL | Thompson, Inc. was present during drilling to observe drilling operations, log the soil and bedrock, and obtain samples. Summary logs of the exploratory borings including results of field penetration resistance tests and a portion of laboratory test results are presented in Appendix A.

Samples were returned to our laboratory where they were examined by our engineer and tests were assigned. Laboratory tests included dry density, moisture content, percent silt and clay-sized particles (passing the No. 200 sieve), Atterberg limits, and swell-consolidation. Swell-consolidation tests were performed by wetting the samples under approximate existing overburden pressures (the weight of the overlying soil). Results of laboratory tests are presented in Appendix B and are summarized in Table B-I.

SUBSURFACE CONDITIONS

Subsoils encountered in our borings consisted of 7 to 30 feet of clean to clayey sand and/or sandy clay. Claystone and sandstone bedrock was encountered in TH-101 through TH-103 at depths of 7 to 29 feet. Some pertinent engineering characteristics of the soil and bedrock are presented in the following paragraphs.

The sandy clay was soft to very stiff based on field penetration resistance tests. Three samples compressed 0.1 to 0.6 percent, and nine samples swelled 0.1 to 3.2 percent when wetted. One sample contained 91 percent fines (passing the No. 200 sieve) and exhibited moderate plasticity.

The clean to clayey sand was medium dense to very dense. Four samples contained 30 to 39 percent fines and exhibited low plasticity. We judge the sand to be predominantly non-expansive or low swelling.

Claystone and sandstone bedrock was encountered below the sand and clay in TH-101 through TH-103. The bedrock was medium hard to very hard. One sample of claystone compressed 0.5 percent, one did not swell, and one sample swelled 5.2 percent when wetted. One claystone sample contained 56 percent fines and exhibited low plasticity. We judge the sandstone to be non-expansive or low swelling. Estimated bedrock surface elevations are shown on Fig. 2.

Groundwater

Groundwater was encountered during drilling at depths of 17.5 to 23 feet in all borings. When the holes were checked several days later, water was measured at depths of 18 to 20 in all borings. Estimated groundwater surface elevations are shown on Fig. 3. Shallow groundwater was encountered in TH-17 and TH-20 in our previous investigation. Grading plans were not available at the time of our investigation. We should be provided these plans once they are available, for our review. Assuming minor cuts throughout the site and no basement construction, we do not anticipate groundwater will affect proposed construction. Groundwater may be encountered in deep utility installation. Groundwater will likely fluctuate seasonally and may rise and/or develop post-construction in response to precipitation and landscape irrigation.

ESTIMATED POTENTIAL HEAVE

Expansive soil and bedrock are present at this site. The soils and bedrock may heave after wetting. Based on the subsurface profiles, swell-consolidation test results, and our experience, we have estimated the potential heave at the existing ground surface as shown in Table I below. We judge there is low likelihood the claystone below the sand, clay, and sandstone will affect shallow foundations and floors. The natural soils and sandstone bedrock will likely act as a buffer to distribute bedrock heave more evenly. Potential heave will be affected by site grading. Variation from our estimates should be anticipated.

Boring	Estimated Heave Considering a 24-Foot Depth of Wetting (inches)	Heave Due to Bedrock (inches)	Estimated Heave Neglecting Bedrock Heave (inches)
TH-15	3.1	0.4	2.7
TH-16	1.8	1.0	0.8
TH-17	2.7	1.4	1.3
TH-18	0.5	0.5	<0.5
TH-19	5.0	5.0	<0.5
TH-20	3.1	2.6	0.5
TH-101	<0.5	-	<0.5
TH-102	1.7	1.7	<0.5
TH-103	<0.5	-	<0.5
TH-104	<0.5	-	<0.5
TH-105	<0.5	-	<0.5
TH-106	1.9	-	1.9

SITE DEVELOPMENT CONSIDERATIONS

Temporary Dewatering

Temporary dewatering may be necessary during construction, particularly in deep utility trenches. It is best for soil stability to excavate pits along the trench alignments and pump water down through the soils rather than collect and pump from the surface. Adjustments are often necessary as excavation proceeds. If excavation will extend more than about 2 to 4 feet below water levels, then more extensive dewatering methods (such as well points) may be required.

Soft/loose, wet soils may be encountered in excavations where shallow water is present. Soft/loose subgrade can be stabilized by crowding crushed rock into the excavation bottom so that when compactive effort is applied, the surface does not deform significantly. Acceptable rock materials include, but are not limited to, No. 2 and No. 57 rock. Crushed rock on a layer of geosynthetic grid or woven fabric can also be used, and should reduce the amount of aggregate needed to achieve stable subgrade. Typically, a biaxially woven fabric such as Mirafi 600x (or equal) or geogrid (such as Tensar TX160) topped with 8 to 12 inches of crushed rock will provide a stable working surface. The actual need for, and elements of subgrade stabilization should be determined at the time of construction.

Sub-Excavation

Our investigation indicates expansive clay and claystone are present at depths likely to influence the performance of shallow foundations and slabs-on-grade. Sub-excavation may be used to create more stable soil conditions and control risk of excessive movements, and to allow use of footing foundations and slab-on-grade floors. If you choose to sub-excavate, we believe sub-excavation is merited in the northern portion of the site to a depth of 7 feet below existing grade, as shown on Fig. 4. Recommendations for moisture conditioning and compaction of fill were presented in our May 18, 2004 report. Alternatively, a deep foundation system such as drilled piers can be used in lieu of sub-excavation.

PAVEMENTS

Pavement subgrade soil will likely consist of sandy clay and clayey sand, or fill of similar composition. Clay soil is considered relatively poor pavement subgrade, and sand is considered better subgrade. The Town of Erie requires the following minimum composite pavement sections. Where clay or clayey sand subgrade soils are present, thicker pavements may be necessary. Soils with a plasticity index greater than 10 will need to be reworked and replaced as moisture-conditioned, compacted fill. A design-level subgrade investigation should be done prior to paving.

Roadway Classification	Asphalt Concrete (AC) + Aggregate Base Course (ABC)
Local Residential	4” AC + 8” ABC
Minor Collectors	4” AC + 8” ABC

LIMITATIONS

This letter supplements our previous report dated May 18, 2004. Our borings were widely spaced to provide a general picture of subsurface conditions for preliminary assessment and planning purposes. We believe this investigation was conducted in a manner consistent with that level of care and skill ordinarily used by geotechnical engineers practicing under similar conditions. No warranty, express or implied, is made. If we can be of further service in discussing the contents of this report or analysis of the influence of subsurface conditions on the project, please call.

CTL | THOMPSON, INC.

Erin C. Beach

Erin C. Beach, E.I.T.
Staff Engineer

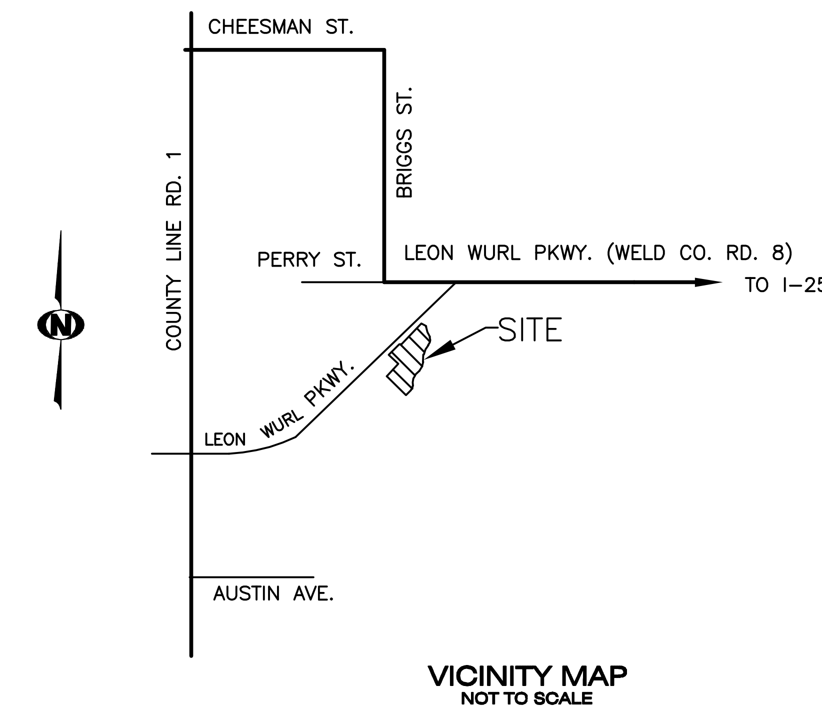
Reviewed by:

COLORADO LICENSED
ALAN J. LISOWY
32516
3/13/17
PROFESSIONAL ENGINEER

Alan Lisowy, P.E.
Associate Engineer

ECB:AJL/nn
(3 copies)

Via e-mail: Michael.lee@centurycommunities.com
insprep-co@centurycommunities.com
BretaS@centurycommunities.com
amyw@centurycommunities.com



LEGEND:

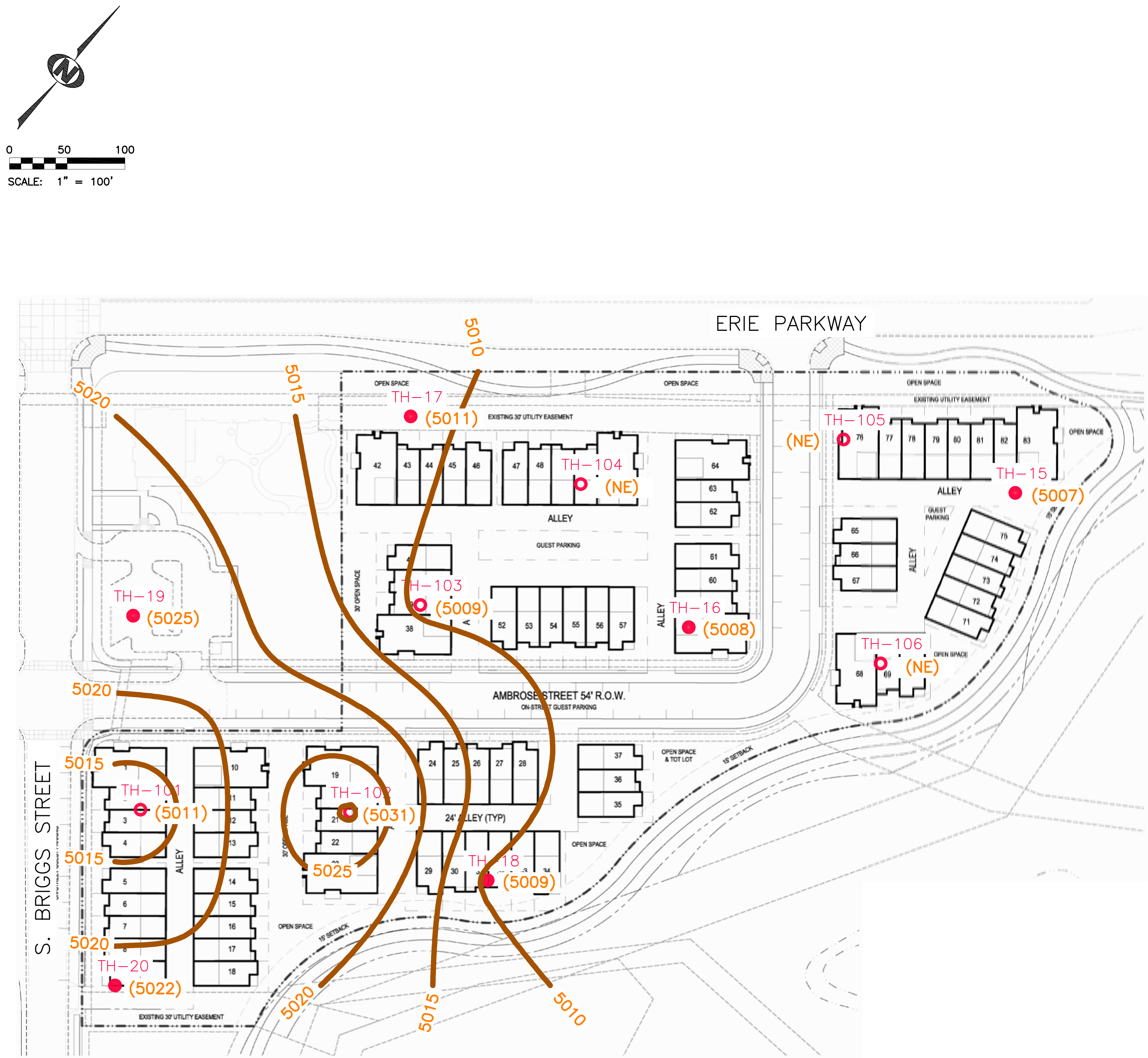
TH-101 APPROXIMATE LOCATION OF EXPLORATORY BORING

TH-15 APPROXIMATE LOCATION OF EXPLORATORY BORING DRILLED IN 2004 INVESTIGATION

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL\T Project No. DN48,805-115-L1

Locations of Exploratory Borings

Fig. 1



LEGEND:

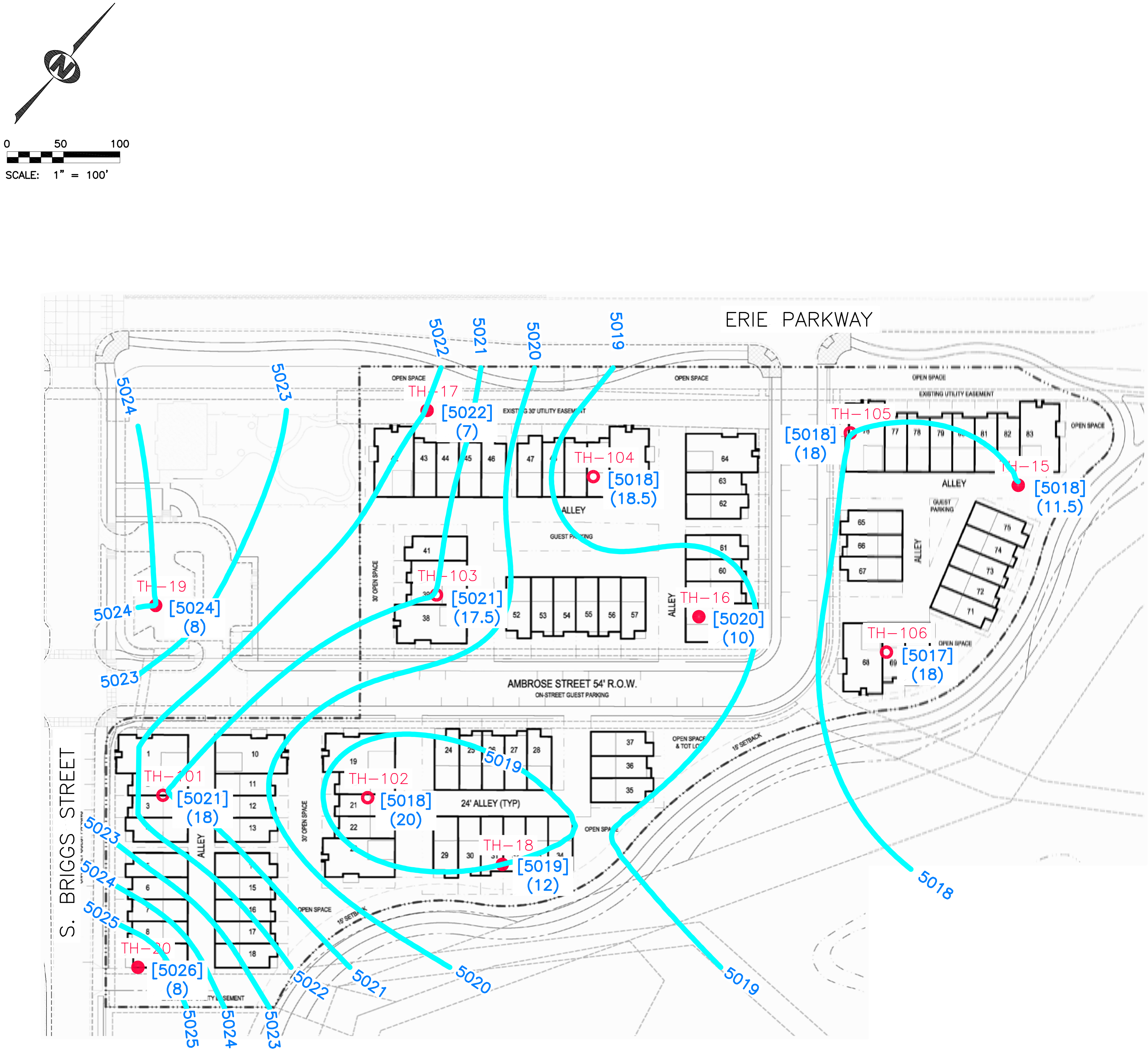
TH-101	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH-15	APPROXIMATE LOCATION OF EXPLORATORY BORING DRILLED IN 2004 INVESTIGATION
(5007)	INDICATES BEDROCK ELEVATION AT BORING LOCATION (FEET)
5010	INDICATES ESTIMATED BEDROCK SURFACE ELEVATION (FEET)

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

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL\T Project No. DN48,805-115-L1

Estimated Bedrock Surface Elevations

Fig. 2



LEGEND:

TH-101 (open circle)	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH-15 (solid dot)	APPROXIMATE LOCATION OF EXPLORATORY BORING DRILLED IN 2004 INVESTIGATION
[5017]	INDICATES GROUNDWATER ELEVATION AT BORING LOCATION (FEET)
(18)	INDICATES MEASURED DEPTH FROM EXISTING GRADE (FEET)
5018	INDICATES ESTIMATED GROUNDWATER 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.

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL\T Project No. DN48,805-115-L1

Estimated Groundwater Surface Elevations

Fig. 3

LEGEND:

TH-101 APPROXIMATE LOCATION OF EXPLORATORY BORING

TH-15 APPROXIMATE LOCATION OF EXPLORATORY BORING DRILLED IN 2004 INVESTIGATION

SUB-EXCAVATION TO 7 FEET BELOW EXISTING GRADE

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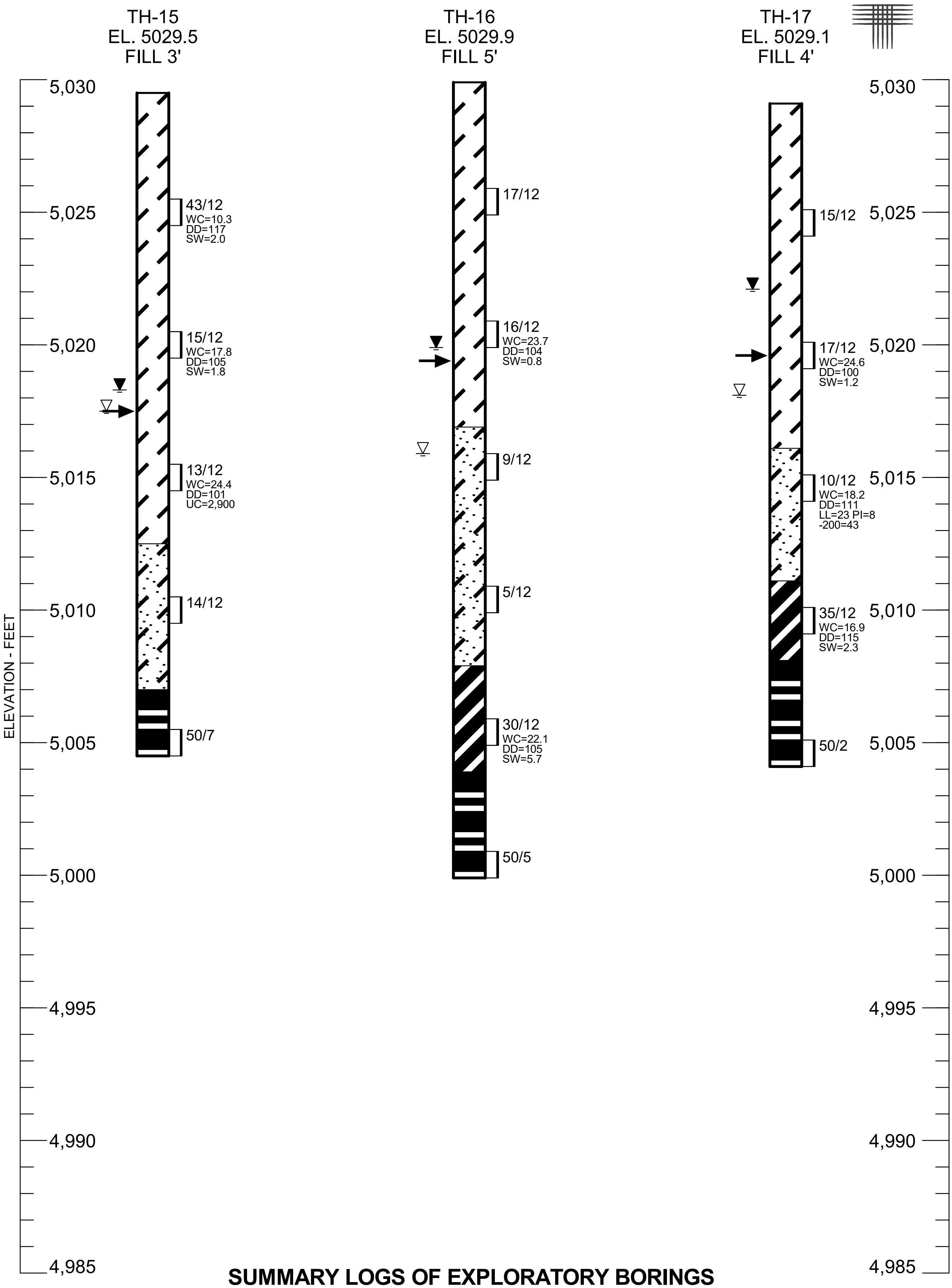
CTL\T Project No. DN48,805-115-L1

Estimated Extent of Sub-Excavation Fig. 4

APPENDIX A

SUMMARY LOGS OF EXPLORATORY BORINGS



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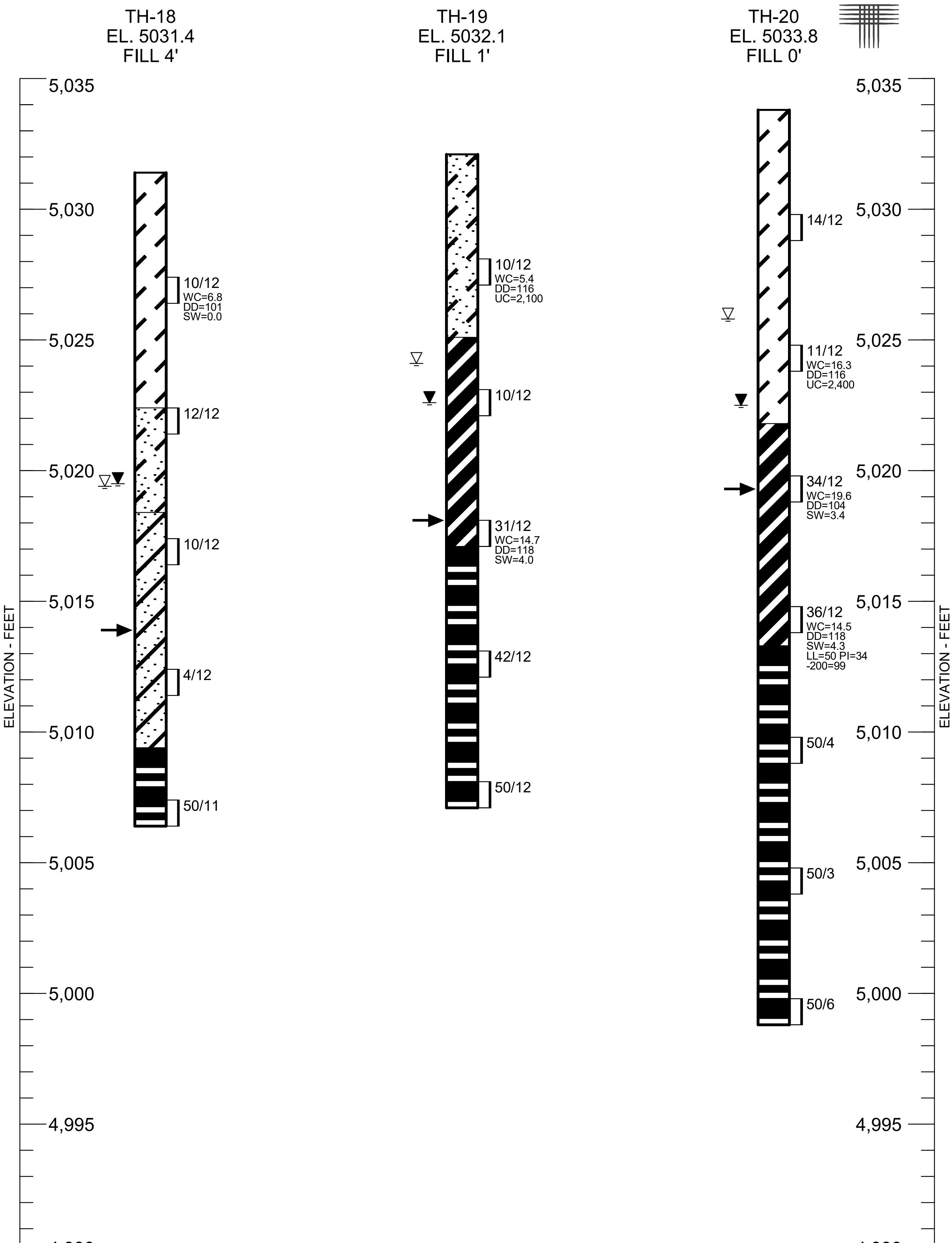
SUMMARY LOGS OF EXPLORATORY BORINGS

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

FIG. A- 1



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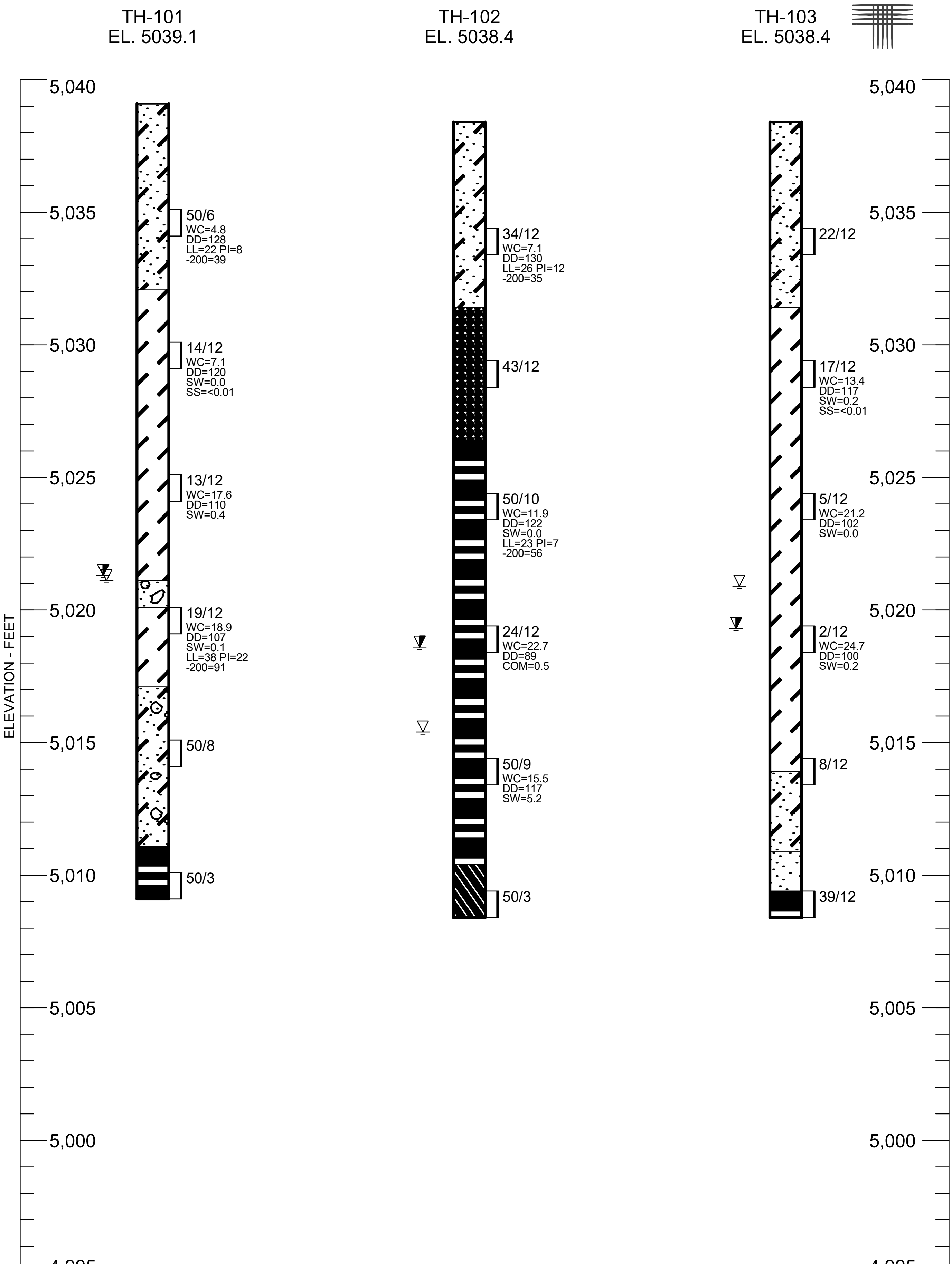
SUMMARY LOGS OF EXPLORATORY BORINGS

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

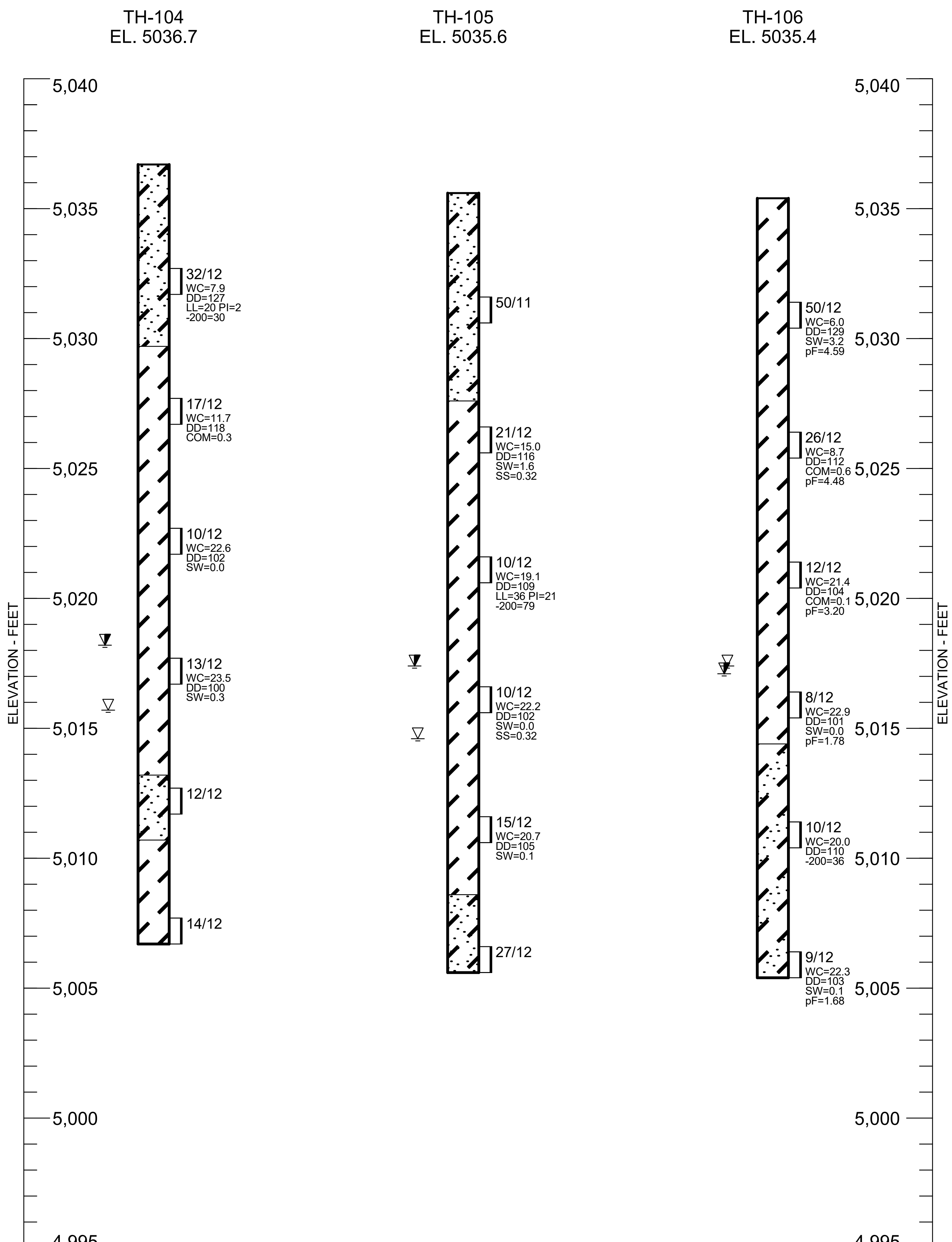
FIG. A- 2



SUMMARY LOGS OF EXPLORATORY BORINGS

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

FIG. A- 3



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SUMMARY LOGS OF EXPLORATORY BORINGS

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

LEGEND:

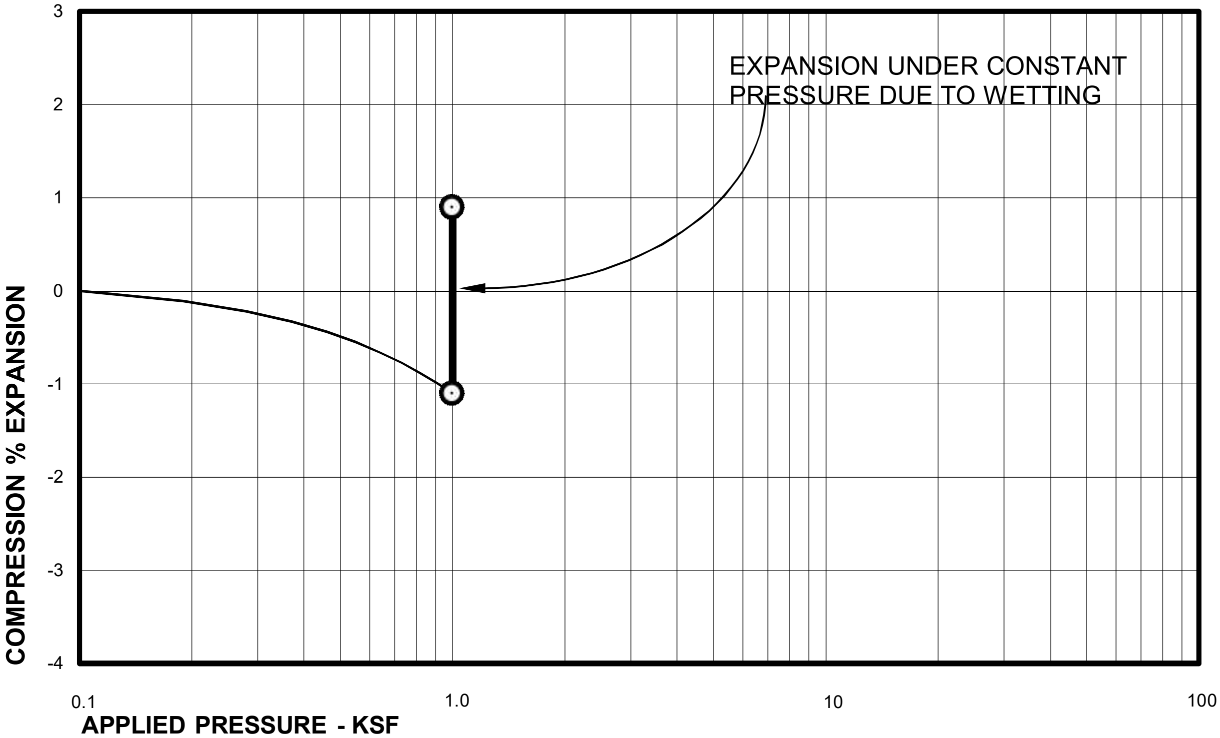
- CLAY, SANDY, SOFT TO VERY STIFF, MOIST, BROWN, TAN (CL).
- SAND, CLAYEY, LOOSE TO VERY DENSE, SLIGHTLY MOIST TO WET, BROWN (SC).
- SAND, SILTY, LOOSE TO MEDIUM DENSE, SLIGHTLY MOIST, BROWN (SM).
- SAND, CLEAN TO SLIGHTLY SILTY, WET, BROWN (SP, SP-SM).
- GRAVEL, CLAYEY, SAND, VERY DENSE, SLIGHTLY MOIST, BROWN, DARK BROWN (GC).
- GRAVEL, SANDY, DENSE, SLIGHTLY MOIST, BROWN (GP).
- WEATHERED CLAYSTONE, MOIST, BROWN, RUST.
- BEDROCK, CLAYSTONE, MEDIUM HARD TO VERY HARD, MOIST, BROWN.
- BEDROCK, SANDSTONE, MEDIUM HARD, MOIST, LIGHT BROWN.

- DRIVE SAMPLE. THE SYMBOL 43/12 INDICATES 43 BLOWS OF AN AUTOMATIC 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.
- ∇ WATER LEVEL MEASURED AT TIME OF DRILLING.
- ▼ WATER LEVEL MEASURED SEVERAL DAYS AFTER DRILLING (DN38,548-115)
- ▼ WATER LEVEL MEASURED AFTER DRILLING ON FEBRUARY 16, 2017.
- → INDICATES DEPTH WHERE HOLE CAVED.

NOTES:

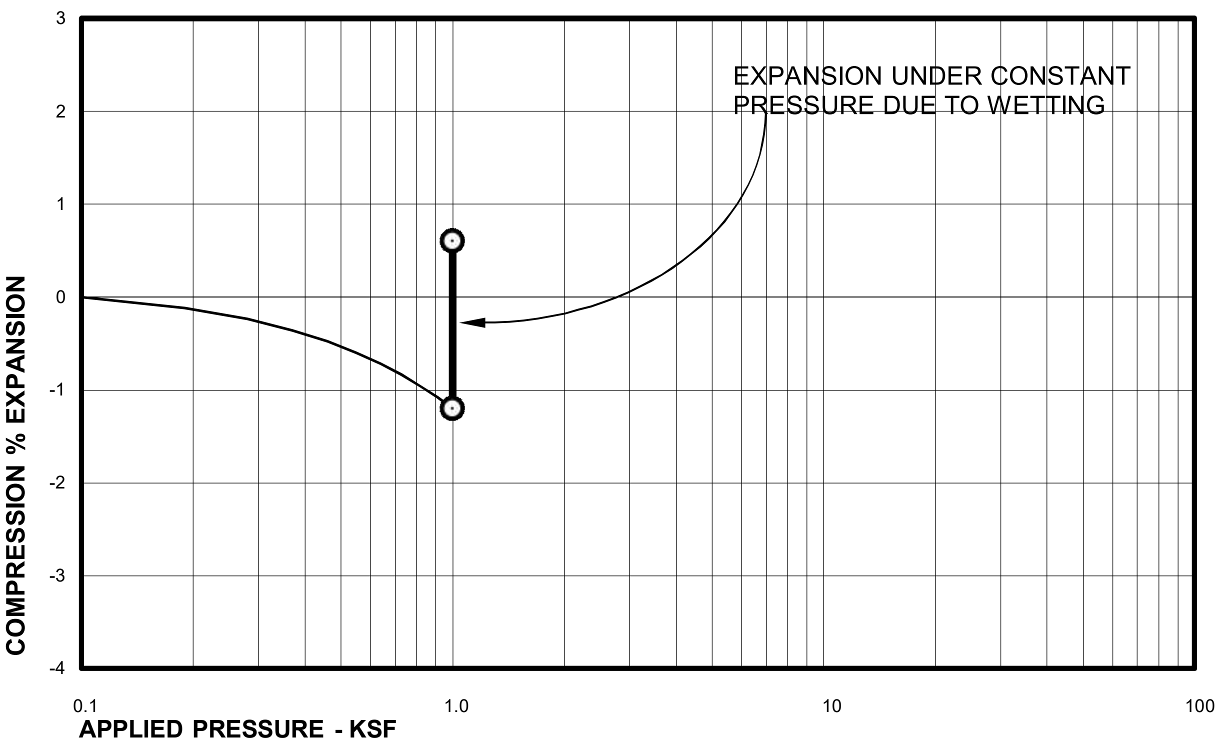
1. TH-101 THROUGH TH-106 WERE DRILLED ON FEBRUARY 8, 2017 USING 4-INCH DIAMETER, CONTINUOUS-FLIGHT SOLID-STEM AUGER AND A TRUCK-MOUNTED CME-45 DRILL RIG.
2. TH-15 THROUGH TH-20 WERE DRILLED DURING OUR PREVIOUS INVESTIGATION (CTL PROJECT NO. DN38,548-115; REPORT DATED MAY 18, 2004), USING 4-INCH DIAMETER, CONTINOUS-FLIGHT SOLID-STEM AUGER AND TRUCK-MOUNTED CME-55 DRILL RIG.
3. BORING LOCATIONS AND ELEVATIONS WERE DETERMINED BY A REPRESENTATIVE OF OUR FIRM REFERENCING THE TEMPORARY BENCHMARK SHOWN ON FIG. 1.
4. WC INDICATES MOISTURE CONTENT (%).
   DD - INDICATES DRY DENSITY (PCF).
   SW - INDICATES SWELL WHEN WETTED UNDER APPLIED PRESSURE (%).
   COM- INDICATES COMPRESSION WHEN WETTED UNDER APPLIED PRESSURE (%).
   LL - INDICATES LIQUID LIMIT.
   PI - INDICATES PLASTICITY INDEX.
   -200 - INDICATES PASSING NO. 200 SIEVE (%).
   UC - INDICATES UNCONFINED COMPRESSIVE STRENGTH (psf).
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT (%).
   pF - INDICATES SOIL SUCTION VALUE (pF).
5. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS AND CONCLUSIONS CONTAINED IN THIS REPORT.

APPENDIX B
LABORATORY TEST RESULTS



Sample of CLAY, SANDY (CL)
From TH-15 AT 4 FEET

DRY UNIT WEIGHT= 117 PCF
MOISTURE CONTENT= 10.3 %

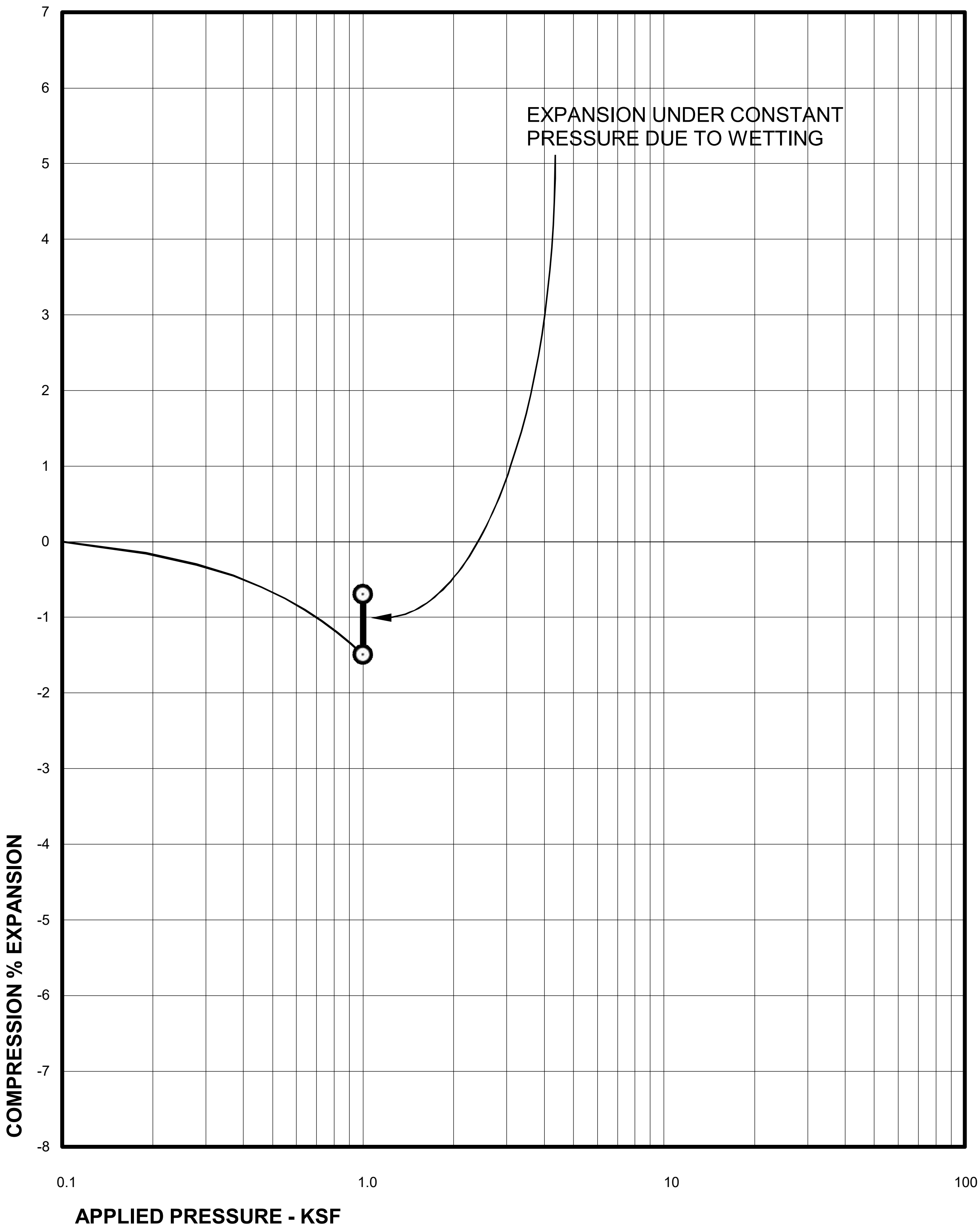


Sample of CLAY, SANDY (CL)
From TH-15 AT 9 FEET

DRY UNIT WEIGHT= 105 PCF
MOISTURE CONTENT= 17.8 %

Swell Consolidation Test Results

FIG. B-1



Sample of CLAY, SANDY (CL)
From TH-16 AT 9 FEET

DRY UNIT WEIGHT= 104 PCF
MOISTURE CONTENT= 23.7 %

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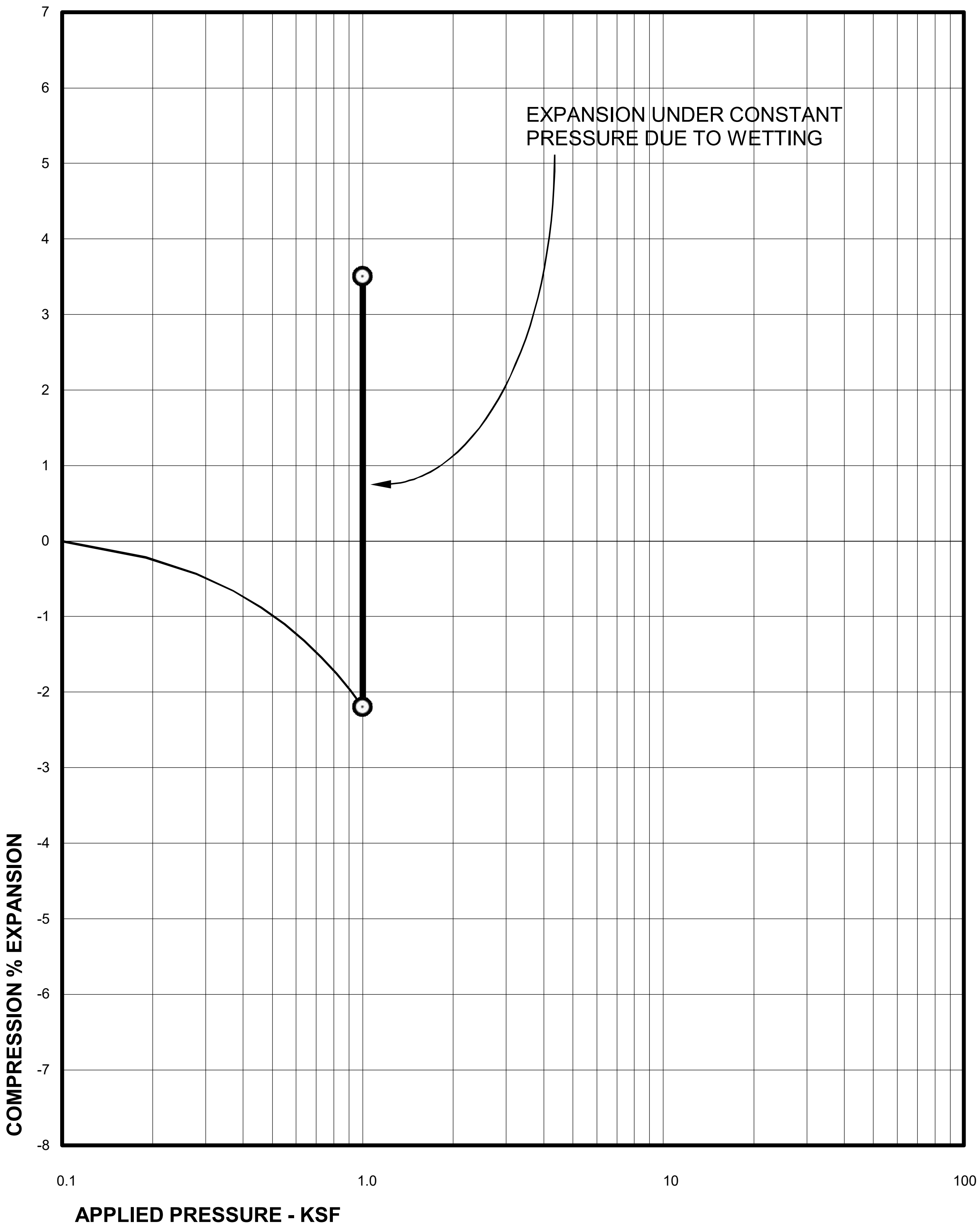
Swell Consolidation Test Results

FIG. B-2



Sample of WEATHERED CLAYSTONE

From TH-16 AT 24 FEET

DRY UNIT WEIGHT= 105 PCF

MOISTURE CONTENT= 22.1 %

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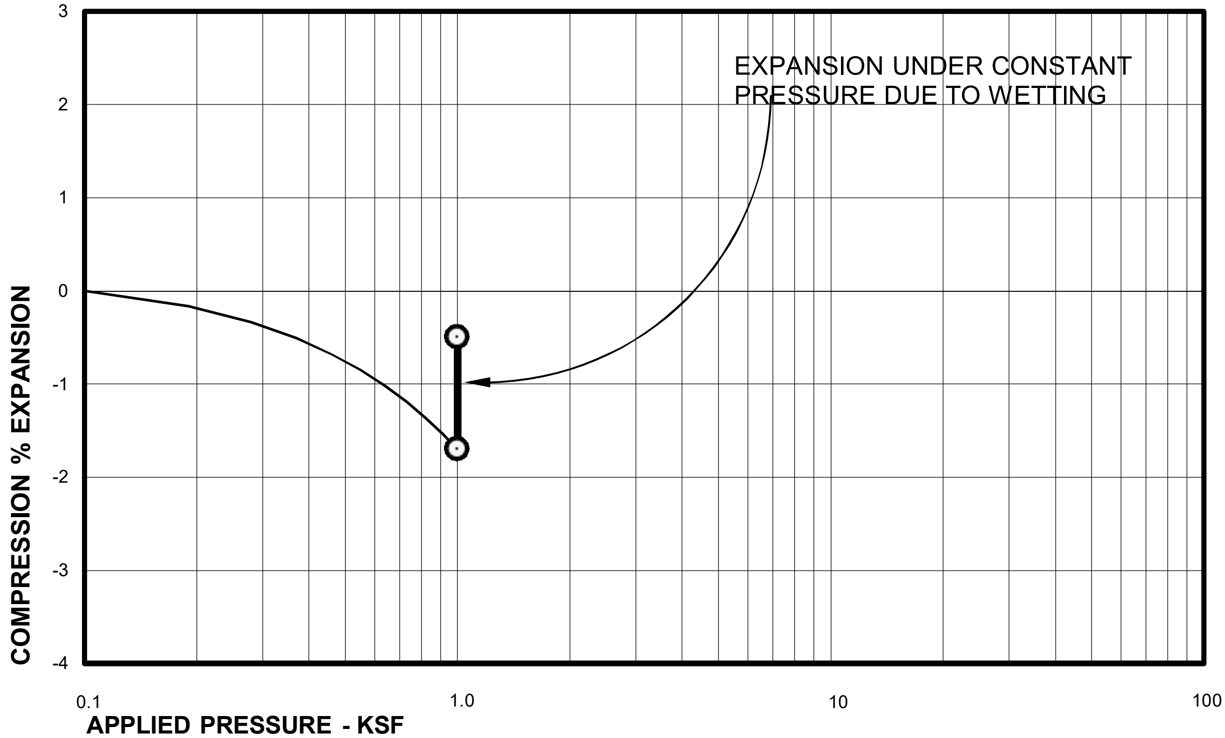
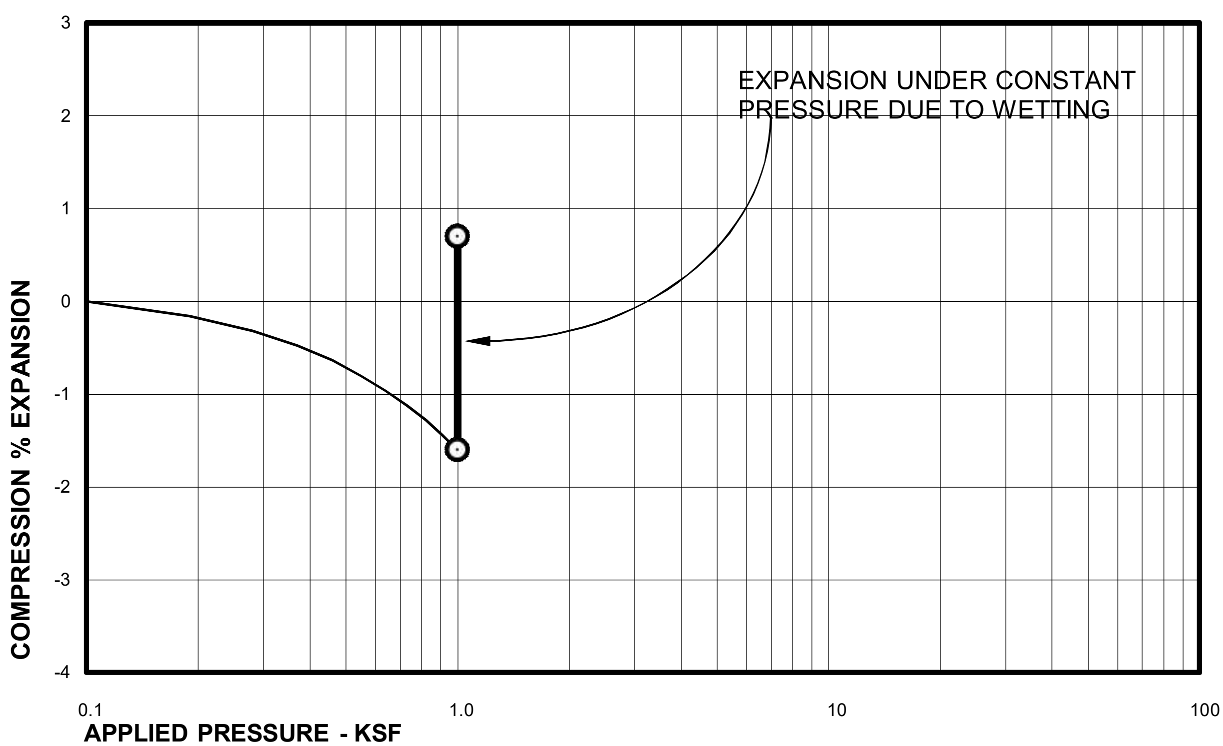
CTL|T PROJECT NO. DN48,805-115-L1

Swell Consolidation Test Results

FIG. B-3



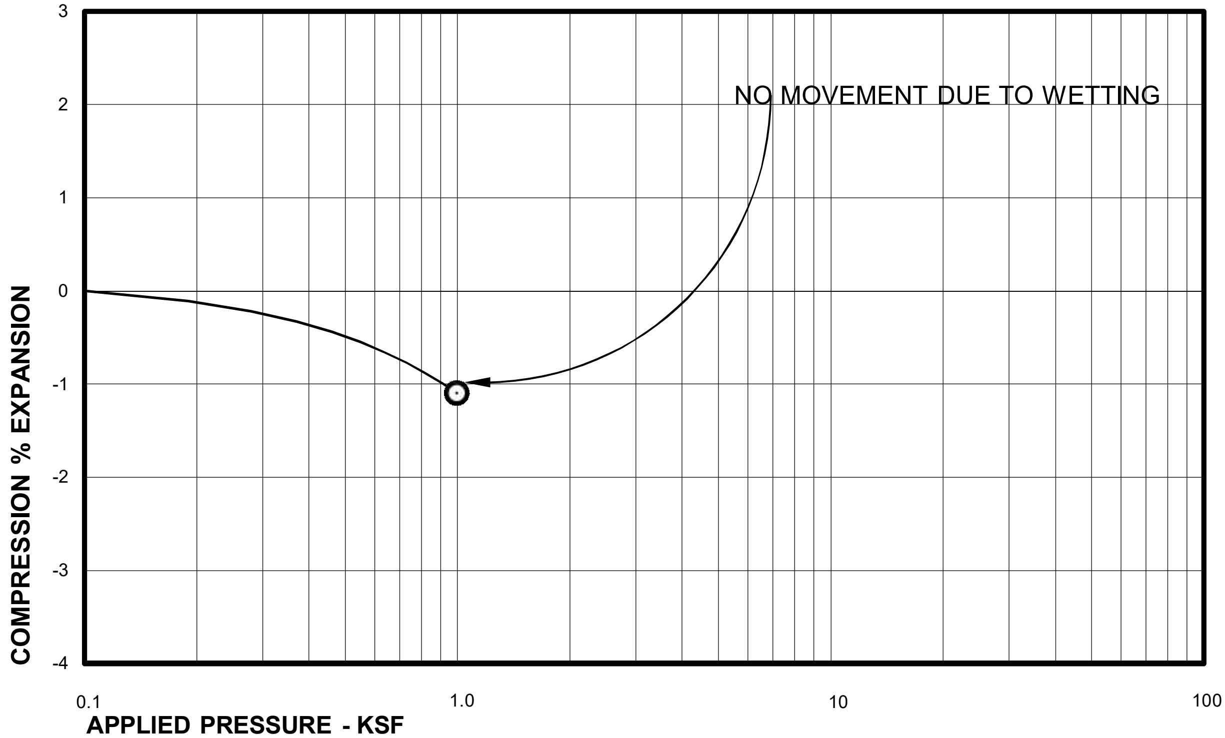
Sample of	CLAY, SANDY (CL)	DRY UNIT WEIGHT=	100	PCF
From	TH-17 AT 9 FEET	MOISTURE CONTENT=	24.6	%



Sample of	WEATHERED CLAYSTONE	DRY UNIT WEIGHT=	115	PCF
From	TH-17 AT 19 FEET	MOISTURE CONTENT=	16.9	%

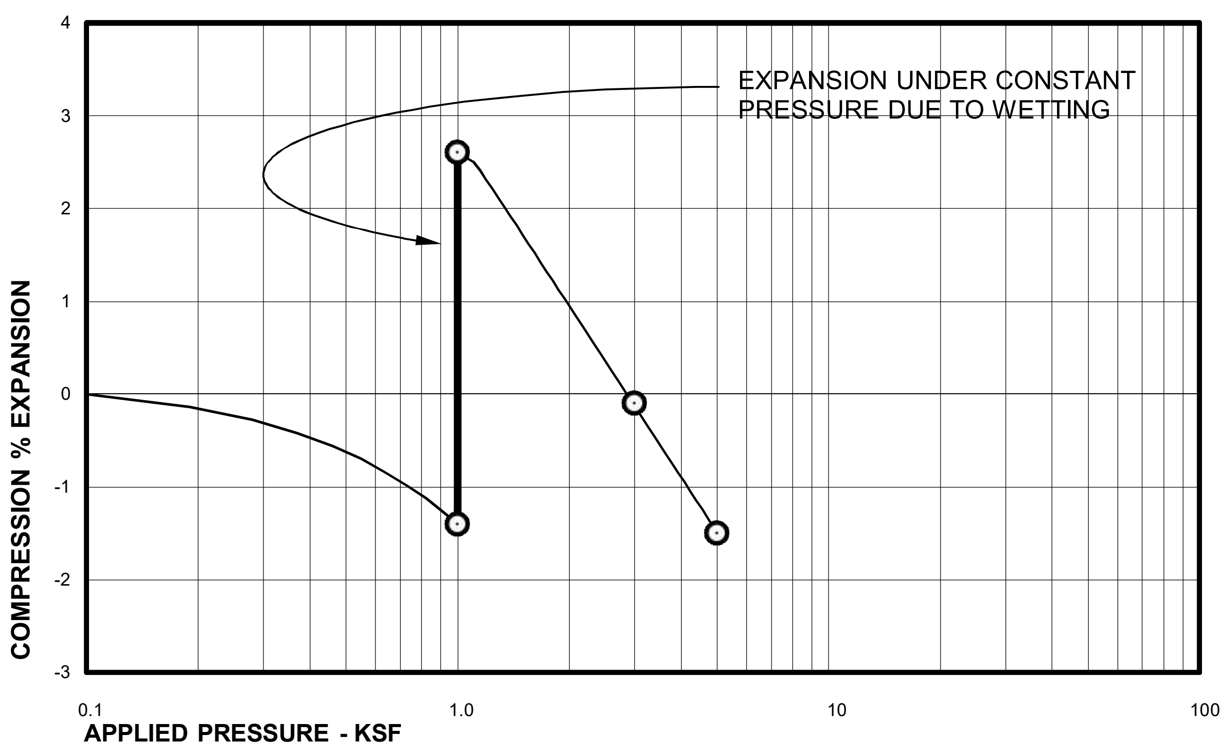
Swell Consolidation Test Results

FIG. B-4



Sample of CLAY, SANDY (CL)
From TH-18 AT 4 FEET

DRY UNIT WEIGHT= 101 PCF
MOISTURE CONTENT= 6.8 %

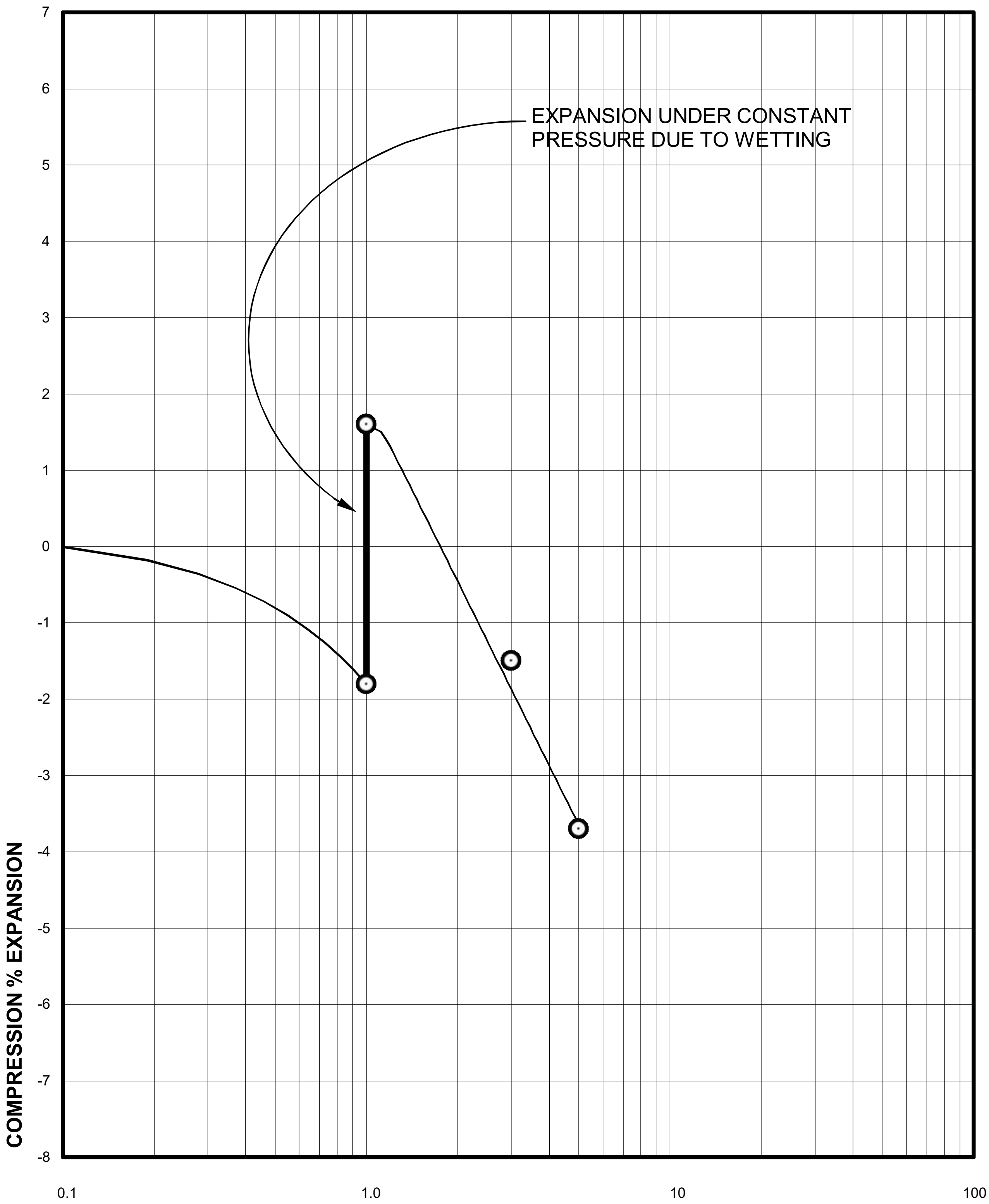


Sample of WEATHERED CLAYSTONE
From TH-19 AT 14 FEET

DRY UNIT WEIGHT= 118 PCF
MOISTURE CONTENT= 14.7 %

Swell Consolidation Test Results

FIG. B-5



Sample of WEATHERED CLAYSTONE

From TH-20 AT 14 FEET

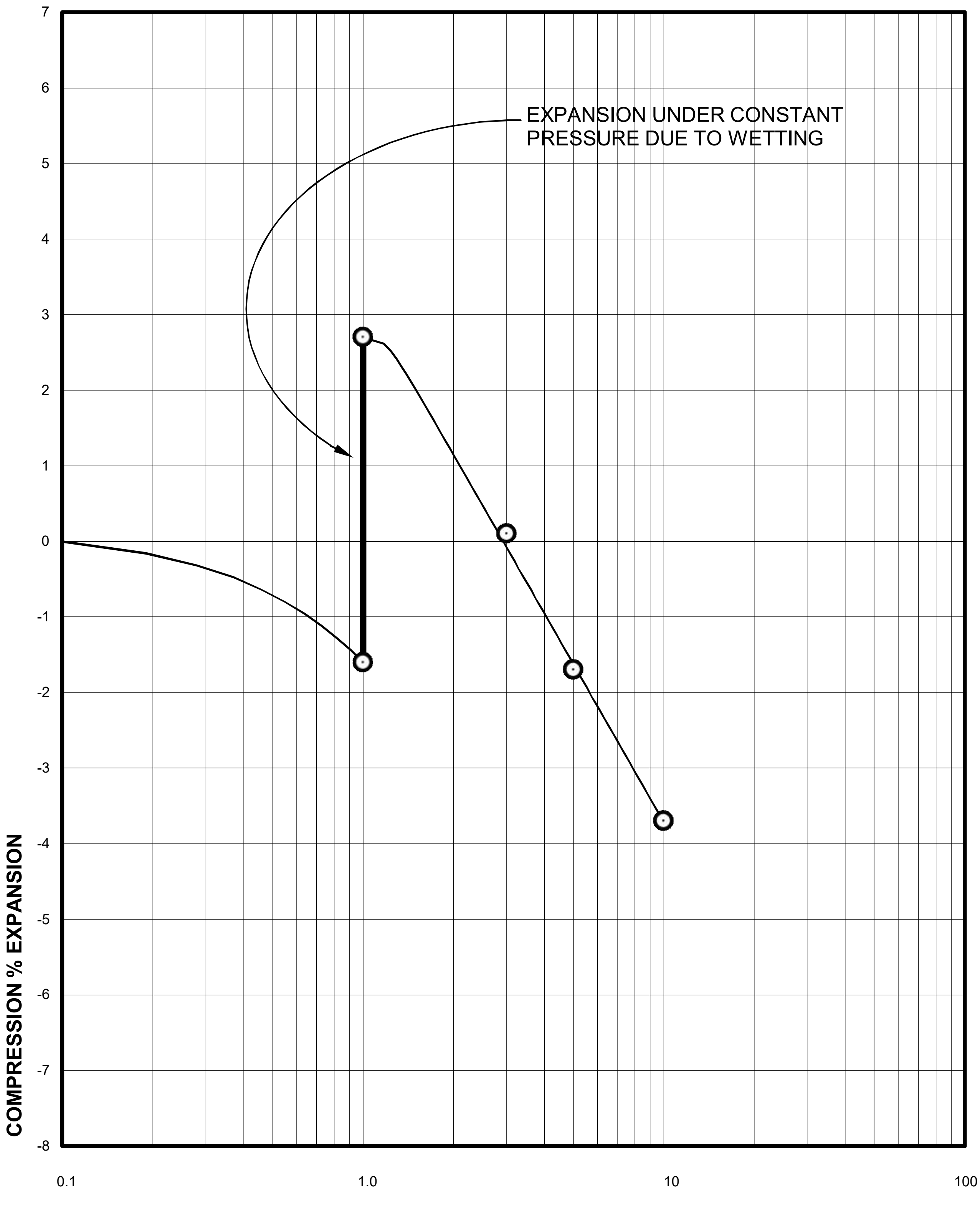
DRY UNIT WEIGHT= 104 PCF

MOISTURE CONTENT= 19.6 %

Swell Consolidation Test Results

FIG. B-6

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

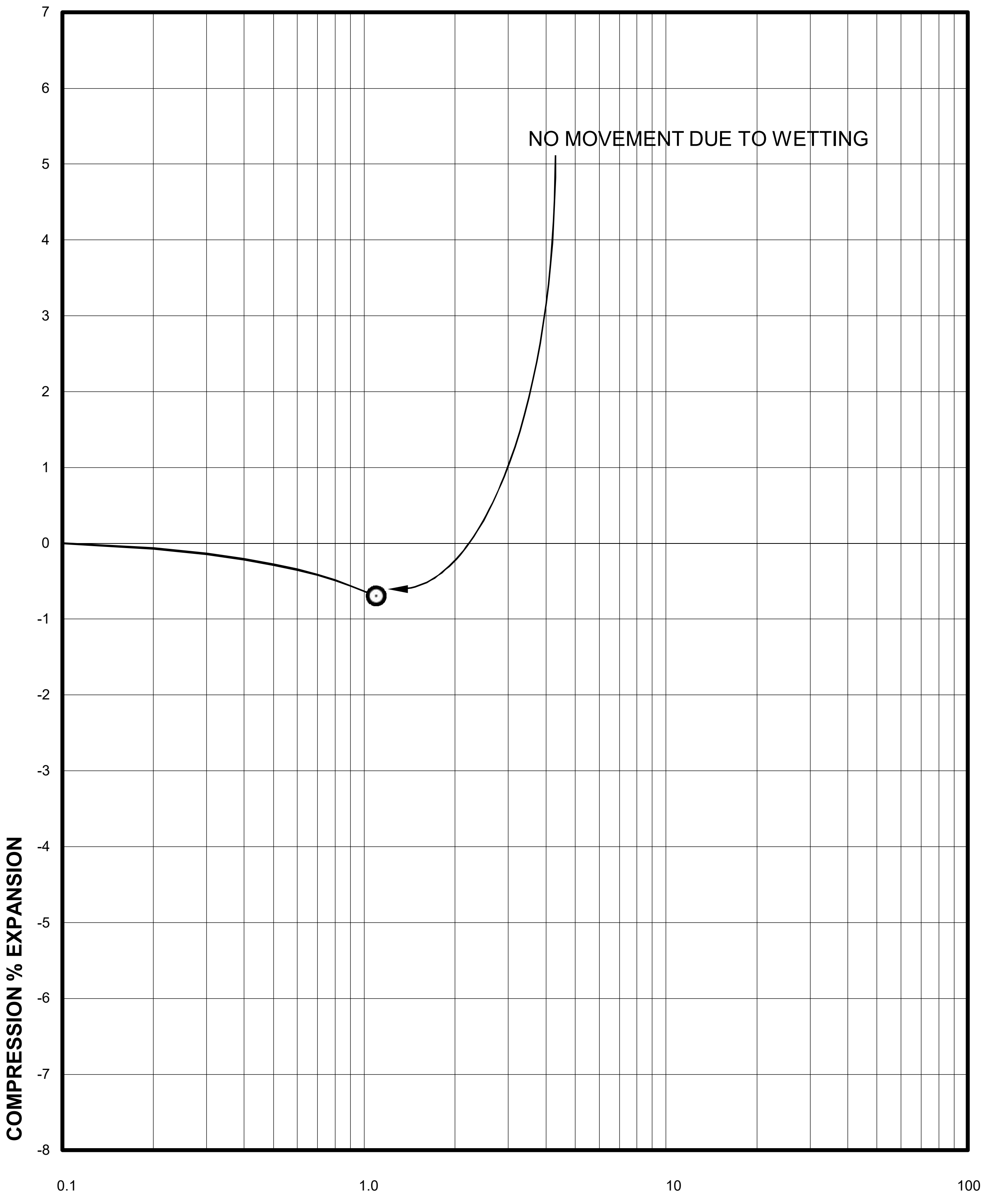


Sample of	WEATHERED CLAYSTONE	DRY UNIT WEIGHT=	118	PCF
From	TH-20 AT 19 FEET	MOISTURE CONTENT=	14.5	%

Swell Consolidation Test Results

FIG. B-7

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1



Sample of CLAY, SANDY (CL)

From TH-101 AT 9 FEET

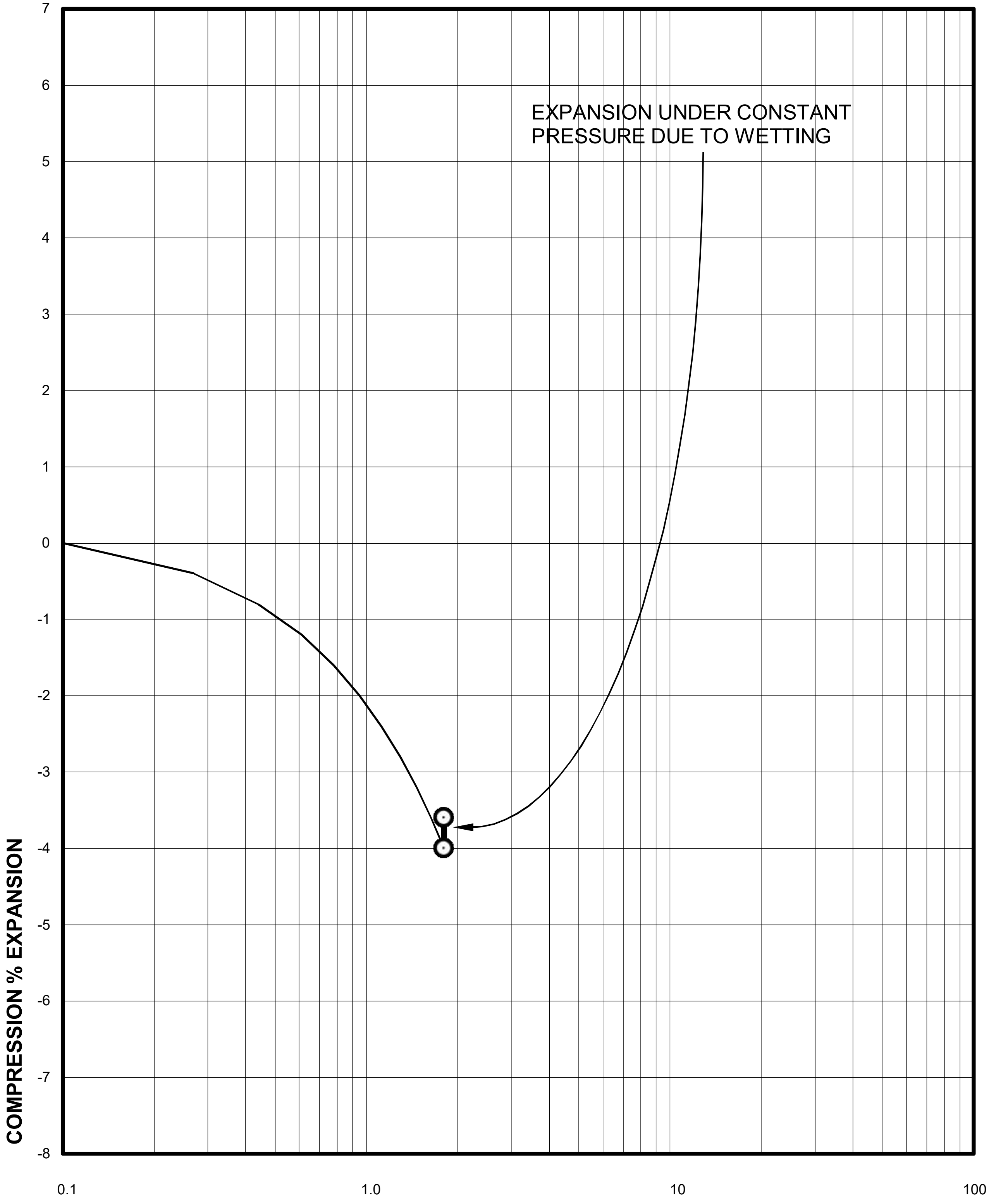
DRY UNIT WEIGHT= 120 PCF

MOISTURE CONTENT= 7.1 %

Swell Consolidation Test Results

FIG. B-8

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1



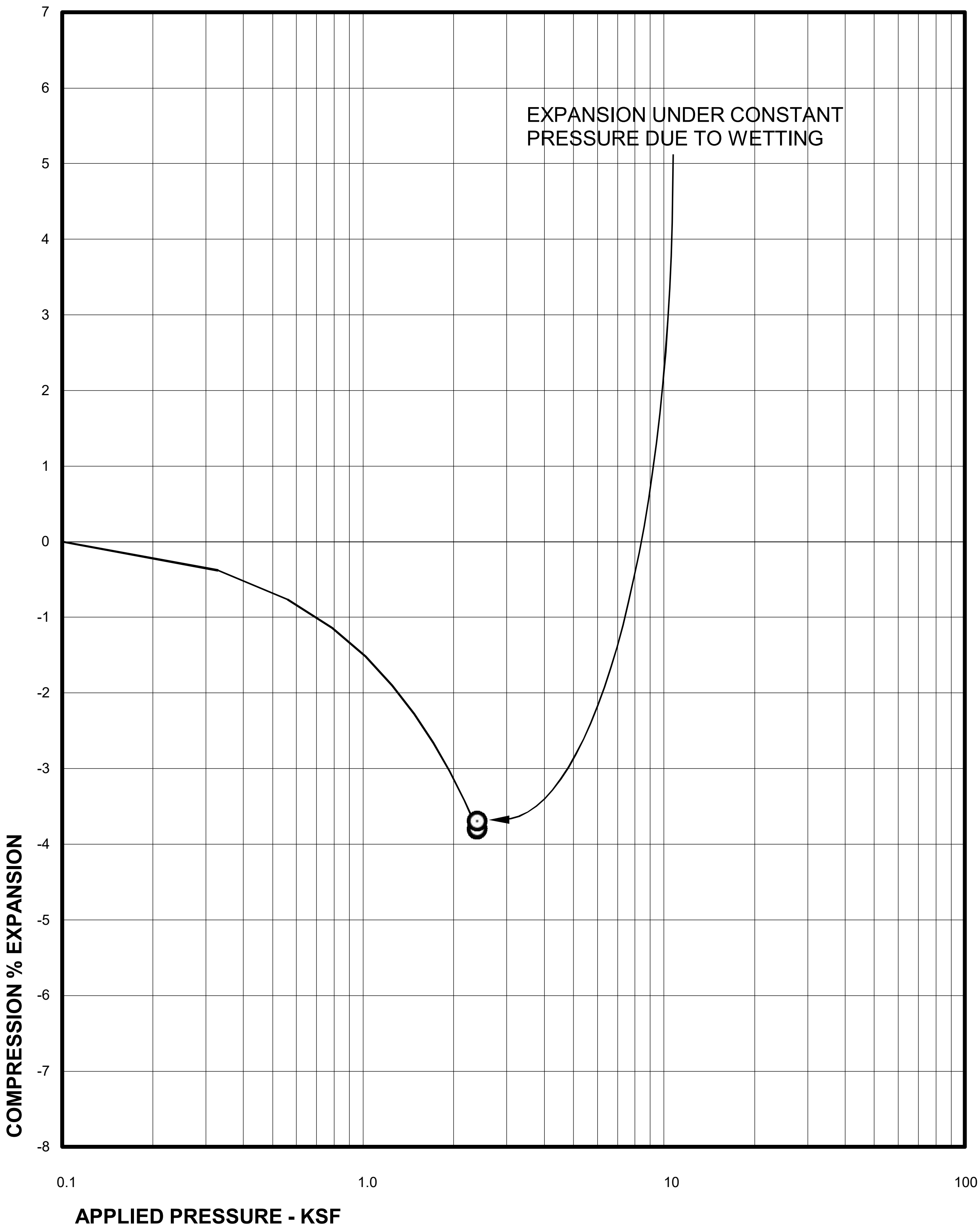
Sample of CLAY, SANDY (CL)
From TH-101 AT 14 FEET

DRY UNIT WEIGHT= 110 PCF
MOISTURE CONTENT= 17.6 %

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

Swell Consolidation Test Results

FIG. B-9



Sample of CLAY, SANDY (CL)

From TH-101 AT 19 FEET

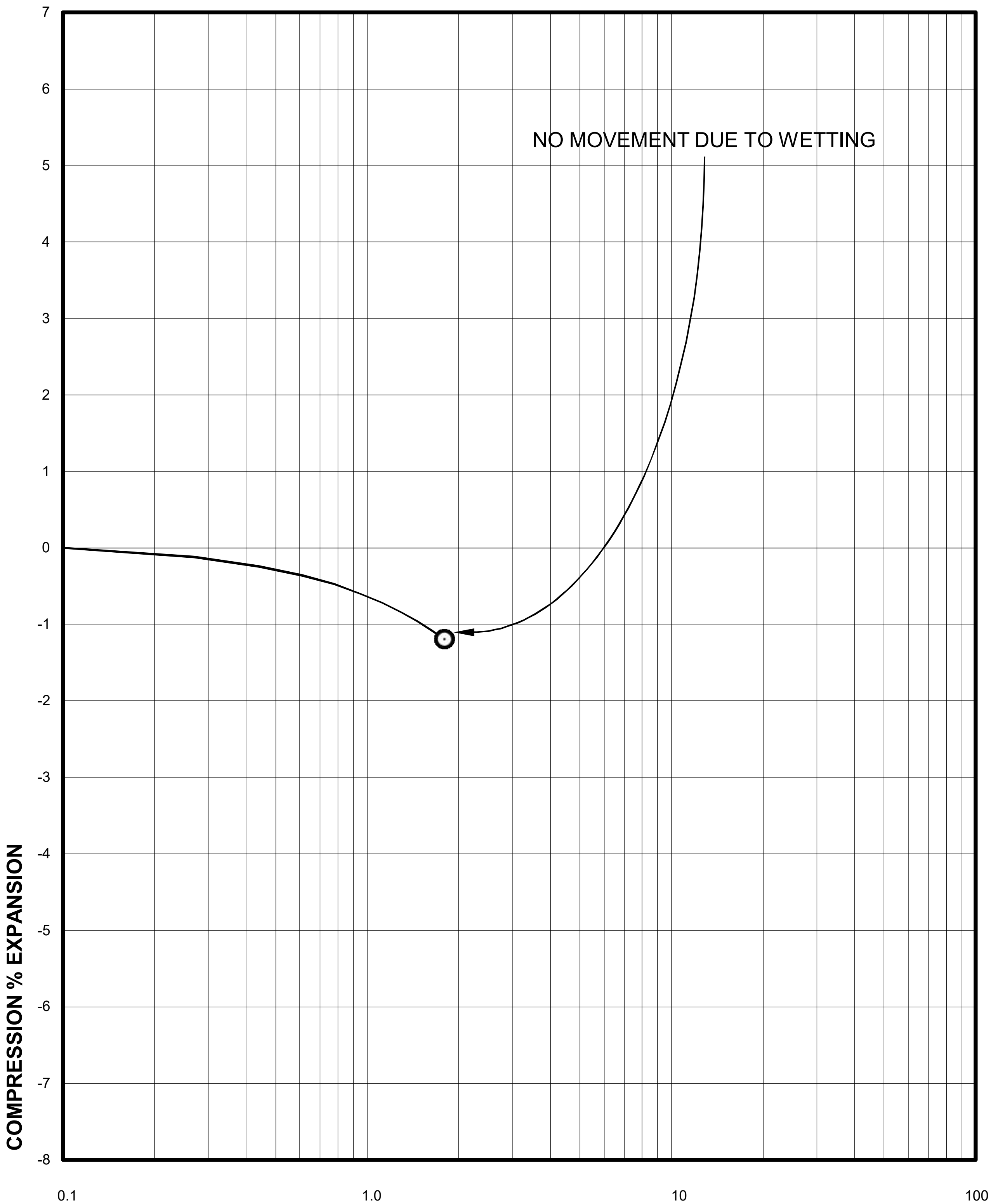
DRY UNIT WEIGHT= 107 PCF

MOISTURE CONTENT= 18.9 %

Swell Consolidation Test Results

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

FIG. B-10



Sample of CLAYSTONE

From TH-102 AT 14 FEET

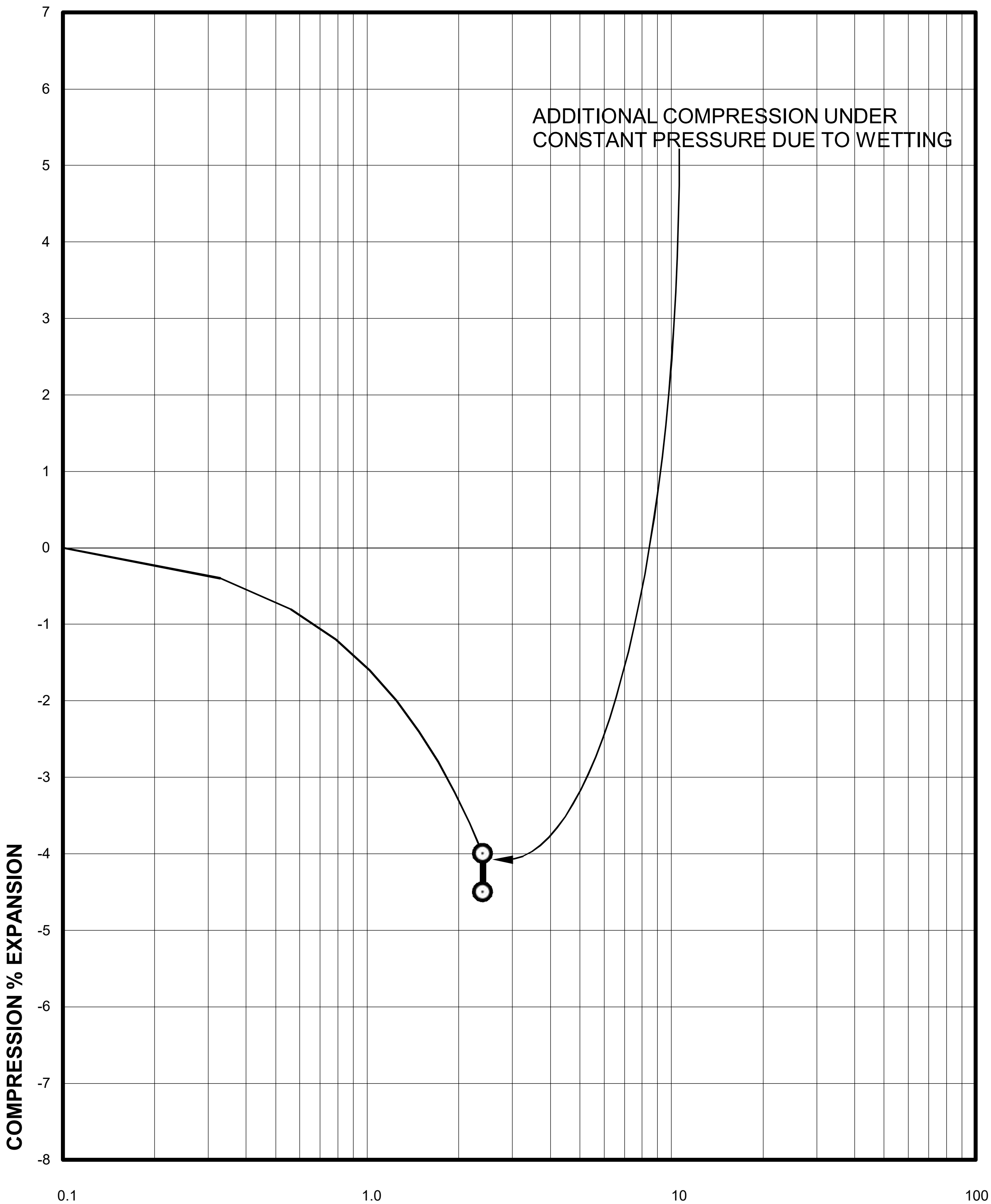
DRY UNIT WEIGHT= 122 PCF

MOISTURE CONTENT= 11.9 %

Swell Consolidation Test Results

FIG. B-11

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

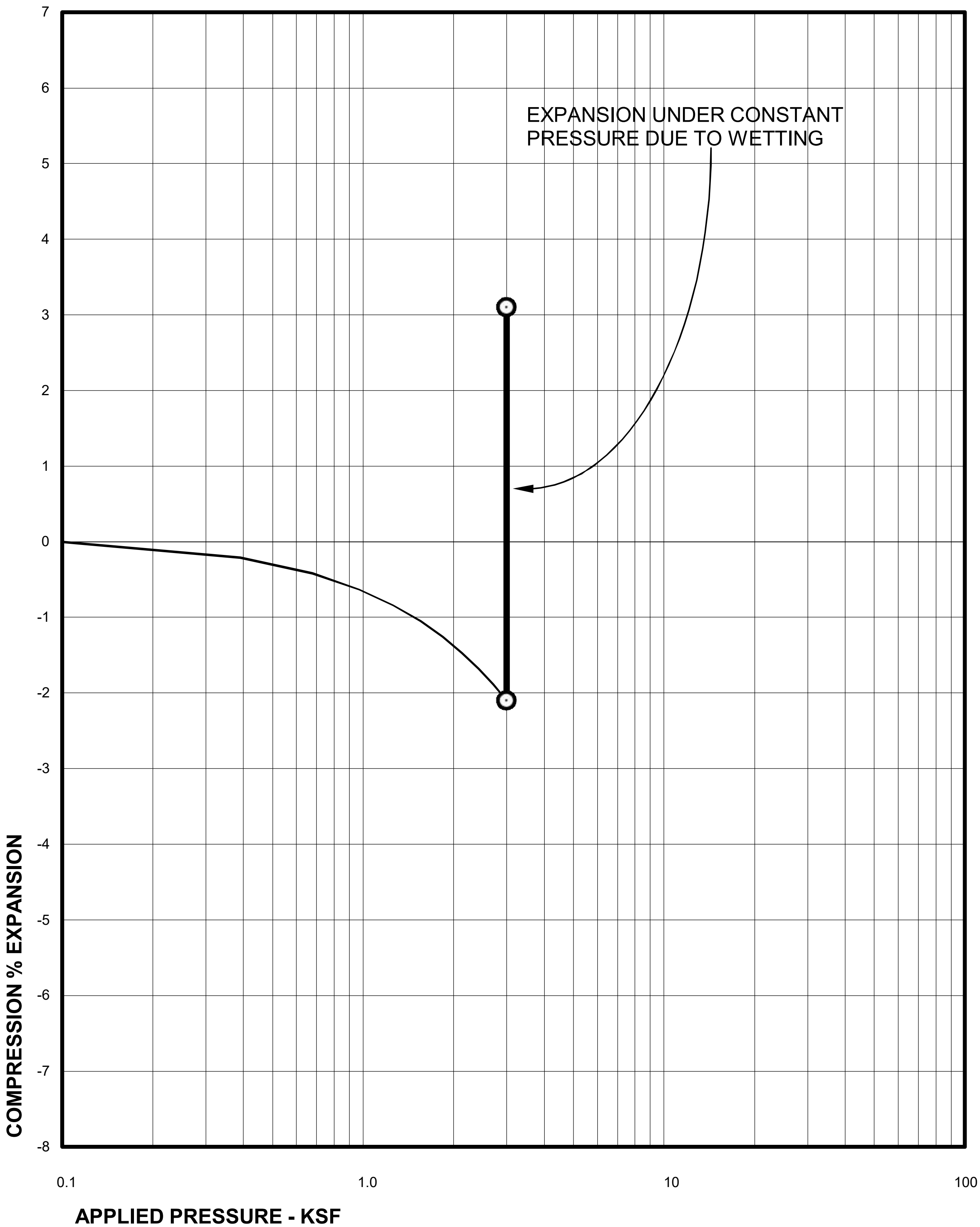


Sample of	CLAYSTONE	DRY UNIT WEIGHT=	89	PCF
From	TH-102 AT 19 FEET	MOISTURE CONTENT=	22.7	%

Swell Consolidation Test Results

FIG. B-12

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1



Sample of CLAYSTONE

From TH-102 AT 24 FEET

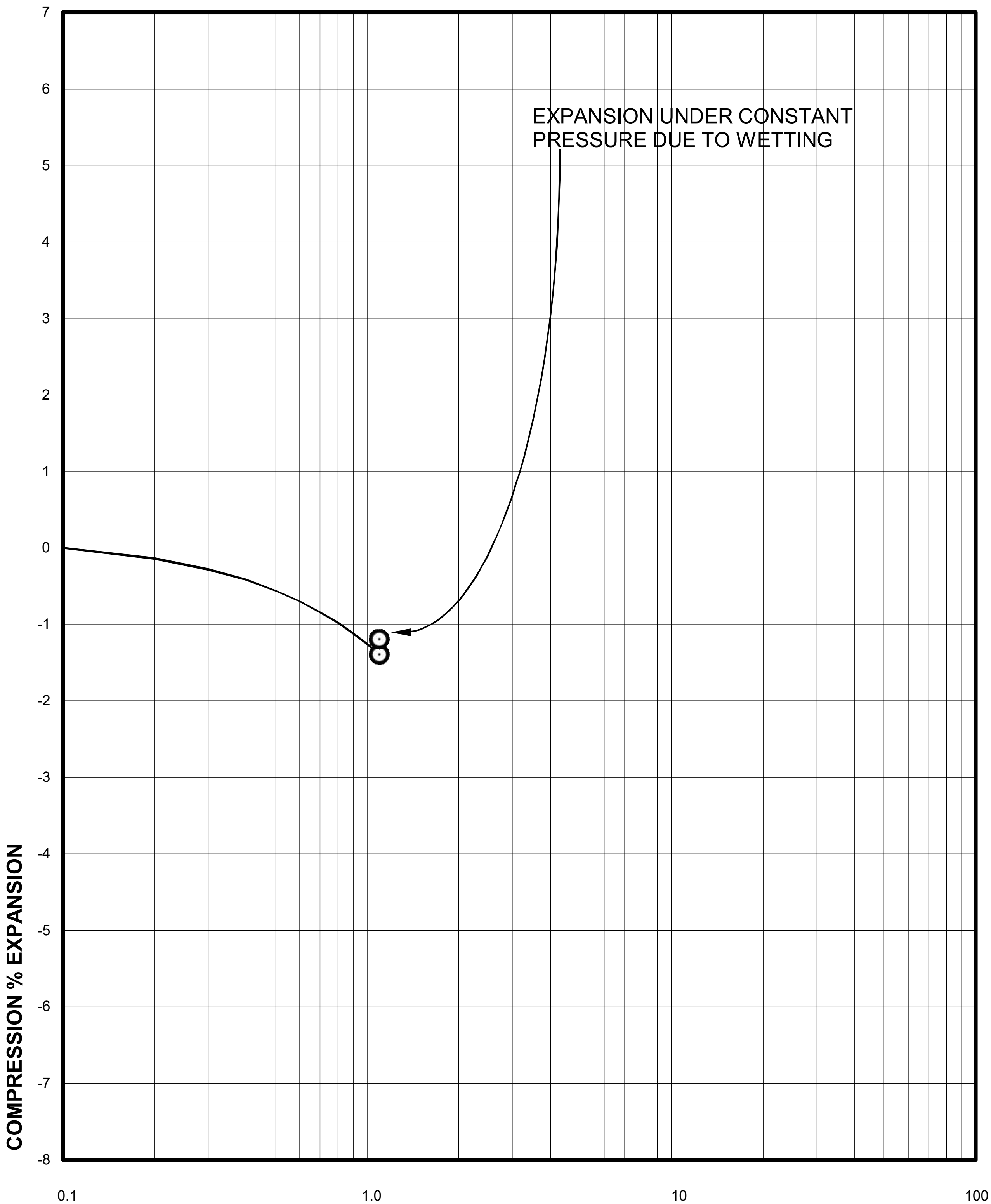
DRY UNIT WEIGHT= 117 PCF

MOISTURE CONTENT= 15.5 %

Swell Consolidation Test Results

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

FIG. B-13



Sample of CLAY, SANDY (CL)

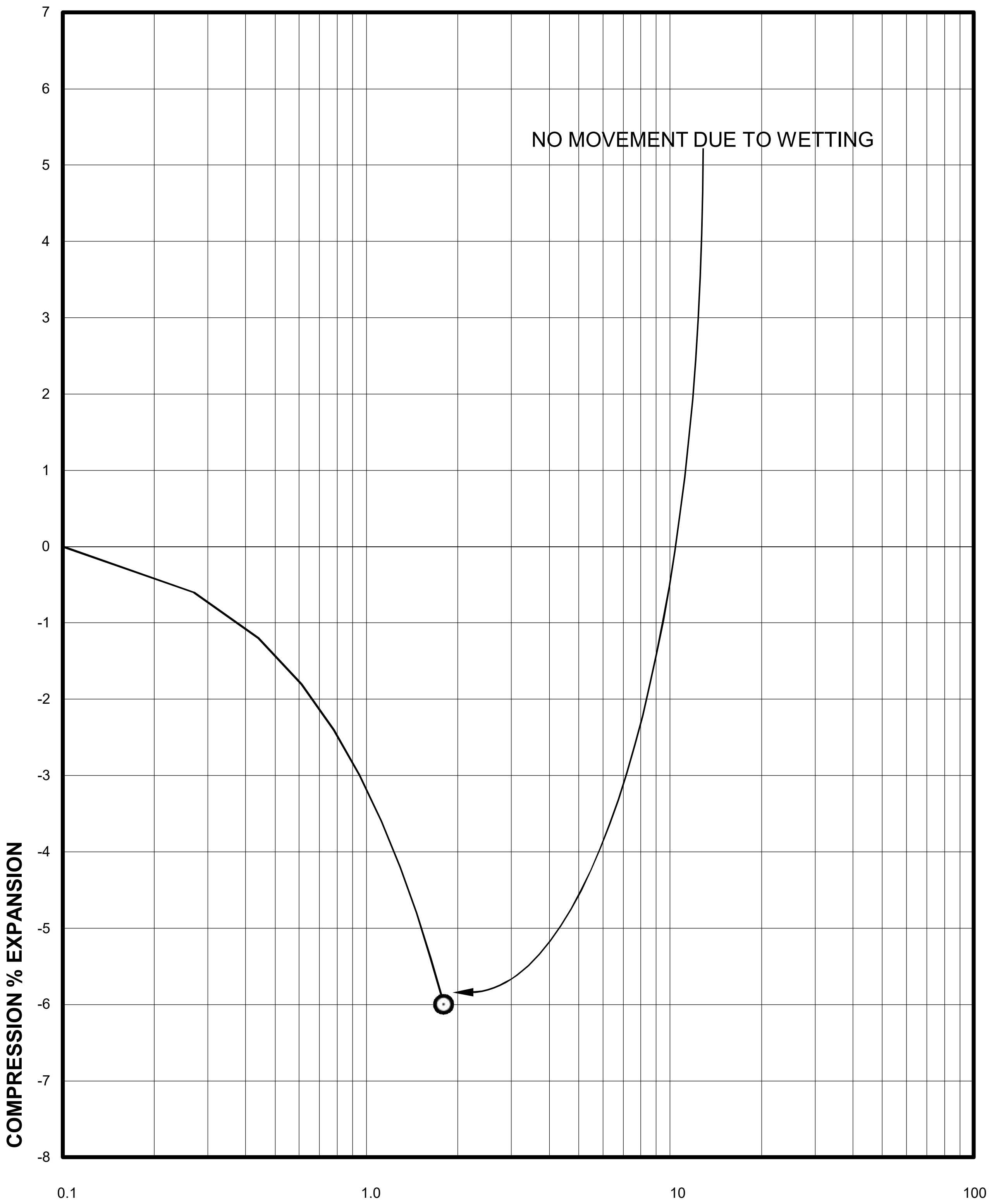
From TH-103 AT 9 FEET

DRY UNIT WEIGHT= 117 PCF

MOISTURE CONTENT= 13.4 %

Swell Consolidation Test Results

FIG. B-14



Sample of CLAY, SANDY (CL)

From TH-103 AT 14 FEET

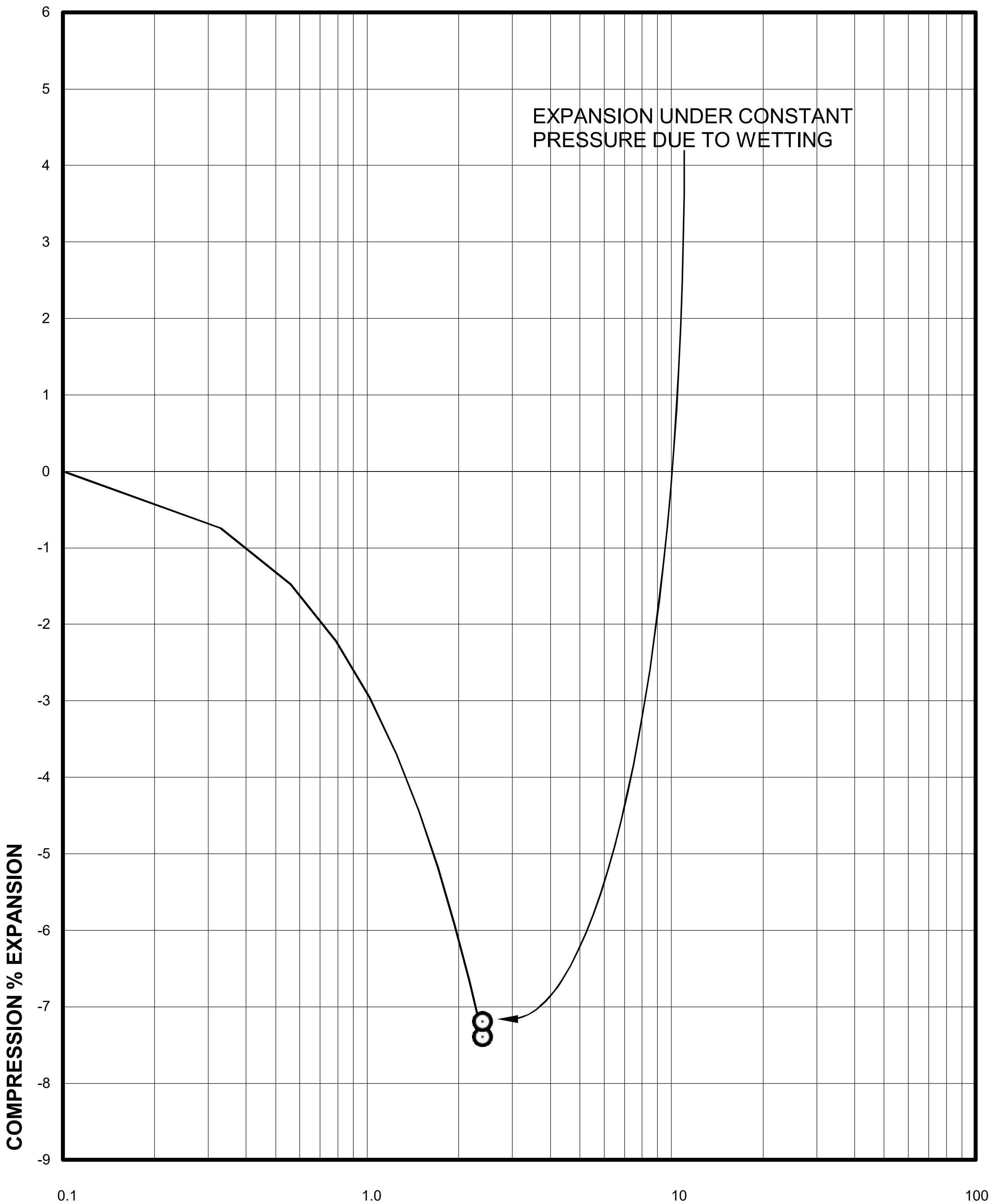
DRY UNIT WEIGHT= 102 PCF

MOISTURE CONTENT= 21.2 %

Swell Consolidation Test Results

FIG. B-15

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1



Sample of CLAY, SANDY (CL)

From TH-103 AT 19 FEET

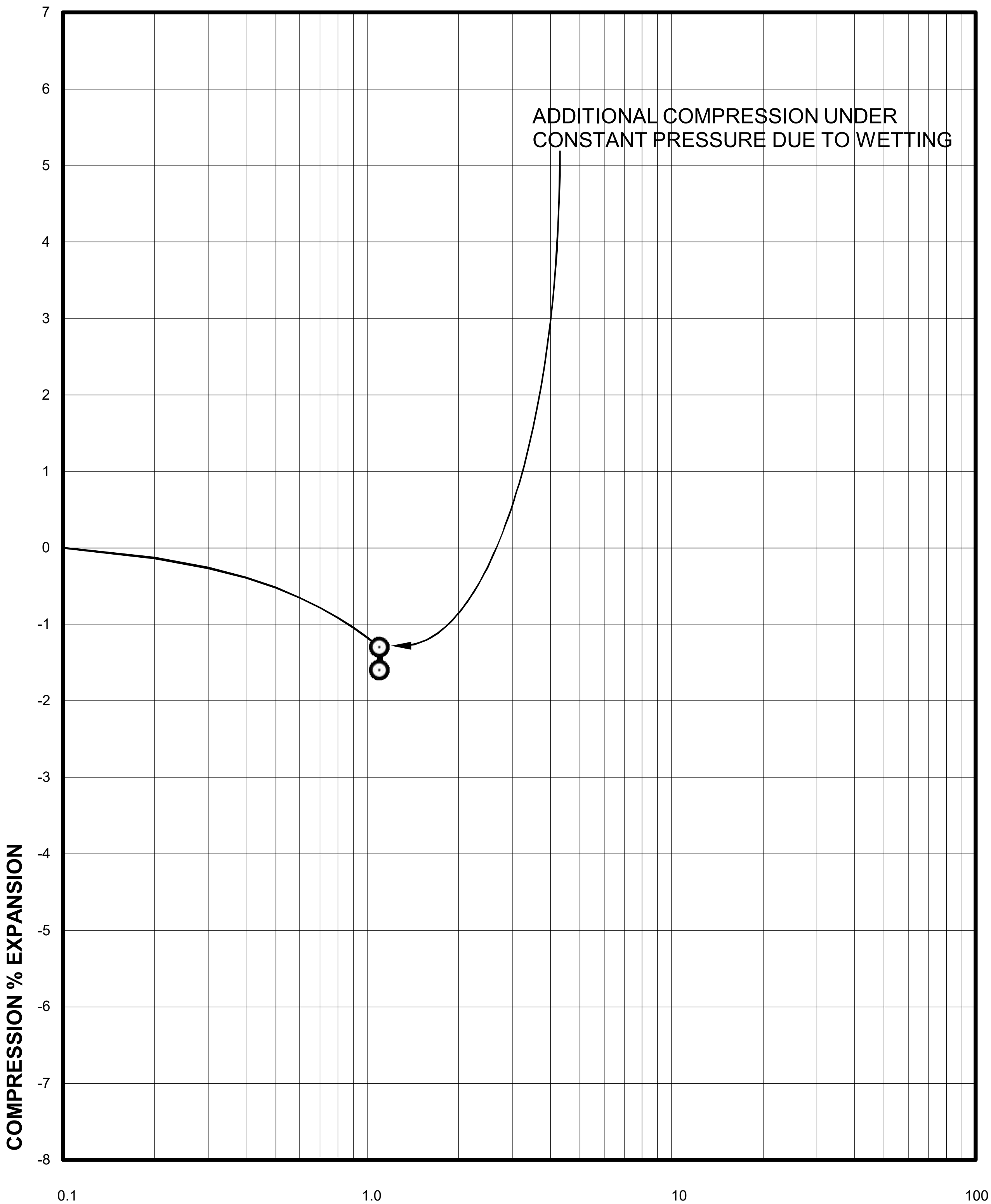
DRY UNIT WEIGHT= 100 PCF

MOISTURE CONTENT= 24.7 %

Swell Consolidation Test Results

FIG. B-16

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1



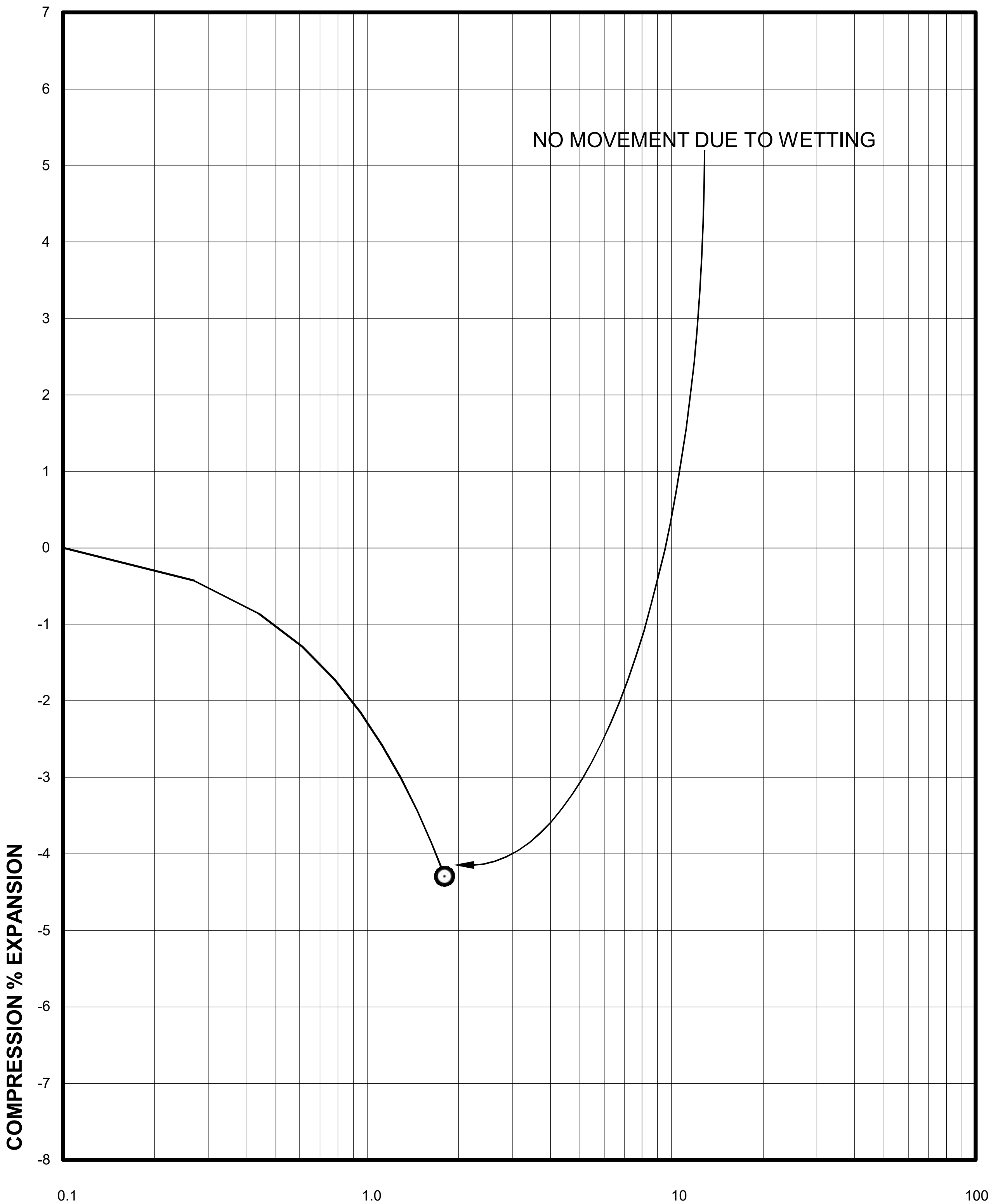
Sample of CLAY, SANDY (CL)
From TH-104 AT 9 FEET

DRY UNIT WEIGHT= 118 PCF
MOISTURE CONTENT= 11.7 %

Swell Consolidation Test Results

FIG. B-17

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1



Sample of CLAY, SANDY (CL)

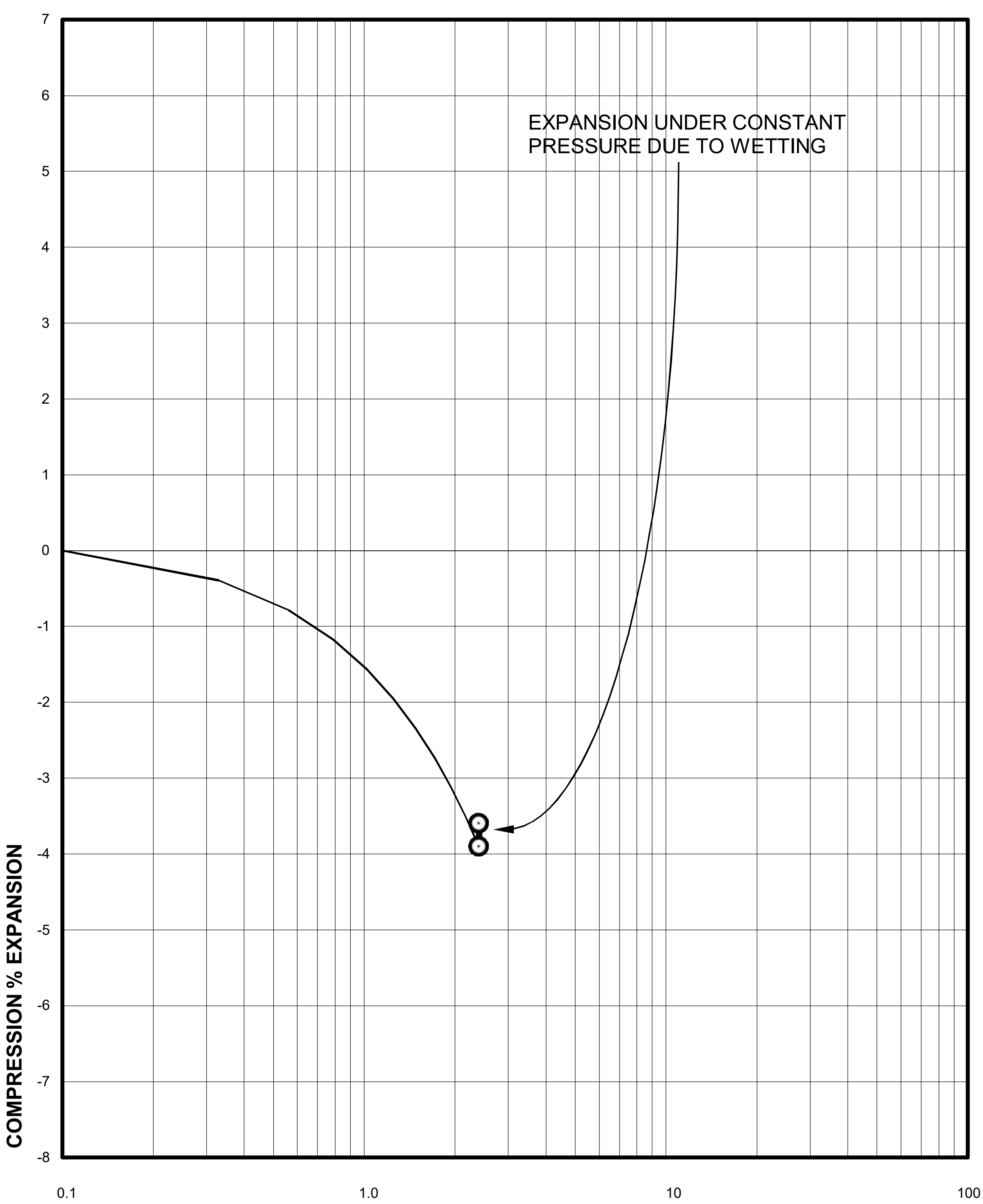
From TH-104 AT 14 FEET

DRY UNIT WEIGHT= 102 PCF

MOISTURE CONTENT= 22.6 %

Swell Consolidation Test Results

FIG. B-18

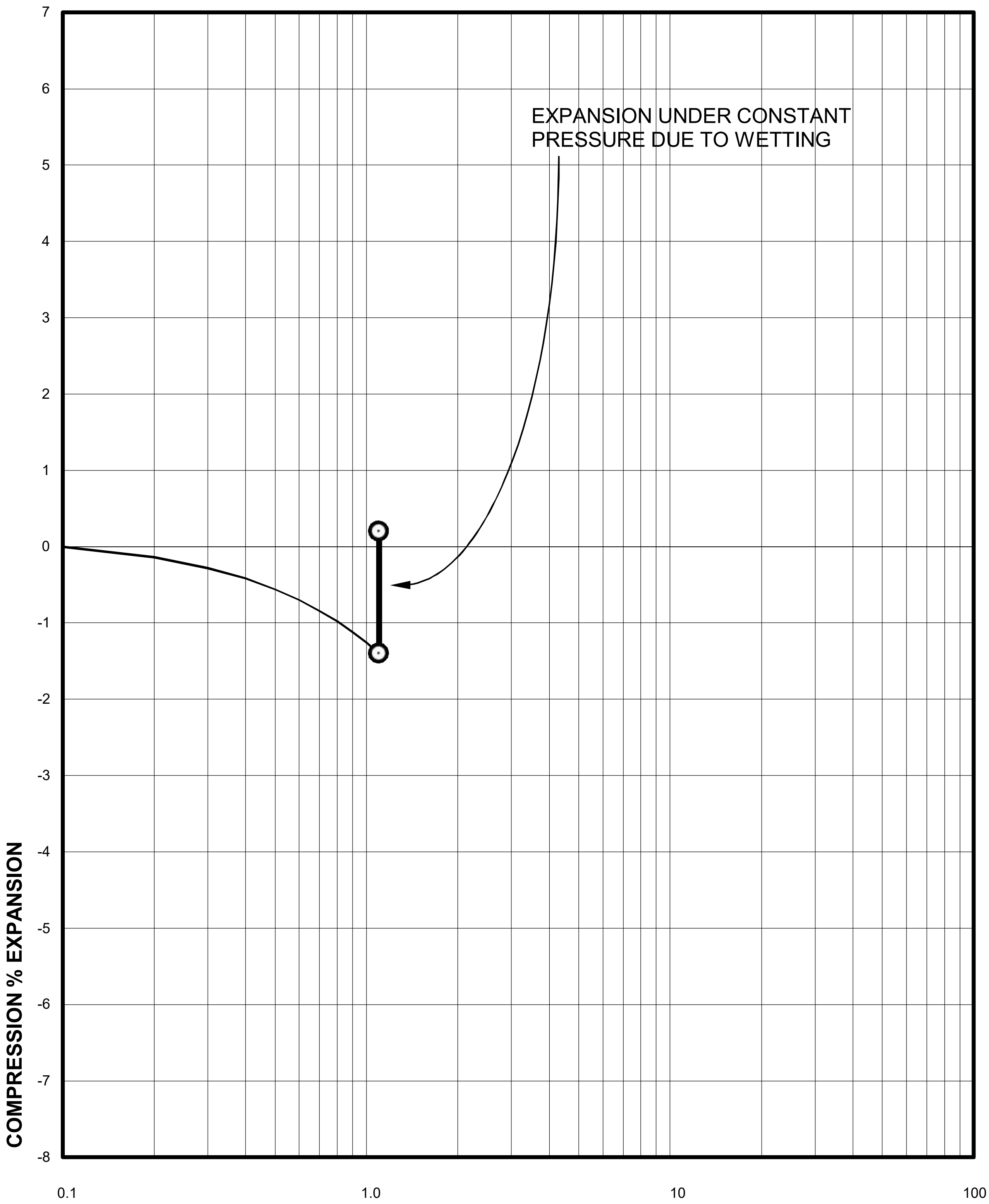


Sample of CLAY, SANDY (CL)
From TH-104 AT 19 FEET

DRY UNIT WEIGHT= 100 PCF
MOISTURE CONTENT= 23.5 %

Swell Consolidation Test Results

FIG. B-19



Sample of CLAY, SANDY (CL)

From TH-105 AT 9 FEET

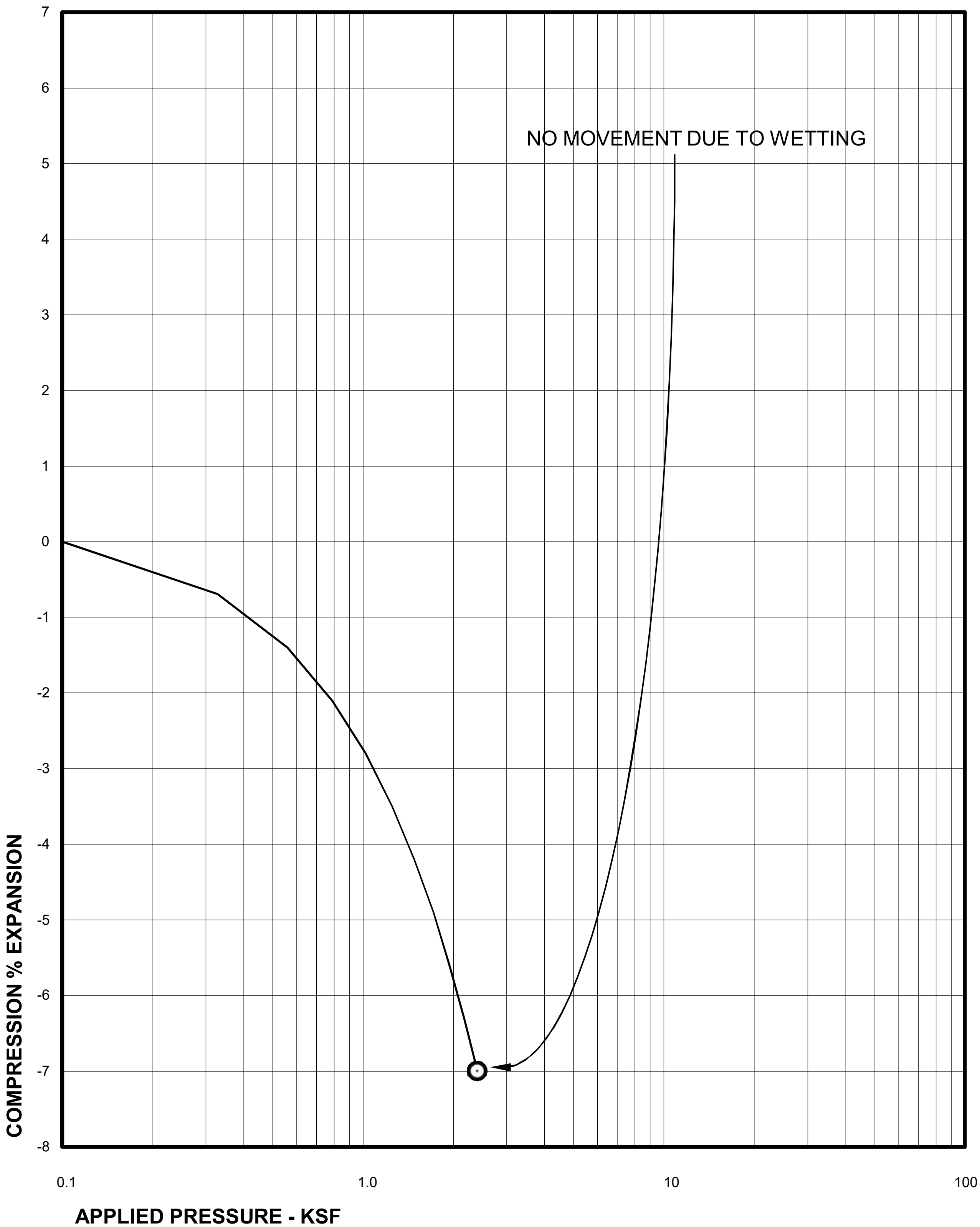
DRY UNIT WEIGHT= 116 PCF

MOISTURE CONTENT= 15.0 %

Swell Consolidation Test Results

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

FIG. B-20

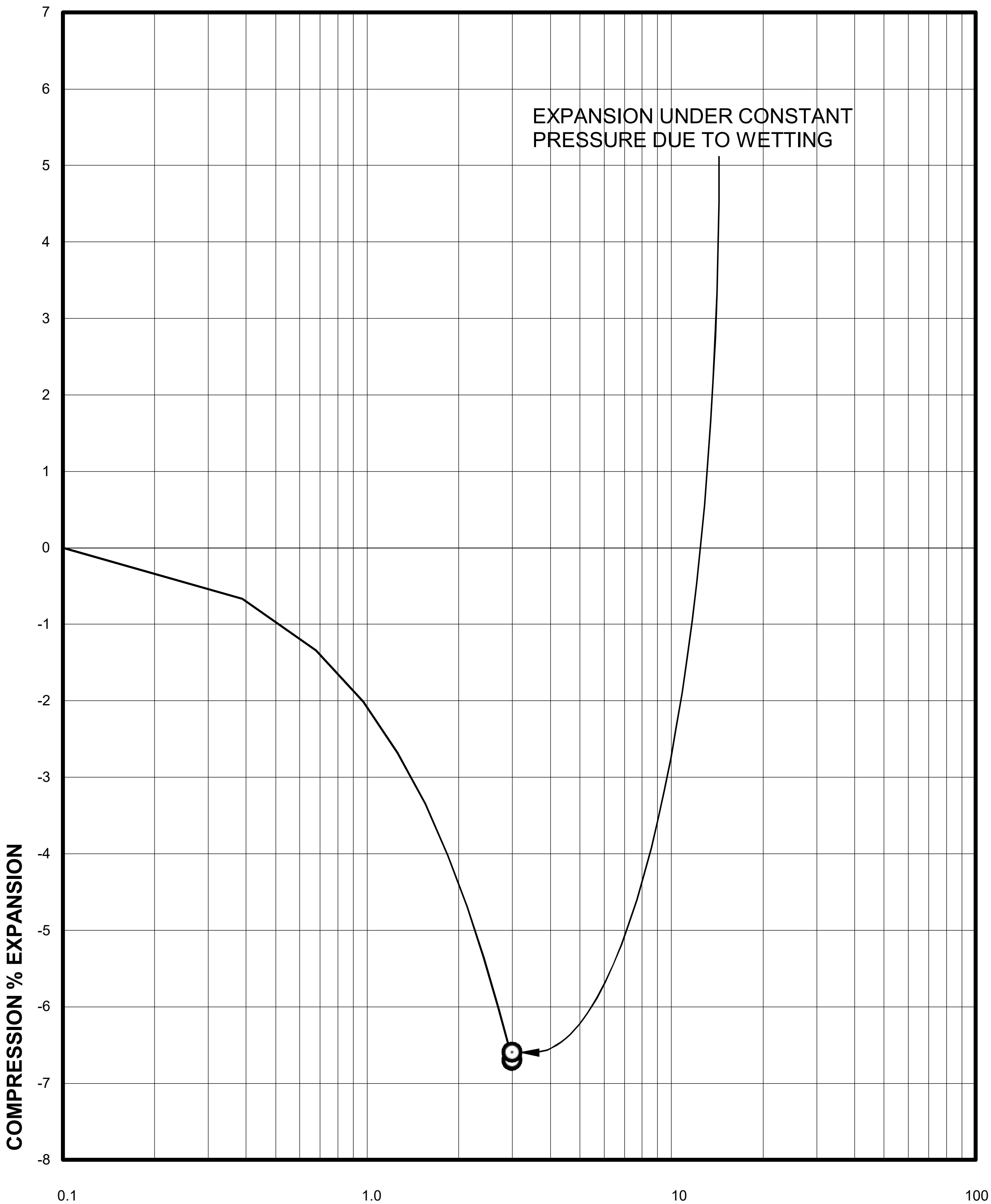


Sample of	CLAY, SANDY (CL)	DRY UNIT WEIGHT=	102	PCF
From	TH-105 AT 19 FEET	MOISTURE CONTENT=	22.2	%

Swell Consolidation Test Results

FIG. B-21

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1



APPLIED PRESSURE - KSF

Sample of CLAY, SANDY (CL)

From TH-105 AT 24 FEET

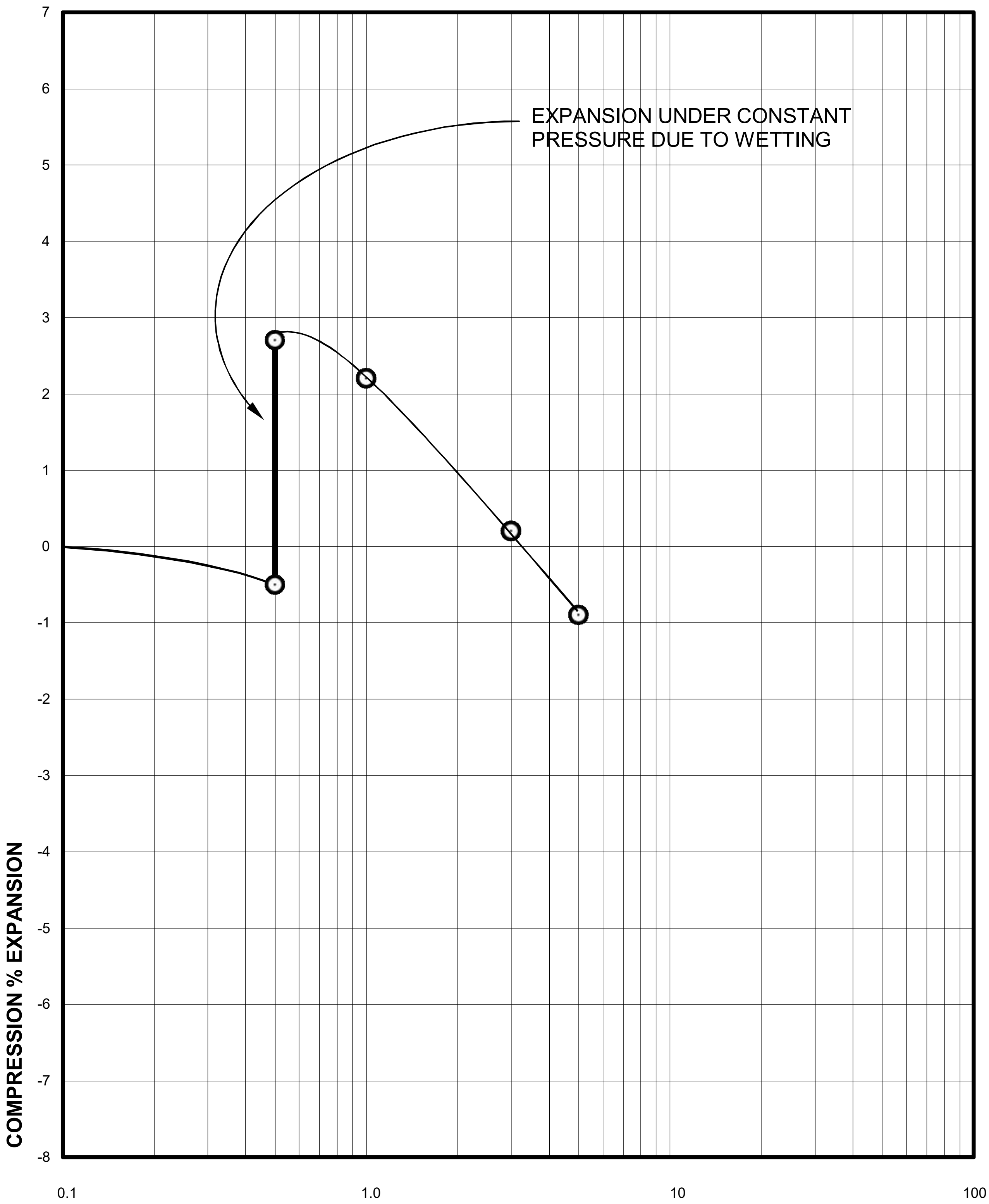
DRY UNIT WEIGHT= 105 PCF

MOISTURE CONTENT= 20.7 %

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

Swell Consolidation Test Results

FIG. B-22

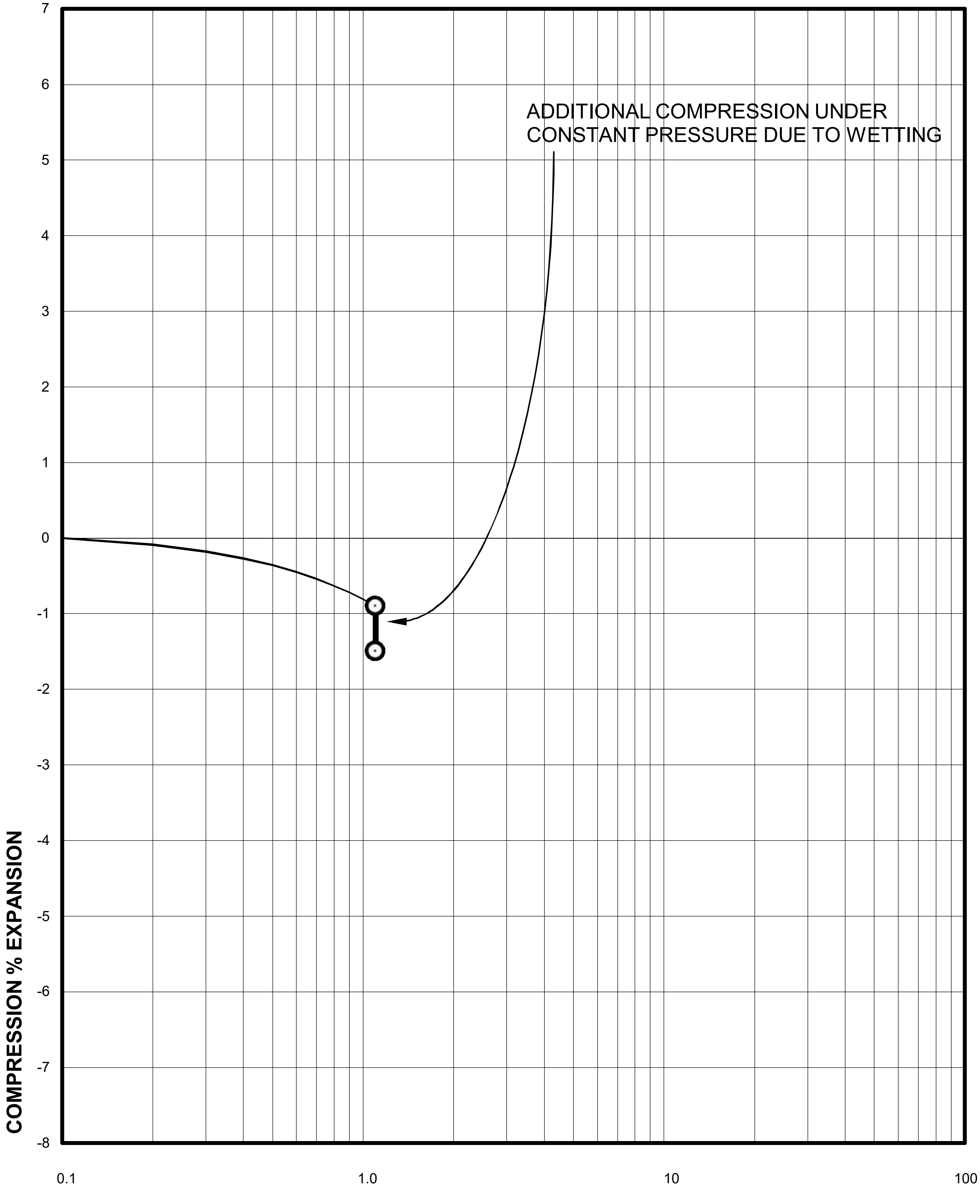


Sample of	CLAY, SANDY (CL)	DRY UNIT WEIGHT=	129	PCF
From	TH-106 AT 4 FEET	MOISTURE CONTENT=	6.0	%

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

Swell Consolidation Test Results

FIG. B-23

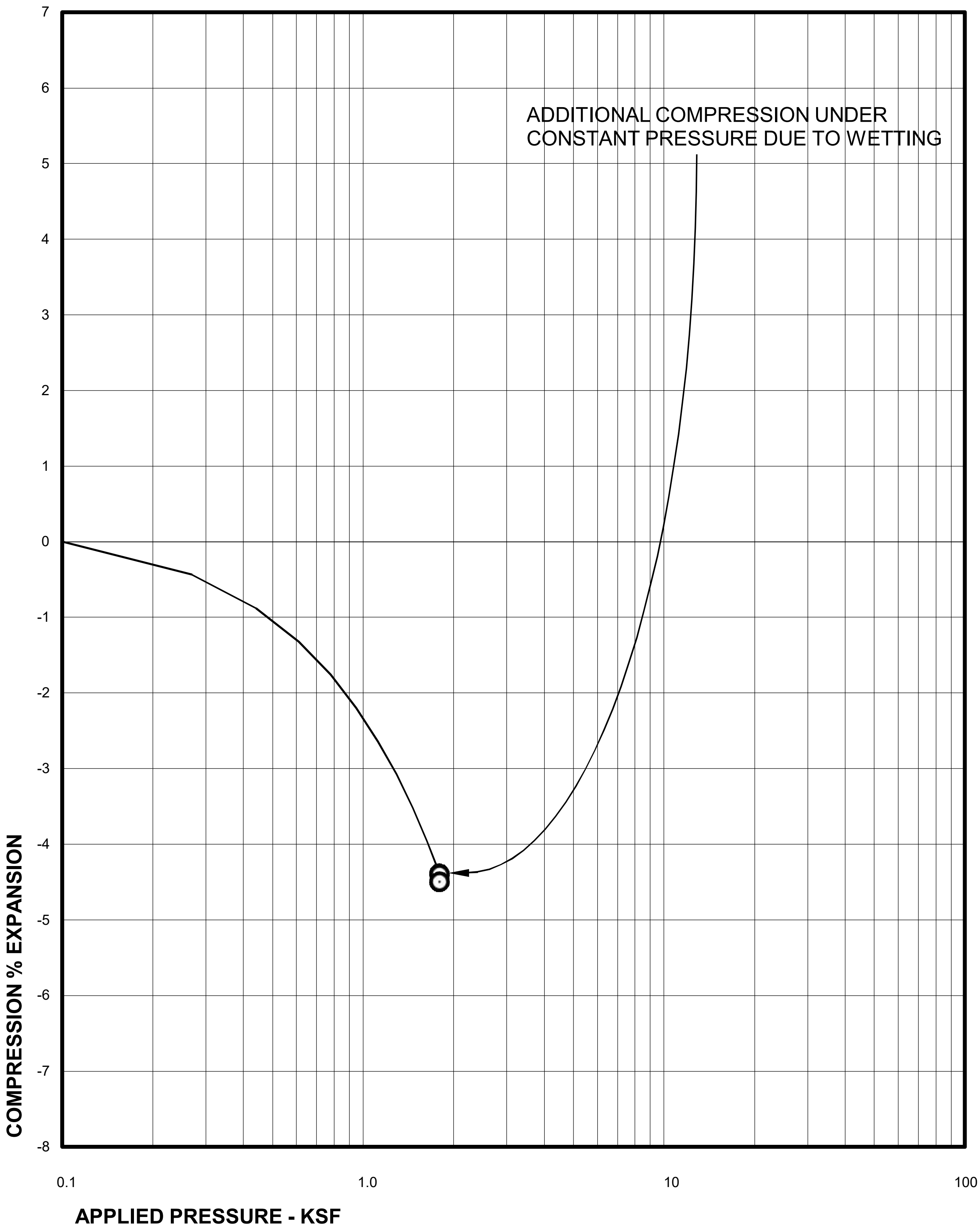


Sample of CLAY, SANDY (CL)
From TH-106 AT 9 FEET

DRY UNIT WEIGHT= 112 PCF
MOISTURE CONTENT= 8.7 %

Swell Consolidation Test Results

FIG. B-24



Sample of CLAY, SANDY (CL)

From TH-106 AT 14 FEET

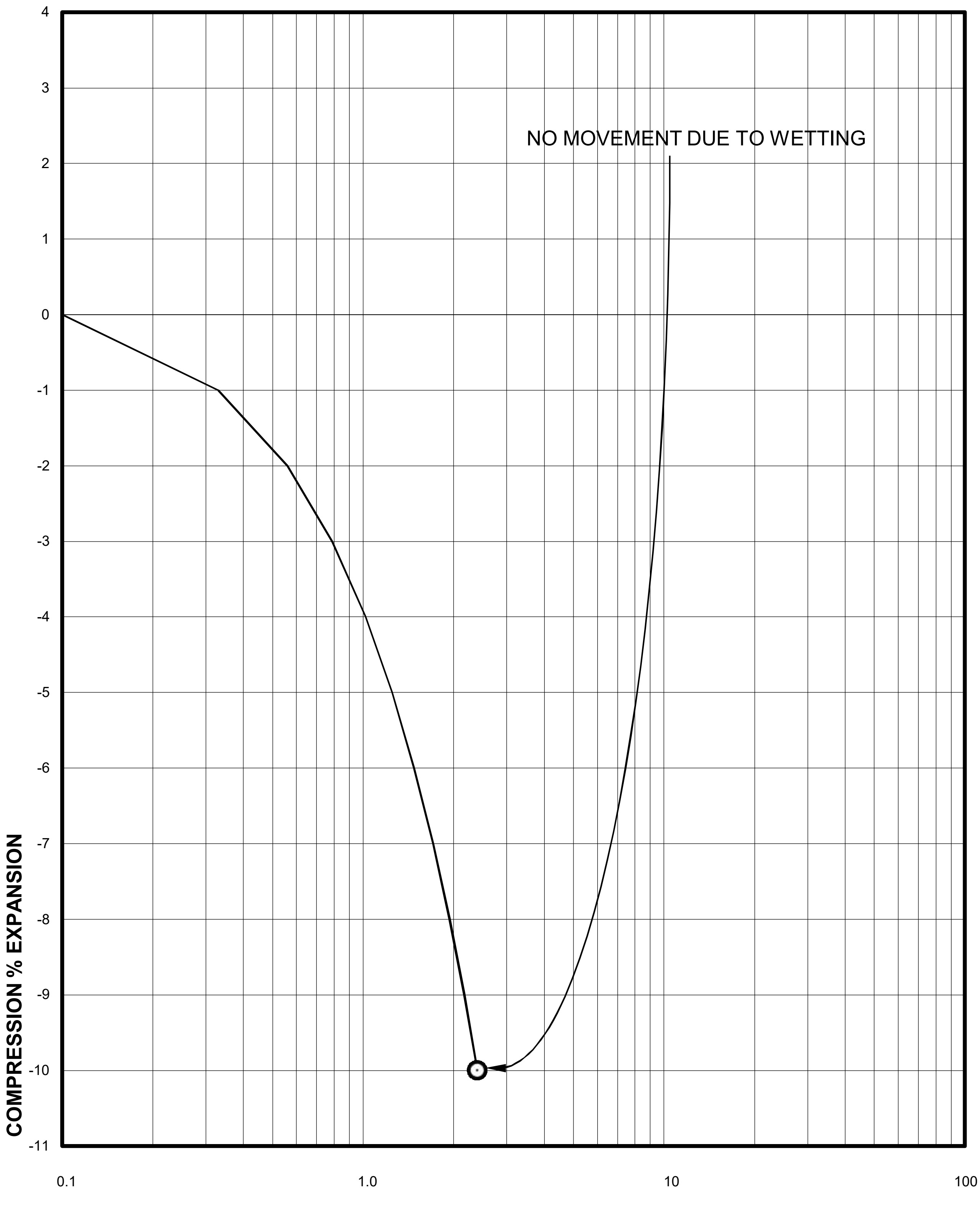
DRY UNIT WEIGHT= 104 PCF

MOISTURE CONTENT= 21.4 %

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

Swell Consolidation Test Results

FIG. B-25



Sample of CLAY, SANDY (CL)

From TH-106 AT 19 FEET

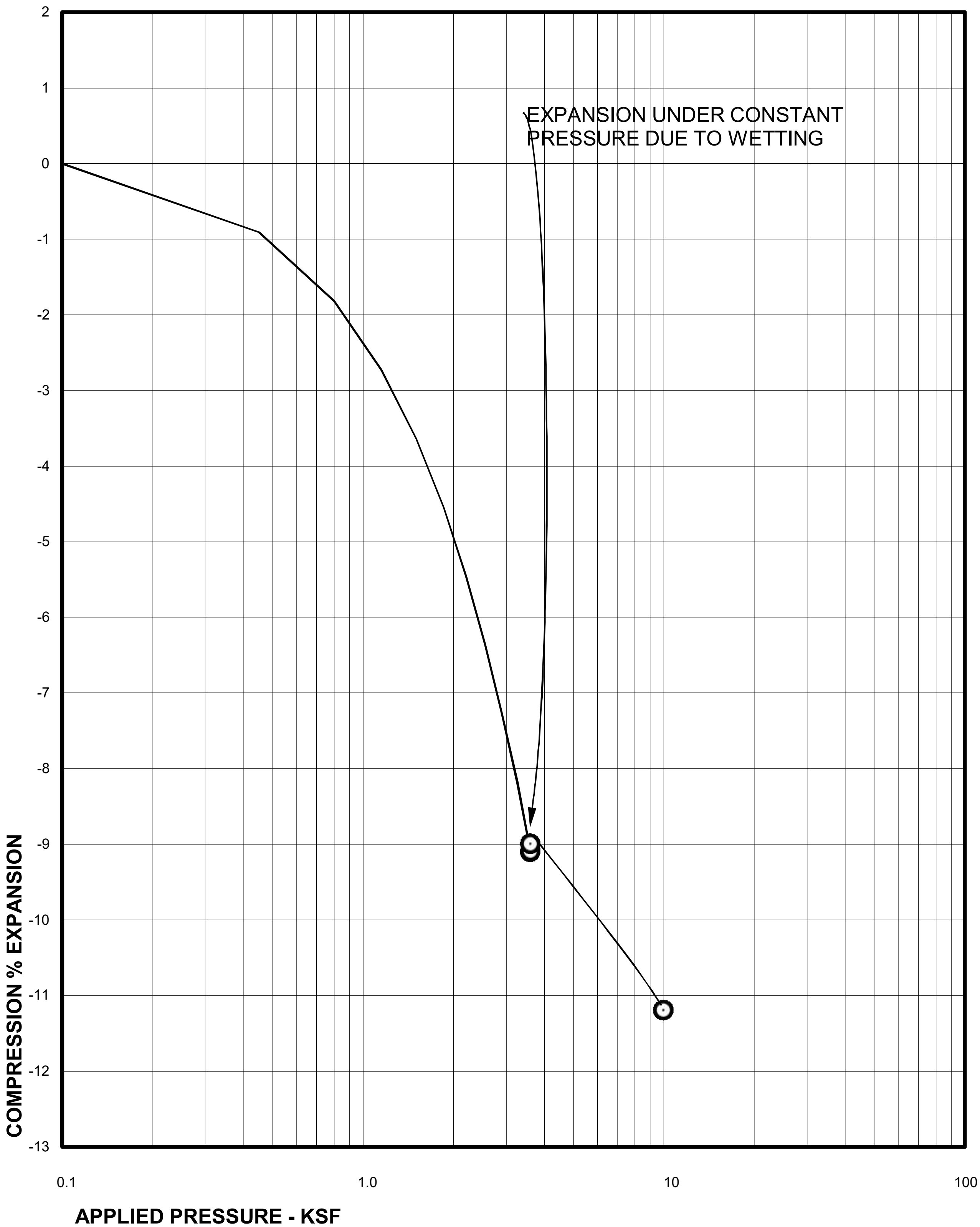
DRY UNIT WEIGHT= 101 PCF

MOISTURE CONTENT= 22.9 %

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

Swell Consolidation Test Results

FIG. B-26



Sample of INTERLAYERED CLAY/SAND

From TH-106 AT 29 FEET

DRY UNIT WEIGHT= 103 PCF

MOISTURE CONTENT= 22.3 %

Swell Consolidation Test Results

FIG. B-27

CENTURY COMMUNITIES
ERIE COMMONS, FILING NO. 4
CTL|T PROJECT NO. DN48,805-115-L1

TABLE B - I

SUMMARY OF LABORATORY TEST RESULTS

BORING	DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	SWELL TEST DATA: SWELL (%)	SWELL TEST DATA: COMPRESSION (%)	SWELL TEST DATA: APPLIED PRESSURE (psf)	SWELL TEST DATA: SWELL PRESSURE (psf)	SOIL SUCTION VALUE (pF)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	UNCONFINED COMPRESSIVE STRENGTH (psf)	SOLUBLE SULFATE CONTENT (%)	PASSING NO. 200 SIEVE (%)	SOIL TYPE
TH-15	4	10.3	117	2.0		1,000								CLAY, SANDY (CL)
TH-15	9	17.8	105	1.8		1,000								CLAY, SANDY (CL)
TH-15	14	24.4	101								2,900			CLAY, SANDY (CL)
TH-16	9	23.7	104	0.8		1,000								CLAY, SANDY (CL)
TH-16	24	22.1	105	5.7		1,000								WEATHERED CLAYSTONE
TH-17	9	24.6	100	1.2		1,000								CLAY, SANDY (CL)
TH-17	14	18.2	111						23	8			43	SAND, CLAYEY (SC)
TH-17	19	16.9	115	2.3		1,000								WEATHERED CLAYSTONE
TH-18	4	6.8	101	0.0		1,000								CLAY, SANDY (CL)
TH-19	4	5.4	116								2,100			SAND, CLAYEY (SC)
TH-19	14	14.7	118	4.0		1,000	9,500							WEATHERED CLAYSTONE
TH-20	9	16.3	116								2,400			CLAY, SANDY (CL)
TH-20	14	19.6	104	3.4		1,000	5,500							WEATHERED CLAYSTONE
TH-20	19	14.5	118	4.3		1,000	9,500		50	34			99	WEATHERED CLAYSTONE
TH-101	4	4.8	128						22	8			39	SAND, CLAYEY (SC)
TH-101	9	7.1	120	0.0		1,100						<0.01		CLAY, SANDY (CL)
TH-101	14	17.6	110	0.4		1,800								CLAY, SANDY (CL)
TH-101	19	18.9	107	0.1		2,400			38	22			91	CLAY, SANDY (CL)
TH-102	4	7.1	130						26	12			35	SAND, CLAYEY (SC)
TH-102	14	11.9	122	0.0		1,800			23	7			56	CLAYSTONE
TH-102	19	22.7	89		0.5	2,400								CLAYSTONE
TH-102	24	15.5	117	5.2		3,000								CLAYSTONE
TH-103	9	13.4	117	0.2		1,100						<0.01		CLAY, SANDY (CL)
TH-103	14	21.2	102	0.0		1,800								CLAY, SANDY (CL)
TH-103	19	24.7	100	0.2		2,400								CLAY, SANDY (CL)
TH-104	4	7.9	127						20	2			30	SAND, CLAYEY (SC)
TH-104	9	11.7	118		0.3	1,100								CLAY, SANDY (CL)
TH-104	14	22.6	102	0.0		1,800								CLAY, SANDY (CL)
TH-104	19	23.5	100	0.3		2,400								CLAY, SANDY (CL)
TH-105	9	15.0	116	1.6		1,100								CLAY, SANDY (CL)
TH-105	14	19.1	109						36	21			79	CLAY, SANDY (CL)
TH-105	19	22.2	102	0.0		2,400						0.32		CLAY, SANDY (CL)
TH-105	24	20.7	105	0.1		3,000								CLAY, SANDY (CL)
TH-106	4	6.0	129	3.2		500	4,200	4.59						CLAY, SANDY (CL)
TH-106	9	8.7	112		0.6	1,100		4.48						CLAY, SANDY (CL)
TH-106	14	21.4	104		0.1	1,800		3.20						CLAY, SANDY (CL)
TH-106	19	22.9	101	0.0		2,400		1.78						CLAY, SANDY (CL)
TH-106	24	20.0	110										36	INTERLAYERED CLAY/SAND
TH-106	29	22.3	103	0.1		3,600	4,300	1.68						INTERLAYERED CLAY/SAND

WESTERN ENVIRONMENT AND ECOLOGY, INC

February 20, 2017

Michael Lee
Director of Land Acquisition
Century Communities, Inc.
8309 East Crescent Parkway, Suite 650
Greenwood Village, Colorado 80111

Subject: Reliance Letter, Mine Subsidence Investigations Erie Commons Filing 4, Blocks 6 and 7 Erie, Colorado. Western Environment and Ecology, Inc. Project Number 134-001-05.

Dear Mr. Lee;

At your request, we have prepared this "Letter of Reliance" regarding Western Environment and Ecology, Inc's reports entitled " Mine Subsidence Investigations Erie Commons Section 19 Township 1 North, Range 68 West Erie, Colorado" and "Review of Erie Commons Filing #4, First Amendment-Final Plat, Town of Erie, Colorado". These reports, both prepared for Community Development Group, were dated September 16th, 2004 and August 23rd, 2010 respectively.

Century Communities, Inc., their affiliates, subsidiaries successors and assignees, may rely upon this report as if they had directly engaged the consultant, including all the warranties and representations typically provided therein.

Should you have any questions or if we could be of further service, do not hesitate to contact me.

Sincerely,

Greg D Sherman

Greg D. Sherman P.G.
President

2217 WEST POWERS AVENUE * LITTLETON, COLORADO 80120
PHONE (303)730-3452 * FAX (303)730-3461
WWW.WESTERNENVIRONMENT.COM

MEETING NOTES

Project:	Erie Commons	Date:	10/18/2017
Subject:	Public Meeting	Time:	6:00 pm-8:00 pm
Minutes by:	Dominique Raymond	Location:	Erie Community Center 450 Powers St, Erie, CO 80516

Neighborhood Attendees	Email
Helen Hoekstray	hlhoekstra@gamil.com
Mary Lou Taylor	Maryloutaylor263@gmail.com

Project Team Attendees	Email
Sean Malone	smalone@norris-design.com
Eva Mather	emather@norris-design.com
Dominique Raymond	draymond@norris-design.com
Cindy Myers	Cindy.myers@centurycommunities.com

Agenda

- Informal introduction of project
- Q&A Session

Questions and answers listed below.

Q&A Session

Are these buildings similar to the project by Boulder Creek?
No, that is a different developer.

Are they 2 car garages?
Yes, all units have a 2-car garage.

Are any of the buildings 2-stories?
Some, then showed locations.

What are the traffic patterns of the proposed development?
Reviewed traffic patterns with resident.

Is the public meeting a part of the process?
Yes, explained planning process and how one meeting is required.

What kind of services will the residents get? Snow plowing?
There will be plowing on main road (Ambrose Street) and HOA will handle snow removal on interior streets of neighborhood.

This looks too crammed. Doesn't look like it fits into current neighborhood character without consideration of the Erie Communities. We don't have businesses to support residents here, we have to go to Arapahoe for groceries.
Usually residents come before business. The more homes you have, the more business you attract, and those businesses are able to be supported by the community.

Traffic concern about waiting at light at Erie Pkwy & S Briggs St.
Cindy says signals can be adjusted.

What is the SF?
It is about 1800-2400 SF per unit.

What is the price range?
Starts in the lower 300's, being sold as townhomes, no renters.

Townhomes on Powers plan is very similar, yet less dense.
These are actually alley-loaded, spacious units compared to what's being built in Denver/Stapleton.
Cindy from Century Communities explains how zoning densities work. You put Single Family Detached out away from main roads and put Single Family Attached closer to main roads, like Erie Parkway.

What is dividing my neighbor's property from this site?
Property owner's fence.

People are speeding down Briggs Street – speed bump requested – people end up in her yard in the winter… with the more traffic, will there be more people in my yard?
Development slows people down, when it looks like a race track, people speed, but when it looks like a neighborhood, people inherently slow down.

Is this a part of a Master Plan?
Yes; Erie Commons.

83 Units?
Yes, it was zoned for 95 units and we're providing 83.

How was number of units decided?
Approved/zoned for 95 units.

Has it always been planned?
Yes, in 2006 it was planned to be a Single Family Attached subdivision. Roads and alleys were platted in 2006.

Where are these residents going to park?
There is on-street parking and guest spots, and 2 car garages for everyone.

We're going to inherit all this noise, parking problems, more activity, dogs etc.
Residents who live here will most likely be either downsizing older couples or young families. No promises, but in past experiences, working with HOA's we have not found there to be many noise complaints. There are multiple entrances to trail, which members of Erie Commons have access to. There will be some separation from the trail with fencing as well to maintain privacy. R.O.W. changed and allowed us to have tree lawns and on-street parking.

Will there be more public meetings?
No, this is the only one but you can call Cindy to discuss more concerns.

Will these residents all have access to the Erie Pool?
These residents will be paying 2 dues, one to HOA and Master Erie Commons, so yes.

Explain traffic patterns/reasoning behind alleys.

Fire department has rules about needing access points into the site.

Maintenance of grass is a concern.
The HOA will be maintaining the grass.

Is 83 units set in stone?
Yes, we're in the process of approval.

What is the order of construction?
Roads go in first, then model homes. Then rest of buildings.

When will you be starting construction?
Late next Spring.

Will it be built in phases?
"Let us know what buildings (side of site) you want to build first and we'll make it happen" -Cindy from Century Communities.

Only 7 ranch units?
Yes.

There are coal mines under the site.
There will be a second set of soil tests done prior to construction. There will be no basements, so not a lot of earthwork.

Other notes:
Norris gave a copy of the boards to Mary Lou for neighbor (Cherry and Bruce Bailey)
Cindy from Century Communities offered putting taller shrubs near south owner's fences and trees in yards