TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

Meeting Agenda

BOARD OF TRUSTEES MEETING

Tuesday, October 13, 2015 | **6:30 PM** | **Board Room**

Study Session 5:45 PM Community Room; Regular Meeting 6:30 PM Board Room

STUDY SESSION 5:45 PM IN THE COMMUNITY ROOM

AGENDA FOR THE STUDY SESSION IS A DISCUSSION OF THE REGULAR MEETING AGENDA BELOW

REGULAR MEETING 6:30 PM IN THE BOARD ROOM

I. CALL MEETING TO ORDER

II. PLEDGE OF ALLEGIANCE AND ROLL CALL

III. APPROVAL OF THE AGENDA

IV. CONSENT AGENDA

(The consent agenda is intended to contain items that are prepared to be decided without discussion. Any Board member may request removal of any item they do not want to consider without discussion or wish to vote no on, without jeopardizing the approval of other items on the consent agenda. Items removed will be placed under IX. General Business, a. in the order they appear on the Agenda.) (This should be done prior to the motion to approve.)

15-066 Approval of September 22, 2015 Meeting Minutes

Attachments: 09-22-2015.pdf

15-067 A Resolution Authorizing the Conduct of a Mail Ballot Election for theTown of Erie's Regular Municipal Election on April 5, 2016

Attachments: Mail Ballot Election Resolution.pdf

15-075 A Resolution For the Distribution of High Efficiency Washing Machine Rebates In Conjunction with the Water Conservation Plan in the Amount of $2,000.

Attachments: -Additional Funds for Washing Machine Rebates for 2015.pdf

15-076 Consideration of A Resolution Authorizing Award Of A Services Contract To InfraTrack, Inc. for the Storm System Video Inspection Services In The Amount Of $30,353.70; And Setting Forth Details In Relation Thereto.

Attachments: - Award Contract for Storm Sewer Video Inspection.pdf

15-077 Consideration of A Resolution Approving a Contract with W.L. Contractors, Inc. for Arapahoe Road / 119th Street Signal Improvements, In The Amount Of $14,698.93; And Setting Forth Details In Relation Thereto.

Attachments: -Signal Improvements for Arapahoe Road-119th Street (2).pdf

15-078 A Resolution Approving an Agreement for Election Services

Attachments: Mail Ballot Services.pdf

Services Agreement.pdf

15-079 A Resolution Authorizing an Agreement for Cultural Survey of Various Historical and Architectural Sites in Erie, Colorado

Attachments: Resolution Approving Front Range Research.pdf

Service Agreement Front Range Research Assoc.pdf

List of Selected Resources to be Surveyed.pdf

15-081 A Resolution Authorizing The Town Of Erie, Colorado, To Enter Into A Declaration Of Permanent Non-Exclusive Easement Agreement With The Dillon Companies, Inc.; Authorizing And Directing The Appropriate Town Officers To Sign Easement Agreement

Attachments: Authorize Dillon Co Dec of Permanent Easement 10.12.15.docx

V. PUBLIC COMMENT

(This agenda item provides the public an opportunity to discuss items other than ordinances on second reading, public hearings and consent agenda items that are not on the agenda. The Board of Trustees is not prepared to decide on matters brought up at this time, but if warranted, will place them on a future agenda.)

VI. PROCLAMATIONS AND PRESENTATIONS

(This agenda item is intended to contain Presentations to the Board that do not require any Board action. Presentations are limited to fifteen (15) minutes.

15-068 2015 SAVVY Awards Presentation, City-County Communications & Marketing Association

Sponsors: Diehl

15-069 Governor's Award for Downtown Excellence: "Firehouse to Brewpub" - Best Adaptive Reuse or Rehabilitation.

Sponsors: Diehl

VII. RESOLUTIONS

(This agenda item is for all matters that should be decided by resolutions.)

15-072 Consideration of A Resolution Authorizing the Town of Erie, Colorado to Apply for a Grant from Great Outdoors Colorado for Funds to Assist with the Master Plan and Construction Documents of the Flatiron Meadows Park Site

Sponsors: Parks and Recreation and Buller

Attachments: -Grant from Great Outdoors Colorado for Flatiron Meadows Park (2).pdf

15-073 Consideration of A Resolution Authorizing the Town of Erie, Colorado to Apply for a Grant from Colorado Parks and Wildlife for Funds to Assist with the Construction Improvements and Maintenance for Town of Erie Trails

Sponsors: Parks and Recreation and Buller

Attachments: Sunset Single Track Map

-Grant from Colorado Parks and Wildlife for Erie Trails (2).pdf

15-080 A Resolution Designating a Historic Landmark Pursuant to the Erie Municipal Code; As a Town Historic Landmark of Special Historical Significance

Attachments: Historic Landmark 365 Main Street.pdf

Main 365 HLPN.pdf

VIII. ORDINANCES

15-054 An Ordinance Authorizing the Issuance and Sale of Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015, Payable Solely Out of Net Revenues to be Derived from the Operation of the Town's Water Enterprise; Providing Other Details Concerning the Bonds, Including, Without Limitation, Covenants and Agreements in Connection Therewith; and Declaring an Emergency

Attachments: Bond Ordinance.doc

Bond Purchase Agreement - Draft.doc

Preliminary Official Statement - Draft.docx

Continuing Disclosure Agreement - Draft.doc

Escrow Agreement - Draft.doc

Paying Agent Agreement - Draft.doc

IX. GENERAL BUSINESS

(This agenda item is reserved for matters that are ready for Board action, and do not fit into other categories, i.e. resolutions, ordinances…)

15-065 A Sketch Plan Review Of Erie Highlands PUD Planning Areas 5, 6 & 14.

Attachments: Staff Memo - Erie Highlands Sketch Plan.pdf
Zoning Map.pdf
PUD Zoning Map.pdf
Natural Areas Inventory 75 76.pdf
Applicant Submittals
Staff Comments - Community Development.pdf
Staff Comments - Public Works.pdf
OSTAB Comments.pdf

X. STAFF REPORTS

(This agenda item is reserved for specific items from Staff requiring Board direction or just relaying important information.)

15-04 April 5, 2016 Municipal Election Update

Attachments: April 5, 2016 CLERK CALENDAR.pdf
2016 Election Information.pdf

15-070 Monthly Communications Report - August 2015

Sponsors: Diehl

Attachments: August 2015 - Website Social Media Insights

15-071 Community Development Monthly Building Permit Report

Attachments: 2015/2014/2013 Building Permits to Projection Comparison
Building Permits by Development
September 2015 Old Town Fees Waived

15-074 County Line Road and Austin Avenue Signal Update

Sponsors: Public Works

XI. BOARD OF TRUSTEES REPORTS & APPOINTMENTS

(This agenda item is for all Board of Trustees reports, Board & Commission Appointment, and items of information as well as Board discussion items, not listed on the agenda.)

XII. ADJOURNMENT

(The Board's Goal is that all meetings be adjourned by 10:30pm. An agenda check will be conducted at or about 10:00 p.m., and no later than at the end of the first item finished after 10:00 p.m. Items not completed prior to adjournment will generally be taken up at the next regular meeting.)

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-066, **Version:** 1

SUBJECT: APPROVAL OF THE SEPTEMER 22, 2015 MEETING MINUTES

DEPARTMENT: TOWN CLERK

PRESENTER: NANCY PARKER

FISCAL INFORMATION:
Cost as Recommended:
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: APPROVAL

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

ATTACHMENTS: SEPTEMBER 22, 2015 MEETING MINUTES

TOWN OF ERIE
BOARD OF TRUSTEES REGULAR MEETING 1
Tuesday, September 22, 2015
6:30 p.m.
Board Room, Erie Town Hall, 645 Holbrook, Erie, CO 80516

I. CALL MEETING TO ORDER

Mayor Harris called the September 22, 2015 Regular Meeting of the Board of Trustees to order at 6:30 p.m.

II. PLEDGE OF ALLEGIANCE AND ROLL CALL

Roll Call:	Trustee Carroll	Present
	Trustee Schutt	Absent/Excused
	Mayor Pro Tem Gruber	Present
	Trustee Moore	Present
	Trustee Charles	Present
	Trustee Woog	Present
	Mayor Harris	Present

III. APPROVAL OF THE AGENDA

Action: Trustee Charles moved to approve the September 22, 2015 agenda; the motion was seconded by Mayor Pro Tem Gruber. The motion carried with all present voting in favor thereof.

IV. CONSENT AGENDA

a. Agenda Item 15-063; Approval of the September 8, 2015 Meeting Minutes

b. Agenda Item 15-041; Resolution 15-120; A Resolution Of The Town Of Erie, Colorado Authorizing A Purchase Order To Calgon Carbon Corporation For Carbon Reactivation For The Granulated Activated Carbon Filters At The Water Treatment Facility In The Amount Of $83,400.00

c. Agenda Item 15-045; Resolution 15-119; A Resolution Finding Substantial Compliance Of The Annexation Petition Regarding The Annexation Of Certain Properties In Boulder County, Colorado To The Town Of Erie, Said Annexation To Be Known As The 119th Jasper Jay Annexation To The Town Of Erie

d. Agenda Item 15-048; Resolution 15-121; A Resolution Of The Town Of Erie Authorizing Award Of A Design Contract To Respec, Inc. For The Austin Avenue Waterline Connection, In The Amount Of $57,173.00

CONSENT AGENDA (continued)

e. Agenda Item 15-049; Resolution 15-122; A Resolution By The Board Of Trustees Of The Town Of Erie, Colorado Accepting Dedications As Shown In The Erie Highlands Filing No. 6 Final Plat; Authorizing The Appropriate Town Official To Sign The Erie Highlands Filing No. 6 Development Agreement; Adopting Certain Findings Of Fact And Conclusions Favorable To Acceptance Of The Dedications And Development Agreement

f. Agenda Item 15-053; Resolution 15-123; A Resolution Finding Substantial Compliance Of The Annexation Petition Regarding The Annexation Of Certain Properties In Boulder County, Colorado To The Town Of Erie, Said Annexation To Be Known As The Strieby-Schofield Annexation To The Town of Erie

Action: Trustee Charles moved to approve the September 22, 2015 Consent Agenda; the motion was seconded by Trustee Woog. The motion carried with the following roll call vote:

Trustee Carroll	Yes
Trustee Woog	Yes
Trustee Moore	Yes
Trustee Charles	Yes
Mayor Pro Tem Gruber	Yes
Mayor Harris	Yes

V. PUBLIC COMMENT

Ken Martin, 1186 Cook Ct., Erie, CO. provided the Board with an update on the Community Garden Project.

VI. PRESENTATIONS

United Power Presentation of the Annual Report and Capital Credits Check; by Bill Meir, Customer Service Representative, Ginny Bussey, Director and Ron Ashe, CEO.
Carolyn White, Esq., LEED AP, Brownstein Hyatt Farber Schreck and Anne Ricker, Principal/Owner, Ricker-Cunningham presented the Condition Surveys, Impact Reports and Urban Renewal Plans for the Four Corners Urban Renewal Area and the Highway 287 Urban Renewal Area.

Action: Mayor Harris called for a break at 7:30 p.m. and reconvened the meeting at 7:51p.m.

VII. ADJOURN TO TOWN OF ERIE URBAN RENEWAL AUTHORITY MEETING

Action: Trustee Charles moved to adjourn the September 22, 2015 to convene as the Town of Erie Urban Renewal Authority; the motion was seconded by Trustee Woog. The motion carried with all present voting in favor thereof. Mayor Harris adjourned the Board of Trustee Regular Meeting to convene the meeting of the Town of Erie Urban Renewal Authority at 7:51 p.m.

Action: Mayor Harris reconvened the Board of Trustees Regular Meeting at 8:10p.m.

VIII. RESOLUTIONS

a. Agenda Item 15-057; Resolution 15-124; A Resolution Of The Town Of Erie, Colorado Approving The Conditions Survey For The Highway 287 Urban Renewal Area, Finding That Blight Exists Within The Highway 287 Urban Renewal Area And Adopting Certain Legislative Findings Regarding The Same

Approval of Resolution 15-124 by the Town Board is a determination that the Highway 287 Area conditions meet the factors of "blighted area" consistent with the Colorado Urban Renewal Law, Part 1 of Article 25 of Title 31 based on a the Highway 287 Area Conditions Survey presented by Ricker Cunningham; that these factors impair or arrest the growth of the Area; and as such, designate the said area as appropriate for an urban renewal project. A presentation of the factors was made to the Town Board. The Town of Erie Urban Renewal Authority approved Resolution 15-09 finding blights exists within the Highway 287 Area and recommended the Town Board approve and adopt findings regarding the same.

Action: **Trustee Charles moved to approve Agenda Item 15-057; A Resolution Approving the Conditions Survey for the Highway 287 Urban Renewal Area; the motion was seconded by Mayor Pro Tem Gruber. The motion carried with a five (5) for and one (1) against vote with Trustee Moore voting no.**

b. Agenda Item 15-059; Resolution 15-125; A Resolution Of The Town Of Erie, Colorado Approving The Highway 287 Boulder County Impact Report

A Highway 287 Area Boulder County Impact Report was developed in accordance of the provisions of the Urban Renewal Law of the State of Colorado, Part 1 of Article 25 of Title 31, Colorado Revised Statutes, as amended. The Reports purpose is to identify the duration of the time to complete the urban renewal project, the estimated annual property tax increment to be generated by the project and the portion of such property tax increment to be allocated during the time to fund the project, the estimated impact of the project on the County revenues, and other potential impacts. Approval of a resolution will be an approval of the Highway 287 Boulder County Impact Report. The Town of Erie Urban Renewal Authority approved Resolution 15-11 approving the Highway 287 Boulder County Impact Report and recommended to the Town Board to approve and adopt the said Report.

Action: **Trustee Charles moved to approve Agenda Item 15-059; A Resolution Approving the Boulder County Impact Report for the Highway 287 Urban Renewal Area; the motion was seconded by Mayor Pro Tem Gruber. The motion carried with a five (5) for and one (1) against vote with Trustee Moore voting no.**

PUBLIC HEARING FOR THE HIGHWAY 287 URBAN RENEWAL PLAN

c. Agenda Item 15-058; Resolution 15-126; A Resolution Of The Town Of Erie, Colorado Making Certain Legislative Findings And Approving The Highway 287 Urban Renewal Plan

An Urban Renewal Area Plan for the Highway 287 Area was developed in accordance of the provisions of the Urban Renewal Law of the State of Colorado, Part 1 of Article 25 of Title 31 Colorado Revised Statutes as amended. The Plan's purpose is to reduce, eliminate and prevent the spread of blight within the Highway 287 Area and to accomplish this; the Plan promotes objectives and priorities in adopted community plans. Approval of a resolution will make certain legislative findings and approve the Urban Renewal Plan for the Highway 287 Area. The Town of Erie Urban Renewal

RESOLUTIONS (continued)

Authority approved Resolution 15-10 that approved and adopted the Highway 287 Area Renewal Plan and made a recommendation that the Town Board approve and adopt the said Plan.

Action: Mayor Harris opened the Public Hearing for Agenda Item 15-058 at 8:17p.m.; hearing no one wishing to make public comment; Mayor Harris closed the Public Hearing at 8:18p.m.

Action: Trustee Charles moved to approve Agenda Item 15-058; A Resolution Approving the Urban Renewal Plan for the Highway 287 Urban Renewal Area as amended; the motion was seconded by Mayor Pro Tem Gruber. The motion carried with a five (5) for and one (1) against vote with Trustee Moore voting no.

d. Agenda Item 15-060; Resolution 15-127 A Resolution of the Town Of Erie, Colorado Approving The Conditions Survey For The Four Corners Urban Renewal Area, Finding That Blight Exists Within The Four Corners Urban Renewal Area And Adopting Certain Legislative Findings Regarding The Same

Approval of a resolution by the Town Board is a determination that the Four Corners Area conditions meet the factors of "blighted area" consistent with the Colorado Urban Renewal Law, Part 1 of Article 25 of Title 31 based on a the Four Corners Area Conditions Survey presented by Ricker Cunningham and attached; that these factors impair or arrest the growth of the Area; and as such, designate the said area as appropriate for an urban renewal project. A presentation of the factors was made to the Town Board. The Town of Erie Urban Renewal Authority approved Resolution 15-12 finding blights exists within the Four Corners Area and recommended to the Town Board approve and adopt findings regarding the same.

Action: Trustee Woog moved to approve Agenda Item 15-060; A Resolution Approving the Conditions Survey for the Four Corners Urban Renewal Area; the motion was seconded by Trustee Carroll. The motion carried with a five (5) for and one (1) against vote with Trustee Moore voting no.

e. Agenda Item 15-062; Resolution 15-128; A Resolution Of The Town Of Erie, Colorado Approving The Four Corners Boulder County Impact Report

A Four Corners Area Boulder County Impact Report was developed in accordance of the provisions of the Urban Renewal Law of the State of Colorado, Part 1 of Article 25 of Title 31, Colorado Revised Statutes, as amended. The Reports purpose is to identify the duration of the time to complete the urban renewal project, the estimated annual property tax increment to be generated by the project and the portion of such property tax increment to be allocated during the time to fund the project, the estimated impact of the project on the County revenues, and other potential impacts. To date no written objection to the said impact report has been received from Boulder County. Approval of a resolution will be an approval of the Four Corners Area Boulder County Impact Report. The Town of Erie Urban Renewal Authority approved Resolution 15-14 approving the Four Corners Area Boulder County Impact Report and recommended to the Town Board to approve and adopt the said Report.

RESOLUTIONS (continued)

Action: Mayor Pro Tem Gruber moved to approve Agenda Item 15-062; A Resolution Approving the Boulder County Impact Report for the Four Corners Urban Renewal Area; the motion was seconded by Trustee Carroll. The motion carried with a five (5) for and one (1) against vote with Trustee Moore voting no.

PUBLIC HEARING FOR THE FOUR CORNERS URBAN RENEWAL PLAN

f. Agenda Item 15-061; Resolution 15-129; A Resolution Of The Town Of Erie, Colorado Making Certain Legislative Findings And Approving The Four Corners Urban Renewal Plan

An Urban Renewal Area Plan for the Four Corners Area was developed in accordance of the provisions of the Urban Renewal I aw of the State of Colorado, Part 1 of Article 25 of Title 31, Colorado Revised Statutes, as amended. The Plan's purpose is to reduce, eliminate and prevent the spread of blight within the Four Corners Area and to accomplish this; the Plan promotes objectives and priorities in adopted community plans. Approval of a resolution will make certain legislative findings and approve the Urban Renewal Plan for the Four Corners Area. The Town of Erie Urban Renewal Authority approved Resolution 15·13 that approved and adopted the Four Corners Area Renewal Plan and recommended that the Town Board approve and adopt the said Plan.

Action: Mayor Harris opened the Public Hearing for Agenda Item 15-061 at 8:19p.m.; hearing no one wishing to make public comment; Mayor Harris closed the Public Hearing at 8:20p.m.

Action: Mayor Pro Tem Gruber moved to approve Agenda Item 15-061; A Resolution Approving the Urban Renewal Plan for the Four Corners Urban Renewal Area; the motion was seconded by Mayor Pro Tem Gruber. The motion carried with a five (5) for and one (1) against vote with Trustee Moore voting no.

PUBLIC HEARING

g. Agenda Item 15-046; Resolution 15-130; A Resolution Making Certain Findings Of Fact And Conclusions Favorable To The Special Review Use For The Morgan Hills 1a-7h-A168, 1b-7h-A168, 1c-7h-A168, 1d-7h-A168, 1e-7h-A168, 1f-7h-A168, 1g-7h-A168, 1h-7h-A168 And 1i-7h-A168 Well Sit

h. Agenda Item 15-047; Resolution 15-131; A Resolution Making Certain Findings Of Fact And Conclusions Favorable To The Site Plan For The Morgan Hills 1a-7h-A168, 1b-7h-A168, 1c-7h-A168, 1d-7h-A168, 1e-7h-A168, 1f-7h-A168, 1g-7h-A168, 1h-7h-A168 And 1i-7h-A168 Well Site

RESOLUTIONS (continued)

Review of the Morgan Hills Oil and Gas Wells for compliance with Municipal Code regulations. The applicant is proposing to drill nine horizontal wells from a new drilling location. At the September 2, 2015 public hearing, the Planning Commission approved Resolution P15-26 and Resolution P15-27, by a 6-1 vote, recommending approval of the Morgan Hills Well Site Special Review Use application and the Site Plan application with the conditions listed below and made part of the staff recommendation

Approval with the following conditions:

a. Prior to construction a Grading and Stormwater Quality Permit shall be obtained from the Town.
b. Prior to construction a Right of Way Permit shall be obtained from the Town.
c. A burrowing owl survey will be required if prairie dogs are euthanized or colonies are disturbed by proposed pad development or drilling between March 15th and October 31st. The applicant shall use the recommended Survey Protocol and Actions in Protecting nesting burrowing owls from Colorado Parks and Wildlife.
d. Abandoned flowlines shall be removed, by the operator, at the Town's discretion.
e. Applicant shall amend COGCC Form 2A (Oil and Gas Location Assessment) to include the BMP's from Appendix A of the Town of Erie/EnCana Operator Agreement.

Action: Mayor Harris opened the Public Hearing for Resolution Item 15-046 and Resolution Item 15-047 at 8:20 p.m.

Public Comment was provided by the applicant:

Miracle Pfister of EnCana Oil & Gas (USA) Inc. 370 17th Street, Suite 1700, Denver, CO 80202

Action: Hearing no requests for further public comment Mayor Harris closed the Public meeting for Agenda Item 15-046; A Resolution Approving the Special Review Use for Morgan Hill Well Site and Agenda Item 15-047; A Resolution Approving the Site Plan for Morgan Hill Will Site at 8:48 p.m.

Action: Mayor Pro Tem Gruber moved to approve Agenda Item 15-046; A Resolution Approving the Special Review Use for Morgan Hill Well Site; the motion was seconded by Trustee Moore. The motion carried with all present voting in favor thereof.

Action: Mayor Pro Tem Gruber moved to approve Agenda Item 15-047; A Resolution Approving the Site Plan for Morgan Hill Well Site; the motion was seconded by Trustee Moore. The motion carried with all present voting in favor thereof.

i. Agenda Item 15-043; Resolution 15-133; A Resolution Of The Town Of Erie, Approving A Contract For Asbestos Abatement At 602 Holbrook Street To Ram Environmental Services LLC, In The Amount Of $36,414.13

RESOLUTIONS (continued)

On July 14, 2015, The Board of Trustees approved Resolution 15-88, awarding the Contract to Alpine Demolition LLC for the demolition of the existing house located on 602 Holbrook Street for the purpose of constructing a parking lot for Town Hall and United Methodist Church. At the time that Alpine began the permitting process they were directed by the State to provide an environmental study. Town staff reached out to RDS Environmental to perform the study. RDS Environmental is a Colorado-based company. They are BBB accredited and maintain an A+ rating. RDS works closely with governing organizations, including AARST, EPA, NEHA, IAQA and ACAC. RDS Environmental preformed the environmental study on August 17, 2015. Materials were sampled and shown to contain asbestos <1% though out the house. by the State of Colorado Regulation 8, all materials identified as containing < 1% asbestos, should be removed prior to demolition in a non-friable manner and/or in accordance with OSHA guidelines for removal of <1%containing material. As well as the landfill accepting said material should be notified of the Asbestos containing material. Subsequently staff requested information from Alpine Demolition LLC for references that specialized on asbestos abatement and they referred staff to RAM Environmental Services. RAM Environmental Services LLC has been in business since 2014 and the owner has been in the industry for 17 years. They have an A rating with the BBB and are on the Colorado General Abatement Contractors. RAM Environmental Services provided staff with a proposal to perform the asbestos abatement. Staff has reviewed proposal and contacted other references form RAM Environmental Services LLC and are confident that the pricing is fair and equitable.

Action: **Mayor Pro Tem Gruber moved to approve Agenda Item 15-043; A Resolution Approving Asbestos Abatement at 602 Holbrook Street; the motion was seconded by Trustee Woog. The motion carried with the following roll call vote:**

Trustee Woog	**Yes**
Trustee Moore	**Yes**
Trustee Charles	**Yes**
Mayor Pro Tem Gruber	**Yes**
Trustee Carroll	**Yes**
Mayor Harris	**Yes**

IX. ORDINANCES

a. **Agenda Item 15-051; Ordinance 14-2015; An Ordinance Of The Town Of Erie, Colorado Amending Title 9, "Building Regulations," Chapter 4, "Special Districts," Sections 9-4-5, "Model Service Plan," And 9-4-12, "Compliance; Modification; Enforcement," Of The Erie Municipal Code**

Per Board of Trustee direction, three amendments are proposed to Title 9, Chapter 4-Special Districts as it **relates to metropolitan districts and their associated service plans.**
I. Section 9-4-5 B 2 The proposed amendment caps the mill levy assessed by the district at 50 mil is for both debt service **and operations and maintenance.** The mill levy assessed by the district on real or personal property within the district shall be capped at fifty (50) mills for both debt service and twenty five (25) mills for operation and maintenance purposes, as provided in the service plan. The debt service mill levy may be subject to adjustment in future years to reflect changes in the residential assessment ratio, The debt service mill levy will terminate when the bonds are no longer outstanding, The district shall not impose a debt service mill levy for more than forty (40)

ORDINANCES (continued)

years after the year of the initial imposition of such debt service mill levy unless: a) a majority of the board of directors of the district imposing the mill levy are residents of such district, and b) such board has voted in favor of issuing debt with a term which requires or contemplates the imposition of a debt service mill levy for a longer period of time than the limitation contained herein,
2, Section 9-4-5 B 6 a
The proposed amendment requires a district to provide written notice to the Town prior to the use **of eminent domain powers.** Condemn property inside or outside the district boundaries without Condemn property inside or outside the district boundaries first providing prior written notice to the board of trustees of the district's intention to use the power of eminent domain.
3. Section 9-4-12 f
The proposed amendment adds a new requirement for a disclosure statement indicating the existence of a metropolitan district(s). This disclosure would be added to all future development agreements for developments having metropolitan district(s). Every development that creates or proposes to create a district shall have, as a requirement in its development agreement with the town, a disclosure statement indicating the existence (or proposed formation) of a district that may impose lip to fifty (50) mills upon all taxable property within the district's boundaries. Such disclosure statement shall be signed by the property owner with the execution of the sales contract for the purchase of the property.

Action: **Trustee Moore moved to approve Agenda Item 15-051; Ordinance 14-2015; An Ordinance Of The Town Of Erie, Colorado Amending Title 9, "Building Regulations," Chapter 4, "Special Districts," Sections 9-4-5, "Model Service Plan," And 9-4-12, "Compliance; Modification; Enforcement," Of The Erie Municipal Code; the motion was seconded by Trustee Charles. The motion carried with all present voting in favor thereof.**

X. GENERAL BUSINESS

a. Agenda Item 15-052; Dog Park at Reliance Park – Update and Request for Funding

In 2015 $15,000 was allocated in the Parks Improvement Fund capital budget to begin construction on a ten acre dog park at Reliance Park. To date a total of $23,922.45 has been spent on the following:

- Expansion of the parking lot for increased capacity
- Grading of site
- Native grass seeding of site
- Installation of prairie dog fencing
- Initial concept design of park
- Branding logo design

An eight member citizen committee has organized and they have assisted in the park design, branding, and leading community education and fund raising efforts by:

- Hosting a booth at 13 community events to provide information and accept cash donations
- Selling merchandise, such as t-shirts, water bottles, and pup-cakes (for dogs only!)
- Connecting with PayPal to accept direct private donations via credit card
- Setting up "Buy-a-Brick" campaign where donors can purchase a personalized brick to be used in the entrance to the dog park - potential funds raised if all bricks are "sold" $65,000

Staff and the citizen committee are seeking Board of Trustee direction as to next steps for funding the project and offer the following possible options: 1. Fund the entire $150,000 from the Park Improvement Fund in 2015 and direct any privately raised funds to a specific amenity. This option would allow for an

GENERAL BUSINESS

opening in the spring of 2016. 2. Fund Phase 1 from the Park Improvement Fund in 2015 (approximately $100,000) to include fencing, gates, irrigation set up, crusher fine path, entrance design, signage, drinking water fountain, doggie bag stations, design and completion of bull pen and maintenance entrances. Fund and complete Phase 2 (approximately $50,000) when the private funds have been raised to provide trees, shelters, and benches. This option would allow for a target opening by the end of 2016. 3. Don't allocate any additional funds to the project and rely solely on privately raised funds. With this option the projected opening would be in the spring of 2018. Staff and the citizen committee are eager to move this project forward and complete the Town of Erie's dog park - The Boneyard.

Action: **No definitive action was taken on this item at this time.**

X. BOARD OF TRUSTEES REPORTS

Trustee Woog requested a straw poll of the Board based on the Citizen Survey to give direction to staff to prepare an ordinance prohibiting Medical Marijuana Dispensaries in the Town of Erie. Mayor Harris indicated that this would be a topic of discussion at the October 10, 2015 Board Study Session.
Trustee Charles provided an update from the Historic Preservation Board.
Mayor Pro Tem Gruber noted an upcoming Highway 7 Coalition Meeting at the Erie Community Center.

XI. ADJOURNMENT

Action: **Trustee Woog moved to adjourn the September 22, 2015 Regular Meeting of the Town of Erie Board of Trustees; the motion was seconded by Mayor Pro Tem Gruber. The motion carried with all present voting in favor thereof.**

Action: **Mayor Harris adjourned the September 22, 2015 Regular Meeting of the Town of Erie Board of Trustees at 9:46 p.m.**

Respectfully Submitted,

Nancy J. Parker, CMC, Town Clerk **Tina Harris-Mayor**

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-067, **Version:** 2

SUBJECT: A RESOLUTION AUTHORIZING THE CONDUCT OF A MAIL BALLOT ELECTION FOR THE TOWN OF ERIE'S REGULAR MUNICIPAL ELECTION ON APRIL 5, 2016 AND, SETTING FORTH DETAILS IN RELATION THERETO.

DEPARTMENT: TOWN CLERK

PRESENTER:

FISCAL INFORMATION:
Cost as Recommended: $60,000.00
Balance Available: $60,000.00 2016 Budget Request
Budget Line Item Number: 100 20 310 561020 0000
New Appropriation Required: No

STAFF RECOMMENDATION: Approval of Resolution

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

The Town of Erie will be conducting its Regular Municipal Election on April 5, 2016. The Town has conducted the last five municipal elections as Mail Ballot Elections. Staff is recommending the 2016 Election be conducted again as a Mail Ballot Election.

- The Town currently has approximately 16,000 registered voters. Ballots will be mailed to all registered voters.
- This Resolution approves conducting a Mail Ballot Election on April 5, 2016
    - Adopts section of the Uniform Election Code
    - Establishes Town Hall as the polling place on April 5, 2016
    - Authorizes the Town Clerk to appoint Election Judges for this election

ATTACHMENTS: Resolution Authorizing the Conduct of a Mail Ballot Election

RESOLUTION NO. 15-_____

A RESOLUTION AUTHORIZING THE CONDUCT OF A MAIL BALLOT ELECTION FOR THE TOWN OF ERIE'S REGULAR MUNICIPAL ELECTION ON APRIL 5, 2016 AND, SETTING FORTH DETAILS IN RELATION THERETO.

WHEREAS, the Town of Erie, Colorado (the "Town"), is a municipal corporation duly organized and operating as a statutory town under the Constitution and laws of the State of Colorado; and,

WHEREAS, Section 31-10-102.7 C.R.S. permits a municipality to utilize the requirements and procedures of the Uniform Election Code of 1992 with respect to any municipal election; and

WHEREAS, the Town Board wishes to adopt a portion of the Uniform Election Code of 1992 relating to mail ballot elections for the April 5, 2016 Municipal election; and

WHEREAS, Section 1-7.5-104, C.R.S provides that the governing board of any political subdivision may determine that an election may be held by mail ballot; and

WHEREAS, the Town Board wishes to conduct the April 5, 2016 Regular Municipal Election as a Mail Ballot Election.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. **Adoption of the Mail Ballot Election Provisions of the Uniform Election Code for the April 5, 2016 Regular Municipal Election**. The Town of Erie hereby adopts the mail ballot election provisions of the Uniform Election Code (C.R.S., Title 1 Article 7.5, also known as the "Mail Ballot Election Act") pertaining to mail ballot elections for the conduct of the April 5, 2016 Regular Municipal Election. In the event procedures for the election are not provided for in the Mail Ballot Election Act, the Town shall comply with the Municipal Election Code (C.R.S. Title 31, Article 10) or applicable Town ordinances and regulations.

Section 2. **Casting Ballots in Person.** Registered voters shall have the opportunity to cast ballots in person as provided by the Mail Ballot Election Act at a polling place at the Town Clerk's Office, Erie Town Hall, 645 Holbrook St.

Section 3. **Recording Votes.** The Accu-Vote OS Precinct Ballot Counter electronic system shall be used to record votes at said election.

Section 4. **Election Judges.** The Town Clerk is hereby authorized to appoint Election Judges at the April 5, 2016 Regular Municipal Election.

ADOPTED AND APPROVED THIS 13TH DAY OF OCTOBER, 2016, BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO.

TOWN OF ERIE,
a Colorado municipal corporation

_____
Tina Harris, Mayor

ATTEST:

By: _____
Nancy J. Parker, CMC, Town Clerk

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-075, **Version:** 1

SUBJECT: Resolution For the Distribution of High Efficiency Washing Machine Rebates In Conjunction with the Water Conservation Plan in the Amount of $2,000

DEPARTMENT: Public Works

PRESENTER/PREPARER: Gary Behlen, Public Works Director
Bethany Peer, Public Works, Administrative Technician

FISCAL INFORMATION:
Cost as Recommended: $2,000
Balance Available: $2,000
Budget Line Item Number: 500-70-110-570280
New Appropriation Required: No

STAFF RECOMMENDATION: Approving said Resolution authorizing continuation of the High Efficiency Washing Machine Rebate Program and authorizing Staff to expend said funds.

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

In 2008, the Board of Trustees approved Resolution 08-10 amending the 2007 Water Conservation Plan and formally adopting the Town of Erie's Water Conservation Plan. At the January 13, 2015 meeting, the Board decided on the 2015 Water Conservation Plan, which includes the High Efficiency Washing Machine Rebates.

At that same meeting, we also requested a budget of $4,000 for 80 High Efficiency Washing Machine Rebates based on the demand in 2013 and 2014. At this time, we have issued 78 out of 80 Washing Machine Rebates to residents. In the 2015 operating budget there is $6,000 total budgeted for the issuance of 120 Washing Machine Rebates at $50 each. This amount was budgeted with the anticipation that with growing residential, we may need additional rebates. With us issuing 78 rebates already this year, we are recommending we offer the additional rebates in order to continue offering the program through the end of the year.

According to the U.S. Department of Energy, qualified clothes washers can save 7,000 gallons of water a year. Below is a summary of the rebates issued since the program began up to and including the rebates issued to date.

Year	# of Rebates Issued	Amt of Rebates	Total Cost	Entity
2008	30	$100	$3,000	Town
2009	60	$100	$6,000	Town
2010	60	$50	$3,000	Town
2010	50	$50	$2,500	Encana
2011	82	$50	$4,100	Encana
2012	67	$50	$3,350	Town
2013	64	$50	$3,200	Town
2014	62	$50	$3,100	Town
2015	80	$50	$4,000	Town

Staff also recommends maintaining the purchase date parameter at March 4, 2008 (the date the State of Colorado officially accepted the Water Conservation Program), thereby allowing residents that purchased washing machines previously, but missed the rebates, to apply in 2015.

High Efficiency Washing Machine Rebate Program Guidelines:

- Must be a customer of the Town of Erie with a current, non-delinquent account.
- The machine must be installed at the primary address and must remain in the possession of the original purchaser, or remain at the original installation address for at least one year from the date of purchase. Leased washers are not qualified. Original receipt must be provided and show a purchase date of March 4, 2008 or later.
- The machine must be a qualifying model listed on the www.energystar.gov <http://www.energystar.com/> website.
- A completed and signed Affidavit of Lawful Presence in the U.S. (required by House Bill 06S-1023 signed into law on July 31, 2006) must be provided along with a legible copy of an acceptable form of identification.
- Must include a copy of current Town of Erie water bill.
- Rebates are on a first-come, first serve basis with a maximum allowable rebate of one per family account.

Required materials can be mailed to or dropped off at the Public Works Department located on the second floor of Town Hall (PO Box 750).

ATTACHMENTS:

a. Resolution

RESOLUTION NO. 15-__

A RESOLUTION APPROVING ADDITIONAL FUNDS FOR THE DISTRIBUTION OF HIGH EFFICIENCY WASHING MACHINE REBATES IN CONJUNCTION WITH THE WATER CONSERVATION PLAN IN THE AMOUNT OF $2,000.00 FOR THE REMAINDER OF THE 2015 BUDGET YEAR; AND SETTING FORTH DETAILS IN RELATION THERETO.

WHEREAS, on July 24, 2007 the Town of Erie, a Colorado Municipal Corporation approved preparation of a Water Conservation Plan; and

WHEREAS, the Town of Erie produces greater than 2,000 acre feet of retail water per year and based upon that threshold, the Town was required to develop a State approved Water Conservation Plan in accordance with C.R.S. §37-60-126; and

WHEREAS, on March 4, 2008 the State of Colorado officially accepted the Town of Erie's Water Conservation Plan which included the distribution of high efficiency washing machine rebates; and

WHEREAS, the Washing Machine Rebate Program is an important management tool in addressing the current and future water needs of the Town of Erie.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. The Town of Erie Board of Trustees approves the additional funds for the Washing Machine Rebates in the amount of $2,000.00 for the remainder of the 2015 budget year.

Section 2. Staff and Elected Officials are hereby directed to implement the necessary procedures to expend said funds.

Section 3. That approving the additional funds for the Washing Machine Rebate Program is found to be in the best interest of the Town of Erie and necessary for the preservation of the public health and safety.

ADOPTED AND APPROVED THIS 13th DAY OF OCTOBER, 2015 BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO.

TOWN OF ERIE,
a Colorado Municipal Corporation

By: _____
Tina Harris, Mayor

ATTEST:

_____
Nancy J. Parker, CMC, Town Clerk

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-076, **Version:** 1

SUBJECT: Consideration of A Resolution Authorizing Award Of A Services Contract To InfraTrack, Inc. for the Storm System Video Inspection Services In The Amount Of $30,353.70; And Setting Forth Details In Relation Thereto.

DEPARTMENT: Public Works

PRESENTER: Gary Behlen, Director of Public Works
Jody Lambert, Operations & Maintenance Manager

FISCAL INFORMATION:

Cost as Recommended:	$32,800
Balance Available:	$32,800
Fund:	Storm Drainage - Operations
Budget Line Item Number:	520.70.760.524000.000000
New Appropriation Required:	No

STAFF RECOMMENDATION: Approving Resolution awarding said contract, authorizing the appropriate Town Officer to execute said contract, authorizing Staff to expend contracted funds.

SUMMARY AND BACKGROUND OF SUBJECT MATTER:
The 2015 operating budget includes funds for video inspections, cleaning, and debris removal of areas of the collection and storm sewer systems main lines. For 2015, the collection system inspections money was needed as part of the sewer rehabilitation project. The 2015 storm inspections will be performed in Old Town.

An Invitation to Bid was posted on the Town's website on August 19, 2015. Bids were received on September 9, 2015 and are listed below. No Erie contractors submitted a bid.

Bid Information

Contractor	Bid Amount
InfraTrack, Inc.	$82,347.15
Professional Services Group, LLC	$82,871.98

Since the bids are higher than the budget allows, Staff negotiated with the Contractor to do a portion in 2015 and the remaining in 2016, pending budget approval. The low bidder is InfraTrack, Inc. InfraTrack has successfully completed this service for other municipalities including: Cities of Lennox, Hills, Sisseton, Valley Springs, and Canton, SD. Staff has reviewed the bids and recommends award of contracts to InfraTrack.

Project Budget Summary

Contract	$30,353.70
Contingency	$2,446.30
Total	**$32,800.00**

Project Schedule

Notice of Award	October 14, 2015
Notice to Proceed	October, 2015
Services Complete	November, 2015

ATTACHMENTS:

a. Resolution

RESOLUTION NO. 15-____

A RESOLUTION OF THE TOWN OF ERIE, COLORADO AUTHORIZING AWARD OF A SERVICES CONTRACT TO INFRATRACK, INC. FOR THE STORM SYSTEM VIDEO INSPECTION SERVICES IN THE AMOUNT OF $30,353.70; AND SETTING FORTH DETAILS IN RELATION THERETO.

WHEREAS, the Town of Erie, Colorado wishes to award a services contract to InfraTrack, Inc. for the Storm System Video Inspection Services; and

WHEREAS, the Board of Trustees of the Town of Erie believes it is in the best interest of the Town to approve such a contract.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. That the contract for services between the Town of Erie and InfraTrack, Inc. is found to be a reasonable and acceptable contract for the Storm System Video Inspection Services.

Section 2. That the Town of Erie be and is hereby authorized and directed to approve the contract with InfraTrack, Inc., and the appropriate Town Officers are hereby authorized and directed to sign and bind the Town of Erie to said contract in an amount not to exceed $30,353.70 for Storm System Video Inspection Services with a contingency not to exceed $2,446.30.

Section 3. That entering into said contract is found to be in the best interest of the Town of Erie, and necessary for the preservation of the public health and safety.

ADOPTED AND APPROVED THIS 13th DAY OF OCTOBER, 2015, BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO.

TOWN OF ERIE,
a Colorado Municipal Corporation

By: _____
Tina Harris, Mayor

ATTEST:

By: _____
Nancy Parker, CMC, Town Clerk

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-077, **Version:** 1

SUBJECT: Consideration of A Resolution Approving a Contract with W.L. Contractors, Inc. for Arapahoe Road / 119th Street Signal Improvements, In The Amount Of $14,698.93; And Setting Forth Details In Relation Thereto.

DEPARTMENT: Public Works

PRESENTER/PREPARER: **Gary Behlen, Director of Public Works**
Jody Lambert, Operations and Maintenance Manager

FISCAL INFORMATION:

Cost as Recommended:	$16,900
Balance Available:	$35,100
Fund:	General - Streets
Budget Line Item Number:	100.70.710.523400.000000
New Appropriation Required:	No

STAFF RECOMMENDATION: Approving the Resolution to awarding said contract and, authorizing Staff to expend said contract and contingency funds.

SUMMARY AND BACKGROUND OF SUBJECT MATTER:
The Town recently annexed a portion of 119th Street from the Water Treatment Facility entrance road south to Arapahoe Road. This annexation includes the existing traffic signal at the Arapahoe Road and 119th Street intersection. The Town has a maintenance contract with W.L. Contractors, Inc. (WL) to complete routine and on-call maintenance of all traffic signals and school zone indicators.

The Town requested a complete inspection from WL of the Arapahoe/119th Street signal. From that inspection, the following items were noted to be deficient and need improvements:

- Raising the traffic cabinet, base and extending the conduit. This has been in water even under normal type rain fall. This will ensure the components within the cabinet stay out of the storm water protecting the electronics within.
- Troubleshoot and upgrade the EVP (Emergency Vehicle Preemption). This is a type of system that allows the normal operation of traffic lights to be preempted. The use of this system is to change the traffic signals in the path of an emergency vehicle, stopping normal traffic and allowing the emergency vehicle right-of-way, helping reduce response times and enhancing traffic safety. All other signals within the Town are running on similar systems. This would keep all of the signals consistent with one another.
- Painting Signal poles. This is routine type maintenance to resist corrosion and extend the life of the signals. This includes a bucket truck to complete.

Staff is recommending the Board of Trustees award the contract to WL Contractors, Inc., for the Arapahoe Road / 119th Street Signal Improvements.

Project Budget Summary

Contract	$14,698.93
Contingency (15%)	$2,201.07
Total Cost	**$16,900.00**

Project Schedule

Notice of Award	October 14, 2015
Notice to Proceed	October 28, 2015
Construction Complete	December 2015

ATTACHMENTS:

a. Resolution

RESOLUTION NO. 15-___

A RESOLUTION OF THE TOWN OF ERIE AWARDING A CONTRACT TO WL CONTRACTORS, INC. FOR THE ARAPAHOE ROAD/119TH STREET SIGNAL IMPROVEMENTS IN THE AMOUNT OF $14,698.93; AND SETTING FORTH DETAILS IN RELATION THERETO

WHEREAS, the Town of Erie, Colorado wishes to award a contract to WL Contractors, Inc. for the Arapahoe Road/119th Street Signal Improvements, in the amount of $14,698.93; and

WHEREAS, the Board of Trustees of the Town of Erie believes it is in the best interest of the Town to enter into such contract.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. That the contract between the Town of Erie and WL Contractors, Inc. is found to be a reasonable and acceptable contract for the signal improvements at Arapahoe Road and 119th Street.

Section 2. That the Town of Erie be and is hereby authorized and directed to enter into the contract with WL Contractors, Inc. and the Appropriate Town Officers are hereby authorized and directed to sign and bind the Town of Erie to said contract in the amount not to exceed $14,698.93. With a contingency in the amount of $2,201.07.

Section 3. That this contract is found to be in the best interest of the Town of Erie, and necessary for the preservation of the public health and safety.

ADOPTED AND APPROVED THIS 13th DAY OF OCTOBER, 2015, BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO.

TOWN OF ERIE,
a Colorado Municipal Corporation

By: _____
Tina Harris, Mayor

ATTEST:

By: _____
Nancy Parker,CMC, Town Clerk

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-078, **Version:** 1

SUBJECT: A RESOLUTION AUTHORIZING AN AGREEMENT FOR ELECTION SERVICES WITH DOMINION VOTING SYSTEMS IN THE AMOUNT OF $27,118.20; AND SETTING FORTH DETAILS IN RELATION

DEPARTMENT:

PRESENTER:

FISCAL INFORMATION:
Cost as Recommended: $27,118.20
Balance Available: $60,000.00 2016 Budget Request
Budget Line Item Number: 001 310 520322 00000
New Appropriation Required: No

STAFF RECOMMENDATION: Approval of Resolution

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

This resolution authorizes the appropriate Town Officers to sign an agreement with Election Systems and Software to provide election services, including equipment rental, technical support, ballot printing and mailing.

- **The contract cost of $27,118.20, does not include postage and shipping costs. Additional costs would also include Election Judges, post office box fees, and miscellaneous supplies.**

ATTACHMENTS: Resolution Authorizing an Agreement for Election Services
Services Agreement with Dominion Voting Systems

RESOLUTION NO. 15-_____

A RESOLUTION AUTHORIZING AN AGREEMENT FOR ELECTION SERVICES WITH DOMINION ELECTION SYSTEMS IN THE AMOUNT OF $27,118.20; AND SETTING FORTH DETAILS IN RELATION THERETO

WHEREAS, the Town of Erie, Colorado wishes to enter into an agreement with Dominion Election Systems to provide equipment rental and elections services for the April 5, 2016Regular Municipal Election; and

WHEREAS, the Board of Trustees of the Town of Erie believes it is in the best interest of the Town to enter into such an agreement.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. That the agreement between the Town of Erie and Dominion Election Systems, herein by reference, is found to be a reasonable and acceptable agreement for the purpose of providing election services for the April 5, 2015 Regular Municipal Election.

Section 2. That the Town of Erie be and is hereby authorized and directed to enter into the agreement with Dominion Election Systems, and the Town Administrator is hereby authorized and directed to sign and bind the Town of Erie to said agreement for providing elections services for the April 5, 2016 Regular Municipal Election.

Section 3. That entering into the agreement is found to be in the best interest of the Town of Erie, and necessary for the preservation of the public health and safety.

ADOPTED AND APPROVED THIS 13th DAY OF OCTOBER 2015, BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO.

TOWN OF ERIE,
a Colorado municipal corporation

By:

_____
Tina Harris, Mayor

ATTEST:

By: _____
Nancy J. Parker, CMC, Town Clerk

HARDWARE RENTAL, SOFTWARE LICENSE AND SERVICES AGREEMENT

This **Hardware Rental, Software License and Services Agreement** (hereafter the "Agreement") dated this 29th day of September, 2015 (hereafter the "Effective Date") is made by and between the Town of Erie, located at 645 Holbrook Street, Erie, CO 80516 (hereafter the "Customer") and **Dominion Voting Systems Inc.,** located at 1201 18th Street, Suite 210, Denver, CO 80202 (hereafter "Dominion"). This Agreement may refer to Dominion and the Customer together as the "Parties," or may refer to Dominion or the Customer individually as a "Party."

1. **Composition of Agreement.** Schedule A is attached and incorporated herein by reference and forms a part of this Agreement. This Agreement consists of the general terms and conditions contained in the following Sections, together with Schedule A:

   Schedule A: Election Services, Deliverables and Pricing, Payment Summary

2. **Definitions.** For the purposes of this Agreement, the following are defined terms:

   2.1. "Dominion Software" means software licensed by Dominion to the Customer.

   2.2. "Dominion Hardware" means Dominion's proprietary voting system hardware as specified in Schedule A herein.

   2.3. "Dominion System" means the Dominion Software and the Dominion Hardware.

   2.4. "Specifications" means descriptions and data regarding the features, functions and performance of the Dominion Software, as set forth in user manuals or other applicable documentation provided by Dominion.

3. **Term of Agreement.** The term of this Agreement (hereinafter the "Term") shall begin on the Effective Date and shall expire in one year, September 29, 2016 (9/29/2016). The payment terms of Section 5, to extent of any payments are still due, shall survive any expiration or termination of this Agreement in accordance with their respective terms.

4. **Dominion's Responsibilities.**

   4.1. Dominion shall provide the Customer with the Dominion Hardware, the Dominion Software, and the services described in Schedule A.

   4.2. Dominion shall rent to the Customer the Dominion Hardware and grant to the Customer a non-exclusive, non-transferable, license (hereinafter the "License") to use the Dominion Software pursuant to Section 6 of this Agreement.

5. **Customer's Responsibilities.**

   5.1. In consideration for the products, licenses and services described in this Agreement, the Customer shall pay the amounts specified in Schedule A. The Customer is responsible for all sales, excise, personal property or other taxes or duties on the amounts paid or

products or services provided under this Agreement. If the Customer is exempt from such taxes or duties, the Customer shall provide Dominion with a tax exemption certificate.

5.2. The Customer shall provide Dominion with physical accommodations reasonably required for Dominion to perform its obligations, including premises access, electrical power, and data connectivity.

5.3. The Customer is solely responsible for assuring all relevant federal and provincial legislation and municipal by-laws are complied with in regard to the use of the Dominion Hardware, the Dominion Software, and the services for any Customer election, including all associated election guidelines and applicable election due dates. Notwithstanding any other provision in this Agreement to the contrary, the Customer shall defend, indemnify and hold Dominion harmless from and against any and all claims, demands, damages, injuries, expenses (including reasonable legal fees and court costs) and liability arising in connection with the Customer's responsibility pursuant to this Section 5.3.

6. Software and Hardware Rental, License and Use.

6.1. Dominion Hardware. Dominion agrees to rent the Dominion Hardware to the Customer during the Term as described in Schedule A.

6.2. Dominion Software. Subject to the terms of this Agreement, Dominion grants the Customer a non-exclusive, non-transferrable license to use the Dominion Software solely for the Customer's own internal business purposes. This License shall only be effective during the Term and cannot be transferred or sublicensed.

6.3. No Other Licenses. Other than as expressly set forth in this Agreement, (a) Dominion grants no licenses, expressly or by implication, and (b) Dominion's entering into and performing the Agreement will not be deemed to license or assign any intellectual property rights of Dominion to the Customer or any third party. Without limiting the foregoing sentence, the Customer agrees to use the Dominion Software as outlined in Schedule A, and agrees not to use any Dominion Hardware or Dominion Software outside the Customer's jurisdiction and agrees not to reverse engineer or otherwise attempt to derive the source code of any Dominion Software. The Customer shall have no power to grant sub-licenses for the Dominion Software. Any use of all or any portion of the Dominion Software not expressly permitted by the terms of this Agreement is strictly prohibited.

6.4. Prohibited Acts. The Customer shall not, without the prior written permission of Dominion:

6.4.1. Transfer or copy onto any storage device or hardware or otherwise copy the Dominion Software in whole or in part except for purposes of a system backup;

6.4.2. Reverse engineer, disassemble, decompile, decipher or analyze the Dominion Software in whole or in part;

6.4.3. Alter or modify the Dominion Software in any way or prepare any derivative works of the Dominion Software or any part of parts of the Dominion Software;

6.4.4. Alter, remove or obstruct any copyright or proprietary notices from the Dominion Software, or fail to reproduce the same on any lawful copies of the Dominion Software.

6.4.5. Disassemble or otherwise alter or modify the Dominion Hardware in any way.

6.5. Proprietary Rights. The Customer acknowledges and agrees that Dominion owns the Dominion Hardware, Dominion Software, all documentation and training materials provided by Dominion, the design and configuration of the Dominion Hardware and the format, layout, measurements, design and all other technical information (except for the Customer supplied information such as election information) associated with the ballots to be used with the Dominion Hardware. The Customer has the right to use the aforementioned items to the extent specified in this Agreement. Dominion likewise owns all patents, trade-marks, copyrights, trade names and other proprietary or intellectual property in, or used in connection with, the aforementioned items. The aforementioned items also contain confidential and proprietary trade secrets of Dominion which are protected by law and are of substantial value to Dominion.

7. Limited Warranties.

7.1. Dominion Software and Hardware. Dominion warrants that, during the Term, the Dominion Software and Hardware will function substantially in accordance with the Specifications. If the Customer believes that the Dominion Software or Hardware is not functioning substantially in accordance with the Specifications, the Customer shall provide Dominion with written notice of the material failure within ten (10) days of discovering the material failure, provided that the Customer can reproduce the material failure to Dominion. Dominion shall use reasonable efforts to correct the material failure of the Dominion Software or Hardware. The foregoing warranty shall be void in the event of the Dominion Software or Hardware (i) has been modified by any party other than Dominion or its licensors or (ii) has been used by the Customer for purposes other than those for which the Dominion Software or Hardware was licensed.

7.2. NO OTHER WARRANTIES. DOMINION DISCLAIMS ALL OTHER REPRESENTATIONS AND WARRANTIES, WHETHER WRITTEN, ORAL, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY BASED ON A COURSE OF DEALING, COURSE OF PERFORMANCE OR USAGE OF TRADE.

8. Indemnification. Each Party to this Agreement shall indemnify, defend, and hold harmless the other Party and its officers, directors, agents, employees, and owners from and against any and all demands, claims, damages to persons or property, losses, and liabilities, including reasonable legal fees (collectively, "Claims"), arising out of or caused by the indemnifying Party's gross negligence or willful misconduct in connection with the services contemplated by this

Agreement. In addition, the Customer shall indemnify and hold harmless Dominion from any third party claims arising from, or alleged to arise from, the Customer's failure to operate properly the Dominion System, in the manner so designated by Dominion.

9. **Limitation of Liability.** Dominion's total aggregate liability for any loss, damage, costs or expenses under or in connection with this Agreement, howsoever arising, including without limitation, loss, damage, costs or expenses caused by breach of contract, negligence, strict liability, breach of statutory or any other duty shall in no circumstances exceed the total dollar amount of the Agreement. Neither Party shall be liable for any loss of profits, loss of business, loss of data, loss of use or any other indirect, incidental, special or consequential loss or damage whatsoever, howsoever arising, incurred by the other Party or any third party, whether in an action in contract, negligence or other tort, even if the Parties or their representatives have been advised of the possibility of such damages.

10. **Liquidated Damages.** Dominion shall not be liable for liquidated damages of any kind.

11. **Confidential Information.**

    11.1. For purposes of this Agreement, confidential information (hereinafter the "Confidential Information") is defined as those materials, documents, data, and technical information, specifications, business information, customer information, or other information that the disclosing Party maintains as trade secrets or confidential and which are disclosed to a receiving Party in tangible form conspicuously marked as "confidential," or with words having similar meaning or which are expressly identified in this Subsection 11.1. Confidential Information includes all Dominion Software source and object code and written documentation associated therewith.

    11.2. Each Party shall treat the other Party's Confidential Information as confidential within their respective organizations.

    11.3. Neither Party shall disclose the other Party's Confidential Information to any person outside their respective organizations unless disclosure is made in response to, or because of, an obligation to any federal, provincial, or local governmental agency or court with appropriate jurisdiction, or to any person properly seeking discovery before any such agency or court or disclosure is required under applicable access and/or privacy legislation.

    11.4. Each Party shall be given the ability to defend the confidentiality of its Confidential Information to the maximum extent allowable under the law prior to disclosure by the other Party of such Confidential Information.

12. **Termination.**

    12.1. If either Party materially breaches this Agreement and does not cure the breach within 30 days after receiving written notice of the breach from the non-breaching Party, the non-breaching Party may terminate this Agreement as of a termination date specified in

that notice or in a subsequent notice delivered within the 30-day period. If the breach cannot be completely cured within the 30-day period, no default will occur if the Party receiving the notice begins curative action within the 30-day period and thereafter proceeds with diligence and in good faith to cure the breach as soon as practicable.

13. **Risk of Loss Insurance.** The Customer shall bear the entire risk of loss or damage to the Dominion Hardware and Software after the Customer receipt of the Dominion Hardware and Software. The occurrence of any such loss or damage shall not permit the Customer to delay or reduce the payment of any fees prescribed under this Agreement. The Customer may, at its own discretion and expense, obtain and maintain property and casualty insurance for the Dominion Hardware and Software against all risks of loss or damage. The amount of such insurance shall not be less than the replacement cost of the Dominion Hardware and Software. All policies for such insurance shall (i) designate Dominion as a named insured and Dominion and the Customer as loss payees, as their interests may appear and (ii) contain a provision that entitles Dominion to at least fifteen (15) days' written notice prior to cancellation or modification of such insurance policy the Customer shall provide Dominion with a certificate of insurance with respect to such policy on or before the time of delivery of the Dominion System. The Customer shall not be relieved of the obligation to reimburse Dominion for the costs associated with damage or loss to the Dominion Hardware and/or Software by failing to obtain the insurance coverage as described above.

14. **Assignment and Right to Subcontract.** Neither Party may assign its rights, obligations, or interests in this Agreement without the written consent of the other Party.

15. **Governing Law.** Interpretation of this Agreement shall be governed by the laws of the Customer's State, and the courts of competent jurisdiction located in that State will have jurisdiction to hear and determine questions relating to this Agreement.

16. **Survival.** The provisions of Sections and Subsections 1, 2, 3, 7, 8, 9, 10, 11, 15, 16, 18, and 20 shall survive the expiration or termination of this Agreement.

17. **Force Majeure.** Should any circumstances beyond the control of Dominion or the Customer occur that delay or render impossible the performance of any obligation due under this Agreement, such obligation will be postponed for the period of any delay resulting from any such circumstances, plus a reasonable period to accommodate adjustment to such extension, or cancelled if performance has been rendered impossible thereby. Such events may include, without limitation, accidents; war, acts of terrorism; natural disasters; labor disputes; acts, laws, rules or regulations of any government or government agency; or other events beyond the control of Dominion or the Customer. Dominion shall not be liable under this Agreement for any loss or damage to the Customer due to such delay or performance failures. Notwithstanding the foregoing, both Parties shall use their best efforts to minimize the adverse consequences of any such circumstances. This Section shall not operate to excuse any Party from paying amounts that are owed pursuant to this Agreement.

18. **Legality and Severability.** This Agreement and the Parties' actions under this Agreement shall comply with all applicable federal, state and local laws, ordinances, rules, regulations, court

orders, and applicable governmental agency orders. If any term or provision of this Agreement is held to be illegal or unenforceable, the remainder of this Agreement shall not be affected thereby and each term or provision of this Agreement shall be valid and enforceable to the fullest extent permitted by law. The Parties agree that any court reviewing this Agreement shall reform any illegal or unenforceable provision to carry out the express intent of the Parties as set forth herein to the fullest extent permitted by law.

19. **Waiver.** Any failure of a Party to assert any right under this Agreement shall not constitute a waiver or a termination of that right, this Agreement, or any provisions herein.

20. **Notices.** All notices required or permitted to be given hereunder shall be given in writing and shall be deemed to have been given when emailed, personally delivered or by nationally recognized overnight carrier or mailed, certified or registered mail, return receipt requested, addressed to the intended recipient as follows:

If to Dominion:

Dominion Voting Systems, Inc.
Attn: Contracts Administrator
1201 18th St., Suite 210
Denver, CO 80202

If to the Customer:
Town of Erie

21. **No Third Party Beneficiaries.** Dominion and the Customer agree that this Agreement is for the benefit of the Parties hereto and is not intended to confer any rights or benefits on any third party, and that there are no third-party beneficiaries of this Agreement or any part or specific provision of this Agreement, and no third party shall have any right to enforce this Agreement or any provision hereof.

22. **Entire Agreement.** This Agreement and its Schedule incorporated herein by reference constitute the entire agreement, understanding and representations between Dominion and the Customer, and supersede and replace all prior agreements, written or oral. No modifications or representations to the Agreement shall be valid unless made in writing and signed by duly authorized representatives of both the Customer and Dominion, and incorporated as an Addendum hereto.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed as of the date first above written.

DOMINION VOTING SYSTEMS INC.

_____
AUTHORIZED SIGNATURE

_____
PRINTED NAME

_____
TITLE

_____
DATE

TOWN OF ERIE, CO

_____
AUTHORIZED SIGNATURE

_____
PRINTED NAME

_____
TITLE

_____
DATE

SCHEDULE A

HARDWARE RENTAL, SOFTWARE LICENSE AND SERVICES AGREEMENT

TOWN OF ERIE, CO

ELECTION SERVICES, DELIVERABLES AND PRICING, PAYMENT SUMMARY

System Lease Pricing For Your Election

April 5, 2016

Below is pricing for the lease of the election automation system.

ITEM	QTY	DESCRIPTION	UNIT PRICE	EXTENSION
1	1	Set up of Election Definition and Ballot Layout	$1,250.00	$1,250.00
2	1	On Site Set up, Logic and Accuracy and Training	$2,000.00	$2,000.00
5	1	Election Day support	$4,500.00	$4,500.00
4	3	AVOS Rental Unit with programmed PCMCIA Cards	$350.00	$1,050.00
5	2	AVOS Ballot Boxes	$100.00	$200.00
6	3	Thermal Paper Rolls	$3.00	$9.00
7	12	Seals	$0.35	$4.20
6	1	***AVOS Ballot Printing (16,000 Registered Voters)***		
7	1	Integra Database Set up $500	$500.00	$500.00
8	1	Ballot Printing Set Up $500	$500.00	$500.00
9	1	Ballots fully Duplex 11" $.29	$4,640.00	$4,640.00
10	1	Automated Insertion $.30	$4,800.00	$4,800.00
11	1	Envelope Design $125 per style	$125.00	$125.00
12		**Envelope Printing**		
13	1	Outgoing Envelopes $.12	$1,920.00	$1,920.00
14	1	Return Envelopes $.12	$1,920.00	$1,920.00
15	1	Security Sleeve $.10	$1,600.00	$1,600.00
16	1	Insert & Printing Voter Instructions $.10	$1,600.00	$1,600.00
		Total of Equipment and Services		**$26,618.20**
		Estimate Round Trip Shipping		**$500.00**
		Total Estimated Cost		**$27,118.20**

Remarks: This quote is valid for 90 days and subject to change for scope and configuration updates.

Prices include travel & Expenses

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-079, **Version:** 1

SUBJECT: A RESOLUTION OF THE TOWN OF ERIE AUTHORIZING THE TOWN TO ENTER INTO A CONSULTING AGREEMENT WITH FRONT RANGE RESEARCH ASSOCIATES, INC. IN THE AMOUNT OF $8,340.00 FOR THE CULTURAL SURVEY OF VARIOUS HISTORICAL AND ARCHITECTURAL BUILDINGS IN ERIE, COLORADO; SETTING FORTH DETAILS IN RELATION THERETO.

DEPARTMENT: Town Clerk

PRESENTER: Nancy Parker

FISCAL INFORMATION:
Cost as Recommended: $2,502.00 (Town Portion)
Balance Available:
Budget Line Item Number:
New Appropriation Required: Yes

STAFF RECOMMENDATION: Approval of Resolution

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

Town of Erie Historic Preservation Board has identified at least 13 potentially significant structures in Erie. The goal of the Historic Preservation Board is to determine the significance of the 13 buildings and/or structures by conducting an intensive survey of these buildings and/or structures as a first step to preserve and publicize historic places within Erie.

The Town of Erie has applied for and received from the Colorado Historical Society to assist in the Cultural Survey of Various Historical and Architectural Buildings and/or Structures Project.

The Grant amount is $8,340.00 and the Town's matching fund amount is $2,502.00The Erie Historic Preservation Board would like to award a contract to Front Range Research Associates, Inc. and to proceed with the project.

ATTACHMENTS: Resolution Approving a Consulting Contract
Services Agreement

RESOLUTION NO. 15-____

A RESOLUTION OF THE TOWN OF ERIE AUTHORIZING THE TOWN TO ENTER INTO A CONSULTING AGREEMENT WITH FRONT RANGE RESEARCH ASSOCIATES, INC. IN THE AMOUNT OF $8,340.00 FOR THE CULTURAL SURVEY OF VARIOUS HISTORICAL AND ARCHITECTURAL BUILDINGS IN ERIE, COLORADO; SETTING FORTH DETAILS IN RELATION THERETO.

WHEREAS, the Town of Erie, Colorado wishes to enter into a consulting contract with Front Range Research Associates, Inc. in the amount of $8,340.00 for the Cultural Survey of Various Historical and Architectural Buildings in Erie, Colorado.

WHEREAS, the Board of Trustees of the Town of Erie believes it is in the best interest of the Town to enter into such a contract.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. That the consulting contract between the Town of Erie and Front Range Research is found to be a reasonable and acceptable contract for the Cultural Survey of Various Historical and Architectural Buildings Project.

Section 2. That the Town of Erie be and is hereby authorized and directed to enter into the contract with Front Range Research Associates, Inc. and the appropriate Town Officers are hereby authorized and directed to sign and bind the Town of Erie to said contract in an amount not to exceed $8,340.00.

Section 3. That entering into the contract is found to be in the best interest of the Town of Erie, and necessary for the preservation of the public health and safety.

ADOPTED AND APPROVED THIS 13TH DAY OF OCTOBER, 2015, BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO.

TOWN OF ERIE,
a Colorado municipal corporation

By: _____
Tina Harris, Mayor

ATTEST:

By: _____
Nancy J. Parker, Town Clerk

INDEPENDENT CONSULTING SERVICE AGREEMENT
Town of Erie, Colorado, Historic Buildings Survey

This independent consulting services agreement is made this __ day of _____ 2015, between the Town of Erie, Colorado (hereafter the Town) and Front Range Research Associates, Inc., Denver, Colorado, a Colorado corporation (hereafter the Contractor). The Contractor agrees to undertake and complete the Scope of Work described in Attachment A of this agreement to conduct a historic buildings survey of thirteen buildings in Erie, Colorado, for a flat, fixed fee of **$8,340**.

ASSIGNMENT. The Contractor shall not assign any of its rights under this Agreement, or delegate the performance of any of its duties hereunder, without the prior written consent of the Town.

INDEPENDENT CONTRACTOR STATUS. This Agreement shall not render the Contractor an employee, partner, agent of, or joint venturer with the Town for any purpose. The Contractor is and will remain an independent contractor in its relationship to the Town. The Town shall not be responsible for withholding taxes with respect to the Contractor's compensation hereunder. The Contractor shall have no claim against the Town hereunder or otherwise for vacation pay, sick leave, retirement benefits, social security, worker's compensation, health or disability benefits, unemployment insurance benefits, or employee benefits of any kind.

ILLEGAL ALIENS–PUBLIC CONTRACTS FOR SERVICES. CRS 8-17.5-101 and 24-76.5-101. Contractor certifies that it shall comply with the provisions of CRS 8-17.5-101 et seq. Contractor shall not knowingly employ or contract with an illegal alien to perform work under this contract or enter into a contract with a subcontractor that fails to certify to Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform work under this contract. Contractor represents, warrants, and agrees that it (i) has verified that it does not employ any illegal aliens, through participation in the Basic Pilot Employment Verification Program administered by the Social Security Administration and Department of Homeland Security, and (ii) otherwise shall comply with the requirements of CRS 8-17.5-102(2)(b). Contractor shall comply with all reasonable requests made in the course of an investigation under CRS 8-17.5-102 by the Colorado Department of Labor and Employment. Failure to comply with any requirement of this provision or CRS 8-17.5-101 et seq., shall be cause for termination for breach and

Contractor shall be liable for actual and consequential damages. Contractor, if a natural person eighteen (18) years of age or older, hereby swears or affirms under penalty of perjury that he or she (i) is a citizen or otherwise lawfully present in the United States pursuant to federal law, (ii) shall comply with the provisions of CRS 24-76.5-101 et seq., and (iii) shall produce one form of identification required by CRS 24-76.5-103 prior to the effective date of this contract.

MODIFICATION. No amendment, change or modification of this Agreement shall be valid unless in writing signed by the parties hereto.

ENTIRE UNDERSTANDING. This document shall constitute the entire understanding and agreement of the parties, and any and all prior agreements, understandings, and representations are hereby terminated and canceled in their entirety and are of no further force and effect.

UNENFORCEABILITY OF PROVISIONS. If any provision of this Agreement, or any portion thereof, is held to be invalid and unenforceable, then the remainder of this Agreement shall nevertheless remain in full force and effect.

NOTICES. Notices required under this agreement shall be sent to the the Town at: Town of Erie, PO Box 750, Erie, CO 80516, and to the Contractor at: Front Range Research Associates, Inc., 3635 West 46th Avenue, Denver, Colorado 80211.

IN WITNESS WHEREOF the undersigned have executed this Agreement effective as to the day and year last written below. The parties hereto agree that facsimile signatures shall be as effective as if originals.

Contractor Research Associates, Inc.	Town of Erie
_____	_____
R. Laurie Simmons, President	{Name}, {Title}
Date: _____	Date _____

ATTACHMENT A

Scope of Work

This proposal is for a selective survey of 13 resources within the Town of Erie in Weld County. The resources include dwellings, a barn and outbuildings, and Mt. Pleasant Cemetery. This survey will be conducted in accordance with the requirements and guidelines of History Colorado (HC) as set forth in the *Colorado Cultural Resource Survey Manual (2007).* All work will be conducted by historic preservation contractors meeting the Secretary of the Interior's Professional Qualifications Standards. Regular consultations between the Town and History Colorado will take place throughout the project.

A. Task 1: Kickoff Teleconference and Fieldwork Preparation

1. Kickoff teleconference with Erie Town Clerk, History Colorado (HC) staff, and the consultant.
2. Pre-fieldwork preparation including: file search of the OAHP COMPASS database to determine previous survey work within Erie; setting up project GIS; obtaining current Assessor data; and setting up survey form database

B. Task 2: Conduct Fieldwork

1. Conduct fieldwork, mapping, and photography for the 13 resources (work will be completed from the public right of way)
2. Photography will be color digital with an average of three to four photos of each resource and will include outbuildings

C. Task 3: Prepare Draft Survey Forms and Report

1. Research the historical background of each of the properties, using such sources as directories, manuscript census returns, maps, old Assessor appraisal cards, property abstracts (if available), newspaper articles, published books, interviews, and other materials
2. Conduct background research into history of town to supplement that done in 2009-10 survey
3. Consult with HC staff on National and State eligibility of surveyed resources
4. Complete draft Architectural Inventory forms (form 1403) for 13 properties, including forms, maps, and labeled photographs
5. Prepare draft survey report, including the historic overview of the town, a survey area map, a USGS location map, and other required elements
6. Submit draft forms and survey report to Town and HC staff for review (one bound copy each and PDF versions of both)

D. Task 4: Prepare Final Survey Forms and Report

1. Incorporate comments on the draft surveys forms and survey report received from Town and HC
2. Produce final Architectural Inventory forms (form 1403) for 13 properties, including forms, maps, and labeled photographs (two original sets with photographs plus PDF versions)
3. Produce final survey report, including the historic overview of the town, a survey area map, a USGS location map, and other required elements (five bound copies plus PDF version)

E. Task 5: Public Presentation

1. Present survey results using PowerPoint to the Town Board of Trustees at a public meeting in Erie

Prepared 16 March 2015

Front Range Research Associates, Inc.
Erie, Colorado Selective Intensive Historic Buildings Survey
Cost Proposal

Project Budget

ITEM		AMOUNT
Labor		***$8,057***
Historian @$89.41/hr. for 90 hrs (rounded)	$8,057	
Task 1. Kickoff teleconference with Erie Town Clerk and HC staff. Pre-fieldwork preparation.	*$715*	
Task 2. Fieldwork, mapping, and photography research	*$2,893*	
Task 3. Prepare draft 1403 survey forms and survey report	*$2,893*	
Task 4. Prepare final 1403 survey forms and survey report	*$1,020*	
Task 5. Present results of survey to public meeting of the Town Board	*$536*	
Expenses		***$283***
Mileage (240 mis. @$.52 mi.; 3 roundtrips from Denver to Erie, mileage in the Erie area, and mileage in Denver for research at Denver Public Library and HC and meetings at HC) and Parking $6	*$131*	
Copies (research copies and copies of draft and final forms and reports) and Supplies (CDs/DVDs, archival photo labels, and archival storage sheets for photos)	*$80*	
Photographic prints (2 sets of 4"x6" prints for each resource)	*$52*	
Postage/shipping (survey forms and reports to Erie)	*$20*	
TOTAL		**$8,340**

NOTE: Labor amounts are rounded. Mileage uses SHF rates.

Prepared 16 March 2015

Front Range Research Associates, Inc.
Erie, Colorado, Selective Intensive Historic Buildings Survey
Timeline and Payment Schedule

APPROXIMATE TIME TO COMPLETE	TASK OR SUBTASK	APPROXIMATE PAYMENT AMOUNT
15 October 2015	Consultant under contract with city and receipt of notice to proceed	--
31 October 2015	Task 1. Completion of pre-fieldwork preparation and kickoff meeting	$715
15 January 2016	Task 2. Completion of intensive survey fieldwork and photography	$2,997
15 April 2016	Task 3. Submission of draft intensive survey forms and survey report	$3,024
15 June 2016	Task 4. Submission of final intensive survey forms and survey report	$1,041
15 July 2016	Task 5. Public meeting presentation of results of project	$563

This schedule assumes a fully executed contract and notice to proceed by 15 August 2015. The payment amounts include labor and an estimated allocation of expenses by task. *Revised 22 September 2015*

Erie Selective Intensive Survey, 2015-16:
List of Selected Resources to be Surveyed

Street Number	Street Name	Notes
305	Briggs St.	One-and-a-half-story frame Craftsman-style house, 1933
340	Briggs St.	One-and-a-half-story frame Craftsman-style house with stone porch and detached garage, 1933
526	Briggs St.	One-story brick two-storefront commercial building (Gateway Building), 1940
575	Cheesman St.	One-story red brick house with spindled porch supports and shingled gable faces, 1947 (according to Assessor but seems older)
585	Evans St.	One-story frame Bungalow-style house, 1927
	High St.	Abandoned barn and associated outbuildings in field 240' south of 300 High St. (Goat Hill Barn)
300	Holbrook St.	Small one-story frame house, 1890
404	Holbrook St.	One-and-a-half-story red brick house with shingled gable faces, 1891
504	Holbrook St.	One-story frame Bungalow-style house, 1930
585	Main St.	One-and-a-half-story frame house and detached garage, 1928
784	Main St.	Two-story frame house (Morgan House #2), 1899
785	Main St.	One-and-a-half-story Craftsman-style house, 1922
3500	Weld County Road 3	Mt. Pleasant Cemetery, 1880s (more than 900 graves on about 14.6 acres)

The source for year-built information is the Weld County Assessor. If for some reason one of the proposed resources in the table cannot be surveyed, it will be replaced with a comparable property.

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-081, **Version:** 1

SUBJECT: A RESOLUTION AUTHORIZING THE TOWN OF ERIE, COLORADO, TO ENTER INTO A DECLARATION OF PERMANENT NON-EXCLUSIVE EASEMENT AGREEMENT WITH THE DILLON COMPANIES, INC.; AUTHORIZING AND DIRECTING THE APPROPRIATE TOWN OFFICERS TO SIGN EASEMENT AGREEMENT

DEPARTMENT: **Administration**

PRESENTER: **A.J. Krieger**

FISCAL INFORMATION:
Cost as Recommended:
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: **Approval of Resolution**

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

ATTACHMENTS: **Resolution**

RESOLUTION NO. _____-2015

A RESOLUTION AUTHORIZING THE TOWN OF ERIE, COLORADO, TO ENTER INTO A DECLARATION OF PERMANENT NON-EXCLUSIVE EASEMENT AGREEMENT WITH THE DILLON COMPANIES, INC.; AUTHORIZING AND DIRECTING THE APPROPRIATE TOWN OFFICERS TO SIGN EASEMENT AGREEMENT; AND, SETTING FORTH DETAILS IN RELATION THERETO.

WHEREAS, the Town of Erie, Colorado wishes to enter into a Declaration of Permanent Non-exclusive Easement Agreement with the Dillon Companies, Inc. for the purpose of accepting an easement from the Dillon Companies, Inc. restricting and prohibiting building on a certain portion of the real property owned by the Dillon Companies Inc.; and,

WHEREAS, the Board of Trustees of the Town of Erie believes it is in the best interest of the Town to enter into and accept such a Declaration of Permanent Non-exclusive Easement Agreement.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. That the Declaration of Permanent Non-exclusive Easement Agreement between the Town of Erie and the Dillon Companies, Inc., a copy of which is attached hereto and incorporated herein by reference, is found to be a reasonable and acceptable easement for the purpose of restricting and prohibiting any construction or building on a certain portion of the real property owned by the Dillon Companies, Inc.

Section 2. That the Town of Erie be and is hereby authorized and directed to enter into the Declaration of Permanent Non-exclusive Easement Agreement with the Dillon Companies, Inc., and the appropriate Town officers are hereby authorized and directed to sign and bind the Town of Erie to said Easement Agreement.

Section 3. That entering into the Declaration of Permanent Non-exclusive Easement Agreement with the Dillon Companies, Inc. is found to be in the best interest of the Town of Erie, and necessary for the preservation of the public health and safety.

ADOPTED AND APPROVED THIS 13TH DAY OF OCTOBER, 2015, BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO.

TOWN OF ERIE,
a Colorado municipal corporation

By: _____
Tina Harris, Mayor

ATTEST:

By: _____
Nancy Parker, CMC, Town Clerk

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-068, **Version:** 1

SUBJECT: 2015 SAVVY Awards Presentation, City-County Communications & Marketing Association

- Town of Erie Government Website: SAVVY Award, Digital Interactive Website
- "Water" episode of Inside Erie: Silver Circle Award, TV and Video - Education/Training

DEPARTMENT: Administration

PRESENTER: Fred Diehl, Assistant to the Town Administrator

FISCAL INFORMATION: N/A
Cost as Recommended:
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: N/A

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

During the 2015 SAVVY Awards held on September 10th in Atlanta, Georgia, the City-County Communications & Marketing Association (3CMA) awarded the Town of Erie government website the SAVVY Award in the category of Digital Interactive Website. 3CMA also awarded the "Water" episode of Inside Erie the Silver Circle Award in the category of TV and Video - Education/Training.

The Savvy Awards, held in conjunction with 3CMA's annual conference, recognize outstanding local government achievements in communications, public-sector marketing and citizen-government relationships. The Savvies salute skilled and effective city, county, agency or district professionals who have creatively planned and carried out successful innovations in communications and marketing. This year, more than 700 entries in 36 categories were received.

Town of Erie Website <http://www.erieco.gov>: SAVVY Award, Digital Interactive - Website
As the online gateway to the Town of Erie, the new www.erieco.gov is a more welcoming, informative and easier to navigate local government website - that doesn't look like a government website. Our good looks may be the reason for the 24% increase in Unique Site Visits but it's our improved navigation that is the reason for the 34% decrease in Total Page Visits. The result? Our customers get to where they want to go in fewer clicks than ever before!

"Water" episode of Erie Edition <https://www.youtube.com/watch?v=xo8vm87cnXg>: Silver Circle, TV and Video - Education/Training
Nationwide, many utilities are grappling with the problem of aging infrastructure. Fortunately, as Erie is a younger community, our water customers enjoy the benefits of our newer - state of the art infrastructure. And at the heart of that infrastructure is the Lynn R. Morgan Water Treatment Facility. The "Water" edition of Inside Erie shows where Erie's

water comes from and what it takes to deliver it to our community.

BACKGROUND: In 2014, the Town of Erie won a SAVVY for the "Keep Erie Safe Animated Video" for best Promotional Video. In 2013, 3CMA awarded the "Town of Erie Economic Development Mobile Application" its highest honor, the 2013 President's Award for Most Outstanding Marketing Program in addition to two SAVVY Awards and one Silver Circle Award.

ATTACHMENTS:

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-069, **Version:** 1

SUBJECT: Governor's Award for Downtown Excellence

DEPARTMENT: Administration

PRESENTER: Paula Mehle, Economic Development Coordinator

FISCAL INFORMATION: N/A
Cost as Recommended:
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: N/A

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

Downtown Colorado, Inc., has awarded the Town of Erie's "Firehouse to Brewpub" submission the Governor's Award for Downtown Excellence in the category of **Best Adaptive Reuse or Rehabilitation, using the tool of a Town Urban Renewal Authority.**

A revitalized Historic Downtown Erie Business District has been a community aspiration for years. The Governor's Award recognizes the Town of Erie's "Firehouse to Brewpub" as a successful public/private partnership that serves as a catalyst for further Downtown retail business development which in turns attracts visitors. Joining Echo Brewery in this revitalization effort are Industrial Revolution Brewing Company, Old Mine Cidery, Sweets Bakery, Erie Farmers Market and 24 Carrot Bistro. With the increase in popularity of Downtown as a destination, it follows that sales tax revenue would increase as well. In fact, Historic Downtown Erie Business District sales tax revenues increased approximately 43% ($23,000) in 2014 when compared to the previous year.

Located on the most prominent corner of Historic Old Town Erie Urban Renewal Area, the 2,500 sq. ft. building was originally constructed in 1969 and served as the community's only fire station until 2002. In February of 2013, a Request for Proposals was issued; in August of 2013, the Lease/Purchase Agreement with Echo Brewery was approved and in September of 2014 Echo celebrated their Grand Opening and will be celebrating their first anniversary this weekend.

About Governor's Awards for Downtown Excellence

All of the 2015 Governor's Awards for Downtown Excellence winners were honored at the 2015 Governor's Awards Gala on October 8, 2015, which was held during DCI's 2015 Annual Conference in Durango.

Since 2003, the Governor's Awards have recognized outstanding projects and people in Colorado that demonstrate creativity in the face of enormous challenges, unlikely and enduring partnerships, and dedication to community. All 2015

nominated projects were completed between September 1, 2010 and May 30, 2015.

About Downtown Colorado, Inc.

Established in 1982 as the Colorado Community Revitalization Association, Downtown Colorado, Inc. is a 501(c)3 nonprofit membership organization that aims to build better communities by providing assistance to downtowns, commercial districts and town centers in Colorado. Organization members represent downtown organizations, local governments, development and improvement districts, consultants, individuals and others involved in downtown and community development.

ATTACHMENTS:

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-072, **Version:** 1

SUBJECT: Resolutions

Consideration of A Resolution Authorizing the Town of Erie, Colorado to Apply for a Grant from Great Outdoors Colorado for Funds to Assist with the Master Plan and Construction Documents of the Flatiron Meadows Park Site
DEPARTMENT: Parks & Recreation

PRESENTER: Farrell Buller, Parks & Recreation Director

FISCAL INFORMATION:
Cost as Recommended: If awarded grant **$108,500.00**
Balance Available: $1,899,152.00
Budget Line Item Number: 320-50-110-605000-100193
New Appropriation Required: Yes - If awarded grant

STAFF RECOMMENDATION:

Approval of A Resolution Authorizing the Town of Erie, Colorado to Apply for a Grant from Great Outdoors Colorado for Funds to Assist with the Master Plan and Construction Documents of the Flatiron Meadows Park Site

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

Great Outdoors Colorado (GOCO) now offers one grant cycle each year. Applications for the 2016 cycle are due on Thursday, November 5, 2015. Based on the Board's interest in pursuing alternative funding options, staff plans to submit a grant application for funds to complete a master plan and construction documents for the Flatiron Meadows park site.

The grant application requires a signed resolution from the Board of Trustees. The resolution must include the following:

- Support for the proposed project and application.
- Acknowledgement that the Town is responsible for the expenditure of funds required to meet the terms and obligations of the grant agreement and application. This would be approximately $108,500 if the grant is awarded.
- A statement authorizing a designated official to sign the grant agreement if the grant is awarded.
- A statement confirming the Town's ability to complete the specific transactions that will be necessary to accomplish the project.

The grant request is for funds to complete the Flatirons Meadows Park Master Plan and construction documents. This plan will be for the Town park site as well as the Boulder Valley School District's new school site that was approved

when BVSD voters passed a bond issue in 2014. The plan will create a comprehensive framework and construction documents for the neighborhood park, trail connections and the school grounds. By working collaboratively with BVSD we can create a site will benefit the residents of Erie in their pursuit of both passive and active recreational opportunities as well as take into consideration the future needs of the Boulder Valley School District. This coordinated effort will maximize our resources and create a unifying document that all parties support.

In March of 2015 the Parks & Recreation Department submitted a grant application for this same project, unfortunately GOCO funded four projects and ours was rated at number five. With updated statistics on growth in the Town, increased collaboration with BVSD, and the 2015 citizen survey results we feel confident that we can be successful in obtaining this grant.

The GOCO Board decision for this cycle is tentatively scheduled for March 17, 2016. If successful, GOCO will fund up to $75,000 of the project cost and the Town must provide the balance (10% must be in cash).

ATTACHMENTS:

RESOLUTION NO. 15-____

A RESOLUTION AUTHORIZING THE TOWN OF ERIE, COLORADO TO APPLY FOR A GRANT FROM GREAT OUTDOORS COLORADO FOR FUNDS TO ASSIST WITH THE MASTER PLAN AND CONSTRUCTION DOCUMENTS OF THE FLATIRON MEADOWS PARK SITE; AND SETTING FORTH DETAILS IN RELATION THERETO.

WHEREAS, the Town of Erie, Colorado wishes to apply for a grant from Great Outdoors Colorado for funds to assist with the Master Plan and Construction Documents of the Flatiron Meadows park site; and

WHEREAS, the Board of Trustees of the Town of Erie believes it is in the best interest of the Town to apply for such grant funding.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. The Town of Erie supports the master planning and construction of the park site located in the Flatiron Meadows development.

Section 2. The Town of Erie acknowledges that it is responsible for providing matching funds as outlined in the grant application and it is responsible for the expenditure of funds necessary to meet the terms and obligations of any grant awarded.

Section 3. If the grant is awarded, the Town of Erie hereby authorizes the Mayor of the Town of Erie to sign the grant agreement with Great Outdoors Colorado.

Section 4. This resolution shall be in full force and effect from and after its passage and approval.

ADOPTED AND APPROVED THIS 13th DAY OF OCTOBER 2015, BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO.

TOWN OF ERIE,
a Colorado municipal corporation

By: _____
Tina Harris, Mayor

ATTEST:
By: _____
Nancy J. Parker, CMC, Town Clerk

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-073, **Version:** 1

SUBJECT: Resolution

Consideration of A Resolution Authorizing the Town of Erie, Colorado to Apply for a Grant from Colorado Parks and Wildlife for Funds to Assist with the Construction Improvements and Maintenance for Town of Erie Trails

DEPARTMENT: Parks & Recreation

PRESENTER: Farrell Buller, Parks & Recreation Director

FISCAL INFORMATION:
Cost as Recommended: If awarded grant - $750.00
Balance Available: $3,414,602.00
Budget Line Item Number: 210-50-110-605000-100204
New Appropriation Required: Yes

STAFF RECOMMENDATION:

Approval of A Resolution Authorizing the Town of Erie, Colorado to Apply for a Grant from Colorado Parks and Wildlife for Funds to Assist with the Construction Improvements and Maintenance for Town of Erie Trails

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

Colorado Parks and Wildlife (CPW) through their Trails Program offers construction and maintenance grants to facilitate their mission of providing opportunities for the public to use and support Colorado's diverse system of trails. Based upon the Board's interest in pursuing alternative funding opportunities, staff would like to submit a grant application for funds to complete a section of Erie's extensive trail network. The grant application deadline for the 2016 grant cycle is November 2, 2015.

The grant application requires a signed resolution for the Board of Trustees. This resolution must include the following:

- Support for the proposed project and grant application
- Acknowledgement that the Town is responsible for the expenditure of funds required to meet the terms and obligations of the grant agreement and application. This would be approximately 30% of the projects eligible costs, but only 3% of the projects costs must be in cash, the remainder can be in-kind
- A statement authorizing a designated official t sign the grant agreement if the grant is awarded
- A statement verifying the property targeted for the proposed project is under the control of the Town for at least 25 years

It is staff's intention to apply for the Small Construction/Maintenance grant in the amount of $25,000 for funds to complete the Black Line of the Single Track trails in the Sunset Open Space. The required matching funds would be secured via in-kind with Town full time and seasonal staff salaries, supplies and materials for the project and support from the Erie Single Track Advocates and volunteer hours. Town funds would not exceed any already requested in the 2016 operation budget.

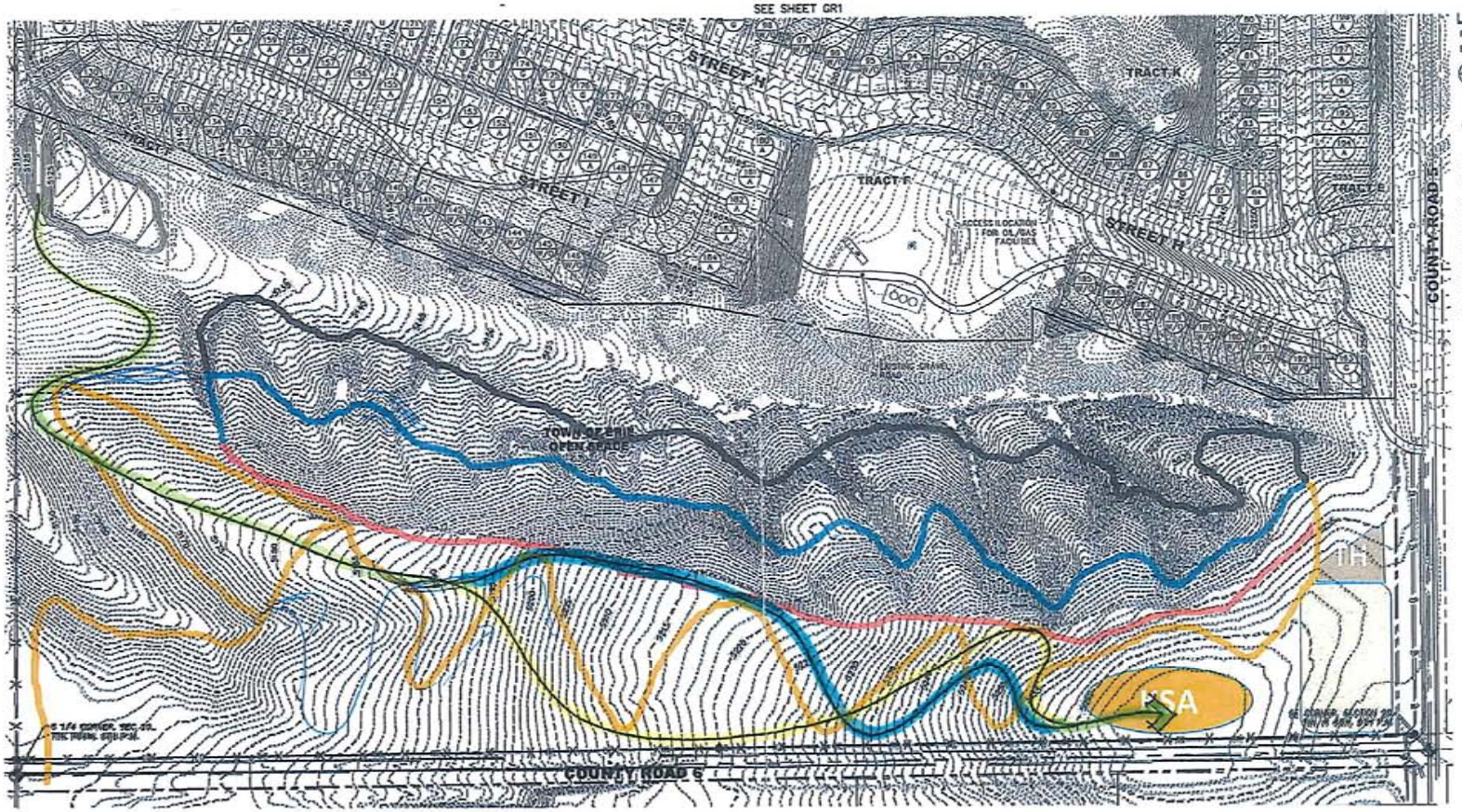
The CPW Commission decision on grant recipients is scheduled for April of 2016.

ATTACHMENTS:

1. Sunset West Trail Map

SUNSET
PRELIMINARY PLAT
A REPLAT OF TRACT A
TOWN OF ERIE, COUNTY OF WELD COUNTY, STATE OF COLORADO
103.83 ACRES - 247 LOTS - 11 TRACTS
PP-13-00010

SEE SHEET GR1



LEGEND:

PROPOSED CONTOURS ——4925——

EXISTING CONTOURS - - - - 4925 - - - -

(12) LOT NUMBER
(A) LOT TYPE

- A FRONT-DRAIN LOT
- B SPLIT-DRAIN LOT
- T TRANSITIONAL LOT
- W/O WALKOUT LOT
- G GARDEN LEVEL LOT

NOTES:

1. SEE LANDSCAPE PLAN FOR WALK DELINEATIONS.
2. RETAINING WALLS WILL BE A MAXIMUM 4' TALL AND WILL BE CONSTRUCTED WITH HOMES. WALL MATERIALS WILL BE APPROVED PER THE COVENANTS. WALLS WILL BE WITHIN PROPERTY LINE EXCEPT AS SHOWN HEREIN.
3. THE DEVELOPER WILL BUILD THE RETAINING WALLS IN THE OPEN SPACE. THE BUILDER WILL BUILD THE RETAINING WALLS IN THE LOTS.
4. SLOPE GRADING DOES NOT EXCEED 4:1 UNLESS NOTED.

DATE	REVISION DESCRIPTION

Drawing Name: 21GR1.dwg	0 50 100 200 — 1 inch = 100 ft. Horizontal		
Job Number: FSLAND SUNSET			
Prepared For: FS ERIE ESTATES, LLC	Designer: BKM	Drafter: BRR	Checked: TAJ

Calibre
Calibre Engineering, Inc
9660 South Ridgeline Boulevard, Suite 105
Highlands Ranch, CO 80129 (303) 730-0424
www.calibre-engineering.com
Construction Management Civil Engineering Surveying

SUNSET
PRELIMINARY PLAT
GRADING PLAN

Sheet **GR2** 11 of 15

Date JANUARY 23, 2014

RESOLUTION NO. 15-____

A RESOLUTION AUTHORIZING THE TOWN OF ERIE, COLORADO TO APPLY FOR A GRANT FROM COLORADO PARKS AND WILDLIFE FOR FUNDS TO ASSIST WITH THE CONSTRUCTION IMPROVEMENTS AND MAINTENANCE FOR THE TOWN OF ERIE TRAILS; AND SETTING FORTH DETAILS IN RELATION THERETO.

WHEREAS, the Town of Erie, Colorado wishes to apply for a grant from Colorado Parks and Wildlife for funds to assist with the Construction Improvements and Maintenance for the Town of Erie Trails; and

WHEREAS, the Board of Trustees of the Town of Erie believes it is in the best interest of the Town to apply for such grant funding.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. The Town of Erie supports the construction improvements and maintenance of the Town of Erie trails.

Section 2. The Town of Erie acknowledges that it is responsible for providing matching funds as outlined in the grant application and it is responsible for the expenditure of funds necessary to meet the terms and obligations of any grant awarded.

Section 3. If the grant is awarded, the Town of Erie hereby authorizes the Mayor of the Town of Erie to sign the grant agreement with Colorado Parks and Wildlife.

Section 4. The proposed project sites are owned by the Town of Erie and will be owned by and under the control and maintenance of the Town of Erie for at least the next 25 years.

Section 5. This resolution shall be in full force and effect from and after its passage and approval.

ADOPTED AND APPROVED THIS 13th DAY OF OCTOBER 2015, BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO.

TOWN OF ERIE,
a Colorado Municipal Corporation

By: _____
Tina Harris, Mayor

ATTEST:
By: _____
Nancy J. Parker, CMC, Town Clerk

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-080, **Version:** 1

SUBJECT: A RESOLUTION OF THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO DESIGNATING AN HISTORIC LANDMARK PURSUANT TO THE PROVISIONS OF TITLE 3, "BOARDS AND COMMISSIONS," CHAPTER 3, "HISTORIC PRESERVATION ADVISORY BOARD," SECTION 3-3-8 B. OF THE TOWN OF ERIE MUNICIPAL CODE; SPECIFICALLY DESIGNATING 365 MAIN STREET, ERIE, COLORADO, AS A TOWN HISTORIC LANDMARK OF SPECIAL HISTORICAL, ARCHITECTURAL, CULTURAL, INTEREST AND VALUE OF A HISTORIC NATURE

DEPARTMENT: Town Clerk

PRESENTER: Historic Preservation Board

FISCAL INFORMATION:
Cost as Recommended: None
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: Approval of Resolution

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

ATTACHMENTS: Resolution Designation Historic Landmark
Applicants Submittal

RESOLUTION 15-____

A RESOLUTION OF THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO DESIGNATING AN HISTORIC LANDMARK PURSUANT TO THE PROVISIONS OF TITLE 3, "BOARDS AND COMMISSIONS," CHAPTER 3, "HISTORIC PRESERVATION ADVISORY BOARD," SECTION 3-3-8 B. OF THE TOWN OF ERIE MUNICIPAL CODE; SPECIFICALLY DESIGNATING 365 MAIN STREET, ERIE, COLORADO, AS A TOWN HISTORIC LANDMARK OF SPECIAL HISTORICAL, ARCHITECTURAL, CULTURAL, INTEREST AND VALUE OF A HISTORIC NATURE; AND, SETTING FORTH DETAILS IN RELATION THERETO.

Whereas, Title 3, "Boards and Commissions," Chapter 3, "Historic Preservation Advisory board," Section 3-3-8 B. of the Erie Municipal Code provides for the nomination and designation of structures and/or sites of special historical or architectural value by the Board of Trustees of the Town of Erie; and

Whereas, Section 3-3-8 B. provides that a historic property can be nominated for designation by the Town of Erie Historic Preservation Board by an application submitted by the owner of authorized representative of the property for which designation is requested; and

Whereas, the Erie Historic Preservation Board, upon application of the owner of the property, initiated proceedings pursuant to Section 3-3-8 B. has recommended the designation of these sites as Historic Landmarks; and

Whereas, the subject property is all that real property described in "Exhibit A" which is attached hereto and made a part hereof by reference as if fully set forth herein.

NOW, THEREFORE BE IT RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO, AS FOLLOWS:

Section 1. In accordance with the provisions of Title 3, "Boards and Commissions," Chapter 3, "Historic Preservation Advisory board," Section 3-3-8 B. of the Erie Municipal Code, the Board of Trustees of the Town of Erie does hereby designate the hereinafter described as 365 Main Street, Erie, Colorado as a landmark of special historic and architectural value.

INTRODUCED, READ, SIGNED AND APPROVED THIS 13th DAY OF OCTOBER, 2015

TOWN OF ERIE, a Colorado municipal corporation

By: _____
Tina Harris, Mayor

ATTEST:

By: _____
Nancy J. Parker, CMC, Town Clerk

EXHIBIT A

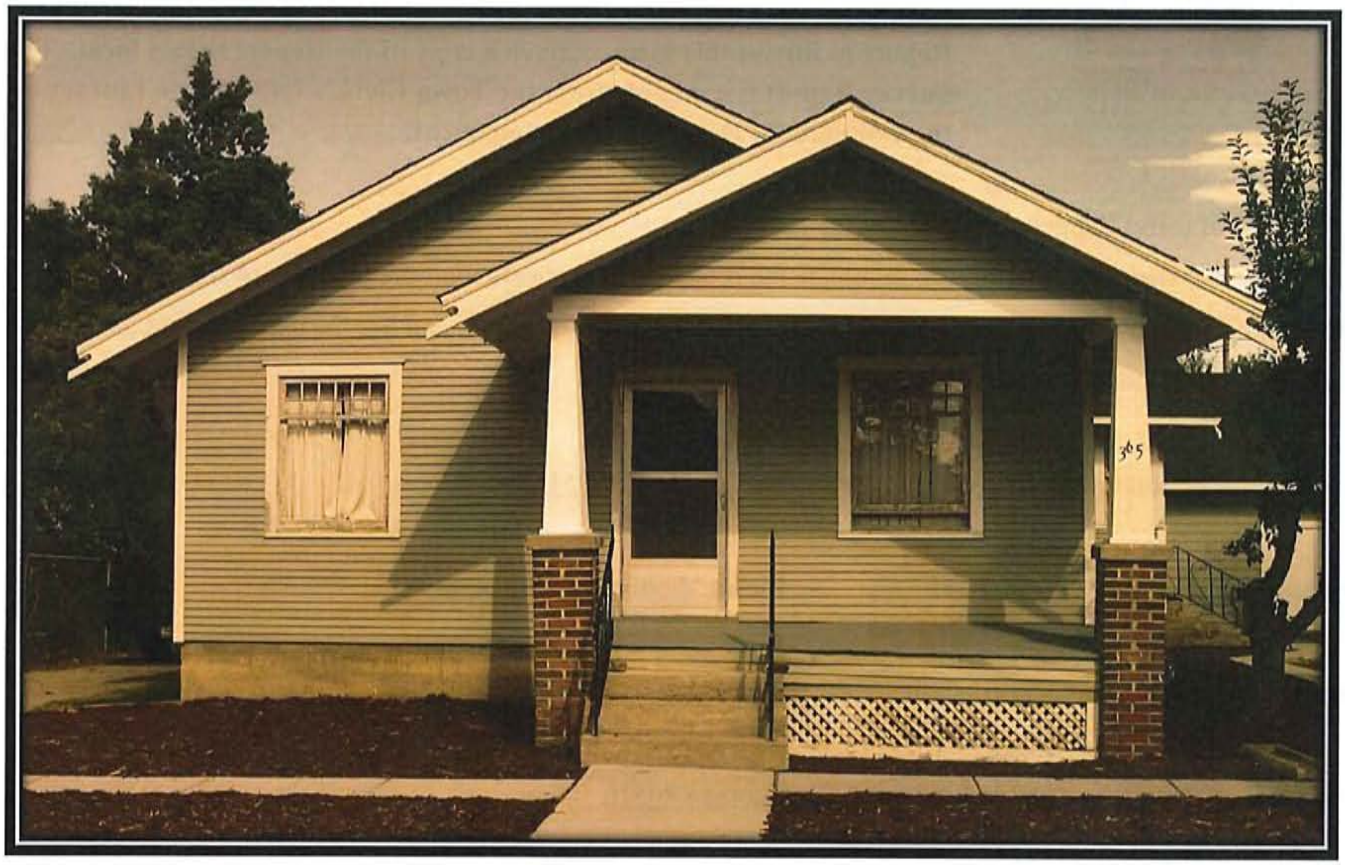
to Resolution

Historic Landmark Designation

365 Main Street
Erie, Colorado

Legal Description:

ERI 24744 L4 THRU L6 & N2 L7 BLK3 HUNTS 1ST



Erie, Colorado

365 Main Street

Historic Properties Landmark Nomination

HISTORIC LANDMARK
CERTIFIED LOCAL GOVERNMENT
TOWN OF ERIE
1874

Site: Main Street 365

HISTORIC
LANDMARK

CERTIFIED LOCAL GOVERNMENT
TOWN OF ERIE
1874

HISTORIC LANDMARK PROPERTIES
NOMINATION FORM

PLEASE NOTE: If this property was included in the 2009-2010 survey of potential historic sites for the Town of Erie by Front Range Research Associates, then most of the information can be used from that Survey Report to fill out this form. Attach a copy of the Report to this form. The Survey Report is available from the Town Clerk's Office, Erie Library or the Community Development Department.

Owner(s) of (Site) Property: David Lotton

(Only the owner(s) of properties can nominate the property. If there are multiple owners, list the principal owner first for contact purposes. List all owners of interest in the property and use the exact name(s) as it appears on the recorded Title.)

Address of contact person: 365 Main Street, Erie, Colorado 80516

Phone: 303-641-5000 **Fax:** _____ **Email:** dlotton@dlotton.com

Historic Name of Property (if applicable) _____

Address of Property: 365 Main Street, Erie, Colorado 80516

Structure(s) on the Property being nominated: Bungalow Style Residence

(List all that are applicable: i.e. house, commercial building, church, etc. Exclude structures not part of the nominated structure but are now located on the (site) property.)

Use of Property:

Historic: Residence

Current: Residence

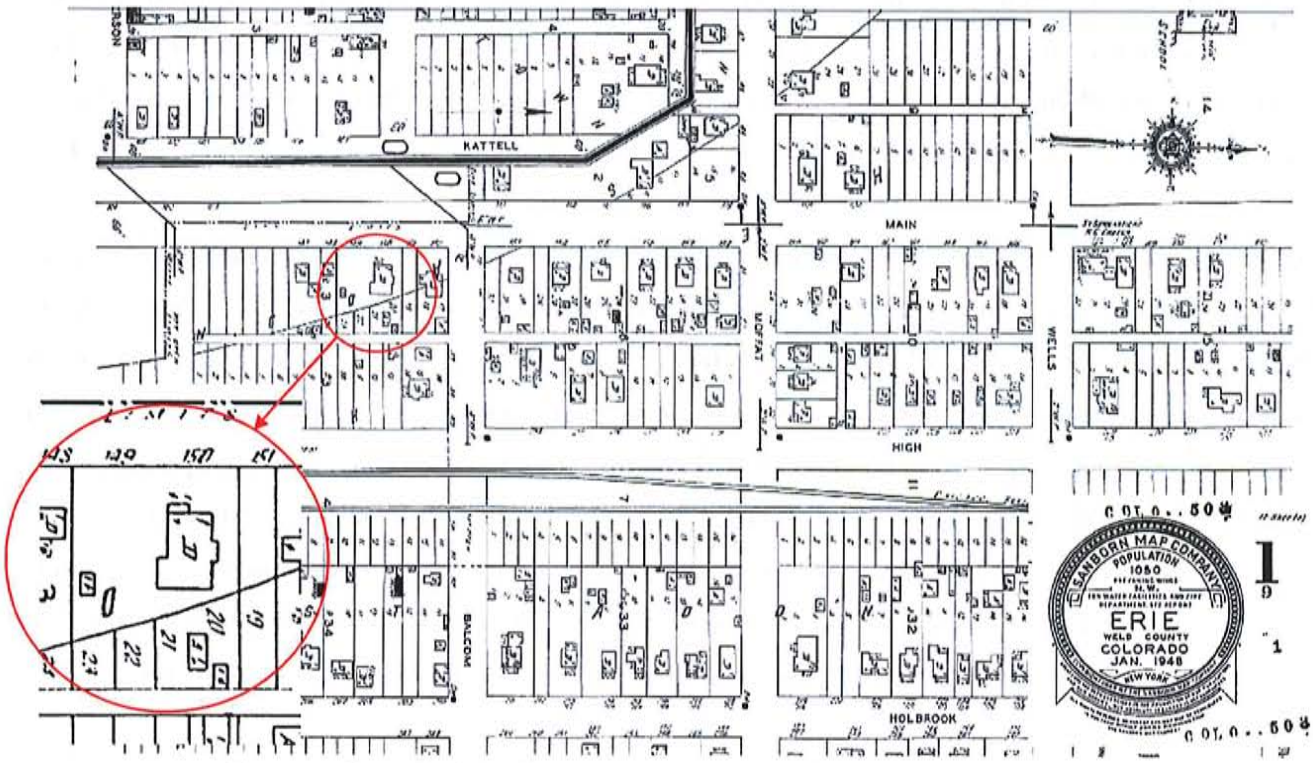
Source(s) of information: Current Owner

Year of Construction: 1931
Year(s) of Exterior Remodeling (if known): 2015

Historical Narrative:

The house located at 365 Main Street has not changed significantly since it's initial 1931 construction date as evidenced by its documentation on the Erie, Colorado 1948 Sanborn Insurace Map. It appears that the addition to the northeast corner was in-situ then and at least one of the out buidlings *(the garage, image 16)* is still located on its historic site.

One of the early owners was Donminick A. Stermlon. His name is engraved on the Coal Miner's Memorial located in front of Erie Town Hall *(grave marker, see image 22).*



Excerpts from 1948 Sanborn Insurance Map Indicating Historic Location and Configuration of 645 Main Street

Description:

Written by Dave Snow, retired National Park Service Historical Architect

The primary structure located at 365 Main Street, Erie, Colorado, is a 1930s era, wood frame, (one level with full basement), American Craftsman Bungalow style residence with two bedrooms, study, living, dining, kitchen and one bath. Much of the interior is unchanged with stained and varnished door and window trim and tongue and groove natural finish oak floors *(see images 17 and 19)*. There are also a historic built-in features; a closet ironing board, linen and medicine cabinets *(see Images 18, 20 and 21)*. The house is currently undergoing restoration and has never been moved from its historic location. Additionally, there are three unrestored historic out buildings; two garages and an outhouse at the northeast corner of the site *(see Images 13-16)*. A recently constructed contemporary garage is located at the southeast corner of the lot.

The massing of the house consists of one primary gable roofed portion with two perpendicular intersecting similarly gable roofed portions; one at the approximate midpoint of the north elevation *(see Images 8 and 10)* and one that is flush with the east wall of the main structure *(see Image 4)*. The front porch is an asymmetrical extension of the main house gable on the east side *(see Image 1)*. It appears that the intersecting gable roofed portion (southeast corner) was added some time after the initial construction *(see Image 3),* but prior to 1948, likely to allow an enclosed access to the full basement. It should be noted that the foundation walls of this addition consists of concrete block, whereas the main house has a poured-in-place concrete foundation indicating deformations from wood plank forms *(see Images 3 and 4)*. The addition closely matches the character, style and materials of the main house and was constructed early enough (prior to 1948) to be considered an historic modification.

The roof has recent contemporary composition shingles and "turtle back" attic vents. However, the chimney appears to be constructed with historic brick similar to that used on the front porch columns and is assumed to have been part of the initial construction *(see Image 2)*. Eaves are typically exposed rafter tails with gable end barge boards extending beyond the roof drip line. The barge boards are uniquely shaped at their tips and extend past the eave line *(see Image 11)*.

Windows are typically double hung painted wood with six lites in the upper sash, the check rail centered. One exception are windows in the prime living area of the house. Some of these windows are larger and have an upper sash with 12 lites that is only approximately a quarter the height of the entire window, thus substantially raising the height of the check rail. On the west end of the south wall both window types are combined to create a "ribbon window" effect *(see Image 2)*. A second exception are windows on the west and south elevations of the addition;

they are single lite double hung sashes. Other windows used on the south and north elevation of the addition match the main house and may have been reused when the addition was added. Basement windows are 3 lite with painted wood sash *(see Images 4 and5*). Windows and storm sash are currently being restored.

The exterior walls are typically sheathed with painted historic clapboards with approximately a 3-1/4" exposure. According to the current owner, deteriorated historic metal wall corner trim has been replaced with nominal dimension painted wood trim boards.

The wood panel front door appears to be historic and has 6 lites in the upper half and one panel below. It is unknown if the back door on the addition is historic, but the door in that location does have a transom.

The front porch is very characteristic of an American Bungalow with its simplicity of detail. The two square porch columns have unpainted brick bases with what appears to be unpainted cast concrete caps. They are each topped with a tapered and painted wood column. The porch ceiling is sheathed with painted tongue and groove bead board. Voids under the porch are screened with painted wood lattice.

It appears every reasonable effort is being taken to preserve historic fabric and character defining features with the restoration work currently underway by the owner.

General Significance of the Property:

_x_A. Architectural Criteria. The structure has distinctive characteristics of a type, period method of construction or artisan."
_x_C. Geographic Criteria. The structure "Enhances the sense of identity of the community."

Statement of Significance:

The residence at 365 Main Street, Erie, Colorado is an excellent example of a historic American Craftsman Bungalow, a design style that remained popular into the early 1930s.

Overall, its architecture has a low profile with prominent horizontal accents, low pitched roof lines, deep overhanging eaves, exposed rafters; and a front porch beneath an extension of the main roof.

The structure contributes to the identity of the community by being of a comparable vernacular style and construction date as nearby residences concentrated on the historic platted sites and streets that make up the town of Erie, Colorado.

Primary Character Defining Features:

- Heavy gable end barge boards with decoratively shaped tips that extend past the eave line.
- Exposed rafters.
- Large roof overhangs
- Clapboard siding with a narrow exposure to accentuate horizontality.
- Craftsman style windows with divided-lite top sashes (six or twelve-over-one).
- Raised check rails on large windows in prominent locations to emphasize horizontality.
- Front porch beneath extension of main roof.
- Decorative square porch columns with brick masonry and tapered wood columns.

Bibliography:

Stull, James B., *A Brief History of Erie, Colorado, Out of the Coal Dust.* Charleston, SC: The History Press, 2015

Description of Property:

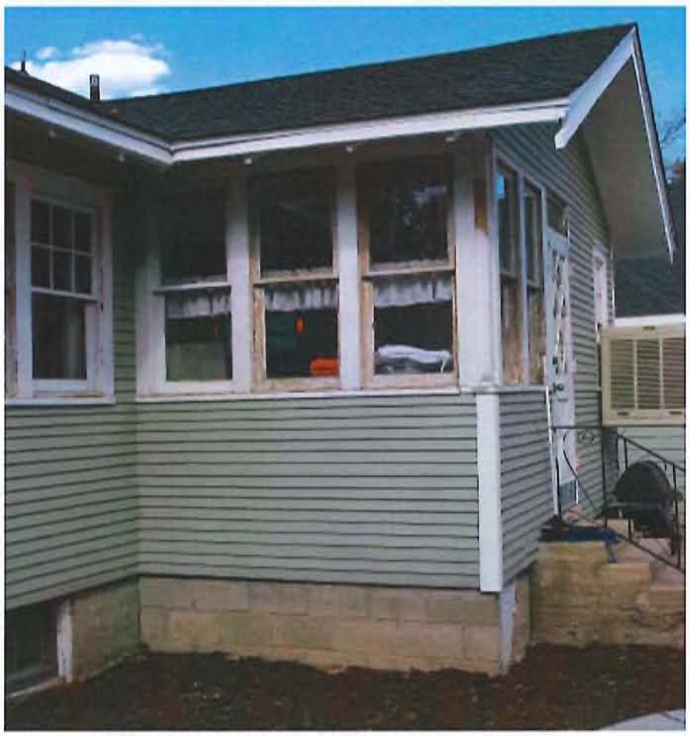
1. Legal description of property: Lot: ERI 24744 Lot 4 Thru Lot N2 L7 Block: 3 Subdivision: Hunts 1st Add

2. Description of manmade site features that contribute to the historic significance of structure being nominated: Detached wood frame, gable-roofed garage.

Photos of Current Structure:

Sept. 2, 2015, Image 1: West Elevation

Sept. 2, 2015, Image 2: West End of South Elevation



Sept. 2, 2015, Image 3: West Elevation of South Addition

Sept. 2, 2015, Image 4: South Elevation of South Addition

Sept. 2, 2015 Image 5: South End of East Elevation

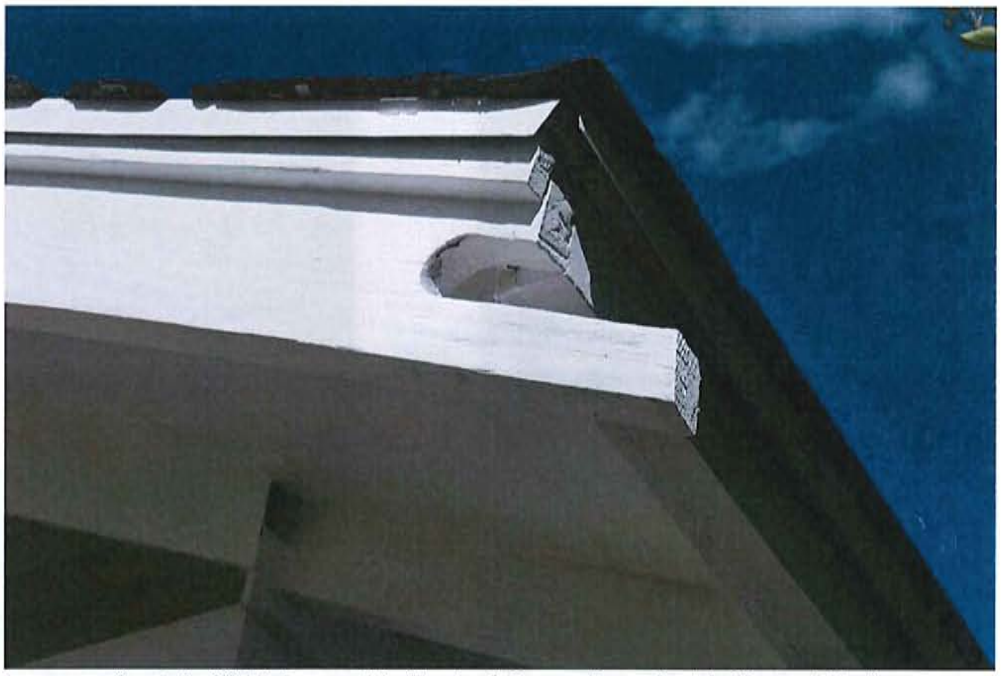
Sept. 2, 2015 Image 6: North End of East Elevation

Sept. 2, 2015 Image 7: East End of North Elevation (Note inset detail of coal chute cover dated 1928)

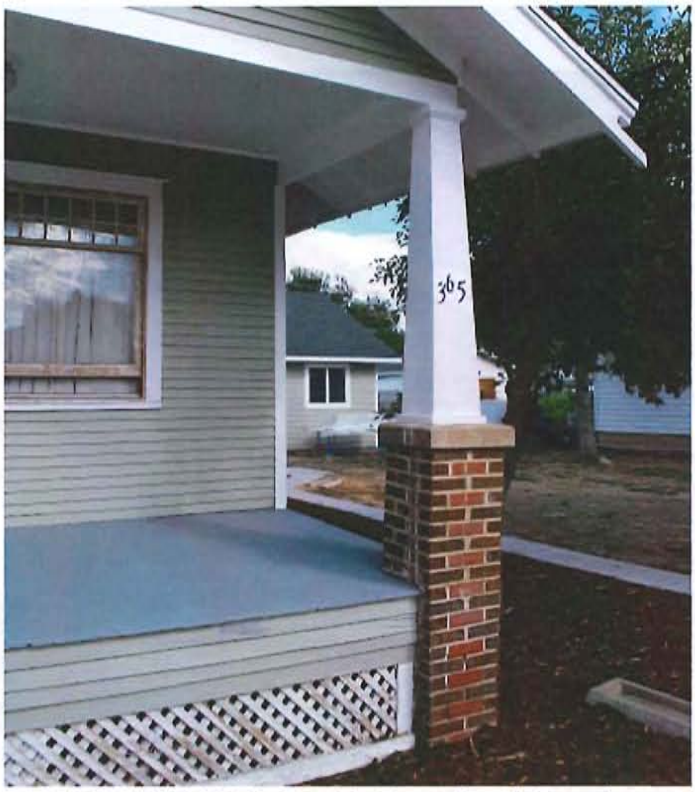
Sept. 2, 2015 Image 8: West End of North Elevation

Sept. 2, 2015 Image 9: Window Detail

Sept. 2, 2015 Image 10: Note North Wall and Roof Extension at far left



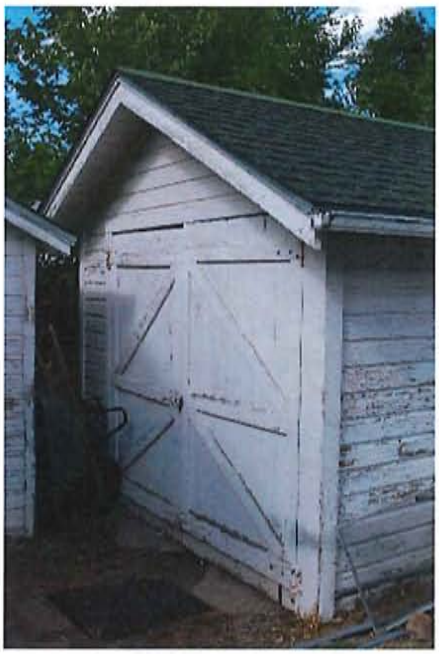
Sept. 2, 2015 Image 11: Typical Barge Board with Shaped End



Sept. 2, 2015 Image 12: Front Porch Detail

Sept. 2, 2015 Image 13: West Garage, Looking Northwest

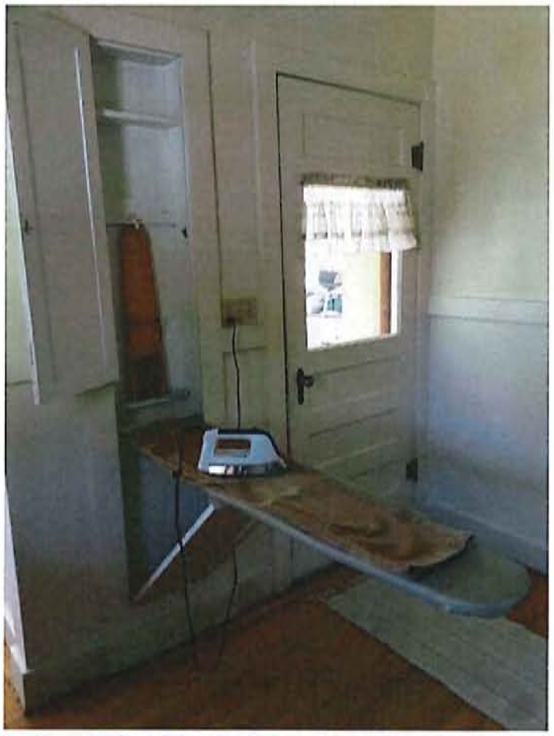
Sept. 2, 2015 Image 14: Out House Between Garages Looking North



Sept. 2, 2015 Image 15: East Garage, Looking Northeast

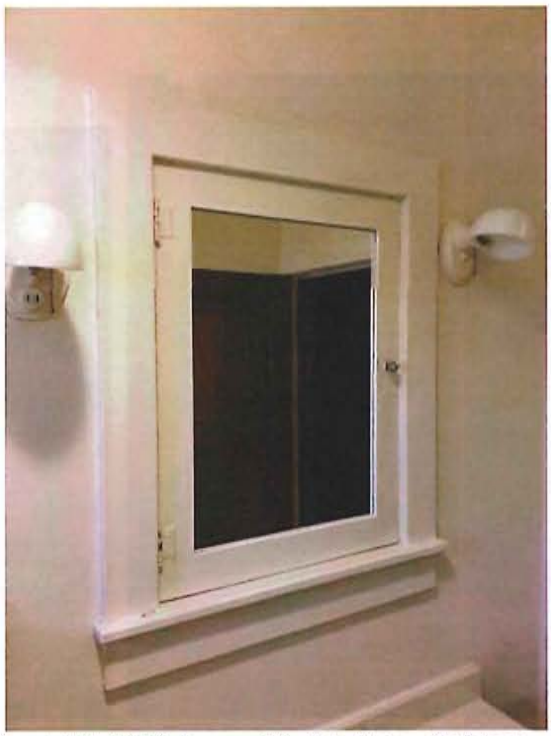
Sept. 2, 2015 Image 16: East Garage, Looking Northwest

Sept. 20, 2015 Image 17: Typical Door Hardware



Sept. 20, 2015 Image 18: Built-in Ironing Board

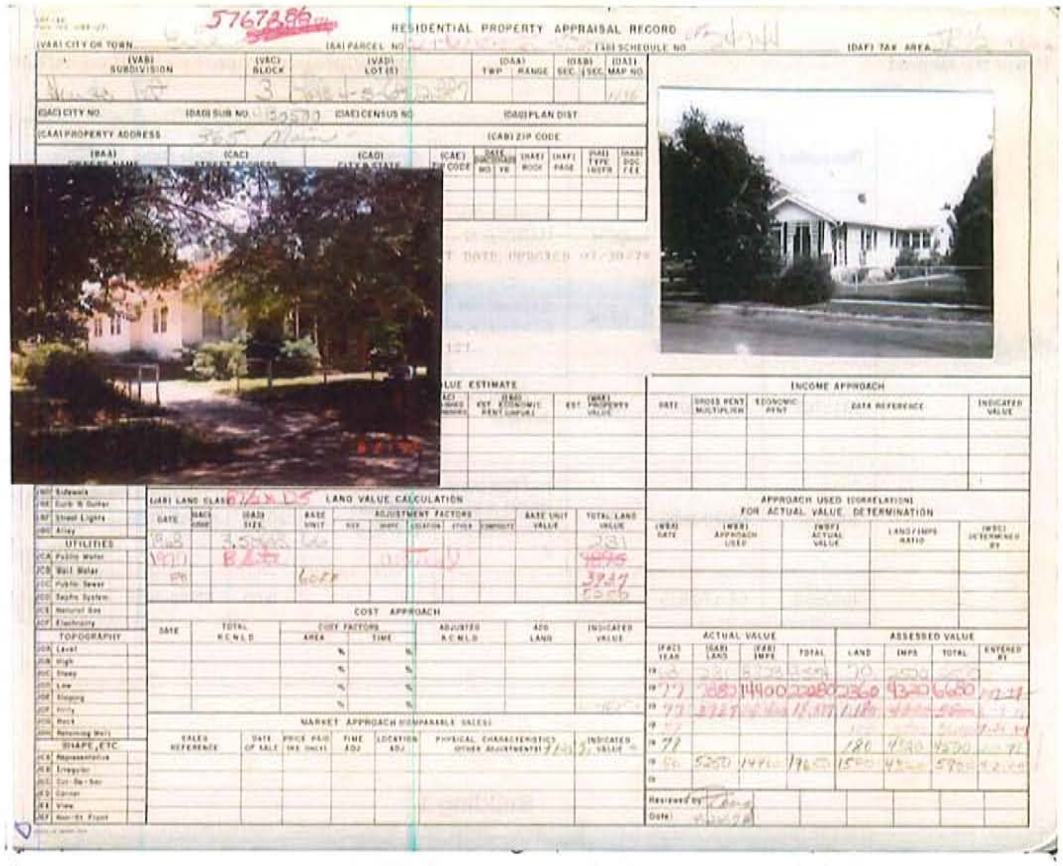
Sept. 20, 2015 Image 19: French Doors



Sept. 20, 2015 Image 20: Medicine Cabinet and Light Fxtures

Sept. 20, 2015 Image 21: Built-in Linen Cabinet

Internet Image 22: Stermlon Grave Marker in Erie's Mount Pleasant Cemetery



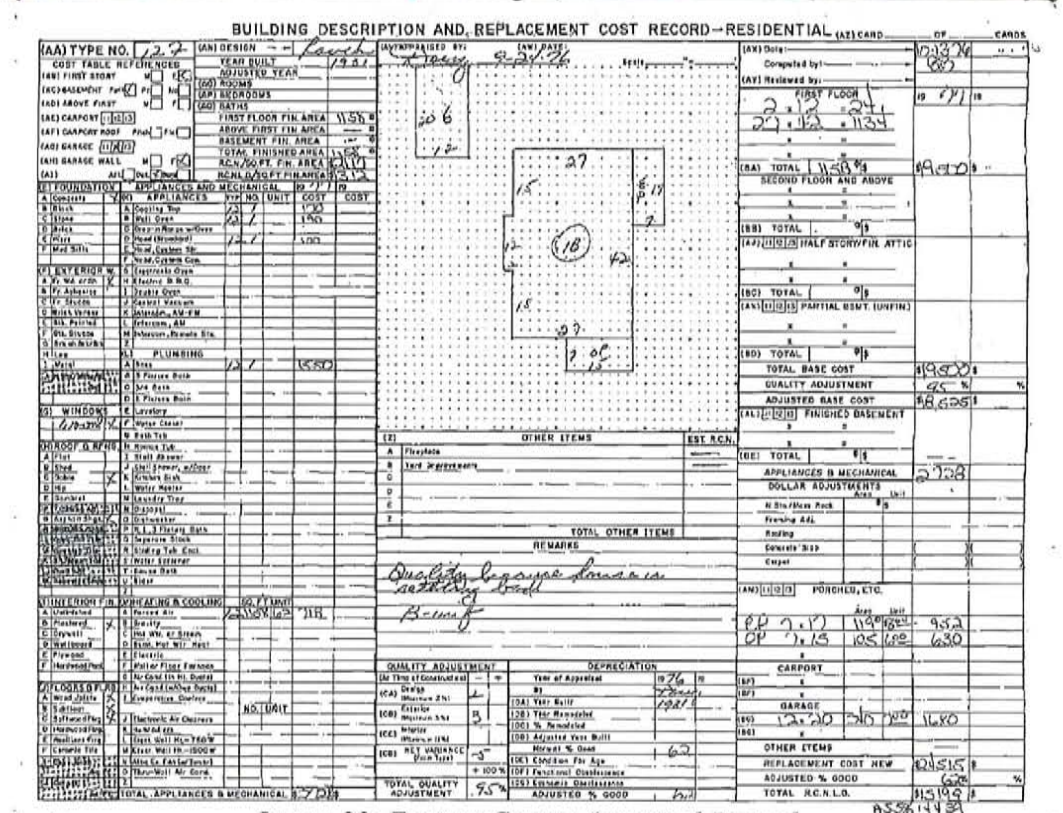


Image 23: Excerpt County Appraisal Record

Reception	Rec Date	Type	Grantor	Grantee	Doc Fee	Sale Date	Sale Price
1503876	05-25-1967	QCN	WINDSLOW HAROLD N & EVELYN	STERMLON DOMINICK A & JEAN M	0.00	05-23-1967	0
2813764	12-18-2000	DTHC	STERMLON DOMINICK A	STERMLON JEAN M	0.00	12-03-1999	0
2813765	12-18-2000	WD	STERMLON JEAN M	PATTERSON DREU S & KATHERYN A	18.00	12-12-2000	180,000
3025148	01-20-2003	WD	PATTERSON DREU S & KATHERYN A	LOTTON DAVID E	20.00	01-15-2003	200,000
4083592	02-17-2015	SURV			0.00	03-30-2014	0

Building Information

Building 1

AccountNo	Building ID	Occupancy
R5767286	1	Single Family Residential

ID	Type	NBHD	Occupancy	Built As	Bedrooms	Baths	Rooms
1	Residential	3009	Single Family Residential	Ranch 1 Story	3	1	6

ID	Square Ft	Condo SF	Total Basement SF	Finished SF	Garage SF	Carport SF	Balcony SF	Porch SF
1	1,158	0	1,158	0	240	0	0	224

Image 24: Excerpt County Property Report

ID	Year Built	% Complete	Stories	Perimeter	Units	Unit Type
1	1931	100	1	0	0	

ID	Length	Width	Make
1	0	0	

ID	Exterior	Roof Cover	Interior	HVAC
1	Frame Siding		Drywall	Forced Air

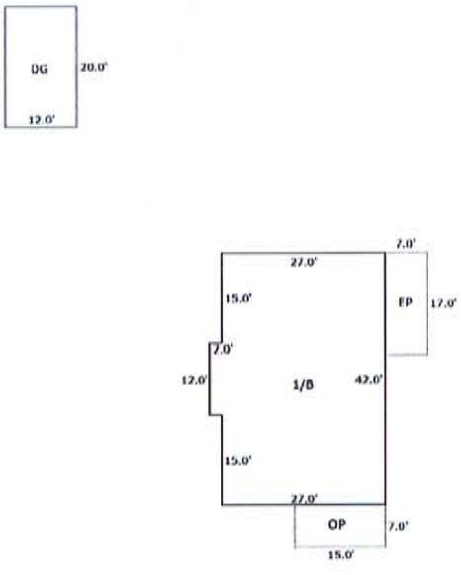
Details Building: 1

ID	Detail Type	Description	Units
1	Appliance	Allowance	1
1	Fixture	Bath 3	1
1	Garage	Detached	240
1	Basement	Bsmnt Conc 8 ft	1,158
1	Porch	Encl Solid Wall	119
1	Porch	Slab Roof Ceil	105
1	Fixture	Allowance	1

Valuation Information

Sept. 20, 2015 Image 25: Excerpt County Property Report

Sketch



Sept. 20, 2015 Image 26: Excerpt County Property Report

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-054, **Version:** 1

SUBJECT:
An Ordinance Authorizing the Issuance and Sale of Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015, Payable Solely Out of Net Revenues to be Derived from the Operation of the Town's Water Enterprise; Providing Other Details Concerning the Bonds, Including, Without Limitation, Covenants and Agreements in Connection Therewith; and Declaring an Emergency.

DEPARTMENT: Finance
PRESENTER: Steve Felten, Finance Director

FISCAL INFORMATION:
Cost as Recommended: N/A
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: Adoption of Ordinance on the First Reading and Declaring an Emergency

SUMMARY AND BACKGROUND OF SUBJECT MATTER:
Approval of the attached ordinance will allow the Town to refund existing debt by issuing Water Enterprise Revenue Refunding Bonds in the approximate amount of $12,600,000. The Town is refunding a portion of the 2007A and 2007B Water Revenue Bonds, issued primarily to finance construction of various waterlines and the water treatment plant, in order to reduce the interest costs of its revenue bonds. Based on recent market conditions, this refinancing is projected to save the Town $1,262,000 on a cash flow basis and $915,000 on a present value basis, a savings of 7.3%, which is well above the GFOA recommended minimum of 3-5%.

As explained at the August 18, 2015 study session, staff is requesting that this ordinance be passed on first reading as an emergency due to the necessity of being able to sell the bonds while market conditions allow in order to achieve the targeted savings.

ATTACHMENTS:
a. Ordinance
b. Bond Purchase Agreement (draft)
c. Preliminary Official Statement (draft)
d. Continuing Disclosure Agreement (draft)
e. Escrow Agreement (draft)
f. Paying Agent Agreement (draft)

ORDINANCE NO. __-2015

AN ORDINANCE AUTHORIZING THE ISSUANCE AND SALE OF TOWN OF ERIE, COLORADO, WATER ENTERPRISE REVENUE REFUNDING BONDS, SERIES 2015, PAYABLE SOLELY OUT OF THE NET REVENUES TO BE DERIVED FROM THE OPERATION OF THE TOWN'S WATER ENTERPRISE; PROVIDING OTHER DETAILS CONCERNING THE BONDS, INCLUDING, WITHOUT LIMITATION, COVENANTS AND AGREEMENTS IN CONNECTION THEREWITH; AND DECLARING AN EMERGENCY.

WHEREAS, the Town of Erie, Colorado (the "Town") is a municipal corporation duly organized and existing under the Constitution and laws of the State of Colorado; and

WHEREAS, the members of the Board of Trustees of the Town (the "Board") have been duly elected or appointed and qualified; and

WHEREAS, the Town now owns and operates a municipal water system (the "System"); and

WHEREAS, the Board has determined that the System constitutes an enterprise pursuant to Article X, Section 20 of the Colorado Constitution; and

WHEREAS, the Board has heretofore issued its Town of Erie, Colorado, Water Enterprise Revenue Bonds, Series 2007A, originally issued and currently outstanding in the aggregate principal amount of $14,225,000 (the "Series 2007A Bonds"); and

WHEREAS, the Board has heretofore issued its Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2007B, originally issued in the aggregate principal amount of $5,035,000 and currently outstanding in the aggregate principal amount of $3,370,000 (the "Series 2007B Bonds"); and

WHEREAS, the Board has determined, and hereby determines, that it is necessary and in the best interest of the Town and its inhabitants that the Town refund certain Series 2007A Bonds and/or certain Series 2007B Bonds as described in the Sale Certificate (hereinafter defined) (the "Refunding Project"); and

WHEREAS, the Town intends to issue its "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015" (the "Series 2015 Bonds") to defray in part the cost of the Refunding Project; and

WHEREAS, the Series 2007A Bonds and the Series 2007B Bonds are secured by a pledge of the Net Revenues of the System; and

WHEREAS, the Town has heretofore issued its Water Enterprise Revenue Refunding Bonds, Series 2009, in the original aggregate principal amount of $6,390,000 and currently outstanding in the aggregate principal amount of $4,370,000 (the "Series 2009 Bonds"), secured by a pledge of the Net Revenues of the System; and

WHEREAS, the Town has heretofore issued its Water Enterprise Revenue Refunding Bonds, Series 2011, in the original aggregate principal amount of $9,930,000 and currently outstanding in the aggregate principal amount of $7,775,000 (the "Series 2011 Bonds"), secured by a pledge of the Net Revenues of the System; and

WHEREAS, the Town is not delinquent in the payment of any principal or interest requirements under the Series 2007A Bonds, the Series 2007B Bonds, the Series 2009 Bonds or the Series 2011 Bonds; and

WHEREAS, except for the Series 2007A Bonds, the Series 2007B Bonds, the Series 2009 Bonds and the Series 2011 Bonds, the Town has not pledged nor in any way hypothecated revenues derived and to be derived directly or indirectly from the operation of the System to the payment of any securities or for any other purpose (excluding securities which have heretofore been redeemed in full, as to all principal, premium, if any, and interest, or are otherwise not outstanding) and with the result that the Net Revenues may now be pledged lawfully and irrevocably for the payment of the Series 2015 Bonds on a parity with the Series 2007A Bonds, the Series 2007B Bonds, the Series 2009 Bonds and the Series 2011 Bonds, and they may be made payable from the Net Revenues; and

WHEREAS, the Town is authorized by Article X, Section 20 of the Colorado Constitution, Title 31, Article 35, Part 4, C.R.S. and Title 37, Article 45.1, C.R.S. to issue the Series 2015 Bonds without an election; and

WHEREAS, the Town is authorized by Section 31-35-402(1)(j), C.R.S., to issue revenue refunding bonds to refund, pay or discharge all or any part of its outstanding water revenue bonds; and

WHEREAS, the Board deems it necessary and advisable to issue the Series 2015 Bonds, as herein provided, to provide funds to finance the Refunding Project; and

WHEREAS, the Board has further determined and hereby further declares that the District is authorized and the Series 2015 Bonds shall be issued pursuant to the provisions of Title 37, Article 45.1; Title 31, Article 35; and Title 11, Article 57, Part 2, C.R.S.; and

WHEREAS, pursuant to Article X, Section 20 of the Colorado Constitution and Article 45.1 of Title 37, Colorado Revised Statutes, the Series 2015 Bonds may be issued without voter approval since the System constitutes an enterprise within the meaning of Article X, Section 20 of the Colorado Constitution; and

WHEREAS, the Town intends to negotiate a proposal with Stifel, Nicolaus & Company, Incorporated, concerning the purchase of the Bonds; and

WHEREAS, pursuant to Section 11-57-203, Colorado Revised Statutes, as amended, the Town desires to delegate to any of the Mayor, the Town Administrator or the Town Finance Director the power to accept the proposal to purchase the Bonds and to determine the rate of interest on the Bonds, the redemption provisions of the Bonds, the price at which the Bonds will be sold, the aggregate principal amount of the Bonds to be issued and the amount of principal maturing, or subject to mandatory redemption, in any particular year; and

WHEREAS, the Board has determined and does hereby declare:

A. In order to meet the present and future needs of the Town, it is necessary to extend, better, otherwise improve and equip the System;

B. The Bonds shall be issued for the Refunding Project;

C. Net Revenues shall be pledged to the payment of the Series 2015 Bonds on a parity with the Series 2007A Bonds, the Series 2007B Bonds, the Series 2009 Bonds and the Series 2011 Bonds;

D. Because of market conditions, the Series 2015 Bonds shall be sold by negotiated sale to Stifel, Nicolaus & Company, Incorporated in accordance with its proposal, and that such sale is to the best advantage of the Town; and

E. All action preliminary to the authorization of the issuance of the Series 2015 Bonds has been taken.

WHEREAS, there are on file with the Town Clerk the forms of the following documents: (i) the form of the Purchase Contract; (ii) the Escrow Agreement; (iii) the form of the Paying Agent Agreement; (iv) the form of a Preliminary Official Statement; and (v) the form of the Continuing Disclosure Certificate; and

WHEREAS, it is necessary to provide for the form of the Series 2015 Bonds, the Series 2015 Bond details, the payment of the Series 2015 Bonds, and other provisions relating to the authorization, issuance, and sale of the Series 2015 Bonds.

NOW, THEREFORE, BE IT ORDAINED BY THE BOARD OF TRUSTEES OF THE TOWN OF ERIE, COLORADO:

ARTICLE I

DEFINITIONS, INTERPRETATION, RATIFICATION AND EFFECTIVE DATE

Section 101. Short Title. This Ordinance shall be known as and may be cited by the short title "Series 2015 Bond Ordinance" (the "Ordinance").

Section 102. Meanings and Construction.

A. Definitions. The terms in this Section for all purposes of this Ordinance and of any ordinance amendatory hereof or supplemental hereto, or relating hereto, and of any other ordinance or any other document pertaining hereto, except where the context by clear implication otherwise requires, shall have the meanings herein specified:

"acquire" or "acquisition" means the opening, laying out, establishment, purchase, construction, securing, installation, reconstruction, lease, gift, grant from the Federal Government, the State, any body corporate and politic therein, or any other Person, the endowment, bequest, devise, transfer, assignment, option to purchase, other contract, or other acquisition, or any combination thereof, of any properties pertaining to the System, or an interest therein, or any other properties herein designated.

"Balloon Bonds" means any securities payable from Net Revenues 25% or more of the original principal amount of which matures during any consecutive twelve month period if such maturing principal amount is not required to be amortized by mandatory redemption or prepayment prior to such period and if such twelve month period overlaps the Fiscal Year in which the Combined Maximum Annual Principal and Interest Requirements occur (without regard to the assumptions contained in clause (c) of the definition of Combined Maximum Annual Principal and Interest Requirements).

"Board" means the Board of Trustees of the Town, and any successor governing body of the municipal corporation owning the System.

"Bond Counsel" means an attorney or a firm of attorneys, designated by the Town and satisfactory to the Paying Agent of nationally recognized standing in matters pertaining to the tax status of interest on bonds issued by states and their political subdivisions, duly admitted to the practice of law before the highest court of any state of the United States of America or the District of Columbia.

"Bond Account" means the special account designated as the "Town of Erie, Colorado, Water Enterprise Revenue Bonds, Bond Account" created pursuant to the Series 1998 Ordinance and continued herein.

"Bond Requirements" means the principal of, any prior redemption premiums due in connection with, and the interest on any Bonds or other securities payable from the Net Revenues and heretofore or hereafter issued, if any, or such part of such securities as may be designated.

"Bonds" or "Series 2015 Bonds" means those securities issued hereunder and designated as the "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015."

"Book-entry form" or "book-entry system" means, with respect to the Bonds, a form or system, as applicable, under which physical Bond certificates in fully registered form are registered only in the name of The Depository Trust Company or its nominee as Owner, with the physical Bond certificates "immobilized" in the custody of The Depository Trust Company. The book-entry system maintained by and the responsibility of The Depository Trust Company and not maintained by or the responsibility of the Town or the Paying Agent is the record that identifies, and records the transfer of the interests of, the owners of book-entry interests in the Bonds.

"Business Day" means a day of the year, other than a Saturday or Sunday, other than a day on which commercial banks located in the city in which the principal corporate trust office of the Paying Agent is located are required or authorized to remain closed and other than a day on which the New York Stock Exchange is closed.

"Capital Improvements" means the acquisition of land, water or water rights, easements, facilities, and equipment (other than ordinary repairs and replacements), and the construction or reconstruction of improvements, betterments, and extensions, for use by or in connection with the System which, under Generally Accepted Accounting Principles for governmental units as described by the Governmental Accounting Standards Board, are properly chargeable as capital items.

"Closing Date" means the date of delivery of and payment for the Bonds.

"Code" means the Internal Revenue Code of 1986, as amended to the date of delivery of the Bonds, and the regulations promulgated thereunder.

"Combined Maximum Annual Principal and Interest Requirements" means the largest sum of the principal of and interest on the Bonds and any other Outstanding Parity Lien Bonds, excluding any securities the principal of which is payable within less than one year from the date on which issued, to be paid during any one Fiscal Year for the period beginning with the Fiscal Year in which such computation is made and ending with the Fiscal Year in which any Bond or other such security last becomes due at maturity or on a Redemption Date, whichever time is later (but excluding any reserve requirement to secure such payments unless otherwise expressly provided). The word "principal," as used in the preceding sentence, means for all purposes of this paragraph, the principal which must be paid to security Owners, whether on stated maturity dates or on mandatory Redemption Dates, or otherwise. Any such computation shall be adjusted for all purposes in the same manner as is provided in Section 803 hereof. For the purposes of this computation, it shall be assumed that (a) Variable Rate Bonds shall be assumed to bear interest at the highest of: (i) the actual rate of any Outstanding Variable Rate Bonds on the date of computation, or if the Variable Rate Bonds are not yet Outstanding, the initial rate (if established and binding), (ii) if the Variable Rate Bonds have been Outstanding for at least twelve months, the average rate over the twelve months immediately preceding the date of computation, or if no Variable Rate Bonds are Outstanding for such twelve months, the

average rate borne by reference to an index comparable to that to be utilized in determining the interest rate for the Variable Rate Bonds to be issued or (iii) (1) if interest on the Variable Rate Bonds is excludable from gross income under the applicable provisions of the Internal Revenue Code, the most recently published Bond Buyer "Revenue Bond Index" (or if such Index is not published within 30 days prior to such determination, such index selected by the Town and acceptable to the Insurer), or (2) if interest is not so excludable, the interest rate on direct U.S. Treasury Obligations with comparable maturities; (b) any Tender Bonds Outstanding at the time of such determination shall mature on the stated maturity or mandatory Redemption Date or Dates thereof; and (c) any Balloon Bonds Outstanding at the time of such determination which mature more than six months thereafter shall be deemed to mature over 30 years from the date of issuance of the Balloon Bonds, will bear interest on the unpaid principal amount thereof at the fixed rate of interest equal to the Revenue Bond Index or if such Index is no longer published, of a comparable index selected by the Town and acceptable to the Insurer and will be payable on a level annual debt service basis over a thirty year period.

"Commercial Bank" means a state or national bank or trust company which is a member of the Federal Deposit Insurance Corporation (or any successors thereto) and of the Federal Reserve System, which has a capital and surplus of $10,000,000 or more, and which is located within the United States of America.

"Continuing Disclosure Certificate" the Continuing Disclosure Certificate executed by the Town in connection with the issuance of the Bonds, which constitutes an undertaking pursuant to Rule 15c2-12 promulgated by the U.S. Securities and Exchange Commission.

"Escrow Account" means the account maintained by the Escrow Bank pursuant to the Escrow Agreement.

"Escrow Agreement" means the Escrow Agreement dated as of its date, between the Town and the Escrow Bank.

"Escrow Bank" means UMB Bank, n.a. or its successors and assigns, acting as Escrow Bank under the Escrow Agreement.

"Events of Default" means the events stated in Section 1003 hereof.

"Federal Government" means the United States of America and any agency, instrumentality or corporation thereof.

"Federal Securities" means bills, certificates of indebtedness, notes, bonds or other similar instruments which are direct non-callable obligations of the United States of America or which area fully and unconditionally guaranteed as to the timely payment of principal and interest by the United States of America.

"Finance Director" means the chief financial officer of the Town, or his or her successor in functions, if any.

"Fiscal Year" means the calendar year or any other 12 month period hereafter selected by the Town as its fiscal year.

"Gross Revenues" means all fees (including but not limited to user fees and plant investment fees), charges and revenues directly or indirectly derived by the Town for the services furnished by, or use of, the System, or any part thereof, including all income attributable to any future dispositions of property or rights related contracts, settlements, or judgments held or obtained in connection with the System or its operations; provided however, that there shall be excluded from Gross Revenue (a) moneys borrowed and used for providing Capital Improvements, (b) any money and securities, and investment income therefrom, in any refunding fund, escrow account, or similar account pledged to the payment of any bonds or other obligations for the purpose of defeasing the same, and (c) any moneys received as grants or appropriations from the United States, the State of Colorado, or other sources, the use of which is limited or restricted by the grantor or donor to the provision of Capital Improvements or for other purposes resulting in the general unavailability thereof, except to the extent any such moneys shall be received as payments for the use of the System, services rendered thereby, the availability of any such service, or the disposal of any commodities therefrom.

"improve" or "improvement" means the extension, reconstruction, alteration, betterment or other improvement by the construction, purchase or other acquisition of facilities, including, without limitation, appurtenant machinery, apparatus, fixtures, structures and buildings.

"Independent Accountant" means any certified public accountant, or any firm of certified public accountants, duly licensed to practice and practicing as such under the laws of the State:

(a) Who is, in fact, independent and not under the domination of the Town;

(b) Who does not have any substantial interest, direct or indirect, with the Town, and

(c) Who is not connected with the Town as an officer or employee thereof, but who may be regularly retained to make annual or similar audits of any books or records of the Town.

"Independent Engineer" means an individual, firm or corporation engaged in the engineering profession of recognized good standing and having specific experience in respect of business and properties of a character similar to those of the System, which individual, firm or corporation has no substantial interest, direct or indirect, in the Town and in the case of an individual, is not a member of the Board, or an officer or employee of the Town, and in the case of a firm or corporation, does not have a partner, director, officer or employee who is a member of the Board or an officer or employee of the Town.

"Insurance Policy" means the municipal bond new issue insurance policy, if any, issued by the Insurer that guarantees payment of principal of and interest on the Bonds when due.

"Insurer" means the issuer of a municipal bond insurance policy, if any.

"Investment Securities" means any securities or other obligations permitted as investments of moneys of the Town under the laws of the State.

"Letter of Representations" means the Letter of Representations from the Town and The Depository Trust Company in connection with the issuance of the Bonds in a book-entry system, as supplemented and amended from time to time.

"Mayor" means the mayor of the Town, or his or her successor in functions.

"Mayor Pro Tem" means the mayor pro tem of the Town, or his or her successors in functions.

"Moody's" means Moody's Investors Services, Inc., a corporation organized and existing under the laws of the State of Delaware, its successors and assigns.

"Net Revenues" means the Gross Revenues remaining after the payment of the Operation and Maintenance Expenses of the System.

"Official Statement" means the Official Statement delivered in connection with the original issuance and sale of the Bonds.

"Operation and Maintenance Expenses" means all reasonable and necessary current expenses of the Town, paid or accrued, for operating, maintaining, and repairing the System, including without limitation legal and overhead expenses of the Town directly related to the administration of the System; provided however, that there shall be excluded from Operation and Maintenance Expenses any allowance or transfers for depreciation, payments in lieu of taxes or franchise fees, legal liabilities not based on contract, expenses incurred in connection with Capital Improvements, payments due in connection with any bonds or other obligations issued to provide Capital Improvements, and charges for accumulation of reserves.

"Outstanding" when used with reference to the Bonds, Parity Lien Bonds, or any other designated securities and as of any particular date means all the Bonds, Parity Lien Bonds, or any such other securities payable from the Net Revenues or otherwise pertaining to the System, as the case may be, in any manner theretofore and thereupon being executed and delivered:

(a) Except any Bond or other security canceled by the Town, by any paying agent, or otherwise on the Town's behalf, at or before such date;

(b) Except any Bond or other security deemed to be paid as provided in Section 1301 hereof or any similar provision of the ordinance authorizing the issuance of such other security;

(c) Except any Bond or other security in lieu of or in substitution for which another Bond or other security shall have been executed and delivered pursuant to Sections 306, 307 or 1108 hereof or any similar provisions of the ordinance authorizing the issuance of such other security.

"Owner" means the registered owner of any designated Bond or other designated security.

"Parity Lien Bonds" means the Series 2007A Bonds, the Series 2007B Bonds, the Series 2009 Bonds, the Series 2011 Bonds and any other securities hereafter issued payable from and having an irrevocable lien upon the Net Revenues on a parity with the Bonds.

"Parity Bond Ordinances" means the Series 2007A Bond Ordinance, the Series 2007B Bond Ordinance, the Series 2009 Bond Ordinance and the Series 2011 Bond Ordinance, and any agreements hereafter entered into by the Town with respect to Parity Lien Bonds and, without duplication, any ordinances hereafter adopted by the Board authorizing the issuance of Parity Lien Bonds.

"Paying Agent" means UMB Bank, n.a., in Denver, Colorado, and being an agent of the Town for the payment of the Bond Requirements due in connection with the Bonds, the registrar for the Bonds and for other administration of moneys pertaining to the Bonds, and includes any successor Commercial Bank as paying agent.

"Paying Agent Agreement" means the Registrar and Paying Agent Agreement between the Town and the Paying Agent.

"Person" means a corporation, firm, other body corporate (including, without limitation, the Federal Government, the State, or any other body corporate and politic other than the Town), partnership, limited liability company, association or individual, and also includes an executor, administrator, trustee, receiver or other representative appointed according to law.

"Policy Costs" means repayment of draws under the Reserve Account Insurance Policy, if any, plus all related reasonable expenses incurred by the Surety Provider, plus accrued interest thereon at the Reserve Policy Rate or any similar costs related to a reserve fund insurance policy for Parity Lien Bonds.

"Preliminary Official Statement" means the Preliminary Official Statement delivered in connection with the original issuance and sale of the Bonds.

"Pro Rata Portion" means the dollar amount derived by dividing the amount of principal or interest to come due on the next principal or interest payment date by the number of monthly credits required to be made prior to such payment date.

"Purchaser" means Stifel, Nicolaus & Company, Incorporated, Denver, Colorado.

"Purchase Contract" means the Bond Purchase Agreement between the Town and the Purchaser concerning the purchase of the Bonds.

"Rating Agency" means each nationally recognized securities rating agency then maintaining a rating on the Bonds and initially means Moody's and Standard & Poor's.

"Rebate Fund" means the special account designated as the "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015 Rebate Fund" created pursuant to Section 609 hereof.

"Record Date" means the close of business on the fifteenth day (whether or not a Business Day) of the calendar month next preceding an interest payment date.

"Redemption Date" means, with respect to the Refunded Bonds, the earliest date on which the Refunded Bonds may be called for prior redemption; or the date fixed for the redemption prior to their respective maturities of any Bonds or other designated securities payable from Net Revenues in any notice of prior redemption or otherwise fixed and designated by the Town.

"Refunded Bonds" means any of the currently outstanding Series 2007A Bonds and/or the Series 2007B Bonds which the Town has determined to call for prior redemption as set forth in the Sale Certificate.

"Refunded Bond Requirements" means (i) the payment of the interest due on the Refunded Bonds as the same become due on and after the date of delivery of the Bonds and on and before the Redemption Date; (ii) the payment of principal of the Refunded Bonds as the same becomes due upon prior redemption on the Redemption Date; and (iii) payment of the costs of issuance of the Bonds.

"Refunding Project" the payment of the Refunded Bond Requirements and the payment of the costs of issuing the Refunding Bonds.

"Reserve Account" means the special account designated as the "Town of Erie, Colorado, Water Enterprise Revenue Bonds, Reserve Account" created pursuant to the Series 1998 Ordinance.

"Reserve Account Insurance Policy" means any insurance policy, surety bond, letter or line of credit or similar instrument which is utilized in lieu of cash or Investment Securities in the Reserve Account issued for the benefit of the Owners by an entity (i) the unsecured long term debt obligations of which are rated in one of the two highest rating categories by Standard & Poor's Rating Services or Moody's Investors Service or, upon the discontinuance of either or both of such rating services, any other nationally recognized rating service, or (ii) approved in writing by the Insurer.

"Reserve Account Requirement" means, as of any date on which it is calculated, the least of (a) 10% of the principal amount of the applicable Outstanding Bonds, (b) the maximum annual debt service in any calendar year on the applicable Outstanding Bonds, or

(c) 125% of the average annual debt service on the applicable Outstanding Bonds; provided, however, that the Reserve Account Requirement may be reduced if, in the opinion of Bond Counsel, the funding or maintenance of it at the level otherwise determined pursuant to this definition will adversely affect the exclusion from gross income tax for federal income tax purposes of interest on any of the Bonds.

"Reserve Policy Rate" means the lower of (i) the prime rate of Citibank, N.A., of New York in effect from time to time plus 2% per annum and (ii) the highest rate permitted by law.

"Revenue Bond Index" means the Revenue Bond Index as published in the most recent issue of The Bond Buyer (or any successor thereto).

"Sale Certificate" means the sale certificate of the Town relating to the Bonds issued pursuant to the Supplemental Public Securities Act and described in Section 213 hereof.

"Series 2007A Bonds" means the Town's Water Enterprise Revenue Bonds, Series 2007A, as further described in the recitals hereto.

"Series 2007A Bond Ordinance" means the Town's Ordinance No. 22-2007, authorizing the issuance of the Series 2007A Bonds.

"Series 2007B Bonds" means the Town's Water Enterprise Revenue Refunding Bonds, Series 2007B, as further described in the recitals hereto.

"Series 2007B Bond Ordinance" means the Town's Ordinance No. 23-2007, authorizing the issuance of the Series 2007B Bonds.

"Series 2009 Bonds" means the Town's Water Enterprise Revenue Refunding Bonds, Series 2009, as further described in the recitals hereto.

"Series 2009 Bond Ordinance" means the Town's Ordinance No. 32-2009, authorizing the issuance of the Series 2009 Bonds.

"Series 2011 Bonds" means the Town's Water Enterprise Revenue Refunding Bonds, Series 2011, as further described in the recitals hereto.

"Series 2011 Bond Ordinance" means the Town's Ordinance No. 25-2011, authorizing the issuance of the Series 2011 Bonds.

"Special Record Date" means a special date fixed by the Paying Agent to determine the names and addresses of Owners of Bonds for the purpose of paying interest on a special interest payment date for the payment of defaulted interest, all as further provided in Section 302 hereof.

"Standard & Poor's" means Standard & Poor's Ratings Services, a division of McGraw-Hill, Inc., a corporation organized and existing under the laws of the State of New York, its successors and its assigns.

"State" means the State of Colorado.

"Subordinate Securities" means securities payable from the Net Revenues subordinate and junior to the lien thereon of the Bonds and any Parity Lien Bonds.

"Supplemental Public Securities Act" means Part 2 of Article 57 of Title 11, Colorado Revised Statutes, as amended.

"Surety Provider" means any entity issuing a Reserve Account Insurance Policy with respect to the Bonds.

"System" means the municipal water system consisting of all properties, real, personal, mixed or otherwise, now owned or hereafter acquired by the Town, through purchase, construction and otherwise, and used in connection with such system of the Town, and in any way pertaining thereto, whether or not located within or without or both within and without the boundaries of the Town; and such defined term includes any other utility or other income-producing facilities added to the System and to which the lien and pledge herein provided are extended by ordinance adopted by the Board or the qualified electors of the Town.

"Tax Compliance Certificate" means the Federal Tax Exemption Certificate executed by the Town in connection with the initial issuance and delivery of the Bonds as it may from time to time be amended.

"Tender Bonds" means the Bonds and any other securities payable from Net Revenues which by their terms may be required to be tendered for purchase, or which may be tendered by and at the option of the Owner thereof for purchase, prior to the stated maturity thereof.

"Term Bonds" means Bonds that are payable on or before their specified maturing dates from sinking fund payments established for that purpose and calculated to retire such Bonds on or before their specified maturity dates.

"Town" means the Town of Erie, Colorado, or any successor municipal corporation owning the System.

"Town Administrator" means the town administrator of the Town, or his or her successor.

"Town Clerk" means the town clerk of the Town, or his or her successor in functions, if any.

"Trust Bank" means a Commercial Bank which is authorized to exercise and is exercising trust powers located within or without the State, and also means any branch of the Federal Reserve Bank.

"Variable Rate Bonds" means any securities payable from Net Revenues issued with a variable, adjustable, convertible or other similar interest rate which is not fixed in percentage for the entire term thereof at the date of issue.

"Water Fund" means a special fund of the Town continued by the provisions hereof, designated as the "Town of Erie, Colorado, Water Fund."

B. Town-Held Securities. Any securities payable from any Net Revenues held by the Town shall not be deemed to be Outstanding for the purpose of redemption nor Outstanding for the purpose of consents hereunder or for any other purpose herein.

Section 103. Parties Interested Herein. Nothing herein expressed or implied confers any right, remedy or claim upon any Person, other than the Town, the Board, the Paying Agent, the Insurer, the Surety Provider, the Owners of the Bonds and the Owners of any Parity Lien Bonds or other securities payable from the Net Revenues when reference is expressly made thereto. All the covenants, stipulations, promises and agreements herein contained by and on behalf of the Town shall be for the sole and exclusive benefit of the Town, the Board, the Paying Agent, the Insurer, the Surety Provider, the Owners of the Bonds and the Owners of any such other securities in the event of such a reference.

Section 104. Ratification; Approval of Documents. All action heretofore taken (not inconsistent with the provisions of this Ordinance) by the Board, the officers of the Town and otherwise taken by the Town directed toward the Refunding Project and the sale and delivery of the Bonds for such purposes, be, and the same hereby is, ratified, approved and confirmed.

Section 105. Repealer. All bylaws, orders, resolutions and ordinances, or parts thereof, inconsistent herewith are hereby repealed to the extent only of such inconsistency. This repealer shall not be construed to revive any such bylaw, order, resolution or ordinance, or part thereof, heretofore repealed. All rules of the Board, if any, which might prevent the final passage and adoption of this Ordinance as an emergency measure at this meeting of the Board be, and the same hereby are, suspended.

Section 106. Severability. If any section, subsection, paragraph, clause or other provision of this Ordinance for any reason is invalid or unenforceable, the invalidity or unenforceability of such section, subsection, paragraph, clause or other provision shall not affect any of the remaining provisions of this Ordinance.

Section 107. Ordinance Irrepealable. After any of the Bonds are issued, this Ordinance shall constitute an irrevocable contract between the Town and the Owner or Owners of the Bonds and this Ordinance shall be and shall remain irrepealable until the Bonds, as to all Bond Requirements, shall be fully paid, canceled, and discharged, except as herein otherwise provided.

Section 108. Emergency Declaration. It is hereby found and determined by the Board that: (i) the refunding of the Series 2007A Bonds is necessary in the public interest in order to properly and safely serve the Town and its residents; (ii) the long-term financing of the Refunding Project by the issuance of the Bonds is necessary in order to reduce the costs of the Refunding Project; and (iii) it is necessary to take advantage of the current conditions in the municipal bond market, the continuation of which cannot be predicted. As a result of the foregoing, the Board hereby declares that an emergency exists, and that this Ordinance is necessary to the immediate preservation of the public health and safety, all in accordance with §31-16-105, C.R.S.

Section 109. Effective Date and Disposition. The procedures set forth in Board Resolution No. 2002-44 requiring a second reading of this Ordinance prior to final adoption are hereby suspended. This Ordinance shall take effect upon adoption by the affirmative vote of three-fourths (3/4) of the members of the Board of Trustees pursuant to §31-16-105, C.R.S. This Ordinance, as adopted by the Board, shall be numbered and recorded by the Town Clerk in the official records of the Town. The adoption and publication shall be authenticated by the signatures of the Mayor, or Mayor Pro Tem, and Town Clerk, and by the certificate of publication.

ARTICLE II

DETERMINATION OF THE TOWN'S AUTHORITY AND OBLIGATIONS; APPROVAL OF RELATED DOCUMENTS; AND ELECTION TO APPLY SUPPLEMENTAL PUBLIC SECURITIES ACT TO THE BONDS

Section 201. Authority for This Ordinance. The Bonds are issued in accordance with the Constitution and laws of the State and the provisions of this Ordinance, specifically Title 37, Article 45.1; Title 31, Article 35; and the Supplemental Public Securities Act. For the purpose of defraying the cost of the Project, the Town hereby authorizes to be issued its "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015" in the aggregate principal amount provided in the Sale Certificate, subject to the parameters and restrictions contained in this Ordinance.

Section 202. Bonds Equally Secured. The covenants and agreements herein set forth to be performed on behalf of the Town shall be for the equal benefit, protection and security of the Owners of any and all of the Outstanding Bonds and any Outstanding Parity Lien Bonds heretofore or hereafter authorized and issued, all of which, regardless of the time or times of their issue or maturity, shall be of equal rank without preference, priority or distinction of any of such securities over any other thereof, except as otherwise expressly provided in or pursuant to this Ordinance.

Section 203. Special Obligations. All of the Bond Requirements of the Bonds and the Policy Costs shall be payable and collectible solely out of the Net Revenues, which revenues are so pledged; the Owner or Owners of the Bonds and the Surety Provider may not look to any general or other fund for the payment of such Bond Requirements, except the herein designated special funds pledged therefor; the Bonds and the Policy Costs shall not constitute an indebtedness or a debt within the meaning of any constitutional, or statutory provision or limitation; and the Bonds and the Policy Costs shall not be considered or held to be general obligations of the Town but shall constitute its special obligations. No statutory or constitutional provision enacted after the issuance of the Bonds shall in any manner be construed as limiting or impairing the obligation of the Town to comply with the provisions of this Ordinance or to pay the Bond Requirements of the Bonds and the Policy Costs as herein provided.

Section 204. Character of Agreement. None of the covenants, agreements, representations and warranties contained herein or in the Bonds shall ever impose or shall be construed as imposing any liability, obligation or charge against the Town (except the special funds pledged therefor), or against its general credit, or as payable out of its general fund or out of any funds derived from taxation or out of any other revenue source (other than those pledged therefor).

Section 205. No Pledge of Property. The payment of the Bonds and the Policy Costs is not secured by an encumbrance, mortgage or other pledge of property of the Town, except for the Net Revenues and other moneys pledged for the payment of the Bond Requirements of the Bonds. No property of the Town, subject to such exception, shall be liable to be forfeited or taken in payment of the Bonds or the Policy Costs.

Section 206. No Recourse Against Officers and Agents. No recourse shall be had for the payment of the Bond Requirements of the Bonds or for any claim based thereon or otherwise upon this Ordinance or any other ordinance pertaining hereto, against any individual member of the Board or any officer, employee or other agent of the Town, past, present or future, either directly or indirectly through the Board, or the Town, or otherwise, whether by virtue of any penalty or otherwise, all such liability, if any, being by the acceptance of the Bonds and as part of the consideration of their issuance specially waived and released.

Section 207. Authorization of the Refunding Project. The Board, on behalf of the Town, does hereby determine to undertake the Refunding Project, which is hereby authorized, and the proceeds of the Bonds shall be used therefor.

Section 208. Enterprise Status. The Board, on behalf of the Town, hereby confirms its intention that the System shall be an "enterprise" for the purposes of Article X, Section 20 of the State Constitution. In particular, the System shall be owned by the Town and shall have the power to issue the Bonds in the manner and payable from the sources set forth in this Ordinance.

Section 209. Sale of Bonds. The Bonds shall be sold by negotiated sale to the Purchaser. Pursuant to the Supplemental Public Securities Act, the Board hereby delegates to any of the Mayor, the Town Administrator or the Finance Director the authority to execute the Purchase Contract submitted by the Purchaser.

Section 210. Official Statement. The preparation and use of the Preliminary Official Statement and of the final Official Statement are hereby authorized. The Finance Director is hereby authorized to approve, on behalf of the Town, the Official Statement, in substantially the form of the Preliminary Official Statement with such changes are hereinafter approved. The execution of the Official Statement by the Mayor, the Town Administrator or the Finance Director shall be conclusively deemed to evidence the approval of the form and contents thereof by the Town.

Section 211. Paying Agent Agreement and Escrow Agreement. The Board hereby determines to approve the Paying Agent Agreement and the Escrow Agreement. If the Paying Agent appointed thereunder shall resign, or if the Town shall determine to remove the Paying Agent, then the Town may appoint a successor Paying Agent, upon notice mailed to each owner of any Bond at his address last shown on the registration records maintained by the Paying Agent. No resignation or dismissal of the Paying Agent may take effect until a successor has been appointed and has accepted the duties of the Paying Agent. Every such successor Paying Agent shall be a bank or trust company located in the United States of America and having shareholder's equity (e.g., capital stock, surplus and profits), however denominated, of not less than $10,000,000.

Section 212. Other Related Documents. The forms, terms and provisions of, and the performance by the Town of its obligations under the Preliminary Official Statement, Escrow Agreement, the Paying Agent Agreement, and the Continuing Disclosure Certificate are hereby approved and the Mayor, the Mayor Pro Tem, the Town Administrator, and the Town Clerk and any deputy thereof are hereby authorized and directed to execute each of such

documents on behalf of and in the name of the Town, and to deliver each of such documents, in substantially the form on file with the Town Clerk, with such changes as are not inconsistent herewith.

Section 213. Election to Apply Supplemental Public Securities Act to the Bonds. Pursuant to Section 11-57-204 of the Supplemental Public Securities Act, a public entity, including the Town, may elect in an act of issuance to apply all or any of the provisions of the Supplemental Public Securities Act. The Board hereby elects to apply all of the provisions of the Supplemental Public Securities Act to the Bonds. Pursuant to such election to apply Section 11-57-205 of the Supplemental Public Securities Act to the Bonds, the Board hereby delegates to any of the Mayor, the Town Administrator or the Finance Director the authority to make the following determinations with respect to the Bonds, subject to the parameters and restrictions contained in this Ordinance, without any requirement that the Board approve such determinations:

(i) Interest Rate. The net effective rate of interest to be borne by the Bonds which shall not exceed 4.50% per annum, which is less than the net effective interest rate on the Refunded Bonds.

(ii) Section 31-35-412(2), C.R.S., Determination. The aggregate principal and interest costs of the Series 2015 Bonds issued to accomplish the Refunding Project (the "Refunding Bonds") for the period ending on the scheduled final maturity date of the Refunded Bonds, without regard to any redemptions that may be made prior to such scheduled maturity date, does not exceed such unaccrued costs of the Refunded Bonds for the same time period, excluding from the computation of the aggregate principal and net interest cost of the Refunding Bonds the amount of the principal of any Refunding Bonds issued to pay any interest in arrears or about to become due on the Refunded Bonds and to pay any interest on the Refunding Bonds.

(iii) Redemption Provisions. The prior redemption provisions of the Bonds, provided that the Bonds shall either (a) not be subject to redemption prior to maturity at the option of the Town, or, (b) subject to optional redemption at such time or times as permitted by State law and as set forth in the Sale Certificate, at a redemption price not to exceed 100%;

(iv) Purchase Price. The price at which the Bonds will be sold to the Purchaser which shall not be less than 98% of the aggregate principal amount of the Bonds.

(v) Principal Amount. The aggregate principal amount of the Bonds, provided that such principal amount shall not exceed $12,600,000.

(vi) Maturity Schedule. The amount of principal of the Bonds maturing, or subject to mandatory sinking fund redemption, in any particular year; to be not more than $1,400,000 annually, and the total repayment cost shall not exceed $19,950,000.

(vii) Term of the Bonds. The Bonds shall not mature later than December 1, 2032.

(viii) Net Present Value Savings: The net present value savings shall be at least 4.00% of the principal amount of the Refunded Bonds.

(ix) Requirements Not Increased. The Combined Maximum Annual Principal and Interest Requirements for the Bonds and the Parity Lien Bonds Outstanding immediately after the issuance of the Bonds is not greater than the Combined Maximum Annual Principal and Interest Requirements for the Refunded Bonds and the Parity Lien Bonds Outstanding immediately prior to the issuance of the Bonds.

(x) Insurer. Any of the Mayor, the Town Administrator or the Finance Director may determine whether it is in the best interest of the Town to obtain a municipal bond insurance policy or a surety policy, and if so determined, to execute any commitment or any other agreement or agreements relating to same.

Such determinations shall be evidenced by the Sale Certificate, which shall not be more than one year from the date of adoption of this Ordinance. If the Town shall determine to not obtain an Insurance Policy to secure the payment of principal of and interest on the Bonds, or not to obtain a Reserve Account Insurance Policy, any references to the Insurer, the Insurance Policy, the Reserve Account Insurance Policy, the Surety Provider, the Policy Costs, or other provisions relating to bond insurance shall be of no force or effect.

ARTICLE III

AUTHORIZATION, TERMS, EXECUTION AND ISSUANCE OF BONDS

Section 301. Authorization of Bonds. For the purpose of protecting the public health, conserving the property and advancing the general welfare of the citizens of the Town and of defraying wholly or in part the Cost of the Refunding Project, the "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015" in an aggregate principal amount set forth in the Sale Certificate (but not to exceed $12,600,000) are hereby authorized to be issued; and the Town pledges irrevocably, but not necessarily exclusively, the Net Revenues to the payment of the Bond Requirements of the Bonds.

Section 302. Bond Details.

A. Basic Provisions. The Bonds shall be issued in fully registered form (*i.e.* registered as to payment of both principal and interest), in denominations of $5,000 or any integral multiple thereof. The Bonds shall be lettered "R" and shall be numbered separately from 1 upward. The Bonds shall be dated as of the date of delivery of the Bonds. The Bonds shall mature on December 1, in the years and amounts and subject to prior redemption as set forth herein and in the Sale Certificate. The Bonds shall bear interest from the most recent interest payment date to which interest has been paid, or if no interest has been paid, from their date until their respective maturities (or prior redemption) at the rates set forth in the Sale Certificate. No interest shall accrue on any Bonds owned by or on behalf of the Town.

B. Payment of Bonds. The principal of each Bond shall be payable at the principal corporate trust office of the Paying Agent, or at such other office as the Paying Agent directs in writing to the Owners of the Bonds, or at the principal office of its successor, upon presentation and surrender of the Bond. Payment of interest on any Bond shall be made to the Owner thereof by the Paying Agent on or before each interest payment date, (or, if such interest payment date is not a Business Day, on or before the next succeeding Business Day), to such Owner at his or her address as it appears on the registration records kept by the Paying Agent on the Record Date; but any such interest not so timely paid or duly provided for shall cease to be payable to the person who is the Owner thereof at the close of business on the Record Date and shall be payable to the person who is the Owner thereof at the close of business on a Special Record Date for the payment of any such defaulted interest. Such Special Record Date and the date fixed for payment of such defaulted interest shall be fixed by the Paying Agent whenever moneys become available for payment of the defaulted interest, and notice of the Special Record Date shall be given to the Owners not less than ten days prior to the Special Record Date by first-class mail to each such Owner as shown on the Paying Agent's registration books on a date selected by the Paying Agent, stating the date of the Special Record Date and the date fixed for the payment of such defaulted interest. The Paying Agent may make payments of interest on any Bond by such alternative means as may be mutually agreed to between the Owner of such Bond and the Paying Agent. If any Bond is not paid upon its presentation and surrender at or after its maturity or prior redemption, interest shall continue at its stated rate per annum until the principal thereof is paid in full. All such payments shall be made in lawful money of the United States of America.

Section 303. Execution of Bonds. The Bonds shall be executed in the name of the Town by the manual or facsimile signature of the Mayor, shall be sealed with the corporate seal of the Town or a facsimile thereof thereunto affixed, imprinted, engraved or otherwise reproduced and shall be attested by the manual or facsimile signature of the Town Clerk. Any Bond may be signed (manually or by facsimile), sealed or attested on behalf of the Town by any person who, at the date of such act, shall hold the proper office, notwithstanding that at the date of authentication, issuance or delivery, such person may have ceased to hold such office. The Mayor and the Town Clerk may adopt as and for his or her own facsimile signature the facsimile signature of his or her predecessor in office in the event that such facsimile signature appears on any of the Bonds. Before the execution of any Bond, the Mayor and the Town Clerk shall each file with the Secretary of State of the State his or her manual signature certified by him or her under oath.

Section 304. Authentication Certificate. The authentication certificate upon the Bonds shall be substantially in the form and tenor provided in the form of the Bonds attached to this Ordinance as Exhibit A. No Bond shall be secured hereby or entitled to the benefit hereof, nor shall any Bond be valid or obligatory for any purpose, unless the certificate of authentication, substantially in such form, has been duly executed by the Paying Agent and such certificate of the Paying Agent upon any Bond shall be conclusive evidence that such Bond has been authenticated and delivered hereunder. The certificate of authentication shall be deemed to have been duly executed by it if manually signed by an authorized officer or employee of the Paying Agent, but it shall not be necessary that the same officer or employee sign the certificate of authentication on all of the Bonds.

Section 305. Registration and Payment. The Paying Agent shall keep or cause to be kept sufficient records for the registration and transfer of the Bonds, which shall at all times be open to inspection by the Town. Upon presentation for such purpose, the Paying Agent shall, under such reasonable regulations as it may prescribe, register or transfer or cause to be registered or transferred, on said records, Bonds as herein provided. Except as provided in the first paragraph of Section 307 hereof, the Person in whose name any Bond shall be registered on the registration records kept by the Paying Agent shall be deemed and regarded as the absolute owner thereof for the purpose of making payment of the Bond Requirements thereof and for all other purposes; and payment of or on account of the Bond Requirements of any Bond shall be made only to the Owner thereof or his or her legal representative, but such registration may be changed upon transfer of such Bond in the manner and subject to the conditions and limitations provided herein. All such payments shall be valid and effectual to discharge the liability upon such Bond to the extent of the sum or sums so paid. The foregoing provisions of this Section are subject to the provisions of Section 308 hereof.

Section 306. Transfer and Exchange. Any Bond may be transferred upon the records required to be kept pursuant to the provisions of Section 305 hereof by the Person in whose name it is registered, in person or by his or her duly authorized attorney, upon surrender of such Bond for cancellation, accompanied by delivery of a written instrument of transfer in a form approved by the Paying Agent, duly executed. Whenever any Bond or Bonds shall be surrendered for transfer, the Paying Agent shall authenticate and deliver a new Bond or Bonds for a like aggregate principal amount and of the same maturity and interest rate and of any authorized denominations. The Bonds may be exchanged by the Paying Agent for a like

aggregate principal amount of Bonds of the same maturity and interest rate and of other authorized denominations. The execution by the Town of any Bond of any denomination shall constitute full and due authorization of such denomination and the Paying Agent shall thereby be authorized to authenticate and deliver such Bond.

The Paying Agent shall not be required to transfer or exchange (a) any Bond subject to redemption during a period beginning at the opening of business 15 days before the day of the mailing of a notice of redemption of Bonds and ending at the close of business on the day such notice is mailed, or (b) any Bond so selected for redemption in whole or in part after the mailing of notice calling such Bond or any portion thereof for prior redemption except the unredeemed portion of Bonds being redeemed in part.

The Paying Agent shall require the payment by any Owner requesting exchange or transfer of any tax or other governmental charge required to be paid with respect to such exchange or transfer, and may charge a sum sufficient to pay the cost of preparing each new Bond upon each exchange or transfer and any other expenses of the Town or the Paying Agent incurred in connection therewith.

The foregoing provisions of this Section are subject to the provisions of Section 308 hereof.

Section 307. Bond Replacement. Upon receipt by the Town and the Paying Agent of evidence satisfactory to them of the ownership of and the loss, theft, destruction or mutilation of any Bond and, in the case of a lost, stolen or destroyed Bond, of indemnity satisfactory to them, and in the case of a mutilated Bond upon surrender and cancellation of the Bond, (a) the Town shall execute and the Paying Agent shall authenticate and deliver a new Bond of the same date, interest rate and denomination in lieu of such lost, stolen, destroyed or mutilated Bond or (b) if such lost, stolen, destroyed or mutilated Bond shall have matured or have been called for redemption, in lieu of executing and delivering a new Bond as aforesaid, the Town may pay such Bond. Any such new Bond shall bear a number not previously assigned. The applicant for any such new Bond may be required to pay all expenses and charges of the Town and of the Paying Agent in connection with the issuance of such Bond. All Bonds shall be held and owned upon the express condition that, to the extent permitted by law, the foregoing conditions are exclusive with respect to the replacement and payment of mutilated, destroyed, lost or stolen Bonds, negotiable instruments or other securities.

Section 308. Custodial Deposit.

A. Depository. Notwithstanding any contrary provision of this Ordinance, the Bonds initially shall be evidenced by one Bond of the same maturity and interest rate in denominations equal to the aggregate principal amount of the Bonds of the same maturity and interest rate. Such initially delivered Bonds shall be registered in the name of "Cede & Co." as nominee for The Depository Trust Company, the securities depository for the Bonds. The Bonds may not thereafter be transferred or exchanged except:

(1) to any successor of The Depository Trust Company or its nominee, which successor must be both a "clearing corporation" as defined in Section 4-8-102(a)(5), C.R.S. and a

qualified and registered "clearing agency" under Section 17A of the Securities Exchange Act of 1934, as amended; or

(2) upon the resignation of The Depository Trust Company or a successor or new depository institution under clause (1) or this clause (2) of this paragraph A, or a determination by the Board that The Depository Trust Company or such successor or a new depository institution is no longer able to carry out its functions, and the designation by the Board of another depository institution acceptable to the Board and to the depository institution then holding the Bonds, which new depository institution must be both a "clearing corporation" as defined in Section 4-8-102(a)(5), C.R.S. and a qualified and registered "clearing agency" under Section 17A of the Securities Exchange Act of 1934, as amended, to carry out the functions of The Depository Trust Company or such successor new depository institution; or

(3) upon the resignation of The Depository Trust Company or a successor or new depository institution under clause (1) above or designation of a new depository institution pursuant to clause (2) above, or a determination of the Board that The Depository Trust Company or such successor or depository institution is no longer able to carry out its functions, and the failure by the Board, after reasonable investigation, to locate another depository institution under clause (2) to carry out such depository institution functions.

B. Successor. In the case of a transfer to a successor of The Depository Trust Company or its nominee as referred to in clause (1) of paragraph A hereof, upon receipt of the outstanding Bonds by the Paying Agent together with written instructions for transfer satisfactory to the Paying Agent, a new Bond for each maturity and interest rate of the Bonds then outstanding shall be issued to such successor or new depository, as the case may be, or its nominee, as is specified in such written transfer instructions. In the case of a resignation or determination under clause (3) of paragraph A hereof and the failure after reasonable investigation to located another qualified depository institution for the Bonds as provided in clause (3) of paragraph A hereof, and upon receipt of the outstanding Bonds by the Paying Agent, together with written instructions for transfer satisfactory to the Paying Agent, new Bonds shall be issued in authorized denominations as provided in and subject to the limitations of Sections 302, 305, and 306 hereof, registered in the names of such persons, as are requested in such written transfer instructions; however, the Paying Agent shall not be required to deliver such new Bonds within a period of less than 60 days from the date of receipt of such written transfer instructions.

C. Absolute Owner. The Board and the Paying Agent shall be entitled to treat the Owner of any Bond as the absolute owner thereof for all purposes hereof and any applicable laws, notwithstanding any notice to the contrary received by any or all of them and the Board and the Paying Agent shall have no responsibility for transmitting payments or notices to the beneficial owners of the Bonds held by The Depository Trust Company or any successor or new depository named pursuant to paragraph A hereof.

D. Payment. The Board and the Paying Agent shall endeavor to cooperate with The Depository Trust Company or any successor or new depository named pursuant to clause (1) or (2) of paragraph A hereof in effectuating payment of the principal amount of the

Bonds upon maturity or prior redemption by arranging for payment in such a manner that funds representing such payments are available to the depository on the date they are due.

E. Redemption. Upon any partial redemption of Bonds of the same maturity and interest rate, Cede & Co. (or its successor) in its discretion may request the Town to issue and authenticate a new Bond or shall make an appropriate notation on the Bond indicating the date and amount of prepayment, except in the case of final maturity, in which case the Bond must be presented to the Paying Agent prior to payment. The records of the Paying Agent shall govern in the case of any dispute as to the amount of any partial prepayment made to Cede & Co. (or its successor).

Section 309. Bond Cancellation. Whenever any Bond shall be surrendered to the Paying Agent upon payment thereof, or to the Paying Agent for transfer, exchange or replacement as provided herein, such Bond shall be promptly canceled and destroyed by the Paying Agent, and a certificate of such cancellation and destruction shall be furnished by the Paying Agent to the Town.

Section 310. Incontestable Recital in Bonds. Pursuant to Article XX of the State Constitution, the Supplemental Public Securities Act and this Ordinance, each Bond shall recite that it is issued under the authority of this Ordinance and the Supplemental Public Securities Act and that it is the intention of the Town that such recital shall conclusively impart full compliance with all the provisions of this Ordinance and shall be conclusive evidence of the validity and the regularity of the issuance of the Bonds after their delivery for value and that all the Bonds issued containing such recital shall be incontestable for any cause whatsoever after their delivery for value.

Section 311. Bond Form. Subject to the provisions of this Ordinance, each Bond shall be in substantially the form attached hereto as Exhibit A, with such omissions, insertions, endorsements and variations as to any recitals of fact or other provisions as may be required by the circumstances, be required or permitted by this Ordinance, be consistent with this Ordinance or be necessary or appropriate to conform to the rules and requirements of any governmental authority or any usage or requirement of law with respect thereto.

ARTICLE IV

REDEMPTION

Section 401. Optional Redemption. The Bonds will be subject to redemption at the option of the Town from any legally available funds on the dates, at the prices, and in the manner set forth in the Sale Certificate.

Notwithstanding the foregoing, the Bonds may not be redeemed pursuant to this Section unless all Policy Costs, if any, due and owing at the time to the Surety Provider have been paid.

Section 402. Mandatory Sinking Fund Redemption. The Term Bonds, if any, shall be subject to mandatory sinking fund redemption at the times, in the amounts and at the prices provided in the Sale Certificate.

On or before the thirtieth day prior to each such sinking fund payment date, the Paying Agent shall proceed to call the Term Bonds, if any, as provided in the Sale Certificate (or any Term Bond or Term Bonds issued to replace such Term Bonds) for redemption from the sinking fund on the next December 1, and give notice of such call without further instruction or notice from the Town.

At its option, to be exercised on or before the sixtieth day next preceding each such sinking fund Redemption Date, the Town may (a) deliver to the Paying Agent for cancellation Term Bonds subject to mandatory sinking fund redemption on such date in an aggregate principal amount desired or (b) receive a credit in respect of its sinking fund redemption obligation for any Term Bonds of the same maturity and interest rate subject to mandatory sinking fund redemption on such date, which prior to said date have been redeemed (otherwise than through the operation of the sinking fund) and canceled by the Paying Agent and not theretofore applied as a credit against any sinking fund redemption obligation. Each Term Bond so delivered or previously redeemed will be credited by the Paying Agent at the principal amount thereof against the obligation of the Town on such sinking fund date and such sinking fund obligation will be accordingly reduced. The Town will on or before the sixtieth day next preceding each sinking fund Redemption Date furnish the Paying Agent with its certificate indicating whether or not and to what extent the provisions of (a) and (b) of the preceding sentence are to be availed with respect to such sinking fund payment. Failure of the Town to deliver such certificate shall not affect the Paying Agent's duty to give notice of sinking fund redemption as provided in this paragraph.

Section 403. Partial Redemption. In the case of Bonds of a denomination larger than $5,000, a portion of such Bond ($5,000 or any integral multiple thereof) may be redeemed, in which case the Paying Agent shall, without charge to the owner of such Bond, authenticate and issue a replacement Bond or Bonds for the unredeemed portion thereof.

Section 404. Notice of Prior Redemption. Notice of optional or mandatory redemption shall be given by the Paying Agent in the name of the Town by sending a copy of such notice by first-class, postage prepaid mail, not more than sixty nor less than thirty days prior

to the Redemption Date to each Owner at his address as it last appears on the registration books kept by the Paying Agent; but neither failure to give such notice nor any defect therein shall affect the redemption of any Bond. Such notice shall identify the Bonds to be so redeemed (if less than all are to be redeemed) and the Redemption Date, and shall further state that on such Redemption Date there will become and be due and payable upon each Bond so to be redeemed, at the Paying Agent, the principal amount thereof, accrued interest to the Redemption Date, and the stipulated premium, if any, and that from and after such date interest will cease to accrue. Notice having been given in the manner hereinabove provided, the Bond or Bonds so called for redemption shall become due and payable on the Redemption Date so designated; and upon presentation thereof at the Paying Agent, the Paying Agent will pay the Bond or Bonds so called for redemption. No further interest shall accrue on the principal of any such Bond called for redemption from and after the Redemption Date, provided sufficient funds are deposited with the Paying Agent and available on the Redemption Date.

Notwithstanding the provisions of this Section, any notice of redemption shall either (a) contain a statement that the redemption is conditioned upon the receipt by the Paying Agent on or before the Redemption Date of funds sufficient to pay the redemption price of the Bonds so called for redemption, and that if such funds are not available, such redemption shall be canceled by written notice to the Owners of the Bonds called for redemption in the same manner as the original redemption notice was mailed, or (b) be given only if funds sufficient to pay the redemption price of the Bonds so called for redemption are on deposit with the Paying Agent in the applicable fund or account.

Section 405. Bonds Owned by the Town. Bonds owned by or on behalf of the Town shall not be subject to redemption. At any time the Town may surrender any Bonds owned by or on behalf of the Town to the Paying Agent, which shall promptly cancel such Bonds.

Section 406. No Partial Redemption After Default. Anything in this Ordinance to the contrary notwithstanding, if there shall have occurred and is continuing an Event of Default hereunder of which an officer of the Paying Agent has actual knowledge, there shall be no redemption of less than all of the Bonds at the time Outstanding (other than pursuant to Section 402 hereof).

ARTICLE V

USE OF BOND PROCEEDS AND OTHER MONEYS

Section 501. Disposition of Bond Proceeds. The net proceeds derived from the sale of the Bonds, upon the receipt thereof, shall be credited to the special and separate account hereby created and to be known as the "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015 Escrow Account." Except as otherwise provided herein, the moneys in the Escrow Account shall be used solely for the purpose of paying the costs of the Refunding Project.

On the date of delivery of the Bonds, the Town shall pay from the net proceeds of the Bonds the premiums payable to the Insurer, if any, for its Insurance Policy, and to the Surety Provider, if any, for its Reserve Account Insurance Policy.

Section 502. Payment of Expenses. Any moneys remaining after the deposit to the Escrow Account pursuant to Section 501 hereof shall be deposited with the Town and used to defray the administrative costs of the Refunding Project, including, without limitation, amounts to be paid to the Paying Agent, legal fees, accounting fees, financial advisory fees, printing costs and rating fees.

Section 503. Lien on Bond Proceeds. Until the proceeds of the Bonds deposited in the Escrow Account are applied as herein provided, such Bond proceeds are subject to a lien thereon and pledge thereof for the benefit of the Owners of the Outstanding Bonds as provided in Section 601 hereof.

Section 504. Purchaser Not Responsible. The validity of the Bonds is not dependent upon nor affected by the validity or regularity of any proceedings relating to the application of the Bond proceeds. The Purchaser and any subsequent Owners of any of the Bonds are not responsible for the application or disposal by the Town or by any of its officers, agents and employees of the moneys derived from the sale of the Bonds or of any other moneys herein designated.

ARTICLE VI

ADMINISTRATION OF AND ACCOUNTING FOR PLEDGED REVENUES

Section 601. Pledge Securing Bonds. Subject only to the right of the Town to cause amounts to be withdrawn and paid on account of Operation and Maintenance Expenses of the System, the Gross Revenues and, subject to the right of the Town to cause amounts to be withdrawn to pay the Cost of the Project as provided herein and other than moneys and securities held in the Rebate Fund to the extent such amounts are required to be paid to the United States, all moneys and securities paid or to be paid to or held or to be held in any account under this Article or under Section 501 hereof are hereby pledged to secure the payment of the Bond Requirements of the Outstanding Bonds and to secure the obligations of the Town to pay the Policy Costs. The pledge of the Net Revenues to secure the payment of the Bond Requirements of the Outstanding Bonds and any Parity Lien Bonds is on a parity with the pledge of the Net Revenues for, and lien thereon of the Parity Lien Bonds heretofore issued and any other Parity Lien Bonds hereafter issued in compliance with the provisions of Article VIII hereof. The pledge of Net Revenues to secure the payment of the Policy Costs is subordinate only to the pledge to pay the Bond Requirements with respect to the Bonds and any Parity Lien Bonds. This pledge shall be valid and binding from and after the date of the delivery of the Bonds, and the moneys as received by the Town and hereby pledged shall immediately be subject to the lien of this pledge without any physical delivery thereof, any filing, or further act. The lien of this pledge and the obligation to perform the contractual provisions hereby made shall have priority over any or all other obligations and liabilities of the Town except any Outstanding Parity Lien Bonds heretofore or hereafter authorized and any Policy Costs as provided herein. The lien of this pledge shall be valid and binding as against all parties having claims of any kind in tort, contract or otherwise against the Town (except as herein otherwise provided) irrespective of whether such parties have notice thereof.

Section 602. Water Fund Deposits. So long as any of the Bonds shall be Outstanding, as to any Bond Requirements related to the Bonds and the Parity Lien Bonds, the entire Gross Revenues, upon their receipt from time to time by the Town, shall be set aside and credited immediately to the special and separate account hereby continued known as the "Town of Erie, Colorado, Water Fund."

Section 603. Administration of Water Fund. So long as any of the Bonds and the Parity Lien Bonds shall be Outstanding, as to any Bond Requirements, the following payments shall be made from the Water Fund, as provided in Sections 604 through 609 hereof.

Section 604. Operation and Maintenance Expenses. First, as a first charge on the Water Fund, from time to time there shall continue to be held therein moneys sufficient to pay Operation and Maintenance Expenses, as they become due and payable, and thereupon they shall be promptly paid. Any surplus remaining in the Water Fund at the end of the Fiscal Year and not needed for Operation and Maintenance Expenses shall be used for other purposes of the Water Fund as herein provided.

Section 605. Bond Account Payments. Second, from any remaining Net Revenues, there shall be credited, concurrently with amounts required to meet the Bond Requirements for any Outstanding Parity Lien Bonds heretofore or hereafter issued, to the special and separate account hereby continued known as the "Town of Erie, Colorado, Water Enterprise Revenue Bonds, Bond Account" the following amounts:

A. *Use of Moneys in the Bond Account*. Moneys deposited in the Bond Account shall be used solely for the purpose of paying the principal of, premium, if any, and interest on the Bonds and any Parity Lien Bonds. Nothing herein shall be construed to prevent the Town from creating separate principal and interest accounts for the Bonds and any Parity Lien Bonds and accounting separately for any deposits made thereto on account of the Bonds and any Parity Lien Bonds, if such action is deemed by the Town to be necessary or desirable, provided that any such separate accounts shall have claims to the Net Revenues equal to and on a parity with those of the other such accounts.

B. *Deposits to the Bond Account*. On or before the last day of each month, commencing in the month next succeeding the date of issuance of the Bonds, the Town shall deposit to the Bond Account from the Net Revenues, an amount equal to the Pro Rata Portion of the interest and principal to come due on the Bonds and the Parity Lien Bonds on the next succeeding interest payment date. All deposits to the Bond Account shall first be allocated to the payment of interest to come due on the Bonds and the Parity Lien Bonds.

C. *Investments*. Moneys deposited in the Bond Account may be invested or deposited in securities or obligations which are Investment Securities. The investment of moneys deposited in the Bond Account shall, however, be subject to the covenants and provisions in Section 930 hereof regarding the exclusion of interest on the Bonds from gross income for federal income tax purposes.

Section 606. Reserve Account. Third, from any remaining Net Revenues, there shall be credited, if necessary, sufficient amounts into a separate account known as the "Town of Erie, Colorado, Water Enterprise Revenue Bonds, Reserve Account," any amounts necessary to meet the Reserve Account Requirement.

A. *Use of Moneys in the Reserve Account*. Moneys in the Reserve Account shall be used, if necessary, only to prevent a default in the payment of the principal of, premium, if any, and interest on the Bonds and Parity Lien Bonds when due. Moneys on deposit in the Reserve Account, proceeds of the liquidation of Investment Securities on deposit in the Reserve Account, or moneys available from a Reserve Account Insurance Policy shall be transferred to the Bond Account on any date on which a payment of principal of, premium, if any, or interest on the Bonds and any Parity Lien Bonds is due to the extent the amount on deposit in the Bond Account is insufficient to make such payment.

B. *Funding and Maintenance of Reserve Account Requirement*. The Reserve Account Requirement shall be funded and maintained by any one of or any combination of (i) cash; (ii) Investment Securities; and (iii) a Reserve Account Insurance Policy which provides for payments when and as required for purposes of the applicable reserve account and is issued by an obligor whose obligations such as the Reserve Account Insurance Policy are either (A) rated

by a rating agency as investment grade or (B) if a rating has been obtained on the Bonds or any Parity Lien Bonds whose obligations are rated by each rating agency that then maintains a rating on the Bonds or any Parity Lien Bonds in a category (or comparable classification) equal to or higher than the category, if any, in which the Bonds or any Parity Lien Bonds are rated. To the extent that the Reserve Account Requirement is funded from Investment Securities, such investments shall have an aggregate weighted term to maturity of not greater than five years.

C. *Valuation of Deposits*. Cash shall satisfy the Reserve Account Requirement by the amount of cash on deposit. Investment Securities shall satisfy the Reserve Account Requirement by the value of such investments. The value of each Permitted Investment on deposit in the Reserve Account shall be (i) its purchase price from the date of purchase until the first date thereafter on which the Reserve Account Requirement is calculated pursuant to paragraph D. of this section and (ii) following each date on which the Reserve Account Requirement is calculated pursuant to paragraph D. of this section until the next date on which the Reserve Account Requirement is so calculated, its fair market value determined as of such calculation date. A Reserve Account Insurance Policy shall satisfy the Reserve Account Requirement by the amount payable to the Town pursuant to such policy.

D. *Calculation of Reserve Account Requirement and Transfers Resulting from Calculation*. The Reserve Account Requirement shall be calculated as of (i) the date of issuance of the Bonds; (ii) the date of issuance of each series of Parity Lien Bonds; and (iii) not less than every six months. If at any time the calculated amounts of the Reserve Account are less than the Reserve Account Requirement or transfers are made from the Reserve Account as provided in paragraph (A) hereof, then the Town shall deposit to the Reserve Account from the Net Revenues amounts sufficient to bring the amounts deposited in the Reserve Account to the Reserve Account Requirement. If at any time the calculated amounts of the Reserve Account are more than the Reserve Account Requirement, then the Town shall transfer from the Reserve Account to the Bond Account any amounts which are in excess of the Reserve Account Requirement. Such deposits shall be made as soon as possible after such use or calculation, but in accordance with and subject to the limitations of this Article VI.

E. *Transfer of Interest Income to Bond Account*. The investment of moneys deposited in the Reserve Account shall be subject to the covenants and provisions of Section 930 hereof. Except to the extent otherwise required by such section, interest income from the investment or reinvestment of moneys deposited in the Reserve Account shall be transferred to the Bond Account.

Section 607. Rebate Fund. Fourth, concurrently with any payments required to be made pursuant to any Parity Bond Ordinances with respect to any rebate funds established thereby, there shall be deposited into the special and separate account hereby created and to be known as the "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015 Rebate Fund" moneys in the amounts and at the times specified in the Tax Compliance Certificate so as to enable the Town to comply with Section 930 hereof. Amounts on deposit in the Rebate Fund shall not be subject to the lien and pledge of this Ordinance to the extent that such amounts are required to be paid to the United States Treasury. The Town shall cause amounts on deposit in the Rebate Fund to be forwarded to the United States Treasury (at the

address provided in the Tax Compliance Certificate) at the times and in the amounts set forth in the Tax Compliance Certificate.

If the moneys on deposit in the Rebate Fund are insufficient for the purposes thereof, the Town shall transfer moneys in the amount of the insufficiency to the Rebate Fund, to the extent permitted by Section 606 hereof, from the Reserve Account and the Bond Account. Upon receipt by the Town of an opinion of Bond Counsel to the effect that the amount in the Rebate Fund is in excess of the amount required to be contained therein, such excess may be transferred to the Water Fund.

Section 608. Payment of Additional Securities. Subject to the provisions hereinabove in this Article, but subsequent to the payments required by Sections 605, 606 and 607 hereof, any moneys remaining in the Water Fund may be used by the Town for the payment of Bond Requirements of subordinate securities, including reasonable reserves for such subordinate securities and for rebate of amounts to the United States Treasury with respect to such subordinate securities.

Section 609. Use of Remaining Revenues. After the payments hereinabove required to be made by Sections 602 through 608 hereof are made, any remaining Net Revenues in the Water Fund shall be used, first, for any one or any combination of necessary purposes relating to the operation, improvement or debt management of the System and, second, to the extent of any remaining surplus, for any one or any combination of lawful purposes as the Board may from time to time conclusively determine.

Section 610. Maintenance of Escrow Account. The Escrow Account shall be maintained in an amount at the time of those initial deposits therein and at all times subsequently at least sufficient, together with the known minimum yield to be derived from the initial investment and any temporary reinvestment of the deposits therein or any part thereof in Federal Securities to pay the principal of, redemption premium, if any, and interest on the Refunded Bonds on the Redemption Date. The form, terms and provisions of the Escrow Agreement are hereby approved in substantially the form as on file with the Town Clerk, and the Mayor and Town Clerk are hereby authorized to execute and deliver the Escrow Agreement.

Section 611. Use of Escrow Account. Moneys shall be withdrawn by the Escrow Bank from the Escrow Account in sufficient amounts and at such times to permit the payment without default of the principal of, redemption premium, if any, and interest on the Refunded Bonds on the Redemption Date. Any moneys remaining in the Escrow Account after provision shall have been made for the payment in full of the Refunded Bonds shall be applied to any lawful purpose of the Town as the Board of Trustees may hereafter determine.Exercise of Option. The Board of Trustees has elected and does hereby declare its intent to exercise on the behalf and in the name of the Town its option to redeem the Refunded Bonds on the Redemption Date. The Board of Trustees is hereby obligated so to exercise such option, which option shall be deemed to have been exercised when notice is duly given and completed as herein provided; however, should the Board of Trustees determine that it is not in the best interest of the Town to call for prior redemption the Refunded Bonds, such exercise of option as provided in this section is deemed void.Manner of Giving Notice. The notice of prior redemption and defeasance shall be given in accordance with the Refunded Bond Ordinance by mailing a copy of the notice by

first class mail (postage prepaid) to the registered owners of the Refunded Bonds and the original bond insurer at the addresses shown on the registration records of the registrar for the Refunded Bonds.

GENERAL ADMINISTRATION

Section 701. Administration of Accounts. The special accounts designated in Articles V and VI hereof shall be administered as provided in this Article (but not any account under Section 1301 hereof).

Section 702. Places and Times of Deposits. Except as hereinafter provided, each of such special accounts shall be maintained by the Town as a book account and kept separate from all other accounts as a trust account solely for the purposes herein designated therefor. The moneys accounted for in such special book accounts may be in one or more bank accounts in one or more Commercial Banks. Each such bank account shall be continuously secured to the fullest extent required or permitted by the laws of the State for the securing of public funds and shall be irrevocable and not withdrawable by anyone for any purpose other than the respective designated purposes. Each periodic payment shall be credited to the proper book account not later than the date therefor herein designated, except that when any such date shall not be a Business Day, then such payment shall be made on or before the next preceding Business Day. Moneys shall be deposited with the Paying Agent for the Bonds at least three days prior to each interest payment date and each maturity or mandatory Redemption Date herein designated in amounts sufficient to pay the Bond Requirements then becoming due on the Outstanding Bonds.

Section 703. Investment of Moneys. Any moneys in the Water Fund, Bond Account, Reserve Account and Rebate Fund and not needed for immediate use shall be invested or reinvested by the Finance Director in Investment Securities. All such investments shall (a) either be subject to redemption at any time at a fixed value by the holder thereof at the option of such holder, or (b) mature not later than the estimated date or respective dates on which the proceeds are to be expended as estimated by the Finance Director at the time of such investment or reinvestment; provided that (1) Investment Securities credited to the Reserve Account shall not mature later than ten years from the date of such investment or reinvestment and (2) collateral securities of any Investment Securities may have a maturity of more than five years from the date of purchase thereof. For the purpose of any such investment or reinvestment, Investment Securities shall be deemed to mature at the earliest date on which the obligor is, on demand, obligated to pay a fixed sum in discharge of the whole of such obligations.

Section 704. Accounting for Investments. The Investment Securities so purchased as an investment or reinvestment of moneys in any such account hereunder shall be deemed at all times to be a part of the account. Any interest or other gain from any investments and reinvestments of moneys accounted for in the Water Fund, the Bond Account and the Rebate Fund shall be credited to such Fund, and any loss resulting from any such investments or reinvestments of moneys accounted for in the Water Fund, the Bond Account, the Reserve Account and the Rebate Fund shall be charged or debited to such Fund. Any interest or other gain from any investment or reinvestment of moneys accounted for in the Reserve Account (a) shall be credited to the Rebate Fund or the Bond Account, at the discretion of the Finance

Director, if the amount credited to the Reserve Account immediately after such credit to the Rebate Fund or the Bond Account is not less than the Reserve Account Requirement and (b) if the amount credited to the Reserve Account is less than the Reserve Account Requirement, shall be credited to the Reserve Account (up to the amount of the deficiency). No loss or profit in any account on any investments or reinvestments in Investment Securities shall be deemed to take place as a result of market fluctuations of the Investment Securities prior to the sale or maturity thereof. In the computation of the amount in any account for any purpose hereunder, except as herein otherwise expressly provided or for rebate purposes, as described in the Tax Compliance Certificate, Investment Securities shall be valued at the cost thereof (including any amount paid as accrued interest at the time of purchase of the obligation); provided that any time or demand deposits shall be valued at the amounts deposited, in each case exclusive of any accrued interest or any other gain to the Town until such gain is realized by the presentation of matured coupons for payment or otherwise.

Section 705. Redemption or Sale of Investment Securities. The Finance Director shall present for redemption or sale on the prevailing market at the best price obtainable any Investment Securities so purchased as an investment or reinvestment of moneys in the account whenever it shall be necessary in order to provide moneys to meet any withdrawal, payment or transfer from such account. Neither the Finance Director or any other officer or employee of the Town shall be liable or responsible for any loss resulting from any such investment or reinvestment made in accordance with this Ordinance.

Section 706. Character of Funds. The moneys in any account designated in Articles V and VI hereof shall consist either of lawful money of the United States or Investment Securities, or both such money and such Investment Securities. Moneys deposited in a demand or time deposit account in a bank or savings and loan association, appropriately secured according to the laws of the State, shall be deemed lawful money of the United States.

Section 707. Payment of Bond Requirements. The moneys credited to any fund or account designated in Article VI hereof for the payment of the Bond Requirements of any Bonds shall be used without requisition, voucher, warrant, further order or authority (other than is contained herein), or any other preliminaries, to pay promptly the Bond Requirements of any Bonds payable from such fund or account as such amounts are due, except to the extent any other moneys are available therefor.

ARTICLE VIII

SECURITIES LIENS AND ADDITIONAL SECURITIES

Section 801. Lien Status. The Bonds constitute an irrevocable lien (but not necessarily an exclusive lien) upon the Net Revenues on a parity with the lien of the Net Revenues of the Parity Bonds. The Policy Costs constitute an irrevocable and subordinate lien (but not necessarily an exclusive subordinate lien) upon the Net Revenues.

Section 802. Equality of Bonds. The Bonds and any Parity Lien Bonds heretofore issued or hereafter authorized to be issued and from time to time Outstanding are equitably and ratably secured by a lien on the Net Revenues and shall not be entitled to any priority one over the other in the application of the Net Revenues regardless of the time or times of the issuance of the Bonds and any other such Parity Lien Bonds, it being the intention of the Board that there shall be no priority among the Bonds and any such Parity Lien Bonds regardless of the fact that they may be actually issued and delivered at different times, except that (a) moneys in the Bond Account and Reserve Account shall secure only the Bonds and the moneys in any acquisition, bond, reserve or similar funds established for other Parity Lien Bonds shall secure only such Parity Lien Bonds and (b) other Parity Lien Bonds may have a lien on Net Revenues on a parity with lien thereon of the Bonds even if no Reserve Account is established for such Parity Lien Bonds or a Reserve Account is established but with a different requirement as to the amount of moneys (or the value of a Reserve Account insurance policy with respect to such Parity Lien Bonds) required to be on deposit therein or the manner in which such Reserve Account is funded or the period of time over which such Reserve Account is funded.

Section 803. Issuance of Parity Lien Bonds. Nothing herein prevents the issuance by the Town of additional securities payable from the Net Revenues and constituting a lien thereon on a parity with, but not prior nor superior to, the lien thereon of the Bonds; but before any such additional Parity Lien Bonds, except as provided in Section 808, are authorized or actually issued: hereof, unless all of the following conditions are satisfied:

A. Absence of Default. At the time of the adoption of the ordinance authorizing the issuance of the additional securities, the Town shall not be in default in making any payments required by Article VI hereof, including any payments of Policy Costs.

B. Historic Earnings Test. The Net Revenues for any 12 consecutive months out of the 18 months preceding the month in which such securities are to be issued are at least equal to the sum of (a) 125% of the Combined Maximum Annual Principal and Interest Requirements of (i) the Outstanding Bonds and any Outstanding Parity Lien Bonds, (ii) such proposed Parity Lien Bonds to be issued and (iii) 100% of the Policy Costs then due and owing, if any, except as hereinafter otherwise expressly provided and (b) 100% of maximum annual debt service of all other indebtedness payable from the Net Revenues.

C. Adjustment of Gross Revenues. In any computation under paragraph B of this Section, the amount of the Gross Revenues for the applicable period shall be decreased and may be increased by the amount of loss or gain conservatively estimated by an Independent Accountant, Independent Engineer or the Finance Director, as the case may be, which results

from any changes which became effective not less than 60 days prior to the last day of the period for which Gross Revenues are determined in any schedule of fees, rates and other charges constituting Gross Revenues based on the number of users during the applicable period as if such modified schedule of fees, rates and other charges shall have been in effect during such entire time period. However, the Gross Revenues need not be decreased by the amount of any such estimated loss to the extent the Independent Accountant, the Independent Engineer or the Finance Director estimates the loss is temporary in nature or will be offset within a reasonable temporary period by an increase in revenues or a reduction in Operation and Maintenance Expenses not otherwise included in the calculations under this Section, and estimates any loss under this sentence will not at any time materially and adversely affect the Town's apparent ability to comply with the rate maintenance covenant stated in Section 921 hereof without modification because of any restrictive legislation, regulation or other action under the police power exercised by any governmental body.

D. Reduction of Annual Requirements. The respective annual Bond Requirements (including as such a requirement the amount of any prior redemption premiums due on any Redemption Date) shall be reduced to the extent such Bond Requirements are scheduled to be paid in each of the respective Fiscal Years with moneys held in trust or in escrow for that purpose by any Trust Bank, including the known minimum yield from any investment in Federal Securities and any bank deposits, including any certificate of deposit.

E. Consideration of Additional Expenses. In determining whether or not additional Parity Lien Bonds may be issued as aforesaid, consideration shall be given to any probable increase (but not reduction) in the Operation and Maintenance Expenses of the System as estimated by the Finance Director that will result from the expenditure of the funds proposed to be derived from the issuance and sale of the additional securities; but the Finance Director may reduce any such increase in Operation and Maintenance Expenses by the amount of any increase in revenues or any reduction in Operation and Maintenance Expenses resulting from the Capital Improvements to which such expenditure relates and not otherwise included in the calculations under this Section, if the Finance Director also opines that any such reduction in any such increase in Operation and Maintenance Expenses will not materially and adversely affect the Town's apparent ability to comply with the rate maintenance covenant stated in Section 921 hereof without modification because of any restrictive legislation, regulation or other action under the police power exercised by any governmental body.

Section 804. Certification of Revenues. A written certificate or written opinion by the Finance Director under Section 803B that such annual revenues, when adjusted as hereinabove provided in paragraphs C, D, and E of Section 803 hereof, are sufficient to pay such amounts, as provided in paragraph B of Section 803 hereof, shall be conclusively presumed to be accurate in determining the right of the Town to authorize, issue, sell and deliver additional securities on a parity with the Bonds.

Section 805. Subordinate Securities Permitted. Nothing herein prevents the Town from issuing additional securities payable from the Net Revenues and having a lien thereon subordinate, inferior and junior to the lien thereon of the Bonds.

Section 806. Superior Securities Prohibited. Nothing herein permits the Town to issue additional securities payable from the Net Revenues and having a lien thereon prior and superior to the lien thereon of the Bonds.

Section 807. Use of Proceeds. The proceeds of any additional parity securities payable from any Net Revenues shall be used only to finance Capital Improvements or to refund other securities payable from Net Revenues, regardless of the priority or the lien of such securities on Net Revenues.

Section 808. Issuance of Refunding Securities. The Town may issue any refunding securities payable from Net Revenues to refund any Outstanding Bonds, Parity Lien Bonds or any subordinate securities heretofore or hereafter issued, with such details as the Board of Trustees may by ordinance provide so long as there is no impairment of any contractual obligation imposed upon the Town by any proceedings authorizing the issuance of any unrefunded portion of such Outstanding securities of any one or more issues; but so long as the Bonds, or any part thereof, are Outstanding, refunding securities payable from Net Revenues may be issued on a parity with the unrefunded Bonds only if:

A. Prior Consent. The Town first receives the consent of the Owner or Owners of the unrefunded portion of the Bonds; or

B. Requirements Not Increased. The Combined Maximum Annual Principal and Interest Requirements for the Bonds and Parity Lien Bonds Outstanding immediately after the issuance of the refunding securities is not greater than the Combined Maximum Annual Principal and Interest Requirements for all Bonds and Parity Lien Bonds Outstanding immediately prior to the issuance of the refunding securities and the lien of any refunding Parity Lien Bonds on the Net Revenues is not raised to a higher priority than the lien thereon of any securities thereby refunded; or

C. Earnings Test. The refunding securities are issued in compliance with Section 803B hereof.

ARTICLE IX

PROTECTIVE COVENANTS

Section 901. General. The Town hereby covenants and agrees with the Owners of the Bonds and makes provisions which shall be a part of its contract with such Owners to the effect and with the purpose set forth in the following Sections of this Article.

Section 902. Performance of Duties. The Town, acting by and through the Board or otherwise, shall faithfully and punctually perform, or cause to be performed, all duties with respect to the Gross Revenues and the System required by the Constitution and laws of the State and various ordinances of the Town, including, without limitation, the making and collection of reasonable and sufficient fees, rates and other charges for services rendered or furnished by or the use of the System, as herein provided, and the proper segregation of the proceeds of the Bonds and of any securities hereafter authorized and the Gross Revenues and their application from time to time to the respective accounts provided therefor.

Section 903. Contractual Obligations. The Town shall perform all contractual obligations undertaken by it under any agreements relating to the Bonds, the Gross Revenues, the Refunding Project, or the System, or any combination thereof, with any other Persons.

Section 904. Further Assurances. At any and all times the Town shall, so far as it may be authorized by law, pass, make, do, execute, acknowledge, deliver and file or record all and every such further instruments, acts, deeds, conveyances, assignments, transfers, other documents and assurances as may be necessary or desirable for the better assuring, conveying, granting, assigning and confirming all and singular the rights, the Gross Revenues and other moneys and accounts hereby pledged or assigned, or intended so to be, or which the Town may hereafter become bound to pledge or to assign, or as may be reasonable and required to carry out the purposes of this Ordinance and to comply with any instrument of the Town amendatory thereof, or supplemental thereto. The Town, acting by and through the Board, or otherwise, shall at all times, to the extent permitted by law, defend, preserve and protect the pledge of the Gross Revenues and other moneys and accounts pledged hereunder and all the rights of every Owner of any Bond hereunder against all claims and demands of all Persons whomsoever.

Section 905. Conditions Precedent. Upon the date of issuance of the Bonds, all conditions, acts and things required by the Federal or State Constitution, the Supplemental Public Securities Act and this Ordinance to exist, to have happened and to have been performed precedent to or in the issuance of the Bonds shall exist, have happened, and have been performed; and the Bonds, together with all other obligations of the Town, shall not contravene any debt or other limitation prescribed by the State Constitution.

Section 906. Efficient Operation and Maintenance. The Town shall at all times operate the System properly and in a sound and economical manner; and the Town shall maintain, preserve and keep the same properly or cause the same so to be maintained, preserved and kept, with the appurtenances and every part and parcel thereof in good repair, working order and condition, and shall from time to time make or cause to be made all necessary and proper repairs, replacements and renewals so that at all times the operation of the System may be

properly and advantageously conducted. All salaries, fees, wages and other compensation paid by the Town in connection with the maintenance, repair and operation of the System shall be reasonable and proper.

Section 907. Rules, Regulations and Other Details. The Town, acting by and through the Board, shall establish and enforce reasonable rules and regulations governing the operation, use and services of the System. The Town shall observe and perform all of the terms and conditions contained in this Ordinance and shall comply with all valid acts, rules, regulations, orders and directions of any legislative, executive, administrative or judicial body applicable to the System or to the Town.

Section 908. Payment of Governmental Charges. The Town shall pay or cause to be paid all taxes and assessments or other municipal or governmental charges, if any, lawfully levied or assessed upon or in respect of the System, or upon any part thereof, or upon any portion of the Gross Revenues, when the same shall become due, and shall duly observe and comply with all valid requirements of any municipal or governmental authority relative to the System or any part thereof, except for any period during which the same are being contested in good faith by proper legal proceedings. The Town shall not create or suffer to be created any lien upon the System, or any part thereof, or upon the Gross Revenues, except the pledge and lien created by this Ordinance for the payment of the Bond Requirements of the Bonds and except as herein otherwise permitted. The Town shall pay or cause to be discharged or shall make adequate provision to satisfy and to discharge, within 60 days after the same shall become payable, all lawful claims and demands for labor, materials, supplies or other objects which, if unpaid, might by law become a lien upon the System, or any part thereof, or the Gross Revenues; but nothing herein requires the Town to pay or cause to be discharged or to make provision for any such tax, assessment, lien or charge, so long as the validity thereof is contested in good faith and by appropriate legal proceedings.

Section 909. Protection of Security. The Town, the officers, agents and employees of the Town, and the Board shall not take any action in such manner or to such extent as might prejudice the security for the payment of the Bond Requirements of the Bonds and any other securities payable from the Net Revenues or any Policy Costs relating thereto according to the terms thereof. No contract shall be entered into nor any other action taken by which the rights of any Owner of any Bond or other security payable from Net Revenues or any Policy Costs relating thereto might be prejudicially and materially impaired or diminished.

Section 910. Prompt Payment of Bonds. The Town shall promptly pay the Bond Requirements of the Bonds at the places, on the dates and in the manner specified herein and in the Bonds according to the true intent and meaning hereof.

Section 911. Use of Bond and Reserve Accounts. The Bond Account and the Reserve Account shall be used solely and only and the moneys credited to such accounts are hereby pledged for the purpose of paying the Bond Requirements of the Bonds to their respective maturities or any Redemption Date or Dates, subject to the provisions of Sections 606, 704 and 1301 hereof.

Section 912. Other Liens. Other than as provided herein, there are no liens or encumbrances of any nature whatsoever on or against the System, or any part thereof, or on or against the Gross Revenues on a parity with or superior to the lien thereon of the Bonds.

Section 913. Corporate Existence. The Town shall maintain its corporate identity and existence so long as any of the Bonds remain Outstanding, unless another body corporate and politic by operation of law succeeds to the powers, privileges, rights, liabilities, disabilities, duties and immunities of the Town and is obligated by law to operate and maintain the System and to fix and collect the Gross Revenues as herein provided without adversely and materially affecting at any time the privileges and rights of any Owner of any Outstanding Bond.

Section 914. Disposal of System Prohibited. Except for the use of the System and services pertaining thereto in the normal course of business, neither all nor a substantial part of the System shall be sold, leased, mortgaged, pledged, encumbered, alienated or otherwise disposed of, until all the Bonds have been paid in full, as to all Bond Requirements, or unless provision has been made therefor, or until the Bonds have otherwise been redeemed, including, without limitation, the termination of the pledge as herein authorized; and the Town shall not dispose of its title to the System or to any useful part thereof, including any property necessary to the operation and use of the System and the lands and interests in lands comprising the sites of the System, except as provided in Section 915 hereof.

Section 915. Disposal of Unnecessary Property. The Town at any time and from time to time may sell, exchange, lease or otherwise dispose of any property constituting a part of the System and not useful in the construction, reconstruction or operation thereof, or which shall cease to be necessary for the efficient operation of the System, or which shall have been replaced by other property of at least equal value. Any proceeds of any such sale, exchange or other disposition received and not used to replace such property so sold or so exchanged or otherwise so disposed of, shall be deposited by the Town in the Water Fund or into a special book account for the betterment, enlargement, extension, other improvement and equipment of the System, or any combination thereof, as the Board may determine, and any proceeds of any such lease received shall be deposited by the Town as Gross Revenues in the Water Fund.

Section 916. Competing System. So long as any of the Bonds are Outstanding, the Town shall not grant any franchise or license to any competing facilities so that the Gross Revenues shall not be sufficient to satisfy the covenant in Section 921 hereof.

Section 917. Loss From Condemnation. If any part of the System is taken by the exercise of the power of eminent domain, the amount of any award received by the Town as a result of such taking shall be paid into the Water Fund or into a capital improvement account pertaining to the System for the purposes thereof, or, applied to the redemption of the Outstanding Bonds and any Outstanding Parity Lien Bonds relating thereto, all as the Town may determine.

Section 918. Employment of Management Engineers. If the Town defaults in paying the Bond Requirements of the Bonds and any other securities or Policy Costs relating thereto payable from the Gross Revenues promptly as the same fall due, or in the keeping of any covenants herein contained, and if such default continues for a period of 60 days, or if the Net

Revenues in any Fiscal Year fail to equal at least the amount of the Bond Requirements of the Outstanding Bonds and any other securities (including all reserves therefor specified in the authorizing proceedings, including, without limitation, this Ordinance) or Policy Costs relating thereto payable from the Net Revenues in that Fiscal Year, the Town shall retain a firm of competent management engineers skilled in the operation of such facilities to assist the management of the System so long as such default continues or so long as the Net Revenues are less than the amount hereinabove designated in this Section.

Section 919. Budgets. The Board and officials of the Town shall annually and at such other times as may be provided by law prepare and adopt a budget pertaining to the System.

Section 920. Reasonable and Adequate Charges. While the Bonds remain Outstanding and unpaid, the fees, rates and other charges due to the Town for the use of or otherwise pertaining to and services rendered by the System to the Town, to its inhabitants and to all other users within and without the boundaries of the Town shall be reasonable and just, taking into account and consideration public interests and needs, the cost and value of the System, the Operation and Maintenance Expenses thereof, and the amounts necessary to meet the Bond Requirements of all Bonds and any other securities payable from the Net Revenues, including, without limitation, reserves and any replacement accounts therefor.

Section 921. Adequacy and Applicability of Charges. There shall be charged against users of service pertaining to and users of the System, including the Town, except as provided by Section 922 hereof, such fees, rates and other charges so that the Gross Revenues shall be adequate to meet the requirements of this and the preceding Sections hereof. Such charges pertaining to the System shall be at least sufficient so that the Gross Revenues annually are sufficient to pay in each Fiscal Year:

A. Operation and Maintenance Expenses. An amount equal to the annual Operation and Maintenance Expenses for such Fiscal Year,

B. Principal and Interest. An amount equal to 125% of both the principal and interest on the Bonds and any Parity Lien Bonds then Outstanding payable from the Net Revenues in that Fiscal Year, and

C. Deficiencies. Any amounts required to pay all Policy Costs, if any, due and owing and all sums, if any, due and owing to meet then existing deficiencies pertaining to any fund or account relating to the Gross Revenues or any securities payable therefrom.

Section 922. Limitations Upon Free Service. No free service or facilities shall be furnished by the System, except as hereinafter provided. If the Town elects to use for municipal purposes any water, water facilities, sanitary sewer facilities, or other services and facilities provided by the System or otherwise to use the System or any part thereof, any such use will be paid for from the Town's general fund or from other available revenues other than Gross Revenues at the reasonable value of the use so made; provided that the Town need not pay for any such use by the Town of any facilities of the water and sanitary sewer system for fire protection purposes. All the income so derived from the Town shall be deemed to be income

derived from the operation of the System, to be used and to be accounted for in the same manner as any other income derived from the operation of the System.

Section 923. Levy of Charges. The Town shall forthwith and in any event prior to the delivery of any of the Bonds, fix, establish and levy the fees, rates and other charges which are required by Section 921 of this Ordinance, if such action is necessary therefor. No reduction in any initial or existing rate schedule for the System may be made:

A. Proper Application. Unless the Town has fully complied with the provisions of Article VI of this Ordinance for at least the full Fiscal Year immediately preceding such reduction of the initial or any other existing rate schedule; and

B. Sufficient Revenues. Unless the audit required by the Independent Accountant by Section 927 hereof for the full Fiscal Year immediately preceding such reduction discloses that the estimated revenues resulting from the proposed rate schedule for the System, after the schedule's proposed reduction, shall be at least sufficient to produce the amounts required by Section 921 hereof.

Section 924. Collection of Charges. The Town shall cause all fees, rates and other charges pertaining to the System to be collected as soon as is reasonable, shall prescribe and enforce rules and regulations or impose contractual obligations for the payment of such charges, and for the use of the System, and shall provide methods of collection and penalties, to the end that the Gross Revenues shall be adequate to meet the requirements of this Ordinance and any other ordinance supplemental thereto.

Section 925. Procedure for Collecting Charges. All bills for water services or facilities, sanitary sewer services and all other services or facilities furnished or served by or through the System shall be rendered to customers on a regularly established basis. The fees, rates and other charges due shall be collected in a lawful manner, including, without limitation, discontinuance of service.

Section 926. Maintenance of Records. So long as any of the Bonds and any other Parity Lien Bonds payable from the Gross Revenues remain Outstanding, proper books of record and account shall be kept by the Town, separate and apart from all other records and accounts.

Section 927. Audits Required. The Town, within 60 days following the close of each Fiscal Year, shall order an audit for the Fiscal Year of such books and accounts to be made forthwith by an Independent Accountant, and order an audit report showing the receipts and disbursements for each account pertaining to the System and the Gross Revenues.

Section 928. Accounting Principles. System records and accounts, and audits thereof, shall be currently kept and made, as nearly as practicable, in accordance with the then generally accepted accounting principles, methods and terminology followed and construed for utility operations comparable to the System, except as may be otherwise provided herein or required by applicable law or regulation or by contractual obligation existing on the effective date of this Ordinance.

Section 929. Insurance and Reconstruction. Except to the extent of any self-insurance, the Town shall at all times maintain with responsible insurers fire and extended coverage insurance, worker's compensation insurance, public liability insurance and all such other insurance as is customarily maintained with respect to utilities of like character against loss of or damage to the System and against loss of revenues and against public and other liability to the extent reasonably necessary to protect the interests of the Town and of each Owner of a Bond. If any useful part of the System shall be damaged or destroyed, the Town shall, as expeditiously as may be possible, commence and diligently proceed with the repair or replacement of the damaged property so as to restore the same to use. The proceeds of any such insurance shall be payable to the Town and (except for proceeds of any use and occupancy insurance) shall be applied to the necessary costs involved in such repair and replacement and to the extent not so applied shall (together with the proceeds of any such use and occupancy insurance) be deposited in the Water Fund by the Town as revenues derived from the operation of the System. If the costs of such repair and replacement of the damaged property exceed the proceeds of such insurance available for the payment of the same, moneys in the Water Fund shall be used to the extent necessary for such purposes, as permitted by Section 611 hereof.

Section 930. Federal Income Tax Exemption. The Town covenants for the benefit of the Owners of the Bonds that it will not take any action or omit to take any action with respect to the Bonds, the proceeds thereof, any other funds of the Town or any facilities financed or refinanced with the proceeds of the Bonds if such action or omission (a) would cause the interest on the Bonds to lose its exclusion from gross income for federal income tax purposes under Section 103 of the Code, (b) would cause interest on the Bonds to lose its exclusion from alternative minimum taxable income as defined in Section 55(b)(2) of the Code except to the extent such interest is required to be included in the adjusted current earnings adjustment applicable to corporations under Section 56 of the Code in calculating corporate alternative minimum taxable income or (c) would cause interest on the Bonds to lose its exclusion from Colorado taxable income or Colorado alternative minimum taxable income under present State law. In furtherance of this covenant, the Town agrees to comply with the procedures set forth in the Tax Compliance Certificate. The foregoing covenant shall remain in full force and effect notwithstanding the payment in full or defeasance of the Bonds until the date on which all obligations of the Town in fulfilling the above covenant under the Code and Colorado law have been met.

Section 931. Continuing Disclosure. The Town shall comply with the provisions of the Continuing Disclosure Certificate. Any failure by the Town to perform in accordance with this Section shall not constitute an Event of Default under this Ordinance, and the rights and remedies provided by this Ordinance upon the occurrence of an Event of Default shall not apply to any such failure. The Paying Agent shall not have any power or duty to enforce this Section. No Owner of a Bond shall be entitled to damages for the Town's non-compliance with its obligations under this Section; however, the Owners of the Bonds may enforce specific performance of the obligations contained in this Section by any judicial proceeding available.

ARTICLE X

PRIVILEGES, RIGHTS AND REMEDIES

Section 1001. Owners' Remedies. Each Owner of any Bond shall be entitled to all of the privileges, rights and remedies provided and this Ordinance, and as otherwise provided or permitted by law or in equity or by any statutes, except as provided in Sections 202 through 206 hereof, but subject to the provisions herein concerning the pledge of and the covenants and the other contractual provisions concerning the Gross Revenues and the proceeds of the Bonds.

Section 1002. Right to Enforce Payment. Nothing in this Article affects or impairs the right of any Owner of any Bond to enforce the payment of the Bond Requirements due in connection with his or her Bond or the obligation of the Town to pay the Bond Requirements of each Bond to the Owner thereof at the time and the place expressed in the Bond.

Section 1003. Events of Default. Each of the following events is hereby declared an "Event of Default," provided however, that in determining whether a payment default has occurred pursuant to paragraphs A or B of this Section, no effect shall be given to payments made under the Insurance Policy:

A. Nonpayment of Principal. Payment of the principal of any of the Bonds is not made when the same becomes due and payable, either at maturity or by proceedings for prior redemption, or otherwise;

B. Nonpayment of Interest. Payment of any installment of interest on any of the Bonds is not made when the same becomes due and payable;

C. Cross Defaults. The occurrence and continuance of an "event of default," as defined in any Parity Bond Ordinance;

D. Failure to Reconstruct. The Town unreasonably delays or fails to carry out with reasonable dispatch the reconstruction of any part of the System which is destroyed or damaged and is not promptly repaired or replaced (whether such failure promptly to repair the same is due to impracticability of such repair or replacement or is due to a lack of moneys therefor or for any other reason), but it shall not be an Event of Default if such reconstruction is not essential to the efficient operation of the System;

E. Appointment of Receiver. An order or decree is entered by a court of competent jurisdiction with the consent or acquiescence of the Town appointing a receiver or receivers for the System or for the Gross Revenues and any other moneys subject to the lien to secure the payment of the Bonds, or if an order or decree having been entered without the consent or acquiescence of the Town is not vacated or discharged or stayed on appeal within 60 days after entry; and

F. Default of Any Provision. The Town defaults in the due and punctual performance of any other of the representations, covenants, conditions, agreements and other provisions contained in the Bonds or in this Ordinance on its part to be performed (other than

Section 931 hereof), and such default continues for 60 days after written notice specifying such default and requiring the same to be remedied is given to the Town and the Insurer specifying the failure and requiring that it be remedied, which notice may be given by the Paying Agent in its discretion and shall be given by the Paying Agent at the written request of the Owners of not less than 25 percent in aggregate principal amount of Bonds then Outstanding.

Section 1004. Remedies for Defaults. Upon the happening and continuance of any Event of Default, the Owner or Owners of not less than 25% in aggregate principal amount of the Bonds then Outstanding, including, without limitation, a trustee or trustees therefor, may proceed against the Town and its agents, officers and employees to protect and to enforce the rights of any Owner of Bonds under this Ordinance by mandamus or by other suit, action or special proceedings in equity or at law, in any court of competent jurisdiction, either for the appointment of a receiver or for the specific performance of any covenant or agreement contained herein or in an award of execution of any power herein granted for the enforcement of any proper legal or equitable remedy as such Owner or Owners may deem most effectual to protect and to enforce the rights aforesaid, or thereby to enjoin any act or thing which may be unlawful or in violation of any right of any Owner of any Bond, or to require the Town to act as if it were the trustee of an expressed trust, or any combination of such remedies. All such proceedings at law or in equity shall be instituted, had and maintained for the equal benefit of all Owners of the Bonds and any other Parity Lien Bonds.

Section 1005. Receiver's Rights and Privileges. Any receiver appointed in any proceedings to protect the rights of such Owners hereunder, the consent to any such appointment being hereby expressly granted by the Town, may enter and may take possession of the System, may operate and maintain the same, may prescribe fees, rates and other charges, and may collect, receive and apply all Gross Revenues arising after the appointment of such receiver in the same manner as the Town itself might do.

Section 1006. Rights and Privileges Cumulative. The failure of any Owner of any Outstanding Bond to proceed in any manner herein provided shall not relieve the Town, or any of its officers, agents or employees of any liability for failure to perform or carry out any duty, obligation or other commitment. Each right or privilege of any such Owner (or trustee thereof) is in addition and is cumulative to any other right or privilege, and the exercise of any right or privilege by or on behalf of any Owner shall not be deemed a waiver of any other right or privilege thereof.

Section 1007. Duties upon Defaults. Upon the happening of any Event of Default, the Town shall do and perform all proper acts on behalf of and for the Owners of Bonds to protect and to preserve the security created for the payment of the Bonds and to insure the payment of the Bond Requirements promptly as the same become due. While any Event of Default exists, except to the extent it may be unlawful to do so, all Gross Revenues shall be paid into the Bond Account and into bond or similar funds established for other Parity Lien Bonds then Outstanding, pro rata based upon the aggregate principal amount of the Bonds and Parity Lien Bonds then Outstanding. If the Town fails or refuses to proceed as in this Section provided, the Owner or Owners of not less than 25% in aggregate principal amount of the Bonds then Outstanding, after demand in writing, may proceed to protect and to enforce the rights of the Owners of the Bonds as hereinabove provided, and to that end any such Owners of the

Outstanding Bonds shall be subrogated to all rights of the Town under any agreement, lease or other contract involving the System or the Gross Revenues entered into prior to the effective date of this Ordinance or thereafter while any of the Bonds are Outstanding.

ARTICLE XI

AMENDMENT OF ORDINANCE

Section 1101. Privilege of Amendments.

A. Except as hereafter provided, this Ordinance may be amended or supplemented by ordinances adopted by the Board in accordance with law, without receipt by the Town of any additional consideration, but with the written consent of the Insurer, and, subject to Section 1201 hereof, the Owners of not less than 66% in aggregate principal amount of the Bonds Outstanding at the time of the adoption of such amendatory or supplemental ordinance excluding, pursuant to Section 102B hereof, any Bonds which may then be held or owned for the account of the Town. Notwithstanding the foregoing, no such ordinance shall permit:

(1) Changing Payment. A change in the maturity, terms of redemption or interest payment of any Outstanding Bond; or

(2) Reducing Return. A reduction in the principal amount of any Bond or the rate of interest thereon, without the consent of the Owner of the Bond; or

(3) Prior Lien. The creation of a lien upon or a pledge of revenues ranking prior to the lien or to the pledge created by this Ordinance; or

(4) Modifying Any Bond. A reduction of the principal amount or percentages or otherwise affecting the description of Bonds the consent of the Owners of which is required for any such modification or amendment; or

(5) Priorities Between Bonds The establishment of priorities as between Bonds issued and Outstanding; or

(6) Modification of Less Than All the Bonds. The modification of or otherwise affecting the rights of the Owners of less than all of the Outstanding Bonds.

B. Notwithstanding the foregoing provisions of this Section, this Ordinance and the rights and obligations of the Town and of the Owners of the Bonds may also be modified or amended at any time, with the written consent of the Insurer but without the consent of any Owners of the Bonds, but only to the extent permitted by law and only for any or all of the following purposes:

(1) to add to the covenants and agreements of the Town in this Ordinance contained other covenants and agreements thereafter to be observed;

(2) to subject to the covenants and agreements of the Town in this Ordinance additional System revenues, to be defined and treated as Gross Revenues, for the purpose of providing additional security for the Bonds and any Parity Lien Bonds;

(3) in connection with the provision of a Reserve Account Insurance Policy subsequent to the issuance of the Bonds;

(4) to provide for the appointment of a new Paying Agent; or

(5) to make such provisions for the purpose of curing any ambiguity or of curing or correcting any formal defect or omission in this Ordinance, or in regard to questions arising under this Ordinance, as the Town may deem necessary or desirable, and which shall not adversely affect the interests of the Owners of the Bonds.

Section 1102. Notice of Amendment. Whenever the Board proposes to amend or modify this Ordinance under the provisions of this Article, it shall cause notice of the proposed amendment to be mailed to Owners of all Outstanding Bonds at their addresses as the same last appear on the registration records maintained by the Paying Agent and to the Insurer. Such notice shall briefly set forth the nature of the proposed amendment and shall state that a copy of the proposed amendatory ordinance is on file in the office of the Town Clerk for public inspection. Notice of the proposed amendment, together with a copy of the proposed amendatory ordinance, shall be delivered to the Rating Agencies then maintaining a rating on the Bonds at least 15 days in advance of the adoption of the amendment. A full transcript of all proceedings relating to the execution of such amendatory ordinance shall be provided to the Insurer.

Section 1103. Time for Amendment. If the ordinance is required to be consented to by the Owners of the Bonds, whenever at any time within one year from the date of the giving of such notice there shall be filed in the office of the Town Clerk an instrument or instruments executed by the Owners of at least 66% in aggregate principal amount of the Bonds then Outstanding, which instrument or instruments shall refer to the proposed amendatory ordinance described in such notice and shall specifically consent to and approve the adoption of such ordinance, the Board may adopt such amendatory ordinance and such ordinance shall become effective. If the ordinance is not required to be consented to by the Owners of the Bonds, the amendatory ordinance may be adopted by the Board at any time.

Section 1104. Binding Consent to Amendment. If the Owners of not less than 66% in aggregate principal amount of the Bonds Outstanding at the time of the adoption of such amendatory ordinance requiring consent of the Owners of the Bonds, or the predecessors in title of such Owners, shall have consented to and approved the adoption thereof as herein provided, no Owner of any Bond, whether or not such Owner shall have consented to or shall have revoked any consent as in this Article provided, shall have any right or interest to object to the adoption of such amendatory ordinance or to object to any of the terms or provisions therein contained or to the operation thereof or to enjoin or restrain the Town from taking any action pursuant to the provisions thereof.

Section 1105. Time Consent Binding. Any consent given by the Owner of a Bond pursuant to the provisions of this Article shall be irrevocable for a period of 6 months from the date of the giving of the notice above provided for and shall be conclusive and binding upon all future Owners of the same Bond during such period. Such consent may be revoked at any time after 6 months from the date of such giving of such notice by the Owner who gave such consent or by a successor in title by filing notice of such revocation with the Town Clerk, but such revocation shall not be effective if the Owners of not less than 66% in aggregate principal amount of the Bonds Outstanding as in this Article provided, prior to the attempted revocation, consented to and approved the amendatory ordinance referred to in such revocation.

Section 1106. Unanimous Consent. Notwithstanding anything in the foregoing provisions of this Article, the terms and provisions of this Ordinance or of any ordinance amendatory thereof or supplemental thereto and the rights and the obligations of the Town and of the Owners of the Bonds thereunder may be modified or amended in any respect upon the adoption by the Town and upon the filing with the Town Clerk of an ordinance to that effect and with the consent of the Owners of all the then Outstanding Bonds, such consent to be given as provided in Section 1103 hereof; and no notice to Owners of Bonds shall be required as provided in Section 1102 hereof, nor shall the time of consent be limited except as may be provided in such consent.

Section 1107. Exclusion of Town's Bonds. At the time of any consent or of other action taken under this Article, the Town shall furnish to the Town Clerk a certificate of the Finance Director, upon which the Town may rely, describing all Bonds to be excluded for the purpose of consent or of other action or of any calculation of Outstanding Bonds provided for in this Article, and the Town shall not be entitled with respect to such Bonds to give any consent or to take any other action provided for in this Article, as provided in Section 102 B hereof.

Section 1108. Notation on Bonds. Bonds authenticated and delivered after the effective date of any action taken as in this Article provided may bear a notation by endorsement or otherwise in form approved by the Board as to such action; and after the approval of such notation, then upon demand of the Owner of any Bond Outstanding and upon presentation of his or her Bond for that purpose at the principal office of the Paying Agent, suitable notation shall be made on such Bond by the Paying Agent as to any such action. If the Board so determines, new Bonds, so modified as in the opinion of the Board conform to such action, shall be prepared, executed, authenticated and delivered; and upon demand of the Owner of any Bond then Outstanding, shall be exchanged without cost to such Owner for Bonds then Outstanding upon surrender of such Bonds.

Section 1109. Proof of Instruments and Bonds. The fact and date of execution of any instrument under the provisions of this Article, the amount and number of the Bonds held by any Person executing such instrument, and the date of his or her holding the same may be proved as provided by Section 1303 hereof.

Section 1110. Copies of Supplemental Ordinances to Rating Agencies. Copies of any supplemental or amendatory ordinance shall be sent by the Town to the Rating Agencies at least 10 days prior to the effective date thereof.

ARTICLE XII

INSURANCE POLICY AND RESERVE ACCOUNT INSURANCE POLICY PROVISIONS

Section 1201. Insurer To Be Deemed Owner, Rights of the Insurer, Payments by the Insurer: Notices.

A. Notwithstanding any provision of this Ordinance to the contrary, so long as the Insurer is not in default in its payment obligations under the Insurance Policy, the Insurer shall at all times be deemed the sole and exclusive Owner of the Outstanding Bonds for the purposes of all approvals, consents, waivers, institution of any action, and the direction of all remedies pursuant to this Ordinance, including but not limited to approval of or consent to any amendment of or supplement to this Ordinance which requires the consent or approval of the Owners of not less than 66% in aggregate principal amount of the Bonds then Outstanding pursuant to this Ordinance; provided, however, that the Insurer shall not be deemed to be the sole and exclusive Owner of the Outstanding Bonds with respect to any amendment or supplement to this Indenture which seeks to amend or supplement this Indenture for the purposes set forth in clauses A (1) through A (6) of Section 1101 hereof, and provided, further, that the Insurer shall not have the right to direct or consent to Town, Paying Agent or Owner action as provided herein, if:

(1) the Insurer shall be in payment default under the Insurance Policy;

(2) any material provision of the Insurance Policy shall be held to be invalid by a final, non-appealable order of a court of competent jurisdiction, or the validity or enforceability thereof shall be contested by the Insurer; or

(3) a proceeding shall have been instituted in a court having jurisdiction in the premises seeking an order for relief, rehabilitation, reorganization, conservation, liquidation or dissolution in respect of the Insurer under Article 16 of the Insurance Law of the State of New York or any successor provision thereto and such proceeding is not terminated for a period of 90 consecutive days or such court enters an order granting the relief sought in such proceeding.

B. To the extent that the Insurer makes payment of any principal of or interest on a Bond, it shall be fully subrogated to all of the Owner's rights thereunder in accordance with the terms of the Insurance Policy to the extent of such payment, including the Owner's rights to payment thereof.

C. In the event that the principal of or interest on a Bond shall be paid by the Insurer pursuant to the terms of the Insurance Policy: (1) such Bond shall continue to be "Outstanding" under this Ordinance, and (2) the Insurer shall be fully subrogated to all of the rights of the Owner thereof in accordance with the terms and conditions of paragraph B of this Section and the Insurance Policy.

D. This Ordinance shall not be discharged unless and until all amounts due to the Insurer have been paid in full or duly provided for.

E. The rights granted under this Ordinance to the Insurer to request, consent to or direct any action are rights granted to the Insurer in consideration of its issuance of the Insurance Policy. Any exercise by the Insurer of such rights is merely an exercise of the Insurer's contractual rights and shall not be construed or deemed to be taken for the benefit of or on behalf of the Owners, nor does such action evidence any position of the Insurer, positive or negative, as to whether Owner consent is required in addition to consent of the Insurer.

F. No modification, amendment or supplement to this Ordinance shall become effective except upon obtaining the prior written consent of the Insurer.

G. No contract shall be entered into nor any action taken by the Town or the Paying Agent pursuant to which the rights of the Insurer or security for or sources of payment of the Bonds under this Ordinance may be impaired or prejudiced except upon obtaining the prior written consent of the Insurer.

ARTICLE XIII

MISCELLANEOUS

Section 1301. Defeasance. If, when the Bonds shall be paid in accordance with their terms (or payment of the Bonds has been provided for in the manner set forth in the following paragraph), together with all other sums payable hereunder, then this Ordinance and all rights granted hereunder shall thereupon cease, terminate and become void and be discharged and satisfied. Also if all Outstanding Bonds shall have been purchased by the Town and delivered to the Paying Agent for cancellation, and all other sums payable hereunder have been paid, or provision shall have been made for the payment of the same, then this Ordinance and all rights granted hereunder shall thereupon cease, terminate and become void and be discharged and satisfied.

Payment of any Outstanding Bond shall prior to the maturity or Redemption Date thereof be deemed to have been provided for within the meaning and with the effect expressed in this Section if (a) in case said Bond is to be redeemed on any date prior to its maturity, the Town shall have given to the Paying Agent in form satisfactory to it irrevocable instructions to give on a date in accordance with the provisions of Section 404 hereof notice of redemption of such Bond on said Redemption Date, such notice to be given in accordance with the provisions of Section 404 hereof, (b) there shall have been deposited with the Paying Agent or other Trust Bank either moneys in an amount which shall be sufficient, or Federal Securities which shall not contain provisions permitting the redemption thereof at the option of the issuer, the principal of and the interest on which when due, and without any reinvestment thereof, will provide moneys which, together with the moneys, if any, deposited with or held by the Paying Agent or other Trust Bank at the same time, shall be sufficient to pay when due the Bond Requirements due and to become due on said Bond on and prior to the Redemption Date or maturity date thereof, as the case may be, and (c) in the event said Bond is not by its terms subject to redemption within the next sixty days, the Town shall have given the Paying Agent in form satisfactory to it irrevocable instructions to give, as soon as practicable in the same manner as the notice of redemption is given pursuant to Section 404 hereof, a notice to the Owner of such Bond that the deposit required by (b) above has been made with the Paying Agent or other Trust Bank and that

payment of said Bond has been provided for in accordance with this Section and stating such maturity or Redemption Date upon which moneys are to be available for the payment of the Bond Requirements of said Bond. Neither such securities nor moneys deposited with the Paying Agent or other Trust Bank pursuant to this Section or principal or interest payments on any such Federal Securities shall be withdrawn or used for any purpose other than, and shall be held in trust for, the payment of the Bond Requirements of said Bond; provided any cash received from such principal or interest payments on such Federal Securities deposited with the Paying Agent or other Trust Bank, if not then needed for such purpose, shall, to the extent practicable, be reinvested in securities of the type described in (b) of this paragraph maturing at times and in amounts sufficient to pay when due the Bond Requirements to become due on said Bond on or prior to such Redemption Date or maturity date thereof, as the case may be. At such time as payment of a Bond has been provided for as aforesaid, such Bond shall no longer be secured by or entitled to the benefits of this Ordinance, except for the purpose of any payment from such moneys or securities deposited with the Paying Agent or other Trust Bank.

In the event that any Bond is deemed to have been paid and defeased in accordance with (b) of the preceding paragraph, then in connection therewith, the Town shall cause to be delivered a verification report of an independent nationally recognized certified public accountant. If a forward supply contract is employed in connection with the refunding, (1) such verification report shall expressly state that the adequacy of the escrow to accomplish the refunding relies solely on the initial escrowed investments and the maturing principal thereof and interest income thereon and does not assume performance under or compliance with the forward supply contract, and (2) the applicable escrow agreement shall provide that in the event of any discrepancy or difference between the terms of the forward supply contract and the escrow agreement (or the authorizing ordinance, if no separate escrow agreement is utilized), the terms of the escrow agreement or authorizing ordinance, if applicable, shall be controlling.

The release of the obligations of the Town under this Section shall be without prejudice to the right of the Paying Agent to be paid reasonable compensation for all services rendered by it hereunder and all its reasonable expenses, charges and other disbursements incurred on or about the administration of and performance of its powers and duties hereunder.

Upon compliance with the foregoing provisions of this Section with respect to all Bonds then Outstanding, this Ordinance may be discharged in accordance with the provisions of this Section but the liability of the Town in respect of the Bonds shall continue; provided that the Owners thereof shall thereafter be entitled to payment only out of the moneys or Federal Securities deposited with the Paying Agent or other Trust Bank as provided in this Section.

Section 1302. Delegated Powers. The officers and employees of the Town be, and they hereby are, authorized and directed to take all action necessary or appropriate to effectuate the provisions of this Ordinance, including, without limitation:

A. Final Certificates. the execution of such certificates as may be reasonably required by the Purchaser, including the Continuing Disclosure Certificate;

B. Paying Agent Agreement. the execution and delivery of an agreement with the Paying Agent necessary or desirable to evidence the acceptance by the Paying Agent of its duties hereunder;

C. Escrow Agreement. The execution and delivery of an agreement with the Escrow Bank concerning the administration of the Escrow Account and the payment of the Refunded Bond Requirements.

D. Official Statement. the execution and delivery of the final Official Statement; and

E. Purchase Contract. the execution and delivery of the Purchase Contract between the Town and the Purchaser.

Section 1303. Evidence of Bond Owners. Any request, consent or other instrument which this Ordinance may require or may permit to be signed and to be executed by the Owners of any Bonds may be in one or more instruments of similar tenor and shall be signed or shall be executed by each such Owner in person or by his or her attorney appointed in writing. Proof of the execution of any such instrument or of an instrument appointing any such attorney, or the holding by any Person of the Bonds shall be sufficient for any purpose of this Ordinance (except as otherwise herein expressly provided) if made in the following manner:

A. Proof of Execution. The fact and the date of the execution by any Owner of any Bonds or his or her attorney of such instrument may be established by a certificate, which need not be acknowledged or verified, of an officer of a bank or trust company satisfactory to the Town Clerk or of any notary public or other officer authorized to take acknowledgments of deeds to be recorded in the state in which he or she purports to act, that the individual signing such request or other instrument acknowledged to him or her the execution thereof, or by an affidavit of a witness of such execution, duly sworn to before such notary public or other officer; the authority of the individual or individuals executing any such instrument on behalf of a corporate Owner of any securities may be established without further proof if such instrument is signed by an individual purporting to be the president or vice president of such corporation with a corporate seal affixed and attested by an individual purporting to be its secretary or an assistant secretary; and the authority of any Person or Persons executing any such instrument in any fiduciary or representative capacity may be established without further proof if such instrument is signed by a Person or Persons purporting to act in such fiduciary or representative capacity; and

B. Proof of Holdings. The amount of Bonds held by any Person and the numbers, date and other identification thereof, together with the date of his or her holding the Bonds, shall be proved by the registration records maintained by the Paying Agent.

Section 1304. Parties Interested Herein. Nothing in this Ordinance expressed or implied is intended or shall be construed to confer upon, or to give to, any Person, other than the Town, the Paying Agent, the Insurer and the Owners of the Bonds, any right, remedy or claim under or by reason of this Ordinance or any covenant, condition or stipulation hereof; and all the covenants, stipulations, promises and agreements in this Ordinance contained by and on behalf

of the Town shall be for the sole and exclusive benefit of the Town, the Paying Agent, the Insurer and the Owners of the Bonds.

Section 1305. Notices. Except as otherwise may be provided in this Ordinance, all notices, certificates, requests or other communications pursuant to this Ordinance shall be in writing and shall be sufficiently given and shall be deemed given by personal delivery or when mailed by first class mail, and either delivered or addressed as follows:

If to the Town at:

Town of Erie, Colorado
P. O. Box 750
Erie, Colorado 80516
Attention: Finance Director

If to the Paying Agent at:

UMB Bank, n.a.
Corporate Trust and Escrow Services
1670 Broadway
Denver, Colorado 80202

Any of the foregoing Persons may, by notice given hereunder to each of the other Persons, designate any further or different addresses to which subsequent notices, certificates, requests or other communications shall be sent.

Section 1306. Business Days. If the date for making any payment or the last date for performance of any act or the exercising of any rights, as provided in this Ordinance, shall not be a Business Day, such payment may be made or act performed or right exercised on the next succeeding Business Day, with the same force and effect as if done on the nominal date provided in this Ordinance, and no interest shall accrue for the period after such nominal date.

PASSED, ADOPTED AS AN EMERGENCY MEASURE AND ORDERED PUBLISHED IN FULL this 13th day of October, 2015.

(S E A L) **TOWN OF ERIE, COLORADO**

_____
Mayor

ATTEST:

_____
Town Clerk

EXHIBIT A

(FORM OF BOND)

Unless this Bond is presented by an authorized representative of The Depository Trust Company, a New York corporation ("DTC"), to the Town or its agent for registration of transfer, exchange, or payment, and any Bond issued is registered in the name of Cede & Co. or in such other name as is requested by an authorized representative of DTC (and any payment is made to Cede & Co. or to such other entity as is requested by an authorized representative of DTC), ANY TRANSFER, PLEDGE, OR OTHER USE HEREOF FOR VALUE OR OTHERWISE BY OR TO ANY PERSON IS WRONGFUL inasmuch as the registered owner hereof, Cede & Co., has an interest herein.

UNITED STATES OF AMERICA

STATE OF COLORADO **COUNTIES OF BOULDER AND WELD**

TOWN OF ERIE, COLORADO
WATER ENTERPRISE REVENUE REFUNDING BOND
SERIES 2015

No. R- $_____

INTEREST RATE	MATURITY DATE	DATED AS OF	CUSIP
_____%	December 1, 20__	[date of delivery]	_____

REGISTERED OWNER:

PRINCIPAL AMOUNT: _____ DOLLARS

The Town of Erie (the "Town"), in the Counties of Boulder and Weld and State of Colorado (the "State"), for value received, hereby promises to pay to the registered owner specified above, or registered assigns, upon the presentation and surrender of this bond, solely from the special funds provided therefor, as hereinafter set forth, the principal amount set forth above on the maturity date specified above (unless this bond shall have been called for prior redemption, in which case on the Redemption Date) and to pay solely from such special funds interest hereon at the interest rate per annum specified above, payable semiannually on June 1 and December 1 in each year, commencing on June 1, 2016, until the principal amount is paid or payment has been provided for, as described in an ordinance adopted by the Board of Trustees of the Town of the Town on October 13, 2015 (the "Ordinance"). This is one of an authorized series of bonds issued under the Ordinance (the "Bonds"). The Bonds are all issued under and equally and ratably secured by and entitled to the security of the Ordinance. To the extent not defined herein, terms used in this Bond shall have the same meanings as set forth in the Ordinance. This Bond bears interest, matures, is payable, is subject to redemption and is transferable as provided in the Ordinance.

Reference is made to the Ordinance and to all Ordinances supplemental thereto, with respect to the nature and extent of the security for the Bonds, the accounts, funds or revenues pledged, rights, duties and obligations of the Town, the Paying Agent and the Insurer, the rights of the Owners of the Bonds, the events of defaults and remedies, the circumstances under which any Bond is no longer Outstanding, the issuance of additional bonds and the terms on which such additional bonds may be issued under and secured by the Ordinance, the ability to amend the Ordinance, and to all the provisions of which the Owner hereof by the acceptance of this Bond assents.

THE BONDS ARE ISSUED PURSUANT TO AND IN FULL COMPLIANCE WITH THE CONSTITUTION AND LAWS OF THE STATE OF COLORADO, AND PURSUANT TO THE ORDINANCE. THE BONDS ARE SPECIAL, LIMITED OBLIGATIONS OF THE TOWN, SECURED BY THE NET REVENUES. THE BONDS DO NOT CONSTITUTE A DEBT OF THE TOWN, THE STATE OR ANY POLITICAL SUBDIVISION THEREOF, AND NEITHER THE TOWN, THE STATE NOR ANY OF THE POLITICAL SUBDIVISIONS THEREOF IS LIABLE THEREFOR. NEITHER THE MEMBERS OF THE BOARD OF TRUSTEES OF THE TOWN NOR ANY PERSONS EXECUTING THIS BOND SHALL BE PERSONALLY LIABLE FOR THIS BOND.

It is certified, recited and warranted that all the requirements of law have been fully complied with by the proper officers of the Town in the issuance of this Bond; that it is issued pursuant to and in strict conformity with the Constitution of the State, the laws of the State of Colorado, and with the Ordinance and any ordinances supplemental thereto; and that this Bond does not contravene any Constitutional or statutory limitation.

The bonds of the series of which this bond is one are issued under the authority of Title 31, Article 35; Title 37, Article 45.1; and Title 11, Article 57, Part 2, C.R.S., and in full conformity therewith. Pursuant to Section 11-57-210, C.R.S., and Section 31-35-413, C.R.S., this recital shall be conclusive evidence of the validity and the regularity of the issuance of the Bonds and the Bonds shall be incontestable for any cause whatsoever after their delivery for value.

This Bond shall not be valid or become obligatory for any purpose or be entitled to any security or benefit under the Ordinance until the certificate of authentication hereon shall have been duly executed by the Paying Agent.

IN WITNESS WHEREOF, the Town has caused this Bond to be signed and executed in its name and upon its behalf with the facsimile signature of its Mayor, has caused the facsimile of the seal of the Town to be affixed hereon and has caused this Bond to be signed, executed and attested with the facsimile signature of its Town Clerk, all as of the date specified above.

(Manual or Facsimile Signature)
Mayor

(MANUAL OR FACSIMILE SEAL)
Attest:

(Manual or Facsimile Signature)
Town Clerk

(End of Form of Bond)

(Form of Registrar's Certificate of Authentication)

REGISTRAR'S CERTIFICATE OF AUTHENTICATION

This is one of the Bonds described in the within-mentioned Ordinance, and this Bond has been duly registered on the registration records kept by the undersigned as Registrar for such Bonds.

UMB BANK, N.A., as Registrar

Date of Authentication
and Registration:

By:_____
Authorized Officer or Employee

_____

(End of Form of Registrar's Certificate of Authentication)

(Form of Prepayment Panel)

PREPAYMENT PANEL

The following installments of principal (or portion thereof) of this Bond have been prepaid in accordance with the terms of the Ordinance authorizing the issuance of this Bond.

Date of Prepayment	Principal Prepaid	Signature of Authorized Representative of the Depository

(End of Form of Prepayment Panel)

(Form of Assignment)

ASSIGNMENT

For value received, the undersigned hereby sells, assigns and transfers unto _____ the within Bond and hereby irrevocably constitutes and appoints _____ attorney, to transfer the same on the records of the Registrar, with full power of substitution in the premises.

_____

Dated: _____

Signature Guaranteed:

_____

Signature must be guaranteed by a member
of a Medallion Signature Program

Address of transferee:

_____
_____
_____

Social Security or other tax
identification number of transferee:

_____

NOTE: The signature to this Assignment must correspond with the name as written on the face of the within Bond in every particular, without alteration or enlargement or any change whatsoever.

EXCHANGE OR TRANSFER FEES MAY BE CHARGED

(End of Form of Assignment)

STATE OF COLORADO)
)
COUNTIES OF BOULDER AND WELD) SS.
)
TOWN OF ERIE)

I, Nancy Parker, the Town Clerk of the Town of Erie, Colorado, do hereby certify:

1. That the foregoing pages are a true, correct, and complete copy of an ordinance (the "Ordinance") concerning the Town's Water Enterprise Revenue Refunding Bonds, Series 2015 adopted by the Board of Trustees (the "Board") of the Town at regular meetings of the Board held at the Town Hall on October 13, 2015.

2. The Ordinance was adopted as an emergency ordinance at an open, regular meeting of the Board on October 13, 2015 by an affirmative vote of three fourths (3/4) of the members of the Board as follows:

Name	"Yes"	"No"	Absent	Abstain
Tina Harris, Mayor				
Mark Gruber, Mayor Pro Tem				
Dan Woog				
Jennifer Kramer Carroll				
Scott Charles				
Janice Moore				
Waylon Schutt				

3. The Ordinance has been signed by the Mayor, sealed with the corporate seal of the Town, attested by me as Town Clerk, and duly recorded in the books of the Town; and that the same remains of record in the book of records of the Town.

4. That notice of the regular meeting of October 13, 2015 attached hereto as **Exhibit A** was posted within the Town at least 24 hours before such meeting as required by law.

5. That the Ordinance was published in full after adoption in the Erie Review, a newspaper of general circulation within the Town, on October 13, 2015. The affidavit of publication is attached hereto as **Exhibit B**.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Town this 13th day of October, 2015.

(SEAL) _____
Town Clerk

EXHIBIT A

(Attach Notice of Meeting)

EXHIBIT B

(Affidavit of Publication)

TOWN OF ERIE, COLORADO
WATER ENTERPRISE REVENUE REFUNDING BONDS
SERIES 2015

BOND PURCHASE AGREEMENT

October __, 2015

Board of Trustees
Town of Erie, Colorado

Ladies and Gentlemen:

The Town of Erie, Colorado (the "Town") proposes to issue $_____ aggregate principal amount of its Water Enterprise Revenue Refunding Bonds, Series 2015 (the "Bonds") pursuant to an ordinance adopted by the Board of Trustees of the Town (the "Board") on October 13, 2015 (the "Bond Ordinance"). This Bond Purchase Agreement (the "Agreement") states the terms and conditions upon which the Town will sell to and Stifel, Nicolaus & Company, Incorporated (the "Purchaser"), will purchase all of the Bonds from the Town and supersedes any prior agreement between the Town and the Purchaser with respect to the Bonds. If this Agreement is accepted by the Town, the Purchaser agrees to make a bona fide public offering of all of the Bonds at prices not to exceed the public offering prices set forth on the cover of the Official Statement and may subsequently change such offering prices without any requirement of prior notice. The Purchaser may offer and sell Bonds to certain dealers (including dealers depositing Bonds into investment trusts) and others at prices lower than the public offering prices stated on the cover of the Official Statement. Capitalized terms used in this Agreement and not otherwise defined herein shall have the same meanings given to such terms in the Bond Ordinance.

ARTICLE I

Terms of Bonds

The Bonds shall mature, bear interest and shall be subject to redemption as described in the Sale Certificate authorized by the Bond Ordinance (the "Sale Certificate"), and as shown in the pricing summary attached hereto as **Exhibit A** and incorporated herein by reference. The terms of the Bonds shall be as described more fully in the Bond Ordinance and in the Sale Certificate.

ARTICLE II

The Official Statement

(a) The Preliminary Official Statement has been prepared for use by the Purchaser in connection with the public offering, sale and distribution of the Bonds. The Preliminary Official Statement had been deemed final by the Town as of its date, except for the omission of such information which is dependent upon the final pricing of the Bonds for completion, all as permitted to be excluded by Section (b)(1) of Rule 15c2-12 under the Securities Exchange Act of 1934 ("Rule 15c2-12").

(b) The Town shall provide, or cause to be provided, to the Purchaser as soon as practicable after the date of the Town's acknowledgement of this Agreement (but, in any event, not later than within seven business days after the acknowledgement by the Town of this Agreement and in sufficient time to accompany any confirmation that requests payment from any customer) copies of the Official Statement which is complete as of the date of its delivery to the Purchaser in such quantity as the Purchaser shall request in order for the Purchaser to comply with Section (b)(4) of Rule 15c2-12 and the rules of the Municipal Securities Rulemaking Board (the "MSRB"). The Town confirms that it does not object to the distribution of the Official Statement in electronic form.

(c) If, after the date of this Agreement to and including the date the Purchaser is no longer required to provide an Official Statement to potential customers who request the same pursuant to Rule 15c2-12 (the earlier of (i) 90 days from the "end of the underwriting period" (as defined in Rule 15c2-12) and (ii) the time when the Official Statement is available to any person from the MSRB, but in no case less than 25 days after the "end of the underwriting period" for the Bonds), the Town becomes aware of any fact or event which might or would cause the Official Statement, as then supplemented or amended, to contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading, or if it is necessary to amend or supplement the Official Statement to comply with law, the Town will notify the Purchaser (and for the purposes of this clause provide the Purchaser with such information as it may from time to time reasonably request), and if, in the opinion of the Purchaser, such fact or event requires preparation and publication of a supplement or amendment to the Official Statement, the Town will forthwith prepare and furnish, at the Town's own expense (in a form and manner reasonably approved by the Purchaser), a reasonable number of copies of either amendments or supplements to the Official Statement so that the statements in the Official Statement as so amended and supplemented will not contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading, or so that the Official Statement will comply with law. If such notification shall be subsequent to the Closing Date (as defined below), the Town shall furnish such legal opinions, certificates, instruments and other documents as the Purchaser may deem reasonably necessary to evidence the truth and accuracy of such supplement or amendment to the Official Statement.

(d) The Purchaser hereby agrees to file the Official Statement with the MSRB. Unless otherwise notified in writing by the Purchaser, the Town can assume that the "end of the underwriting period" for purposes of Rule 15c2-12 is the Closing Date.

ARTICLE III

Sale, Purchase and Delivery of the Bonds

Section 3.01 Sale. Upon the terms and subject to the conditions stated in this Agreement, the Town agrees to issue and sell to the Purchaser, and the Purchaser agrees to purchase from the Town, at the Closing (as defined below), all but not less than all of the Bonds maturing, bearing interest, and subject to redemption as provided in the Bond Ordinance and the Sale Certificate at a purchase price of $_____ (which is equal to the par amount of the Bonds of $_____, plus/less a[n] original issue premium/discount of $_____, and less an underwriter's discount of $_____).

Section 3.02 Closing. In this Agreement, the term "Closing" means the consummation of the issuance and sale of the Bonds by the Town and the purchase of the Bonds by the Purchaser. The Closing is currently scheduled to occur at the offices of Butler Snow LLP, Denver, Colorado, at 9:00 a.m. on October __, 2015 (the "Closing Date"), and may occur at such different place or time as may be agreed to by the Town and the Purchaser. At the Closing, the Town will cause the Registrar to authenticate and deliver the Bonds in definitive form to The Depository Trust Company ("DTC") for the account of the Purchaser against receipt by the Town of the full amount of the purchase price.

ARTICLE IV

Representations, Warranties and Agreements of the Town

By the execution hereof the undersigned hereby represent and warrant to, and agree with, the Purchaser that:

(a) The Town is a municipal corporation duly organized and existing under the laws of the State of Colorado (the "State") and is authorized under the laws of the State to adopt the Bond Ordinance and issue the Bonds.

(b) Upon adoption of the Bond Ordinance, the Town will have duly authorized all necessary action for: (i) the issuance and sale of the Bonds upon the terms set forth herein, in the Sale Certificate and in the Preliminary Official Statement, dated October __, 2015 (the "Preliminary Official Statement"), prepared for use in connection with the Bonds and in any final Official Statement, amendment or supplement that may be authorized for use with respect to the Bonds (herein collectively referred to as the "Official Statement"); (ii) the adoption of the Bond Ordinance providing for the issuance of and security for the Bonds; (iii) the execution and delivery of, and the due performance of all obligations represented by, this Agreement, the Bonds, the Continuing Disclosure Certificate, dated the hereinafter defined Closing Date (the "Continuing Disclosure Certificate"), executed by the Town, the Escrow Agreement, dated as of October __, 2015 (the "Escrow Agreement"), by and between the Town

and UMB Bank, n.a. (the "Escrow Bank"), the Registrar and Paying Agent Agreement, dated as of October __, 2015, by and between the Town and UMB Bank n.a. (the "Paying Agent Agreement"), the Sale Certificate, dated on or before the date of the delivery of the Bonds (the "Sale Certificate"), executed by the Mayor, Town Administrator or Town Finance Director, and any and all such other agreements and documents as may be required to carry out, give effect to, and consummate the transactions contemplated hereby and by the Official Statement; and (iv) the carrying out, giving effect to, and consummation of the transactions contemplated hereby and by the Bond Ordinance, the Sale Certificate and the Official Statement. Certified copies of the Bond Ordinance will be delivered to the Purchaser by the Town at the Closing (hereinafter defined). This Agreement, the Official Statement, the Continuing Disclosure Certificate, the Escrow Agreement, the Paying Agent Agreement, the Sale Certificate and any other documents executed by the Town in connection therewith shall be collectively referred to herein as the "Town Documents."

(c) Upon adoption of the Bond Ordinance, the Town will have complied with all provisions of the Constitution and laws of the State and have full power and authority to consummate all transactions contemplated by the Town Documents.

(d) All authorizations, approvals, licenses, permits, consents and orders of any governmental authority, legislative body, board, agency or commission having jurisdiction of the matter which are required for the due authorization of, which would constitute a condition precedent to, or the absence of which would materially adversely affect the due performance by the Town of its obligations under the Town Documents, and the Bonds have been duly obtained, except for such approvals, consents and orders as may be required under the Blue Sky or securities laws of any jurisdiction in connection with the offering and sale of the Bonds.

(e) The Town Documents and all other documents, agreements and instruments that may be required to be executed, delivered, received or performed by the Town in order to carry out, give effect to and consummate the transactions contemplated by the Town Documents have been duly authorized, executed, received and delivered by the Town and, assuming their enforceability against the other parties thereto, constitute valid, legal and binding obligations of the Town, enforceable in accordance with their terms, subject only to bankruptcy, insolvency, moratorium or other laws affecting creditors' rights generally and equitable principles, whether considered at law or in equity.

(f) Except as disclosed in the Official Statement, there is no action, suit, proceeding, inquiry or investigation at law or in equity or before or by any court, public board or body pending or, to the best knowledge of the Town, threatened against or affecting the Town (or to the best knowledge of the Town any basis therefor), wherein an unfavorable decision, ruling or finding would adversely affect the transactions contemplated by the Town Documents, or the validity of the Bonds, the Town Documents or any agreement or instrument to which the Town is a party and which is used or contemplated for use in the consummation of the transactions contemplated by the Official Statement.

(g) The execution and delivery of the Town Documents and the Bonds, and compliance with the provisions thereof, will not conflict with or constitute a breach of or a default by the Town under any existing law, court or administrative regulation, decree or order or

any agreement, indenture, mortgage, lease or other instrument to which the Town is subject or by which the Town is bound.

(h) The financial statements of the Town included in the Official Statement have been prepared in conformity with generally accepted accounting principles consistently applied to the periods concerned and fairly present the financial condition of the Town and Net Revenues pledged as security for the Bonds or referred to in the Official Statement.

(i) As of the date thereof, the Preliminary Official Statement did not contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading. In the course of the preparation of the Preliminary Official Statement, no information has come to the attention of the Town that causes the Town to believe that the Preliminary Official Statement as of its date contains any untrue statement of material fact or omits to state a material fact necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading.

(j) At the time of the Town's acceptance hereof and (unless the Official Statement is amended or supplemented pursuant to Article II of this Agreement) at all times subsequent thereto during the period up to and including the Closing Date, the Official Statement does not and will not contain any untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made, not misleading.

(k) If the Official Statement is supplemented or amended pursuant to paragraph Article II of this Agreement, at the time of each supplement or amendment thereto and (unless subsequently again supplemented or amended pursuant to such paragraph) at all times subsequent thereto during the period up to and including the Closing Date the Official Statement as so supplemented or amended will not contain any untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which made, not misleading.

(l) Any certificate signed by any authorized officers of the Town and delivered to the Purchaser shall be deemed a representation and warranty by the Town to the Purchaser as to the statements made therein.

(m) Except as otherwise disclosed in the Official Statement, the Town has not failed during the previous five years to comply in all material respects with any previous undertakings in a written continuing disclosure contract or agreement under Rule 15c2-12.

(n) The Town will furnish such information, execute such instruments and take such other action in cooperation with the Purchaser as the Purchaser may reasonably request in order to qualify the Bonds for offer and sale under the Blue Sky or other securities laws and regulations of such states and other jurisdictions of the United States as the Purchaser may designate.

(o) The Town has previously provided the Purchaser with a Preliminary Official Statement. As of its date the Preliminary Official Statement has been "deemed final" by

the Town for purposes of Rule 15c2-12 promulgated under the Securities Exchange Act of 1934, as amended.

(p) The Town hereby ratifies and confirms the authority of the Purchaser to use and distribute the Preliminary Official Statement; and the Town hereby acknowledges and authorizes the use and distribution of the final Official Statement, in substantially the form and with substantially the content of the Preliminary Official Statement, by the Purchaser in connection with the sale of the Bonds.

ARTICLE V

Conditions of Sale and Purchase

Section 5.01 The Purchaser has entered into this Agreement in reliance upon the representations, warranties and agreements herein and the performance by the Town of its obligations hereunder at or prior to the Closing Date. The Purchaser's obligations under this Agreement are and shall be subject to the following further conditions being satisfied at or prior to the Closing Date:

(a) The representations of the Town contained herein shall be true, complete and correct on the date hereof and on and as of the Closing Date, as if made on the Closing Date.

(b) The Town Documents, and the Bonds shall have been duly authorized, executed, authenticated, delivered and received by the respective parties thereto in the form approved by the Purchaser with only such changes as shall be mutually agreed upon by the respective parties thereto and the Purchaser.

(c) The Purchaser shall have received evidence satisfactory to the Purchaser that the Town has taken all action reasonably necessary to cause the Bonds to be executed and delivered to the Purchaser.

(d) At the Closing, the Purchaser shall receive the following documents, each dated as of the Closing Date (other than the final Official Statement and the rating letters required by (xi) below, which are not dated as of the Closing Date) and in form and substance satisfactory to the Purchaser:

(i) a copy of the Town's Bond Ordinance authorizing the execution and delivery of the Town Documents, the Bonds and other matters related thereto;

(ii) executed copies of each of the Town Documents;

(iii) the opinion of Butler Snow LLP, as Bond counsel to the Town ("Bond Counsel"), in substantially the form attached to the Official Statement as Appendix D relating to the valid issuance of the Bonds and the tax treatment of interest on the Bonds under federal and State income tax laws, with a reliance letter addressed to the Purchaser, dated as of the Closing Date and addressed to the Town;

(iv) a letter from Bond Counsel, in form and substance satisfactory to the Purchaser, with a reliance letter addressed to the Purchaser, dated as of the Closing Date and addressed to the Town, stating, in substance, that nothing came to the attention of the attorneys at Butler Snow LLP rendering legal services in connection with such firm's representation of the Town that the Preliminary Official Statement as of its date and the date hereof and the Official Statement as of its date and the Closing Date (except for any financial statements, demographic, economic, engineering, financial, or statistical data and any statements of trends, forecasts, estimates, projections, assumptions, or any expressions of opinion and information concerning The Depository Trust Company and its procedures contained in the Preliminary Official Statement and the Official Statement and its appendices, as to which no view is expressed) contained any untrue statement of a material fact or omitted any material fact required to be stated therein or necessary to make the statements in Preliminary Official Statement or the Official Statement, in light of the circumstances under which they were made, not misleading;

(v) a supplemental opinion of Bond Counsel in the form and substance satisfactory to the Purchaser, with a reliance letter addressed to the Purchaser, to the effect that the Bonds are exempt from registration under the Securities Act of 1933, as amended, and the Bond Ordinance is exempt from qualification under the Trust Indenture Act of 1939, as amended;

(vi) an opinion of Bond Counsel addressed to the Town, with a reliance letter addressed to the Purchaser, in form and substance satisfactory to the Purchaser, and dated as of Closing Date, substantially to the effect that the Refunded Bonds are deemed to have been paid in accordance with the 2007A Ordinance and 2007B Ordinance, and the Refunded Bonds are no longer deemed outstanding thereunder;

(vii) an opinion or certificate of the Town Attorney of the Town relating to (A) the due organization of the Town, (B) the due authorization, execution and delivery of the Bond Ordinance and Town Documents by the Town, (C) the enforceability of the Town Documents against the Town, (D) the information respecting the Town in certain sections of the Official Statement, (E) the absence of any material litigation involving the Town, (F) the adoption of the Bond Ordinance; and (G) such other matters as may be reasonably required;

(viii) a certificate of the Town signed by duly authorized officials of the Town relating to (A) the representations of the Town contained herein are true and correct in all material respects and as of the Closing Date as if made on the Closing Date; (B) the due organization of the Town, (C) the absence of any material litigation against the Town, (D) the due authorization, execution, and delivery of the Town Documents by the Town, (E) the validity and enforceability of the Bond Ordinance and the Town Documents, and (F) the Net Revenues have been lawfully and irrevocably pledged to the payment of the Bonds as of Closing Date; together with a certificate executed by one or more officers of the Town, to the effect that the Official Statement, as then amended or supplemented, to the best of their knowledge, neither contains an untrue statement of any material fact nor omits to state any material fact necessary to make the statements made

in the Official Statement, in light of the circumstances in which they are made, not misleading;

(ix) evidence satisfactory to the Purchaser that the Bonds have been assigned a rating of "__" by Moody's Investors Service ("Moody's") and that such rating is in effect as of the Closing Date;

(x) Rule 15c2-12 Certificate of the Town;

(xi) [an opinion of counsel to the Insurer in form and substance satisfactory to the Purchaser;

(xii) a Municipal Bond Insurance Policy, issued by_____, guaranteeing the scheduled payment of principal and interest when due or provided therein;]

(xiii) such additional certificates and documents as the Purchaser may reasonably request to evidence performance of or compliance with the provisions hereof and the transactions contemplated by the Town Documents and by the Official Statement.

(e) All proceedings and related matters in connection with the Town Documents shall have been satisfactory to Bond Counsel, and Bond Counsel shall have been furnished with all papers, certificates and information as it may have reasonably requested to enable it to pass upon the matters referred to in its opinions. Further, all the opinions, letters, certificates, instruments and other documents mentioned above or elsewhere in this Agreement shall be deemed to be in compliance with the provisions hereof if, but only if, they are in form and substance reasonably satisfactory to the Purchaser.

If any condition stated in this Article V is not satisfied on or prior to the Closing Date, this Agreement may be terminated by the Purchaser by notifying the Town in writing and, in that event, neither the Purchaser nor the Town shall have any further obligation under this Agreement, except for the obligations of the parties to pay expenses as specified in Article VI hereof. The Purchaser may waive compliance with any condition stated in this Article V or extend the time for performance of any one or more of the conditions stated in this Article V; and, by accepting delivery of the Bonds, shall be deemed to have waived compliance by the Town with any condition stated in this Article V that has not been complied with.

Section 5.02 The Town acknowledges and agrees that: (i) the primary role of the Purchaser, as underwriter, is to purchase securities, for resale to investors, in an arm's-length commercial transaction between the Town and the Purchaser and that the Purchaser has financial and other interests that differ from those of the Town; (ii) the Purchaser is acting solely as a principal and is not acting as municipal advisor, financial advisor, or fiduciary to the Town and has not assumed any advisory or fiduciary responsibility to the Town with respect to the transaction contemplated hereby and the discussions, undertakings and procedures leading thereto (irrespective of whether the Purchaser has provided other services or is currently providing other services to the Town on other matters); (iii) the only obligations the Purchaser has to the Town with respect to the transaction contemplated hereby expressly are set forth in

this Agreement; and (iv) the Town has consulted their own financial and/or municipal, legal, accounting, tax and other advisors, as applicable, to the extent they deem appropriate.

ARTICLE VI

Expenses

Expenses will be incurred to make arrangements for the sale of the Bonds before their delivery and receipt of proceeds by the Town. Unless the obligation of the Purchaser to purchase the Bonds is terminated pursuant to Article VII, expenses incurred in connection with the authorization, sale and delivery of the Bonds will be borne by the Town, including:

Fees and expenses of Bond Counsel;
Fees and expenses of Special Counsel relating to the Official Statement;
Printing and/or Posting of the Preliminary Official Statement and the Official Statement;
Financial Advisor Fees
Registrar and Paying Agent Fees;
CUSIP and other registration fees;
[Bond Insurance Fees;]
Fees and expenses of Counsel to the Underwriter;
Escrow Agent Fees; and
Rating Agency fees.

The payment of these expenses will be included as an itemized cost of the issuance of the Bonds and will be paid out of the proceeds of the sale of the Bonds or other legally available funds of the Town. All other out-of-pocket expenses will be borne by the Purchaser.

If the obligation of the Purchaser is terminated pursuant to Article VII, such termination shall occur without either party incurring any liability to the other party.

Neither the Town nor any elected or appointed officer or agent of the Town shall be subjected to any pecuniary liability in connection with any agreement, covenant or undertaking by the Purchaser in connection with the issuance, sale and delivery of the Bonds or with respect to any action taken or omitted to be taken with respect to the issuance, sale, or delivery of the Bonds by such officer or agent in good faith.

ARTICLE VII

Termination

Section 7.01 The Purchaser shall have the right to terminate its obligation to purchase the Bonds by giving notice to the Town if any of the following conditions is not fulfilled:

(a) At the Closing, (i) the Bond Ordinance, the Sale Certificate, the Official Statement, the Escrow Agreement, the Registrar Agreement, the Continuing Disclosure Undertaking and this Agreement shall be in full force and effect, and shall not have been materially amended, modified or supplemented since the date hereof except as may have been

agreed to in writing by the Purchaser, and (ii) the Town shall perform or have performed all of its obligations required to be performed prior to or simultaneously with the Closing, under or specified in the Bond Ordinance, the Sale Certificate and this Agreement.

(b) The Bonds shall have been duly authorized, executed and authenticated in accordance with the provisions of the Bond Ordinance and the Sale Certificate.

(c) At the Closing Date, the Town shall have taken in connection with the issuance of the Bonds and with the transactions contemplated thereby and by this Agreement, all such action as, in the opinion of Bond Counsel, shall be necessary and appropriate to the rendering of Bond Counsel's unqualified opinion.

Section 7.02 The Purchaser shall have the right to terminate its obligations under this Agreement to purchase the Bonds by notifying the Town in writing of its election to do so, if any of the following events occur prior to the Closing Date:

(a) a tentative decision with respect to legislation shall be reached by a committee of the House of Representatives or the Senate of the Congress of the United States of America, or legislation shall be favorably reported by such a committee or be introduced by amendment or otherwise, in, or be passed by, the House of Representatives or the Senate, or recommended to the Congress of the United States of America for passage by the President of the United States of America, or be enacted by the Congress of the United States of America, or a decision by a court established under Article III of the Constitution of the United States, or the Tax Court of the United States, shall be rendered, or a ruling, regulation or order of the Treasury Department of the United States of America or the Internal Revenue Service shall be made or proposed, having the purpose or effect of imposing federal income taxation, or any other event shall have occurred which results in the imposition of federal income taxation, upon revenues or other income of the general character to be derived by the Town or by any similar body or upon interest received on obligations of the general character of the Bonds, which, in the Purchaser's reasonable opinion, materially adversely affects the market price of the Bonds;

(b) any legislation, ordinance, rule or regulation shall be introduced in or be enacted by any governmental body, department or agency in the State or a decision by any court of competent jurisdiction within the State shall be rendered which, in the Purchaser's reasonable opinion, materially adversely affects the market price of the Bonds;

(c) a stop order, ruling, regulation or official statement by, or on behalf of, the Securities and Exchange Commission or any other governmental agency having jurisdiction over the subject matter shall be issued or made to the effect that the execution and delivery, offering or sale of obligations of the general character of the Bonds, or the execution and delivery, offering or sale of the Bonds, including all the underlying obligations, as contemplated by the Town Documents or by the Official Statement, is in violation or would be in violation of any provision of the federal securities laws, including the Securities Act of 1933, as amended and as then in effect, the Securities Exchange Act of 1934, as amended and as then in effect, or the Trust Indenture Act of 1939, as amended and as then in effect;

(d) legislation shall be introduced in or enacted by the Congress of the United States of America, or a decision by a court established under Article III of the Constitution of the United States, or the Tax Court of the United States, shall be rendered, or a ruling, regulation or official statement of the Securities and Exchange Commission or other governmental agency having jurisdiction of the subject matter shall be made or proposed, to the effect that obligations of the general character of the Bonds, or the Bonds, including all of the underlying obligations, are not exempt from registration under or from other requirements of the Securities Act of 1933, as amended and as then in effect, or the Securities Exchange Act of 1934, as amended and as then in effect, or that the Indenture is not exempt from qualification under or other requirements of the Trust Indenture Act of 1939, as amended and as then in effect;

(e) any event shall have occurred, or information become known, which, in the Purchaser's opinion, makes untrue in any material respect any statement or information contained in the Official Statement or has the effect that the Official Statement contains an untrue statement of a material fact or omits to state a material fact necessary in order to make the statements made therein, in light of the circumstances under which they were made, not misleading;

(f) additional material restrictions not in force as of the date hereof shall have been imposed upon trading in securities generally by any governmental authority or by any national securities exchange;

(g) the New York Stock Exchange or any national securities exchange, or any governmental authority, shall have imposed, as to the Bonds or obligations of the general character of the Bonds, any material restrictions not now in force or being enforced, or increase materially those now in force, with respect to the extension of credit by, or the charge to the net capital requirements of, the Purchaser;

(h) a general banking moratorium shall have been established by federal or State of Colorado authorities;

(i) the rating of any of the Town's securities shall have been downgraded or withdrawn by a national rating service, which, in the Purchaser's opinion, materially and adversely affects the market price of the Bonds; or trading in any of the Town's securities shall have been suspended on any national securities exchange; or any proceeding shall be pending or threatened by the Securities and Exchange Commission against the Town; or

(j) a war involving the United States of America shall have been declared, or any conflict involving the armed forces of the United States of America shall have escalated, or any other national emergency relating to the effective operation of government or the financial community shall have occurred, which, in the Purchaser's opinion, materially adversely affects the market price of the Bonds.

ARTICLE VIII

Miscellaneous

Section 8.01 Survival of Representations, Warranties and Agreements. All of the Town's representations, warranties and agreements set forth in this Agreement shall remain operative and in full force and effect, regardless of any investigation made by the Purchaser or on its behalf, and shall survive delivery of the Bonds to the Purchaser.

Section 8.02 Entire Agreement; Parties in Interest. This Agreement when accepted by the Town in writing as specified herein shall constitute the entire agreement between the Purchaser and the Town and is made solely for the benefit of the Purchaser and the Town (including their successors, if any), and no other person shall acquire or have any right hereunder or by virtue hereof.

Section 8.03 Governing Law; No Assignment. The validity, interpretation and performance of this Agreement shall be governed by the laws of the State of Colorado. This Agreement shall not be assigned by the Purchaser or the Town.

Section 8.04 Time of Essence. Time shall be of the essence in this Agreement.

ARTICLE IX

Acceptance of Agreement

The submission to the Town of this Agreement, executed by the Purchaser, constitutes an offer of the Purchaser to purchase the Bonds upon the terms and conditions stated in this Agreement. The offer by the Purchaser must be accepted by the Town no later than midnight, October __, 2015, by the execution of this Agreement by an authorized officer of the Town. If not delivered in person, this Agreement after execution by the Town may be delivered to the Purchaser by first-class mail, provided that the Purchaser is advised by telephone or facsimile communication immediately after the mailing. This Agreement shall not be binding on either party until acceptance shall have been made by the Town in the manner stated in this paragraph. This Agreement may be executed in any number of counterparts, each of which shall be an original, but such counterparts shall together constitute one and the same instrument.

It is our pleasure to present this offer to purchase the Bonds from the Town.

Respectfully submitted,

STIFEL, NICOLAUS & COMPANY,
INCORPORATED

By: _____
Title: Managing Director

After due consideration, this Bond Purchase Agreement is hereby accepted by the Town this October __, 2015.

TOWN OF ERIE, COLORADO

By: _____
Authorized Representative

Time of Acceptance: _____, p.m.

EXHIBIT A

28088145 v1

DRAFT - 9/29/15

PRELIMINARY OFFICIAL STATEMENT DATED OCTOBER 14, 2015

NEW ISSUE
BOOK ENTRY ONLY

RATING: Moody's: [TO COME]
See: "RATING"

In the opinion of Butler Snow LLP, Bond Counsel, assuming continuous compliance with certain covenants described herein, interest on the 2015 Bonds is excluded from gross income under federal income tax laws pursuant to Section 103 of the Internal Revenue Code of 1986, as amended to the date of delivery of the 2015 Bonds (the "Tax Code"), and interest on the 2015 Bonds is excludable from alternative minimum taxable income as defined in Section 55(b)(2) of the Tax Code except that such interest is required to be included in calculating the "adjusted current earnings" adjustment applicable to corporations for purposes of computing the alternative minimum taxable income of corporations. Under the laws of the State of Colorado in effect as of the date of delivery of the 2015 Bonds, interest on the 2015 Bonds is exempt from taxation by the State of Colorado, except inheritance, estate and transfer taxes. See "TAX MATTERS."

$11,690,000*
TOWN OF ERIE, COLORADO
WATER ENTERPRISE REVENUE REFUNDING BONDS
SERIES 2015

Dated: Date of Delivery **Due: December 1, as shown herein**

The Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015 (the "2015 Bonds") are issued as fully registered bonds in denominations of $5,000 or integral multiples thereof. The 2015 Bonds initially will be registered in the name of Cede & Co., as nominee of The Depository Trust Company, New York, New York ("DTC"), which as acting as the securities depository for the 2015 Bonds. Purchases of the 2015 Bonds are to be made in book-entry form only. Purchasers will not receive certificates representing their beneficial ownership interest in the 2015 Bonds. See "THE 2015 BONDS--Book-Entry Only System." The 2015 Bonds bear interest at the rates set forth herein, payable on June 1, 2016, and semiannually thereafter on each June 1 and December 1, to and including the maturity dates shown on the inside cover page, by check or draft mailed to the registered owner of the 2015 Bonds, initially Cede & Co. The principal of the 2015 Bonds will be payable upon presentation and surrender at UMB Bank, n.a., Denver, Colorado, or its successor as the Paying Agent for the 2015 Bonds. See "THE 2015 BONDS."

The maturity schedule for the 2015 Bonds appears on the inside cover page of this Official Statement.

The 2015 Bonds are subject to optional redemption prior to maturity at the option of the Town as described in "THE 2015 BONDS--Prior Redemption."

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* Subject to change.

The 2015 Bonds are being issued by the Town to (i) refund certain outstanding obligations of the Town, as further described herein; and (ii) pay the costs of issuing the 2015 Bonds. See "SOURCES AND USES OF FUNDS."

The 2015 Bonds are special, limited obligations of the Town payable solely from the Net Revenues (defined herein) derived by the Town from operation of its water system. The 2015 Bonds constitute an irrevocable lien (but not necessarily an exclusive lien) upon the Net Revenues on a parity with certain outstanding obligations described herein and any parity lien bonds to be issued in the future. See "SECURITY FOR THE BONDS." **The 2015 Bonds do not constitute a general obligation of the Town. Owners of the 2015 Bonds may not look to any other funds or accounts other than those specifically pledged by the Town to the payment of the 2015 Bonds.**

This cover page contains certain information for quick reference only. It is *not* a summary of the issue. Investors must read the entire Official Statement to obtain information essential to making an informed investment decision, giving particular attention to the section entitled "CERTAIN RISK FACTORS."

The 2015 Bonds are offered when, as, and if issued by the Town and accepted by the Underwriter subject to the approval of legality of the 2015 Bonds by Butler Snow LLP, Denver, Colorado, Bond Counsel, and the satisfaction of certain other conditions. Butler Snow LLP also has acted as special counsel to the Town in connection with the Official Statement. Certain legal matters will be passed upon for the Town by the Town Attorney. First Southwest Company, LLC, Denver, Colorado, is acting as financial advisor to the Town. Bookhardt & O'Toole, Denver, Colorado, is acting as counsel to the Underwriter. It is expected that the 2015 Bonds will be available for delivery through the facilities of DTC on or about October 28, 2015.*

[STIFEL LOGO]

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* Subject to change.

MATURITY SCHEDULE*
(CUSIP© 6-digit issuer number: _____)

$11,690,000*
Town of Erie, Colorado
Water Enterprise Revenue Refunding Bonds
Series 2015

Maturing (December 1)	Principal Amount	Interest Rate	Price or Yield	CUSIP© Issue Number	Maturing (December 1)	Principal Amount	Interest Rate	Price or Yield	CUSIP© Issue Number
2018	$ 260,000				2026	$ 1,000,000			
2019	270,000				2027	1,055,000			
2020	270,000				2028	1,110,000			
2021	280,000				2029	1,160,000			
2022	290,000				2030	1,220,000			
2023	290,000				2031	1,280,000			
2024	910,000				2032	1,340,000			
2025	955,000								

* Subject to change.

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USE OF INFORMATION IN THIS OFFICIAL STATEMENT

This Official Statement, which includes the cover page, the inside cover page and the appendices, does not constitute an offer to sell or the solicitation of an offer to buy any of the 2015 Bonds in any jurisdiction in which it is unlawful to make such offer, solicitation, or sale. No dealer, salesperson, or other person has been authorized to give any information or to make any representations other than those contained in this Official Statement in connection with the offering of the 2015 Bonds, and if given or made, such information or representations must not be relied upon as having been authorized by the Town or the Underwriter. The Town maintains an internet website; however, the information presented there is not a part of this Official Statement and should not be relied upon in making an investment decision with respect to the 2015 Bonds.

The information set forth in this Official Statement has been obtained from the Town, from the sources referenced throughout this Official Statement and from other sources referenced in this Official Statement, which the Town believes to be reliable. No representation or warranty is made by the Town, however, as to the accuracy or completeness of information received from sources other than the Town. This Official Statement contains, in part, estimates and matters of opinion which are not intended as statements of fact, and no representation or warranty is made as to the correctness of such estimates and opinions, or that they will be realized.

The Underwriter has provided the following sentence for inclusion in this Official Statement. The Underwriter has reviewed the information in this Official Statement in accordance with, and as part of, its responsibilities to investors under the federal securities laws as applied to the facts and circumstances of this transaction, but the Underwriter does not guarantee the accuracy or completeness of such information.

The information, estimates, and expressions of opinion contained in this Official Statement are subject to change without notice, and neither the delivery of this Official Statement nor any sale of the 2015 Bonds shall, under any circumstances, create any implication that there has been no change in the affairs of the Town, or in the information, estimates, or opinions set forth herein, since the date of this Official Statement.

This Official Statement has been prepared only in connection with the original offering of the 2015 Bonds and may not be reproduced or used in whole or in part for any other purpose.

The 2015 Bonds have not been registered with the Securities and Exchange Commission due to certain exemptions contained in the Securities Act of 1933, as amended. The 2015 Bonds have not been recommended by any federal or state securities commission or regulatory authority, and the foregoing authorities have neither reviewed nor confirmed the accuracy of this document.

THE PRICES AT WHICH THE 2015 BONDS ARE OFFERED TO THE PUBLIC BY THE UNDERWRITER (AND THE YIELDS RESULTING THEREFROM) MAY VARY FROM THE INITIAL PUBLIC OFFERING PRICES OR YIELDS APPEARING ON THE INSIDE COVER PAGE HEREOF. IN ADDITION, THE UNDERWRITER MAY ALLOW CONCESSIONS OR DISCOUNTS FROM SUCH INITIAL PUBLIC OFFERING PRICES TO DEALERS AND OTHERS. IN ORDER TO FACILITATE DISTRIBUTION OF THE 2015 BONDS, THE UNDERWRITER MAY ENGAGE IN TRANSACTIONS INTENDED TO STABILIZE THE PRICE OF THE 2015 BONDS AT A LEVEL ABOVE THAT WHICH MIGHT OTHERWISE PREVAIL IN THE OPEN MARKET. SUCH STABILIZING, IF COMMENCED, MAY BE DISCONTINUED AT ANY TIME.

TOWN OF ERIE, COLORADO

Board of Trustees
Tina Harris, Mayor
Mark Gruber, Mayor Pro Tem
Scott Charles, Trustee
Jennifer Carroll, Trustee
Janice Moore, Trustee
Waylon Schutt, Trustee
Dan Woog, Trustee

Town Administration
A.J. Krieger, Town Administrator
Steven R. Felten, Finance Director
Gary Behlen, Director of Public Works
Jon L. Mays, Water/Wastewater Operations Manager

Town Attorney
Mark R. Shapiro, P.C.
Boulder, Colorado

Special Counsel to the Town for Water Matters
Paul J. Zilis, Esq.
Vranesh & Raisch, LLP
Boulder, Colorado

FINANCIAL ADVISOR TO THE TOWN
First Southwest Company, LLC
Denver, Colorado

REGISTRAR, PAYING AGENT AND ESCROW BANK
UMB Bank, n.a.
Denver, Colorado

BOND AND SPECIAL COUNSEL
Butler Snow LLP
Denver, Colorado

UNDERWRITER
Stifel, Nicolaus & Company, Incorporated
Denver, Colorado

UNDERWRITER'S COUNSEL
Bookhardt & O'Toole
Denver, Colorado

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OFFICIAL STATEMENT

$11,690,000*
TOWN OF ERIE, COLORADO
WATER ENTERPRISE REVENUE REFUNDING BONDS
SERIES 2015

INTRODUCTION

General

This Official Statement, which includes the cover page, the inside cover page and the appendices, is furnished by the Town of Erie, Colorado (the "Town"), a political subdivision of the State of Colorado (the "State"), to provide information about the Town and its $11,690,000* Water Enterprise Revenue Refunding Bonds, Series 2015 (the "2015 Bonds"). The 2015 Bonds will be issued pursuant to an ordinance (the "Bond Ordinance") adopted by the Board of Trustees of the Town (the "Board") on October 13, 2015. See Appendix B - Summary of Certain Provisions of the Bond Ordinance.

The offering of the 2015 Bonds is made only by way of this Official Statement, which supersedes any other information or materials used in connection with the offer or sale of the 2015 Bonds. The following introductory material is only a brief description of and is qualified by the more complete information contained throughout this Official Statement. A full review should be made of the entire Official Statement and the documents summarized or described herein, including the section entitled "CERTAIN RISK FACTORS." Detachment or other use of this "INTRODUCTION" without the entire Official Statement, including the cover page, the inside cover page and the appendices, is unauthorized. Unless otherwise provided, capitalized terms used herein are defined in Appendix B hereto.

The Town

The Town is a municipal corporation which was organized in 1874 and operates as a statutory town pursuant to the Constitution and laws of the State of Colorado (the "State"). The Town is located approximately 25 miles north of the City and County of Denver, Colorado ("Denver") and encompasses approximately 20 square miles. Based upon the Town's 2015 preliminary certified assessed value (which is subject to change until December 2015), approximately 44% of the assessed valuation of the Town lies in Boulder County, Colorado, and approximately 56% of the Town's assessed valuation lies in Weld County, Colorado (collectively, the "Counties"). "Historic Downtown Erie" is located approximately 3.5 miles west of Interstate Highway 25 ("I-25") which provides convenient access from the Town to downtown Denver. According to the Town's Community Development Department, the estimated population of the Town as of January 2015 was approximately 22,000. See "THE TOWN."

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* Subject to change.

Purpose

The 2015 Bonds are being issued by the Town to (i) refund $10,460,000* aggregate principal amount of the Town's Water Enterprise Revenue Bonds, Series 2007A (the "2007A Bonds"), currently outstanding in the aggregate principal amount of $14,225,000; (ii) refund $1,760,000* aggregate principal amount of the Town's Water Enterprise Revenue Refunding Bonds, Series 2007B (the "2007B Bonds"), currently outstanding in the aggregate principal amount of $3,370,000; and (ii) pay the costs of issuing the 2015 Bonds. See "SOURCES AND USES OF FUNDS."

The 2007A Bonds to be refunded consist of a portion of each maturity of the 2007A Bonds maturing on and after December 1, 2024 (the "Refunded 2007A Bonds"). The 2007B Bonds to be refunded consist of a portion of each maturing of the 2007B maturing on and after December 1, 2018 (the "Refunded 2007B Bonds"). The Refunded 2007A Bonds and the Refunded 2007B Bonds are referred to collectively as the "Refunded Bonds". The refunding of the Refunded Bonds is referred to herein as the "Refunding Project." See "SOURCES AND USES OF FUNDS--The Refunding Project" for more specific information regarding the Refunded Bonds.

Security

General. The 2015 Bonds are special, limited obligations of the Town. The principal and interest on the 2015 Bonds is payable solely from the Net Revenues. The Bond Ordinance defines "Net Revenues" as the Gross Revenues remaining after the payment of the Operation and Maintenance Expenses of the Town's municipal water system (the "System," as more fully described in Appendix B).

The Bond Ordinance defines "Gross Revenues" to mean all fees (including but not limited to user fees and plant investment fees), charges and revenues directly or indirectly derived by the Town for the services furnished by, or use of, the System, or any part thereof, including all income attributable to any future dispositions of property or rights related contracts, settlements, or judgments held or obtained in connection with the System or its operations; provided however, that there shall be excluded from Gross Revenue: (a) moneys borrowed and used for providing Capital Improvements; (b) any money and securities, and investment income therefrom, in any refunding fund, escrow account, or similar account pledged to the payment of any bonds or other obligations for the purpose of defeasing the same; and (c) any moneys received as grants or appropriations from the United States, the State, or other sources, the use of which is limited or restricted by the grantor or donor to the provision of Capital Improvements or for other purposes resulting in the general unavailability thereof, except to the extent any such moneys shall be received as payments for the use of the System, services rendered thereby, the availability of any such service, or the disposal of any commodities therefrom.

The Bond Ordinance defines "Operation and Maintenance Expenses" to mean all reasonable and necessary current expenses of the Town, paid or accrued, for operating, maintaining, and repairing the System, including without limitation legal and overhead expenses of the Town directly related to the administration of the System; provided however, that there shall be excluded from Operation and Maintenance Expenses any allowance or transfers for depreciation, payments in lieu of taxes or franchise fees, legal liabilities not based on contract, expenses incurred in connection with Capital Improvements, payments due in connection with

any bonds or other obligations issued to provide Capital Improvements, and charges for accumulation of reserves.

Special, Limited Obligations. The 2015 Bonds do not constitute a general obligation of the Town. Owners of the 2015 Bonds may not look to any other funds or accounts other than those specifically pledged by the Town to the payment of the 2015 Bonds. The 2015 Bonds do not constitute a debt or indebtedness of the Counties or the State.

Lien Priority. Upon issuance, the 2015 Bonds will constitute an irrevocable lien (but not necessarily an exclusive lien) upon the Net Revenues on a parity with the lien thereon of $17,515,000* outstanding principal amount of outstanding obligations, comprised of: (1) $3,760,000* of the 2007A Bonds remaining unrefunded; (2) $1,610,000* of the 2007B Bonds remaining unrefunded; (3) the Water Enterprise Revenue Refunding Bonds, Series 2009, currently outstanding in the aggregate principal amount of $4,370,000 (the "2009 Bonds"); and (4) the Water Enterprise Revenue Refunding Bonds, Series 2011, currently outstanding in the aggregate principal amount of $7,775,000 (the "2011 Bonds"). The 2007A Bonds, the 2007B Bonds, the 2009 Bonds and the 2011 Bonds are referred to collectively as the "Prior Bonds."

Upon the satisfaction of certain conditions set forth in the Bond Ordinance, the Town may issue additional obligations that have a lien on the Net Revenues on a parity with the lien thereon of the 2015 Bonds ("Additional Parity Lien Bonds"). The 2015 Bonds, the Prior Bonds and any Additional Parity Lien Bonds are sometimes referred to herein as "Parity Lien Bonds." See "SECURITY FOR THE BONDS--Additional Parity Lien Bonds."

The Town is currently a participant in two large water projects, the Windy Gap Firming Project and the Northern Integrated Supply Project ("NISP") as more fully described in "THE SYSTEM--Other Water Projects." The Town may issue Additional Parity Lien Bonds in the future to fund all or a portion of its participation in those projects.

The Town currently leases water pursuant to a 2010 Lease Purchase Agreement described in "TOWN FINANCIAL OPERATIONS AND DEBT STRUCTURE--Leases and Other Financial Obligations - Capital Lease Purchase Agreement." Base rentals due under that lease are paid from legally available Town revenues. Currently, the Town pays base rentals from net revenues of the System; however, the lease does not have any lien on the Net Revenues.

Reserve Account. The 2015 Bonds are secured by a Reserve Account. See "SECURITY FOR THE BONDS--Reserve Account."

The 2015 Bonds; Prior Redemption

The 2015 Bonds are issued solely as fully registered certificates in the denomination of $5,000, or any integral multiple thereof. The 2015 Bonds initially will be registered in the name of Cede & Co., as nominee for The Depository Trust Company, New York, New York ("DTC"), which is acting as the securities depository for the 2015 Bonds. Purchases of the 2015 Bonds are to be made in book-entry form only. Purchasers will not receive certificates representing their beneficial ownership interest in the 2015 Bonds. See "THE 2015 BONDS--Book-Entry Only System."

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* Subject to change.

The 2015 Bonds mature and bear interest (calculated based on a 360-day year consisting of twelve 30-day months) as set forth on the inside cover page of this Official Statement. The payment of principal and interest on the 2015 Bonds is described in "THE 2015 BONDS--Payment Provisions."

The 2015 Bonds are subject to redemption prior to maturity at the option of the Town as described in "THE 2015 BONDS--Prior Redemption."

Authority for Issuance

The 2015 Bonds will be issued pursuant to the constitution and laws of the State, including: Title 37, Article 45.1; Colorado Revised Statutes ("C.R.S."); Title 31, Article 35, C.R.S.; and the Supplemental Public Securities Act (Title 11, Article 57, Part 2, C.R.S.); and pursuant to the Bond Ordinance.

Professionals

Butler Snow LLP, Denver, Colorado, has acted as Bond Counsel in connection with the execution and delivery of the 2015 Bonds and also has acted as special counsel to the Town in connection with this Official Statement. The fees of Butler Snow LLP will be paid only at closing from the proceeds of the 2015 Bonds. Certain legal matters will be passed on for the Town by the Town Attorney, Mark R. Shapiro, P.C., Boulder, Colorado. First Southwest Company, LLC, Denver, Colorado, is acting as the financial advisor to the Town (the "Financial Advisor") in connection with execution and delivery of the 2015 Bonds. See "FINANCIAL ADVISOR." UMB Bank, n.a., Denver, Colorado, will act as the registrar and paying agent for the 2015 Bonds (the "Registrar" and "Paying Agent"), and will also act as the Escrow Bank in connection with the Refunding Project. CliftonLarsonAllen LLP, certified public accountants, Greenwood Village, has audited the basic financial statements of the Town attached hereto as Appendix A. See "INDEPENDENT AUDITORS." Stifel, Nicolaus & Company, Incorporated, Denver, Colorado, will act as the Underwriter of the Bonds (the "Underwriter"). See "UNDERWRITING." Bookhardt & O'Toole, Denver, Colorado, is acting as counsel to the Underwriter. Certain mathematical computations with respect to the Refunding Project will be verified by _____, certified public accountants, _____, Colorado. See "SOURCES AND USES OF FUNDS--The Refunding Project - Verification of Mathematical Computations."

Tax Status

In the opinion of Butler Snow LLP, Bond Counsel, assuming continuous compliance with certain covenants described herein, interest on the 2015 Bonds is excludable from gross income under federal income tax laws pursuant to Section 103 of the Internal Revenue Code of 1986, as amended to the date of delivery of the 2015 Bonds (the "Tax Code"), and interest on the 2015 Bonds is excludable from alternative minimum taxable income as defined in Section 55(b)(2) of the Tax Code, except that such interest is required to be included in calculating the "adjusted current earnings" adjustment applicable to corporations for purposes of computing the alternative minimum taxable income of corporations. Under the laws of the State in effect as of the date of delivery of the 2015 Bonds, interest on the 2015 Bonds is exempt from taxation by the State, except inheritance, estate and transfer taxes. See "TAX MATTERS."

Continuing Disclosure Undertaking

The Town will execute a continuing disclosure certificate (the "Disclosure Certificate") at the time of the closing for the 2015 Bonds. The Disclosure Certificate will be executed for the benefit of the beneficial owners of the 2015 Bonds and the Town will covenant in the Bond Ordinance to comply with its terms. The Disclosure Certificate will provide that so long as the 2015 Bonds remain outstanding, the Town will provide the following information to the Municipal Securities Rulemaking Board, acting through its Electronic Municipal Market Access ("EMMA") system: (i) annually, certain financial information and operating data; and (ii) notice of the occurrence of certain material events; all as specified in the Disclosure Certificate. The form of the Disclosure Certificate is attached hereto as Appendix E.

The Town did not timely file its 2010 audited financial statements or financial information on EMMA; however, the 2010 Comprehensive Annual Financial Report (which includes the annual financial information) has since been filed. Other than the late filing, the Town reports that it has not failed to materially comply with prior undertakings made pursuant to the Rule in the last five years.

Forward-Looking Statements

This Official Statement, particularly (but not limited to) the information contained under the headings "CERTAIN RISK FACTORS," "SYSTEM FINANCIAL INFORMATION--Water Fund - Budget Summary and Comparison," and "SYSTEM FINANCIAL INFORMATION--Management's Summary of Material Trends" contains statements relating to future results that are "forward-looking statements" as defined in the Private Securities Litigation Reform Act of 1995. When used in this Official Statement, the words "estimate," "forecast," "intend," "expect" and similar expressions identify forward-looking statements. Any forward-looking statement is subject to uncertainty. Accordingly, such statements are subject to risks that could cause actual results to differ, possibly materially, from those contemplated in such forward-looking statements. Inevitably, some assumptions used to develop forward-looking statements will not be realized or unanticipated events and circumstances may occur. Therefore, investors should be aware that there are likely to be differences between forward looking statements and actual results. Those differences could be material and could impact the availability of Net Revenues to pay debt service on the 2015 Bonds.

Additional Information

This introduction is only a brief summary of the provisions of the 2015 Bonds and the Bond Ordinance; a full review of the entire Official Statement should be made by potential investors. Brief descriptions of the 2015 Bonds, the Bond Ordinance, the System, the Refunding Project and the Town are included in this Official Statement. All references herein to the 2015 Bonds, the Bond Ordinance and other documents are qualified in their entirety by reference to such documents. *This Official Statement speaks only as of its date and the information contained herein is subject to change.*

Additional information and copies of the documents referred to herein are available from the Town, the Financial Advisor and the Underwriter:

Town of Erie, Colorado
Attn: Finance Director
645 Holbrook, P.O. Box 750
Erie, Colorado 80516
Telephone: (303) 926-2751.

First Southwest Company, L.L.C.
8055 East Tufts Avenue, Suite 500
Denver, Colorado 80237
Telephone: (303) 771-1678

Stifel, Nicolaus & Company, Incorporated
1125 Seventeenth Street, Suite 1600
Denver, Colorado 80202
Telephone: (303) 291-5265.

CERTAIN RISK FACTORS

The purchase of the 2015 Bonds involves special risks and the 2015 Bonds may not be appropriate investments for all types of investors. Each prospective investor is encouraged to read this Official Statement in its entirety and to give particular attention to the factors described below, which, among other factors discussed herein, could affect the payment of debt service on the 2015 Bonds and could affect the market price of the 2015 Bonds to an extent that cannot be determined at this time. *The following does not purport to be an exhaustive listing of risks and other considerations that may be relevant to investing in the 2015 Bonds. In addition, the order in which the following information is presented is not intended to reflect the relative importance of such risks.*

2015 Bonds Are Limited Obligations

General. The 2015 Bonds constitute special, limited obligations of the Town. The principal of and interest on the 2015 Bonds is payable solely from and secured by an irrevocable pledge of the Net Revenues derived by the Town from the operation of the System, together with certain interest income and other amounts as provided in the Bond Ordinance. The 2015 Bonds constitute an irrevocable pledge of the Net Revenues on a parity with the lien thereon of the Prior Bonds and any Additional Parity Lien Bonds. See "SECURITY FOR THE BONDS." **The 2015 Bonds do not constitute a general obligation of the Town. Owners of the 2015 Bonds may not look to any funds or accounts of the Town other than those specifically pledged to the payment of the 2015 Bonds.**

The ability of the Town to meet its payment obligations under the Bond Ordinance will depend upon the ability of the System to generate sufficient Gross Revenues to meet such obligations, the System's operating expenses, debt service on other debt or obligations, extraordinary costs or expenses that may occur and other costs and expenses. Accordingly, investors should be aware that future revenues and expenses of the Town will be subject to conditions that may differ materially from current conditions to an extent that cannot be determined at this time.

No Mortgage Secures the 2015 Bonds. The payment of the 2015 Bonds is not secured by an encumbrance, mortgage or other pledge of property of the Town, except for the Net Revenues and other moneys pledged for the payment of the Bond Requirements of the 2015 Bonds. No property of the Town, subject to such exception, shall be liable to be forfeited or taken in payment of the 2015 Bonds. See "SECURITY FOR THE BONDS--Limited Obligations."

Factors that May Cause Insufficiency of Expected Revenues

The generation of Net Revenues is dependent upon several factors outside the Town's control, such as the economy, cool or wet summer weather resulting in lower water usage, collections of water service charges and tap fees, continued growth (or lack thereof) and changes in law. It is impossible to predict whether current economic conditions will continue or worsen or to predict how future conditions will affect the operation of the System or the Town's finances in general. The following factors, among others, may impact the generation of Net Revenues in the future.

General. Payment on the 2015 Bonds is dependent upon the generation of sufficient Net Revenues of the System. If the System becomes inoperable due to damage, destruction, environmental restriction or for any other reason, if the Town should lack raw water or lack treatable water due to contamination, lack of adequate supply to serve existing customers, drought or for any other reason, if the Town has inadequate storage or transmission facilities, if the Town is unable to increase rates and charges for any reason or if the Town incurs unanticipated expenses or reduced revenues due to power rate increases or for any other reason, the Town may be unable to generate adequate revenues from the System to pay debt service on the 2015 Bonds.

Water Quality and Environmental Requirements. The System is subject to numerous federal and State regulatory requirements. Those regulations are subject to change at any time. Public drinking water systems like the System are regulated by the Environmental Protection Agency; the Colorado Department of Health has the authority to enforce drinking water quality standards. Water quality standards imposed by the federal government or the State may affect the water available to the Town and implementation of those standards or enforcement by the State Department of Health could result in increased costs associated with water treatment operations of the Town. In addition, failure to comply with regulatory changes, or the inability to comply with them in a timely manner could cause portions of the System to become unavailable. Any disruption of service could negatively impact Net Revenues.

In operating the System, the Town also may be subject to various environmental regulations which could subject the Town to increased operating costs or capital expenditures. Such risks include the use of hazardous materials in the water treatment process and the disposal of such materials, the occurrence of upstream events that could cause contamination of the Town's water sources, or other factors. Such increased costs could reduce the amount of Net Revenues available to pay debt service on the 2015 Bonds.

Drought. In recent years, the State has experienced drought conditions. The Town has implemented a Drought Plan program (drought plan) containing triggers requiring specific actions. The drought mitigation plan is a strategy for temporary supply management and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. The Board approved the plan on August 11, 2015. The Town has also implemented a conservation program with a stated goal to conserve water. Currently, the Town is operating at Action Level 1, which is a voluntary water conservation program pursuant to which residents are asked to comply with twice-weekly lawn watering, among other items. As a result, the Town has seen reduced per-capita consumption over the last several years; that reduced level of consumption is expected to continue into the future. However, more severe watering limitations or increased conservation measures could reduce the amount of water treated and sold by the Town and therefore could reduce the revenues generated by the System.

Certain Water-Related Risks. As described in "THE SYSTEM--The Water System - Raw Water Supply," one of the Town's primary sources of water is the Northern Colorado Water Conservation District ("NCWCD") Colorado Big Thompson Project ("CBT"). Each CBT share (a "CBT Unit") represents the right to use a portion of certain water rights in the CBT Project pursuant to the rules and regulations of the NCWCD. The Town owns 6,069 CBT Units; 1,312 CBT Units are owned by the Town of Erie Finance Corporation (the "Corporation") but are controlled by the Town pursuant to a 2010 Lease Purchase Agreement, as amended on

December 1, 2014 (see "TOWN FINANCIAL OPERATIONS AND DEBT STRUCTURE--Leases and Other Financial Obligations"). Loss of the CBT units for any reason, including the Town's failure to appropriate rental payments under the 2010 Lease, could negatively impact the operation of the System and the generation of Net Revenues.

Ownership of CBT Units is subject to the Rules and Regulations and policies of the NCWCD, the Water Conservancy Act of Colorado, by Section 37-45-131, C.R.S., and by a Repayment Contract dated July 5, 1938, between NCWCD and the United States of America. Failure to comply with those rules, regulations, statutes and agreements could result in NCWCD's removal of ownership of the CBT Units from the Town or the Corporation after notice and a hearing. This provision applies to the CBT Units that secure the 2010 Lease.

Ownership of the CBT Units is subject to an annually renewable perpetual contract for the right to use CBT water. CBT Units must be used exclusively for domestic, irrigation or industrial use within the Town's boundaries (or areas served by the Town) or leased on an annual basis to other users within the NCWCD; all of the property served must be within the boundaries of NCWCD. Should those requirements not be met, NCWCD may determine to remove the CBT Units from the Town or the Corporation.

Further, the Town and the Corporation are required to pay certain fees ("CBT Assessment Fees") annually in advance at a price per CBT Unit set annually by the NCWCD Board (currently, that fee is $30.50 per CBT Unit; it will increase to $35.90 per CBT Unit for the water year beginning November 1, 2015). Payment of the CBT Assessment Fees automatically renews the right of use for another water year (from November 1 through the succeeding October 31). If annual payments are not made by October 1 of each year, water deliveries will be suspended as of November 1 until payment of the delinquency is made. If payment is not made within 90 days after the mailing of written notice, the non-paying party will have no further right, title or interest in the CBT units and the right of use of the CBT Units will terminate. However, proceeds from any sale of the right of use to another allottee which are over and above NCWCD's actual expense in terminating and disposing of the contract right to use would be paid to the Town or the Corporation, as applicable.

Future Water Supplies. As more fully described in "THE SYSTEM--The Water System - Raw Water Supply," the water rights and shares owned by the Town currently yield approximately 7,576.1 acre-feet of water in a dry year with a firm annual yield of 3,814.4 acre-feet per year. The Town's water engineers have calculated future demands in the Town's Water Conservation Plan. Based upon the slowdown in growth of the last several years and increases in water supply obtained by the Town, the Town currently believes it has sufficient raw water available until approximately 2025. However, if growth rates return to past levels, that date will occur sooner. The Town will have to locate and acquire additional water rights or continue participation in additional water projects after that time if growth continues. Some current sources of the Town's water, including the CBT Project, have finite amounts of water available. If adequate raw water is not available to the Town as needed to support growth, Net Revenues may be negatively impacted in the future.

Lack of Continuation of Development. The Town has experienced significant growth in the past decade. This development has been spurred by commercial growth in the Denver metropolitan area, including that in the nearby communities of Boulder, Louisville, Lafayette and Broomfield. As a result of that growth, the System has collected tap fees and water

resource fees (the tap fees and water resource fees are sometimes referred to collectively as "system connection fees"). After a slowdown in development due to the recession that began in 2007, residential building activity began increasing in 2012 and 2013. With 248 residential permits issued in 2013, 291 issued in 2014, and approximately 400 expected for 2015, development activity is expected to continue to strengthen. The Town currently expects that after 2015, growth levels will average 300-500 building permits per year. This expectation is based upon current expectations about development plans provided by private parties; there is no assurance that those developers will be willing or able to realize their current development plans. In addition, the Town's 2005 Master Plan estimated that the Town will have a population of approximately 40,680 by 2025. Approximately 6,900 additional taps would be needed to serve that population. However, there is no guarantee that growth will continue in the Town, or if it continues, at what rate. As a result, it is not possible to predict the amount of system connection fees that will be collected in future years.

Further, the System's current facilities are sized to accommodate projected growth over the next several years. In the event that development within the Town slows, the cost of those facilities will be spread over a smaller customer base; as a result, development fees and other charges may need to be increased to pay debt service on the 2015 Bonds or other existing obligations and to pay Operation and Maintenance Expenses. Significant increases in fees, however, may result in a further reduction in development and less connection fee revenues in the future.

Delay in Enforcement of Liens. The Town has the statutory authority to enforce payment of its rates and charges through the foreclosure of liens on the real property of delinquent ratepayers. However, foreclosure of real property liens is a time-consuming and burdensome remedy. The delays involved in foreclosure could substantially delay the collection of Gross Revenues by the Town. In addition, proceeds realized from the sale of real property, if any, may not be sufficient to cover the delinquent rates and charges after the payment of any senior liens on the property.

Constitutional Limitations on Enterprises. The Town has concluded that its System presently qualifies as an "enterprise" under the provisions of Article X, Section 20 of the Colorado Constitution ("TABOR"). If the Town's water operations should fail at some time in the future to qualify as an enterprise for purposes of TABOR, the System would become subject to the limitations of TABOR, including, without limitation, the spending limits contained in TABOR. See "LEGAL MATTERS--Certain Constitutional Limitations." If the Town fails to maintain the enterprise status of the System, that event will not adversely affect the validity or enforceability of the 2015 Bonds, but may affect the Town's ability to collect Net Revenues in an amount sufficient to pay debt service.

Additional Parity Lien Securities

Upon issuance, the 2015 Bonds will have a lien on the Net Revenues on a parity with the lien thereon of the Prior Bonds. In addition, under the Bond Ordinance, the Town is permitted to incur other debt payable on a parity with the lien of the 2015 Bonds. See "SECURITY FOR THE BONDS--Additional Bonds." Debt service on the 2015 Bonds, the Prior Bonds and all Additional Parity Lien Bonds will be payable from Net Revenues on a pro-rata basis. Accordingly, to the extent that future obligations are issued on a parity with the lien

of the 2015 Bonds, the security for the 2015 Bonds may be diluted. See "SECURITY FOR THE BONDS--History of Net Revenues and Pro-Forma Debt Service Coverage."

Changes in Law

Various Colorado constitutional provisions, laws and regulations apply to the operation of the System and the operation and finances of the Town. Various federal laws and regulations also apply to the operation of the System. There is no assurance that there will not be any change in, interpretation of, or addition to the applicable laws, provisions, and regulations which would have a material effect, directly or indirectly, on the affairs of the Town or the operation of the System in the future.

Limitations on Remedies Available to Owners of 2015 Bonds

No Acceleration. There is no provision for acceleration of maturity of the principal of the 2015 Bonds in the event of a default in the payment of principal of or interest on the 2015 Bonds. Consequently, remedies available to the owners of the 2015 Bonds may have to be enforced from year to year.

Bankruptcy, Federal Lien Power and Police Power. The enforceability of the rights and remedies of the owners of the 2015 Bonds and the obligations incurred by the Town in issuing the 2015 Bonds are subject to the federal bankruptcy code and applicable bankruptcy, insolvency, reorganization, moratorium, or similar laws relating to or affecting the enforcement of creditors' rights generally, now or hereafter in effect; usual equity principles which may limit the specific enforcement under State law of certain remedies; the exercise by the United States of America of the powers delegated to it by the federal Constitution; the power of the federal government to impose liens in certain situations, which could result in a federal lien on the Net Revenues which is superior to the lien thereon of the 2015 Bonds; and the reasonable and necessary exercise, in certain exceptional situations, of the police power inherent in the sovereignty of the State and its governmental bodies in the interest of serving a significant and legitimate public purpose. Bankruptcy proceedings or the exercise of powers by the federal or State government, if initiated, could subject the owners of the 2015 Bonds to judicial discretion and interpretation of their rights in bankruptcy or otherwise, and consequently may entail risks of delay, limitation or modification of their rights.

No Trustee. There is no bond trustee or similar person or entity to monitor or enforce the provisions of the applicable Bond Ordinance on behalf of the Owners of the 2015 Bonds, and therefore the Owners should be prepared to enforce such provisions themselves if the need to do so ever arises.

Secondary Market

There is no guarantee that a secondary market for the 2015 Bonds will be maintained by the Underwriter or others. Thus, prospective investors should be prepared to hold their 2015 Bonds to maturity.

SOURCES AND USES OF FUNDS

Sources and Uses of Funds

The proceeds the 2015 Bonds are expected to be applied in the following manner:

Sources and Uses of Funds

	Amount
Sources:	
Principal amount of the 2015 Bonds	
Plus/(less): net original issue premium/(discount)	
Other available funds (1)	
Total	
Uses:	
The Refunding Project	
Costs of issuance (including Underwriter's discount)	
Total	

(1) Consists of amounts on deposit in the bond fund [and the reserve fund] for the Refunded Bonds.

Source: The Underwriter.

The Refunding Project

General. A portion of the proceeds of the 2015 Bonds will be used to advance refund the Refunded Bonds. In order to accomplish the Refunding Project, the Town will deposit a portion of the 2015 Bond proceeds with the Escrow Bank pursuant to an Escrow Agreement. The amounts deposited with the Escrow Bank will be deposited into the Escrow Account created under the Bond Ordinance and invested in Federal Securities (defined herein) maturing at such times and in such amounts as required to provide funds sufficient to pay (i) the interest on the Refunded Bonds as it becomes due through December 1, 2017; and (ii) the principal on the Refunded Bonds upon prior redemption on December 1, 2017.

Verification of Mathematical Computations. The accuracy of the mathematical computations of the adequacy of the maturing principal of and interest on the federal securities and cash deposited in the Escrow Account to provide for the payment of the principal and interest with respect to the Refunded Bonds when due or upon prior redemption, which computations support the conclusion of Bond Counsel that the 2015 Bonds are not "arbitrage bonds" under Section 148 of the Tax Code, will be verified by _____, Certified Public Accountants, _____, Colorado.

Summary of Refunded 2007A Bonds and 2007B Bonds. The following tables set forth the original amount of each maturity of the 2007A Bonds and 2007B Bonds, the principal amounts being refunded, and the principal amounts remaining after the Refunding Project.

	2007A Bonds			2007B Bonds		
Year	Original Principal Amount(1)	Amount Refunded*	Principal Outstanding After Refunding*	Original Principal Amount(1)	Amount Refunded*	Principal Outstanding After Refunding*
2015	--	--	--	$ 315,000	--	$ 315,000
2016	--	--	--	325,000	--	325,000
2017	--	--	--	340,000	--	340,000
2018	--	--	--	355,000	$260,000	95,000
2019	--	--	--	375,000	275,000	100,000
2020	--	--	--	390,000	285,000	105,000
2021	--	--	--	405,000	300,000	105,000
2022	--	--	--	425,000	315,000	110,000
2023	--	--	--	440,000	325,000	115,000
2024	$ 1,290,000	$ 950,000	$ 340,000	--	--	--
2025	1,355,000	995,000	360,000	--	--	--
2026	1,420,000	1,045,000	375,000	--	--	--
2027	1,495,000	1,100,000	395,000	--	--	--
2028	1,570,000	1,155,000	415,000	--	--	--
2029	1,645,000	1,210,000	435,000	--	--	--
2030	1,730,000	1,275,000	455,000	--	--	--
2031	1,815,000	1,335,000	480,000	--	--	--
2032	1,905,000	1,400,000	505,000	--	--	--
Total	$14,225,000	$10,465,000	$3,760,000	$3,370,000	$1,760,000	$1,610,000

(1) Includes mandatory sinking fund amounts in 2026-2032.

* Subject to change.

THE 2015 BONDS

General

The 2015 Bonds are special limited obligations of the Town and will be dated as of their date of delivery and will mature and bear interest as shown on the inside cover page of this Official Statement. The 2015 Bonds will be issued in fully registered form and initially will be registered in the name of "Cede & Co.," as nominee for DTC. Purchases by beneficial owners of the 2015 Bonds ("Beneficial Owners") are to be made in book-entry only form in the principal amount of $5,000 or any integral multiple thereof. Payments to Beneficial Owners are to be made as described below in "Book-Entry Only System" and Appendix C hereto.

For a complete statement of the details and conditions of the 2015 Bonds, reference is made to the Bond Ordinance and the Sale Certificate (defined in Appendix B hereto) for the 2015 Bonds, copies of which are available from the sources listed in "INTRODUCTION--Additional Information."

Payment Provisions

Interest on the 2015 Bonds (calculated based on a 360-day year consisting of twelve 30-day months) is payable semiannually on June 1 and December 1, commencing on June 1, 2016. Interest on the 2015 Bonds is payable to the registered owner thereof (the "Owner") by the Paying Agent on or before the interest payment date (or if such day is not a business day, on the next succeeding business day), at the address appearing on the registration records kept by the Paying Agent at the close of business on the fifteenth day of the calendar month (whether or not a Business Day) next preceding an interest payment date (the "Record Date"). Any interest not timely paid or duly provided for shall cease to be payable to the person who is the registered owner thereof at the close of business on the Record Date and shall be payable to the person who is the registered owner thereof at the close of business on a Special Record Date for the payment of any such defaulted interest. The Special Record Date and the date fixed for payment of the defaulted interest shall be fixed by the Paying Agent whenever moneys become available for payment of the defaulted interest and notice of the Special Record Date and the date fixed for payment of the defaulted interest will be given to the Owners (as shown on the registration books on a date selected by the Paying Agent) not less than ten days prior to the Special Record Date by first class mail. The Paying Agent may make payments of interest on any 2015 Bond by any alternative means as may be mutually agreed to between the Owner of such 2015 Bond and the Paying Agent.

The principal of any 2015 Bond will be payable upon presentation and surrender at the principal corporate trust office of the Paying Agent. If any 2015 Bond is not paid upon presentation and surrender at maturity or upon prior redemption, interest shall continue at its stated rate per annum until the principal is paid in full. All such payments will be made in lawful money in the United States of America.

Notwithstanding the foregoing, payments of the principal of and interest on the 2015 Bonds will be made directly to DTC or its nominee, Cede & Co., by the Paying Agent, so long as DTC or Cede & Co. is the Registered Owner of the 2015 Bonds. Disbursement of such payments to DTC's Participants is the responsibility of DTC, and disbursements of such payments to the Beneficial Owners are the responsibility of DTC's Participants and the Indirect Participants, as more fully described herein. See "Book-Entry Only System" below.

Prior Redemption*

Optional Redemption.* The 2015 Bonds maturing on and before December 1, ____, are not subject to redemption prior to maturity. The 2015 Bonds maturing on and after December 1, ____, are subject to redemption prior to maturity, at the option of the Town, as a whole or in integral multiples of $5,000, in any order of maturity and in whole or partial maturities, on December 1, ____, or on any date thereafter at a redemption price equal to the principal amount so redeemed plus accrued interest to the redemption date without a redemption premium.

[Notwithstanding the foregoing, the 2015 Bonds may not be redeemed as described above unless all Policy Costs, if any, due and owing at the time to the Surety Provider have been paid. See Appendix B - Summary of Certain Provisions of the Bond Ordinance.]

No Partial Optional Redemption After Default. If there shall have occurred and is continuing an Event of Default under the Bond Ordinance, of which an officer of the Paying Agent has actual knowledge, there shall be no optional redemption of less than all of the applicable 2015 Bonds then Outstanding. See Appendix B - Summary of Certain Provisions of the Bond Ordinance--Events of Default and Remedies.

Notice of Redemption. Notice of optional or mandatory redemption shall be given by the Paying Agent in the name of the Town by sending a copy of such notice by first-class, postage prepaid mail, not more than 60 nor less than 30 days prior to the redemption date to each Owner at his address as it last appears on the registration books kept by the Paying Agent; but neither failure to give such notice nor any defect therein shall affect the redemption of any 2015 Bond. Such notice shall identify the 2015 Bonds to be so redeemed (if less than all are to be redeemed) and the redemption date, and shall further state that on such redemption date there will become and be due and payable upon each 2015 Bond so to be redeemed, at the Paying Agent, the principal amount thereof, accrued interest to the redemption date, and the stipulated premium, if any, and that from and after such date interest will cease to accrue. Notice having been given in the manner described above, the 2015 Bond or 2015 Bonds so called for redemption shall become due and payable on the redemption date so designated; and upon presentation thereof at the Paying Agent, the Paying Agent will pay the 2015 Bond or 2015 Bonds so called for redemption. No further interest shall accrue on the principal of any such 2015 Bond called for redemption from and after the redemption date, provided sufficient funds are deposited with the Paying Agent and available on the redemption date.

Notwithstanding the foregoing, any notice of redemption shall either (i) contain a statement that the redemption is conditioned upon the receipt by the Paying Agent on or before the Redemption Date of funds sufficient to pay the redemption price of the 2015 Bonds so called for redemption, and that if such funds are not available, such redemption shall be canceled by written notice to the Owners of the 2015 Bonds called for redemption in the same manner as the original redemption notice was mailed, or (ii) be given only if funds sufficient to pay the redemption price of the 2015 Bonds so called for redemption are on deposit with the Paying Agent in the applicable fund or account.

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* Subject to change.

Tax Covenant

In the Bond Ordinance, the Town covenants for the benefit of the Owners of the 2015 Bonds that it will not take any action or omit to take any action with respect to the 2015 Bonds, the proceeds thereof, any other funds of the Town or any facilities financed or refinanced with the proceeds of the 2015 Bonds if such action or omission (a) would cause the interest on the 2015 Bonds to lose its exclusion from gross income for federal income tax purposes under Section 103 of the Code, (b) would cause interest on the 2015 Bonds to lose its exclusion from alternative minimum taxable income as defined in Section 55(b)(2) of the Tax Code except to the extent such interest is required to be included in the adjusted current earnings adjustment applicable to corporations under Section 56 of the Tax Code in calculating corporate alternative minimum taxable income or (c) would cause interest on the 2015 Bonds to lose its exclusion from Colorado taxable income or Colorado alternative minimum taxable income under present State law. In furtherance of this covenant, the Town agrees to comply with the procedures set forth in the Tax Compliance Certificate. The foregoing covenants shall remain in full force and effect notwithstanding the payment in full or defeasance of the 2015 Bonds until the date on which all obligations of the Town in fulfilling the above covenant under the Tax Code and Colorado law have been met.

Book-Entry Only System

The 2015 Bonds will be available only in book-entry form in the principal amount of $5,000 or any integral multiple thereof. DTC will act as the initial securities depository for the 2015 Bonds. The ownership of one fully registered 2015 Bond for each maturity, in the aggregate principal amount of such maturity coming due thereon, as set forth on the inside cover page of this Official Statement, will be registered in the name of Cede & Co., as nominee for DTC. See Appendix B - Book-Entry Only System.

SO LONG AS CEDE & CO, AS NOMINEE OF DTC, IS THE REGISTERED OWNER OF THE 2015 BONDS, REFERENCES IN THIS OFFICIAL STATEMENT TO THE OWNERS WILL MEAN CEDE & CO. AND WILL NOT MEAN THE BENEFICIAL OWNERS.

Neither the Town nor the Registrar and Paying Agent will have any responsibility or obligation to DTC's Participants or Indirect Participants (defined herein), or the persons for whom they act as nominees, with respect to the payments to or the providing of notice for the Direct Participants, the Indirect Participants or the beneficial owners of the 2015 Bonds as further described in Appendix C to this Official Statement.

DEBT SERVICE REQUIREMENTS

Set forth below is a summary of the estimated annual debt service requirements for the 2015 Bonds, the estimated combined annual debt service payable on the Prior Bonds (after taking the Refunding Project into account), and the estimated combined annual debt service requirements for the 2015 Bonds and the Prior Bonds. **[NOTE: These are the first round of numbers. Need revised numbers showing first interest payment date of 6/1/16]**

Debt Service Requirements(1)*

	2015 Bonds*			Debt Service on the Prior	
Year	Principal	Interest(2)	Total	Bonds(3)*	Total*
2015	--	$ 49,444	$ 49,444	$ 1,896,986	$ 1,946,430
2016	--	539,388	539,388	2,235,160	2,774,548
2017	--	539,388	539,388	2,235,948	2,775,335
2018	$ 260,000	539,388	799,388	1,975,648	2,775,035
2019	270,000	534,189	804,189	1,973,960	2,778,149
2020	270,000	528,788	798,788	1,972,610	2,771,398
2021	280,000	523,388	803,388	1,969,835	2,773,223
2022	290,000	517,088	807,088	1,970,973	2,778,060
2023	290,000	509,475	799,475	1,389,260	2,188,735
2024	910,000	501,500	1,411,500	528,000	1,939,500
2025	955,000	456,000	1,411,000	531,000	1,942,000
2026	1,000,000	408,250	1,408,250	528,000	1,936,250
2027	1,055,000	358,250	1,413,250	529,250	1,942,500
2028	1,110,000	305,500	1,415,500	529,500	1,945,000
2029	1,160,000	250,000	1,410,000	528,750	1,938,750
2030	1,220,000	192,000	1,412,000	552,000	1,964,000
2031	1,280,000	131,000	1,411,000	504,250	1,915,250
2032	1,340,000	67,000	1,407,000	530,250	1,937,250
Total	$11,690,000	$6,950,032	$18,640,032	$22,381,379	$41,021,411

(1) Totals may not add due to rounding.
(2) Assumes interest at rates estimated by the Underwriter.
(3) Includes the estimated combined principal and interest payable on the Prior Bonds, after taking the Refunding Project into account.

Source: The Underwriter.

* Subject to change.

SECURITY FOR THE BONDS

Limited Obligations

The 2015 Bonds are special, limited obligations of the Town. The 2015 Bonds do not constitute a general obligation of the Town nor do they constitute a lien on any properties owned by or located within the boundaries of the Town other than the Net Revenues. The owners of the 2015 Bonds may not look to any funds of the Town (other than Net Revenues or other funds or accounts specifically pledged by the Town) for payment of the 2015 Bonds. Therefore, the security for the punctual payment of the debt service on the 2015 Bonds is dependent upon the generation of Net Revenues in an amount sufficient to meet those requirements.

History of Net Revenues and Pro-Forma Debt Service Coverage

The following table sets forth a history of the Net Revenues for the past five calendar years, the estimated Combined Maximum Annual Principal and Interest Requirements payable on the 2015 Bonds and the Prior Bonds, after taking the Refunding Project into account ($2,778,149* in 2019*), and the pro-forma debt service coverage computed based upon a comparison of historical Net Revenues to the estimated Combined Maximum Annual Principal and Interest Requirements in each year. *Investors should be aware that collections of Net Revenues may not continue at the levels stated below, and the coverage factors in future years may not remain at the historical levels indicated.* See "CERTAIN RISK FACTORS." Additional information about the Net Revenues can be found in "SYSTEM FINANCIAL INFORMATION."

* Subject to change.

History of Net Revenues and Pro-Forma Debt Service Coverage*

Fiscal Year	2010	2011	2012	2013	2014
Gross Revenues					
Water sales	$5,511,767	$6,321,368	$7,104,638	$6,393,236	$6,514,590
Tap fees	2,671,115	2,404,432	3,212,714	6,001,910	7,244,159
Interest income (1)	79,323	68,418	62,457	43,001	62,563
Other income	53,790	63,440	58,414	236,059	444,158
Total Gross Revenues	8,315,995	8,857,658	10,438,223	12,674,206	14,265,470
Operation and Maintenance Expenses (2)	2,655,958	2,746,833	3,012,737	3,191,385	4,090,660
Net Revenues	$5,660,037	$6,110,825	$7,425,486	$9,482,821	$10,174,810
Estimated Combined Maximum Annual Principal and Interest Requirements (3)*	$2,778,149	$2,778,149	$2,778,149	$2,778,149	$2,778,149
Pro-Forma Coverage*	2.04x	2.20x	2.67x	3.41x	3.66x

(1) Includes interest earnings only; does not include unrealized gains or losses.
(2) This figure includes all expenses properly allocable to the System pursuant to GAAP. Does not include depreciation, amortization, interest paid on outstanding bonds and gains or losses from sale of capital assets.
(3) Represents the Combined Maximum Annual Principal and Interest Requirements payable on the Prior Bonds and the 2015 Bonds, after taking the Refunding Project into account ($2,778,149* in 2019*). See "DEBT SERVICE REQUIREMENTS."

Sources: Derived from the Town's audited financial statements for fiscal years 2010-2014, and information provided by the Town.

Reserve Account

General. The ordinance authorizing the issuance of the 1998 Bonds (as defined in Appendix B, which have been retired) (the "1998 Bond Ordinance") created a Reserve Account which is to be used (subject to any required rebate of investment earnings thereon to the United States of America) solely for the payment of principal of, any premium, and interest on the 2015 Bonds, the Prior Bonds and any Additional Parity Lien Bonds in the event that moneys in the Bond Account are insufficient to make such payments when due. The Reserve Account is required to be maintained in an amount equal to the Reserve Account Requirement. "Reserve Account Requirement" means, as of any date on which it is calculated, the least of (a) 10% of the principal amount of the applicable Outstanding Bonds, (b) the maximum annual debt service in any calendar year on the applicable Outstanding Bonds, or (c) 125% of the average annual debt service on the applicable Outstanding Bonds; provided, however, that the Reserve Account Requirement may be reduced if, in the opinion of Bond Counsel, the funding or maintenance of it at the level otherwise determined pursuant to this definition will adversely affect the exclusion from gross income tax for federal income tax purposes of interest on any of the Bonds.

Upon issuance of the 2015 Bonds, the amount of the Reserve Account Requirement will be $_____;* that amount will be funded with amounts already on deposit in the Reserve Account. At any time, the Town may deposit a Reserve Account Insurance Policy (defined in Appendix B) into the Reserve Account to satisfy all or a portion of the Reserve Account Requirement, with the prior approval of Assured Guaranty Municipal Corp. (formerly

* Subject to change.

known as Financial Security Assurance Inc.) ("AGM" or the "Prior Bond Insurer"). If at any time the amounts of the Reserve Account (calculated as described in the Bond Ordinance) are less than the Reserve Account Requirement, then the Town shall deposit to the Reserve Account from the Net Revenues amounts sufficient to bring the amounts deposited in the Reserve Account to the Reserve Account Requirement.

For further information about the Reserve Fund, see Appendix B - Summary of Certain Provisions of the Bond Ordinance--Reserve Account.

Rate Maintenance Covenant

The Town covenants in the Bond Ordinance to charge against users of the System, including the Town (except for fire protection uses), such fees, rates and other charges so that the Gross Revenues shall be adequate to meet the requirements of the Bond Ordinance. Such charges pertaining to the System shall be at least sufficient so that the Gross Revenues annually are sufficient to pay in each Fiscal Year: (a) an amount equal to the annual Operation and Maintenance Expenses for such Fiscal Year, (b) an amount equal to 125% of both the principal and interest on the 2015 Bonds and any Parity Lien Bonds then Outstanding (including the 2007A Bonds, the 2007B Bonds, the 2009 Bonds and the 2011 Bonds) payable from the Net Revenues in that Fiscal Year (excluding the reserves therefor), and (c) any amounts required to pay all Policy Costs (defined in Appendix B), if any, due and owing and all sums, if any, due and owing to meet then existing deficiencies pertaining to any fund or account relating to the Gross Revenues or any securities payable therefrom.

Flow of Funds

So long as any of the 2015 Bonds shall be Outstanding, as to any Bond Requirements related to the 2015 Bonds and the Parity Lien Bonds, the entire Gross Revenues, upon their receipt from time to time by the Town, shall be set aside and credited immediately to the special and separate account known as the "Town of Erie, Colorado, Water Fund" (the "Water Fund," as more particularly defined in the Bond Ordinance).

The following payments shall be made from the Water Fund:

(1) Operation and Maintenance Expenses. First, as a first charge on the Water Fund, from time to time there shall continue to be held therein moneys sufficient to pay Operation and Maintenance Expenses, as they become due and payable, and thereupon they shall be promptly paid. Any surplus remaining in the Water Fund at the end of the Fiscal Year and not needed for Operation and Maintenance Expenses shall be used for other purposes of the Water Fund as described below.

(2) Bond Account Payments. Second, from any remaining Net Revenues, on or before the last day of each month, commencing in the month next succeeding the date of issuance of the 2015 Bonds, the Town shall deposit to the Bond Account from the Net Revenues, an amount equal to the Pro Rata Portion of the interest and principal to come due on the 2015 Bonds and the Parity Lien Bonds on the next succeeding interest payment date. All deposits to the Bond Account shall first be allocated to the payment of interest to come due on the Bonds and the Parity Lien Bonds.

(3) Reserve Account. Third, from any remaining Net Revenues, there shall be credited, if necessary, any amounts necessary to meet the Reserve Account Requirement. See "Reserve Account" above.

(4) Rebate Fund. Fourth, concurrently with any payments required to be made pursuant to any Parity Bond Ordinances with respect to any rebate funds established thereby, there shall be deposited into the Rebate Fund moneys in the amounts and at the times specified in the Tax Compliance Certificate so as to enable the Town to comply with the covenant described in "THE 2015 BONDS--Tax Covenant." Amounts on deposit in the Rebate Fund shall not be subject to the lien and pledge of the Bond Ordinance to the extent that such amounts are required to be paid to the United States Treasury. For further information, see Appendix B - Summary of Certain Provisions of the Bond Ordinance--Rebate Fund.

(5) Payment of Additional Securities. Fifth, any moneys remaining in the Water Fund may be used by the Town for the payment of Bond Requirements of subordinate securities, including reasonable reserves for such subordinate securities and for rebate of amounts to the United States Treasury with respect to such subordinate securities.

(6) Use of Remaining Revenues. After the payments described above are made, any remaining Net Revenues in the Water Fund shall be used, first, for any one or any combination of necessary purposes relating to the operation, improvement or debt management of the System and, second, to the extent of any remaining surplus, for any one or any combination of lawful purposes as the Board may from time to time conclusively determine.

Additional Bonds

Parity Lien Bonds. The Town is authorized to issue Additional Parity Lien Bonds upon the satisfaction of following conditions which are set forth in the Bond Ordinance. In addition, the Town obtained municipal bond insurance policies from the Prior Bond Insurer in connection with the issuance of the Prior Bonds. The Prior Bond Insurer also has imposed conditions upon the issuance of Additional Parity Lien Bonds pursuant to an Insurance Agreement between AGM and the Town. The conditions that must be satisfied prior to the issuance of Additional Parity Lien Bonds are described below.

Conditions Imposed by the Bond Ordinance. The Bond Ordinance authorize the issuance of Additional Parity Lien Bonds (having a lien on the Net Revenues on a parity with the 2015 Bonds and the Prior Bonds) provided the following requirements have been complied with:

A. At the time of the adoption of the ordinance authorizing the issuance of the additional securities, the Town shall not be in default in making any payments described in "Flow of Funds" above, including any payments of Policy Costs (defined in Appendix B).

B. The Net Revenues for any 12 consecutive months out of the 18 months preceding the month in which such securities are to be issued are at least equal to the sum of (a) 125% of the Combined Maximum Annual Principal and Interest Requirements of (i) the Outstanding 2015 Bonds and any Outstanding Parity Lien Bonds, (ii) the Parity Lien Bonds proposed to be issued, and (iii) 100% of the Policy Costs then due and owing, if any, except as

otherwise expressly provided in the Bond Ordinance, and (b) 100% of maximum annual debt service on all other indebtedness payable from the Net Revenues.

In any computation under paragraph B above, the amount of the Gross Revenues for the applicable period shall be decreased and may be increased by the amount of loss or gain conservatively estimated by an Independent Accountant, Independent Engineer or the Director of Finance, as the case may be, which results from any changes which became effective not less than 60 days prior to the last day of the period for which Gross Revenues are determined in any schedule of fees, rates and other charges constituting Gross Revenues based on the number of users during the applicable period as if such modified schedule of fees, rates and other charges shall have been in effect during such entire time period. However, the Gross Revenues need not be decreased by the amount of any such estimated loss to the extent the Independent Accountant, the Independent Engineer or the Director of Finance estimates the loss is temporary in nature or will be offset within a reasonable temporary period by an increase in revenues or a reduction in Operation and Maintenance Expenses not otherwise included in the calculations under this Section, and estimates any loss under this sentence will not at any time materially and adversely affect the Town's apparent ability to comply with the rate maintenance covenant described in "Rate Maintenance Covenant" above without modification because of any restrictive legislation, regulation or other action under the police power exercised by any governmental body.

The respective annual Bond Requirements (including as such a requirement the amount of any prior redemption premiums due on any Redemption Date) shall be reduced to the extent such Bond Requirements are scheduled to be paid in each of the respective Fiscal Years with moneys held in trust or in escrow for that purpose by any Trust Bank, including the known minimum yield from any investment in Federal Securities and any bank deposits, including any certificate of deposit.

In determining whether or not additional Parity Lien Bonds may be issued as described above, consideration shall be given to any probable increase (but not reduction) in the Operation and Maintenance Expenses of the System as estimated by the Director of Finance that will result from the expenditure of the funds proposed to be derived from the issuance and sale of the additional securities; but the Director of Finance may reduce any such increase in Operation and Maintenance Expenses by the amount of any increase in revenues or any reduction in Operation and Maintenance Expenses resulting from the Capital Improvements to which such expenditure relates and not otherwise included in the calculations under this Section, if the Director of Finance also opines that any such reduction in any such increase in Operation and Maintenance Expenses will not materially and adversely affect the Town's apparent ability to comply with the Town's rate maintenance covenant without modification because of any restrictive legislation, regulation or other action under the police power exercised by any governmental body.

A written certificate or written opinion by the Director of Finance that annual revenues, when adjusted as provided above, are sufficient to pay the amounts required by paragraph B above, shall be conclusively presumed to be accurate in determining the right of the Town to authorize, issue, sell and deliver additional securities on a parity with the 2015 Bonds.

The proceeds of any Additional Parity Lien Bonds shall be used only to finance Capital Improvements or to refund other securities payable from Net Revenues, regardless of the priority or the lien of such securities on Net Revenues.

The Bond Ordinance also set forth the requirements the Town must meet prior to the issuance of refunding bonds or other refunding obligations having a parity lien on the Net Revenues. Those requirements are discussed in Appendix B - Summary of Certain Provisions of the Bond Ordinance--Refunding Bonds.

Conditions Imposed by the Insurance Agreement. Notwithstanding the satisfaction of the conditions to the issuance of Additional Parity Lien Bonds described above, the Town may not issue Additional Parity Lien Bonds, unless otherwise permitted by the Prior Bond Insurer: (i) if an Event of Default (or any event which, once all notice or grace periods have passed, would constitute an Event of Default) exists unless such default is cured upon the issuance of such Additional Parity Lien Bonds; and (ii) unless the Reserve Account is fully funded at the Reserve Account Requirement (including the proposed issuance) upon the issuance of such Additional Parity Lien Bonds.

Superior Lien Bonds. The Bond Ordinance prohibits the issuance of obligations having a lien on Net Revenues which is superior to the lien thereon of the 2015 Bonds.

Subordinate Lien Bonds. The Bond Ordinance permits the issuance of additional obligations with a lien on Net Revenues which is subordinate or junior to the lien thereon of the 2015 Bonds.

Ordinance Irrepealable

After any of the 2015 Bonds are issued, the Bond Ordinance shall constitute an irrevocable contract between the Town and the Owner or Owners of the 2015 Bonds and the Bond Ordinance shall be and shall remain irrepealable until the 2015 Bonds, as to all Bond Requirements, shall be fully paid, canceled, and discharged.

THE SYSTEM

General; Service Area

The System generally serves customers located within the Town's corporate limits, although it currently serves one customer outside of the Town boundaries. The Town has entered into an intergovernmental agreement describing water service in the area with the Left Hand Water District, which also provides water to rural areas in the vicinity of the Town. Generally, the Town may serve customers in any area south of State Highway 52 within the Left Hand Water District boundary once the land is annexed to the Town.

Administration and Employees

General. The System is administered by the Town Administrator and the Public Works Director and is currently staffed with 16 employees, including water distribution and water treatment personnel. The Town has designated the System as an "enterprise" for purposes of TABOR. See "LEGAL MATTERS--Certain Constitutional Limitations" for a discussion of enterprise status under TABOR.

Jon L. Mays - Water/Wastewater Operations Manager. The Water/Wastewater Operations Manager supervises the Chief Water Operator, who is responsible for all aspects of operation of the Town's existing water treatment facility (described below). The Operations Manager is hired and supervised by the Public Works Director. Mr. Mays has been with the Town for 8.5 years. Prior to that time, he was the Water/Wastewater Superintendent for the City of Yuma, Colorado for 2.5 years. He also has been a Class A Wastewater Operator with LB and B Associates, Fort Carson, Colorado and a Class A Water/Wastewater Operator for the Three Lakes Water and Sanitation District in Grand Lake, Colorado. Mr. Mays holds a Class A Wastewater Plant Operator License and a Class 4 Wastewater Collections License as well as a Class A Waterworks Operator License and a Class 4 Water Distribution License.

Bruce Chameroy - Chief Water Operator. Mr. Chameroy has been the System's Chief Water Operator and Operation in Responsible Charge ("ORC") since August 8, 2011. Prior to joining the Town, he was an A Water Operator with the city of Westminster, Colorado, for 7 years. He also has been the ORC for North Washington Water District (a small water system) for the past 10 years. He holds a Colorado Class A Water Operator license and a Colorado Class 4 Distribution license.

The Water System

General. As a water supplier, the Town must insure adequate water supply, guard against the effects of drought and continually protect its water supply from encroachment, depletion and contamination, and its water rights from legal attack. An adequate water supply is essential to the Town's ability to provide water service to its users and to generate the revenues necessary to meet the debt service payments on its bonds, loans and other obligations.

Water Treatment and Distribution Facilities. The Town operates and maintains its own Water Treatment Facility ("WTF") and treated water distribution system.

Treatment Plant. The existing WTF was constructed in 1999 and a 4.5 million gallon per day ("MGD") expansion was completed in 2005. Total capacity at the WTF is

now 9.9 MGD (12.15 MGD peak capacity). This capacity is expected to be sufficient through 2019. If buildout occurs as expected by the Town, the WTF will need to be expanded to a capacity of approximately 44 MGD. **[Plans to expand?]**

The pretreatment facility includes a rapid mix, flocculation, and sedimentation system. The design capacity of the pretreatment facility is 10 MGD with a maximum hydraulic capacity of 12.5 MGD. The water is treated through a microfiltration membrane technology process that filters out contaminates of the raw water. The existing microfiltration system has six microfiltration units and each clean unit can treat approximately 0.9 MGD of raw water. The new expansion includes 6 new basins with only 3 basins initially used. The expansion uses a different technology of submerged membranes with each unit having a capacity of 2.3 MGD for a total plant capacity of 12.15 MGD. Prior to the expansion, the WTF was close to using its total capacity on a peak day; currently the WTF is at less than 50% of capacity. In addition to the treatment facility, a 2.2 million gallon clearwell with attached wet well and an above-ground 1.5 million gallon potable storage tank provide the necessary treated water storage to meet the per hour demand on the System. The Town recently completed a 4 million gallon ("MG") water storage tank to provide additional storage capacity for future growth.

The Town and Left Hand Water District have also entered into agreements which provide for water delivery to the System at a maximum rate of 500 gallons per minute, for a minimum of 8 hours per day during the off-peak hours of 11:00 p.m. to 7:00 a.m. and in emergency situations. Left Hand Water District can provide potable water service directly to customers within an approximately 1,300 acre area located within the Town's planning area. An agreement between the Town and the City of Lafayette provides additional water for delivery in an emergency situation for redundant operation.

Distribution System. The Town has approximately 135 miles of water line. The System includes a 30" water transmission/distribution main from the WTF to the 1.5 million gallon storage tank. There are three elevation zones (numbered 2 through 4) that the System serves. Water distribution mains ranging from 12" to 20" in size distribute water among the zones. Zone two includes gravity water lines to the Town's older section and areas of low elevation. Zone three includes a 30" distribution water line along the middle elevation area of the Town. Zone four is a pumped zone from two separate pumping stations that serve the high elevation areas of the Town. The Erie Air Park area has aged water lines, which are in the process of being replaced. Except for a few existing lines in Old Town and the Erie Air Park, most of the distribution system and pumping system is new since 1999. The distribution system also includes two high-service pumping stations, a 5.3 MGD Zone 4B station and a 10.6 MGD Zone 3/4A station. The peak demands for 2014 reached a little over 6 MGD.

Raw Water Supply. The Town currently has the capacity to receive its water supply from many sources, which are briefly described in this paragraph. The Town owns 205 shares of the South Boulder Canyon Ditch Company and reservoir water rights, all of which provide the Town with the right to divert water from South Boulder Creek above Baseline Reservoir in the South Boulder Canyon Ditch. That ditch system conveys water through an open ditch approximately eighteen miles for direct delivery or storage in the Town's two water storage reservoirs, Erie Reservoir and Thomas Reservoir. The Town also owns shares in other mutual ditch companies. The Town owns or controls 311.5 shares in the Leyner Cottonwood Consolidated Ditch Company, 98 shares in the Erie and Coal Creek Ditch and Reservoir Company and 8.24 shares in the Farmers Reservoir and Irrigation

Company. This water is diverted through the respective ditch companies' headgates for direct delivery to the Town, except 155 shares in the Leyner Cottonwood Ditch, which can also be delivered through the South Boulder Canyon Ditch. The primary source of water is derived from the Town's ownership of water in the CBT Project ("CBT") and the Windy Gap Project which are operated by NCWCD and its Municipal Subdistrict. The Town owns or controls 7,381 CBT Units and 14 Units in the Windy Gap Project. Both of those sources of water are delivered to the Town through the Northern Colorado Water Conservancy District's raw water pipeline which extends from Carter Lake to Broomfield, Colorado (the "SWSP Pipeline") and through the Town's own raw water line and pump station, which extends from the Boulder Supply Canal to the Town (the "Erie Pipeline"). The Town participated in construction of the SWSP Pipeline. The Town's interest in the SWSP is set forth in its Allotment Contract with the NCWCD which allocates 5.5 cubic feet per second ("cfs") of the pipeline's overall capacity to the Town. Water is delivered to the Town from the main SWSP Pipeline through a 12" waterline, which extends to the Town's water treatment facility. The Erie Pipeline belongs solely to the Town and has a capacity of 20 cfs.

The water rights and shares described above currently yield approximately 7,576.1 acre-feet in a dry year, with a firm yield of 3,814.4 acre-feet per year. The Town's water engineers have calculated future demands in the Town's Water Conservation Plan. The Town currently believes it has sufficient raw water available until approximately 2025. However, if growth rates return to past levels, that date will occur sooner. See "CERTAIN RISK FACTORS--Factors that May Cause Insufficiency of Expected Revenues - Insufficient Water System Revenues--Future Water Supplies."

The Board has approved a five-year lease agreement between the Town and Bijou Irrigation Company ("Bijou") for the lease of 980 CBT Units to further firm its water supply while the Windy Gap Firming Project and NISP are being pursued. The lease term is from November 1, 2015 to October 31, 2021; the lease also provides the Town a right of first refusal to lease the shares for additional years. The 980 CBT Units are expected to yield approximately 686 acre-feet per year. The Town will pay $250 per acre-foot actually delivered in the first year; the cost per acre-foot increases 2% per year to $270.61 per acre-foot in the fifth year. The Bijou lease is subject to annual appropriation.

Raw Water Storage. The Town's reservoir storage water rights include 239 acre feet in Erie Reservoir and 148 acre feet in Thomas Reservoir. Raw water is currently stored in Erie Lake and Thomas Reservoir. Erie Lake can store both ditch water and can also fill Thomas Reservoir. Thomas Reservoir is only used during the summer months and is off-line during the winter. The Carter Lake water can also feed directly to the membrane units located within the WTF or be diverted to a 0.5 MG raw water storage tank located on-site. The Erie Lake reservoir has been in service for some time; however, in 2004 the reservoir was rehabilitated to meet current standards.

System Capital Improvements Program

Capital Improvement Plan. The Town's capital improvement planning process is discussed in more detail in "THE TOWN--Capital Improvement Plan." Capital improvements to the System are financed primarily by System revenues, supplemented as necessary by borrowing.

Capital expenditures for the Water Fund in the past five years were as follows: 2010 - $4,019,505; 2011 - $1,745,268; 2012 - $883,934; 2013 - $5,256,213; and 2014 - $6,025,885. In 2015, the Town completed construction of a 4 million gallon water storage tank to meet future growth needs. Other recent water projects include the 2013 completion of a 1,000 acre foot reuse water reservoir, to more efficiently use the Town's water supply. The reservoir will provide water for irrigation of parks, open space and landscaping in various parts of the Town. The Town also completed replacement of the microfiltration membranes at its water treatment plant and purchased 50 CBT Units. These projects were funded through cash funds on hand in the Water Fund.

In addition, the Town is a participant in both the Windy Gap Firming Project and NISP, part of its efforts to ensure adequate water supplies as the Town grows. See "Other Water Projects - Windy Gap Firming Project" and "Northern Infrastructure Supply Project" below.

2016-2020 CIP - Water Fund. The Town's current CIP, still in progress of being updated as of the date of this Official Statement, contemplates approximately $120 million in water fund-related capital expenditures over the five-year period 2016-20. The majority of the planned expenditures (approximately $111 million) are for growth-related water projects, including all of the planned expenditures for the Windy Gap Firming Project (approximately $18 million) and a portion of the expenditures for NISP (approximately $51 million). Both of these projects are described in more detail in "Other Water Projects."

Master Plan 2013. The Town's most recent Water and Wastewater Master Plan was completed in 2007 (the "Master Plan") and studied water demands through 2025. The Master Plan projected a service area population of 32,000 in 2025. The Master Plan was formulated at the end of the 2009 to 2012 period, when the Town experienced lower than predicted growth; as a result, the Master Plan's projected 2025 population is lower than the projection contained in the 2005 Comprehensive Plan discussed elsewhere in this Official Statement.

Based on those projections, the Master Plan contemplates an increase in water storage, treatment and distribution capacities over time. A phased approach to expansion of the WTF is contemplated in the Master Plan based upon certain population triggers. The existing WTF has been designed to accommodate the phased expansion of capacity. The Master Plan also recommends that the Town continue its practice of requiring developers to provide potable water lines with adequate capacity to conform with the distribution system. New pump stations and expanded storage also will be required during the Master Plan timeline.

Other Water Projects

Windy Gap Firming Project. The Town has entered into agreements with the Municipal Subdistrict, Northern Colorado Water Conservancy District, together with 12 other entities, to participate in the Windy Gap Firming Project. The purpose of the Windy Gap Firming Project is to improve the reliability of the water supplies developed by the original Windy Gap Project. The Windy Gap Firming Project includes construction of an approximately 90,000 acre-foot storage reservoir (Chimney Hollow Reservoir) west of Carter Lake. The Chimney Hollow Reservoir site was acquired in 2004 for approximately $4,000,000.

Windy Gap water is desirable for the Town because the water is fully consumable (available for total consumptive use, reuse, sale of effluent, etc.) and because it is deliverable

through the existing NCWCD SWSP Pipeline and the Erie Pipeline. The Windy Gap Firming Project has always been contemplated as a component of the Windy Gap Project. It is necessary in order to provide additional storage to firm the annual yield of the Windy Gap water rights. This project is expected to satisfy the Town's water demands during both wet and dry years.

Several phases of the Windy Gap Firming Project are essentially complete. The work completed to date includes preliminary studies to evaluate potential reservoir sites, engineering and environmental studies, an alternatives analysis and completion of the Final Environmental Impact Statement. A Record of Decision has also been issued by the U.S. Bureau of Reclamation and Grand County has approved the 1041 county permit. Further negotiations and permitting are ongoing. Engineering design currently is scheduled to start in 2016-2017 with construction scheduled for 2018. The Town's pro rata share of the project work during 2015 is expected to total approximately $97,055. The total cost of the Windy Gap Firming Project to date has been approximately $19 million; the Town's share of those costs has been approximately $1,127,959. The total future cost of the Windy Gap Firming Project currently is expected to be approximately $364 million; the Town's share of that cost is expected to be approximately $25.3 million based on the Town's current participation level of 6,000 acre-feet; however, those costs remain subject to change as the project progresses. The Windy Gap costs have been included in the Town's 2015-19 CIP. The Town currently expects to pay the costs of the Windy Gap Project from net revenues of its Water System Enterprise and additional Water Revenue Bonds secured by those revenues.

Northern Infrastructure Supply Project. The Town also is a participant in the Northern Integrated Supply Project ("NISP"). NISP is a cooperative, regional effort to meet the water needs of many Front Range communities, including the Town and 14 other municipalities or water districts, through development of one regional water project. As currently envisioned, the project would include two off-channel reservoirs. Using two water rights to fill the corresponding reservoirs, it would provide 40,000 acre-feet of reliable firm yield annually to the 15 water providers which are funding the project. The project currently is expected to cost approximately $597 million; the Town's share of that cost would be approximately $97 million based on the Town's current participation level of 6,500 acre-feet; however, the current cost estimates could change in the future. Major expenditures associated with development of the project currently are not expected to begin before 2017. A portion of the NISP costs (approximately $42 million) have been included in the Town's 2015-19 CIP; the majority of the NISP costs currently are expected to be incurred after 2017. The Town currently expects to pay the costs of the NISP Project from net revenues of its Water System Enterprise and additional Water Revenue Bonds secured by those revenues.

SYSTEM FINANCIAL INFORMATION

Customer Rates and Charges

General. The Town imposes service charges for the System. Service charges are utilized to meet the operation and maintenance costs of the System, together with the accumulation of sufficient cash reserves to fund the necessary periodic replacement and improvements thereto and applicable debt service, and the costs of maintaining dedicated or reserved capacity in the System.

Rate Study. The Town completed a comprehensive rate study for its water, wastewater and storm drainage systems in 2014. The study was the basis for recommended water volume rate increases and water resource and tap fee increase that were effective on January 1, 2015.

Current Rates and Charges. The Town's current water rate ordinance became effective on January 1, 2015, and included annual increases in service charges and volume rate charges for the years 2015 through 2019.

The Town's present water rate schedule is set by volume consumed and meter size. In 2015, for a standard residential water meter (3/4" meter), the base charge is $25.41 per bill and the volume charge rate schedule incrementally increases for each 1,000 gallons of water consumed, ranging from $3.75/1,000 gallons for the first 5,000 gallons used, increasing to $4.68/1,000 gallons for the next 10,000 gallons used, $7.03/1,000 gallons for the next 10,000 gallons used, and reaching $10.54/1,000 gallons over 25,000 gallons per month. For small commercial users (3/4" meter), the base charge is $26.68 per bill and the volume rate charge is $6.02/1,000 gallons used. For small irrigation users (3/4" meter) the base charge is $26.68 per bill and the volume rate charge is $6.33/1,000 gallons used.

The average monthly total charge (including base charges and volume rates) will increase by 5% in 2016 and 2017, 4% in 2018 and 3% in 2019.

Connection Fees

General. Water connection fees (which include water tap fees and water resource fees) are assessed and collected at the time a building permit is issued for construction of a residence or commercial facility. The Town requires the payment of the water resource fee in lieu of dedication to satisfy its water dedication requirements for all uses on lands annexed to the Town, except that a person may elect to dedicate water rights for irrigation of parks and open space.

The Town's current connection fees for a standard residential water meter (3/4" meter) are $25,716, of which $10,416 is the tap fee (which is allocated to capital improvement costs) and $15,300 is the water resource fee (which is allocated to an account for the acquisition of additional water rights). Tap fees for larger connections are proportionately higher. Additional increases for tap fees are scheduled in 2016-2019 based on the recommendations in the 2014 rate study discussed above, with the tap fee reaching $15,080 effective January 1, 2019.

History of Water Connection Fees Collected. The following table sets forth a history of water taps sold by the Town and the associated connection fees (including tap fees and water resource fees).

History of Water Connection Fees

Year	Residential Taps Sold	Residential Tap Fees Collected	Commercial Taps Sold	Commercial Tap Fees Collected	Total Taps Sold	Total Tap Fees Collected
2010	119	$2,471,431	3	$199,684	122	$2,671,115
2011	108	2,249,349	2	155,083	110	2,404,432
2012	147	3,147,149	1	65,565	148	3,212,714
2013	248	5,983,209	1	18,701	249	6,001,910
2014	291	6,948,481	5	295,678	296	7,244,159
2015(1)	231	5,848,878	0	--	231	5,848,878

(1) Tap sales as of June 30, 2015 (unaudited).

Source: The Town.

Customer Information

The Town's service area is primarily residential. The Town classifies its water customers as residential, commercial or irrigation. The System currently has no industrial users. A history of the Town's water accounts by category is set forth in the following table.

History of Water Accounts

Year	Residential Accounts	Commercial Accounts	Irrigation Accounts	Total
2010	6,267	119	117	6,503
2011	6,329	101	116	6,546
2012	6,542	117	106	6,765
2013	6,757	123	110	6,990
2014	6,944	120	131	7,195
2015(1)	7,137	125	139	7,401

(1) Customer accounts as of June 30, 2015.

Source: The Town.

The following table sets forth the ten largest customers of the System in 2014 (by revenue). Information on water usage by those customers is also provided. State law protects personal financial information of utility users unless that information is presented in a form that prevents the identification, location or habits of individuals. Accordingly, the information set forth below does not identify customers by name; it includes only the type of business. No independent investigation has been made of, and consequently there can be no representation as to, the financial condition of the customers listed below or their continued usage of the System at significant levels. The Town currently expects that the largest users of the System will remain substantially similar in 2015.

Largest Customers of the System - 2014

Type of Business	Billings	% of Total(1)	Gallons Used (in 000's)	% of Total(2)
School District	$168,269	2.58%	27,157,871	3.20%
The Town	136,190	2.09	20,817,388	2.45
Homeowner's Association	106,191	1.63	14,781,679	1.74
Homeowner's Association	78,733	1.21	12,563,436	1.48
Homeowner's Association	53,587	0.82	8,354,888	0.98
Homeowner's Association	50,136	0.77	8,028,219	0.95
Homeowner's Association	46,710	0.72	6,957,904	0.82
Homeowner's Association	36,126	0.55	4,704,733	0.55
Homeowner's Association	29,236	0.45	4,633,778	0.55
Homeowner's Association	28,569	0.44	4,409,753	0.52
	$733,747	11.26%	112,409,649	13.24%

(1) Based on total charges for service of $6,514,950 in 2014.
(2) Based on 848,755,746 total gallons used in 2014.

Source: The Town.

Billing and Collection

The Town billing department mails utility bills monthly to each of its customers. Each customer's bill includes water, sewer and drainage use charges. Bills unpaid for a period of one month are considered delinquent. Service may be terminated after 30 days of delinquency. An additional charge of 1% interest is assessed monthly on any balance of any delinquent fee. Reconnection requires settlement of all past due amounts. Pursuant to Town ordinance, delinquent service charges become a lien against the property served for the amount due and may be foreclosed upon by the Town in due course. It is the Town's practice to annually file liens with the county treasurers' offices for accounts that are six months or more past due.

Colorado law provides that, until paid, all fees, rates, tolls, penalties or charges imposed for connection to or use of the system constitute a perpetual lien on and against the property served and any such lien may be foreclosed in the same manner as provided by State law for the foreclosure of mechanics liens.

The Water Fund

The accounts of the Town are organized and operated on a fund basis. Such funds are segregated for the purpose of accounting for the operation of specific activities or attaining certain objectives. The governmental fund utilized for the administration and operation of the System is the Water Fund. The Water Fund is an enterprise fund for accounting purposes. All activities necessary to provide water service are accounted for in the Water Fund.

Water Fund - Budget Summary and Comparison

The budget for the Water Fund is adopted as part of the overall Town budget. See "TOWN FINANCIAL OPERATIONS--Budget Process." Set forth in the table below is a comparison of the Town's final Water Fund budget for 2014 and revised Water Fund budget for 2015, compared to actual (unaudited) interim results for the six-month periods ending June 30,

2014 and 2015. The table is presented on a budgetary basis and is not intended to be presented according to Generally Accepted Accounting Principles ("GAAP").

In accordance with its adopted financial policies, the Town is required to have a reserve equal to 90 days of operating expenses plus 2% of the book value of the Water Funds fixed assets. However, due to the fact that the Town's water infrastructure is relatively new, the Town is studying the possibility of eliminating the additional "book value" component of the reserve policy.

Budget Summary and Comparison - Water Fund

	2014 Final Budget	2014 YTD (through June 30)(1)	2015 Revised Budget(1)	2015 YTD (through June 30)(1)
Beginning Working Capital Balance	$10,791,543	$10,791,543	$11,320,896	$11,320,896
Revenues				
Charges for services	6,475,700	2,891,215	6,970,000	2,429,759
Capital contributions and fees	6,740,500	3,120,444	10,689,400	5,848,878
Investment earnings	4,300	35,087	25,000	3,851
Miscellaneous	453,900	2,908	25,000	2,923
Total revenues	13,674,400	6,049,654	17,709,400	8,285,411
Expenses				
Administration	2,277,600	1,456,627	2,601,000	1,453,577
Distribution	236,600	56,447	237,200	100,248
Treatment	1,411,500	433,912	1,412,700	413,652
Meters	157,300	65,801	161,400	69,390
Debt service (2)	32,414,800	1,141,075	4,436,500	1,046,676
Capital outlay (3)	10,783,300	2,455,234	10,814,100	2,556,434
Total operating expenses	47,281,100	5,609,096	19,662,900	5,639,977
Increase (Decrease) in Working Capital Balance	(33,606,700)	440,558	(1,953,500)	2,645,434
Other Financing Sources				
Proceeds from debt issuance (2)	27,970,000	--	--	--
Ending Working Capital Balance	$5,184,843	$11,232,101	$9,367,396	$13,966,330

(1) Unaudited.
(2) In 2014, the Town remarketed its 2010 Certificates of Participation (the "2010 COPS," as described in "TOWN FINANCIAL OPERATIONS AND DEBT STRUCTURE--Leases and Other Financial Obligations") to a fixed rate. These figures include $27,670,000 for the remarketing of the 2010 COPS and approximately $300,000 in related issuance costs.
(3) See "Capital Improvement Plan" above and "THE TOWN--Capital Improvement Plan" for a general description of Water System capital projects. This category also includes payments made under capital leases (including the Lease).

Source: The Town's 2015 adopted budget, 2015 Budget Supplemental Appropriation #1, and Town monthly financial reports.

History of Revenues, Expenses and Changes in Net Position

The following table provides comparative statements of revenues, expenses and changes in net position for the Town's Water Fund for fiscal years 2010 through 2014. The information has been obtained from the financial information presented in the Town's audited

financial statements for those years. This information should be read together with the Town's 2014 basic financial statements (and accompanying notes) appearing in Appendix A to this Official Statement. Preceding years' financial statements may be obtained from the sources noted in "INTRODUCTION--Additional Information."

Water Fund - History of Revenues, Expenses and Changes in Net Position

	Year Ended December 31,				
	2010	2011	2012	2013	2014
Operating Revenues					
Charges for Services (Water Sales) (1)	$5,511,767	$6,321,368	$7,104,638	$6,393,236	$6,514,590
Operating Expenses					
Personnel Services	1,212,818	1,212,449	1,185,324	1,367,069	1,523,281
Operations and Maintenance	1,415,897	1,534,384	1,827,413	1,824,316	2,567,379
Project Expenses	27,243	--	--	--	--
Depreciation	1,876,677	1,966,472	2,275,380	2,669,956	2,508,658
Total Operating Expenses	4,532,635	4,713,305	5,288,117	5,861,341	6,599,318
Net Operating Income (Loss)	979,132	1,608,063	1,816,521	531,895	(84,728)
Nonoperating Revenue (Expenses)					
Investment Earnings	79,323	68,418	62,457	43,001	62,563
Other	53,790	63,440	7,139	7,295	59,060
Litigation proceeds	--	--	--	325,000	--
Loss on Disposition of Capital Assets	--	--	--	(96,236)	--
Interest Expense	(2,266,314)	(2,403,947)	(2,309,700)	(2,219,004)	(2,389,405)
Amortization of Debt Issuance Costs	(27,724)	(50,222)	(68,916)	--	--
Issuance Costs	(3,331)	--	--	--	--
Total Nonoperating Revenue (Expenses)	(2,164,256)	(2,322,311)	(2,309,020)	(1,939,944)	(2,267,782)
(Loss) before contributions/transfers	(1,185,124)	(714,248)	(492,499)	(1,408,049)	(2,352,510)
Capital contributions	2,671,115	2,404,432	3,263,989	6,001,910	7,629,257
Change in Net Position	1,485,991	1,690,184	2,771,490	4,593,861	5,276,747
Total Net Position - Beginning (2)	102,022,849	103,478,544	100,672,837	102,224,496	106,253,567
Prior Period Adjustments (3)	(30,296)	(4,495,890)	(1,219,831)	(564,790)	--
Total Net Position - Ending (2)	$103,478,544	$100,672,837	$102,224,496	$106,253,567	$111,530,314

(1) Charges for Services increased in 2012 primarily due to an extraordinarily dry summer, which caused increased irrigation by Water System customers.

(2) Net Position include all assets of the System, including non-cash assets.

(3) In 2010, 2011 and 2012, various prior period adjustments were recorded, primarily related to the carrying value of capital assets, bond-related deferrals and liability for compensated absences. In 2013, the prior period adjustment reflects the implementation of Governmental Accounting Standards Board Statement No. 65, which resulted in the expensing of certain bond issuance costs that previously were capitalized and amortized over the life of the related debt.

Source: Derived from the Town's audited financial statements for the years ended December 31, 2010-2014.

Management's Summary of Material Trends

The Town's population has grown from 6,291 in 2000 to approximately 22,000 in December 2015. According to the 2005 Comprehensive Plan, the Town anticipates a population of approximately 40,860 in 2025 and a population of approximately 68,000 at ultimate build-out.

The Town continues to experience growth primarily due to construction of single-family units. In the last five years, the Town has issued new residential building permits as follows: 119 in 2010, 108 in 2011, 147 in 2012, 248 in 2013 and 291 in 2014. For 2015, the Town currently expects to issue approximately 400 building permits (as was contemplated by the Town's 2015 budget). The Town expects growth to continue for the next several years, with 400 residential permits expected to be issued in 2016. Portions of the Town's capital projects are paid for by development tap fees imposed on a per-unit basis. As the economic climate changes, the Town adjusts its revenue projections and capital plans accordingly.

As a result of the growth experienced by the Town over the last ten years, operational and capital revenues and expenses in the Water Enterprise Fund (the "Water Fund") have increased considerably.

Water usage rates increased at a rate of 3% annually from 2009 through 2013. Rates were unchanged in 2014, and increased 5% in 2015. In addition, the number of water customers has grown each year in the same timeframe. As a result of these two factors, charges for services in the water fund have increased from $5.5 million in 2010 to $6.5 million in 2014. Through June 30, 2015, charges for services were $2.4 million, a decrease of $461,000 compared to the same period in 2014. This decrease was due to higher than normal levels of precipitation in May and June, reducing demand. The Town budgeted to receive $6.5 million in charges for services in 2015, and currently expects actual charges for services to be somewhat less than the budgeted amount.

After a slowdown in building activity during 2009-2011, tap fee revenues (i.e., system connection fees) in the Water Fund have increased in each of the last three years. From a low of 110 single family permits issued in 2011, permits increased to 147 in 2012, 248 in 2013 and 291 in 2014. Revenue for these years ranged from a low of $2.4 million in 2011 to a high of $7.2 million in 2014. The Town expects to receive approximately $10.7 million in tap fee revenue in 2015, in line with the amount budgeted for the year, which was based on the issuance of 400 residential single family permits.

Operating expenses (excluding depreciation) for the Water Fund have increased from approximately $2.6 million in 2010 to $3.4 million in 2014. The increase in operating expenses since 2010 was due primarily to additional personnel to support the Town's expanding water operations, increases in assessment fees and various water treatment operational expenses. The Town budgeted to expend $4.4 million in operating expenses in 2015, reflecting the Town's budgeting methodology to include significant authorized expenditure levels in the event of various contingencies. As a result, the Town generally ends the year with actual expenses significantly below budgeted amounts. For example, in 2014 actual operating expenditures were $710,000 less than budgeted amounts. However, actual expenditures for 2015 are expected to increase due to additional staff and increased assessments. The Town currently expects to end 2015 well under budget.

THE TOWN

General

The Town is a municipal corporation and a political subdivision of the State incorporated in 1874. As a statutory town, the Town operates according to the Constitution and laws of the State and Town ordinances adopted pursuant thereto. The Town is primarily a developing residential community located approximately 25 miles north of Denver in the north-central part of the State. The Town encompasses approximately 20 square miles. As of January 2015, the Community Development Department estimated the Town's population was 22,000.

In its 2005 Comprehensive Plan (described below), the Town estimated that its population would grow to approximately 40,680 by 2025. According to the Town, it currently has 7,330 households with an average median household income of $103,800.

The Town has experienced significant growth in recent years. In 1990, the Town had a population of 1,258; the population grew to 6,291 by 2000, to 18,135 by 2010, and it continues to increase. The Town has annexed nearly 6,000 acres since 2000 and continues to review applications for annexation. The Town's 2005 Comprehensive Plan recognized a "sphere of influence" or planning area of approximately 48 square miles. However, the Town has entered into various intergovernmental agreements with surrounding communities and counties. Those agreements may have the effect of limiting the areas that may be annexed into the Town in the future.

Town Powers

Because the Town is a statutory town, state law governs all municipal matters. The rights, powers, privileges, authorities and duties of the Town are established by the Constitution and laws of the State, more particularly by Title 31, C.R.S. Under the authority granted by such statutes, the Town has the power to enter into contracts and agreements; to sue and be sued; to incur indebtedness and issue bonds; to refund any bond of the Town without an election; to acquire, hold, lease, and dispose of property, both real and personal; to adopt and enforce ordinances promulgated by the Board of Trustees; to appropriate money for municipal purposes; to levy and collect ad valorem property taxes; to levy and collect sales taxes; to construct and acquire public buildings and utilities, water systems and sewer systems; to construct or acquire public improvements and to assess the costs of such improvements against benefited properties; to enter into long-term leases for governmental purposes; to fix rates, tolls or charges for services, programs or facilities furnished by the Town, and to pledge such revenues for the payment of any indebtedness of the Town; and to exercise the power of eminent domain for the condemnation of private property for public use.

Town Services

The Town provides its citizens with police protection, streets and public works, parks and recreation services, sanitary sewer services and water services. Gas and electric services in the Town are provided by Xcel Energy. United Power, Inc. also provides certain residents electric service. SourceGas provides certain residents with gas service. Fire protection and ambulance services are provided by Mountain View Fire District.

Board of Trustees

The Town is governed by the Board, which consists of the Mayor and six trustees (the "Trustees"). The Mayor is elected at large for a two-year term and the Trustees are at large for staggered four-year terms of office. The Board holds regular meetings on the second and fourth Tuesdays of the month, with special meetings held as needed. The Mayor presides at all meetings of the Board and has the same voting powers as the Trustees. The Board elects a Mayor Pro Tem from among its members. Any vacancies on the Board are filled until the next regular election by appointment or election. Pursuant to the State Constitution, the Mayor is limited to three consecutive terms in office and Trustees are limited to two consecutive terms in office. Town voters may lengthen, shorten or eliminate the term limitations; however, no election to do so has been held.

The Mayor receives $500 per month as base compensation from the Town. As of April 1, 2014, the Trustees also began receiving base compensation of $300 per month from the Town. The Mayor and the Trustees also receive $25 per meeting for attendance at meetings on behalf of the Town; this is capped at $200 per month for the Mayor and $100 per month for each Trustee.

The current members of the Board, their offices, principal occupations and the year of expiration of their terms are as follows:

Name and Title	Principal Occupation	Length of Service	Term Expires
Tina Harris, Mayor	Teacher	1 year	4/2018
Mark Gruber, Mayor Pro Tem	Project financier	5 years	4/2018
Scott Charles, Trustee	Training Developer	1 year	4/2016
Jennifer Carroll, Trustee	Engineer	1 year	4/2018
Janice Moore, Trustee	Physical Therapist	3 years	4/2016
Waylon Schutt, Trustee	Software Engineer	1 year	4/2018
Dan Woog, Trustee (1)	Property Management	2 years	4/2016

(1) Trustee Woog was appointed in October 2013 to fill a vacant seat. He won reelection to a two-year term at the April 2014 election.

Administration

The Town has a Board-Administrator form of government. The Town Administrator is appointed by the Board and serves at the Board's pleasure. The Director of Finance and the Director of Public Works are hired by the Town Administrator. The Town Attorney is appointed by the Board. Brief job descriptions and biographies of the Town administration involved in the issuance of the 2015 Bonds are set forth below.

Town Administrator. The Town Administrator is the chief operating and administrative officer of the Town. The Town Administrator possesses and exercises all the operating powers and administrative powers vested to him in the Municipal Code. The Town Administrator oversees all Town department and functions. The principal departments of the Town presently consist of the finance department, the police department, the department of community development (planning), the department of public works, and the parks and recreation department.

A.J. Krieger has been the Town Administrator since August 1, 2011. He has worked in local government for 20 years, including the last 12 as a city manager/administrator, most recently with the City of Sheridan, Colorado. Mr. Krieger also has worked with the City of Northglenn, Colorado, the City of Ferguson, Missouri, and the City of Decatur, Illinois. Prior to his city manager/administrator positions, he held positions in economic and community development and served as an assistant city manager for three years. Mr. Krieger has a B.S. degree from Southern Illinois University-Carbondale and an M.P.A. degree from Saint Louis University.

Mr. Krieger is an at-will employee who is employed pursuant to an employment contract with the Town. The contract sets forth salary, review procedures, benefits and severance provisions. The contract is amended each time the salary or severance provisions are adjusted.

Director of Finance. The Director of Finance is responsible for preparing and administering the annual budget and preparing complete reports on the financial activities for the Town. The Director of Finance keeps the Board advised of the financial condition and future needs of the Town. The Director of Finance also is responsible for the accounting, municipal court, and reception functions of the Town.

Steven R. Felten is the Town's Director of Finance. Mr. Felten assumed this position with the Town in February 2012. Mr. Felten has extensive experience serving in various senior accounting and finance roles in commercial banking, state and local government, non-profit and higher education. Mr. Felten served for four years in various finance roles at the City of Boulder, Colorado, including Finance Director, and for three years as the Director of Accounting/Controller for the Colorado Housing and Finance Authority. Mr. Felten has also worked for several large financial institutions and a Big 4 public accounting firm over the course of his career. Mr. Felten holds a Bachelor of Business Administration degree in Accounting from the University of Mississippi and is a Mississippi licensed CPA.

Director of Public Works. The Department of Public Works oversees all engineering and operation and maintenance of Town infrastructure and facilities, including the System, the wastewater and storm drainage systems and the airport.

Gary Behlen is the Town's Director of Public Works. He has been the Director of Public Works since April 2004. Mr. Behlen is a registered engineer with more than 30 years of professional experience in business and civil engineering, project management, municipal engineering, land planning, transportation engineering and structural engineering. Before joining the Town, Mr. Behlen was a Senior Project Manager at Carter & Burgess, Inc. for 2.5 years and was the City Engineer for the City of Broomfield, Colorado prior to that time. Mr. Behlen holds a B.S. Degree in Civil Engineering from Newark College of Engineering and an M.B.A. degree in Business Administration from the University of Colorado, Denver.

Town Attorney. The Town Attorney is the legal representative of the Town and advises the Board and Town officials in matters relating to their official powers and duties.

Mark R. Shapiro has been the Erie Town Attorney since 1997, serving in that capacity on a contractual basis. Additionally, he maintains a general practice firm with its emphasis in municipal law, real estate and business transactions. Mr. Shapiro also represents additional municipal clients. Mr. Shapiro received his Bachelor of Arts degree from the

University of Colorado in 1972, and his Juris Doctorate degree from the University of Colorado School of Law in 1975.

Employees; Benefits and Pension Matters

Employees. The Town currently employs approximately 119 full-time, 11 full-time seasonal and 175 part-time personnel. No employees of the Town are members of any labor union or association. In the opinion of the Director of Finance, the state of employee relations is good.

Benefits. The Town's full-time employees working 30 hours or more per week are eligible for benefits. Benefits include health, dental and vision insurance for which the Town pays a part of the premiums for the employee, life insurance, accidental death and dismemberment insurance, short-term and long-term disability insurance, paid time off and other fringe benefits.

Pension Matters. The Town sponsors a 457/401(a) defined contribution plan for its employees. The Town matches contributions to the 457 plan up to 5% into the 401(a) plan for benefited employees (excluding sworn police officers). Employee and Town contributed funds are 100% vested upon deposit into the plan. The Town contributed $200,510 to this plan in 2012, $220,149 in 2013 and $248,939 in 2014. The Town has budgeted contributions of $300,700 for 2015.

In addition, all of the Town's sworn police officers are members of the State Fire and Police Pension Plan ("FPPA"). More information on the FPPA can be found in Note III(F) to the audited financial statements attached hereto as Appendix A. The Town contributed $113,156 to FFPA in 2012, $116,331 in 2013 and $128,017 for 2014. The Town has budgeted contributions of $148,600 for 2015.

The Town does not offer any post-retirement benefits ("OPEB") to its retirees other than access to insurance pursuant to COBRA. Accordingly, it does not have material unfunded actuarial liability for OPEB and does not expect to have any in the future.

Intergovernmental and Other Agreements

As discussed in this Official Statement, the Town has entered into various intergovernmental agreements providing for joint planning efforts with the communities and counties surrounding the Town, including the operation of a library in the Town, orderly development procedures and establishing mutually agreeable annexation boundaries. The Town also is a party to numerous agreements that impose obligations upon the Town. Except as discussed elsewhere in this Official Statement, none of those agreements have a material impact on the Net Revenues or the transactions contemplated by the Bond Ordinance.

Comprehensive Plan

The Town adopted a Comprehensive Plan for the Town's planning area in 1996 and updated it in 1999 and 2005. The Comprehensive Plan serves as a guide to the Town's land use decisions. The Comprehensive Plan's guiding principles include the following key principles: a coordinated and efficient pattern of growth; quality design and development; overall economic vitality; downtown vitality; a comprehensive, integrated transportation system;

stewardship of the natural environment; trails, parks and recreation opportunities; a protect lands program; balanced land use mix; stable cohesive neighborhoods offering a variety of housing types; and providing infrastructure and public services efficiently and equitably. According to the Town's Community Development department, the Town's planning boundaries encompass approximately 48 square miles extending from State Highway 7 on the south to north of Highway 52, and from U.S. Highway 287 on the west to I-25 on the east. Of those 48 square miles, approximately 20 square miles have been incorporated into the Town. According to the Comprehensive Plan, as of June 2004, over 60% of the Town's incorporated area has been committed for future residential development as part of previously approved development agreements. According to the Town planning division, an additional 2,000 dwelling units are expected to be completed within the next five years.

Capital Improvement Plan

Pursuant to its established financial policies, the Town has developed a five-year plan for capital improvements (the "CIP") and updates it annually in conjunction with adoption of the budget. The CIP is a planning document that identifies needed infrastructure projects, the expected timing of those projects and the sources of paying for them. Although the CIP is revised annually, as circumstances change and new needs arise, priorities may change. The CIP is organized by fund. These include street, airport, storm drainage, wastewater, water, park and recreation, public facilities, transportation and trails projects.

The Town continues to provide necessary services to its residents. In 2014, the Town purchased various open space parcels and completed repairs arising from the 2013 flood (funded primarily with federal and state grants). In 2015, the Town completed construction of a 4 million gallon water storage tank to meet future growth needs and a new police station and municipal court building.

See "THE SYSTEM--System Capital Improvements Program" for a description of the CIP attributable to the Water Fund.

Risk Management

The Town is exposed to various risk of loss related to: torts; theft of, damage to and destruction of assets; errors and omissions; injuries to employees; and natural disasters. In order to insure against these risks of loss, the Town purchases general liability (including automobile, health care and social services, errors and omissions, employment practices, employee benefits, law enforcement, employee dishonesty and other miscellaneous liability coverage), property (including earthquake and flood coverage) and workers' compensation insurance from private insurance carriers. The Town's current policies expire on January 1, 2016. See Note IV(A) in the audited financial statements attached hereto as Appendix A for a description of the Town's coverage and deductibles for fiscal year 2014. In the opinion of the Town Clerk/Risk Coordinator, the Town's insurance policies provide adequate insurance protection for the Town.

TOWN FINANCIAL OPERATIONS AND DEBT STRUCTURE

Prospective investors should be aware that the 2015 Bonds constitute special, limited obligations of the Town payable solely from the Net Revenues. The 2015 Bonds are not general obligations of the Town. See "SECURITY FOR THE BONDS" and "CERTAIN RISK FACTORS." The information in this section is provided for informational purposes only and does not indicate that any of the sources of revenue described herein are pledged to the payment of the 2015 Bonds.

Budget Process

The Town is required by law to adopt an annual budget setting forth all proposed expenditures for the administration, operation, and maintenance of all offices, departments, boards, commissions, and institutions of the Town. The budget must show the actual or estimated deficits from prior years, all debt redemptions and interest charges during the budget year, and all expenditures for capital projects to be undertaken or executed during the budget year. It must also set forth the anticipated income and other means of financing the proposed expenditures for the ensuing year, which coincides with the calendar year.

On or before the fifteenth day of October of each year, the Town Administrator must propose a budget for the ensuing budget year and cause to be published a notice that such proposed budget is open for inspection by the public. Prior to adoption, any elector of the Town may register his or her objections to the proposed budget. The Town must adopt its budget by December 15. After adoption of the budget, the Board must enact a corresponding appropriation resolution before the beginning of the fiscal year. If the Town fails to file a certified copy of its budget with the Colorado Division of Local Government in the Department of Local Affairs no later than 30 days after the start of the fiscal year, the division may authorize the county treasurer to prohibit release of the Town's tax revenues and other moneys held by the county treasurer until the Town files its budget.

In general, the Town cannot expend money for any of the purposes set out in the appropriation resolution in excess of the amount appropriated. However, in the case of an emergency or some contingency which was not reasonably foreseeable, the Board may authorize the expenditure of funds in excess of the budget by a resolution adopted by a two-thirds vote. If the Town receives revenues which were unanticipated at the time of adoption of the budget, the Board may authorize the expenditure of such revenues by adopting a supplemental budget after notice and hearing.

Financial Statements

General. Under Colorado law, the Town is required to have an annual audit of its financial statements for each fiscal year. The audit must be completed and the audit report submitted by the independent auditor to the Town within six months after the close of the Town's fiscal year. A copy of the audit report must be filed with the State Auditor no later than thirty days after the report is received by the Town. If the Town fails to file its audit report with the State Auditor, the State Auditor may, after notice to the Town, authorize the County Treasurer to prohibit release of the Town's tax revenues and other moneys held by the County Treasurer until the Town files the audit report. The Town filed its 2014 audit on time.

The Town's financial statements for the year ended December 31, 2014, are attached to this Official Statement as Appendix A. Those financial statements represent the most recent audited financial statements of the Town.

Awards. The Town has received the Certificate of Achievement for Excellence in Financial Reporting from the GFOA for its Comprehensive Annual Financial Report for the fiscal year ended December 31, 2013. The certificate is the highest form of recognition in the area of governmental financial reporting and is awarded by the GFOA to local governments whose comprehensive annual financial reports are judged to conform substantially to program standards. This is the 10th year the Town has received the award. The Town has submitted its 2014 Comprehensive Annual Financial Report to the GFOA to determine its eligibility for another certificate.

Town Debt Structure - General

Required Elections. TABOR requires that, except for refinancings at a lower interest rate and obligations issued by "enterprises" as defined in TABOR, the Town must obtain voter approval in advance for the creation of any direct or indirect Town debt or multiple-fiscal year obligation. See "LEGAL MATTERS--Certain Constitutional Limitations" for a more detailed discussion of TABOR.

Authorization of Debt and Other Obligations. Subject to TABOR, indebtedness and other obligations of the Town may be incurred as provided in Title 31, C.R.S. (the "Act"). The Board has the power to contract indebtedness or other obligations on behalf of the Town for any municipal purpose and may issue the following securities to evidence such obligations: (i) short-term notes; (ii) general obligation bonds; (iii) revenue bonds; (iv) special or local improvement bonds; and (v) any other legally recognized form of security (including capital lease obligations). Pursuant to the Act, the Town may not create any general obligation debt unless such general obligation debt is approved by a majority of registered electors voting in an election on such bond question.

General Obligation Debt

General. "Debt" or "indebtedness" as used in this Official Statement means, generally, obligations backed by the full faith and credit of the Town and secured by the unlimited power of the Town to levy ad valorem property taxes for the payment of bonds and interest thereon. Debt refers only to principal amounts and not to the interest to become due thereon. Debt does not include revenue obligations; debt that has been refinanced; obligations arising upon a contingency; and obligations which do not extend beyond the fiscal year in which incurred.

Limitation on Indebtedness. Pursuant to the Act, the total outstanding indebtedness of the Town may not exceed 3% of the actual valuation of taxable property within the Town as determined by the county assessor. The Act specifically excludes from the limitation any indebtedness incurred for the purpose of supplying water. Based on the Town's preliminary certified 2015 actual value of $2,892,228,628 (which includes the value of certain tax-exempt property, and which is subject to change until mid-December 2015), the Town's debt limit is $86,766,859.

General Obligation Bonds Outstanding. The Town currently has outstanding $19,755,000 aggregate principal amount of bonds applicable against its debt limit, including its: (1) General Obligation Bonds, Series 2006A, currently outstanding in the aggregate principal amount of $3,845,000; (2) General Obligation Refunding Bonds, Series 2006B, currently outstanding in the aggregate principal amount of $1,345,000; (3) General Obligation Refunding Bonds, Series 2013, currently outstanding in the aggregate principal amount of $8,365,000; and (4) General Obligation Bonds, Series 2014, currently outstanding in the aggregate principal amount of $6,200,000.

Revenue Obligations

Pursuant to the Act, the Town also has the authority to issue revenue obligations payable from the net revenues of Town income-producing facilities or payable in whole or in part from available proceeds of sales and use taxes.

Existing Revenue Obligations. As of the date of issuance of the 2015 Bonds, the Town will have outstanding $29,205,000* of water revenue bonds secured by the Net Revenues (assuming issuance of the 2015 Bonds and completion of the Refunding Project), comprised of: (i) the 2015 Bonds; (ii) $3,760,000* of the 2007A Bonds remaining unrefunded; (iii) $1,610,000* of the 2007B Bonds remaining unrefunded; (iv) $4,370,000 of the 2009 Bonds; and (v) $7,775,000 of the 2011 Bonds.

The Town currently has other revenue bond issues outstanding which are secured by wastewater system revenues: (1) the Wastewater Enterprise Revenue Bonds, Series 2008A, currently outstanding in the aggregate principal amount of $7,900,000; (2) the Wastewater Enterprise Revenue Refunding Bonds, Series 2008B, currently outstanding in the aggregate principal amount of $365,000; and (3) the Wastewater Enterprise Revenue Bonds, Series 2009A, currently outstanding in the aggregate principal amount of $10,650,000.

Finally, the Town has outstanding several loans from the Colorado Water Resources and Power Development Authority ("CWRPDA"), including: (1) a May 1997 CWRPDA wastewater loan, currently outstanding in the aggregate principal amount of $251,083; (2) an October 1997 CWRPDA wastewater loan, currently outstanding in the aggregate principal amount of $73,801; (3) a 2009 CWRPDA base program wastewater loan, currently outstanding in the aggregate principal amount of $678,099; and (4) a 2009 CWRPDA ARRA wastewater loan, currently outstanding in the aggregate principal amount of $1,500,000

The Town also has an outstanding loan from the Colorado Water Conservation Board, currently outstanding in the aggregate principal amount of $297,980. The loan was made in connection with a flood plain project and is paid for through storm drainage fees.

Leases and Other Financial Obligations

General. The Board has the authority to enter into installment or lease option contracts subject to annual appropriation for the purchase of land, buildings, equipment and other property for governmental or proprietary purposes. The term of any such contract may not extend over a period greater than the estimated useful life of the property or equipment.

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* Subject to change.

Capital Lease Purchase Agreement. The Town currently has obligations pursuant to an annually renewable Lease Purchase Agreement dated as of October 1, 2010, as amended on December 1, 2014, between the Town and the Town of Erie Finance Corporation, (the "2010 Lease"). Pursuant to the 2010 Lease, the Town owes base rentals to the Finance Corporation (for the use of 1,312 CBT Units) in an aggregate principal amount of $25,105,000 (assuming the Town determines not to terminate the lease in any future fiscal year, which it may determine to do). Amounts due under the 2010 Lease are payable from any available revenues of the Town; the Town currently makes 2010 Lease payments from net revenues of the Town's Water System. Payments made by the Town pursuant to the 2010 Lease are used by the Finance Corporation to pay debt service on the related 2010 COPS.

Operating Leases. The Town also has entered into several year operating leases for a grader and police car radios. See Note III(5) in the audited financial statements attached hereto as Appendix A for a description of those leases as of December 31, 2014.

The Town is expected to entering into a lease of CBT water from Bijou; the terms of that lease are described in "THE SYSTEM-- The Water System - Raw Water Supply."

Short Term Borrowing

The Town may borrow funds which must mature before the close of the fiscal year in which the money is borrowed, in anticipation of the collection of taxes or other revenues. No short term borrowing has been requested or authorized in the last five years, nor does the Town anticipate any short-term borrowing in the next several years.

ECONOMIC AND DEMOGRAPHIC INFORMATION

The following information is intended only to provide prospective investors with general information regarding the Town's community. The information was obtained from the sources indicated and is limited to the time periods indicated. The information is historic in nature; it is not possible to predict whether the trends shown will continue in the future. The Town makes no representation as to the accuracy or completeness of data obtained from parties other than the Town.

Population

The following table sets forth a history of the population of the Town, the Counties of Boulder and Weld, and the State. Between 2000 and 2010, the Town's population increased approximately 188.3%, and the populations of Boulder County and Weld County increased 9.2% and 39.7%, respectively. The State's population increased 16.9% during the same period.

Population

	Town of Erie		Boulder County		Weld County		Colorado	
Year	Population	Percent Change	Population	Percent Change	Population	Percent Change	Population	Percent Change
1970	1,090	--	131,889	--	89,297	--	2,207,259	--
1980	1,254	15.0%	189,625	43.8%	123,438	38.2%	2,889,735	30.9%
1990	1,258	0.3	225,339	18.8	131,821	6.8	3,294,394	14.0
2000	6,291	400.1	269,814[1]	19.7	180,936	37.3	4,301,261	30.6
2010	18,135	188.3	294,567	9.2	252,825	39.7	5,029,196	16.9
2011	18,917	--	300,210	--	258,368	--	5,117,368	--
2012	19,567	3.4%	305,068	1.6%	263,687	2.1%	5,188,504	1.4%
2013	20,109	2.8	309,874	1.6	269,643	2.3	5,264,890	1.5

(1) Adjusted by the Colorado State Demography Office to reflect the 2001 creation of the City and County of Broomfield.

Sources: United States Department of Commerce, Bureau of the Census (1970-2010) and Colorado State Demography Office (2000 Boulder County estimate and 2011 to 2013 estimates).

Income

The following table sets forth a five year history of the annual per capita personal income levels for the residents of the Counties, the State and the United States.

Annual Per Capita Personal Income

Year[1]	Boulder County	Weld County	Colorado	United States
2009	$48,159	$28,470	$41,518	$39,379
2010	48,983	28,716	41,689	40,144
2011	51,668	30,654	44,183	42,332
2012	54,502	32,549	46,315	44,200
2013	54,968	33,393	46,897	44,765
2014	n/a	n/a	48,730	46,129

(1) Figures for Boulder County and Weld County posted November 20, 2014. State and national figures posted March 25, 2015. All figures are subject to periodic revisions.

Source: United States Department of Commerce, Bureau of Economic Analysis.

Employment

The following table presents information on employment within the Counties, the State and the nation for the time period indicated.

Labor Force and Employment

	Boulder County[1]		Weld County[1]		Colorado[1]		United States
Year	Labor Force	Percent Unemployed	Labor Force	Percent Unemployed	Labor Force	Percent Unemployed	Percent Unemployed
2010	170,293	7.0%	131,910	9.2%	2,724,417	8.7%	9.6%
2011	171,906	6.4	134,255	8.6	2,734,416	8.3	8.9
2012	174,308	6.1	137,013	7.8	2,757,126	7.8	8.1
2013	175,582	5.4	139,813	6.6	2,779,631	6.8	7.4
2014	177,744	4.1	146,103	4.5	2,817,334	5.0	6.2
Month of July							
2014	177,676	4.2%	146,560	4.5%	2,846,410	4.9%	6.2%
2015	174,681	3.3	149,917	4.1	2,830,747	4.0	5.3

(1) Figures for the Counties and the State are not seasonally adjusted and are subject to periodic revisions.

Sources: State of Colorado, Department of Labor and Employment, Labor Market Information, Colorado Areas Labor Force Data and United States Department of Labor, Bureau of Labor Statistics.

The following table shows the number of individuals employed within selected Boulder County industries which are covered by unemployment insurance. In 2014, the largest employment sector in Boulder County was professional and technical services (comprising approximately 15.1% of the county's work force), followed, in order, by educational services; health care and social assistance; manufacturing; and retail trade. For the twelve-month period ended December 31, 2014, total average employment in the County increased 2.7% as compared to the same period ending December 31, 2013, and the weekly average wage increased by 3.1% during the same time period.

Average Number of Employees Within Selected Industries - Boulder County

Industry	2010	2011	2012	2013	2014	2015[1]
Accommodation and Food Services	14,259	14,977	15,525	15,856	16,333	15,930
Administrative and Waste Services	5,832	6,492	6,617	6,832	7,038	6,792
Agriculture, Forestry, Fishing, Hunting	382	389	385	394	405	322
Arts, Entertainment and Recreation	2,749	2,788	2,813	2,861	2,978	3,074
Construction	4,086	3,831	3,993	4,259	4,709	4,806
Educational Services	18,986	19,150	19,537	19,955	20,562	21,385
Finance and Insurance	4,869	4,756	4,742	4,906	4,871	4,898
Government	7,590	7,565	7,609	7,667	7,836	7,546
Health Care and Social Assistance	17,605	18,314	18,853	19,558	19,960	20,418
Information	8,696	8,662	8,733	8,348	8,288	8,259
Management of Companies/Enterprises	923	939	1,029	1,068	1,078	1,082
Manufacturing	15,202	15,920	16,543	17,148	17,437	17,270
Mining	545	251	251	212	276	264
Non-classifiable	9	8	20	23	34	29
Other Services	4,429	4,430	4,566	4,773	4,865	4,951
Professional and Technical Services	21,504	22,628	23,721	24,422	25,603	26,129
Real Estate, Rental and Leasing	2,114	2,141	2,226	2,284	2,379	2,423
Retail Trade	15,181	15,582	16,009	16,177	16,500	16,550
Transportation and Warehousing	1,940	1,918	1,967	2,037	2,048	2,151
Utilities	332	306	292	284	292	302
Wholesale Trade	4,884	5,088	5,266	5,522	5,559	5,598
Total[2]	152,116	156,134	160,697	164,583	169,053	170,179

(1) Figures are averaged through the first quarter of 2015.
(2) Figures may not equal totals when added due to the rounding of averages or the inclusion in the total figure of employees that were not disclosed in individual classifications.

Source: State of Colorado, Department of Labor and Employment, Labor Market Information, Quarterly Census of Employment and Wages (QCEW).

The following table sets forth the number of individuals employed within selected Weld County industries which are covered by unemployment insurance. In 2014, the largest employment sector in Weld County was manufacturing (comprising approximately 11.9% of the county's work force), followed, in order, by construction; retail trade; educational services; and health care and social assistance. For the twelve-month period ended December 31, 2014, total average employment in the County increased 9.0% as compared to the same period ending December 31, 2013, and the average weekly wage increased 5.7% during the same time period.

Average Number of Employees Within Selected Industries - Weld County

Industry	2010	2011	2012	2013	2014	2015[1]
Accommodation and Food Services	5,829	5,995	6,223	6,510	7,001	7,276
Administrative and Waste Services	3,795	4,177	4,586	5,549	6,086	5,875
Agriculture, Forestry, Fishing, Hunting	3,314	3,448	3,422	3,524	3,681	3,563
Arts, Entertainment and Recreation	871	901	935	922	1,038	910
Construction	6,537	6,561	7,087	8,412	10,043	10,216
Educational Services	8,602	8,497	8,533	8,639	8,875	9,269
Finance and Insurance	3,141	2,902	2,996	3,001	3,045	3,029
Government	4,848	4,558	4,573	4,651	4,830	4,751
Health Care and Social Assistance	7,819	8,072	8,230	8,148	8,446	8,818
Information	1,112	978	926	897	889	884
Management of Companies/Enterprises	1,085	1,340	1,305	1,294	1,345	1,451
Manufacturing	10,240	11,201	11,378	11,471	11,768	12,463
Mining	3,133	4,116	5,101	6,052	8,420	8,898
Non-classifiable	n/a[2]	6	17	16	24	7
Other Services	1,817	1,764	1,832	1,923	2,089	2,253
Professional and Technical Services	1,927	2,039	2,138	2,270	2,366	2,603
Real Estate, Rental and Leasing	957	964	987	1,106	1,245	1,260
Retail Trade	7,531	7,849	8,151	8,722	9,137	9,413
Transportation and Warehousing	2,364	2,819	3,124	3,247	3,862	4,290
Utilities	297	325	341	348	373	369
Wholesale Trade	3,435	3,605	3,510	3,702	3,967	4,085
Total[3]	78,655	82,114	85,394	90,403	98,530	101,684

(1) Figures are averaged through the first quarter of 2015.
(2) Figures were not released due to confidentiality.
(3) Figures may not equal totals when added due to the rounding of averages or the inclusion in the total figure of employees that were not disclosed in individual classifications.

Source: State of Colorado, Department of Labor and Employment, Labor Market Information, Quarterly Census of Employment and Wages (QCEW).

The following table sets forth the major employers located in the area surrounding the Town and in the Town. No independent investigation of the stability or financial condition of the employers listed hereafter has been conducted; therefore, no representation can be made that these employers will continue to maintain their status as major employers.

2015 Major Area Employers and Erie Employers

Employer	Product or Service	Estimated Numbers of Employees
Area Employers		
University of Colorado at Boulder	Higher education	9,000
Boulder Valley School District	K-12 education	4,650
St. Vrain Valley School District	K-12 education	3,900
Level 3 Communications	Telecommunication services	2,500
IBM	Computer software, hardware and services	2,000
Ball Aerospace	Aerospace systems/components	1,600
Exempla Good Samaritan	Hospital	1,450
University Corporation for Atmospheric Research (UCAR)	Nonprofit geoscience research consortium	1,400
Seagate Technology	Data storage	1,380
Tyco Healthcare Group/Covidien	Healthcare products	1,350
Longmont United Hospital	Hospital	1,280
Boulder Community Hospital	Hospital	1,240
Urban Settlement Services	Mortgage services	1,100
Oracle Corp.	Computer hardware and software	830
Intrado	911 support services	770
Employers in the Town		
Town of Erie	Local government	278[(1)]
Magnum Plastics	Medical components	90[(2)]
Safeway – Arapahoe Ridge	Retail - grocery	73
Colorado National Golf Club	Golf course	50
The Lazy Dog Sports Bar & Grill	Restaurant	43

(1) The Town of Erie figure includes 122 full time employees.
(2) Figure includes temporary employees.

Source: Town of Erie, *2015 Community Profile.*

Retail Sales

The following table sets forth annual retail sales figures for the Town, the Counties and the State as compiled by the State Department of Revenue. Despite the retail sales numbers reported by the State for 2012 and 2013, the Town's sales revenues (as remitted to the Town by the State) increased by approximately 5.6% and 5.2%, respectively.

Retail Sales
(in thousands)

Year	Town of Erie	Percent Change	Boulder County	Percent Change	Weld County	Percent Change	Colorado	Percent Change
2009	$90,846	--	$7,975,222	--	$5,291,585	--	$134,058,593	--
2010	158,790	74.8%	8,474,164	6.3%	6,024,014	13.8%	143,670,319	7.2%
2011	202,606	27.6	9,139,050	7.8	7,454,858	23.8	154,697,943	7.7
2012	166,118	(18.0)	9,632,691	5.4	8,372,182	12.3	164,387,648	6.3
2013	160,157	(3.6)	9,991,822	3.7	9,703,732	15.9	172,784,033	5.1
2014[1]	180,920	--	10,369,463	--	11,663,179	--	182,374,957	--

(1) Figures are through the fourth quarter of 2014, but do not represent final figures for the year.

Source: State of Colorado, Department of Revenue, "Sales Tax Statistics," 2009-2014.

Building Permits

The following tables set forth histories of building permits issued in the Town and in the unincorporated portions of the Counties.

Building Permit Issuances in the Town of Erie

	Residential		Commercial/Industrial	
Year	Units	Valuation	Permits	Valuation
2010	119	$25,714,523	3	$14,093,550
2011	108	27,681,427	2	1,988,216
2012	150	36,498,702	5	3,860,578
2013	249	63,529,916	2	8,414,892
2014	291	81,564,843	7	14,437,901
2015[1]	313	85,169,028	2	1,155,445

(1) Figures are for permits issued from January 1 through August 31, 2015.

Source: Town of Erie Building Department.

Building Permit Issuances in Unincorporated Boulder County

Year	New Residential		New Commercial/Industrial[1]	
	Permits	Valuation	Permits	Valuation
2010	44	$24,294,536	-0-	-0-
2011[2]	101	38,742,276	1	$49,000
2012	58	22,664,299	1	692,000
2013	59	26,599,986	2	681,500
2014	43	27,150,645	4	2,829,000
2015[3]	27	14,572,368	1	470,000

(1) Includes new industrial; manufacturing; office, bank, and professional buildings; stores; and service and restaurant structures.
(2) The unusually high number of new residential permits is partially due to permits issued to replace residences destroyed by wildfire.
(3) Figures are for permits issued from January 1 through July 31, 2015.

Source: Boulder County Land Use Department, Building Division.

Building Permit Issuances for New Structures in Unincorporated Weld County

Year	New Residential		New Commercial[1]		Oil and Gas[2]	
	Permits	Valuation	Permits	Valuation	Permits	Valuation
2010	50	$9,393,589	26	$8,320,122	841	$61,962,892
2011	50	9,860,555	20	5,859,497	990	59,192,648
2012	85	18,881,708	27	19,889,888	866	185,871,088
2013	98	20,259,358	39	16,066,989	829	267,634,651
2014	155	29,266,494	23	2,456,018	856	623,412,423
2015[3]	83	13,321,773	2	1,685,000	315	233,364,631

(1) Includes hotels and motels; amusement and recreational buildings; industrial buildings; public parking garages; service stations and repair garages; office, bank, and professional buildings; public works and utilities buildings; and stores and other mercantile buildings.
(2) Includes tank battery, meter house, etc.
(3) Figures are for permits issued from January 1 through June 30, 2015.

Source: Weld County Building Division.

Foreclosure Activity

The following table sets forth data on the number of foreclosures filed for the time period indicated. Such information does not take into account the number of foreclosures which were filed and subsequently redeemed or withdrawn.

History of Foreclosures - Boulder and Weld Counties

Year	Boulder County Number of Foreclosures Filed	Percent Change	Weld County Number of Foreclosures Filed	Percent Change
2010	1,352	--	2,758	--
2011	965	(28.6)%	1,919	(30.4)%
2012	789	(18.2)	1,576	(17.9)
2013	389	(50.7)	820	(48.0)
2014	249	(36.0)	598	(27.1)
2015[1]	147	--	245	--

(1) Number of foreclosures filed from January 1 through August 4, 2015 (Boulder County) and through July 31, 2015 (Weld County).

Sources: Colorado Division of Housing (2010-2014 figures) and Public Trustee Offices of Boulder and Weld Counties (2015 figures).

TAX MATTERS

In the opinion of Bond Counsel, assuming continuous compliance with certain covenants described below, interest on the 2015 Bonds is excludable from gross income under federal income tax laws pursuant to the Tax Code and interest on the 2015 Bonds is excludable from alternative minimum taxable income as defined in Section 55(b)(2) of the Tax Code except that such interest is required to be included in calculating the "adjusted current earnings" adjustment applicable to corporations for purposes of computing the alternative minimum taxable income of corporations as described below. Under the laws of the State in effect as of the date of delivery of the 2015 Bonds, interest on the Bonds is exempt from taxation by the State, except inheritance, estate and transfer taxes. For purposes of this paragraph and the succeeding discussion, "interest" includes the original issue discount on the 2015 Bonds only to the extent such original issue discount is accrued as described herein.

The Tax Code imposes several requirements which must be met with respect to the 2015 Bonds in order for the interest thereon to be excludable from gross income, alternative minimum taxable income (except to the extent of the aforementioned adjustment applicable to corporations), Colorado taxable income and Colorado alternative minimum taxable income. Certain of these requirements must be met on a continuous basis throughout the term of the 2015 Bonds. These requirements include: (a) limitations as to the use of proceeds of the 2015 Bonds; (b) limitations on the extent to which proceeds of the 2015 Bonds may be invested in higher yielding investments; and (c) a provision, subject to certain limited exceptions, that requires all investment earnings on the proceeds of the 2015 Bonds above the yield on the 2015 Bonds to be paid to the United States Treasury. The Town will covenant and represent in the Bond Ordinance that it will take all steps to comply with the requirements of the Tax Code and Colorado law (in effect on the date of delivery of the 2015 Bonds) to the extent necessary to maintain the exclusion of interest on the applicable series of 2015 Bonds from gross income and alternative minimum taxable income (except to the extent of the aforementioned adjustment applicable to corporations) under such federal income tax laws and Colorado laws. Bond Counsel's opinion as to the exclusion of interest on the 2015 Bonds from gross income and alternative minimum taxable income (to the extent described above) is rendered in reliance on these covenants, and assumes continuous compliance therewith. The failure or inability of the Town to comply with these requirements could cause the interest on the 2015 Bonds to be included in gross income, alternative minimum taxable income, or both, from the date of issuance. Bond Counsel's opinion also is rendered in reliance upon certifications of the Town and other certifications furnished to Bond Counsel. Bond Counsel has not undertaken to verify such certifications by independent investigation.

Section 55 of the Tax Code contains a 20% alternative minimum tax on the alternative minimum taxable income of corporations. Under the Tax Code, 75% of the excess of a corporation's "adjusted current earnings" over the corporation's alternative minimum taxable income (determined without regard to this adjustment and the alternative minimum tax net operating loss deduction) is included in the corporation's alternative minimum taxable income for purposes of the alternative minimum tax applicable to the corporation. "Adjusted current earnings" includes interest on the 2015 Bonds.

With respect to 2015 Bonds that were sold in the initial offering at a discount (the "Discount Bonds"), the difference between the stated redemption price of the Discount Bonds at maturity and the initial offering price of those bonds to the public (as defined in Section 1273 of

the Tax Code) will be treated as "original issue discount" for federal income tax purposes and will, to the extent accrued as described below, constitute interest which is excludable from gross income, alternative minimum taxable income and Colorado taxation (as described above) under the conditions and subject to the exceptions described in the preceding paragraphs. The original issue discount on the Discount Bonds is treated as accruing over the term of such Discount Bonds on the basis of a constant interest rate compounded at the end of each six-month period (or shorter period from the date of original issue) ending on June 1 and December 1 with straight line interpolation between compounding dates. The amount of original issue discount accruing each period (calculated as described in the preceding sentence) constitutes interest which is excludable from gross income, alternative minimum taxable income and Colorado taxation (as described above) under the conditions and subject to the exceptions described in the preceding paragraphs and will be added to the owner's basis in the Discount Bonds. Such adjusted basis will be used to determine taxable gain or loss upon disposition of the Discount Bonds (including sale or payment at maturity). Owners should consult their own tax advisors with respect to the tax consequences of the ownership of the Discount Bonds.

Owners who purchase Discount Bonds after the initial offering or who purchase Discount Bonds in the initial offering at a price other than the initial offering price (as defined in Section 1273 of the Tax Code) should consult their own tax advisors with respect to the federal tax consequences of the ownership of the Discount Bonds. Owners who are subject to state or local income taxation (other than Colorado state income taxation) should consult their tax advisor with respect to the state and local income tax consequences of ownership of the Discount Bonds. It is possible that, under the applicable provisions governing determination of state and local taxes, accrued original issue discount on the Discount Bonds may be deemed to be received in the year of accrual even though there will not be a corresponding cash payment.

The Tax Code contains numerous provisions which may affect an investor's decision to purchase the 2015 Bonds. Owners of the 2015 Bonds should be aware that the ownership of tax-exempt obligations by particular persons and entities, including, without limitation, financial institutions, insurance companies, recipients of Social Security or Railroad Retirement benefits, taxpayers who may be deemed to have incurred or continued indebtedness to purchase or carry tax-exempt obligations, foreign corporations doing business in the United States and certain "subchapter S" corporations may result in adverse federal and Colorado tax consequences. Under section 3406 of the Tax Code, backup withholding may be imposed on payments on the 2015 Bonds made to any owner who fails to provide certain required information, including an accurate taxpayer identification number, to certain persons required to collect such information pursuant to the Tax Code. Backup withholding may also be applied if the owner underreports "reportable payments" (including interest and dividends) as defined in Section 3406, or fails to provide a certificate that the owner is not subject to backup withholding in circumstances where such a certificate is required by the Tax Code. Certain of the 2015 Bonds may be sold at a premium, representing a difference between the original offering price of those 2015 Bonds and the principal amount thereof payable at maturity. Under certain circumstances, an initial owner of such 2015 Bonds (if any) may realize a taxable gain upon their disposition, even though such bonds are sold or redeemed for an amount equal to the owner's acquisition cost. Bond Counsel's opinion relates only to the exclusion of interest (and, to the extent described above for the Discount Bonds, original issue discount) on the 2015 Bonds from gross income, alternative minimum taxable income and taxation by the State of Colorado as described above and will state that no opinion is expressed regarding other federal or Colorado tax consequences arising from the receipt or accrual of interest on or ownership of the 2015

Bonds. Owners of the 2015 Bonds should consult their own tax advisors as to the applicability of these consequences.

The opinions expressed by Bond Counsel are based on existing law as of the delivery date of the 2015 Bonds. No opinion is expressed as of any subsequent date nor is any opinion expressed with respect to pending or proposed legislation. Amendments to the federal or state tax laws may be pending now or could be proposed in the future that, if enacted into law, could adversely affect the value of the 2015 Bonds, the exclusion of interest (and, to the extent described above for the Discount Bonds, original issue discount) on the 2015 Bonds from gross income or alternative minimum taxable income or both from the date of issuance of the 2015 Bonds or any other date, the tax value of that exclusion for different classes of taxpayers from time to time, or that could result in other adverse tax consequences. In addition, future court actions or regulatory decisions could affect the tax treatment or market value of the 2015 Bonds. Owners of the 2015 Bonds are advised to consult with their own tax advisors with respect to such matters.

The Internal Revenue Service (the "Service") has an ongoing program of auditing tax-exempt obligations to determine whether, in the view of the Service, interest on such tax-exempt obligations is includable in the gross income of the owners thereof for federal income tax purposes. No assurances can be given as to whether or not the Service will commence an audit of the 2015 Bonds. If an audit is commenced, the market value of the 2015 Bonds may be adversely affected. Under current audit procedures, the Service will treat the Town as the taxpayer and the Owners may have no right to participate in such procedures. The Town has covenanted in each Bond Ordinance not to take any action that would cause the interest on the applicable series of 2015 Bonds to lose its exclusion from gross income for federal income tax purposes or lose its exclusion from alternative minimum taxable income except to the extent described above for the owners thereof for federal income tax purposes. None of the Town, the Underwriter, or Bond or Special Counsel is responsible for paying or reimbursing any Registered Owner or Beneficial Owner for any audit or litigation costs relating to the 2015 Bonds.

LEGAL MATTERS

Litigation

The Town Attorney states that, as of the date hereof, to the best of his knowledge, there is no pending or threatened litigation which would restrain or enjoin the issuance of the 2015 Bonds or the collection of Net Revenues from the System to pay debt service on the 2015 Bonds. From time to time, the Town is subject to certain pending and threatened litigation regarding various other matters arising in the ordinary course of the Town's business. It is the opinion of the Town Attorney that the Town's level of insurance coverage is adequate and that the pending litigation will not result in final judgments against the Town which would, individually or in the aggregate, materially adversely affect the Town's financial position or its ability to perform its obligations to the owners of the 2015 Bonds.

Governmental Immunity

The Colorado Governmental Immunity Act, Title 24, Article 10, Part 1, C.R.S. (the "Immunity Act"), provides that, with certain specified exceptions, sovereign immunity acts as a bar to any action against a public entity, such as the Town, for injuries which lie in tort or could lie in tort.

The Immunity Act provides that sovereign immunity is waived by a public entity for injuries occurring as a result of certain specified actions or conditions, including: the operation of a non-emergency motor vehicle (including a light rail car), owned or leased by the public entity; the operation of any public hospital, correctional facility or jail; a dangerous condition of any public building; certain dangerous conditions of a public highway, road or street; failure to perform an education employment required background check; and the operation and maintenance of any public water facility, gas facility, sanitation facility, electrical facility, power facility or swimming facility by such public entity. In such instances, the public entity may be liable for injuries arising from an act or omission of the public entity, or an act or omission of its public employees, which are not willful and wanton, and which occur during the performance of their duties and within the scope of their employment. The maximum amounts that may be recovered under the Immunity Act for injuries occurring on or after July 1, 2013, whether from one or more public entities and public employees, are as follows: (a) for any injury to one person in any single occurrence, the sum of $350,000; and (b) for an injury to two or more persons in any single occurrence, the sum of $990,000; except in such instance, no person may recover in excess of $350,000. Those amounts will increase four years pursuant to a formula based on the Denver-Boulder-Greeley Consumer Price Index. The Town may increase any maximum amount that may be recovered from the Town for certain types of injuries. However, the Town may not be held liable either directly or by indemnification for punitive or exemplary damages unless the Town voluntarily pays such damages in accordance with State law. The Town has not acted to increase the damage limitations in the Immunity Act.

The Town may be subject to civil liability and damages including punitive or exemplary damages under federal laws, and it may not be able to claim sovereign immunity for actions founded upon various federal laws. Examples of such civil liability include suits filed pursuant to Section 1983 of Title 42 of the United States Code, alleging the deprivation of federal constitutional or statutory rights of an individual. In addition, the Town may be enjoined from engaging in anti-competitive practices which violate federal and State antitrust laws. However, the Immunity Act provides that it applies to any State court having jurisdiction over any claim brought pursuant to any federal law, if such action lies in tort or could lie in tort.

Approval of Certain Legal Proceedings

The approving opinion of Butler Snow LLP, as Bond Counsel, will be delivered with the 2015 Bonds. A form of the Bond Counsel opinion is attached to this Official Statement as Appendix D. The opinion will include a statement that the obligations of the Town are subject to the reasonable exercise in the future by the State and its governmental bodies of the police power inherent in the sovereignty of the State and to the exercise by the United States of the powers delegated to it by the federal constitution, including bankruptcy. Butler Snow LLP, Denver, Colorado, has also acted as Special Counsel to the Town in connection with this Official Statement. Certain matters will be passed upon for the Town by the Town Attorney. Certain matters will be passed upon for the Underwriter by its counsel, Bookhardt & O'Toole, Denver, Colorado.

Certain Constitutional Limitations

General. In 1992, the voters of Colorado approved TABOR, a constitutional amendment which is codified as Article X, Section 20, of the Colorado Constitution. In general, TABOR restricts the ability of the State and local governments to increase revenues and

spending, to impose taxes, and to issue debt and certain other types of obligations without voter approval. TABOR generally applies to the State and all local governments, including the Town ("local governments"), but does not apply to "enterprises," defined as government-owned businesses authorized to issue revenue bonds and receiving under 10% of annual revenue in grants from all state and local governments combined.

Because some provisions of TABOR are unclear, litigation seeking judicial interpretation of its provisions has been commenced on numerous occasions since its adoption. Additional litigation may be commenced in the future seeking further interpretation of TABOR. No representation can be made as to the overall impact of TABOR on the future activities of the Town, including its ability to generate sufficient revenues for its general operations, to undertake additional programs or to engage in any subsequent financing activities.

Voter Approval Requirements and Limitations on Taxes, Spending, Revenues, and Borrowing. TABOR requires voter approval in advance for: (a) any new tax, tax rate increase, mill levy above that for the prior year, valuation for assessment ratio increase, extension of an expiring tax, or a tax policy change causing a net tax revenue gain; (b) any increase in a local government's spending from one year to the next in excess of the limitations described below; (c) any increase in the real property tax revenues of a local government from one year to the next in excess of the limitations described below; or (d) creation of any multiple-fiscal year direct or indirect debt or other financial obligation whatsoever, subject to certain exceptions such as the refinancing of obligations at a lower interest rate.

TABOR limits increases in government spending and property tax revenues to, generally, the rate of inflation and a local growth factor which is based upon, for school districts, the percentage change in enrollment from year to year, and for non-school districts, the actual value of new construction in the local government. Unless voter approval is received as described above, revenues collected in excess of these permitted spending limitations must be rebated. Debt service on bonds can be paid without regard to any spending limits, assuming revenues are available to do so.

In 1994, the Town received approval from its voters to collect and spend, during 1994 and each subsequent year, the full revenues received pursuant to its existing sales and use tax code and general taxes on all taxable property.

Emergency Reserve Funds. TABOR also requires local governments to establish emergency reserve funds. The reserve fund must consist of at least 3% of fiscal year spending. TABOR allows local governments to impose emergency taxes (other than property taxes) if certain conditions are met. Local governments are not allowed to use emergency reserves or taxes to compensate for economic conditions, revenue shortfalls, or local government salary or benefit increases. The Town has budgeted emergency reserves as required by TABOR.

Other Limitations. TABOR also prohibits new or increased real property transfer tax rates and local government income taxes. TABOR allows local governments to enact exemptions and credits to reduce or end business personal property taxes; provided, however, the local government's spending is reduced by the amount saved by such action. With the exception of K-12 public education and federal programs, TABOR also allows local governments (subject to certain notice and phase-out requirements) to reduce or end subsidies to any program

delegated for administration by the general assembly; provided, however, the local government's spending is reduced by the amount saved by such action.

Enterprise Status. The Town has determined that the System is currently an enterprise; however, TABOR contemplates that enterprise status can change over time. Because the 2015 Bonds are issued by the Town as an enterprise, voter approval for the issuance of the 2015 Bonds is not required under TABOR, and the remaining terms of TABOR do not apply to the operation of the System.

If the System ever ceases to be an enterprise, the System's spending and revenues would become subject to the limitations of TABOR, unless the Town obtains voter approval to be exempted from such limitations. Assuming such voter approval is not obtained, the applicability of the spending and revenue limitations upon the System could restrict the Town's ability to spend its revenues in excess of such limitations absent voter approval. The effect of any future application of the limitations of TABOR would depend on the Town's overall spending and revenues at that time. Even if the System ceases to have enterprise status, the rate covenant and the lien on Net Revenues provided for in the Bond Ordinance will continue to secure the payment of debt service on the 2015 Bonds.

Police Power

The obligations of the Town are subject to the reasonable exercise in the future by the State and its governmental bodies of the police power inherent in the sovereignty of the State and to the exercise by the United States of America of the powers delegated to it by the Federal Constitution, including bankruptcy.

RATING

Moody's Investors Service ("Moody's") has assigned the 2015 Bonds the rating shown on the cover page of this Official Statement. An explanation of the significance of any rating given by Moody's may be obtained from Moody's at 7 World Trade Center at 250 Greenwich Street, New York, NY 10007.

Such rating reflects only the views of such rating agency, and there is no assurance that the rating will continue for any given period of time or that it will not be revised downward or withdrawn entirely by the rating agency if, in its judgment, circumstances so warrant. Any such downward revision or withdrawal of the rating may have an adverse effect on the market price of the 2015 Bonds. Other than its obligations under the Disclosure Certificate, the Town has not undertaken any responsibility to bring to the attention of the owners of the 2015 Bonds any proposed change in or withdrawal of such ratings once received or to oppose any such proposed revision.

FINANCIAL ADVISOR

First Southwest Company, LLC, Denver, Colorado (the "Financial Advisor") has served as financial advisor to the Town with respect to the 2015 Bonds. As the Town's financial advisor, the Financial Advisor has assisted in the preparation of this Official Statement and in other matters relating to the planning, structuring, rating and issuance of the 2015 Bonds. In its role of financial advisor to the Town, the Financial Advisor has not undertaken either to make an

independent verification of or to assume responsibility for the accuracy or completeness of the information contained in the Official Statement and the appendices hereto.

INDEPENDENT AUDITORS

The basic financial statements of the Town for the fiscal year ended December 31, 2014, included in this Official Statement as Appendix A, have been audited by CliftonLarsonAllen LLP, independent certified public accountants, Greenwood Village, Colorado, to the extent and for the period indicated in their report thereon.

UNDERWRITING

Stifel, Nicolaus & Company, Incorporated, Denver, Colorado (the "Underwriter") has agreed to purchase the 2015 Bonds from the Town pursuant to a Bond Purchase Agreement at a purchase price equal to $_____ (which is equal to the par amount of the 2015 Bonds, less Underwriter's discount of $_____).

The Underwriter is committed to take and pay for all of the 2015 Bonds if any are taken. The Underwriter intends to offer the 2015 Bonds to the public at the offering prices or yields set forth on the inside cover page of this Official Statement. The Underwriter may allow concessions from the public offering price to certain dealers who may reallow concessions to other dealers. After the initial public offering price, prices may be varied from time to time by the Underwriter, and the 2015 Bonds may be offered and sold at prices other than the initial offering prices, including sales to dealers who may sell such 2015 Bonds into investment accounts.

OFFICIAL STATEMENT CERTIFICATION

The preparation of this Official Statement and its distribution has been authorized by the Board. This Official Statement is hereby duly approved by the Town as of the date on the cover page hereof.

TOWN OF ERIE, COLORADO

By: _____
Mayor

APPENDIX A

AUDITED BASIC FINANCIAL STATEMENTS OF THE TOWN FOR THE YEAR ENDED DECEMBER 31, 2014

NOTE: The audited basic financial statements of the Town for the year ended December 31, 2014, have been excerpted from the Town's Comprehensive Annual Financial Report for that year. Combining and individual fund financial statements, the introductory section and statistical tables for the year ended December 31, 2014, were purposely excluded from this Appendix A. Such statements provide supporting details and are not necessary for a fair presentation of the general purpose financial statement of the Town.

APPENDIX B

SUMMARY OF CERTAIN PROVISIONS OF THE BOND ORDINANCE

APPENDIX C

BOOK-ENTRY ONLY SYSTEM

DTC will act as securities depository for the 2015 Bonds. The 2015 Bonds will be issued as fully-registered securities registered in the name of Cede & Co. (DTC's partnership nominee) or such other name as may be requested by an authorized representative of DTC. One fully-registered certificate will be issued for each maturity of the 2015 Bonds, in the aggregate principal amount of such maturity, and will be deposited with DTC.

DTC, the world's largest securities depository, is a limited-purpose trust company organized under the New York Banking Law, a "banking organization" within the meaning of the New York Banking Law, a member of the Federal Reserve System, a "clearing corporation" within the meaning of the New York Uniform Commercial Code, and a "clearing agency" registered pursuant to the provisions of Section 17A of the Securities Exchange Act of 1934. DTC holds and provides asset servicing for over 3.5 million issues of U.S. and non-U.S. equity issues, corporate and municipal debt issues, and money market instruments (from over 100 countries) that DTC's participants ("Direct Participants") deposit with DTC. DTC also facilitates the post-trade settlement among Direct Participants of sales and other securities transactions in deposited securities through electronic computerized book-entry transfers and pledges between Direct Participants' accounts. This eliminates the need for physical movement of securities certificates. Direct Participants include both U.S. and non-U.S. securities brokers and dealers, banks, trust companies, clearing corporations, and certain other organizations. DTC is a wholly-owned subsidiary of The Depository Trust & Clearing Corporation ("DTCC"). DTCC is the holding company for DTC, National Securities Clearing Corporation and Fixed Income Clearing Corporation, all of which are registered clearing agencies. DTCC is owned by the users of its regulated subsidiaries. Access to the DTC system is also available to others such as both U.S. and non-U.S. securities brokers and dealers, banks, trust companies, and clearing corporations that clear through or maintain a custodial relationship with a Direct Participant, either directly or indirectly ("Indirect Participants"). DTC has a Standard & Poor's rating of AA+. The DTC Rules applicable to its Participants are on file with the Securities and Exchange Commission. More information about DTC can be found at www.dtcc.com.

Purchases of 2015 Bonds under the DTC system must be made by or through Direct Participants, which will receive a credit for the 2015 Bonds on DTC's records. The ownership interest of each actual purchaser of each 2015 Bond ("Beneficial Owner") is in turn to be recorded on the Direct and Indirect Participants' records. Beneficial Owners will not receive written confirmation from DTC of their purchase. Beneficial Owners are, however, expected to receive written confirmations providing details of the transaction, as well as periodic statements of their holdings, from the Direct or Indirect Participant through which the Beneficial Owner entered into the transaction. Transfers of ownership interests in the 2015 Bonds are to be accomplished by entries made on the books of Direct and Indirect Participants acting on behalf of Beneficial Owners. Beneficial Owners will not receive certificates representing their ownership interests in 2015 Bonds, except in the event that use of the book-entry system for the 2015 Bonds is discontinued.

To facilitate subsequent transfers, all 2015 Bonds deposited by Direct Participants with DTC are registered in the name of DTC's partnership nominee, Cede & Co., or such other name as may be requested by an authorized representative of DTC. The deposit of 2015 Bonds

with DTC and their registration in the name of Cede & Co. or such other DTC nominee do not effect any change in beneficial ownership. DTC has no knowledge of the actual Beneficial Owners of the 2015 Bonds; DTC's records reflect only the identity of the Direct Participants to whose accounts such 2015 Bonds are credited, which may or may not be the Beneficial Owners. The Direct and Indirect Participants will remain responsible for keeping account of their holdings on behalf of their customers.

Conveyance of notices and other communications by DTC to Direct Participants, by Direct Participants to Indirect Participants, and by Direct Participants and Indirect Participants to Beneficial Owners will be governed by arrangements among them, subject to any statutory or regulatory requirements as may be in effect from time to time. Beneficial Owners of 2015 Bonds may wish to take certain steps to augment the transmission to them of notices of significant events with respect to the 2015 Bonds, such as redemptions, tenders, defaults, and proposed amendments to the 2015 Bond documents. For example, Beneficial Owners of 2015 Bonds may wish to ascertain that the nominee holding the 2015 Bonds for their benefit has agreed to obtain and transmit notices to Beneficial Owners. In the alternative, Beneficial Owners may wish to provide their names and addresses to the Registrar and request that copies of notices be provided directly to them.

Redemption notices shall be sent to DTC. If less than all of the 2015 Bonds within an issue are being redeemed, DTC's practice is to determine by lot the amount of the interest of each Direct Participant in such issue to be redeemed.

Neither DTC nor Cede & Co. (nor any other DTC nominee) will consent or vote with respect to the 2015 Bonds unless authorized by a Direct Participant in accordance with DTC's MMI Procedures. Under its usual procedures, DTC mails an Omnibus Proxy to the Town as soon as possible after the record date. The Omnibus Proxy assigns Cede & Co.'s consenting or voting rights to those Direct Participants to whose accounts 2015 Bonds are credited on the record date (identified in a listing attached to the Omnibus Proxy).

Principal, interest and redemption proceeds on the 2015 Bonds will be made to Cede& Co., or such other nominee as may be requested by an authorized representative of DTC. DTC's practice is to credit Direct Participants' accounts upon DTC's receipt of funds and corresponding detail information from the Town or the Paying Agent on payable date in accordance with their respective holdings shown on DTC's records. Payments by Participants to Beneficial Owners will be governed by standing instructions and customary practices, as is the case with securities held for the accounts of customers in bearer form or registered in "street name," and will be the responsibility of such Participant and not of DTC, the Paying Agent or the Town, subject to any statutory or regulatory requirements as may be in effect from time to time. Payment of principal, interest or redemption proceeds to Cede & Co. (or such other nominee as may be requested by an authorized representative of DTC) is the responsibility of the Town or the Paying Agent, disbursement of such payments to Direct Participants will be the responsibility of DTC, and disbursement of such payments to the Beneficial Owners will be the responsibility of Direct and Indirect Participants.

DTC may discontinue providing its services as depository with respect to the 2015 Bonds at any time by giving reasonable notice to the Town or the Registrar and Paying Agent. Under such circumstances, in the event that a successor depository is not obtained, 2015 Bond certificates are required to be printed and delivered.

The Town may decide to discontinue use of the system of book-entry-only transfers through DTC (or a successor securities depository). In that event, 2015 Bond certificates will be printed and delivered to DTC.

The information in this section concerning DTC and DTC's book-entry system has been obtained from sources that the Town believes to be reliable, but the Town takes no responsibility for the accuracy thereof.

APPENDIX D

FORM OF BOND COUNSEL OPINION

APPENDIX E

FORM OF CONTINUING DISCLOSURE CERTIFICATE

27766010v2

$[_____]
TOWN OF ERIE, COLORADO
WATER ENTERPRISE REVENUE REFUNDING BONDS
SERIES 2015

CONTINUING DISCLOSURE CERTIFICATE

This Continuing Disclosure Certificate (the "Disclosure Certificate") is executed and delivered by the Town of Erie, Colorado (the "Town") in connection with the issuance of its Water Enterprise Revenue Refunding Bonds, Series 2015, in the aggregate principal amount of $[_____], dated as of [October 28], 2015 (the "Bonds"). The Bonds are being issued pursuant to Ordinance No. __-2015 finally adopted on October 13, 2015 (the "Ordinance"). The Town covenants and agrees as follows:

SECTION 1. Purpose of the Disclosure Certificate. This Disclosure Certificate is being executed and delivered by the Town for the benefit of the holders and beneficial owners of the Bonds and in order to assist the Participating Underwriter in complying with Rule 15c2-12(b)(5) of the Securities and Exchange Commission (the "SEC").

SECTION 2. Definitions. In addition to the definitions set forth in the Ordinance or parenthetically defined herein, which apply to any capitalized terms used in this Disclosure Certificate unless otherwise defined in this Section, the following capitalized terms shall have the following meanings:

"Annual Report" shall mean any Annual Report provided by the Town pursuant to, and as described in, Sections 3 and 4 of this Disclosure Certificate.

"Dissemination Agent" shall mean, initially, the Town, or any successor Dissemination Agent designated in writing by the Town and which has filed with the Town a written acceptance of such designation.

"Material Events" shall mean any of the events listed in Section 5 of this Disclosure Certificate.

"MSRB" shall mean the Municipal Securities Rulemaking Board. As of the date hereof, the MSRB's required method of filing is electronically via its Electronic Municipal Market Access (EMMA) system available on the Internet at http://emma.msrb.org.

"Participating Underwriter" shall mean the original underwriter of the Bonds required to comply with the Rule in connection with an offering of the Bonds.

"Rule" shall mean Rule 15c2-12(b)(5) adopted by the SEC under the Securities Exchange Act of 1934, as the same may be amended from time to time.

SECTION 3. Provision of Annual Reports.

a. The Town shall, or shall cause the Dissemination Agent to, not later than nine (9) months following the end of the Town's fiscal year of each year, commencing nine (9) months following the end of the Town's fiscal year ending December 31, 2015, provide to the MSRB (in an electronic format as prescribed by the MSRB), an Annual Report which is consistent with the requirements of Section 4 of this Disclosure Certificate. Not later than five (5) business days prior to said date, the Town shall provide the Annual Report to the Dissemination Agent (if other than the Town). The Annual Report may be submitted as a single document or as separate documents comprising a package, and may cross-reference other information as provided in Section 4 of this Disclosure Certificate; provided that the audited financial statements of the Town may be submitted separately from the balance of the Annual Report.

b. If the Town is unable to provide to the MSRB an Annual Report by the date required in subsection (a), the Town shall file or cause to be filed, in a timely manner, with the MSRB a notice in substantially the form attached as Exhibit "A."

c. The Dissemination Agent shall:

(1) determine each year prior to the date for providing the Annual Report the appropriate electronic format prescribed by the MSRB;

(2) if the Dissemination Agent is other than the Town, send written notice to the Town at least 45 days prior to the date the Annual Report is due stating that the Annual Report is due as provided in Section 3(a) hereof; and

(3) if the Dissemination Agent is other than the Town, file a report with the Town certifying that the Annual Report has been provided pursuant to this Disclosure Certificate, stating the date it was provided and listing all the entities to which it was provided.

SECTION 4. Content of Annual Reports. The Town's Annual Report shall contain or incorporate by reference the following:

a. A copy of its annual financial statements prepared in accordance with generally accepted accounting principles audited by a firm of certified public accountants. If audited annual financial statements are not available by the time specified in Section 3(a) above, audited financial statements will be provided when and if available.

b. An update of the type of information identified in Exhibit "B" hereto, which is contained in the tables in the Official Statement with respect to the Bonds.

Any or all of the items listed above may be incorporated by reference from other documents, including official statements of debt issues of the Town or related public entities, which are available to the public on the MSRB's Internet Web Site or filed with the SEC. The Town shall clearly identify each such document incorporated by reference.

SECTION 5. Reporting of Material Events. The Town shall file or cause to be filed with the MSRB, in a timely manner not in excess of ten business days after the occurrence of the event, notice of any of the events listed below with respect to the Bonds:

a. Principal and interest payment delinquencies;

b. Non-payment related defaults, if material;

c. Unscheduled draws on debt service reserves reflecting financial difficulties;

d. Unscheduled draws on credit enhancements reflecting financial difficulties;

e. Substitution of credit or liquidity providers or their failure to perform;

f. Adverse tax opinions, the issuance by the Internal Revenue Service of proposed or final determinations of taxability, Notices of Proposed Issue (IRS Form 5701-TEB) or other material notices or determinations with respect to the tax status of the Bonds, or other material events affecting the tax status of the Bonds;

g. Modifications to rights of bondholders, if material;

h. Bond calls, if material, and tender offers;

i. Defeasances;

j. Release, substitution or sale of property securing repayment of the Bonds, if material;

k. Rating changes;

l. Bankruptcy, insolvency, receivership or similar event of the obligated person;[1]

m. The consummation of a merger, consolidation, or acquisition involving an obligated person or the sale of all or substantially all of the assets of the obligated person, other than in the ordinary course of business, the entry into a definitive agreement to undertake such an action or the termination of a definitive agreement relating to any such actions, other than pursuant to its terms, if material; and

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[1] *For the purposes of the event identified in subparagraph (b)(5)(i)(C)(12) of the Rule, the event is considered to occur when any of the following occur: the appointment of a receiver, fiscal agent or similar officer for an obligated person in a proceeding under the U.S. Bankruptcy Code or in any other proceeding under state or federal law in which a court or governmental authority has assumed jurisdiction over substantially all of the assets or business of the obligated person, or if such jurisdiction has been assumed by leaving the existing governing body and official or officers in possession but subject to the supervision and orders of a court or governmental authority, or the entry of an order confirming a plan of reorganization, arrangement or liquidation by a court or governmental authority having supervision or jurisdiction over substantially all of the assets or business of the obligated person.*

n. Appointment of a successor or additional trustee or the change of name of a trustee, if material.

SECTION 6. Format; Identifying Information. All documents provided to the MSRB pursuant to this Disclosure Certificate shall be in the format prescribed by the MSRB and accompanied by identifying information as prescribed by the MSRB.

As of the date of this Disclosure Certificate, all documents submitted to the MSRB must be in portable document format (PDF) files configured to permit documents to be saved, viewed, printed and retransmitted by electronic means. In addition, such PDF files must be word-searchable, provided that diagrams, images and other non-textual elements are not required to be word-searchable.

SECTION 7. Termination of Reporting Obligation. The Town's obligations under this Disclosure Certificate shall terminate upon the earliest of: (i) the date of legal defeasance, prior redemption or payment in full of all of the Bonds; (ii) the date that the Town shall no longer constitute an "obligated person" within the meaning of the Rule; or (iii) the date on which those portions of the Rule which require this written undertaking are held to be invalid by a court of competent jurisdiction in a non-appealable action, have been repealed retroactively or otherwise do not apply to the Bonds.

SECTION 8. Dissemination Agent. The Town may, from time to time, appoint or engage a Dissemination Agent to assist the Town in carrying out its obligations under this Disclosure Certificate, and may discharge any such Dissemination Agent, with or without appointing a successor Dissemination Agent.

SECTION 9. Amendment; Waiver. Notwithstanding any other provision of this Disclosure Certificate, the Town may amend this Disclosure Certificate and may waive any provision of this Disclosure Certificate, without the consent of the holders and beneficial owners of the Bonds, if such amendment or waiver does not, in and of itself, cause the undertakings herein (or action of any Participating Underwriter in reliance on the undertakings herein) to violate the Rule, but taking into account any subsequent change in or official interpretation of the Rule. The Town will provide notice of such amendment or waiver to the MSRB.

SECTION 10. Additional Information. Nothing in this Disclosure Certificate shall be deemed to prevent the Town from disseminating any other information, using the means of dissemination set forth in this Disclosure Certificate or any other means of communication, or including any other information in any Annual Report or notice of occurrence of a Material Event, in addition to that which is required by this Disclosure Certificate. If the Town chooses to include any information in any Annual Report or notice of occurrence of a Material Event in addition to that which is specifically required by this Disclosure Certificate, the Town shall have no obligation under this Disclosure Certificate to update such information or include it in any future Annual Report or notice of occurrence of a Material Event.

SECTION 11. Default. In the event of a failure of the Town to comply with any provision of this Disclosure Certificate, any holder or beneficial owner of the Bonds may take such

actions as may be necessary and appropriate, including seeking mandate or specific performance by court order, to cause the Town to comply with its obligations under this Disclosure Certificate. A default under this Disclosure Certificate shall not be deemed an event of default under the Ordinance, and the sole remedy under this Disclosure Certificate in the event of any failure of the Town to comply with this Disclosure Certificate shall be an action to compel performance.

SECTION 12. Beneficiaries. This Disclosure Certificate shall inure solely to the benefit of the Town, the Dissemination Agent, the Participating Underwriter and the holders and beneficial owners from time to time of the Bonds, and shall create no rights in any other person or entity.

DATE: October 28, 2015

TOWN OF ERIE, COLORADO

_____

Mayor

EXHIBIT "A"

NOTICE OF FAILURE TO FILE ANNUAL REPORT

Name of Issuer: Town of Erie, Colorado

Name of Bond Issue: Water Enterprise Revenue Refunding Bonds, Series 2015, dated as of October 28, 2015, in the aggregate principal amount of $[_____].

Date of Issuance: October 28, 2015.

NOTICE IS HEREBY GIVEN that the Town has not provided an Annual Report with respect to the above-named Bonds as required by Section 931 of the Ordinance, finally adopted on October 13, 2015 and the Continuing Disclosure Certificate executed on October 28, 2015, by the Town. The Town anticipates that the Annual Report will be filed by _____.

Dated: _____, _____

TOWN OF ERIE, COLORADO

_____

Mayor

EXHIBIT "B"

INDEX OF OFFICIAL STATEMENT TABLES TO BE UPDATED

TOWN OF ERIE, COLORADO
WATER ENTERPRISE REVENUE REFUNDING BONDS
SERIES 2015

ESCROW AGREEMENT

DATED as of _____, 2015, made by and between the Town of Erie, Colorado (the "Town"), legally created, established, organized and existing municipal corporation and political subdivision of the State of Colorado (the "State") under Constitution of the State and UMB Bank, n.a., Denver, Colorado (the "Escrow Bank"), a national banking association having and exercising full and complete trust powers, duly organized and existing under the laws of the United States of America, being a member of the Federal Deposit Insurance Corporation and the Federal Reserve System.

(1) **WHEREAS**, the Town is a legally and regularly created, established, organized and existing municipal corporation and political subdivision of the State; and

(2) **WHEREAS**, the Town has heretofore issued its Town of Erie, Colorado, Water Enterprise Revenue Bonds, Series 2007A, originally issued and currently outstanding in the aggregate principal amount of $14,225,000 (the "Series 2007A Bonds"), such Series 2007A Bonds maturing on December 1 of each year as follows:

Maturity (December 1)	Principal Amount	Interest Rate
2024	$ 1,290,000	5.00%
2025	1,355,000	5.00
2032	11,580,000	5.00

and;

(3) **WHEREAS**, the Series 2007A Bonds maturing on and after December 1, 2018, are subject to redemption prior to maturity, at the option of the Town, as a whole or in integral multiples of $5,000, in any order of maturity and in whole or partial maturities, on December 1, 2017, or on any date thereafter at a redemption price equal to the principal amount so redeemed plus accrued interest to the redemption date without a redemption premium; and

(4) **WHEREAS**, the Town has heretofore issued its Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2007B, originally issued in the aggregate principal amount of $5,035,000 and currently outstanding in the aggregate principal amount of

$3,370,000 (the "Series 2007B Bonds"), such Series 2007B Bonds maturing on December 1 of each year as follows:

Maturity (December 1)	Principal Amount	Interest Rate
2015	$315,000	4.250%
2016	325,000	4.250
2017	340,000	5.000
2018	355,000	4.250
2019	375,000	4.250
2020	390,000	4.250
2021	405,000	4.250
2022	425,000	4.375
2023	440,000	4.400

and;

(5) **WHEREAS**, the Series 2007B Bonds maturing on and after December 1, 2018, are subject to redemption prior to maturity, at the option of the Town, as a whole or in integral multiples of $5,000, in any order of maturity and in whole or partial maturities, on December 1, 2017, or on any date thereafter at a redemption price equal to the principal amount so redeemed plus accrued interest to the redemption date without a redemption premium; and

(6) **WHEREAS**, the Town has determined that it is necessary and in the best interest of the Town and its inhabitants that the Town refund that portion of the outstanding Series 2007A Bonds maturing on and after December 1, 2018, in the aggregate principal amount of $[_____] as shown below (the "Refunded 2007A Bonds") and to call the Refunded 2007A Bonds for prior redemption on December 1, 2017 (the "2007A Redemption Date"):

2024	$ [_____]	5.00%
2025	[_____]	5.00
2032	[_____]	5.00

and;

(7) **WHEREAS**, the Town has determined that it is necessary and in the best interest of the Town and its inhabitants that the Town refund that portion of the outstanding Series 2007B Bonds maturing on and after December 1, 2018, in the aggregate principal amount of $[_____] as shown below (the "Refunded 2007B Bonds" and, together with the Refunded 2007A Bonds, the "Refunded Bonds") and to call the Refunded Bonds for prior redemption on

December 1, 2017 (the "2007B Redemption Date" or, together with the 2007A Redemption Date, the "Redemption Date"):

2015	4.250%
2016	4.250
2017	5.000
2018	4.250
2019	4.250
2020	4.250
2021	4.250
2022	4.375
2023	4.400

and;

(8) **WHEREAS**, the Town intends to issue its "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015" (the "2015 Bonds" or the "Bonds") to defray the cost of refunding the Refunded Bonds; and

(9) **WHEREAS**, the Town is not delinquent in the payment of the principal of, premium of, or interest on any of the Refunded Bonds; and

(10) **WHEREAS**, Stifel Nicolaus & Company, Incorporated (the "Purchaser") has submitted an offer to purchase of the Bonds in the aggregate principal amount of $[_____], to be issued, in part, for the purpose of 1) paying the interest due on Refunded Bonds, both accrued and not accrued, as the same becomes due on and after the date of delivery of the 2015 Bonds and on or before the Redemption Date, and 2) paying the principal of the Refunded Bonds which becomes due upon prior redemption on the Redemption Date (the "Refunded Bond Requirements"), and to pay incidental costs thereof; and

(11) **WHEREAS**, the 2015 Bonds were authorized to be issued by an ordinance (the "Bond Ordinance") finally and duly adopted by the Board of Trustees of the Town on October 13, 2015; and

(12) **WHEREAS**, the 2015 Bonds were sold subject to the approving opinion of the Town's bond counsel, Butler Snow LLP, Denver, Colorado ("bond counsel"); and

(13) **WHEREAS**, the Town, by the Bond Ordinance, among other provisions:

A. Authorized the issuance of the 2015 Bonds;

B. Created the Escrow Account;

C. Provided for the deposit in the Escrow Account (defined below) of a portion of the net proceeds of the 2015 Bonds and other moneys in an aggregate amount fully sufficient, together with the known minimum yield from the investment of such moneys in bills, certificates of indebtedness, notes, bonds, or similar securities which are direct obligations of, or the principal and interest of which are fully and unconditionally guaranteed as to timely payment of principal and interest by, the United States, which obligations are not callable at the option of the issuer thereof (provided that the full faith and credit of the United States of America has been pledged to any such direct or unconditionally guaranteed obligations) ("Federal Securities"), other than an initial cash balance of $[__] remaining uninvested, to pay the Refunded Bond Requirements, as set forth therein and herein;

D. Provided for the purchase of Federal Securities with such moneys credited to the Escrow Account, other than such initial cash balance remaining uninvested; and

E. Authorized the completion and execution of this Agreement.

(14) **WHEREAS**, a copy of the Bond Ordinance has been delivered to the Escrow Bank and the provisions therein set forth are herein incorporated by reference as if set forth herein verbatim in full; and

(15) **WHEREAS**, the Federal Securities described in the Report have appropriate maturities and yields to insure, together with the initial cash, the payment of the Refunded Bond Requirements; and

(16) **WHEREAS**, a schedule of receipts from such Federal Securities and a schedule of payments and disbursements in a report (the "Report") attached hereto as Exhibit A, demonstrate the sufficiency of the Federal Securities and initial cash for such purpose; and

(17) **WHEREAS,** the Bond Ordinance in effect prohibits investments in the Escrow Account with yields exceeding the limitations of Section 148, Internal Revenue Code of 1986, as amended (the "Tax Code") and the currently applicable regulations thereunder; and

(18) **WHEREAS**, in the opinion of bond counsel the Report demonstrates compliance with Section 148 of the Tax Code and the currently applicable regulations thereunder; and

(19) **WHEREAS**, the Escrow Bank is empowered to undertake the obligations and commitments on its part herein set forth; and

(20) **WHEREAS**, the undersigned officers of the Escrow Bank are duly authorized to execute and deliver this Agreement in the Escrow Bank's name and on its behalf; and

(21) **WHEREAS,** the Town is empowered to undertake the obligations and commitments on its part herein set forth; and

(22) **WHEREAS**, the undersigned officers of the Town are duly authorized to execute and deliver this Agreement in the Town's name and on its behalf.

NOW, THEREFORE, THIS ESCROW AGREEMENT WITNESSETH:

That in consideration of the mutual agreements herein contained, and the payment of the fees and costs specified in Section 9 duly paid by the Town to the Escrow Bank at or before the execution and delivery of this Agreement, the receipt of which is hereby acknowledged, and in order to secure the payment of the Refunded Bond Requirements as the same become due, the parties hereto mutually undertake, promise, and agree for themselves, their respective representatives, successors and assigns, as follows:

Section 1. <u>Creation of Escrow</u>.

A. Simultaneously with the delivery of the 2015 Bonds, and subject to their issuance, the Town shall cause to be deposited with the Escrow Bank $[_____] of the 2015 Bond proceeds and other available moneys. With the amount deposited, the Escrow Bank shall purchase (to the extent not heretofore purchased) on behalf of the Town the Federal Securities described in Exhibit 1 to this Agreement (the "Initial Federal Securities") and shall cause the Initial Federal Securities, if any, and an initial cash balance of $[_____] (the "initial cash") to be credited to and accounted for in a separate trust account designated as the "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015 Escrow Account" (the

"Escrow Account"). Receipt of $[_____] by the Escrow Bank to be applied as provided herein is hereby acknowledged.

B. Other Federal Securities may, at any time, be substituted for any Federal Securities if the Initial Federal Securities are unavailable for purchase on the date of delivery of this Escrow Agreement or if such substitution of Federal Securities is required by the Tax Code or requested by the Town and permitted by Section 148 of the Tax Code and the applicable regulations thereunder, subject in any case to sufficiency demonstrations and yield proofs in a report of an independent firm of certified public accountants, and subject to a favorable opinion of nationally recognized bond counsel as to the legality of any such substitution and the continued exclusion of interest on the 2015 Bonds from gross income for federal income tax purposes (except certain alternative minimum taxes described in bond counsel's opinion), and in any event in such a manner so as not to increase the price which the Town pays for the initial acquisition of Federal Securities for the Escrow Account. The certified public accountant's report must indicate that the receipts from the substitute securities are sufficient without any need for reinvestment to fully pay the principal of, interest on and any prior redemption premiums due in connection with the Refunded Bonds. In lieu of, or in addition to, substituting other Federal Securities pursuant to the preceding sentence, moneys in an amount equal to the principal of and interest on all or any portion of such Initial Federal Securities may be credited to the Escrow Account subject to the provisions of Section 5 hereof. Any such cash shall be deemed to be part of the initial cash. Any Federal Securities temporarily substituted may be withdrawn from the Escrow Account when the Initial Federal Securities are purchased and credited to the Escrow Account. Any moneys temporarily substituted for Initial Federal Securities shall be repaid to the person advancing such moneys when such Initial Federal Securities are purchased and credited to the Escrow Account. Similarly any temporary advancement of moneys to the Escrow Account to pay designated Refunded Bond Requirements because of a failure to receive promptly the principal of and interest on any Federal Securities at their respective fixed maturity dates, or otherwise, may be repaid to the person advancing such moneys upon the receipt by the Escrow Bank of such principal and interest payments on such Federal Securities.

C. The initial cash, the proceeds of the Initial Federal Securities (and of any other Federal Securities acquired as an investment or reinvestment of moneys accounted for in the Escrow Account), and any such Federal Securities themselves (other than Federal Securities, including the Initial Federal Securities, held as book-entries) shall be deposited with the Escrow Bank and credited to and accounted for in the Escrow Account. The securities and moneys accounted for therein shall be redeemed and paid out and otherwise administered by the Escrow Bank for the benefit of the Town and the owners of the Refunded Bonds as provided in this Agreement and the Bond Ordinance.

Section 2. <u>Purpose of Escrow</u>.

A. The Escrow Bank shall hold the initial cash, all Federal Securities accounted for in the Escrow Account (other than any Federal Securities, including the Initial Federal Securities, held as book-entries), and all moneys received from time to time as interest on and principal of such Federal Securities (including those held as book-entries), in trust to secure and for the payment of the Refunded Bond Requirements, as the same become due and are called for prior redemption.

B. Except as provided in Paragraph B of Section 1 and in Section 8 hereof, the Escrow Bank shall collect the principal of and interest on such Federal Securities promptly as such principal and interest become due and shall apply all money so collected to the payment of the Refunded Bond Requirements as aforesaid.

Section 3. <u>Accounting for Escrow</u>.

A. The moneys and the Federal Securities accounted for in the Escrow Account shall not be subject to checks drawn by the Town or otherwise subject to its order except as otherwise provided in Paragraph B of Section 1 and in Section 8 hereof.

B. The Escrow Bank shall transfer from time to time from the Escrow Account to the paying agent for the Refunded Bonds sufficient moneys to permit payment, without any default, of the Refunded Bond Requirements, as provided herein and as directed by the duly authorized officers of the Town. The Escrow Bank shall never be required to advance its own funds for payment in connection with the Refunded Bond Requirements.

C. Except as otherwise provided in Paragraph B of Section 1 of this Agreement, there shall be no sale of any Federal Securities held hereunder, and no Federal Securities held hereunder and callable for prior redemption at the Town's option shall be called at any time for prior redemption, except if necessary to avoid a default in the payment of the Refunded Bond Requirements.

Section 4. <u>Maturities of Federal Securities</u>.

A. Federal Securities shall not be callable by the issuer thereof and shall be purchased in such manner:

(1) So that such Federal Securities may be redeemed in due season at their respective maturities to meet the Bond Requirements as the same become due.

(2) So that any sale or prior redemption of such Federal Securities shall be unnecessary.

B. There shall be no substitution of any Federal Securities except as otherwise provided in Paragraph B of Section 1 of this Agreement.

Section 5. <u>Reinvestments</u>.

A. The Escrow Bank shall reinvest the cash balances listed in the Report for the period designated in the Report in state and local government series securities ("slgs") purchased directly by the Escrow Bank for the Town from the United States Government to the extent set forth in the Report. All of the slgs in which such reinvestments are made shall bear interest at the rate of 0% per annum and shall mature on or before the date or dates when the proceeds thereof must be available as shown on the Report for the prompt payment of the Refunded Bond Requirements. The Escrow Bank agrees to comply with applicable regulations as are from time to time in effect in subscribing for and purchasing such slgs.

B. In addition to or, as the case may be, in lieu of the reinvestments required by Paragraph A of this Section 5, the Escrow Bank, at the written direction of the Town, shall invest the initial cash and shall reinvest in Federal Securities any moneys received in payment of

the principal of and interest on any Federal Securities accounted for in the Escrow Account, subject to the limitations of Sections 1, 4 and 6 hereof and the following limitations:

(1) Any such Federal Securities shall not be subject to redemption prior to their respective maturities at the option of their issuer.

(2) Any such Federal Securities shall mature on or prior to the date or dates when the proceeds thereof must be available for the prompt payment of the Refunded Bond Requirements.

(3) Under no circumstances shall any reinvestment be made under this Paragraph B if such reinvestment, alone or in combination with any other investment or reinvestment, violates the applicable provisions of Section 148 of the Tax Code and the rules and regulations thereunder.

(4) The Escrow Bank shall make no such reinvestment under this Paragraph B unless the Town first obtains and furnishes to the Escrow Bank a written opinion of nationally recognized bond counsel to the effect that such reinvestment, as described in the opinion, complies with subparagraph (3) of this Section 5.

(5) Except as provided in this Section 5, the Escrow Bank shall have no obligation by virtue of this Agreement, general trust law or otherwise to make any reinvestment of any moneys in the Escrow Account at any time.

Section 6. **Sufficiency of Escrow**. The moneys and Federal Securities accounted for in the Escrow Account shall be in an amount (or have appropriate maturities and yields to produce an amount) which at all times shall be sufficient to pay the Refunded Bond Requirements. Should the amount in the Escrow Account at any time be insufficient to pay the Refunded Bonds Requirements, the Escrow Bank shall notify the Town of such deficiency. Upon such notification, the Town shall immediately remit to the Escrow Bank, from any available funds of the Town, an amount sufficient to cover such deficiency.

Section 7. **Transfers and Redemption Notice for Refunded Bond Requirements; Notice**.

A. The Escrow Bank shall make such transfers to the paying agent for the Refunded Bonds, as will ensure, to the extent of money in the Escrow Account properly allocable to and available therefor, the timely payment of the Bond Requirements.

B. The Escrow Bank shall give or cause the paying agent for the Refunded Bonds to give notice of redemption of the Refunded Bonds by mailing a copy of the notice by first class mail (postage prepaid) not more than 60 days nor less than 30 days prior to the Redemption Date to the registered owner of each Refunded Bond to be redeemed in whole or in part at the address shown on the registration books maintained by the registrar for the Refunded Bonds.

Section 8. **Termination of Escrow Account**. When the Escrow Bank shall have made payment or provisions for payment so that all Refunded Bond Requirements shall be or shall have been paid to the paying agent for the Refunded Bonds, the Escrow Bank shall immediately pay over to the Town the moneys, if any, then remaining in the Escrow Account and shall make forthwith a final report to the Town. Such moneys may be used by the Town for any lawful purpose, subject to any limitations in the Bond Ordinance.

Section 9. **Fees and Costs**.

A. The Escrow Bank's fees and costs for and in carrying out the provisions of this Agreement have been fixed at $[_____], which amount is to be paid at or prior to the time of the issuance of the 2015 Bonds by the Town, directly to the Escrow Bank as payment in full of all charges (except the costs of mailing and publishing notices of redemption) of the Escrow Bank pertaining to this Agreement for services performed hereunder. In addition, the Town shall pay and/or reimburse the Escrow Bank for its costs of publishing and mailing the redemption notices required to be given by the Escrow Bank pursuant to Subsection B of Section 7 hereof.

B. Such payment for services rendered and to be rendered by the Escrow Bank shall not be for deposit in the Escrow Account, and the fees of and the costs incurred by the Escrow Bank shall not be deducted from such account. The Escrow Bank shall never assert a lien on the moneys or Federal Securities in the Escrow Account for payment for its services.

Section 10. **Status Report and Rebate Notice**.

A. On or before January 1 of each year commencing January 1, 2016 through and including January 1, 2018, the Escrow Bank shall submit to the Finance Director of the Town a report covering all money which the Escrow Bank shall have received and all payments which it shall have made or caused to be made hereunder during the next preceding Fiscal Year (or such lesser amount of time as the Escrow Account shall have been in existence).

B. Each such report (except the last report) shall also list all Federal Securities and the amount of money accounted for in the Escrow Account on December 31 of the Fiscal Year to which the report pertains.

C. Each such report (including the last report) shall further indicate for which period any Federal Securities pledged to secure the repayment to the Town of any uninvested moneys were placed in pledge, as permitted by Section 12.

D. At least 30 but not more than 60 days prior to the date on which the last Refunded Bond is discharged, the Escrow Bank shall send written notice to the Town stating that the Town must: (i) compute the amount of rebatable arbitrage, if any, which is due to the federal government pursuant to Sections 103 and 148(f) of the Internal Revenue Code of 1986, as amended, and (ii) pay such amount no later than 60 days from the date on which the last Refunded Bond is discharged.

Section 11. <u>Character of Deposit</u>.

A. It is recognized that title to the Federal Securities and money accounted for in the Escrow Account from time to time shall remain vested in the Town or in the Escrow Bank on behalf of the Town but subject always to the prior charge and lien thereon of this Agreement and the use thereof required to be made by the provisions of this Agreement and the Bond Ordinance.

B. The Escrow Bank shall hold all such Federal Securities (except as they may be held as book-entries) and money in the Escrow Account as a special trust fund and account separate and wholly segregated from all other securities and funds of the Escrow Bank or deposited therein, and shall never commingle such securities or money with other securities or money.

Section 12. **Securing Deposit**.

A. The Escrow Agent may cause the Federal Securities accounted for in the Escrow Account to be registered in the name of the Escrow Agent for payment, if they are registrable for payment.

B. No money paid into and accounted for in the Escrow Account shall ever be considered as an asset of the Escrow Agent and the Escrow Agent shall have no right or title with respect thereto except as provided herein.

Section 13. **Purchaser's Responsibility**. The Purchaser and holders from time to time of the 2015 Bonds shall in no manner be responsible for the application or disposition of the proceeds thereof or any moneys or Federal Securities accounted for in the Escrow Account.

Section 14. **Amendment**.

A. The Bonds shall be issued in reliance upon this Agreement and except as herein provided, this Agreement shall be irrevocable and not subject to amendment after any of the 2015 Bonds shall have been issued, except as provided herein.

B. The provisions of this Escrow Agreement cannot be amended, waived or modified except to correct ambiguities or to add to the protection of the owners of the 2015 Bonds or the Refunded Bonds and such amendments shall be in writing executed by the parties hereto. Copies of any modification or amendment to this Agreement shall be sent at least 10 days prior to the effective date thereof to any rating agency then maintaining a rating on the 2015 Bonds.

Section 15. **Exculpatory Provisions**.

A. The duties and responsibilities of the Escrow Bank are limited to those expressly and specifically stated in this Agreement.

B. The Escrow Bank and any of its officers, agents or employees shall not be liable or responsible for any loss resulting from any investment or reinvestment made pursuant to this Escrow Agreement and made in compliance with the provisions hereof.

C. The Escrow Bank and any of its officers, agents or employees shall not be personally liable or responsible for any act which it may do or omit to do hereunder, while acting with reasonable care, except for duties expressly imposed upon the Escrow Bank hereunder or as otherwise expressly provided herein.

D. The Escrow Bank shall neither be under any obligation to inquire into or be in any way responsible for the performance or nonperformance by the Town of any of its obligations, nor shall the Escrow Bank be responsible in any manner for the recitals or statements contained in this Agreement, in the Bond Ordinance, in the Refunded Bonds, or in any proceedings taken in connection therewith, such recitals and statements being made solely by the Town.

E. Nothing in this Agreement creates any obligation or liabilities on the part of the Escrow Bank to anyone other than the Town and the holders of the Refunded Bonds and the 2015 Bonds.

Section 16. **Time of Essence**. Time is of the essence in the performance of the obligations from time to time imposed upon the Escrow Bank by this Agreement.

Section 17. **Successors**.

A. Whenever in this Agreement the Town or the Escrow Bank is named or is referred to, such provision is deemed to include any successor of the Town or the Escrow Bank, respectively, immediate or intermediate, whether so expressed or not.

B. All of the stipulations, obligations and agreements by or on behalf of and other provisions for the benefit of the Town or the Escrow Bank contained in this Agreement:

(1) Shall bind and inure to the benefit of any such successor, and

(2) Shall bind and inure to the benefit of any officer, board, authority, agent, or instrumentality to whom or to which there shall be transferred by or in accordance with law any relevant right, power or duty of the Town or the Escrow Bank, respectively, or of its successor.

Section 18. **Severability**. If any section, paragraph, clause, or provision of this Agreement shall for any reason be held to be invalid or unenforceable, the invalidity or

unenforceability of such section, paragraph, clause, or provision shall not affect any of the remaining provisions of this Agreement.

Section 19. **Notices**. Any notice to be given hereunder shall be delivered personally or mailed postage prepaid, return receipt requested, to the following addresses:

If to the Town: Town of Erie, Colorado
645 Holbrook Street
P.O. Box 750
Erie, Colorado 80516
Attention: Finance Director

If to the Escrow Bank: UMB Bank, n.a.
Corporate Trust and Escrow Services
1670 Broadway
Denver, Colorado 80202

or to such other address as any party may, by written notice to the other parties, hereafter specify. Any notice shall be deemed to be given upon mailing.

Section 20. **Severability**.

If any section, paragraph, clause, or provision of this Escrow Agreement shall for any reason be held to be invalid or unenforceable, the invalidity or unenforceability of such section, paragraph, clause, or provision shall not affect any of the remaining provisions of this Agreement.

Section 21. **Electronic Storage**. The parties hereto agree that the transaction described herein may be conducted and related documents may be stored by electronic means. Copies, telecopies, facsimiles, electronic files and other reproductions of original executed documents shall be deemed to be authentic and valid counterparts of such original documents for all purposes, including the filing of any claim, action or suit in the appropriate court of law."

Section 22. **Jurisdiction and Venue**. The rights of the Town under this Agreement shall be deemed to be a contract made under and shall be construed in accordance with and governed by the laws of the State of Colorado. Jurisdiction and venue for any disputes related to this Agreement shall be in United States District Court for the District of Colorado.

Section 23. **Exercise of Option**. The Board of Trustees of the Town has elected in the Bond Ordinance to exercise on the behalf and in the name of the Town its option to redeem the Refunded Bonds on the Redemption Date. The Town hereby authorizes and directs the UMB Bank, n.a., Denver, Colorado, as registrar for such Refunded Bonds, to give notice of refunding, defeasance and redemption of the Refunded Bonds to the registered owners of the Refunded Bonds in accordance with the provisions of the Ordinance authorizing the issuance of the Refunded Bonds.

Section 24. **Form of Notice**. The notice so to be given shall be in substantially the following form:

(Form of Notice)

NOTICE OF PARTIAL REFUNDING, DEFEASANCE AND PRIOR REDEMPTION

TOWN OF ERIE, COLORADO
WATER ENTERPRISE REVENUE BONDS
SERIES 2007A MATURING ON AND AFTER DECEMBER 1, 2018

CUSIP NUMBER: 295017 CC9, BH9, BJ5

And

TOWN OF ERIE, COLORADO
WATER ENTERPRISE REVENUE REFUNDING BONDS
SERIES 2007B MATURING ON AND AFTER DECEMBER 1, [___]

CUSIP NUMBER: 295017 [_____]

NOTICE IS HEREBY GIVEN that Town of Erie, Boulder and Weld Counties, State of Colorado (the "Town") will cause to be deposited in escrow with UMB Bank, n.a., Denver, Colorado (the "Escrow Bank"), refunding bond proceeds and other moneys which will be invested (except for a small initial cash balance remaining uninvested) in certificates of indebtedness, notes, bonds and similar securities which are direct obligations of, or obligations the principal or and interest on which are unconditionally guaranteed by, the United States of America to refund, pay, redeem and discharge the a portion of the principal and interest in connection with the Town's Water Enterprise Revenue Bonds, Series 2007A (the "Series 2007A Bonds") and the Town's Water Enterprise Revenue Refunding Bonds, Series 2007B (the "Series 2007B Bonds") as more particularly described below.

$[_____] of the Series 2007A Bonds maturing on and after December 1, 2018 as shown below (the "Refunded Bonds") will be called for prior redemption on December 1, 2017 (the "Redemption Date"). On the Redemption Date, the principal of such Refunded Bonds and accrued interest to the Redemption Date, will become due and payable at the principal office of the paying agent, UMB Bank, n.a., as paying agent for the Series 2007A Bonds (the "Paying Agent"), and thereafter interest will cease to accrue. The Refunded Bonds will be redeemed without a premium. New CUSIP Numbers have been issued for the Series 2007A Bonds as follows:

2007A Refunded Maturity	2007A Refunded Principal Amount	CUSIP for Amount Refunded	2007A Outstanding Maturity	2007A Outstanding Principal Amount	CUSIP for Amounts Outstanding
12/15/2024			12/15/2024		
12/15/2025			12/15/2025		
12/15/2032			12/15/2032		

$[_____] of the Series 2007B Bonds maturing on and after December 1, 2018 as shown below (the "Refunded Bonds") will be called for prior redemption on December 1, 2017 (the "Redemption Date"). On the Redemption Date, the principal of such Refunded Bonds and accrued interest to the Redemption Date, will become due and payable at the principal office of the paying agent, UMB Bank, n.a., as paying agent for the Series 2007B Bonds (the "Paying Agent"), and thereafter interest will cease to accrue. The Refunded Bonds will be redeemed without a premium. New CUSIP Numbers have been issued for the Series 2007B Bonds as follows:

2007B Refunded Maturity	2007B Refunded Principal Amount	CUSIP for Amount Refunded	2007B Outstanding Maturity	2007B Outstanding Principal Amount	CUSIP for Amounts Outstanding

According to a report of a firm of certified public accountants, licensed to practice in Colorado, the escrow, including the known minimum yield from such investments and any temporary reinvestments and the initial cash balance remaining uninvested, will be fully sufficient at the time of the deposit and at all times subsequent, to pay the principal amount of the Refunded Bonds on the

Redemption Date, and interest accruing on and after the date of the deposit and on and before the Redemption Date.

Pursuant to federal law, the Paying Agent is required to withhold a portion of the principal of your bond redeemed unless the Paying Agent is provided with your Social Security Number or Taxpayer Identification Number, properly certified or submitted on a Form W-9. A completed Form W-9 should be presented with your bond.

The above-referenced CUSIP numbers were assigned to this issue by Standard & Poor's Corporation and are intended solely for bondholders' convenience. Neither the Paying Agent nor the Town shall be responsible for selection or use of the CUSIP numbers, nor is any representation made as to their correctness on the Refunded Bonds or as indicated in any redemption notice.

Dated _____, 2015.

UMB BANK, N.A.

By:_____
Title: Senior Vice President

(End Form of Notice)

IN WITNESS WHEREOF, the Town of Erie has caused this Escrow Agreement to be signed in the Town's corporate name by its Mayor and to be attested by its Town Clerk, with the seal thereof hereunto affixed; and UMB Bank, n.a., has caused this Escrow Agreement to be signed in its corporate name by one of its authorized officers, and sealed with its corporate seal, all as of the day and year first above written.

(SEAL)

TOWN OF ERIE, COLORADO

Attest:

By:_____
Mayor

_____
Town Clerk

UMB Bank, n.a.

By:_____
Senior Vice President

EXHIBIT A

Escrow Verification Report

TOWN OF ERIE, COLORADO

PAYING AGENT AND REGISTRAR AGREEMENT

THIS AGREEMENT, dated as of October 28, 2015, is by and between the Town of Erie, in the Counties of Boulder and Weld, State of Colorado (the "Town"), and UMB Bank, n.a., Denver, Colorado (the "Bank").

WITNESSETH:

WHEREAS, by ordinance of the Board of Trustees of the Town duly adopted on October 13, 2015 (the "Bond Ordinance"), the Town has authorized the issuance of its Water Enterprise Revenue Refunding Bonds, Series 2015, in the aggregate principal amount of $[_____] (the "Bonds"); and

WHEREAS, it is mutually desirable to the Town and the Bank that the Bank, through its Corporate Trust Department located in Denver, Colorado, act as Paying Agent (as defined in the Bond Ordinance) for the Bonds; and

WHEREAS, it is mutually desirable that this agreement (the "Agreement") be entered into between the Town and the Bank to provide for certain aspects of such Registrar and Paying Agent services.

NOW, THEREFORE, the Town and the Bank, in consideration of the mutual covenants herein contained, agree as follows:

1. The Bank hereby accepts all duties and responsibilities of the Registrar and Paying Agent as provided in the Bond Ordinance and this Agreement. The Bank shall cause the Bonds to be honored in accordance with their terms, provided that the Town causes to be made available to the Bank all funds necessary in order to so honor the Bonds. Nothing in this Agreement shall require the Bank to pay or disburse any funds in excess of the amount then on deposit in the "Principal and Interest Payment Account" provided for in Section 2 of this Agreement. Nothing in this Agreement shall require the Town to pay or disburse any funds for payment of the Bonds or interest thereon except at the times and in the manner provided in the Bond Ordinance. In addition, the Bank hereby accepts, including, without limitation, the duties and responsibilities pertaining to the authentication, registration, transfer, exchange and

replacement of Bonds, and the duties and responsibilities pertaining to the calling of the Bonds for prior redemption, all as provided in the Bond Ordinance.

2. Not less than (a) one business day prior to each payment date, if funds are delivered by wire transfer, or (b) three business days prior to each payment date if funds are delivered by another method of payment, funds for the payment of the Bonds and interest thereon are to be deposited by the Town with the Bank in an account designated "Principal and Interest Payment Account." The funds so deposited shall be held and applied by the Bank through its Corporate Trust Department solely for the payment of principal of and interest on the Bonds. From such funds, the Bank agrees to pay at the times and in the manner provided in the Bond Ordinance, the principal of, interest on and redemption premium, if any, on the Bonds. In the event a payment date is not a business day, the Bank shall make the principal and/or interest payment on the following business day with the same effect as if it had been made on the date scheduled for such payment. The Bank shall not be required to invest or to pay interest on any funds of the Town for any period during which such funds are held by the Bank awaiting the presentation of the Bonds for payment.

3. At least 30 but not more than 60 days prior to October 28, 2020, October 28, 2025, October 28, 2030, October 28, 2035, and on the date on which the last Bond is discharged, the Bank shall send written notice to the Town stating that the Town must: (i) compute the amount of rebatable arbitrage, if any, which is due to the federal government pursuant to Sections 103 and 148(f) of the Internal Revenue Code of 1986, as amended, and (ii) pay such amount no later than sixty days from October 28, 2020, October 28, 2025, October 28, 2030, October 28, 2035, and on the date on which the last Bond is discharged. The Bank shall have no further obligation or duty related to the Town's arbitrage-related obligations under Sections 103 and 148 (f) of the Internal Revenue Code of 1986 other than giving notice to the Town as provided herein.

4. The Bank agrees to annually notify the Town, in writing, of the Town's obligation to file its Annual Report (as such term is defined in the Continuing Disclosure Certificate dated October 28, 2015, relating to the issuance of the Bonds) at least 30 but not more than 60 days prior to the time when the Annual Report is required to be filed pursuant to the terms of the Continuing Disclosure Certificate. The Bank shall have no further obligation or

duty related to the Town's obligation under the Continuing Disclosure Agreement other than providing notice as described herein.

5. At least 30 but not more than 60 days prior to December 1, 2017 (the "Redemption Date" of the Refunded 2007A Bonds and the Refunded 2007B Bonds), and on the date which the last Bond is discharged, the Bank shall send written notice to the Town stating that the Town must: (i) compute the amount of rebatable arbitrage, if any, which is due to the federal government pursuant to Sections 103 and 148(f) of the Internal Revenue Code of 1986, as amended, and (ii) pay such amount no later than sixty days from December 1, 2017, and on the date on which the last Bond is discharged.

6. The Town shall pay to the Bank fees in accordance with its then existing fee schedule. The Bank's current fee schedule is attached hereto as Exhibit A. No new fee schedule shall become effective until 30 days after the Bank has given the Town notice thereof.

7. Unless waived by the Bank, the Town agrees to provide the Bank with not less than 60 days' notice of any prior redemption of the Bonds.

8. The Town agrees to provide the Bank with a supply of blank Bonds for use in the transfer and exchange of Bonds.

9. Any moneys held by the Bank for the owners of the Bonds remaining unclaimed for one year after principal and interest of the respective Bonds with respect to which such moneys have been set aside become due and payable shall without further request by the Town be paid to the Town.

10. The Agreement may be terminated as provided in the Bond Ordinance.

11. In the event of any conflict between the provisions of this Agreement and the provisions of the Bond Ordinance, the provisions of the Bond Ordinance shall be controlling.

12. There is hereby created and established with the Paying Agent a trust fund to be designated "Town of Erie, Colorado, Water Enterprise Revenue Refunding Bonds, Series 2015, Costs of Issuance Fund" (the "Costs of Issuance Fund"). Into such fund shall be deposited $[_____] of the proceeds of the Bonds which shall be used to pay costs of issuance and expenses incurred as a result of the issuance of the Bonds. The Paying Agent is hereby directed to pay the costs of issuance to the parties and in the amounts listed in a copy of the closing memorandum upon presentation of an invoice from each party for the amount listed. Any discrepancies will be approved by the Town prior to payment of the expense. Moneys held as

part of the Costs of Issuance Fund shall be invested or reinvested by the Paying Agent, to the extent permitted by law, in authorized investments in accordance with the written instructions from the Town. All investment income shall be retained in the fund. Any amounts remaining in the Costs of Issuance Fund after December 31, 2015, shall be transferred to the Town.

13. The rights of the Town under this Agreement shall be deemed to be a contract made under and shall be construed in accordance with and governed by the laws of the State of Colorado. Jurisdiction and venue for any disputes related to this Agreement shall be in a District Court for the State of Colorado.

14. The parties hereto agree that the transaction described herein may be conducted and related documents may be stored by electronic means. Copies, telecopies, facsimiles, electronic files and other reproductions of original executed documents shall be deemed to be authentic and valid counterparts of such original documents for all purposes, including the filing of any claim, action or suit in the appropriate court of law."

IN WITNESS WHEREOF, the Bank and the Town have caused this Agreement to be duly executed and delivered as of the day and year first above written.

TOWN OF ERIE, COLORADO

By:_____
Mayor

(SEAL)

Attest:

_____
Secretary

UMB BANK, N.A.,
Denver, Colorado

By:_____
Title: Senior Vice President

EXHIBIT A

(Attach Registrar's Fee Schedule)

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-065, **Version:** 1

SUBJECT: A Sketch Plan Review Of Erie Highlands PUD Planning Areas 5, 6 & 14.

DEPARTMENT: Community Development

PRESENTER: Deborah Bachelder AICP, Senior Planner

FISCAL INFORMATION: N/A
Cost as Recommended:
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: N/A

SUMMARY AND BACKGROUND OF SUBJECT MATTER: See Attachment

ATTACHMENTS:
Staff Memo - Erie Highlands Sketch Plan
Zoning Map
PUD Zoning Map
Natural Areas Inventory #75 #76
Applicant-Land Use Application
Applicant-Narrative
Applicant- SUA - Encana
Applicant -SUA - Kerr-McGee
Applicant -Master Pre-Dev Agreement
Applicant -ALTA East
Applicant -ALTA West
Applicant -PA 5-6-14 Sketch Plan
Applicant -Phase III Drainage Report
Applicant -Cultural Report
Applicant -Geologic-Soils Report
Applicant -Phase 1 Environmental
Applicant -Phase I Drainage Report
Applicant -Subsidence Report
Applicant -Threatened Species-Wetland Report
Applicant -Traffic Report
Staff Comments - Community Development

Staff Comments - Public Works
OSTAB Comments

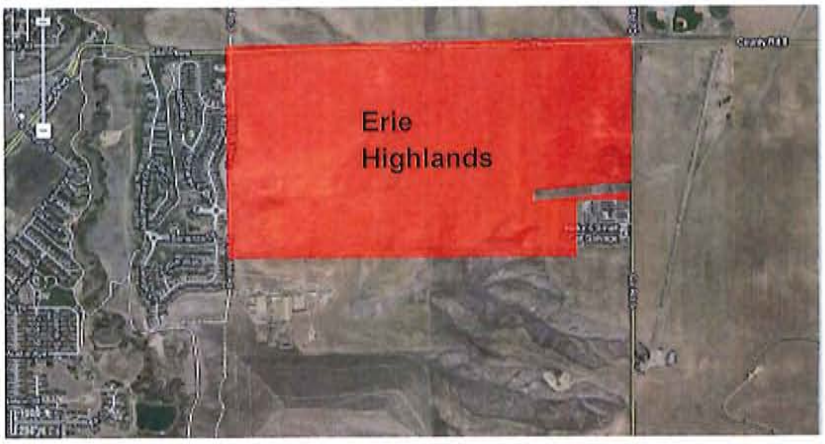
TOWN OF ERIE
BOARD OF TRUSTEE AGENDA ITEM
Board Meeting Date: October 13, 2015

SUBJECT:	**GENERAL BUSINESS:**
	A Sketch Plan Review Of Erie Highlands PUD Planning Areas 5, 6 & 14.
CODE REVIEW:	Erie Municipal Code, Title 10
PURPOSE:	A Sketch Plan represents a generalized land use plan and layout for the area proposed to be included within a subdivision. A Sketch Plan application is required to allow for an early, informal evaluation of a proposed subdivision before detailed planning and engineering work has occurred.
DEPARTMENT:	Community Development
PRESENTER:	Deborah Bachelder AICP, Senior Planner
STAFF RECOMMENDATION:	See Attachments for Staff Review Memo
PLANNING COMMISSION:	Planning Commission reviewed and commented on the Sketch Plan application at their September 16, 2015 meeting.

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

Owner: Oakwood Homes, LLC
4908 Tower Road
Denver, CO 80249

Location:
The Erie Highlands development is located south of Erie Parkway; west of Road 5 and Blake's Auto Salvage Yard; and, east of the Grandview Subdivision.



Existing Conditions within the Sketch Plan Area:

Zoning: AG/OS – Agriculture/Open Space; LR – Low Density Residential; both with PUD – Planned Unit Development Overlay.

Project Size: 101.7 Acres

Existing Use: Vacant

Existing Site Features:

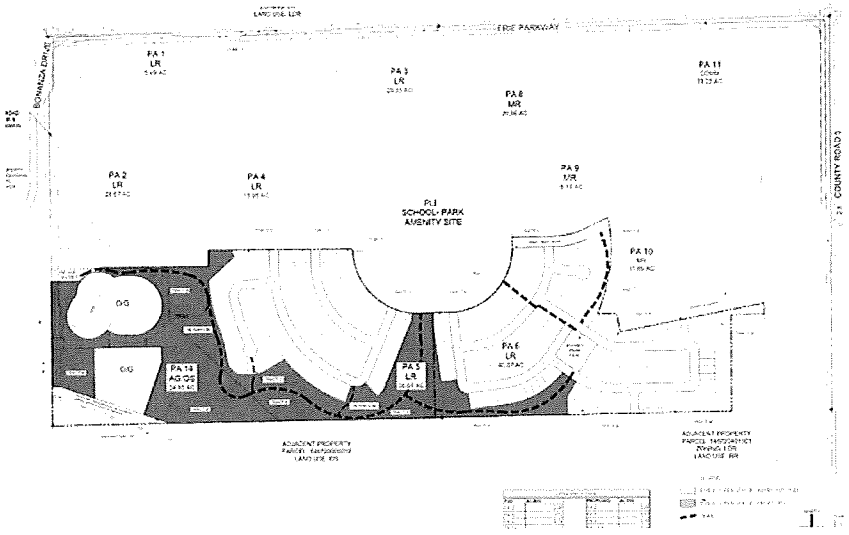
- Western Area Power Association (WAPA) Distribution Lines
- 3 Oil/Gas Well Facility Sites: Existing wells & access roads; potential for future well activity
- Undermining

Adjacent Land-Use/Zoning:

	ZONING	LAND USE
NORTH	CC/PUD – Community Commercial LR/PUD – Low Density Residential PLI/PUD – Public Lands & Institutions	Erie Highlands – Vacant Commercial Erie Highlands – Single Family Residential Erie Highlands – Vacant Elementary School Site; Neighborhood Park; HOA Amenity Site
SOUTH	AG – Agricultural Weld County LR – Low Density Residential	Green Mill Sportsman Club Sunset - Vacant Residential
EAST	AG – Agricultural Weld County	Blake's Auto Salvage Yard
WEST	PD – Planned Development	Grandview – Single Family Residential

SITE SPECIFIC DEVELOPMENT INFORMATION:

The Erie Highlands Planning Area 5, 6 and 14 Sketch Plan application is for the southern half of the overall development. The northwest portion of Erie Highlands is currently under development with 7 different final plat filings. The full development is 296 acres in size.



Sketch Plan Development Data:

- Sketch Plan Area: 101.7 acres
- Residential Development:
  - Single Family Detached 243 dwelling units
- Open Space and Parks:
  - 1 Pocket Park 1.0 acres
  - Public Open Space 31.0 acres
  - Oil/Gas Well Sites 9.0 acres
  - Private Open Space 6.4 acres

Mix of Housing:

To meet the UDC Mix of Housing Type requirement (UDC 10.6.7 D.) for the full development, 237.2 acres, of proposed residential zoned property; the Erie Highlands development should provide one of the following UDC housing diversities:

- 4 housing types, or
- 3 types and 1 variation, or
- 2 types and 2 variations.

The applicant stated in a previous Sketch Plan application narrative letter that they will provide two housing types with two variations within the overall development. They anticipated that the two housing types would be single family and either apartments or townhomes; the two variations would be 2 variations in the single family lot sizes.

Within the current development of Erie Highlands, in the northwest portion of the development, the applicant has provided 1 housing type (single family – lot size 5,000-9,999 square feet) with 2 variations (single family – lot size under 5,000 square feet; single family – lot size 10,000-39,999 square feet). The proposed Sketch Plan does not add to the diversity of the housing in Erie Highlands. The applicant anticipates providing the additional, required housing type in the future residential area zoned MR-Medium Density Residential in the east portion of the Erie Highlands Development.

Parks and Open Space:

The Erie Highlands PUD contains a "Parks & Open Space" dedication table that identifies the overall park and open space dedication requirements. The table includes:

- Community Park: The full development of Erie Highlands requires a dedication of 13.87 acres of community park land. The Board of Trustees approved a fee in lieu of land dedication for the Community Park dedication requirement. A fee in lieu will be calculated with each final plat and included in the associated development agreement.
- Neighborhood Park: The applicant is required to dedicate an 8.32 acre neighborhood park within Planning Area 13 of the Erie Highlands PUD.
- Pocket Park: A 1 acre pocket park is required in the PUD for Planning Area 6. The applicant has met this requirement in the Sketch Plan submittal.
- Open Space:

- The open space dedication requirement for the full development of Erie Highlands is 47.15 acres. The Board of Trustees approved a minimum dedication of 32.65 acres of open space to the Town and the remainder of the dedication requirement is to be paid as a fee in lieu.
- MC 10.6.3 C.4.: The open space dedication on the current PUD was approved by the Board of Trustees with the approval of the PUD. The oil/gas well sites and the WAPA overhead power line easement are not included in public dedication acreage. There are some areas of the open space that are narrower than 300 feet; however, they contain trails in which the Town approved these narrower areas.
- The applicant is proposing to modify the open space dedication areas that are defined on the approved Erie Highlands PUD Zoning Map. This will require a PUD rezoning amendment application.
- The Sketch Plan represents an open space dedication amount of 31 acres; combined with the proposed open space dedication in Erie Highlands Filing 1-7, Erie Highlands would provide a total of 33.38 acres of open space dedication within the development. Public open space dedication is not anticipated in the future development areas (northeast) within Erie Highlands.

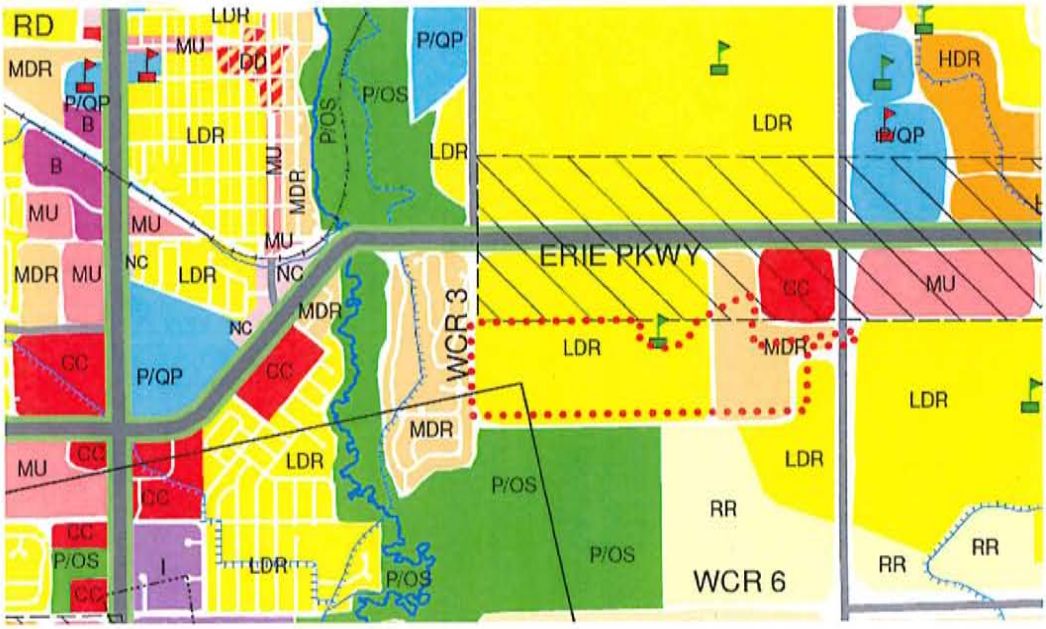
Open Space and Trails Advisory Board:

The Open Space and Trails Advisory Board have provided the applicant with comments in the attached memo.

Compliance with Town of Erie Comprehensive Plan:

The Land Use designations, in this portion of the Erie Highlands development, on the 2005 Comprehensive Plan, Land Use Plan Map are:

- LDR – Low Density Residential (Gross Density of 2-6 Dwelling Units/Acre)
- MDR – Medium Density Residential (Gross Density of 6-12 DU/Acre)



Compliance with Municipal Code Title 10 (UDC)

Town staff has reviewed the proposed Sketch Plan for compliance with the UDC and has provided the applicant with comments in the attached memo.

Compliance with the Erie Highlands Zoning Map/ Erie Highlands PUD Zoning Map

Town staff has reviewed the proposed Sketch Plan for compliance with the zoning and PUD overlay zoning and has provided the applicant with comments in the attached memo.

Natural Areas Inventory and Endangered Species:

The Town of Erie, Natural Areas Inventory has two natural areas identified in Erie Highlands as part of the Town wide inventory that was done in 2008. The natural areas report sheet is attached to this memo.

- Inventory Site #75: Only the northeast portion of this natural area is on the property. The WAPA utility lines provide excellent perches for raptors.
- Inventory Site #76: This site is fully on the west end of the property. A prairie dog colony was noted which would make it a potential site for burrowing owls. The prairie dog colony is considered a raptor hunting ground.

SKETCH PLAN PROCESS:

Below is the process outlined in Title 10 (UDC) of the Municipal Code for Sketch Plan review.

Step 2A (Development Application Submittal – Sketch Plan)

Two types of application submittals are required – first, a Sketch Plan, followed by a Preliminary Plat. The Sketch Plan requirements are listed in this Subsection. The Preliminary Plat requirements are listed below as "Step 2B." Applications for Subdivision shall only be accepted for property annexed into the municipality. A Subdivision application cannot be reviewed concurrently with an annexation application.

a. **Purpose**
A Sketch Plan represents a generalized land use plan and layout for the area proposed to be included within a subdivision. Sketch Plan is required to allow early, informal evaluation of a proposed subdivision before detailed planning and engineering work has been undertaken and before substantial expenses have been incurred by the applicant.

b. **Sketch Plan Submittal Requirements**
A Sketch Plan shall be prepared and submitted to the Community Development Director pursuant to the User's Guide. An Alta Survey shall be prepared and submitted to illustrate the existing conditions on the property and, at a minimum, the Sketch Plan shall contain the following:
   i. Uses proposed;
   ii. Intensity or density of uses proposed;
   iii. Location of public and private open space;
   iv. Drainage Facilities;

v. Road, street, and pedestrian networks proposed; and
vi. Existing or proposed utilities and public services for the development.

c. **Staff Review**
The Community Development Department shall review the Sketch Plan, focusing on standards and criteria of this UDC that are applicable to the proposed development. The Community Development Department shall summarize the results of the review in writing and provide a copy to the applicant. The summary shall include any special information regarding the proposed project, plus an evaluation of the proposal with respect to the current policies of the Town, identifying areas of potential compatibility or conflict with these policies. All comments made by the Community Development Department shall not be binding on the Town's consideration of any subsequent application, and are intended only to provide an informal evaluation of the proposed project.

d. **Meeting to Discuss Sketch Plan**
At the request of the Community Development Director or applicant, the parties shall meet to discuss the results of the review. The applicant shall be informed of the necessary provisions of this UDC relating to subdivision application, including submittal requirements, required public improvements, design standards, and Development Agreements. The Community Development Director shall inform the applicant whether or not a Planning Commission Review shall be required.

e. **Planning Commission Review**
In addition to the staff review the Community Development Director may require that the Sketch Plan be reviewed by the Planning Commission or the applicant may request this review. The staff review summary shall be submitted to the Planning Commission for consideration. All comments made by the Planning Commission shall not be binding on the Town's consideration of any subsequent application, and are intended only to provide an informal evaluation of the proposed project.

f. **Effect of Review**
The Sketch Plan is not part of a formal application for approval of a subdivision and any comments made by the Town in reaction to a Sketch Plan shall not be binding on the Town's consideration of any subsequent Preliminary or Final Plat application, nor result in a vested property right under this UDC or State Statute. Since the Sketch Plan is conceptual only, there are no lapse provisions applicable.

ERIE HIGHLANDS ZONING MAP

A PART OF THE NORTH HALF OF
SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST
OF THE SIXTH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO.
305.126 ACRES
RZ-13-00020

OVERALL BOUNDARY DESCRIPTION

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'28" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID NORTH LINE, NORTH 88°48'28" EAST, A DISTANCE OF 2,648.08 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE NORTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20, NORTH 88°46'06" EAST, A DISTANCE OF 2648.24 FEET TO THE NORTHEAST CORNER OF SAID SECTION 20;

THENCE ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, SOUTH 00°00'25" WEST, A DISTANCE OF 1720.04 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 309 AT PAGE 79, IN THE OFFICE OF THE CLERK AND RECORDER OF WELD COUNTY;

THENCE DEPARTING SAID EAST LINE AND ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°55'29" WEST, A DISTANCE OF 430.59 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID NORTHERLY BOUNDARY, NORTH 89°58'35" WEST, A DISTANCE OF 27.44 FEET TO THE NORTHWEST CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'25" WEST, A DISTANCE OF 5.38 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 309 AT PAGE 79;

THENCE ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°55'29" WEST, A DISTANCE OF 768.24 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 814 AT PAGE 231, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY, WESTERLY AND SOUTHERLY BOUNDARIES OF SAID PARCEL THE FOLLOWING THREE (3) COURSES:

1) SOUTH 78°55'29" WEST, A DISTANCE OF 250.00 FEET;

2) SOUTH 11°04'31" EAST, A DISTANCE OF 125.00 FEET;

3) NORTH 78°55'29" EAST, A DISTANCE OF 250.00 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL DESCRIBED IN BOOK 309 AT PAGE 79;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL, NORTH 78°55'29" EAST, A DISTANCE OF 744.78 FEET TO A POINT ON THE WESTERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 1179 AT PAGE 541;

THENCE ALONG SAID WESTERLY BOUNDARY, SOUTH 00°00'25" WEST, A DISTANCE OF 78.02 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1044 AT RECEPTION NO. 1983188, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY BOUNDARY OF SAID PARCEL, SOUTH 89°05'08" WEST, A DISTANCE OF 225.15 FEET TO THE NORTHWESTERLY CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'21" WEST, A DISTANCE OF 650.47 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL AND A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'07" WEST, A DISTANCE OF 1,062.78 FEET TO THE CENTER QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20, SOUTH 89°05'29" WEST, A DISTANCE OF 2640.94 FEET TO THE WEST QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, NORTH 00°21'43" WEST, A DISTANCE OF 2629.51 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 305.126 ACRES, (13,291,297 SQUARE FEET), MORE OR LESS.

MEDIUM RESIDENTIAL ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'28" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, SOUTH 00°00'25" WEST, A DISTANCE OF 1,720.04 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 309 AT PAGE 79, IN THE OFFICE OF THE CLERK AND RECORDER OF WELD COUNTY AND THE POINT OF BEGINNING;

THENCE DEPARTING SAID EAST LINE AND ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°55'29" WEST, A DISTANCE OF 430.59 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID NORTHERLY BOUNDARY, NORTH 89°58'35" WEST, A DISTANCE OF 27.44 FEET TO THE NORTHWEST CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'25" WEST, A DISTANCE OF 5.38 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 309 AT PAGE 79;

THENCE ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°55'29" WEST, A DISTANCE OF 768.24 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 814 AT PAGE 231, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY BOUNDARY OF SAID PARCEL, SOUTH 78°55'29" WEST, A DISTANCE OF 250.00 FEET;

THENCE DEPARTING SAID NORTHERLY BOUNDARY, SOUTH 89°58'45" WEST, A DISTANCE OF 128.09 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 1,135.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS NORTH 84°33'06" WEST;

THENCE NORTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 31°45'48", AN ARC LENGTH OF 629.21 FEET;

THENCE SOUTH 64°58'03" WEST, A DISTANCE OF 188.11 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHERLY HAVING A RADIUS OF 475.00 FEET;

THENCE WESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'36", AN ARC LENGTH OF 197.67 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 88°48'28" WEST, A DISTANCE OF 398.25 FEET;

THENCE NORTH 01°11'21" WEST, A DISTANCE OF 623.28 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 20.00 FEET;

THENCE NORTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 90°00'00", AN ARC LENGTH OF 31.42 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 88°48'28" WEST, A DISTANCE OF 378.72 FEET;

THENCE NORTH 01°11'21" WEST, A DISTANCE OF 830.07 FEET TO A POINT ON THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID NORTH LINE, NORTH 88°48'28" EAST, A DISTANCE OF 36.88 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE NORTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20, NORTH 88°46'06" EAST, A DISTANCE OF 1,423.51 FEET;

THENCE DEPARTING SAID NORTH LINE, SOUTH 01°11'06" EAST, A DISTANCE OF 282.17 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 475.00 FEET;

THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'32", AN ARC LENGTH OF 197.70 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 25°01'37" EAST, A DISTANCE OF 423.53 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 475.00 FEET;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 18°51'30", AN ARC LENGTH OF 156.39 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 06°10'08" EAST, A DISTANCE OF 238.04 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 450.00 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 89°58'35" EAST, A DISTANCE OF 477.85 FEET TO A POINT ON THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID EAST LINE, SOUTH 00°00'25" WEST, A DISTANCE OF 28.22 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 37.618 ACRES, (2,308,823 SQUARE FEET), MORE OR LESS.

COMMUNITY COMMERCIAL ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTHEAST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'28" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, SOUTH 00°00'25" WEST, A DISTANCE OF 1,691.82 FEET;

THENCE DEPARTING SAID EAST LINE, NORTH 89°58'35" WEST, A DISTANCE OF 477.85 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 450.00 FEET;

THENCE NORTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 83°48'27", AN ARC LENGTH OF 658.25 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 06°10'08" WEST, A DISTANCE OF 238.04 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 475.00 FEET;

THENCE NORTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 18°51'30", AN ARC LENGTH OF 156.39 FEET;

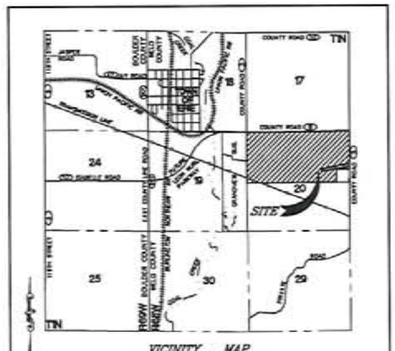
THENCE TANGENT TO SAID CURVE, NORTH 25°01'37" WEST, A DISTANCE OF 423.53 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 475.00 FEET;

THENCE NORTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'32", AN ARC LENGTH OF 197.70 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 01°11'06" WEST, A DISTANCE OF 282.17 FEET TO A POINT ON THE NORTH LINE OF SAID NORTHEAST QUARTER;

THENCE ALONG SAID NORTH LINE, NORTH 88°46'06" EAST, A DISTANCE OF 1,224.73 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 39.550 ACRES, (1,722,809 SQUARE FEET), MORE OR LESS.



VICINITY MAP
SCALE: 1"=3000'

LOW RESIDENTIAL ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'28" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID NORTH LINE, NORTH 88°48'28" EAST, A DISTANCE OF 2,611.10 FEET;

THENCE DEPARTING SAID NORTH LINE, SOUTH 01°11'21" EAST, A DISTANCE OF 830.07 FEET;

THENCE SOUTH 88°48'28" WEST, A DISTANCE OF 147.83 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 265.00 FEET;

THENCE SOUTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 63°18'20", AN ARC LENGTH OF 292.80 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 25°30'18" WEST, A DISTANCE OF 174.67 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 440.00 FEET;

THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 25°42'58", AN ARC LENGTH OF 197.49 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 00°12'39" EAST, A DISTANCE OF 59.82 FEET;

THENCE NORTH 89°47'21" EAST, A DISTANCE OF 140.84 FEET;

THENCE SOUTH 00°12'39" EAST, A DISTANCE OF 272.04 FEET;

THENCE SOUTH 53°38'57" WEST, A DISTANCE OF 87.18 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 365.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS NORTH 53°38'57" EAST;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 54°36'57", AN ARC LENGTH OF 347.81 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 89°02'08" EAST, A DISTANCE OF 181.63 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 365.00 FEET;

THENCE NORTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 90°13'29", AN ARC LENGTH OF 574.77 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 01°11'21" WEST, A DISTANCE OF 23.81 FEET;

THENCE NORTH 88°48'28" EAST, A DISTANCE OF 398.25 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHERLY HAVING A RADIUS OF 475.00 FEET;

THENCE EASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'36", AN ARC LENGTH OF 197.67 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 64°58'03" EAST, A DISTANCE OF 188.11 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 1,135.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS SOUTH 84°41'06" WEST;

THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 31°45'48", AN ARC LENGTH OF 629.21 FEET;

THENCE NON-TANGENT TO SAID CURVE, NORTH 89°59'43" EAST, A DISTANCE OF 128.09 FEET TO THE NORTHWESTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 814 AT PAGE 231, IN THE OFFICE OF THE CLERK AND RECORDER OF WELD COUNTY;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 11°04'31" EAST, A DISTANCE OF 125.00 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL, NORTH 78°55'29" EAST, A DISTANCE OF 250.00 FEET TO THE SOUTHWESTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 309 AT PAGE 79, IN SAID RECORDS;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL, NORTH 78°55'29" EAST, A DISTANCE OF 744.78 FEET TO A POINT ON THE WESTERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID WESTERLY BOUNDARY, SOUTH 00°00'25" WEST, A DISTANCE OF 78.02 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1044 AT RECEPTION NO. 1983188, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY BOUNDARY OF SAID PARCEL, SOUTH 89°05'08" WEST, A DISTANCE OF 225.15 FEET TO THE NORTHWESTERLY CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'21" WEST, A DISTANCE OF 650.47 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL AND A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'07" WEST, A DISTANCE OF 1,062.78 FEET TO THE CENTER QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20, SOUTH 89°05'29" WEST, A DISTANCE OF 1102.70 FEET;

THENCE DEPARTING SAID SOUTH LINE, NORTH 47°12'22" WEST, A DISTANCE OF 1013.25 FEET;

THENCE NORTH 00°21'37" WEST, A DISTANCE OF 348.82 FEET;

THENCE SOUTH 89°50'36" WEST, A DISTANCE OF 799.02 FEET TO A POINT ON THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID WEST LINE, NORTH 00°21'43" WEST, A DISTANCE OF 1,509.10 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 164.358 ACRES, (7,159,451 SQUARE FEET), MORE OR LESS.

AG-OPEN SPACE ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE WEST QUARTER CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'28" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID WEST LINE, NORTH 00°21'43" WEST, A DISTANCE OF 1059.41 FEET;

THENCE DEPARTING SAID WEST LINE, NORTH 89°50'36" EAST, A DISTANCE OF 799.02 FEET;

THENCE SOUTH 00°21'37" EAST, A DISTANCE OF 348.82 FEET;

THENCE SOUTH 47°12'22" EAST, A DISTANCE OF 1013.25 FEET TO A POINT ON THE SOUTH LINE OF SAID NORTHWEST QUARTER;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'29" WEST, A DISTANCE OF 1538.24 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 25.276 ACRES, (1,101,030 SQUARE FEET), MORE OR LESS.

PUBLIC LANDS - INSTITUTIONS ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTH QUARTER CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'28" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID NORTH LINE, SOUTH 88°48'28" WEST, A DISTANCE OF 36.98 FEET;

THENCE DEPARTING SAID NORTH LINE, SOUTH 01°11'21" EAST, A DISTANCE OF 830.07 FEET TO THE POINT OF BEGINNING;

THENCE NORTH 88°48'28" EAST, A DISTANCE OF 378.72 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 20.00 FEET;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 90°00'00", AN ARC LENGTH OF 31.42 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 01°11'21" EAST, A DISTANCE OF 547.09 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 365.00 FEET;

THENCE SOUTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 90°13'29", AN ARC LENGTH OF 574.77 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 89°02'08" WEST, A DISTANCE OF 181.63 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 365.00 FEET;

THENCE NORTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 54°36'48", AN ARC LENGTH OF 347.81 FEET;

THENCE NON-TANGENT TO SAID CURVE, NORTH 53°38'57" EAST, A DISTANCE OF 87.18 FEET;

THENCE NORTH 00°12'39" WEST, A DISTANCE OF 272.04 FEET;

THENCE SOUTH 89°47'21" WEST, A DISTANCE OF 140.84 FEET;

THENCE NORTH 00°12'39" WEST, A DISTANCE OF 59.82 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 440.00 FEET;

THENCE NORTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 25°42'58", AN ARC LENGTH OF 197.49 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 25°30'18" EAST, A DISTANCE OF 174.67 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 265.00 FEET;

THENCE NORTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 63°18'20", AN ARC LENGTH OF 292.80 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 88°48'28" EAST, A DISTANCE OF 147.83 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 18.323 ACRES, (798,172 SQUARE FEET), MORE OR LESS.

GENERAL NOTES

1. THE BEARINGS SHOWN HEREON ARE BASED UPON THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF WELD, STATE OF COLORADO, ASSUMED TO BEAR NORTH 88°48'28" EAST, A DISTANCE OF 2648.08 FEET BETWEEN FOUND MONUMENTS AS SHOWN HEREON.
2. NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVERED SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.
3. DISTANCES ON THIS MAP ARE GROUND DISTANCES EXPRESSED IN U.S. SURVEY FEET AND DECIMALS THEREOF. A U.S. SURVEY FOOT IS DEFINED AS EXACTLY 1200/3937 METERS.
4. THIS ZONING MAP IS NOT AN IMPROVEMENT SURVEY PLAT, NOR IS IT A LAND SURVEY PLAT, IT IS INTENDED TO SHOW THE ZONING AREAS DESCRIBED IN THE LEGAL DESCRIPTIONS.
5. ADJACENT TOWN ZONING BASED ON TOWN OF ERIE ZONING MAP WITH A REVISION DATE OF 11/16/2012. COUNTY ZONING INFORMATION FROM COUNTY WEBSITE ZONING MAPPING APPLICATION ACCESSED 04/15/2013.

SURVEYOR'S CERTIFICATE

I, DEREK BROWN, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS ZONING MAP TRULY AND CORRECTLY REPRESENTS THE ABOVE DESCRIBED LEGAL DESCRIPTIONS FOR EACH ZONE DISTRICT.

I ATTEST TO THE ABOVE ON THIS ________ DAY OF ____________________, 2013.

COLORADO LICENSED DEREK S. BROWN 38064 PROFESSIONAL LAND SURVEYOR

____
DEREK BROWN
COLORADO REGISTERED PROFESSIONAL LAND SURVEYOR # 38064
FOR AND ON BEHALF OF AZTEC CONSULTANTS, INC.

PLANNING COMMISSION CERTIFICATE

THIS ZONING MAP WAS REVIEWED BY THE PLANNING COMMISSION ON THE _____ DAY OF __________, 2013.

____
CHAIRPERSON DATE

BOARD OF TRUSTEES APPROVAL CERTIFICATE

THIS ZONING MAP IS TO BE KNOWN AS THE ERIE HIGHLANDS ZONING MAP AND IS APPROVED AND ACCEPTED BY ORDINANCE NO. ____________ PASSED AND ADOPTED AT THE REGULAR MEETING OF THE BOARD OF TRUSTEES OF ERIE, COLORADO, HELD ON ____________, 2013.

____
MAYOR

ATTEST ____________________________
TOWN CLERK

CLERK & RECORDER CERTIFICATE

STATE OF COLORADO)
) ss.
COUNTY OF WELD)

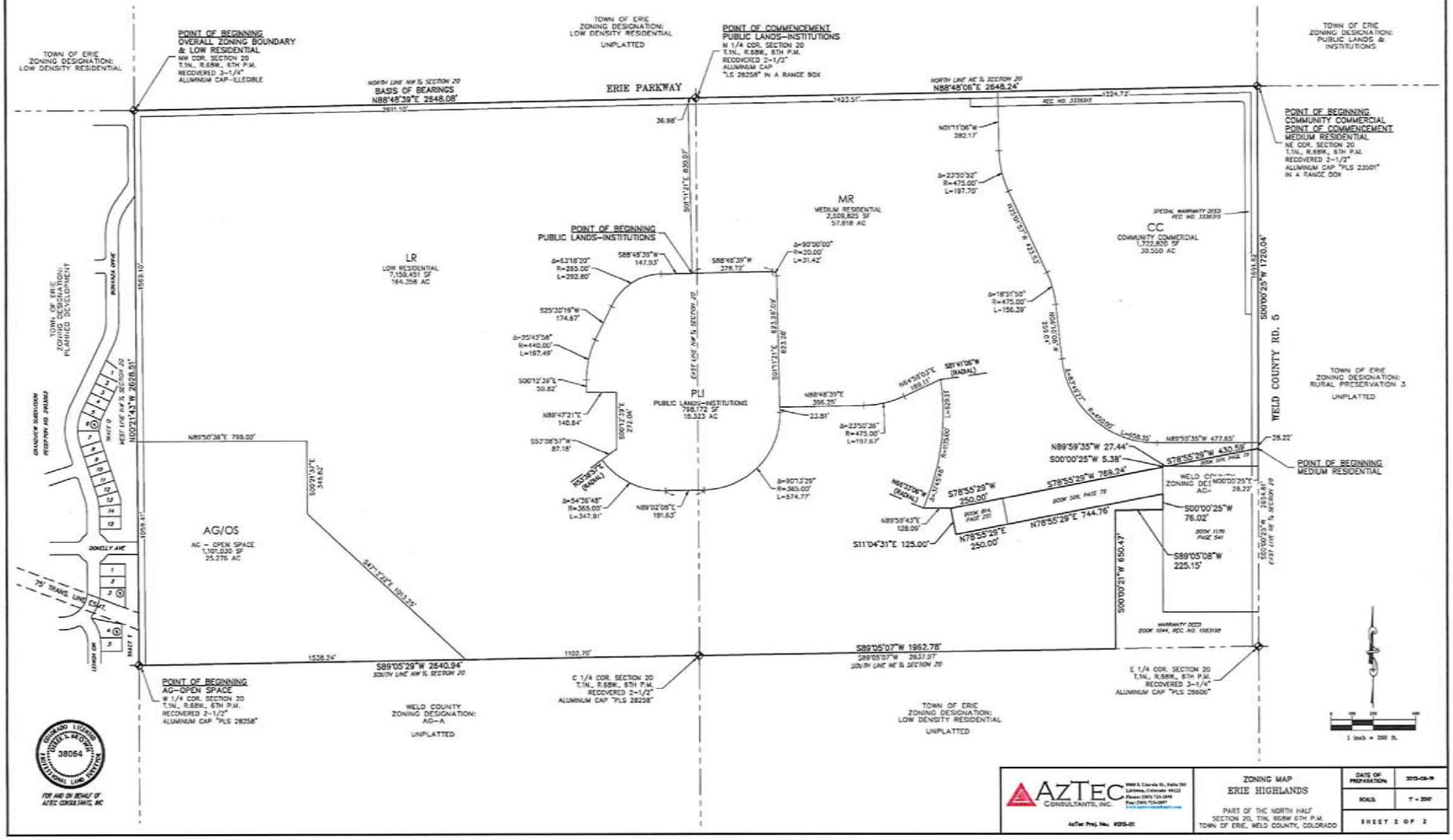
I DO HEREBY CERTIFY THAT THIS ZONING MAP WAS FILED IN MY OFFICE ON THIS ___ DAY OF ________ 2013 A.D. AND WAS RECORDED AT RECEPTION NUMBER ____________.

____
WELD COUNTY CLERK AND RECORDER

AZTEC CONSULTANTS, INC. AzTec Proj. No. [illegible]	ZONING MAP ERIE HIGHLANDS PART OF THE NORTH HALF SECTION 20, T1N, R68W 6TH P.M. TOWN OF ERIE, WELD COUNTY, COLORADO	DATE OF PREPARATION	2013-0[illegible]
		SCALE	NA
		SHEET 1 OF 2	

ERIE HIGHLANDS ZONING MAP

A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO.
305.126 ACRES
RZ-13-00020



AZTEC CONSULTANTS, INC.

AzTec Proj. No. 1013-01

ZONING MAP
ERIE HIGHLANDS

PART OF THE NORTH HALF
SECTION 20, T1N, R68W 6TH P.M.
TOWN OF ERIE, WELD COUNTY, COLORADO

DATE OF PREPARATION	2013-08-19
SCALE	1" = 200'
SHEET 2 OF 2	

ERIE HIGHLANDS PUD ZONING MAP

A PORTION OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
305.126 ACRES
PUD-13-00021

OVERALL BOUNDARY DESCRIPTION:

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'39" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID NORTH LINE, NORTH 88°48'39" EAST, A DISTANCE OF 2,648.08 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE NORTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20, NORTH 88°48'06" EAST, A DISTANCE OF 2648.24 FEET TO THE NORTHEAST CORNER OF SAID SECTION 20;

THENCE ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, SOUTH 00°00'25" WEST, A DISTANCE OF 1720.04 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 509 AT PAGE 79, IN THE OFFICE OF THE CLERK AND RECORDER OF WELD COUNTY;

THENCE DEPARTING SAID EAST LINE AND ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°55'29" WEST, A DISTANCE OF 430.59 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID NORTHERLY BOUNDARY, NORTH 89°59'35" WEST, A DISTANCE OF 27.44 FEET TO THE NORTHWEST CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'25" WEST, A DISTANCE OF 5.38 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 509 AT PAGE 79;

THENCE ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°55'29" WEST, A DISTANCE OF 769.24 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 509 AT PAGE 79, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY, WESTERLY AND SOUTHERLY BOUNDARIES OF SAID PARCEL THE FOLLOWING THREE (3) COURSES:

1) SOUTH 78°55'29" WEST, A DISTANCE OF 250.00 FEET;

2) SOUTH 11°04'31" EAST, A DISTANCE OF 125.00 FEET;

3) NORTH 78°55'29" EAST, A DISTANCE OF 250.00 FEET TO THE SOUTHWESTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 509 AT PAGE 79, IN SAID RECORDS;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL, NORTH 78°55'29" EAST, A DISTANCE OF 744.76 FEET TO A POINT ON THE WESTERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID WESTERLY BOUNDARY, SOUTH 00°00'25" WEST, A DISTANCE OF 76.02 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1044 AT RECEPTION NO. 1983198, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY BOUNDARY OF SAID PARCEL, SOUTH 89°05'08" WEST, A DISTANCE OF 225.15 FEET TO THE NORTHWESTERLY CORNER OF SAID PARCEL;

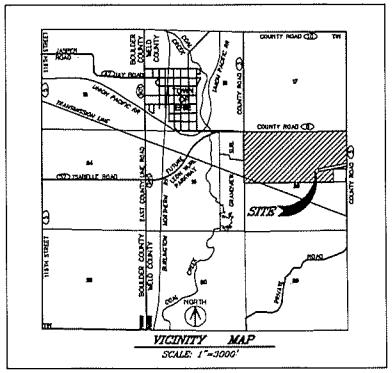
THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'21" WEST, A DISTANCE OF 650.47 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL AND A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'07" WEST, A DISTANCE OF 1,962.78 FEET TO THE CENTER QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20, SOUTH 89°05'29" WEST, A DISTANCE OF 2640.94 FEET TO THE WEST QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, NORTH 00°21'46" WEST, A DISTANCE OF 2628.51 FEET TO THE **POINT OF BEGINNING.**

CONTAINING AN AREA OF 305.126 ACRES, (13,291,297 SQUARE FEET), MORE OR LESS.



NOTES:
1. THIS PUD ZONING MAP MODIFIED THE DIMENSIONAL STANDARDS SET FORTH IN THE TOWN OF ERIE UDC AS PROVIDED FOR IN SECTION 10.2.7.D.
2. IN THE EVENT THAT THERE IS ANY DISCREPENCY BETWEEN THE CODE AND THIS PUD, THE PUD SHALL CONTROL. ANY PROVISIONS THAT ARE NOT SPECIFICALLY ADDRESSED IN THIS PUD ZONING MAP SHALL COMPLY WITH THE CODE.
3. THE MAXIMUM NUMBER OF UNITS ALLOWED IN THIS PUD IS 994.

SURVEYOR'S CERTIFICATE

I, DEREK BROWN, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS PUD ZONING MAP TRULY AND CORRECTLY REPRESENTS THE ABOVE DESCRIBED LEGAL DESCRIPTIONS FOR EACH PUD OVERLAY ZONE DISTRICT.

I ATTEST TO THE ABOVE ON THIS _____DAY OF _____, 2013.

_____
DEREK BROWN

COLORADO REGISTERED PROFESSIONAL LAND SURVEYOR #

PLANNING COMMISSION CERTIFICATE

THIS PUD ZONING MAP WAS REVIEWED BY THE PLANNING COMMISSION ON THE _____DAY OF _____, 2013.

_____ _____
CHAIRPERSON DATE

BOARD OF TRUSTEES APPROVAL CERTIFICATE

THIS PUD ZONING MAP IS TO BE KNOWN AS THE "ERIE HIGHLANDS PUD ZONING MAP" AND IS APPROVED AND ACCEPTED BY ORDINANCE NO._____, PASSED AND ADOPTED AT THE REGULAR MEETING OF THE BOARD OF TRUSTEES OF ERIE, COLORADO, HELD ON _____, 2013.

_____
MAYOR

ATTEST _____
TOWN CLERK

CLERK & RECORDER CERTIFICATE

STATE OF COLORADO)
) ss.
COUNTY OF WELD)

I DO HEREBY CERTIFY THAT THIS PUD ZONING MAP WAS FILED IN MY OFFICE ON THIS _____ DAY OF _____, 2013 A.D. AND WAS RECORDED AT RECEPTION NUMBER _____.

_____
_____ ___ COUNTY CLERK AND RECORDER

APPLICANT
OAKWOOD HOMES LLC
4908 TOWER ROAD
DENVER, CO 80249
(303) 486-8500
CONTACT: CHAD ELLINGTON

OWNER
J DEARMIN LLC
10343 FEDERAL BOULEVARD
UNIT 515
WESTMINSTER, CO 80260
CONTACT: JAMES DEARMIN

OWNER
J GAZ LLC
4955 WEST 65TH AVENUE
ARVADA, CO 80003
CONTACT: JOHNNY GAZ

OWNER
THE JACK SHELL & SONYA SHELL FAMILY TRUSTS
10015 MEADE COURT
WESTMINSTER, CO 80031
CONTACT: JACK SHELL

OWNER
WY&K HOLDINGS, LLC
28221 HIDDEN VILLAGE DRIVE
EVERGREEN, CO 80439
CONTACT: ROBERT E. YOULE

PLANNER
TERRACINA DESIGN
9025 E KENYON AVE
SUITE 219
DENVER, CO 80237
(720) 263-4866
CONTACT: LAYLA ROSALES

ENGINEER
ENGINEERING PARTNERS
1950 WEST LITTLETON BLVD.
SUITE 109
LITTLETON, COLORADO 80120
(303)709-4680
CONTACT: DAVID FORBES

SURVEYOR
AZTEC CONSULTANTS
8000 S. LINCOLN ST, STE 201
LITTLETON, COLORADO 80122
(303)713-1898
CONTACT: DEREK BROWN

SHEET INDEX

1 COVER
2 PUD PLAN
3 PUD NOTES

Terracina Design
Land Planning & Landscape Architecture
9025 E. Kenyon Ave. Suite 219
Denver, CO 80237
Phone: (720) 263-4866
www.TerracinaDesign.com

PROJECT NAME

ERIE HIGHLANDS
PUD ZONING MAP
TOWN OF ERIE, COLORADO

SHEET TITLE

COVER SHEET

SHEET NUMBER

1

SHEET 1 OF 3

SEPTEMBER 13, 2013

\\Projects\Projects\Erie Highlands PUD\Admin\Erie Highlands-PUD Cover Sheet.dwg

ERIE HIGHLANDS PUD ZONING MAP

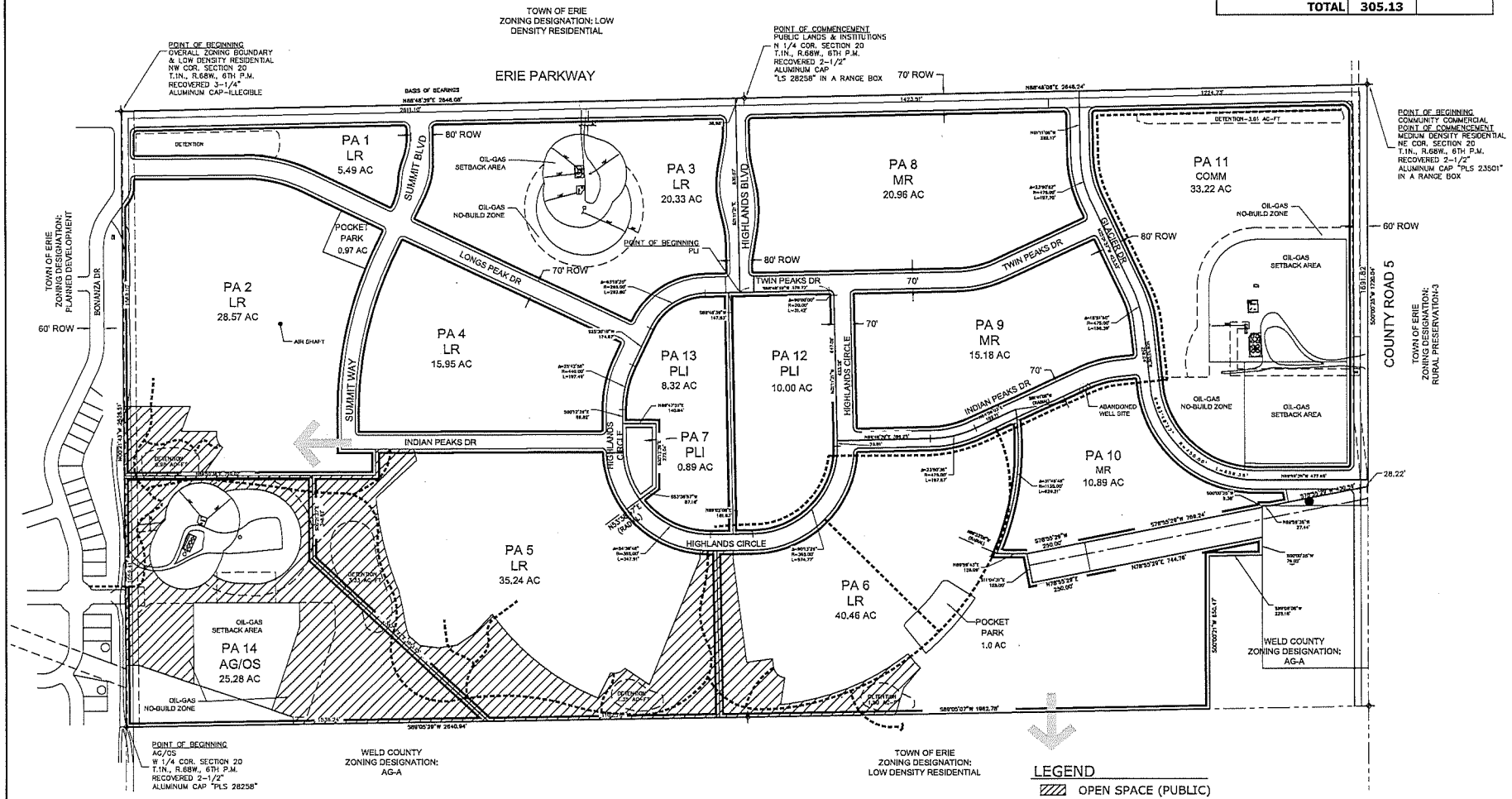
A PORTION OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
305.126 ACRES
PUD-13-00021

PARKS & OPEN SPACE

PARK AREA	ACRES REQUIRED	ACRES TO BE PROVIDED
COMMUNITY PARK	13.87	FEE IN LIEU
NEIGHBORHOOD PARK	8.32	8.32
POCKET PARK	1.39	1.97
OPEN SPACE (PUBLIC)	47.15	32.65 + FEE IN LIEU

DEVELOPMENT SUMMARY

LAND USE	ACRES	% ACRES
Residential	175.66	57.6%
Commercial	33.22	10.9%
School	10.00	3.3%
Parks & Open Space	51.90	17.0%
Right-of-Way	34.35	11.3%
TOTAL	305.13	



Terracina Design

PROJECT NAME

ERIE HIGHLANDS
PUD ZONING MAP
TOWN OF ERIE, COLORADO

SHEET TITLE

PUD PLAN

SHEET NUMBER

2

SHEET 2 OF 3

SEPTEMBER 13, 2013

ERIE HIGHLANDS PUD ZONING MAP

A PORTION OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
305.126 ACRES
PUD-13-00021

ARCHITECTURAL STANDARDS-SINGLE FAMILY RESIDENTIAL DETACHED

1. Architectural Variety and Character
   a. Architectural Variety

      I. Design Standards
      (A) No identical model plan elevation shall be repeated directly across any street from the same model plan and elevation.
      (B) No identical model plan elevation shall be repeated more than once within every 4 lots on the same side of any street.
      (C) A minimum of 3 alternative elevations for each model plan shall be submitted to the Town for review.

   b. Architectural Character
      Each single family detached model plan and elevation shall demonstrate the following design attributes:

      I. Design Standards

      (A) Each elevation shall include a minimum of two windows (or one window and one door) per floor.
      (B) Each front and rear elevation shall include more than one wall plane. Articulation that adds shadow and visual interest is encouraged.
      (C) A variety of roof forms should be used. Single unbroken roof pitches should be avoided, except where a single roof treatment is an essential element of the Architectural Style. (e.g. Mansard)
      (D) The main roof should extend beyond the primary façade by a minimum of one foot.
      (E) An elevation of the home that faces a street, park, trail corridor or open space area shall provide an "Enhanced Elevation". An "Enhanced Elevation" shall provide three or more of the following design enhancements listed in (1) through (5) below. Application of the design enhancement shall be applied in a manner that is consistent with the style of the home. Side and rear elevation design enhancements shall be consistent with the design elements of the front elevation.

         (1) The addition of one window unit.
         (2) A change in wall plane by providing one or more of the following options:
            - An additional wall plane change. Minimum six feet in width and one foot projection.
            - A projecting or cantilevered living space.
            - A bay or boxed window.
         (3) A covered porch or deck.
         (4) The addition of architectural detail elements such as: shutters, eave brackets, exposed rafter tails, corbels, lintels, trellises, columns or pilasters.
         (5) The use of a minimum of two exterior cladding materials that can include materials such as masonry (cultured stone, stone, brick, stucco, or tile), lap siding, shingles, board and batten, or other decorative siding treatment.

      (F) Columns or posts extending more than 36 inches above the ground which support structural elements such as porches, decks, or roofs should appear to be of adequate mass to support the structure above. (No exposed 4"x4" posts shall be allowed more than 36 inches above the ground). Columns supporting upper story decks should be 8"x8" minimum finished.

      ii. Materials
      (A) All exterior materials shall be of high quality, used in applications and treated appropriately to provide an attractive and long lasting appearance.
      (B) When masonry cladding is used in locations where its mass is logical and appropriate. In instances where masonry wraps the exterior corner of the home the masonry should continue to a natural transition point such as an inside corner of a projecting wall, a column, a door or window or other logical point. In cases where no such feature exists near the corner, the masonry wrap shall extend at least six feet from the corner.

2. Orientation of Dwellings to the Street
   Each residence shall have at least one primary pedestrian doorway for access to the dwelling unit facing and generally visible from the front lot line of the property, and within twelve feet of the most forward plane of the ground level living space. On corner lots, the pedestrian doorway may face any adjacent street. An exception shall be made for alley-loaded single-family detached dwelling units that do not have street frontage but do front onto a park, or landscaped common area . In such case where the dwelling unit does not have street frontage, one primary pedestrian doorway shall be oriented toward a common pedestrian walk that connects to a street.

3. Garages
   These regulations for garages shall be applied to non-living space or storage areas within garages whether used for storage of automobiles or other items.
   a. Diversity of Garage Orientation:
      A. Except for garages oriented to alleys, all single family homes shall provide garages that meet one of the requirements below, and a variety in garage orientation by providing a minimum of two of the following garage orientations on any subdivision filing.

      - Recessed garage; where the primary garage door generally faces the front lot line and the garage is recessed a minimum of two feet behind the most forward plane of the main floor living space or a front porch.
      - Projecting garages; where the primary garage door generally faces the front lot line and the garage projects no more than fifteen feet from the front door.
      - Side loaded garages.
      - Garages recessed a minimum of two feet beneath a second floor living space.

   b. Width / Façade Ratio
      The width of a front loaded garage shall not exceed 65% of the width of the front elevation.
   c. Three or More Car Garage Orientation
      The third of more bay of any three or more garage shall either:
      I. Have a different orientation from the first two; or
      II. Shall be recessed behind the first two by at least two feet when having the same orientation; or
      III. Shall be tandem to the first two.

4. Front Stoop
   For model plans with a front stoop; the front stoop shall include the platform and stairs that are generally in front of a door that can be covered or uncovered. The maximum width of a covered front stoop shall be three feet in width from the side of the front door. Covered platforms that exceed three feet in width from the side of the front door shall be considered a front porch.

5. Front Porches
   For model plans with a front porch; the front porch shall be a minimum size of fifty square feet, excluding the stoop with a minimum depth of five feet.

DEVELOPMENT STANDARDS

PLANNING AREA	ZONE DISTRICT	MIN LOT WIDTH	MIN LOT NET AREA (SF)	FRONT SETBACK	FRONT SETBACK (PORCH)	STREET SETBACK	INTERIOR LOT LINE SETBACK	REAR SETBACK	MAX. HEIGHT
PA-1	LR	60(4)	6,000	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-2	LR	45 (4)	4,500	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-3	LR	60 (4)	6,000	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-4	LR	50(4)	5,000	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-5	LR	60 (4)	6,000	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-6	LR	45 (4)	4,500	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-7	MR	45 (4)	4,500	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-8	MR	40 (4)	2,800	16 (2)	10	10 (1)(4)	5 (1)	10	35'

(1) Permitted encroachments. Side setbacks shall allow for encroachments up to twelve(12) inches beyond the building foundation for window wells and above grade features including eaves, counterforts, fireplace box out, stoops, bay windows, room cantilevers and overhangs provided that the living space of the projection does not exceed six (6) feet in width. There shall be no more than two above grade encroachments per elevation totaling no more than twenty (20) sf.
(2) Front loaded garages shall be set back twenty (20) feet. A sixteen(16) foot front setback allowed with side loaded garage
(3) Unenclosed covered patios may project up to eight (8) feet into a rear setback. The projection shall be at least five feet from the property line.
(4) The minimum lot width shall be measured from the front setback line and shall be increased on corner lots to accommodate the additional side on street setback.

LAND USE SUMMARY

TRACT	ZONE DISTRICT	AREA (ACRES)	PRIMARY USE	DWELLING UNITS	PUBLIC OPEN SPACE PROVIDED
LOW DENSITY RESIDENTIAL					
PA 1	LR	5.49	SFD	7	
PA 2	LR	28.57	SFD	112	2.33
PA 3	LR	20.33	SFD	37	
PA 4	LR	15.95	SFD	95	
PA 5	LR	35.24	SFD	95	12.54
PA 6	LR	40.46	SFD	155	3.92
PA 7	LR	0.89	AMENITY	0	
SUBTOTAL		**146.93**			
RIGHT OF WAY		17.43			
SUBTOTAL		**164.36**		**501**	**18.8**
MEDIUM DENSITY RESIDENTIAL					
PA 8	MR	20.96	SFD	120	
PA 9	MR	15.18	SFD	170	
PA 10	MR	10.89	TH/ APT	203	
SUBTOTAL		**47.03**			
RIGHT OF WAY		12.32			
SUBTOTAL		**59.35**		**493**	
COMMUNITY COMMERCIAL					
PA 11		33.22	COMM		
SUBTOTAL		**33.22**			
RIGHT OF WAY		4.60			
SUBTOTAL		**37.82**			
PUBLIC LAND AND INSTITUTIONS					
PA 12		10.00	SCHOOL		
PA 13		8.32	N PARK		
SUBTOTAL		**18.32**			
AGRICULTURAL / OPEN SPACE					
PA 14		25.28	OPEN SPACE		13.86
SUBTOTAL		**25.28**			
TOTAL		**305.13**		**994**	**32.65**

NOTES

1. Density: Dwelling units may be transferred between planning areas in the same zone district as long as the maximum density allowed within that zone district is not exceeded.
2. Erie Parkway: Thirty (30) foot landscape buffer not required when a local road is directly adjacent. (i.e. frontage road condition). Thirty (30)foot landscape buffer is required when lots abut Erie Parkway right of way.
3. Fencing along Erie Parkway shall not exceed six feet in height which may include opaque fencing in straight runs limited to approximately 600 feet in length without a break and shall be limited to 30% of the total frontage of Erie Parkway. Masonry columns shall not exceed six feet in height with a four inch cap and shall be provided on corners of lots a minimum of every three lots for all opaque fencing along Erie Parkway.
4. Double frontage lots abutting collector or local roads shall be an additional 10 feet in depth. A twenty (20) foot landscape buffer will be provided along local and collector roads abutting double frontage lots.
5. Planning areas shown with apartments and townhomes land use designation shall be allowed to develop with lower density uses including single family attached and detached as long as the minimum housing diversity requirements and minimum gross density for the zone district are met.
6. The trail along Indian Peaks Drive within PA-6 and PA-10 shall be located within a landscape tract and meander.

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PROJECT NAME
ERIE HIGHLANDS
PUD ZONING MAP
TOWN OF ERIE, COLORADO

SHEET TITLE
PUD NOTES

SHEET NUMBER
3

SEPTEMBER 13, 2013

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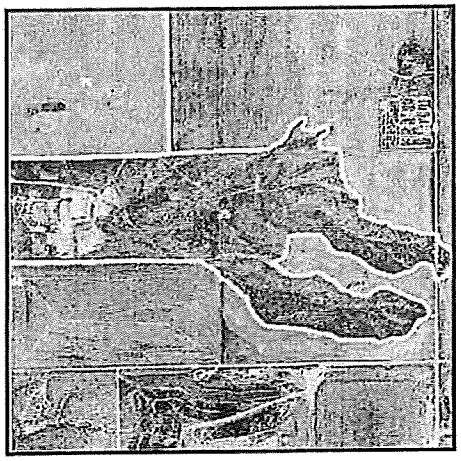
TOWN OF ERIE NATURAL AREAS INVENTORY



Site #: 75
Big Draw

Map: B2
Acres 177

This site is a shooting range with interesting topography created by rolling hills and swales.

Wetlands:
Wetland Functionality: 3

Wetland Value: 1

Landscape Context
Nearby Land Use:
Field without Crops
Subdivision
Natural Area

Habitat Types Present: 2
Agriculture
Other

Viewshed: From Site

Vegetation
Plant Communities: ADUD, CSL, ISAP

Vegetation Structure:
Forbs
Grass

County-listed Noxious Weeds:
Musk Thistle
Canada Thistle

Noxious Weed Cover 5
Ground Disturbance: 3
Plant Diversity: 2
Grassland Value: 0

Wildlife Habitat
Prairie Dog Habitat: 0%
Overall Wildlife Habitat Quality: 3

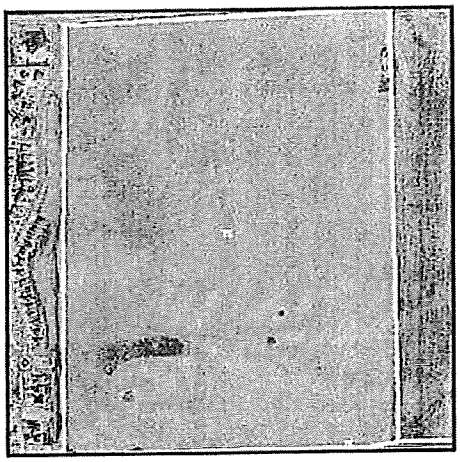
Wildlife Species of Concern:
ferruginous hawk, plains harvest mouse, hispid pocket mouse

Primary Factors Present	Secondary Factors Present
Water or wetland is present State or federally listed species potentially present	Site is larger than 3 acres Site is adjacent to another natural area One of the three vegetation structure types is in good condition

Wildlife Species Seen western meadowlark

Enhancement Effort: Low
Summary Rating: 13
Site Comments
This site comprises a large field with interesting topography created by rolling hills and swales. Monoculture stands of rye grass dominate the site and have out-competed other vegetation. This abundance of rye grass has kept the area devoid of other weeds. This also means that native species are few. The site is used as a shooting range. Utility lines overhead provide excellent perches for raptors such as ferruginous hawks that would forage on the adjacent prairie dog colonies. Access was denied to the site, and the evaluation was conducted from aerials and adjacent roads.

TOWN OF ERIE NATURAL AREAS INVENTORY



Site #: 76 Map: B2
Grandview Rectangular Field Acres 116

Grandview Rectangular Field is predominately a mowed field with a high percentage of bare ground, adjacent to the shooting range (site 75).

Wetlands:
Wetland Functionality: 0 Wetland Value: 1

Landscape Context
Nearby Land Use:
Field without Crops
Subdivision
Natural Area

Habitat Types Present: 1
Other

Viewshed: None

Vegetation
Plant Communities: CSL

Vegetation Structure:
Forbs
Grass

County-listed Noxious Weeds:

Noxious Weed Cover 5
Ground Disturbance: 3
Plant Diversity: 1
Grassland Value: 2

Wildlife Habitat
Prairie Dog Habitat: 20%
Overall Wildlife Habitat Quality: 5

Wildlife Species of Concern:
burrowing owl

Primary Factors Present	Secondary Factors Present
Water or wetland is present State or federally listed species potentially present Site is an irreplaceable source of food and cover, or important for breeding Prairie dogs present	Site is larger than 3 acres Site is adjacent to another natural area One of the three vegetation structure types is in good condition Site is potentially part of a corridor, or a lower quality corridor

Wildlife Species Seen black-tailed prairie dog

Enhancement Effort: Low
Summary Rating: 12
Site Comments
Grandview Rectangular Field is predominately a mowed field with a high percentage of bare ground, adjacent to the shooting range (site 75). A prairie dog colony was noted within the site. The vegetation consisted mainly of weedy forbs. No trees or shrubs were present. Wildlife in this polygon is likely confined to prairie dogs and burrowing owls, as there was no observable water or shelter present. Due to the prairie dog colony, however, this area would be suitable as a raptor hunting ground. Enhancement could include the planting of natives, but it presently looks as though the area is slated for residential development.

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 Highlands PA 5 and PA 6, PA 14

PROJECT ADDRESS: N/A. Located South of Indian Peaks Drive and Highlands Circle

PROJECT DESCRIPTION: Planning Areas 5 and 6 of the Erie Highlands PUD

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

Subdivision Name: Erie Highlands (see attached legal descriptions)

Filing #: Lot #: Block #: Section: Township: Range:

OWNER *(attach separate sheets if multiple)*

Name/Company: see attached

Contact Person:

Address:

City/State/Zip:

Phone: Fax:

E-mail:

AUTHORIZED REPRESENTATIVE

Company/Firm: Oakwood Homes, LLC

Contact Person: John Cheney

Address: 4908 Tower Road

City/State/Zip: Denver, CO 80249

Phone: 303-486-8567 Fax:

E-mail: jcheney@oakwoodhomesco.com

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

Name/Company: William H Peltier / Boulder Valley Coal Co.

Address: 5503 S. Franklin Lane

City/State/Zip: Littleton, CO 80121

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

Name/Company: Encana Oil & Gas Inc.

Address: 370 17th Street, Suite 1700

City/State/Zip: Denver, CO 80202

LAND-USE & SUMMARY INFORMATION

Present Zoning: LR

Proposed Zoning: LR

Gross Acreage: 101.71

Gross Site Density (du/ac): 2.33 du/ac

Lots/Units Proposed: 243

Gross Floor Area:

SERVICE PROVIDERS

Electric: United Power

Metro District: Erie Highlands Metro District No. 1

Water *(if other than Town)*:

Gas: XCel Energy

Fire District: Mountain View Fire District

Sewer *(if other than Town)*:

PAGE TWO MUST BE SIGNED AND NOTARIZED

DEVELOPMENT REVIEW FEES			
ANNEXATION		**SUBDIVISION**	
☐ Major (10+ acres)	$ 4000.00	☑ Sketch Plan	$ 1000.00 + 10.00 per lot
☐ Minor (less than 10 acres)	$ 2000.00	☐ Preliminary Plat	$ 2000.00 + 40.00 per lot
☐ Deannexation	$ 1000.00	☐ Final Plat	$ 2000.00 + 20.00 per lot
COMPREHENSIVE PLAN AMENDMENT		☐ Minor Subdivision Plat	$ 2000.00
☐ Major	$ 3000.00	☐ Minor Amendment Plat	$ 1000.00 + 10.00 per lot
☐ Minor	$ 1200.00	☐ Road Vacation (constructed)	$ 1000.00
ZONING/REZONING		☐ Road Vacation (paper)	$ 100.00
☐ Rezoning	$ 1700.00 + 10.00 per acre	**SITE PLAN**	
☐ PUD Rezoning	$ 1700.00 + 10.00 per acre	☐ Residential	$ 1400.00 + 10.00 per unit
☐ PUD Amendment	$ 1700.00 + 10.00 per acre	☐ Non-Resi. (>10,000 sq. ft.)	$ 2200.00
☐ Major PD Amendment	$ 3700.00 + 10.00 per acre	☐ Non-Resi. (>2,000 sq. ft.)	$ 1000.00
☐ Minor PD Amendment	$ 500.00	☐ Non-Resi. (<2,000 sq. ft.)	$ 200.00
SPECIAL REVIEW USE		☐ Amendment (major)	$ 1100.00
☐ Major	$ 1000.00	☐ Amendment (minor)	$ 350.00
☐ Minor	$ 400.00	**VARIANCE**	$ 600.00
☐ Oil & Gas	$ 1200.00	**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: _____ Date: _____

Owner: _____ Date: _____

Applicant: _____ Date: 5/22/15

STATE OF COLORADO)
) ss.
County of Denver)

The foregoing instrument was acknowledged before me this 22nd day of May, 2015, by John Cheney.

My commission expires: 6/17/2016
Witness my hand and official seal.

Karen L. Wilhelm
Notary Public

Dearmin Property

Owners

Mr. James R. Dearmin
J Dearmin LLC
10343 Federal Boulevard, Unit 515
Westminster, CO 80260
doublebubble1956@gmail.com

Johnny Gaz
J Gaz LLC
4955 West 65th Avenue
Arvada, CO 80003
john.gaz@berkadia.com

Mr. Jack Shell
The Jack Shell and Sonya Shell Family Trusts
10015 Meade Court
Westminster, CO 80031
JackShell@comcast.net

Mr. Robert E. Youle
WY&K Holdings, LLC
28221 Hidden Village Drive
Evergreen, CO 80439
ryoule@shermanhoward.com

EXHIBIT A

LEGAL DESCRIPTION

A PORTION OF TRACT L, ERIE HIGHLANDS FILING NO. 1, AS RECORDED ON SEPTEMBER 10, 2014, AT RECEPTION NO. 4044915 OF THE RECORDS OF THE WELD COUINTY CLERK AND RECORDERS OFFICE, SITUATED IN THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE CENTER QUARTER OF SAID SECTION 20 AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'39" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 SOUTH 89°05'29" WEST, A DISTANCE OF 46.82 FEET TO THE SOUTHWEST CORNER OF SAID TRACT L;

THENCE ALONG THE SOUTHWESTERLY BOUNDARY OF SAID TRACT L NORTH 00°56'35" WEST, A DISTANCE OF 709.11 FEET;

THENCE DEPARTING SAID NORTH 89°02'08" EAST, A DISTANCE OF 83.93 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 435.00 FEET;

THENCE NORTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 86°17'38", AN ARC LENGTH OF 655.16 FEET;

THENCE NON-TANGENT TO SAID CURVE, NORTH 00°38'58" WEST, A DISTANCE OF 88.63 FEET;

THENCE NORTH 88°48'39" EAST, A DISTANCE OF 326.44 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHERLY HAVING A RADIUS OF 440.00 FEET;

THENCE EASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'36", AN ARC LENGTH OF 183.10 FEET;

THENCE TANGENT TO SAID CURVE NORTH 64°58'03" EAST, A DISTANCE OF 189.11 FEET;

THENCE SOUTH 24°54'48" EAST, A DISTANCE OF 34.89 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 1,135.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS SOUTH 81°41'06" WEST;

THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 31°45'48", AN ARC LENGTH OF 629.21 FEET;

THENCE NON-TANGENT TO SAID CURVE SOUTH 89°58'19" EAST, A DISTANCE OF 128.21 FEET TO THE NORTHWEST CORNER OF A PARCEL RECORDED IN BOOK 814, PAGE 251, IN SAID RECORDS;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 11°04'31" EAST, A DISTANCE OF 125.00 FEET;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL AND THE SOUTHERLY BOUNDARY OF THAT PARCEL OF LAND RECORDED IN BOOK 509 AT PAGE 79, IN SAID RECORDS, NORTH 78°55'29" EAST, A DISTANCE OF 994.76 FEET TO THE SOUTHEAST CORNER

OF SAID PARCEL RECORDED IN BOOK 509, PAGE 79, ALSO BEING A POINT ON THE WESTERLY BOUNDARY OF A PARCEL RECORDED IN BOOK 1179, PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID WESTERLY BOUNDARY SOUTH 00°00'25" WEST, A DISTANCE OF 76.02 FEET TO THE NORTHEAST CORNER OF A PARCEL RECORDED AT RECEPTION NO. 1983198, IN SAID RECORDS;

THENCE DEPARTING SAID WESTERLY BOUNDARY AND ALONG THE NORTHERLY AND WESTERLY BOUNDARIES OF SAID PARCEL RECORDED AT RECEPTION NO. 1983198 THE FOLLOWING TWO (2) COURSES:

1) SOUTH 89°05'08" WEST, A DISTANCE OF 225.15 FEET;

2) SOUTH 00°00'21" WEST, A DISTANCE OF 650.47 FEET TO A POINT ON THE SOUTH LINE OF SAID NORTHEAST QUARTER;

THENCE DEPARTING SAID WESTERLY BOUNDARY, ALONG SAID SOUTH LINE SOUTH 89°05'07" WEST, A DISTANCE OF 1,962.78 FEET TO THE **POINT OF BEGINNING**.

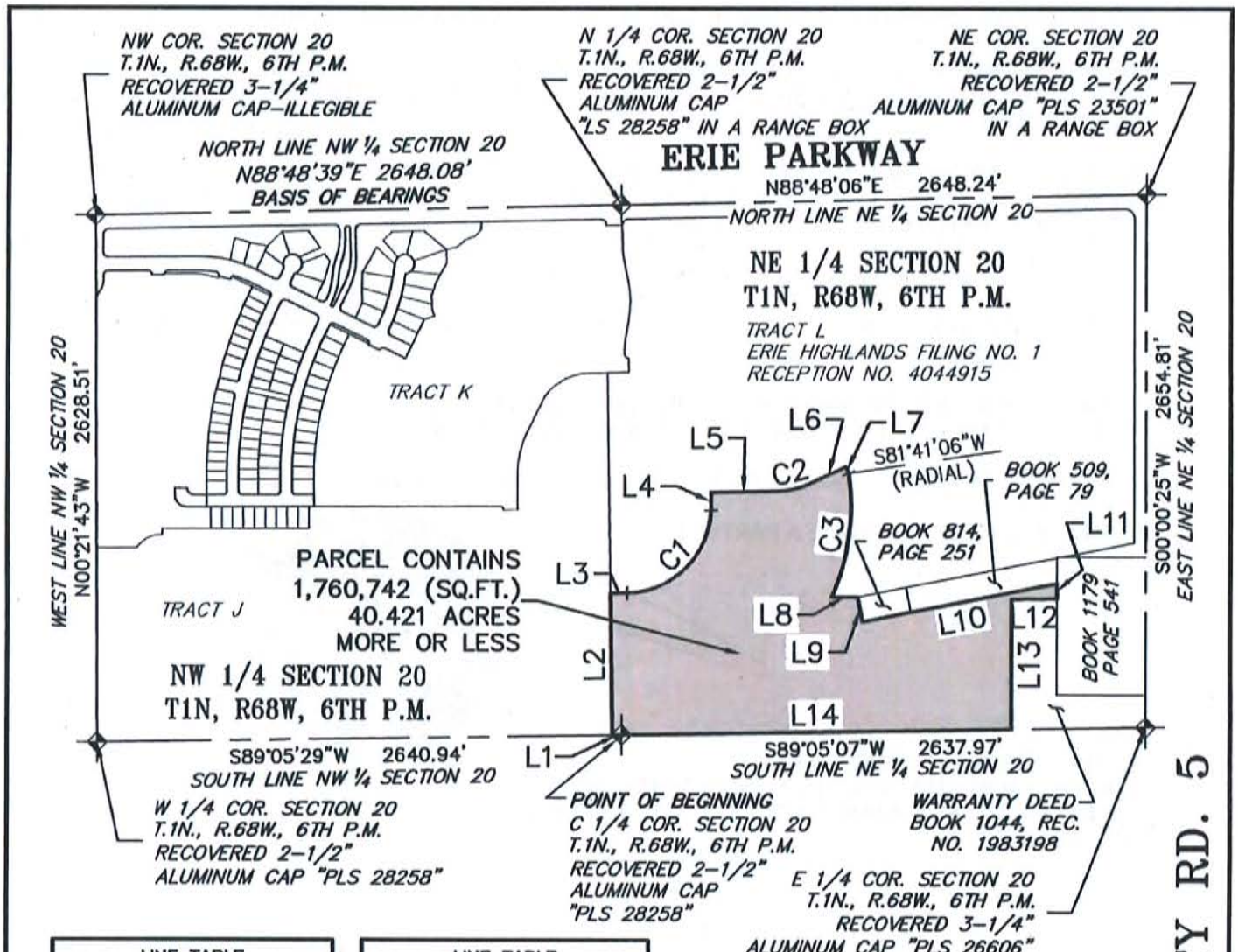
CONTAINING AN AREA OF 40.421 ACRES, (1,760,742 SQUARE FEET), MORE OR LESS.

EXHIBIT ATTACHED AND MADE A PART HEREOF.

COLORADO LICENSED
DEREK S. BROWN
38064
PROFESSIONAL LAND SURVEYOR

DEREK S. BROWN, PLS NO. 38064
FOR AND ON BEHALF OF AZTEC CONSULTANTS, INC.
300 EAST MINERAL AVENUE SUITE 1, LITTLETON, CO 80122
303-713-1898

ILLUSTRATION TO EXHIBIT A



LINE TABLE		
LINE	BEARING	LENGTH
L1	S89°05'29"W	46.82'
L2	N00°56'35"W	709.11'
L3	N89°02'08"E	83.93'
L4	N00°38'58"W	88.63'
L5	N88°48'39"E	326.44'
L6	N64°58'03"E	189.11'
L7	S24°54'48"E	34.89'

LINE TABLE		
LINE	BEARING	LENGTH
L8	S89°58'19"E	128.21'
L9	S11°04'31"E	125.00'
L10	N78°55'29"E	994.76'
L11	S00°00'25"W	76.02'
L12	S89°05'08"W	225.15'
L13	S00°00'21"W	650.47'
L14	S89°05'07"W	1962.78'

CURVE TABLE			
CURVE	DELTA	RADIUS	LENGTH
C1	86°17'38"	435.00'	655.16'
C2	23°50'36"	440.00'	183.10'
C3	31°45'48"	1135.00'	629.21'

NOTE:
THIS EXHIBIT DOES NOT REPRESENT A MONUMENTED SURVEY. IT IS INTENDED ONLY TO DEPICT THE ATTACHED DESCRIPTION.

0 400 800 1600

1 inch = 800 ft.

PATH: V:\19315-13\DWG
DWG NAME: PH2-TAKEDOWN NO. 2
DWG: BJM CHK: DSB
DATE: 2015-06-30
SCALE: 1" = 800'

AZTEC CONSULTANTS, INC.
300 E. MINERAL AVE., SUITE 1
Littleton, Colorado 80122
Phone: (303)713-1898
Fax: (303)713-1897
www.aztecconsultants.com

ERIE HIGHLANDS
PHASE 2 – TAKEDOWN NO. 2
TOWN OF ERIE, COUNTY OF WELD, CO
JOB NUMBER 19315-13

EXHIBIT A

LEGAL DESCRIPTION

A PORTION OF TRACT J, ERIE HIGHLANDS FILING NO. 1, AS RECORDED ON SEPTEMBER 10, 2014, AT RECEPTION NO. 4044915 OF THE RECORDS OF THE WELD COUINTY CLERK AND RECORDERS OFFICE, SITUATED IN THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE WEST QUARTER CORNER OF SAID SECTION 20 AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'39" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, NORTH 00°21'43" WEST, A DISTANCE OF 974.96 FEET;

THENCE DEPARTING SAID SECTION LINE, NORTH 89°38'17" EAST, A DISTANCE OF 202.88 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 150.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS SOUTH 54°25'57" EAST;

THENCE NORTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 57°07'55", AN ARC LENGTH OF 149.57 FEET;

THENCE NON-TANGENT TO SAID CURVE NORTH 00°23'47" WEST, A DISTANCE OF 29.61 FEET;

THENCE NORTH 89°47'21" EAST, A DISTANCE OF 736.93 FEET;

THENCE NORTH 00°12'39" WEST, A DISTANCE OF 110.00 FEET;

THENCE NORTH 89°47'21" EAST, A DISTANCE OF 960.32 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 20.00 FEET;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 87°50'43", AN ARC LENGTH OF 30.66 FEET TO THE BEGINNING OF A REVERSE CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 435.00 FEET;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 88°35'56", AN ARC LENGTH OF 672.66 FEET;

THENCE TANGENT TO SAID CURVE NORTH 89°02'08" EAST, A DISTANCE OF 97.70 FEET;

THENCE SOUTH 00°56'35" EAST, A DISTANCE OF 709.11 FEET TO A POINT ON THE SOUTH LINE OF SAID NORTHWEST QUARTER;

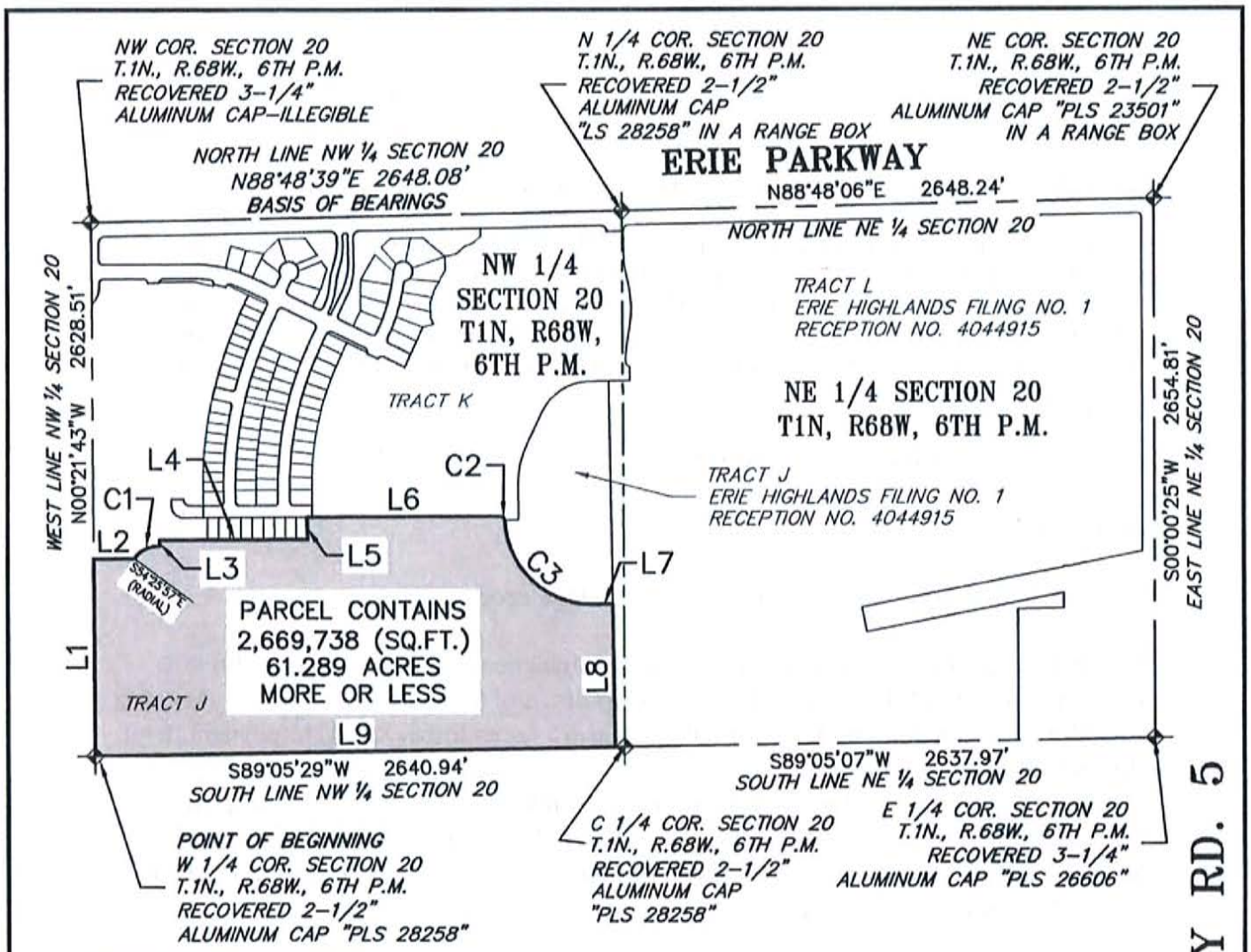
THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'29" WEST, A DISTANCE OF 2,594.12 FEET TO THE **POINT OF BEGINNING**.

CONTAINING AN AREA OF 61.289 ACRES, (2,669,738 SQUARE FEET), MORE OR LESS.

EXHIBIT ATTACHED AND MADE A PART HEREOF.

DEREK S. BROWN, PLS NO. 38064
FOR AND ON BEHALF OF AZTEC CONSULTANTS, INC.
300 EAST MINERAL AVENUE SUITE 1, LITTLETON, CO 80122
303-713-1898

ILLUSTRATION TO EXHIBIT A



LINE TABLE		
LINE	BEARING	LENGTH
L1	N00°21'43"W	974.96'
L2	N89°38'17"E	202.88'
L3	N00°23'47"W	29.61'
L4	N89°47'21"E	736.93'
L5	N00°12'39"W	110.00'

LINE TABLE		
LINE	BEARING	LENGTH
L6	N89°47'21"E	960.32'
L7	N89°02'08"E	97.70'
L8	S00°56'35"E	709.11'
L9	S89°05'29"W	2594.12'

CURVE TABLE			
CURVE	DELTA	RADIUS	LENGTH
C1	57°07'55"	150.00'	149.57'
C2	87°50'43"	20.00'	30.66'
C3	88°35'56"	435.00'	672.66'

NOTE:
THIS EXHIBIT DOES NOT REPRESENT A MONUMENTED SURVEY. IT IS INTENDED ONLY TO DEPICT THE ATTACHED DESCRIPTION.

0 400 800 1600

1 inch = 800 ft.

PATH: V:\19315-13\DWG
DWG NAME: PH2-TAKEDOWN NO. 3
DWG: BJM CHK: DSB
DATE: 2015-05-15
SCALE: 1" = 800'

AZTEC CONSULTANTS, INC.

300 E. MINERAL AVE., SUITE 1
Littleton, Colorado 80122
Phone: (303)713-1898
Fax: (303)713-1897
www.aztecconsultants.com

ERIE HIGHLANDS
PHASE 2 – TAKEDOWN NO. 3
TOWN OF ERIE, COUNTY OF WELD, CO

JOB NUMBER 19315-13

Erie Highlands Planning Areas 5, 6 & 14

Sketch Plan Narrative

August 3, 2015

a. *General project concept and purpose of the request:*

Oakwood Homes is proposing to begin the subdivision process for Phase 2 of Erie Highlands. This phase includes 243 single family homes ranging from 47' to 64' in width, a one acre pocket park and the remaining public open space. The neighborhood is organized around the south side of the school-park site with trail connections through the open space corridors. The following is a summary of the how the plan complies with the Dearmin Property PUD.

b. The total land area to be subdivided:

76.08 acres

c. *The total number of lots, and if residential the proposed density:*

In Planning Area 5, the plan shows 86 lots with a minimum lot size of 6,000 sf. The PUD allows for transfer of density between planning areas of the same zone district. Planning Area 5 is zoned LR with the PUD permitting up to 95 single family lots with a minimum lot size of 6,000 sf.
Planning Area 6 is also zoned LR with the PUD permitting up to 155 single family lots with a minimum lot size of 4,500 sf. The plan shows 157 lots with a minimum lot size of 4,700 sf. With the transfer, Planning Areas 5 and 6 allow for a total of 250 units. The Sketch Plan shows 243 homes.

d. *N/A*

e. *The total land area to be preserved as open space:*

The public open space generally follows the configuration in the PUD. The Open Space Plan shows the minor refinements specifically around the south side of the neighborhoods. The total area of open space is 33.38 acres. The changes are due to refinements in the site plan and the enlarging of the school park site.

f. *A brief description regarding the phasing of the proposed subdivision:*

Portions of planning area 5 and Planning Area 14 will be platted first, likely in multiple filings. This will be followed by Planning Area 6 in multiple filings.

g. *A brief description regarding the availability and adequacy of existing infrastructure and other necessary services including schools, fire protection, water/sewer service, and utility providers:*

The existing portions of the Erie Highlands community have been designed for the extension of utilities and roadways into the southern portions of the site. Utilities and fire protection were accepted for the full buildout of the property at the time of the PUD. Highlands Circle will be extended as necessary to build out each filing of this area. There is also a current application in for a minor subdivision of the school/park/private amenity site in the center of Highlands Circle, which will ultimately dedicate an elementary school site to the school district and a neighborhood park site to the Town for the residents of the Erie Highlands community.

h. *A brief description regarding the location, function and ownership/maintenance of public and private open space, parks, trails, common areas, common buildings:*

Within PA 5, 6 and 14, there are approximately 33 acres of open space proposed. These areas will be dedicated to the Town of Erie, except for a few small tracts adjacent to the lots within PA 5 and 6. Trails connecting to regional connections and throughout the community will be included in the open space areas being dedicated to the Town. There is also a 1 acre pocket park proposed in Planning Areas 6. These are all in addition to the existing amenities in Phase 1 and the neighborhood park being proposed north of this sketch plan area.

i. *A brief description regarding the substance of any existing or proposed covenants, special conditions, grants of easements, or other restrictions applying to the proposed subdivision.*

Three oil and gas sites exist on the property. A Compatible Development and Surface Use Agreement is in place for the property and additional Oil and Gas Operations Areas will not be required.
The existing covenants and design guidelines and any subsequent revisions for Erie Highlands are applicable to the residential portions of this sketch plan.

Entitlements

Preliminary Plat
A site plan for Phase 2 is provided. The applicant will prepare the required Preliminary Plat documents for Phase 2 once the Sketch Plan has been reviewed.

COMPATIBLE DEVELOPMENT AND SURFACE USE AGREEMENT

THIS COMPATIBLE DEVELOPMENT AND SURFACE USE AGREEMENT ("Agreement") is effective this 31st day of July, 2013, by and between Encana Oil & Gas (USA) Inc. (hereinafter referred to as "Encana"), with an address of 370 17th Street, Suite 1700, Denver, Colorado 80202, and J Dearmin LLC ("Dearmin"), J Gaz LLC ("Gaz"), the Jack Shell Family Trust and the Sonya Shell Family Trust, and WY&K Holdings, LLC ("WY&K") (hereinafter Dearmin, Gaz, Shell F/T and WY&K may be referred to collectively as "Owner"), with an address of 10343 Federal Blvd, #J515, Westminster, Colorado 80260. Encana and Owner may be referred to as a "Party" or collectively, as the "Parties."

RECITALS

A. Owner owns the surface estate in that tract of land described as the N/2 of Section 20, Township 1 North, Range 68 West, Weld County, Colorado (the "Described Premises") as delineated on Exhibit A, and Owner intends to develop the Described Premises.

B. Encana owns certain working interests in the Oil and Gas Leases covering the Described Premises ("Leases"), currently operates one or more oil and gas wells ("Existing Wells") on the Described Premises, and has the right to develop its oil and gas leasehold estate by drilling additional wells ("Future Wells") on the Described Premises. Existing Wells and Future Wells are sometimes referred to herein as "Wells."

C. Colorado Oil & Gas Conservation Commission ("COGCC") rules and regulations allow the owner of the oil and gas rights under the Described Premises to drill, twin, deepen or recomplete a well for production from any of the Cretaceous Age formations from drilling locations comprised of a square with sides four hundred (400) feet in length, the center of which is the center of any quarter/quarter section, and a square with sides eight hundred (800) feet in length, the center of which is the center of any quarter section ("Drilling Window"). Owner and Encana recognize that Encana has the right to a reasonable use of the surface estate of the Described Premises for oil and gas development and operations.

D. The Parties enter into this Agreement to provide for the coexistence and joint development of the surface estate and the oil and gas estate for the Described Premises and to delineate the process with which they shall comply with respect to the development of the two estates.

NOW THEREFORE, in consideration of the covenants and mutual promises set forth in this Agreement, including in the recitals, the Parties agree as follows:

1. Oil and Gas Operations Areas (OGOA):

a. Encana agrees to limit its oil and gas operations conducted on the Described Premises to the Oil & Gas Operations Areas ("OGOA") outlined in solid red on Exhibits B, C and D. The OGOA set forth on Exhibit D (the "North OGOA") may be used for maintenance of the Existing Well and appurtenant equipment, production operations, workovers and plugging and abandonment operations. Encana agrees that it shall not expand the size or scope of use of the North OGOA unless otherwise required by new COGCC Rules; provided, however, Encana shall have the right to expand the size and scope of use of the OGOA set forth on Exhibit B (the

"East OGOA")and OGOA set forth on Exhibit C (the "West OGOA") to accommodate additional production. The East and West OGOAs may be used for all oil and gas operations including, but not limited to, drilling, completion, and maintenance of wells and equipment, production operations, workovers, well recompletions and deepenings, fracturing, twinning, the drilling of replacement wells, plugging and abandonment operations, and the location of associated oil and gas production and facilities and also the location and drilling of oil and gas wells that produce from and drain the Described Premises as well as lands which are pooled or communitized with the Described Premises and/or are directionally or horizontally drilled to bottomhole locations outside the Described Premises to the extent such activities are authorized by local and state authorities and regulations; provided, however, that Encana's associated oil and gas production facilities and Future Wells shall only be located in the Equipment Areas of the East OGOA and the West OGOA. Surface Owner and KMG acknowledge that Encana and KMG each shall be permitted to use the Joint Encana and KMG Equipment Area shown on Exhibit B as a co-location for wells and permanent production equipment so long as such use is acceptable to the other operator.

b. The Parties recognize that a fifty (50) foot no-build zone exists around each OGOA, as illustrated in red hatch marks on Exhibits B, C and D ("No Build Zone"). The Parties agree that the No Build Zone prohibits the construction of habitable structures. Encana acknowledges that Owner may use the No Build Zone for the planting and maintenance of shallow-root landscaping provided that Encana shall have no liability for damage to such landscaping and that such landscaping shall not unreasonably interfere with Encana's operations on the Described Premises.

c. Encana agrees to locate its production facilities within the Equipment Areas of the East OGOA and the West OGOA provided that, as set forth above, Encana is able to expand those facilities to accommodate additional production. Such expansion may involve, among other things, installation and connection of flowlines, installation of additional temporary tank batteries, separators, combustors, vapor recovery units, temporary water and oil tanks.

d. Within the Equipment Areas of the East and West OGOAs only, Encana shall continue to have the right to drill more than one well with attendant facilities and to deepen, complete, recomplete, fracture, workover, replace, plug and abandon, or twin any well that is drilled or has been drilled, as well as to drill directional and horizontal wells that produce from and drain the Described Premises or lands other than the Described Premises.

e. Owner shall not plat any surface property line within the OGOAs or within the one hundred and fifty foot (150') Tank Battery Setback. Owner shall not locate any temporary or permanent habitable building or other habitable structure within the OGOAs, Tank Battery Setback or No Build Zone, nor shall Owner locate any improvement within the OGOAs or Tank Battery Setback.

f. The area within the East OGOA but outside the Equipment Area ("Ancillary Operations Area") may be used by Encana for construction and completion staging and operations, production operations and other temporary oil and gas mineral development uses. Encana understands and agrees that Kerr McGee Oil & Gas Onshore, L.P. ("KMG") or other mineral interest owners of the Described Premises may also use the Ancillary Operations Area for construction and completion staging and operations, production operations and other temporary oil and gas mineral development uses other than drilling operations and the placement of permanent surface equipment and facilities. Owner will include in its surface use agreement with KMG a covenant requiring KMG to cooperate with Encana in its use of the

Ancillary Operations Area so that each operator does not directly interfere with the other's temporary production and completion equipment and facilities. Owner will also include in its surface use agreement with KMG a covenant requiring KMG to maintain a minimum distance of 200' between its wellheads and Encana's wellheads. Encana agrees that in its use of the Ancillary Operations Area, it will not directly interfere with KMG's temporary production and completion equipment and facilities and will maintain a minimum distance of 200' between its wellheads and KMG's wellheads..

2. Access to the Oil and Gas Operations Area (OGOA).

a. Access to the OGOAs shall be at the locations identified on Exhibits B, C and D. Owner agrees that neither it nor its agents, contractors, subcontractors, lessees, invitees or guests shall interrupt Encana's access to all of its oil and gas operations on the Described Premises at any time, and no such access may be closed to Encana until an acceptable replacement access route is available.

b. Access may be changed by mutual agreement of the Parties, provided however, all costs and expenses of such relocations shall be borne by the Party which requests them.

c. No party shall unreasonably interfere with the use by the other of an access road.

d. Owner shall keep the portions of access roads jointly used by Owner, its subdivision occupants, and Encana in good condition and repair until such roads are dedicated to the local jurisdiction; provided, however, if Encana causes damage to a portion of a road that is jointly used by both Owner or its subdivision occupants and Encana which is constructed to the specifications in Section 2.e.(1), Encana agrees to promptly repair any damage that is caused by a direct result of its use of the road.

e. Construction and Width of Access Roads.

(1) Access roads or portions of access roads that are jointly used by Encana and Owner shall be thirty (30) feet or more in width. For roads jointly used by Owner and Encana, Owner shall construct or improve all paved or improved joint access roads so as to withstand the weight of oilfield equipment; specifically, Owner shall construct the roads so that they can be used to withstand the weight of 110,000 pounds and 28,000 pounds per axle.

(2) Access roads or portions of access roads that are used exclusively by Encana shall be thirty (30) feet or more in width, and Encana shall install and maintain them to those state and local standards that apply to oil and gas operations.

f. Owner shall provide curb cut access to Encana's oil and gas operation on the Described Premises of forty (40) feet in width with a turn radius of no less than twenty-two (22) feet.

3. **Pipelines, Flowlines and Pipeline Easements.**

a. Owner acknowledges and understands that Encana has the right to continue to use the existing gathering lines identified on Exhibits B, C and D, as well as any other flowlines and pipelines, that it is currently utilizing to service the Existing Wells and to construct, repair, maintain and replace such lines.

b. Upon request of Encana, Owner shall grant Encana easements for future flowlines and pipelines servicing the Wells in the approximate locations shown on Exhibit B, and such flowlines and pipelines shall be installed to a minimum depth of forty eight (48) inches below the surface of the ground.

c. Within thirty (30) days from the date installation of any flowlines or pipelines is complete, Encana shall provide Owner with a set of as-builts to identify the location of such improvements.

d. The location of gathering lines, flowlines and pipelines and easements for future flowlines and pipelines may be changed at the request of Owner, provided that, the change does not interfere with oil and gas operations and is paid for by Owner. In the event that Owner requests the relocation of an existing pipeline or flowline, Encana will provide Owner with a written estimate of the relocation costs. If, after receipt of the written estimate, Owner elects to proceed with the relocation, Encana will designate the contractor to complete the work and schedule the work with Owner. Owner will remit the amount of the estimate to Encana prior to the commencement of the relocation work. After completion of the work Encana will provide to Owner an itemized statement showing the actual cost of the work. Should the actual cost of the work be less than the estimate, Encana will pay the difference to Owner. Should the actual cost of the work be greater than the estimate, Owner will pay the difference to Encana within ten (10) days of receipt of the itemized statement.

e. All pipeline easements shall be fifty (50) feet in width during original construction activities and, after construction, the pipeline easements shall be reduced to thirty (30) feet in width for all other operations, maintenance and transportation activities.

f. Owner shall have the right to cross the pipeline easements at an angle of not less than sixty (60) degrees and not more than ninety (90) degrees, and Owner shall also have the right to install and maintain access to such easements for utility lines, including those for water, gas, sewer, electric, telephone, cable, television and fiber optic and other pipelines that travel along, but not within, the pipeline easements provided for herein; provided however;

i) any new underground facilities which travel along a pipeline easement identified herein shall be located a distance horizontally of at least ten (10) feet from parallel existing pipelines;

ii) any new underground facilities shall have at least twenty-four (24) inches of vertical clearance between such new facility and a pipeline provided for herein; and

iii) any overhead power lines shall be at least twenty (20) feet above the ground.

Owner shall pay Encana all costs and expenses incurred by Encana to encase its pipelines and flowlines to the extent that such pipelines and flowlines intersect and underlie any street or any

other road either in advance of or at the time that Owner commences construction of any street and/or such other road.

g. Under no circumstances shall Owner prohibit Encana from flowing gas through its flowlines and pipelines at any time.

h. Conditioned on Owner's provision of a copy of the as-built drawings identifying the location of any pipelines and flowlines, Owner shall maintain a minimum ground cover of 48 inches and not more than 72 inches over such pipelines and flowlines in the conduct of its operations and its construction activities.

i. Owner, its successors and assigns, hereby agrees to cooperate, at its sole cost and expense, with Encana in its efforts to obtain all necessary permits, licenses and other approvals from state, county and municipal authorities for applications to drill all future wells within the OGOAs.

j. Encana acknowledges that any pipeline easements Owner grants to Encana will be non-exclusive and agrees that it will not object to KMG, other oil and gas operators or utilities concurrently using such easements as Owner may grant from time to time, so long as KMG's, other oil and gas operators' and utilities' concurrent use does not interfere with Encana's pipelines or its oil and gas operations on the Described Premises.

4. **Surface Use and Damages.**

a. Encana shall pay Owner the sum of $10,000 per Future Well ("Damage Payment") upon or prior to the date that each Future Well is spudded. Payments shall be made to Owner at the below address in cash, certified funds or cashiers' check. Such payment shall constitute a onetime payment in full by Encana and its affiliates for all normal damages for the applicable Well, including, but not limited to, damages to growing crops associated with the access to and the drilling, construction, completion, recompletion, reworking, re-entry, production, operation and maintenance of the applicable Well within that designated OGOA. Normal damages include, but are not limited to, reasonable and customary ingress, egress, rights-of-way, construction of all access roads, preparation and use of the drillsite area, preparation and use of reserve pits, and construction, installation and maintenance of production equipment and facilities such as flowlines, gas pipelines, separators, tank batteries and other equipment or facilities necessary or convenient for the production, transportation and sale of oil and/or gas therefrom.

b. The Damage Payment provided herein for surface damage shall release and discharge Encana, its agents, contractors and employees from all ordinary claims, losses, demands and causes of action for damage to the Described Premises, loss of and damage to crops, and loss of dwelling units for the anticipated residential land use and loss of commercial value use of the Described Premises, hereafter arising as a result of Encana's oil and gas operations and other activities conducted pursuant to this Agreement including marketing operations on the Described Premises.

c. Except the Damage Payment set forth in Section 4(a), Owner hereby waives all surface damage payments pursuant to any present or future COGCC rule or regulation or local regulation, state statute, common law or prior agreement for each and every Well and related wellsite that is drilled within an OGOA and for each production facility and access and pipeline easement. Encana or its lessees or assignees may provide a copy of this Agreement to the

COGCC or to any local jurisdiction, person or entity or any court of law as evidence of this waiver.

5. **Subdivision Plat**. Owner shall identify the OGOA, Tank Battery Setback, No Build Zone and all access routes and pipeline easements on its subdivision plat and in all applications for development it files with the local jurisdiction, and the plat shall include restrictions that no property line or temporary or permanent building, structure or other improvement related to the surface development shall be located, constructed or installed within the OGOA, Tank Battery Setback, or the No Build Zone. Owner shall record the subdivision plat in the Office of the Clerk and Recorder of Weld County and provide written evidence to Encana within fifteen (15) days of recording.

6. **Waiver of Setback Requirements**. Owner understands and acknowledges that the COGCC has rules and regulations that apply to the distance between a wellhead and public roads, production facilities, building units and surface property lines, among other things. Owner hereby waives all setback requirements in COGCC Rule 603 and 318A, or other rule or amendment to the COGCC setback rules, and to any other state or local setback requirements that are or become inconsistent with this Agreement or that would prohibit or interfere with the rights of Encana to explore for and produce the oil and gas in accordance with this Agreement. Owner understands (and shall notify parties who purchase any portions of the Described Premises) that Encana may cite the waiver in this Section 7 in order to obtain a location exception or variance consistent with this Agreement under COGCC rules or from a local jurisdiction. Notwithstanding the foregoing, Owner reserves all rights to contest or otherwise object to any proposed rule, regulation or proceeding by any governmental authority that would seek to apply setbacks to the Owner's development of the Described Premises, and the foregoing waiver shall not be effective against Owner in any such proceeding.

7. **Governmental Proceedings.**

a. Owner Will Not Object. Owner agrees that it will not object in any forum to the use by Encana of the surface of the Described Premises, provided such use is in compliance with this Agreement, and Owner hereby waives such right to object to such use so long as it is in compliance with this Agreement. Owner further agrees that it will provide such other written approvals and waivers which are reasonably requested by Encana and consistent with this Agreement, including, but not limited to, all approvals and waivers to drill a well or to conduct oil and gas operations within the OGOA that are needed because of any law or regulation, including any local ordinance and regulations of the COGCC, and including, for example, waivers to state and local setback requirements and to any setback requirements from a surface property line or for an exception location for a well drilled within the OGOA.

b. Encana Will Not Object. Encana agrees that it will not object to the use by Owner of the surface of the Described Premises or to the sale or development by Owner of all or portions of the Described Premises consistent with this Agreement, and Encana will not object in any forum to a request by Owner to annex, zone, rezone, plat or re-plat all or any portion of the Described Premises to extent such request is consistent with this Agreement. Encana further agrees that it will provide such other written approvals or waivers, which are reasonably requested by Owner consistent with this Agreement in connection with the development of the surface estate in any state or local jurisdiction.

8. **Notices of Hearings**. Owner shall provide Encana with written notice not less than thirty (30) days before each hearing for consideration of a plat application or other land use application for the Described Premises or portions of the Described Premises to be held before the Town of Erie or other local jurisdiction.

9. **Notice to Homeowners and Builders**. Owner shall furnish all builders and developers and others which purchase all or any portion of the Described Premises from Owner and each person or entity who proposes to enter into a contract to purchase or lease a lot or other portion of the Demised Premises from Owner which is adjacent to, or within, 350 feet from the OGOA, Tank Battery Setback, No Build Zone or a flowline or pipeline easement, with a plat that shows the locations of the OGOA, No Build Zone and Tank Battery Setback and the flowlines and pipeline easements. In addition, Owner shall provide written notice to all such purchasers that shall include the following:

i there may be ongoing oil and gas operations and production within the OGOA, Tank Battery Setback, pipeline and flowline easements and access routes;

ii. there are likely to be wells drilled and additional oil and gas production facilities constructed and installed within the OGOA, Tank Battery Setback and additional flowlines and pipelines constructed and maintained on the Described Premises,

iii. heavy equipment will be used by Encana from time to time for oil and gas drilling and production operations and such operations may be conducted on a 24-hour basis; and

iv. homeowner associations and buyers of individual lots or homes or portions of the Described Premises will be subject to and burdened by all of the covenants and waivers made by Owner in this Agreement, including, but not limited to those covenants and waivers:

a) prohibiting the location of any temporary or permanent building, structure, or other improvement within the OGOA, No Build Zone and Tank Battery Setback;

b) waiving objections to the drilling of wells, the construction of facilities, and the conduct of oil and gas operations performed in accordance with this Agreement;

c) waiving surface damages payments as provided herein;

d) granting the easements described herein for pipelines; and

e) waiving the setback requirements under the rules of the COGCC or any local jurisdiction consistent with this Agreement, among other things.

10. **Notice of Oil and Gas Operations**. Encana shall provide the Owner with notice of drilling operations and subsequent well operations in accordance with COGCC rules and regulations.

11. **Notice of Construction Activities by Owner**. Owner shall provide Encana with thirty (30) days written notice prior to commencement of any dirt work, grading or other surface construction activities it will be conducting on the Described Premises. Owner shall meet with Encana representatives at the Described Premises to locate existing flowlines, gathering lines or pipelines and to coordinate proposed surface construction activities with current and prospective oil and gas operations.

12. **Impact Mitigation**. Encana agrees that it will install and maintain at its sole cost and expense such fences, gates and locks around the wells and production facilities as are required by the COGCC. Owner may upgrade fences, gates and locks at its expense and with the

consent of Encana, such consent not to be unreasonably withheld, provided that such fences, gates and locks comply with COGCC and local regulations. Encana shall paint production facilities for wells, including wellhead guards, with paint approved by the COGCC and the local jurisdiction. Owner shall have the right of subjacent and lateral support to whatever extent is necessary or desirable for full and complete use and enjoyment of the surface of the Described Property provided that it does not interfere with Encana's operations. Owner shall bear all costs and expense to install such noise and visual impact mitigation measures it desires or the County or other local jurisdiction requires at or around the OGOA which are in excess of or in addition to those measures which are required by COGCC regulations for areas which are not high density; provided, however, Encana shall have reasonable discretion to refuse to allow impact mitigation measures interfere with, or prevent, safe oil and gas operations.

13. **Compliance with Common Law and Statutory and Regulatory Requirements**. Owner expressly acknowledges that this Agreement satisfies the obligations and requirements of Encana pursuant to COGCC rules and regulations and Colorado statutes to consult in good faith with Owner regarding existing and proposed oil and gas operations on the Described Premises. Owner, on the one hand, and Encana, on the other hand, each further expressly acknowledge that this Agreement shall be deemed to be specifically applicable to, and to fully satisfy, the obligations of Encana and Owner to accommodate the use of the surface of the Described Premises by the other, existing and future, and Owner and Encana each waive any statutory and common law claims to the contrary, including, but not limited to, any claims pursuant to C.R.S. 34-60-127. Unless expressly waived in this Agreement, Encana shall comply with all applicable rules and regulations of COGCC, the Town of Erie and any other applicable governing jurisdiction in conducting its oil and gas operations on, under or within the Described Premises. Encana, its employees, lessees, assignees, successors and authorized agents and licensees shall have no right to disturb, access, use or travel upon any portion of the Described Premises which is located outside of the OGOA, the No Build Zone, the Tank Battery Setback and the Access Roads, unless operating within an easement area.

14. **Environmental Indemnification**.

a. "Environmental Claims" shall mean all claims asserted by governmental bodies, Owner or other third parties for pollution or environmental damage of any kind, arising from a violation of Environmental Law and related to operations on the Described Premises or ownership of the oil and gas leasehold interest, whichever is applicable, and all cleanup and remediation costs, fines and penalties associated therewith. Environmental Claims shall not include the costs of any remediation undertaken voluntarily by any party, unless such remediation is performed under the imminent threat of a Environmental Claim by a governmental body or other third party.

b. "Environmental Laws" shall mean any laws, regulations, rules, ordinances, or order of any governmental authority(ies), which relate to or otherwise impose liability, obligation, or standards with respect to pollution or the protection of the environment, including but not limited to, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. § 9601 et seq.), the Resource Conservation and Recovery Act of 1976 (42 U.S.C. §§ 6901 et seq.), the Clean Water Act (33 U.S.C. §§ 466 et seq.), the Safe Drinking Water Act (14 U.S.C. §§ 1401-1450), the Hazardous Material Transportation Act (49 U.S.C. §§ 1801 et seq.), the Clean Air Act, and the Toxic Substances Control Act (15 U.S.C. §§ 2601-2629).

c. Encana shall defend, indemnify and hold harmless the Owner, its successors and assigns, from Environmental Claims caused by Encana's oil and gas activities on and under the Described Premises or those of its agents, contractors and subcontractors, except to the extent caused by Owner.

d. Owner shall defend, protect, indemnify, and hold harmless Encana and its employees, directors, officers, managers, agents, contractors, subcontractors, successors and assigns from all Environmental Claims relating to the Described Premises or this Agreement in any manner caused by, directly or indirectly resulting from, incident to, connected with or arising out of Owner's or its tenants', lessees', invitees', guests' and the like's development or use of the Described Premises.

15. **Authority to Execute Agreement**. Each party represents that he/she/it has the full right and authority to enter into this Agreement with respect to the surface rights, oil and gas interests, or oil and gas leasehold interests that he/she/it owns in the Described Premises, as applicable.

16. **No Waiver of Rights**. Encana does not waive the rights it has pursuant to its oil and gas interests to explore for, drill and produce the oil and gas underlying the Described Premises or for ingress and egress to the OGOA, except as specifically provided in this Agreement. Owner does not waive any of its rights to the Described Premises, except as specifically provided in this Agreement.

17. **Successors and Assigns**. This Agreement and all of the covenants in it shall be binding upon the subsequent lessees and assignees of lessees and also the personal representatives, heirs, successors and assigns of all of the Parties, and the benefits of this Agreement shall inure to all of them. This Agreement and all of the covenants in it shall be covenants running with the land. Encana shall advise Owner of any agreements it enters into with any other entity or person which purport to grant or assign any interests conveyed to Encana under this Agreement to a third party.

18. **Recording**. Encana shall record a memorandum of this Agreement with the Clerk and Recorder of Weld County and provide evidence to Owner of the recording.

19. **Governing Law.** The validity, interpretation and performance of this Agreement shall be governed and construed in accordance with the laws of the local jurisdiction and the State of Colorado without reference to its conflict of laws provisions.

20. **Severability**. If any part of this Agreement is found to be in conflict with applicable laws, such part shall be inoperative, null and void insofar as it conflicts with such laws; however, the remainder of this Agreement shall be in full force and effect. In the event that any part of this Agreement would otherwise be unenforceable or in conflict with applicable laws due to the term or period for which such part is in effect, the term or period for which such part of this Agreement shall be in effect shall be limited to the longest period allowable which does not cause such part to be unenforceable or in conflict with applicable laws.

22. **Notices.** Any notice or communication required or permitted by this Agreement shall be given in writing either by; i) personal delivery; ii) expedited delivery service with proof of delivery; iii) United States mail, postage prepaid, and registered or certified mail with return receipt requested; or iv) prepaid telecopy or fax, the receipt of which shall be acknowledged, addressed as follows:

OWNER(s):

J Dearmin LLC
10343 Federal Blvd, #J515
Westminster, Colorado, 80260
Attn: James Dearmin

Jack Shell Family Trust
10015 Meade Ct.
Westminster, CO 80031

Sonya Shell Family Trust
10015 Meade Ct.
Westminster, CO 80031

J Gaz LLC
4955 W. 65th Ave
Arvada, CO 80003
Attn: Johnny Gaz

WY&K Holdings, LLC
c/o Fairfield & Woods
1700 Lincoln Street, Suite 2400
Denver, CO 80203

ENCANA:

Encana Oil & Gas (USA) Inc.
370 17th Street, Suite 1700
Denver, CO 80202
Attn: DJ Land Department

Any Party may, by written notice as provided in this Section, change the address of the individual to which delivery of notices shall be made thereafter.

23. **Incorporation by Reference**. Exhibits A, B, C and D are incorporated into this Agreement by this reference.

24. **Entire Agreement**. This Agreement sets forth the entire understanding among the Parties and supersedes any previous communications, representations or agreements, whether oral or written. No change of any of the terms or conditions herein shall be valid or binding on any Party unless in writing and signed by an authorized representative of each Party.

25. **Counterpart Executions**. This Agreement may be executed in counterparts, each of which shall be deemed an original and together of which shall constitute one and the same instrument.

IN WITNESS WHEREOF, the undersigned Parties have caused this Agreement to be executed by a duly authorized representative on the dates set forth in the acknowledgements, but to be effective on the date written above.

[Signatures on following pages]

ENCANA OIL & GAS (USA) INC.

By: Helen M. Capps
Helen M. Capps, Attorney-in-Fact dp co

ACKNOWLEDGMENT

State Of Colorado)
City and)ss
County Of Denver)

On this 31st day of July, 2013, before me personally appeared Helen M. Capps, who, being by me duly sworn, did say that he is Attorney-in-Fact for Encana Oil & Gas (USA) Inc, that he signed the foregoing instrument on behalf of said corporation for the uses and purposes therein set forth.

My Commission Expires: 03/18/2017

(SEAL) Notary Public: C. Diaferio

COURTNEY DIAFERIO
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID # 20134017782
MY COMMISSION EXPIRES MARCH 18, 2017

J DEARMIN LLC

By: James R. Dearmin by Debra M. Dearmin
James R. Dearmin, by Debra M. Dearmin, attorney-in-fact
Title Attorney in Fact

ACKNOWLEDGMENT

State Of Colorado)
)ss
County Of Adams)

On this 29th day of _____, 2013, before me personally appeared Debra M. Dearmin, as attorney in fact for James R. Dearmin, who, being by me duly sworn, did say that he is the Power of Attorney for J Dearmin LLC., that he signed the foregoing instrument on behalf of said company and acknowledged the instrument to be the free and voluntary act and deed of said company for the uses and purposes therein set forth.

My Commission Expires: 11-18-13

(SEAL)

NOTARY PUBLIC
MARIANNE DICKERSON
STATE OF COLORADO

Notary Public: Marianne Dickerson

{00547968.1}

J GAZ LLC

By: Emmalou Gaz
Emmalou Gaz, as Attorney in Fact for Johnny Gaz

Title: Manager

ACKNOWLEDGMENT

State Of Colorado)
)ss
City and County Of Denver)

On this 30th day of July, 2013, before me personally appeared Emmalou Gaz, who, being by me duly sworn, did say that she is the Attorney in Fact for Johnny Gaz, that she signed the foregoing instrument on his behalf as Manager of said company and acknowledged the instrument to be the free and voluntary act and deed of said company for the uses and purposes therein set forth.

My Commission Expires: 8/10/2014

(SEAL)

Notary Public: Debra P. Simon

DEBRA P. SIMON NOTARY PUBLIC STATE OF COLORADO

My Commission Expires 08/10/2014

{00547968.1}

WY&K HOLDINGS, LLC

By: _____
Name: ROBERT E YOULE
Title: MANAGER

ACKNOWLEDGMENT

State Of Colorado)
City and)ss
County Of DENVER)

On this 31st day of July, 2013, before me personally appeared Robert E. Youle who, being by me duly sworn, did say that he is the MANAGER for WY&K HOLDINGS, LLC,, that he signed the foregoing instrument on behalf of said company and acknowledged the instrument to be the free and voluntary act and deed of said company for the uses and purposes therein set forth.

My Commission Expires: 3/15/16

(SEAL)

KEHAULANI MERRIE PUNILEI
Notary Public
State of Colorado

Notary Public: _____

{00550555.1}

JACK SHELL FAMILY TRUST

By: Jack Shell

Name: Jack Shell
Title: Trustee

SONYA SHELL FAMILY TRUST

By: Jack Shell

Name: Jack Shell
Title: Trustee

ACKNOWLEDGMENT

State Of Colorado)
)ss
County Of Adams)

On this 30th day of July, 2013, before me personally appeared Jack Shell, who, being by me duly sworn, did say that he is the Trustee for the Jack Shell Family Trust., that he signed the foregoing instrument on behalf of said trust and acknowledged the instrument to be the free and voluntary act and deed of said trust for the uses and purposes therein set forth.

My Commission Expires: My Commission Expires 08/25/2014

(SEAL) TANYA S REED NOTARY PUBLIC STATE OF COLORADO

Notary Public: Tanya Reed

ACKNOWLEDGMENT

State Of Colorado)
)ss
County Of Adams)

On this 30th day of July, 2013, before me personally appeared Jack Shell, who, being by me duly sworn, did say that he is the Trustee for the Sonya Shell Family Trust., that he signed the foregoing instrument on behalf of said trust and acknowledged the instrument to be the free and voluntary act and deed of said trust for the uses and purposes therein set forth.

My Commission Expires: My Commission Expires 08/25/2014

(SEAL) TANYA S REED NOTARY PUBLIC STATE OF COLORADO

Notary Public: Tanya Reed

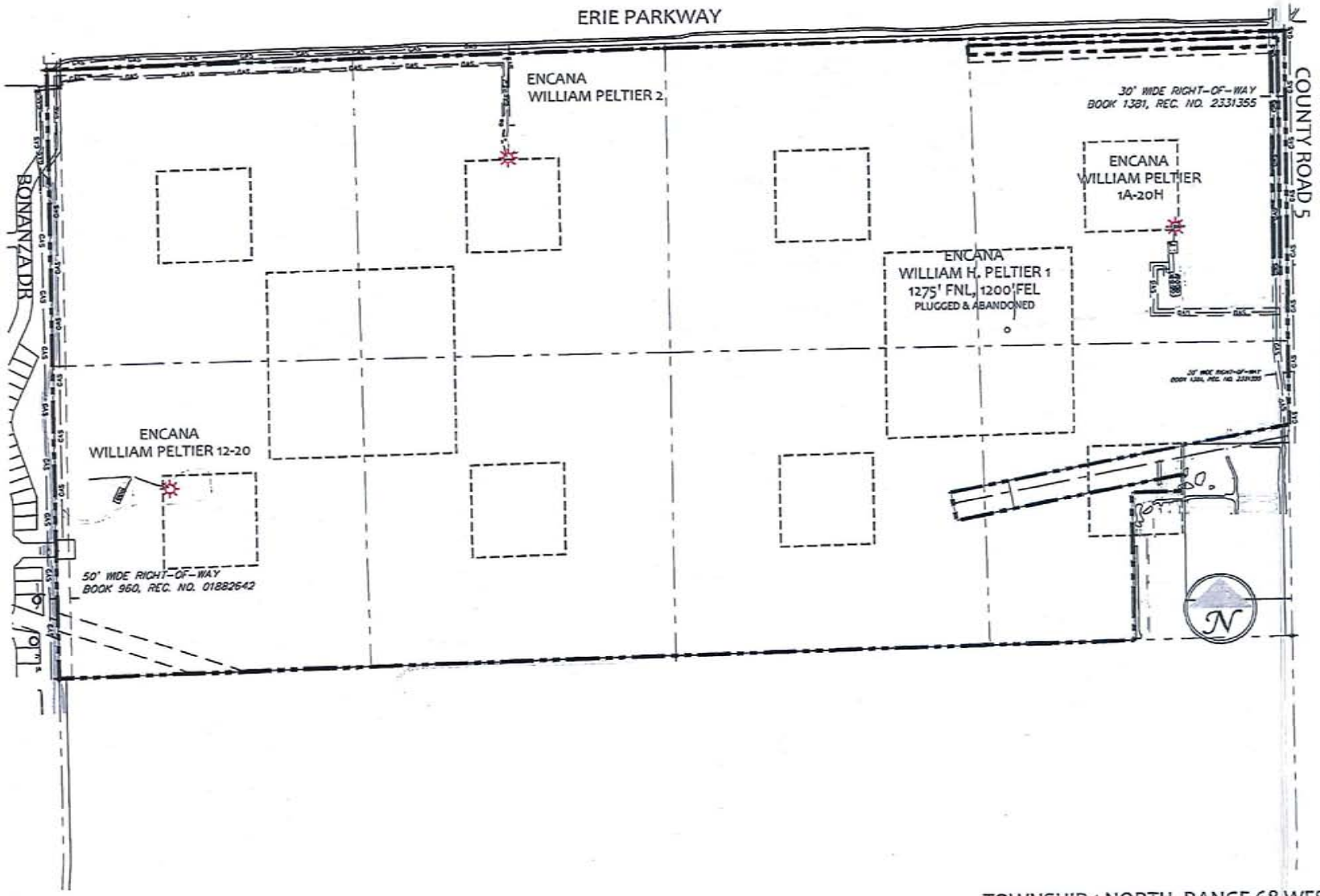


EXHIBIT A

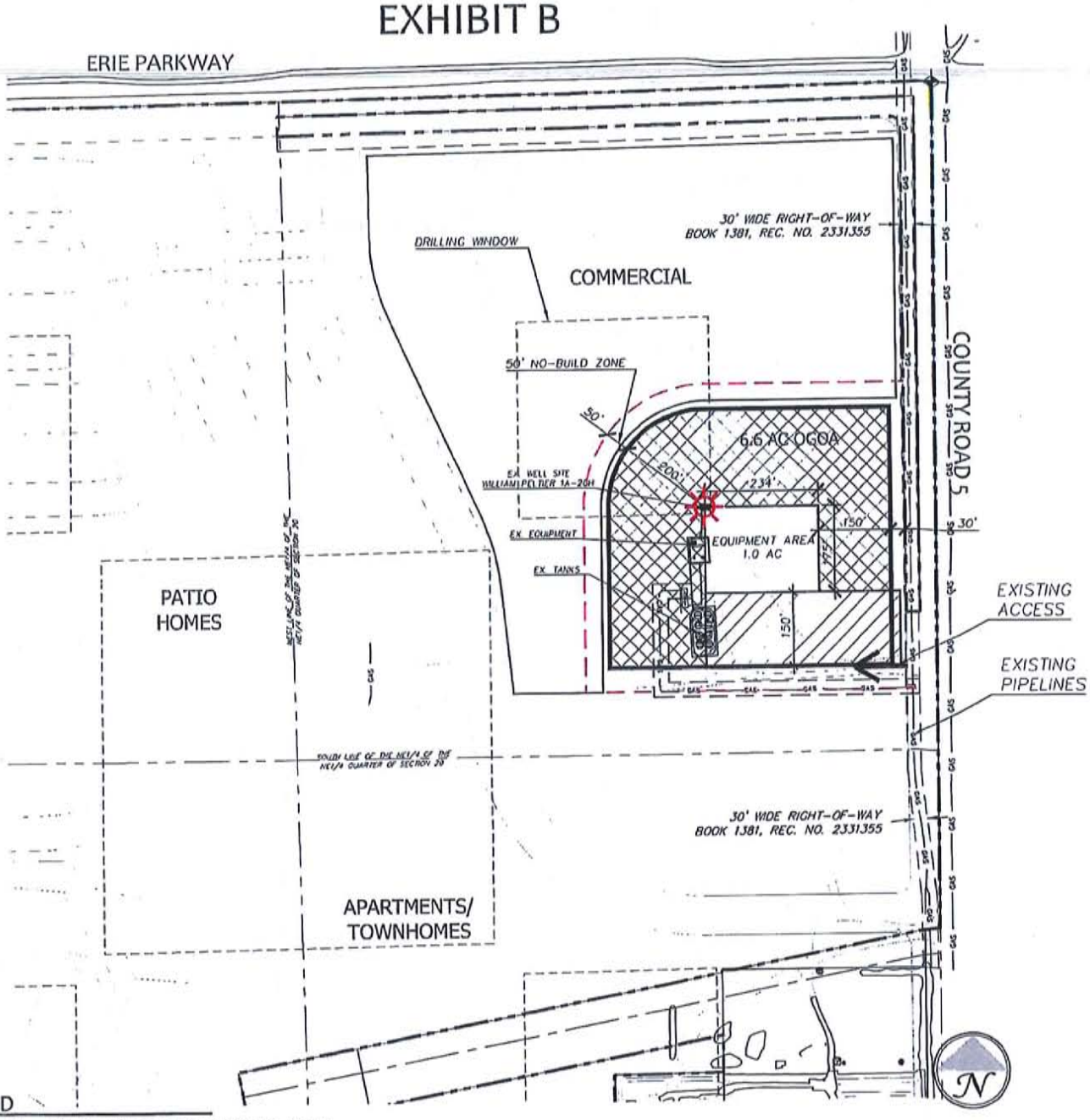
TOWNSHIP 1 NORTH, RANGE 68 WEST

SECTION 20: N½ OIL& GAS

WELD COUNTY, COLORADO

Scale: 1"=600' July 30, 2013

EXHIBIT B



LEGEND

- OIL & GAS OPERATIONS AREA (200' SETBACK)
- 50' NO BUILD ZONE
- JOINT ENCANA & KMG EQUIPMENT AREA
- JOINT ENCANA & KMG OPERATIONS AREA
- DRILLING WINDOWS

LOCATION OF ROADS, LOTS AND OTHER LAND DEVELOPMENT COMPONENTS ARE CONCEPTUAL AND SUBJECT TO CHANGE.

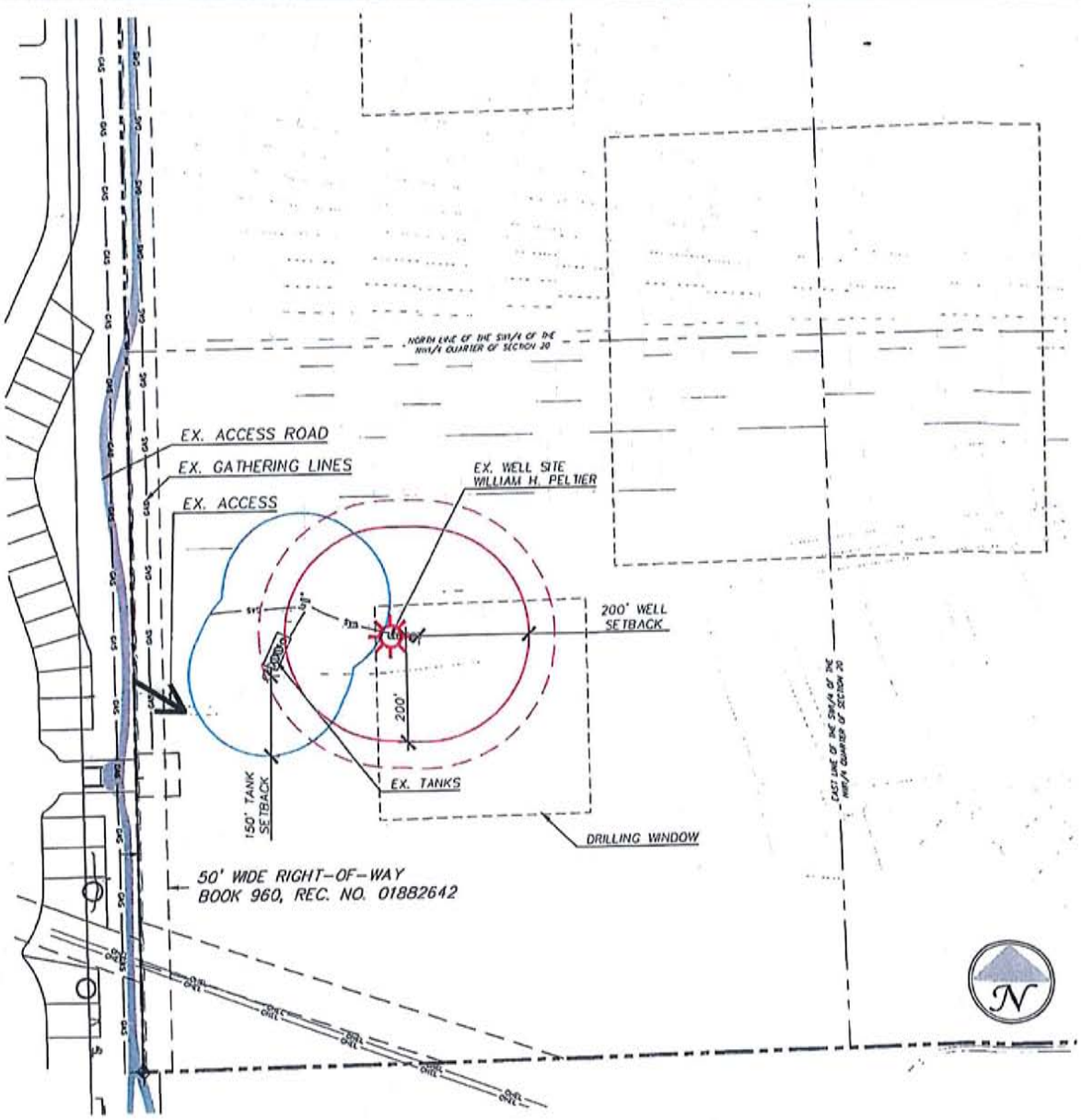
TOWNSHIP 1 NORTH, RANGE 68 WEST

SECTION 20: NE1/4

WELD COUNTY, COLORADO

Scale: 1"=300' July 30, 2013

EXHIBIT C



LEGEND

- OIL & GAS OPERATIONS AREA (200' SETBACK)
- 50' NO BUILD ZONE
- TANK BATTERY SETBACK (150' SETBACK)
- DRILLING WINDOWS

LOCATION OF ROADS, LOTS AND OTHER LAND DEVELOPMENT COMPONENTS ARE CONCEPTUAL AND SUBJECT TO CHANGE.

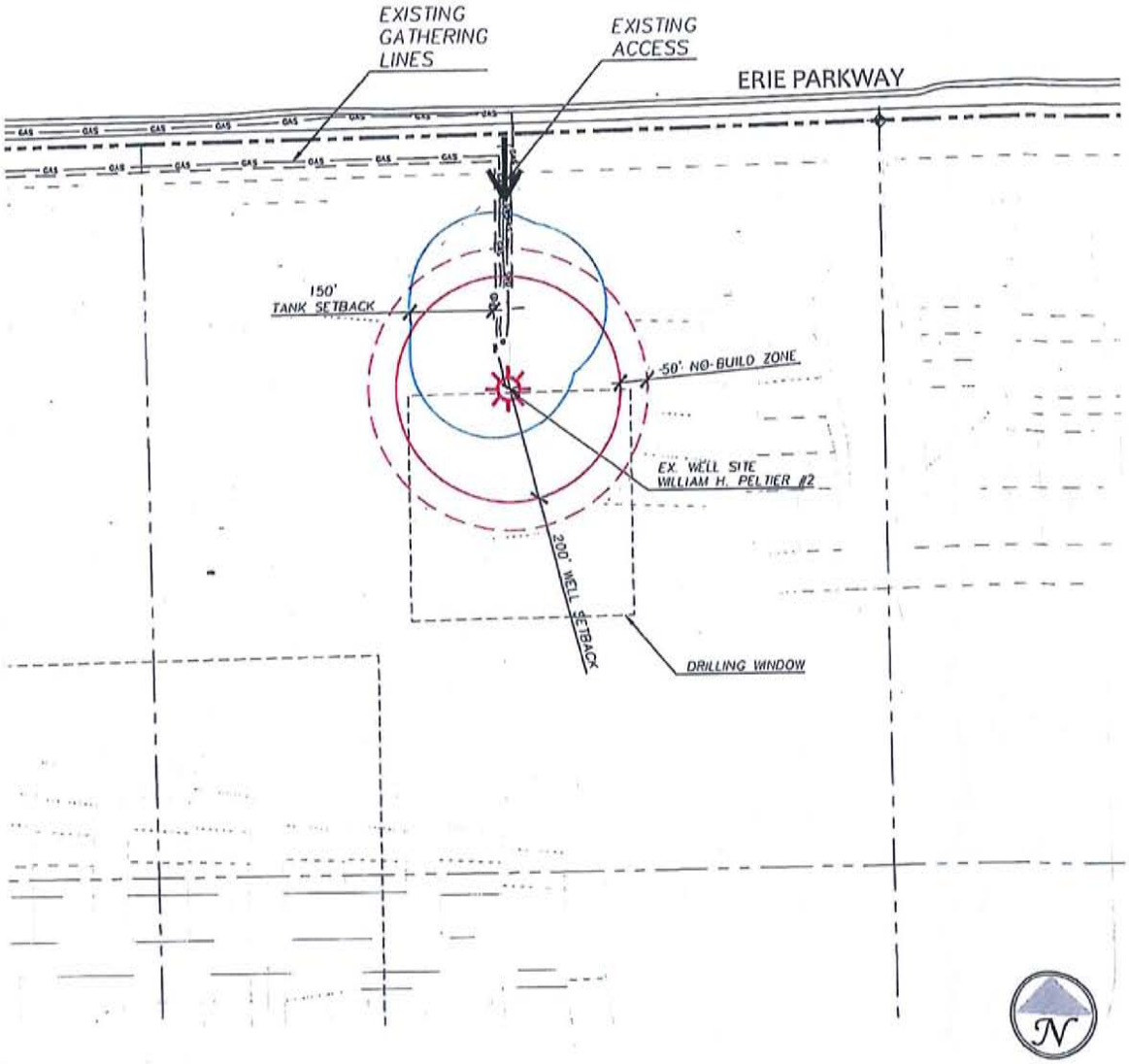
TOWNSHIP 1 NORTH, RANGE 68 WEST

SECTION 20: NW1/4

WELD COUNTY, COLORADO

Scale: 1"=300' July 30, 2013

EXHIBIT D



LEGEND

- OIL & GAS OPERATIONS AREA (200' SETBACK)
- 50' NO BUILD ZONE
- TANK BATTERY SETBACK (150' SETBACK)
- DRILLING WINDOWS

LOCATION OF ROADS, LOTS AND OTHER LAND DEVELOPMENT COMPONENTS ARE CONCEPTUAL AND SUBJECT TO CHANGE.

TOWNSHIP 1 NORTH, RANGE 68 WEST

SECTION 20: NW1/4

WELD COUNTY, COLORADO

Scale: 1"=300' July 30, 2013

SURFACE USE AGREEMENT

This Surface Use Agreement ("**Agreement**") is dated and made effective this 1st day of August, 2013, and is between Kerr-McGee Oil & Gas Onshore LP, a Delaware limited partnership, with an address of 1099 18th Street, Suite 1800, Denver, CO 80202 ("**KMG**") and Kerr-McGee Gathering LLC,a Colorado limited liability company (KMGG), J Dearmin LLC ("Dearmin"), J Gaz LLC ("Gaz"), Jack Shell Family Trust and Sonya Shell Family Trust (collectively "Shell F/T"), and WY&K Holdings, LLC ("WY&K") (hereinafter Dearmin, Gaz, Shell F/T and WY&K may be referred to collectively as "Owner"), with an address of 10343 Federal Blvd, #J515, Westminster, Colorado, 80260 ("**Surface Owner**"). KMG and Surface Owner may be referred to collectively as "Parties" and individually as a "Party."

A. Surface Owner owns the surface estate of that certain tract of land more particularly described on Exhibit A attached hereto, being a part of the N/2 of Section 20, T1N, R68W, Weld County, Colorado (hereinafter referred to as the "**Property**");

B. Surface Owner plans to develop the surface of the Property as a residential and commercial development known as "Erie Highlands";

C. The Parties acknowledge that Encana Oil & Gas (USA) Inc. ("**Encana**") owns certain working interests in oil and gas leases covering the Property;

D. Encana currently operates wells on the Property under such leases and subject to an unrecorded Compatible Development and Surface Use Agreement with the current owners of the property dated March 6, 2012;

E. This Agreement sets forth the Parties' rights, obligations and agreements regarding the relationship between the development of the Property by Surface Owner and KMG's use of the surface of the Property, such rights and obligations to be binding upon the Parties' successors and assigns.

In consideration of the mutual covenants contained herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

1. FUTURE WELL LOCATIONS, VERTICAL, DIRECTIONAL and HORIZONAL DRILLING.

KMG shall drill and operate oil and gas wells on the Property only within the two locations identified and depicted on Exhibits B and C as the "Permanent Operations Areas" ("POA"). The POAs shall include the areas that are in the configurations and sizes depicted on Exhibits B and C. KMG shall have the right to drill future wells within the Permanent Well and Production Area as described below within the POAs identified on Exhibit B and C, including horizontal, vertical and directional wells that produce from and drain the Property ("Future Wells"), and so long as such locations are permitted locations under the then applicable well spacing regulations of the COGCC or exceptions granted thereto by the Director of the COGCC.

The POAs include a Permanent Wellhead and Production Equipment Area and an Ancillary OperationsArea to be used for purposes as follows:

The POAs shall be the location for wells and production facilities, flowlines and portions of pipelines and pipeline easements and for oil and gas drilling and production operations and facilities as more particularly described on Exhibits B and C.

The POAs shall be made available to KMG for its exclusive use for all oil and gas operations to be conducted by KMG, including, but are not limited to, drilling and production activities, workovers, well deepenings, recompletions, fracturing, re-fracturing, twinning, and the drilling of replacement wells and the location of associated oil and gas production and drilling equipment and facilities and flowlines and portions of pipeline easements.

a. Within the designated POAs is an area specifically identified as the Permanent Wellhead and Production Equipment Area. This area is the only location for future wells but this does not limit KMG's rights to install production facility equipment necessary for production of the wells. KMG still will have the right to install and construct production facility equipment and ancillary equipment such as flowlines, pipelines, electrical lines, electrical poles, pedestals, transformers and all other associated equipment necessary for the wells and the production facility. The setbacks from the Permanent Wellhead and Production Equipment Area shall be 250' from that area line to permanent habitable structures. The Permanent Production Area, also more particularly described on Exhibits B and C, shall be limited to use for the installation and operation of production facilities other than wellheads, and the setback shall be 200' from that area line to permanent habitable structures.

b. The Ancillary Operations Areas may be used for operations that include the preparation, drilling and completion of wells to be drilled at locations within a Permanent Operations Area and for the temporary location of production facilities and equipment. Except for portions of pipeline easements, electrical easements and flowlines, KMG may not locate wells or permanent production facilities within the Ancillary Operations Areas, but may use the Ancillary Operations Areas only for temporary uses relating to the drilling and completion of the wells and the temporary location of production facilities.

c. With respect to the POA, Surface Owner shall not plat any surface property lines or install or construct fences, roadways, trees, bushes or any other permanent or temporary improvements within the POAs or upon the pipeline easements provided for herein, and no temporary or permanent building or other structure or improvement shall be located by Surface Owner within the Permanent Operations Areas or the pipeline easement areas. The Permanent Operations Areas shall be for the exclusive use of oil and gas operations and production.

d. Surface Owner may use the Ancillary Operations Areas for grazing and ranching purposes and, with the consent of KMG not to be unreasonably withheld, for landscaping and the installation of irrigation systems; provided, however, KMG shall in

no event be liable for damages to such landscaping and irrigation systems caused by its non-negligent oil and gas operations, and KMG shall at all times have priority of use.

e. KMG shall have the right to locate build, repair and maintain tanks, separators, dehydrators, flowlines, pipelines and all other associated drilling and production equipment and gathering equipment within the POAs and otherwise, as provided in this subsection 4.a. and c.

KMG understands and agrees that the Ancillary Operations Areas is being set aside by Surface Owner to accommodate Encana Oil & Gas (USA) Inc. or other mineral interest owners of the Property to be used for construction and completion staging and operations, production operations and other oil and gas mineral development uses other than drilling operations and the placement of its surface equipment and facilities. Surface Owner will include in its surface use agreement with Encana a covenant requiring Encana to cooperate with KMG in its use of the Ancillary Operations Areas so that each operator does not directly interfere with the wellheads, tanks, and other surface equipment and facilities of the other operator and to require a minimum distance of 150' between the wellheads of each operator. KMG agrees that in its use of the Ancillary Operations Areas, it will not directly interfere with the wellheads, tanks and other surface equipment and facilities of Encana. KMG acknowledges that the perimeter outside the Ancillary Operations Areas fifty feet (50') in width may be used by Surface Owner for the planting and maintenance of shallow-root landscaping provided that KMG shall have no liability for damage to such landscaping and that such landscaping shall not unreasonably interfere with KMG's operations on the Property.

As part of the consideration for this Agreement, Surface Owner hereby waives its right to, and covenants that it shall not protest or object to any COGCC exception location or application for same by KMG. Notwithstanding the foregoing, the wellhead location of any Future Well drilled from the oil and gas operations areas located in the Property shall not be closer than 250' from a residential lot line or publicly dedicated roadway whether platted or planned. KMG shall locate its wellheads, tanks and other surface equipment and facilities entirely within the Permanent Operations Area depicted on Exhibit B and C.

In its preliminary and final plats of Erie Highlands, Surface Owner shall set aside for use by KMG the POAs as referenced above. Any mining tailings or remnants shall be removed and remediated from the POAs; otherwise the POAs are to be made available to KMG in their present conditionfor any oil and gas operations conducted by KMG in connection with the Future Wells, including, but not limited to, production activities, workovers, well deepenings, recompletions, hydraulic fracturing and replacement wells and for a tank battery and all potential flowline routes

In its use of the POAs upon the Property, KMG agrees not to interfere with the separate Encana Equipment Area, as described on Exhibit B, provided for by Surface Owner to Encana in their separate surface use agreement, understanding that all mineral owners and operators are obligated, to the extent possible, to access their separate POAs/OGOAs from the joint or existing access roads contained in Exhibits B and C.

2. RELEASE OF SURFACE RIGHTS

In consideration of Ten Dollars ($10.00) and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, KMG hereby permanently releases, all of KMG's rights to enter upon, access or otherwise use the surface of the Property except as specifically otherwise provided herein. Notwithstanding the foregoing, KMG expressly reserves, retains and excludes from this release of surface rights all of its mineral interest it may own currently or in the future. This Release shall have no effect whatsoever on KMG's subsurface rights in the Property. KMG reserves all necessary subsurface easements to produce the mineral estate in the Property.KMG retains and reserves in connection with its mineral rights the right to develop through vertical, horizontal or directional drilling or otherwise its mineral interest from the OGOAs provided, however, such mineral interest development does not damage or interfere with the Surface Owner's ownership, use and development of the Property. Further, nothing in this release shall be deemed to release any surface rights that may be currently owned by any other person or entity.

This agreement is contingent upon and subject to KMG owning a mineral interest in the Property.

3. SETBACK REQUIREMENTS.

Surface Owner will not locate any lot line, building, or structure within the entirety of the POAss. Surface Owner will not construct habitable structures within the No Build Zone depicted on Exhibit B. Surface Owner understands and acknowledges that the COGCC has rules and regulations that apply to the distance between a wellhead and public roads, production facilities, building units and surface property lines, among other things. In order to give full effect to the purposes of this Agreement, Surface Owner hereby waives its right to object to the location of any of KMG's facilities made in accordance with this Agreement on the basis of setback requirements in the rules and regulations of the COGCC, as they may be amended from time to time. Surface Owner further and similarly waives its right to object to the location of any KMG facilities based upon any other state or local setback requirements or other requirements or regulations that are or become inconsistent with this Agreement provided such locations are made in accordance with this Agreement. KMG or its successors and assigns may cite the waiver in this paragraph in order to obtain a location exception or variance under COGCC rules or from any other state or local governmental body having jurisdiction. Surface Owner agrees not to object to the use of the surface in the OGOA so long as such use is consistent with this Agreement and Surface Owner will provide KMG or its successors and assigns with whatever written support they may reasonably require to obtain permits from the COGCC or any local jurisdiction. This setback distance shall be binding upon Surface Owner's successors and assigns.

Notwithstanding the foregoing, and provided KMG's rights under this Agreement are not adversely affected, Surface Owner reserves all rights to contest or otherwise object to any proposed rule, regulation or proceeding by any governmental authority that would seek to increase setbacks beyond those specified in this Agreement or to apply setbacks to the development of the Property by the Surface Owner, and the foregoing waiver shall not be effective against Surface Owner in any such proceeding.

4. PIPELINES and FLOWLINES.

Subject to the limitations hereinafter described, KMG has a continuing right and entitlement to own, operate, maintain, repair and replace all flowlines and pipelines that may be necessary or convenient to its operations on the OGOAs. This Agreement is intended to generally confine the placement of future flowlines, electrical lines and water lines within the POAs and gathering lines and pipelines to certain specified locations within the Property along County Road 5, and West and center section lines as shown on Exhibit D hereto. Surface Owner understands that the installation of the gathering lines that will service Future Wells will have to be accomplished by entering into a separate petroleum pipeline easement with KMGG. If flowlines or pipelines are not located entirely within a POA that is immediately adjacent to County Road 5, or the West and center section lines as shown on Exhibit D, then Surface Owner agrees to grant an easement from the POAs to the specified flowline or pipeline easement locations by the most direct route.

With respect to the POAs, KMG will need to construct or have constructed by KMGG or the purchaser of gas from the well(s) drilled on the POAs gas sales lines to transport gas from the gas sales meters within the POAs to the location at which the gas will be processed. Subject to the agreement of KMGG or purchaser, the pipelines will be constructed at the sole expense of KMG or KMGG in the Petroleum Pipeline Easements.

All Future Pipelines shall be located as identified above unless otherwise agreed upon between Surface Owner and KMG and KMGG, which agreement shall not be unreasonably withheld. Future Pipelines shall be installed at KMG's or KMGG's sole cost and expense. KMG or KMGG shall abandon all flowline locations that will no longer be used due to any relocations. KMG and KMGG acknowledges that any pipeline easements will be non-exclusive and agrees that it will not object to its concurrent use by Encana, other oil and gas operators or utilities, as Surface Owner may grant from time to time, so long as such other parties comply with KMGG's pipeline guidelines, attached hereto as Exhibit E, and so long as such concurrent use does not unreasonably interfere with KMG's or KMGG's operations. Any pipeline easements and the POAs shall be depicted and labeled on all subdivision plats submitted to the Town of Erie.

The location of gathering lines, flowlines and pipelines and easements for future flowlines and pipelines may be changed at the request of Surface Owner, provided that, the change does not interfere with oil and gas operations and is paid for by Surface Owner. In the event that Surface Owner requests the relocation of an existing pipeline or flowline, KMG or KMGG will provide Surface Owner with a written estimate of the relocation costs. If, after receipt of the written estimate, Surface Owner elects to proceed with the relocation, KMG or KMGG will designate the contractor to complete the work and schedule the work with Surface Owner. Surface Owner will remit the amount of the estimate to KMG or KMGG prior to the commencement of the relocation work. After completion of the work KMG or KMGG will provide to Owner an itemized statement showing the actual cost of the work. Should the actual cost of the work be less than the estimate, KMG will pay the difference to Surface Owner. Should the actual cost of the work be greater than the estimate, Surface Owner will pay the difference to KMG within ten (10) days of receipt of the itemized statement.

All flowlines and pipelines shall be buried to a depth of approximately forty-eight (48) inches from the surface. Surface Owner shall maintain a minimum of forty-eight (48) inches and not more than seventy-two (72) inches of cover over all pipelines and flowlines. The construction and burying of additional flowlines, gathering lines and pipelines shall be at the sole cost and expense of KMG, KMGG or its gas purchaser.

Notwithstanding the preceding paragraph, KMG or KMGG, shall be entitled, from time to time and if necessary to conduct its operations, to locate temporary waterlines within the pipeline easements. The temporary waterline can be used by KMG or KMGG during the duration of the drilling and completion of the Future Wells drilled in the POAs.

Such waterlines will be above ground lines constructed on the Property and shall be constructed and maintained to the following specifications:

a. Temporary above ground waterline easements shall be at the locations identified on ExhibitD as the pipeline easements. If a certified survey has not been completed for existing and future pipeline corridors, the locations of such pipelines as depicted on Exhibit D are approximate locations. In the event that KMG prepares a certified survey for a pipeline, KMG and KMGG shall furnish a copy of the survey to Surface Owner upon its written request.

b. The width of this easement shall be as reflected in Exhibit D for all operations, maintenance and transportation activities or as otherwise agreed to between the parties.

c. Locations of waterline easements may be changed by mutual agreement of Surface Owner and KMG; provided, however, all costs and expenses of such relocations shall be borne by the Party which requests the relocation. KMG or KMGG, as applicable, and Surface Owner shall enter into a separate relocation agreement for the relocation of lines and easements, all costs and expenses of such relocations to be paid by the Party which requests the relocation.

5. ACCESS.

KMG agrees to access the POAs according to the joint or existing access roads depicted and described on the attached Exhibit "D". Surface Owner shall have the right to relocate any access in the future at Surface Owner's cost and expense so long as KMG has convenient and uninterrupted access. Roads no longer used by KMG shall be abandoned. Surface Owner shall not inhibit KMG's access to the POAs or inhibit KMG's operations within the POAs. KMG acknowledges that access to the POAs will be non-exclusive to accommodate use of such access by the other mineral operator upon the Property, Encana, however no third party – including EnCana - shall impact KMG's access.

6. BATTERIES, EQUIPMENT, and OPERATIONS.

Any necessary additional future tanks and related surface equipment shall be located by KMG in the POAs. KMG shall have the right to locate, build, repair and maintain tanks, separators, dehydrators, compressors and other equipment reasonably appropriate for the

operation and production of any Future Wells only within the POAs. No compressors, other than wellhead compressors, shall be located on the Property.

With respect to KMG's equipment and facilities, flowlines or pipelines, KMG shall comply with all requisite mitigation measures contained in the COGCC Rules and Regulations and Erie Rules, Regulations and Ordinances that are not inconsistent with those of the COGCC, and shall include the following:

a. KMG shall install and maintain, at its sole cost and expense, all fences around any Future Wells and production facilities in compliance with the Rules and Regulations of the COGCC and the Town of Erie. The fence material may be upgraded at Surface Owner's option and expense, so long as the upgrade complies with COGCC and Town of Erie rules and regulations and provided Surface Owner obtains the prior written consent of KMG which consent shall not be unreasonably withheld;

b. KMG shall install and maintain, at its sole cost and expense, all gates and locks reasonably necessary for the security of any wells or facilities in the POAs. Such gates and locks shall be the standard gates and locks used by KMG;

c. KMG shall paint all production facilities for all wells, including wellhead guards, with paint that is approved by the COGCC. The color may be selected by Surface Owner, provided that any additional costs of using the color is paid by Surface Owner and that it is in compliance with COGCC and Town of Erie Rules and Regulations; and

d. KMG shall remediate and reclaim the Joint Use Areas depicted on Exhibit B and C in accordance with COGCC and Erie Rules and Regulations, and as soon as reasonably practicable following completion of the last of the Future Wells drilled within a particular POAs.

e. KMG shall not dispose of or permanently store upon or in the Property sludge, cuttings, produced water, chemicals or any hazardous or noxious substances.

Surface Owner shall not inhibit KMG's access to the POAs or inhibit KMG's operations within the POAs.

7. NOTICES TO PROPERTY OWNERS AND BUILDERS.

Surface Owner shall deliver to all buyers of the Property from Surface Owner a plat or map showing the POAs and then existing easements for flowlines, pipelines and access. In addition, Surface Owner shall provide notice to all builders, property owners, property owners' associations, special districts and other buyers of the Property from Surface Owner that:

a. There may be ongoing oil and gas operations and production in the POAs on the surface of the Property;

b. There are likely to be additional Future Wells drilled and oil and gas operations and production from the POAs that affect the surface of the Property;

c. Heavy equipment may be used by KMG from time to time for oil and gas production operations and that such operations may be conducted on a 24 hour basis upon access roads and within the POAs;

d. Future purchasers of all or a portion of the Property, as successors in interest to Surface Owner, will be acquiring a proportionate interest in Surface Owner's rights under this Agreement and assuming those obligations undertaken by Surface Owner pursuant to this Agreement; and

e. Property owner associations, special districts and buyers of individual lots, as successors in interest to Surface Owner, will be subject to the waivers contained in Sections 2 and 3, and the covenants contained in Section 3 prohibiting the location of any building or structure within the POAs or the easements and waiving objection to any setback rules of the COGCC or any local jurisdiction.

f. Surface Owner may comply with such notice obligation by including the above items as notes on the final plats of Erie Highlands.

8. GOVERNMENTAL PROCEEDINGS.

Surface Owner shall not, directly or indirectly, oppose KMG in any agency or governmental proceedings, including but not limited to the COGCC, the Town of Erie or other governing body, related to KMG's operations on the Property, including but not limited to drilling, workovers, well deepenings and recompletions, provided that KMG's position in such proceedings is consistent with this Agreement.

KMG shall not, directly or indirectly, oppose Surface Owner in any agency or governmental proceedings, including but not limited to the Town of Erie or other governing body, related to Surface Owner's application for development of the Property including but not limited to zoning, platting, subdivision, dedications, and subdivision improvement agreements, provided that Surface Owner's applications are consistent with this Agreement. KMG shall withdraw any such opposition previously filed in any agency or governmental proceedings.

9. LIMITATION OF LIABILITY, RELEASE AND INDEMNITY.

a. No Party shall be liable for, or be required to pay for, special, punitive, exemplary, incidental, consequential or indirect damages to any other Party for activities undertaken within the scope of this Agreement;

b. Except as to claims arising out of pollution or environmental damage (which claims are governed by Section 10 below) or out of other provisions of this Agreement (which claims shall be governed by the terms of this Agreement), each Party shall be and remain responsible for its own liability for all losses, claims, damages, demands, suits, causes of action, fines, penalties, expenses and liabilities, including without limitation attorneys' fees and other costs associated therewith (all of the aforesaid

herein referred to collectively as "Claims"), arising out of or connected with each such Party's ownership or operations on the Property, no matter when asserted, subject to applicable statutes of limitations. Each such Party shall release, defend, indemnify and hold the other Parties, their officers, directors, employees, successors and assigns, harmless against all such Claims. This provision does not, and shall not be construed to, create any rights in persons or entities not a party to this Agreement, nor does it create any separate rights in Parties to this Agreement other than the right to be indemnified for Claims as provided herein.

c. Notwithstanding the foregoing, to the maximum extent permitted by applicable law, KMG releases, waives and discharges Surface Owner, its affiliates, and its respective members, managers, officers, directors, employees, agents, attorneys, successors and assigns, from and against any and all liability for personal injury, death, property damage or other liability arising out of KMG's or its agents' operations upon, or use of, the Property unless such liability is the result of Surface Owner's gross negilgence or willful misconduct.

10. ENVIRONMENTAL INDEMNITY.

The provisions of Section 9 above, except for Section 9.a, shall not apply to any environmental matters, which shall be governed exclusively by the following, subject to the limitations of Section 9.a. above:

a. "Environmental Claims" shall mean all Claims asserted by governmental bodies or other third parties for pollution or environmental damage of any kind, arising from operations on or ownership of the Property or ownership of the oil and gas leasehold interest, whichever is applicable, and all cleanup and remediation costs, fines and penalties associated therewith, including but not limited to any Claims arising from Environmental Laws or relating to asbestos or to naturally occurring radioactive material. Environmental Claims shall not include the costs of any remediation undertaken voluntarily by any Party, unless such remediation is performed under the imminent threat of a Claim by a governmental body or other third party;

b. "Environmental Laws" shall mean any laws, regulations, rules, ordinances, or order of any governmental authority(ies), which relate to or otherwise impose liability, obligation, or standards with respect to pollution or the protection of the environment, including but not limited to, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. § 9601 et seq.), the Resource Conservation and Recovery Act of 1976 (42 U.S.C. §§ 6901 et seq.), the Clean Water Act (33 U.S.C. §§ 466 et seq.), the Safe Drinking Water Act (14 U.S.C. §§ 1401-1450), the Hazardous Material Transportation Act (49 U.S.C. §§ 1801 et seq.), the Clean Air Act, and the Toxic Substances Control Act (15 U.S.C. §§ 2601-2629); and

c. Environmental Indemnification. KMG shall protect, indemnify, and hold harmless Surface Owner, any property owners' association, any special district and any lot owner who purchases a lot from Surface Owner from any Environmental Claims relating to the Property or mineral interest thereunder that arise out of KMG's ownership

of the minerals and oil and gas operations upon the Property and its ownership and operation of its pipeline easement or rights-of-way and access easements or rights of way on the Property. Surface Owner shall fully protect, defend, indemnify and hold harmless KMG from any and all Environmental Claims relating to the Property that arise out of Surface Owner's development of the Property.

11. EXCLUSION FROM INDEMNITIES AND INSURANCE REQUIREMENTS.

The indemnities of the Parties herein shall not cover or include any amounts which the indemnified Party is actually reimbursed by any third party. The indemnities in this Agreement shall not relieve any Party from any obligations to third parties.

1. Insurance. KMG shall maintain during the term of this Agreement:

a. Workmen's Comp. Insurance which shall comply with all applicable Workers' Compensation and Occupational Disease Laws and which shall cover all of the KMG's employees performing any work or activities as to the Property.

b. Liability. Commercial General Liability Insurance, including contractual liability coverage as well as sudden and accidental pollution liability coverage, with a combined bodily injury and property damage limit of not less than $5,000,000 per occurrence.

c. Environmental. Environmental Impairment Liability Insurance with a limit of not less than $5,000,000 per occurrence.

KMG shall ensure that it and its contractors' insurers waive all rights of recovery or subrogation against Surface Owner, its parent, subsidiaries, affiliates, agents, directors, officers, employees, servants, co-lessees or co-venturers. As to such liability insurance, Surface Owner shall be named as an additional insured to the extent of KMG's liabilities and obligations hereunder that are covered by such liability insurance. Such liability insurance of KMG shall be written on customary policy forms and by insurance companies with ratings of no less than A- VII or better. Upon request, KMG shall endeavor to furnish Surface Owner with certificates of insurance evidencing compliance with this provision. All such certificates must be signed by authorized representatives of the insurance companies and provide for not less than ten days prior written notice to Owner in the event of cancellation affecting Surface Owner's interest. Neither failure to comply, nor full compliance with the insurance provisions of this Agreement, shall limit or relieve KMG from its indemnity obligations in accordance with this Agreement. KMG agrees to maintain all such liability insurance in accordance with the terms of this Section 11__ until the termination of this Agreement. On the second anniversary date of this Agreement, and every two years thereafter (or, upon request of Surface Owner if the parties have failed to meet during any biennial period), the parties shall meet to discuss whether the policy limits stated in this Section 11 should be adjusted and, as appropriate, adjust such policy limits to reflect then-current economic conditions and industry practices.

Alternatively, KMG may elect to self-insure for so long as such self insurance is the obligation of KMG's parent, Anadarko Petroleum Corporation, and such parent corporation has a

market capitalization in excess of $1 billion. If KMG elects to self-insure, such self-insurance shall include its common law and assumed liability under this Agreement for bodily injury and/or property damage to third parties in connection with accidents arising out of its operations, but only to the extent of those liabilities assumed herein. KMG self-insures the first $5,000,000 of its general liability, with excess liability insurance covering all operations and attaching over its self-insurance retention. KMG's self-insurance will respond to the same extent as if an insurance policy had been purchased naming Owner as an additional insured, but only to the extent of those liabilities assumed herein. Any limitations of KMG's self-insurance shall not limit its obligations to Surface Owner as provided in this Agreement or the Owner OGL. In the event of an assignment or transfer of this Agreement, as a condition precedent to the effectiveness of such assignment, the assignee or transferee shall be required to provide insurance coverage that is reasonably acceptable to Surface Owner before Surface Owner shall be required to consent to such assignment.

12. NOTICE OF CLAIM FOR INDEMNIFICATION.

If a Claim is asserted against a Party for which the other Party would be liable under the provisions of Section 9 or 10 above, it is a condition precedent to the indemnifying Party's obligations hereunder that the indemnified Party give the indemnifying Party written notice of such Claim setting forth all particulars of the Claim, as known by the indemnified Party, including a copy of the Claim (if it is a written Claim). The indemnified Party shall make a good faith effort to notify the indemnifying Party within five days of receipt of a Claim and shall affect such notice in all events within such time as will allow the indemnifying Party to defend against such Claim.

13. REPRESENTATIONS.

Each Party represents that it has the full right and authority to enter into this Agreement. KMG does not represent that it has rights to settle matters for all of the mineral owners or any other lessees in the Property and this Agreement shall only apply to and bind the KMG mineral interest in the Property.

14. SUCCESSORS.

The terms, covenants, and conditions hereof shall be binding upon and shall inure to the benefit of the Parties and their respective heirs, devises, executors, administrators, successors and assigns.

15 TERM.

This Agreement shall become effective when it is fully executed and shall remain in full force and effect until KMG has plugged and abandoned all wells owned all or in part by KMG and complied with the requirements of all applicable existing laws and regulations pertaining to removal of equipment, reclamation, cleanup and all other applicable provisions of existing laws and regulations.

16. NOTICES.

Any notice or other communication required or permitted under this Agreement shall be deemed to have been given and effective and sufficient if deposited in U.S. Mail, postage prepaid, addressed to each of the following:

If to KMG:

Kerr McGee Oil & Gas Onshore LP
1099 18th Street, Suite 1800
Denver, Colorado 80202
Attention: Surface Land Manager

If to Surface Owner:

J Dearmin LLC
10343 Federal Blvd, #J515
Westminster, Colorado, 80260
Attn: James Dearmin

Jack Shell Family Trust
10015 Meade Ct.
Westminster, CO 80031

Sonya Shell Family Trust
10015 Meade Ct.
Westminster, CO 80031

J Gaz LLC
4955 W. 65th Ave
Arvada, CO 80003
Attn: Johnny Gaz
with a copy to:

Oakwood Homes LLC
4908 Tower Road
Denver, Colorado 80249
Attn: Bruce Rau

WY&K Holdings, LLC
c/o Fairfield & Woods
1700 Lincoln Street, Suite 2400
Denver, CO 80203

Dufford & Brown, P.C.
1700 Broadway, Suite 2100
Denver, Colorado 80290-2101
Attn: Randall J. Feuerstein, Esq.

Any Party may, by written notice so delivered to the other Parties, change the address or individual to which delivery shall thereafter be made.

17. RECORDING.

This Agreement, any amendment hereto shall be recorded by KMG, which shall provide the other Parties with a copy showing the recording information as soon as practicable thereafter.

18. SURFACE DAMAGES.

Damages for each Future Well in the amount of $10,000.00 per well shall be paid by KMG to Surface Owner upon or prior to the date that each Future Well is spudded provided that Surface Owner still owns the Property on the date that the Future Wells is spudded. Payments shall be made to Surface Owner at the above address in cash, certified funds or cashiers' check. Upon conveyance of the Property to Oakwood Homes, LLC or an affiliated entity from the individually named surface owners, such damages shall no longer be payable.

19. COVENANT RUNNING WITH THE PROPERTY.

This Agreement constitutes a covenant running with the Property and will be binding upon and inure to the benefit of, and be enforceable by, the Parties and their respective successors, representatives, affiliates, administrators, trustees, executors and assigns.

20. ARBITRATION.

Any controversy or claim arising out of or relating to this Agreement, or the breach thereof, shall be resolved by arbitration conducted in Denver, Colorado and shall be administered by the American Arbitration Association under its commercial rules, and judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. The prevailing Party in any Arbitration, any other dispute resolution proceeding, or any regulatory or judicial proceeding shall be entitled to recover its reasonable attorneys' fees, experts' fees, costs and expenses from the other Party.

21. APPLICABLE LAW.

This Agreement shall be governed by and construed in accordance with the laws of the State of Colorado, without reference to its conflict of laws provisions.

22. ENTIRE AGREEMENT.

This Agreement sets forth the entire understanding among the parties hereto regarding the matters addressed herein, and supersedes any previous communications, representations or agreement, whether oral or written. This Agreement shall not be amended, except by written document signed by all Parties.

23. EXECUTION AND BINDING EFFECT.

This Agreement may be executed in any number of counterparts each of which shall be deemed an original instrument but all of which together shall constitute one and the same instrument, and shall be binding upon and inure to the benefit of the Parties, and each of their

respective heirs, executors, administrators, successors and assigns and is executed by the Parties as of the Effective Date set forth above.

24. ACKNOWLEDGMENT BY SURFACE OWNER.

Surface Owner expressly acknowledges that this Agreement satisfies KMG's obligation under COGCC rules to consult in good faith with the Surface Owner regarding the proposed oil and gas operations. The Parties further expressly acknowledge that this Agreement shall be deemed to be specifically applicable to and to fully satisfy, the obligation of the Parties to reasonably accommodate each other's use of the surface of the Property.

The parties have executed this Agreement on the day and year first above written.

[Remainder of page intentionally blank]

Kerr-McGee Oil & Gas Onshore LP

By: _____
Name: David Bell
Title: Agent and Attorney-In-Fact

STATE OF COLORADO)
) ss.
COUNTY OF Weams)

The foregoing instrument was acknowledged before me this 31 day of July, 2013 by David Bell, as Agent and Attorney-In-Fact of Kerr-McGee Oil & Gas Onshore LP, a Delaware limited partnership.

Witness my hand and official seal.

Rhonda Sutton
Notary Public
My Commission Expires: May 4, 2016

RHONDA SUTTON
NOTARY PUBLIC, STATE OF COLORADO
My Comm. Expires May 4, 2016

(00550583.1)

Kerr-McGee Gathering LLC

By: _____
Name: Ronal H. Olsen
Title: Land Manager

STATE OF COLORADO)
) ss.
COUNTY OF DENVER)

The foregoing instrument was acknowledged before me this 1st day of August 2013 by Ronald H. Olsen, as Land Manager of Kerr-McGee Gathering LLC, a Colorado limited liability company.

Witness my hand and official seal.

Lorri L. Simpson
Notary Public
My Commission Expires: 4/27/2017

LORRI L. SIMPSON
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID # 19974006744
MY COMMISSION EXPIRES APRIL 27, 2017

J DEARMIN LLC

By: James R. Dearmin by Debra M. Dearmin
James R. Dearmin, by Debra M. Dearmin, attorney-in-fact
Title Attorney-in-fact

ACKNOWLEDGMENT

State Of Colorado)
)ss
County Of Adams)

On this 29th day of July, 2013, before me personally appeared Debra M. Dearmin, as attorney in fact for James R. Dearmin, who, being by me duly sworn, did say that he is the Power of Attorney for J Dearmin LLC., that he signed the foregoing instrument on behalf of said company and acknowledged the instrument to be the free and voluntary act and deed of said company for the uses and purposes therein set forth.

My Commission Expires: 11-18-13

(SEAL)

NOTARY PUBLIC
MARIANNE DICKERSON
STATE OF COLORADO

Notary Public: Marianne Dickerson

{00547968.1}

J GAZ LLC

By: Emmalou Gaz
Emmalou Gaz, as Attorney in Fact for Johnny Gaz

Title: Manager

ACKNOWLEDGMENT

State Of Colorado)
City and)ss
County Of Denver)

On this 30th day of July, 2013, before me personally appeared Emmalou Gaz, who, being by me duly sworn, did say that she is the Attorney in Fact for Johnny Gaz, that she signed the foregoing instrument on his behalf as Manager of said company and acknowledged the instrument to be the free and voluntary act and deed of said company for the uses and purposes therein set forth.

My Commission Expires: 8/10/2014

(SEAL)

Notary Public: Debra P. Simon

DEBRA P. SIMON NOTARY PUBLIC STATE OF COLORADO

My Commission Expires 08/10/2014

{00547968.1}

WY&K HOLDINGS, LLC

By: _____
Name: ROBERT E YOULE
Title: _____

ACKNOWLEDGMENT

State Of Colorado)
City and)ss
County Of DENVER)

On this 31st day of July, 2013, before me personally appeared ROBERT E YOULE who, being by me duly sworn, did say that he is the MANAGER for WY&K HOLDINGS, LLC,, that he signed the foregoing instrument on behalf of said company and acknowledged the instrument to be the free and voluntary act and deed of said company for the uses and purposes therein set forth.

My Commission Expires: 3/15/16

(SEAL)

KEHAULANI MERRIE PUNILEI
Notary Public
State of Colorado

Notary Public: _____

{00550583.1}

JACK SHELL FAMILY TRUST

By: Jack Shell

Name: Jack Shell
Title: Trustee

SONYA SHELL FAMILY TRUST

By: Jack Shell

Name: Jack Shell
Title: Trustee

ACKNOWLEDGMENT

State Of Colorado)
)ss
County Of Adams)

On this 30th day of July, 2013, before me personally appeared Jack Shell, who, being by me duly sworn, did say that he is the Trustee for the Jack Shell Family Trust., that he signed the foregoing instrument on behalf of said trust and acknowledged the instrument to be the free and voluntary act and deed of said trust for the uses and purposes therein set forth.

My Commission Expires: My Commission Expires 08/25/2014

(SEAL) TANYA S REED NOTARY PUBLIC STATE OF COLORADO

Notary Public: Tanya S Reed

ACKNOWLEDGMENT

State Of Colorado)
)ss
County Of Adams)

On this 30th day of July, 2013, before me personally appeared Jack Shell, who, being by me duly sworn, did say that he is the Trustee for the Sonya Shell Family Trust., that he signed the foregoing instrument on behalf of said trust and acknowledged the instrument to be the free and voluntary act and deed of said trust for the uses and purposes therein set forth.

My Commission Expires: My Commission Expires 08/25/2014

(SEAL) TANYA S REED NOTARY PUBLIC STATE OF COLORADO

Notary Public: Tanya S Reed

{00547968.1}

Oakwood Homes LLC, as an optionee to purchase the Property from Surface Owner, hereby consents to this Agreement and upon its acquisition of all or any part of the Property, agrees to be bound by the terms and provisions of this Agreement.

OAKWOOD HOMES LLC

By: _____
Name: Robert J Sanderman
Title: Executive Vice President

STATE OF Colorado)
) ss.
COUNTY OF Denver)

The foregoing instrument was acknowledged before me this 31st day of July 2013 by Robert J. Sanderman, as EVP of Oakwood Homes LLC, a Colorado limited liability company.

Witness my hand and official seal.

Karen L. Wilborn
Notary Public

KAREN L. WILBORN NOTARY PUBLIC STATE OF COLORADO

My Commission Expires: 6/17/2016

545333....

EXHIBIT A
To
Surface Use Agreement

PROPERTY DESCRIPTION

Exhibit A

LEGAL DESCRIPTION

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'39" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID NORTH LINE, NORTH 88°48'39" EAST, A DISTANCE OF 2,648.08 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE NORTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20, NORTH 88°48'06" EAST, A DISTANCE OF 2,648.24 FEET TO THE NORTHEAST CORNER OF SAID SECTION 20;

THENCE ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, SOUTH 00°00'25" WEST, A DISTANCE OF 1,720.04 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 509 AT PAGE 79, IN SAID RECORDS;

THENCE DEPARTING SAID EAST LINE AND ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°55'29" WEST, A DISTANCE OF 430.59 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID NORTHERLY BOUNDARY, NORTH 89°59'35" WEST, A DISTANCE OF 27.44 FEET TO THE NORTHWEST CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'25" WEST, A DISTANCE OF 5.38 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 509 AT PAGE 79;

THENCE ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°55'29" WEST, A DISTANCE OF 769.24 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 814 AT PAGE 251, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY, WESTERLY AND SOUTHERLY BOUNDARIES OF SAID PARCEL THE FOLLOWING THREE (3) COURSES:

1) SOUTH 78°55'29" WEST, A DISTANCE OF 250.00 FEET;

2) SOUTH 11°04'31" EAST, A DISTANCE OF 125.00 FEET;

3) NORTH 78°55'29" EAST, A DISTANCE OF 250.00 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL DESCRIBED IN BOOK 509 AT PAGE 79;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL, NORTH 78°55'29" EAST, A DISTANCE OF 744.76 FEET TO A POINT ON THE WESTERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 1179 AT PAGE 541;

THENCE ALONG SAID WESTERLY BOUNDARY, SOUTH 00°00'25" WEST, A DISTANCE OF 76.02 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1044 AT RECEPTION NO. 1983198, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY BOUNDARY OF SAID PARCEL, SOUTH 89°05'08" WEST, A DISTANCE OF 225.15 FEET TO THE NORTHWESTERLY CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'21" WEST, A DISTANCE OF 650.47 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL AND A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'07" WEST, A DISTANCE OF 1,962.78 FEET TO THE CENTER QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20, SOUTH 89°05'29" WEST, A DISTANCE OF 2,640.94 FEET TO THE WEST QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, NORTH 00°21'43" WEST, A DISTANCE OF 2,628.51 FEET TO THE **POINT OF BEGINNING**.

CONTAINING AN AREA OF 305.126 ACRES, (13,291,297 SQUARE FEET), MORE OR LESS.

EXCEPTING THEREFROM:

A PARCEL OF LAND AS DESCRIBED IN SPECIAL WARRANTY DEED AS RECORDED AT RECEPTION NO. 3338315 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDER'S OFFICE, BEING A PART OF THE NORTHEAST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO DESCRIBED FURTHER MORE AS FOLLOWS;

COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION 20, THENCE SOUTH 44°24'16" WEST, A DISTANCE OF 42.88 FEET TO A LINE PARALLEL WITH AND 30 FEET WESTERLY, MEASURED AT RIGHT ANGLES, FROM THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20 AND THE TO THE **POINT OF BEGINNING**;

THENCE ALONG SAID PARALLEL LINE, SOUTH 00°00'25" WEST, A DISTANCE OF 1,048.55 FEET;

THENCE DEPARTING SAID PARALLEL LINE, NORTH 89°59'35" WEST, A DISTANCE OF 30.00 FEET TO A LINE PARALLEL WITH AND 60 FEET WESTERLY, MEASURED AT RIGHT ANGLES, FROM THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID PARALLEL LINE, NORTH 00°00'25" EAST, A DISTANCE OF 987.48 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHEWESTERLY;

THENCE DEPARTING SAID PARALLEL LINE, NORTHWESTERLY ALONG SAID CURVE, THROUGH A CENTRAL ANGLE OF 91°12'20", AN ARC LENGTH OF 31.84 FEET TO A LINE PARALLEL WITH AND 70 FEET SOUTHERLY, MEASURED AT RIGHT ANGLES, FROM THE NORTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID PARALLEL LINE, SOUTH 88°48'06" WEST, A DISTANCE OF 1,272.60 FEET;

THENCE DEPARTING SAID PARALLEL LINE, NORTH 01°11'53" WEST, A DISTANCE OF 40.00 FEET TO A LINE PARALLEL WITH AND 30 FEET SOUTHERLY, MEASURED AT RIGHT ANGLES, FROM THE NORTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID PARALLEL LINE, NORTH 88°48'06" EAST, A DISTANCE OF 1,323.87 FEET TO THE **POINT OF BEGINNING**;

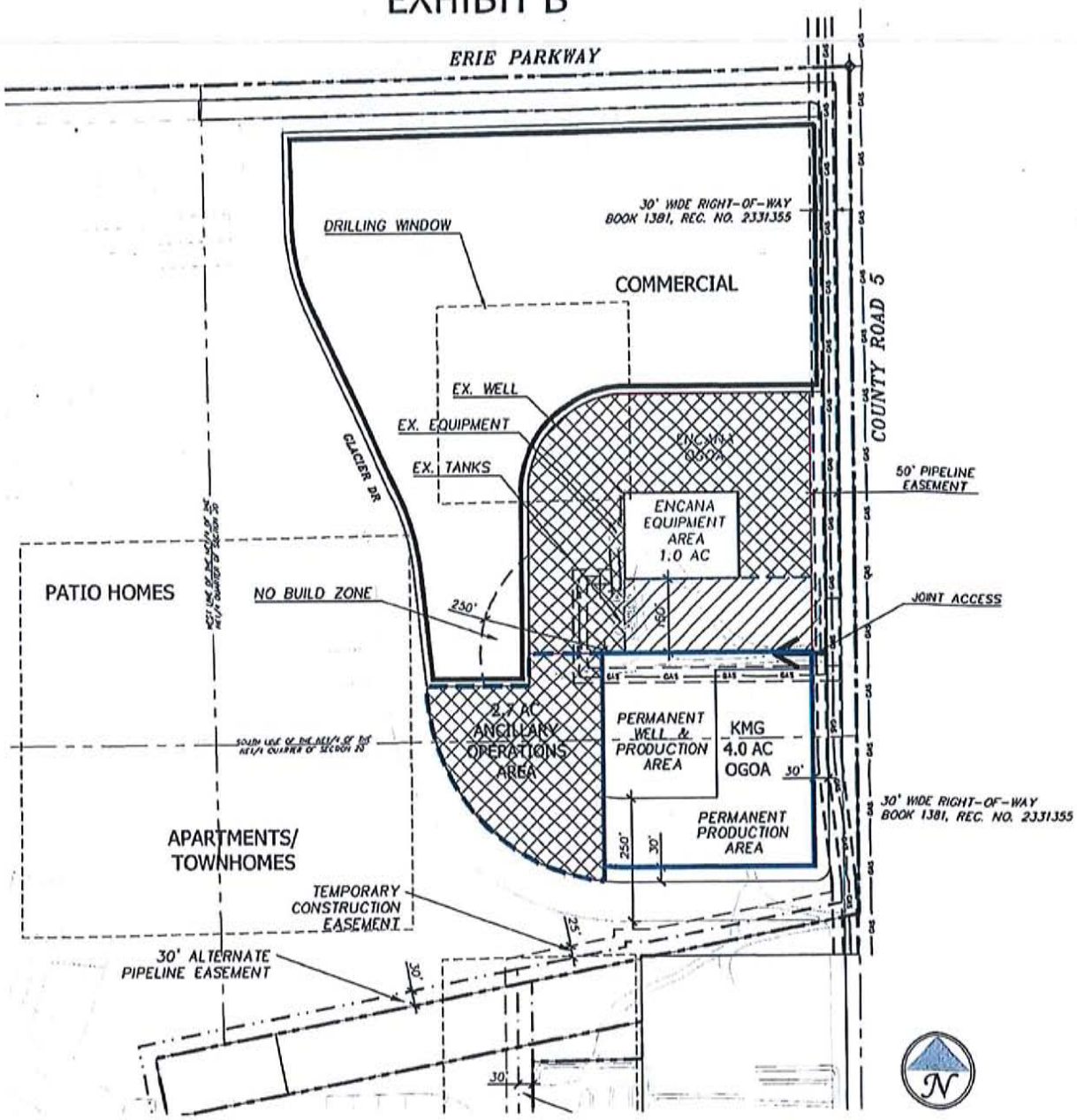
CONTAINING AN AREA OF 1.912 ACRES, (83,275 SQUARE FEET), MORE OR LESS.

THE RESULTANT OR NET AREA FOR THE OVERALL BOUNDARY BEING 303.214 ACRES, (13,208,022 SQUARE FEET), MORE OR LESS.

EXHIBIT B
To
Surface Use Agreement

<u>PERMANENT OPERATIONS AREAS</u>
Section 20: NE1/4

EXHIBIT B



LEGEND

- PERMANENT OPERATIONS AREA
- JOINT ENCANA & KMG ANCILLARY OPERATIONS AREA
- JOINT ENCANA & KMG ANCILLARY EQUIPMENT AREA
- JOINT ACCESS
- DRILLING WINDOWS

LOCATION OF ROADS, LOTS AND OTHER LAND DEVELOPMENT COMPONENTS ARE CONCEPTUAL AND SUBJECT TO CHANGE.

KERR MCGEE

TOWNSHIP 1 NORTH, RANGE 68 WEST

SECTION 20: NE1/4

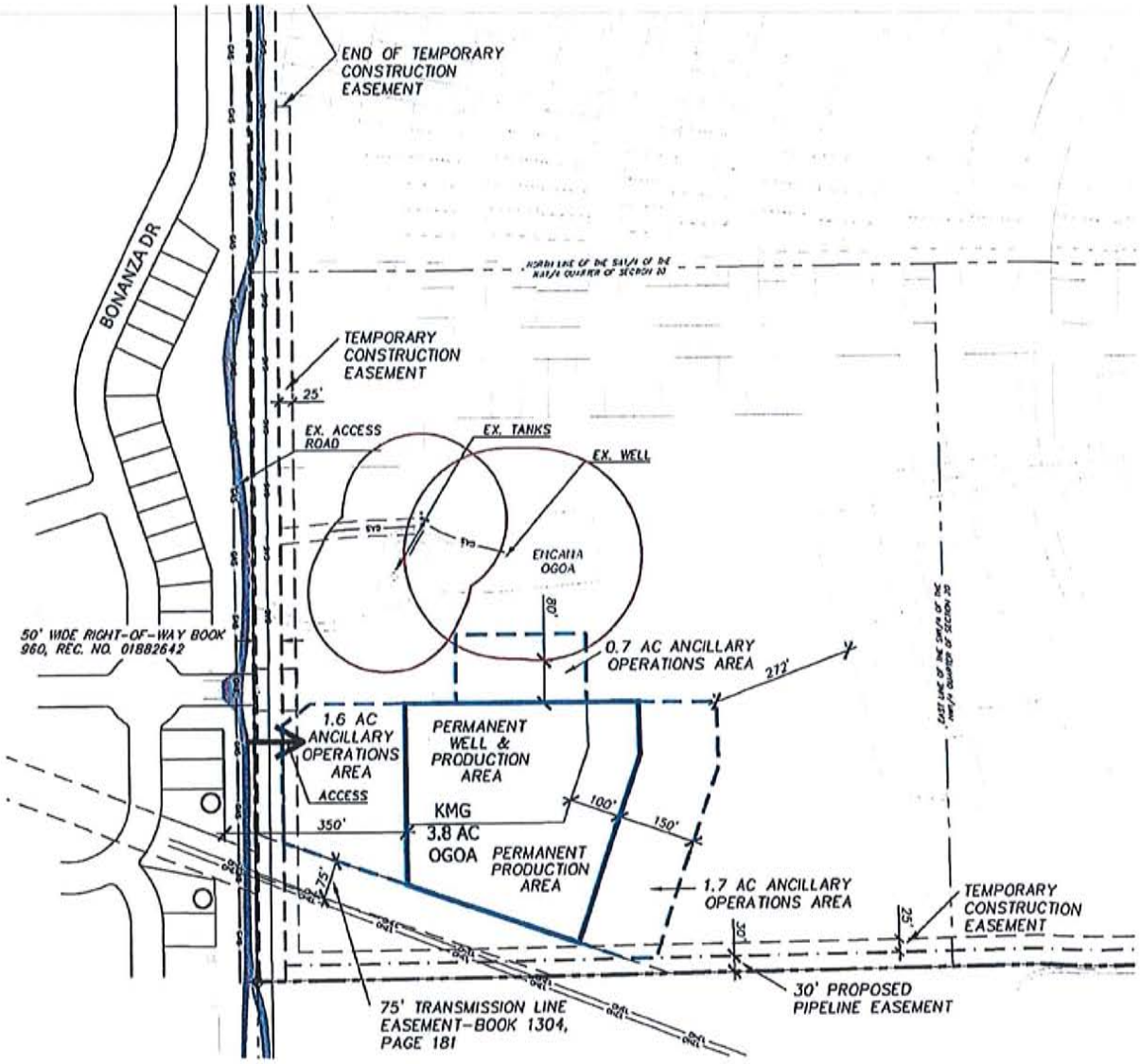
WELD COUNTY, COLORADO

Scale: 1"=300' July 31, 2013

Exhibit C
To
Surface Use Agreement

<u>PERMANENT OPERATIONS AREAS</u>
Section 20: NW1/4

EXHIBIT C



LEGEND

PERMANENT OPERATIONS AREA

ANCILLARY OPERATIONS AREA

ACCESS

LOCATION OF ROADS, LOTS AND OTHER LAND DEVELOPMENT COMPONENTS ARE CONCEPTUAL AND SUBJECT TO CHANGE.

KERR MCGEE

TOWNSHIP 1 NORTH, RANGE 68 WEST

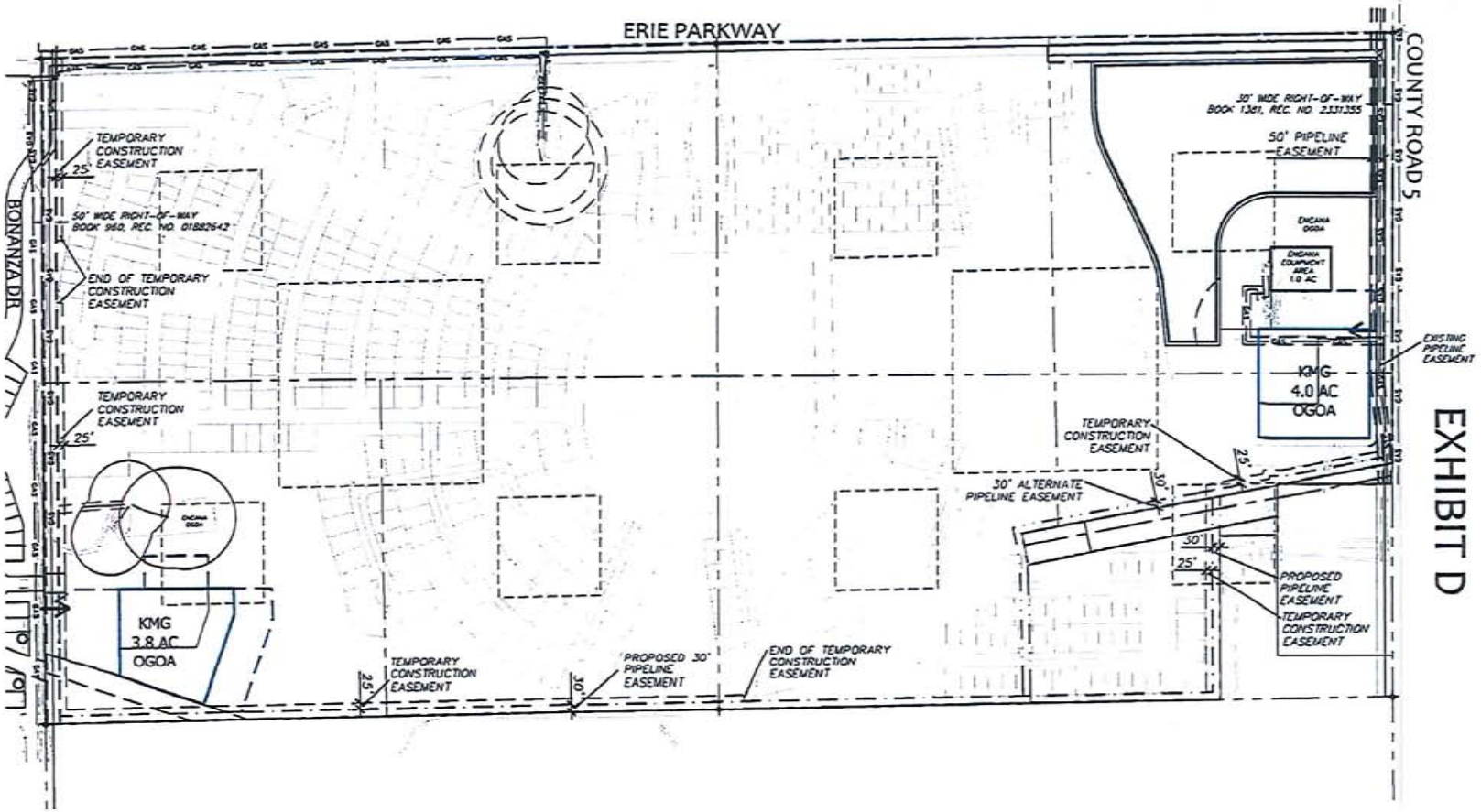
SECTION 20: NW1/4

WELD COUNTY, COLORADO

Scale: 1"=300' July 31, 2013

EXHIBIT D
To
Surface Use Agreement

PETROLEUM PIPELINE EASEMENT LOCATIONS



LEGEND

- ENCANA OGOA
- KMG OGOA
- PROPOSED 30' PIPELINE EASEMENT
- ALTERNATE 30' PIPELINE EASEMENT
- EXISTING 50' PIPELINE ROW BOOK 960, REC. NO. 01882642
- EXISTING 30' PIPELINE ROW BOOK 1381, REC. NO. 2331355

KERR MCGEE

TOWNSHIP 1 NORTH, RANGE 68 WEST

SECTION 20: N1/2

WELD COUNTY, COLORADO

Scale: 1"=600' July 31, 2013

EXHIBIT E
To
Surface Use Agreement

PIPELINE GUIDELINES

General Guidelines for Design and Construction Activities On or Near Kerr- McGee Gathering LLC Pipelines and Related Facilities

This list of design, construction and contractor requirements, including but not limited to the following, is for the design and installation of foreign utilities or improvements on Kerr McGee Gathering LLC (KMGG) right-of-way (ROW). These are not intended to, nor do they waive or modify any rights KMGG may have under existing easements or ROW agreements. For information regarding KMGG's rights and requirements as they pertain to the existing easements, please reference existing easements and amendments documents. This list of requirements is applicable for KMGG facilities on easements and in road rights of ways only. Encroachments on fee property should be referred to the Land & ROW Department. Any reference to KMGG in the below requirements is meant to include and apply to any Kerr McGee entity.

Design

- KMGG shall be provided sufficient prior notice of planned activities involving excavation, blasting, or any type of construction on KMGG's ROW or near its facilities. This is to determine and resolve any location, grade or encroachment problems and allow for the protection of KMGG's facilities and the general public. This prior notification is to be made **before** the actual work is to take place.

- The encroaching entity shall provide KMGG with a set of drawings for review and a set of final construction drawings showing all aspects of the proposed facilities in the vicinity of KMGG's ROW. The encroaching entity shall also provide a set of "as-built drawings" and submit to KMGG, showing the facilities in the vicinity of KMGG's ROW upon completion of the work.

- Only facilities shown on drawings reviewed by KMGG will be approved for installation on KMGG's ROW. All drawing revisions that affect facilities proposed to be placed on KMGG's ROW must be approved by KMGG in writing.

- KMGG shall approve the design of all permanent road crossings.

- Any repair to surface facilities following future pipeline maintenance or repair work by KMGG on its "prior rights" ROW will be at the expense of the developer or landowner. In addition, any repair to surface facilities following future pipeline maintenance or repair work by KMGG on replacement ROW granted to relocate KMGG facilities will also be done at the expense of the developer or landowner unless expressly addressed in surface use agreements and approved in writing by KMGG.

- The depth of cover over the KMGG pipelines shall not be increased or reduced nor surface modified for drainage without KMGG's written approval.

- Construction of any permanent structure within KMGG pipeline easement is **not** permitted without written approval by KMGG.

- Planting of shrubs and trees is not permitted on KMGG pipeline easement without written approval by KMGG.

- Irrigation equipment i.e. backflow prevent devices, meters, valves, valve boxes, etc. shall not be located on KMGG easement without written approval by KMGG.

- Foreign utility installations, i.e., distribution gas, oil and gas gathering, water, electric, telephone, cable and sewer lines, etc., may cross perpendicular to KMGG's pipeline within the ROW, provided that a minimum of eighteen inches (18") of vertical clearance is maintained between KMGG pipeline(s) and the foreign utility. Any installation by a foreign utility with less than 18" of vertical separation is not allowed without written approval by KMGG. In no case will vertical separation be less than 12". Constant line elevations must be maintained across KMGG's entire ROW width, gravity drain lines are the only exception and must be approved in writing. Foreign line crossings below the KMGG pipeline must be evaluated by KMGG to ensure that a significant length of the KMGG line is not exposed and unsupported during construction. **Foreign line crossings above the KMGG pipeline with less than 18" of clearance must be evaluated by KMGG to ensure that additional support is not necessary to prevent settling on top of the KMGG natural gas pipeline.** A KMGG representative must be on site during any crossing activities to verify clearance depths and to assure the integrity and support of the KMGG facility. All installations of foreign crossings done by boring and or jacking require the KMGG facility to be exposed to verify clearances.

General Guidelines for Design and Construction Activities On or Near Kerr- McGee Gathering LLC Pipelines and Related Facilities

- Foreign utilities shall not run parallel to KMGG pipelines within the KMGG easement without written permission by KMGG. **A minimum of 10 feet of horizontal separation must be maintained in parallel installations whether the foreign utility is placed within the KMGG easement or adjacent to the KMGG easement. Any deviation from the 10' horizontal requirement must be approved in writing by KMGG and an "as built survey" provided to KMGG after installation.** In the instance that high voltage electric lines, greater than 20kV, are installed parallel to a KMGG pipeline a minimum horizontal distance of 15' must be maintained.

- The foreign utility should be advised that KMGG maintains cathodic protection on its pipelines and facilities. The foreign utility must coordinate their cathodic protection system with KMGG's. At the request of KMGG, foreign utilities shall install (or allow to be installed) cathodic protection test leads at all crossings for the purposes of monitoring cathodic protection interference. The KMGG CP technician and the foreign utility CP technician shall perform post construction CP interference testing. Interference issues shall be resolved by mutual agreement between foreign utility and KMGG. All costs associated with the correction of cathodic protection interference issues on KMGG pipelines as a result of the foreign utility crossing shall be borne by the foreign utility for a period of one year from date the foreign utility is put in service.

- The developer shall understand that KMGG, whether specifically required per federal law or by company standard, will mark the routing of its underground facilities with aboveground pipeline markers and test leads and maintain those markers and test leads. Markers will be installed at every point the pipeline route changes direction and adequate markers will be installed on straight sections of pipeline to insure, in the sole opinion of KMGG, the safety of the public, contractor, KMGG personnel and KMGG facilities.

- On all foreign utility crossings and / or encroachments, metallic foreign lines shall be coated with a suitable pipe coating for a distance of at least 10 feet on either side of the crossing.

- AC Electrical lines must be installed in conduit and properly insulated.

- On all foreign pipelines, DOT approved pipeline markers shall be installed so as to indicate the route of the foreign pipeline across the KMGG ROW.

- No power poles, light standards, etc. shall be installed in the KMGG easement without written approval by KMGG.

- KMGG installs above ground appurtenances at various locations that are used in the operation of its facilities. Kerr McGee will install protective enclosures at the above ground appurtenances to protect them from outside damage. The design and placement of these above ground appurtenances and protective enclosures is done at KMGG's sole discretion, and may exceed any regulatory requirements.

Construction

- If KMGG will be relocating KMGG facilities for any entity, grading in the new KMGG ROW shall be +/- 6 inches before KMGG will mobilize to complete the relocation. Final cover after the completion of the project will not be manipulated by the requesting entity to be less than 48" nor more than 72". All cover that exceeds 72" or less than 48" will be approved in writing by KMGG. This does not preclude KMGG from installing the pipeline at a minimum cover of 36" as provided for in CFR 49 Part 192. Cover during all construction activities will NEVER be less than 36" unless approved in writing and a KMGG representative is on site during the time cover is reduced.

- The entity requesting relocation shall survey top of pipe after installation but before backfill to determine proper final elevation of KMGG facilities. The entity requesting relocation is solely responsible for the final depth of cover over the relocated KMGG facility. Any deviation from cover requirements as outlined above will be corrected at the sole expense of the entity requesting relocation.

- Contractors shall be advised of KMGG's requirements and be contractually obligated to comply.

- The continued integrity of KMGG's pipelines and the safety of all individuals in the area of proposed work near KMGG's facilities are of the utmost importance. Therefore, contractor must meet with KMGG representatives prior to construction to provide and receive notification listings for appropriate area operations and emergency personnel. **KMGG's on-site representative will require discontinuation of any work that, in his or her opinion, endangers the operations or safety of personnel, pipelines or facilities.**

General Guidelines for Design and Construction Activities On or Near Kerr- McGee Gathering LLC Pipelines and Related Facilities

- **The Contractor must expose all KMGG pipelines prior to crossing to determine the exact alignment and depth of the lines. A KMGG representative must be present.**

- The use of probing rods for pipeline locating shall be performed by KMGG representatives only, to prevent unnecessary damage to the pipeline coating. A KMGG representative shall do all line locating.

- Notification shall be given to KMGG at least 72 hours before start of construction. A schedule of activities for the duration of the project must be made available at that time to facilitate the scheduling of KMGG's work site representative. Any Contractor schedule changes shall be provided to KMGG immediately.

- Heavy equipment will not be allowed to operate directly over KMGG pipelines or in KMGG ROW unless written approval is obtained from KMGG. Heavy equipment shall only be allowed to cross KMGG pipelines at locations designated by KMGG. Haul roads will be constructed at all crossings. The haul roads will be constructed using lightweight equipment. The existing depth of cover over the pipeline must be verified. Cover will be added such that a total of 8' of fill exists over the pipeline and extends a minimum of 10' on each side of the pipeline. Depth of cover will then taper as required for equipment access. Steel plates may be used for load dissipation only if approved in writing by KMGG.

- Contractor shall comply with all precautionary measures required by KMGG, at its sole discretion to protect its pipelines. When inclement weather exists, provisions must be made to compensate for soil displacement due to subsidence of tires.

- Excavating or grading which might result in erosion or which could render the KMGG ROW inaccessible shall not be permitted unless the contractor agrees to restore the area to its original condition and provide protection to KMGG's facility. At no time will cover be reduced to less than 36" without written approval by KMGG and a KMGG representative on site.

- A KMGG representative shall be notified prior to construction activities within twenty-five (25) feet of a KMGG pipeline or above ground appurtenance. The contractor shall not be allowed to work within twenty-five (25) feet of KMGG facilities without approval from the KMGG representative. The KMGG representative may or may not remain on site during the entire construction activity. Contractor shall use extreme caution and take appropriate measures to protect KMGG facilities. The contractor shall call the KMGG representative prior to backfilling around the KMGG facility to allow for a final inspection of the KMGG facility.

- Ripping is only allowed when the position of the pipe is known and not within ten (10) feet of KMGG facility. KMGG personnel must be present.

- Temporary support of any exposed KMGG pipeline by Contractor may be necessary if required by KMGG's on-site representative. Backfill below the exposed lines and 12" above the lines shall be replaced with sand or other selected material as approved by KMGG's on-site representative and thoroughly compacted in 12" lifts to 95% of standard proctor dry density minimum or as approved by KMGG.'s on-site representative. This is to adequately protect against stresses that may be caused by the settling of the pipeline.

- No blasting shall be allowed within 1000 feet of KMGG's facilities unless blasting notification is given to KMGG including complete Blasting Plan Data. A pre-blast meeting shall be conducted by the organization responsible for blasting.

- KMGG shall be indemnified and held harmless from any loss, cost of liability for personal injuries received, death caused or property damage suffered or sustained by any person resulting from any blasting operations undertaken within 500 feet of its facilities. The organization responsible for blasting shall be liable for any and all damages caused to KMGG's facilities as a result of their activities whether or not KMGG representatives are present. KMGG shall have a signed and executed Blasting Indemnification Agreement before authorized permission to blast can be given.

- No blasting shall be allowed within 200 feet of KMGG's facilities unless blasting notification is given to KMGG a minimum of one week before blasting. The organization responsible for blasting must complete Blasting Plan Data. KMGG shall review and analyze the blasting methods. A written blasting plan shall be provided by the organization responsible for blasting and agreed to in writing by KMGG. A written emergency plan shall be provided by the organization responsible for blasting.

- KMGG shall have a signed and executed Blasting Indemnification Agreement before authorized permission to blast can be given. A pre-blast meeting shall be conducted by the organization responsible for blasting.

General Guidelines for Design and Construction Activities On or Near Kerr- McGee Gathering LLC Pipelines and Related Facilities

- Any contact with any KMGG facility, pipeline, valve set, etc. shall be reported immediately to KMGG. If repairs to the pipe are necessary, they will be made and inspected before the section is re-coated and the line is back-filled.
- KMGG personnel shall install all test leads on KMGG facilities.

Local Kerr-McGee Gathering LLC Representation:

Operations Manager	Tim Bates	Phone: (303) 655-4352
Staff Engineer:	Wes Fortik	Phone: (720) 929-6985
Pipeline Foreman:	Wayne Knight	Phone: (303) 655-4329

Emergency Contacts:

On call integrated operation center	Phone: (970) 506-5980
One Call Emergency	Phone: 811

4044917 Pages: 1 of 26
09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO

ERIE HIGHLANDS PROPERTY
MASTER PRE-DEVELOPMENT AGREEMENT

THIS MASTER PRE-DEVELOPMENT AGREEMENT ("Agreement") is made and entered into this 12th day of November 2013, by and among the **TOWN OF ERIE**, a Colorado municipal corporation, hereinafter referred to as "Erie;" **OAKWOOD HOMES, LLC**, a Colorado limited liability company, hereinafter referred to as "Developer;" and **J DEARMIN LLC, J GAZ LLC, THE JACK SHELL & SONYA SHELL FAMILY TRUSTS,** and **WY&K HOLDINGS, LLC**, (collectively, the "Owners").

RECITALS

WHEREAS, Developer is the contract purchaser of an approximately 295.8 acre parcel of land located on the west side of County Road 5 to the south of Erie Parkway, in the Town of Erie, Weld County, state of Colorado, commonly known as the Erie Highlands Property (the "Property"), and as more particularly described in "Exhibit A" attached hereto and incorporated herein by reference; and

WHEREAS, the Owners are collectively the owners of the Property; and

WHEREAS, Developer has applied to Erie for a rezoning of various tracts of the Property as Low Density Residential-LR, Medium Density Residential-MR, and Community Commercial-CC, Public Lands & Institutions-PLI, Agricultural/Opens Space-AG/OS (the "Rezoning") all with a Planned Unit Development Overlay (the "PUD") in order to develop a mixed use project within the Property (the "Development"); and

WHEREAS, the Owners have consented to the submission of such application by Developer; and

WHEREAS, the Board of Trustees of Erie held a public hearing on Developer's application for Rezoning and PUD on October 22, 2013 ("Public Hearing"), at which time evidence and testimony were received by the Board of Trustees, and which evidence and testimony was relied upon by the Board of Trustees in making findings and in determining whether or not the criteria set forth in the Erie Municipal Code ("Code") for rezoning had been met by Developer; and

WHEREAS, Developer presented evidence and testimony at the Public Hearing, including uses, maximum numbers of units, lot size, densities, phasing, open space dedication, park land dedication, and infrastructure for the Property, which evidence and testimony was specifically relied upon by the Board of Trustees in making findings and in determining that the for rezoning set forth in the Code had been met by Developer and in approving the Rezoning and PUD of the Property; and

WHEREAS, the Board of Trustees of Erie approved the Rezoning of the Property by Ordinance No. 35-2013 dated November 12, 2013, and approved the PUD by Ordinance No. 36-2013 dated November 12, 2013, as depicted on the Property zoning maps, attached hereto as "Exhibit B-1" and "Exhibit B-2" and incorporated herein by reference; and

WHEREAS, Erie and Developer now desire to enter into this Agreement to bind Developer to those uses, maximum numbers of units, lot sizes, densities, phasing, open space dedication, park land dedication, and infrastructure for the Property specifically relied upon by the Board of Trustees in approving the Rezoning and PUD; and

WHEREAS, the Development will be developed in multiple phases, wherein each phase will require Final Plat approval; and

WHEREAS, both Erie and Developer understand and agree that Developer intends to submit subsequent applications for Final Plats for each phase of development of the Property at some future date in accordance with the subdivision regulations set forth in the Code, and that at that time of subdivision a separate Development Agreement for each Final Plat will be required of Developer in conjunction with the subdivision process, which Development Agreement will address the required improvements and special provisions related to the subdivision and development of the Property located within each such Final Plat; and

WHEREAS, this Agreement is not intended to replace the Development Agreement for each Final Plat, but is intended only to bind the parties hereto to those items specifically relied upon by the Board of Trustees in making findings and in determining that the Code's criteria for rezoning had been met by Developer and provide assurances to the Developer regarding the overall process and Town interpretations applicable to the entire Property. Accordingly, a separate Development Agreement will be entered into with each Final Plat of the Property that will address matters related to the Property located within each such Final Plat; and

WHEREAS, the execution by Owners of this Agreement is only an acknowledgement of their agreement that Developer is authorized to enter into this Agreement with respect to the Property, and not an agreement by the Owners to undertake any development of the Property.

NOW, THEREFORE, in consideration of the foregoing, the parties hereto promise, covenant and agree as follows:

1. Incorporation of Recitals. The parties agree that the aforesaid recitals are true and correct, and those recitals are hereby incorporated into the body of this Agreement.

2. Phasing. Construction of the Development is anticipated to occur in multiple phases, as shown on the Phasing Map attached as "Exhibit C." The Owner shall determine the sequence of development of each phase provided that such sequencing meets the subdivision regulations of the Code.

3. Separate Development Agreements. Erie and Developer acknowledge and agree that the development obligations for the Property shall be set forth in separate development agreements, known herein as Development Agreements, to be entered into by the parties at the time of Final Plat for each such Final Plat, in accordance with the subdivision regulations of the Code and in conjunction with the subdivision process.

4. Uses, Maximum Number of Dwelling Units, Lot Sizes, Densities. The uses, maximum number of dwelling units, minimum lot sizes, and densities for the Development shall be as depicted on the PUD, attached as "Exhibit B-2." The parties expressly acknowledge that

the Rezoning of various tracts of the Property to Low Density Residential-LR, Medium Density Residential-MR, Community Commercial-CC, Public Lands & Institutions-PLI, and Agricultural/Open Space-AG/OS generally complies with the development standards of the respective zone districts, except as accounted for by the PUD which allows deviations from the underlying zoning in compliance with the Code.

5. **Open Space Dedication.** Developer shall not be required to dedicate open space at the time of approval of the Preliminary Plat or the Rezoning and shall, instead, dedicate open space to Erie as shown on "Exhibit B-2" attached hereto and incorporated herein by reference, within each Final Plat at the time of Final Plat approval for each phase of the Development. The minimum public open space dedication is shown on "Exhibit B-2." Erie acknowledges and agrees there is minimal open space dedication in the Phase 1 Final Plat and in other early phases of the Development and that most of the open space dedication identified on "Exhibit B-2" will occur in later phases of the Development. The minimum open space dedication of 31.33 acres, illustrated on "Exhibit B-2" is adequate to fulfill the open space dedication requirement for 667 dwelling units. The parties agree that after 667 dwelling units have been approved by final plats that for the Development to conform with the aggregate open space dedication requirements of the Code, the Developer shall either dedicate additional open space (above the 31.33 acres) or make a payment of cash in-lieu of land dedication for open space pursuant to the Code with each Final Plat. The Parties agree that the cash in-lieu for open space land dedication shall be $1,278.58 per dwelling unit, which amount is agreed upon and fixed for a period of five years from the effective date of this agreement. In the event that residential portions of the Development have not been final platted by such date, then the Developer shall be required to obtain an appraisal for submittal with the remaining Final Plat(s), which appraisal of then-current value shall be used to calculate a new cash in-lieu.

6. **Park Land Dedication.** The parties acknowledge and agree that the Pocket Park and Neighborhood Park land dedication requirements for the Development shall be based on the maximum number of dwelling units shown on "Exhibit B-2." Developer shall not be required to dedicate park land at the time of approval of the Preliminary Plat or the Rezoning and shall, instead, dedicate Pocket Park and Neighborhood Park land to Erie as shown on "Exhibit B-2" attached hereto and incorporated herein by reference, within each Final Plat at the time of Final Plat approval for each phase of the Development. The minimum Pocket Park and Neighborhood Park land dedication is shown on "Exhibit B-2" attached hereto and incorporated herein by reference. The parties agree that a cash in-lieu of Community Park land dedication will be required for the residential portion of the Development to conform to the Community Park land dedication requirements at the time of Final Plat. Developer shall make a payment of cash in-lieu of land dedication pursuant to the Code with each Final Plat. The Parties agree that the cash in-lieu for park land dedication shall be $376.12 per dwelling unit, which amount is agreed upon and fixed for a period of five years from the effective date of this agreement. In the event that residential portions of the Development have not been final platted by such date, then the Developer shall be required to obtain an appraisal for submittal with the last Final Plat(s), which appraisal of then-current value shall be used to calculate a new cash in-lieu.

7. **School Land Dedication.** The Development is anticipated to increase the demand on the St. Vrain Valley School District RE-1J (the "School District") due to the predictable increase in the number of school age children who will reside in the Development.

Developer has agreed to mitigate a portion of the costs and to meet its obligations under the Intergovernmental Agreement Concerning Fair Contributions for Public School Sites, dated June 8, 2011, between the Town of Erie and the School District ("IGA") by dedicating land for school purposes which would be reasonably necessary to serve the Development and the future residents thereof.

8. Erie Parkway. Future improvements are anticipated for Erie Parkway which runs along the northern border of the Development. The parties acknowledge and agree that Developer shall be responsible for improving the southern half of the Erie Parkway road section to Towns' principal arterial standards. In addition, Developer shall be responsible for making improvements (acceleration, deceleration, turn lanes, etc.) to provide fully functional intersections proposed adjacent to Erie Parkway. Developer shall be responsible for dedication of additional Erie Parkway right-of-way with the first final plat approved for the Development. However, the Parties agree that the obligation of Developer to construct improvements to Erie Parkway and to improve Erie Parkway shall be phased in accordance with the phasing of the overall Development, and the improvements to Erie Parkway required to serve each phase shall be required as part of each Final Plat, and addressed in the Development Agreement for each Final Plat.

9. County Road 5. Future improvements are anticipated for County Road 5 which runs along the east border of the Development. The parties acknowledge and agree that the Developer shall be responsible for improving the western half of the County Road 5 road section to the Towns' arterial standards. In addition, Owner shall be responsible for making improvements (acceleration, deceleration, turn lanes, etc.) to provide fully functional intersections proposed adjacent to County Road 5. Owner shall be responsible for dedication of additional County Road 5 right-of-way with the first final plat approved for the Development.

10. Prototype Site Plans. The parties acknowledge and agree that, prior to building permit application for any individual lot less than 5,000 square feet in size, the Town may require submittal of one or more Site Plans for each planning area within each filing. Site Plans shall be reviewed for approval in accordance with the Code.

11. Public Improvements. The parties acknowledge and agree that Developer shall not be required to construct or install public improvements or construct public infrastructure at the time of Preliminary Plat or the Rezoning and shall, instead, construct or install public improvements outlined in each separate Development Agreement as determined at the time of Final Plat for each phase of the Development based on the relevant engineering studies for each phase.

12. Default by either Party. If any material condition, obligation, or duty is not timely made, tendered, or performed by either Party under this Agreement, the non-defaulting Party may declare the defaulting party in default, following the notice and cure period referenced in Paragraph 15 of this Agreement, may proceed to seek any remedy available at law or in equity, including specific performance, damages, court costs, and attorney fees and costs as may be proper. In addition, if Developer fails to fulfill the terms and conditions of this Agreement, Erie, in its reasonable discretion, may declare Developer in default and may withhold any additional building permits, certificates of occupancy, or provision of new utilities fixtures or

services until the default is cured. No remedy or election hereunder shall be deemed exclusive but shall, whenever possible, be cumulative with all other remedies at law or in equity.

13. Notice of Default and Cure Period. In the event of an alleged Default by either Party under this Agreement, the non-defaulting Party may deliver written notice to the allegedly defaulting Party of such Default, at the address specified herein, and the allegedly defaulting Party shall have thirty (30) days from and after receipt of such notice to cure such Default. If such Default is not of a type which can be cured within such thirty (30) day period and the allegedly defaulting Party gives written notice to the non-defaulting Party within such thirty (30) day period that it is actively and diligently pursuing such cure, then the allegedly defaulting Party shall have a reasonable period of time given the nature of the Default following the end of such thirty (30) day period to cure such Default, provided that the allegedly defaulting Party is at all times within such additional time period actively and diligently pursuing such cure in good faith.

14. Separate Vested Rights Agreement. The parties acknowledge and agree that the parties have entered into a separate Vested Rights Agreement, entered into in accordance with the Code, acknowledging that the Rezoning, Preliminary Plat, Phase 1 Final Plat and any future Final Plats that are approved by Erie for the various phases of the Development, as such Preliminary Plat and plats may be amended from time to time, shall be considered a site specific development plan ("SSDP") for the purposes of the Vested Rights Statute and Sections 10.7.18 and 10.11.3 of the Code.

15. Representations and Warranties by Developer. Developer represents and warrants to Erie that:

a. Developer is duly organized, validly existing and in good standing under the laws of the State of Colorado and has the legal capacity and the authority to enter into and perform its obligations under this Agreement and the documents to be executed and delivered pursuant hereto;

b. The execution and delivery of this Agreement and such documents and the performance and observance of their terms, conditions and obligations have been duly and validly authorized by all necessary action on its part, and such documents and such performance and observance are valid and binding upon Developer;

c. The execution and delivery of this Agreement and the documents required hereunder and the consummation of the transactions contemplated by this Agreement will not (1) conflict with or contravene any law, order, rule or regulation applicable to Developer or to Developer's governing documents, (2) result in the breach of any of the terms or provisions or constitute a default under any agreement or other instrument to which Developer is a party or by which it may be bound or affected, or (3) permit any party to terminate any such agreement or instruments or to accelerate the maturity of any indebtedness or other obligation of Developer; and

d. This Agreement constitutes a valid and binding obligation of Developer, enforceable according to its terms, except to the extent limited by bankruptcy,

insolvency and other laws of general application affecting creditors' rights and by equitable principles, whether considered at law or in equity.

16. Indemnification and Release of Liability. Developer agrees to indemnify and hold harmless Erie, its officers, employees, agents, or servants, and to pay any and all judgments rendered against said persons on account of any suit, action, or claim caused by arising from, or on account of acts or omissions by Developer, its officers, employees, agents, consultants, contractors, and subcontractors, and/or suit, action, or claim resulting from Developer's failure to abide by the terms of this Agreement, and to pay to Erie and said persons their reasonable expenses, including but not limited to, reasonable attorney's fees and reasonable expert witness fees, incurred in defending any such suit, action or claim. Developer's obligation herein shall not apply to the extent said suit, action or claim results from any acts or omissions of officers, employees, agents, or servants of Erie or conformance with requirements imposed by Erie.

17. Title and Authority. Owners warrant to Erie that Owners are the record owners of the Property. The Owners further warrants that the Developer has full power and authority to enter into this Agreement.

18. Recording Agreement. Erie shall record this Agreement at Developer's expense in the office of the Clerk and Recorder, County of Weld, State of Colorado, and Erie shall retain the recorded Agreement.

19. Binding Effect of Agreement. This Agreement shall run with the Property and shall inure to the benefit of and be binding upon Erie and the successors, heirs, assigns, and any other person or entity acquiring or purchasing any interest in any of the Development.

20. Modification and Waiver. No modification of the terms of this Agreement shall be valid unless in writing and executed with the same formality as this Agreement, and no waiver of the breach of the provisions of any sections of this Agreement shall be construed as a waiver of any subsequent breach of the same section or any other sections which are contained herein.

21. Addresses for Notice. Any notice or communication required or permitted hereunder shall be given in writing and shall be personally delivered, sent via overnight delivery service or sent by United States mail, postage, prepaid, registered or certified mail, return receipt requested, addressed as follows:

Erie:	Developer:
Town of Erie Town Administrator P.O. Box 750 Erie, CO 80516-0750	Oakwood Homes, LLC Attn: Chad Ellington 4908 Tower Road Denver, CO 80249
With a copy (which shall not constitute notice) to:	With a copy (which shall not constitute notice) to:

Mark Shapiro Mark R. Shapiro, PC 1650 38th Street, Suite 103 Boulder, CO 80301-2624	Carolynne C. White Brownstein Hyatt Farber Schreck, LLP 410 17th Street, Suite 2200 Denver, CO 80202

With a copy to such other address or the attention of such other person(s) as hereafter designated in writing by the applicable parties in conformance with this procedure. Notices shall be effective upon mailing or personal delivery in compliance with this paragraph.

22. Previous Agreements. This Agreement shall constitute the entire agreement between the parties hereto and shall supersede all prior contracts, proposals, representations, negotiations and letters of intent, whether written or oral, pertaining to the Development.

23. Severability. If any part, section, subsection, sentence, clause or phrase of this Agreement is for any reason held to be invalid, such invalidity shall not affect the validity of the remaining sections of the Agreement. The parties hereby declare that they would have ratified this Agreement including each part, section, subsection, sentence, clause or phrase thereof; irrespective of the fact that one or more parts, sections, subsections, sentence, clauses or phrases be declared invalid.

24. Additional Documents or Action. The parties agree to execute any additional documents or take any additional action that is necessary to carry out this Agreement or is reasonably requested by the other party to confirm or clarify the intent of the provisions hereof and to effectuate the agreements herein contained and the intent hereof. If all or any portion of this Agreement are asserted or determined to be invalid, illegal or are otherwise precluded, the parties, within the scope of their powers and duties, shall cooperate in the joint defense of such documents and, if such defense is unsuccessful, the parties will use reasonable, diligent good faith efforts to amend, reform or replace such precluded items to assure, to the extent legally permissible, that each party substantially receives the benefits that it would have received under this Agreement.

25. Attorney Fees. In the event that either party finds it necessary to retain an attorney in connection with a default by the other as to any of the provisions contained in this Agreement, the defaulting party shall pay the other's reasonable attorney's fees and costs incurred in enforcing the provisions of this Agreement.

26. Situs, Venue and Severability. The laws of the State of Colorado shall govern the interpretation, validity, performance and enforcement of this Agreement. For the resolution of any dispute arising hereunder, venue shall be in the Courts of the County of Boulder, State of Colorado.

27. Paragraph Headings. Paragraph headings are inserted for convenience only and in no way limit or define the interpretation to be placed upon this Agreement.

28. Limited Third Party Beneficiaries. This Agreement is intended to describe the rights and responsibilities only as to the parties hereto and is not intended and shall not be deemed to confer any rights on any person or entity not named as a party hereto.

29. No Presumption. The parties to this Agreement and their attorneys have had a full opportunity to review and participate in the drafting of the final form of this Agreement. Accordingly, this Agreement shall be construed without regard to any presumption or other rule of construction against the party causing the Agreement to be drafted.

30. Parties Not Partners. Notwithstanding any language in this Agreement or any other agreement, representation, or warranty to the contrary, the parties shall not be deemed to be partners or joint venturers, and no party shall be responsible for any debt or liability of any other party.

31. No Waiver of Immunity. Nothing contained in this Agreement constitutes a waiver of sovereign immunity or governmental immunity by any party under applicable state law.

32. Nonliability of Officials, Agents and Employees. No trustee, board member, commissioner, official, employee, consultant, attorney or agent of any party shall be personally liable to any party under this Agreement or in the event of any Default or for any amount that may become due to any party.

33. Execution in Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed an original and all of which shall constitute but one and the same instrument.

[SIGNATURES ON FOLLOWING PAGE]

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Steve Moreno, Clerk and Recorder, Weld County, CO

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first set forth above.

TOWN OF ERIE:

Joseph A. Wilson, Mayor

ATTEST:

Nancy J. Parker, Town Clerk

[SIGNATURES CONTINUE ON FOLLOWING PAGES]

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09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO

DEVELOPER:

OAKWOOD HOMES, LLC,
a Colorado limited liability company

By: _____
Name: Robert J. Sanderman
Title: Executive Vice President

STATE OF COLORADO)
) SS.
COUNTY OF Denver)

Subscribed and sworn to before me this 18th day of October, 2013, by Robert J. Sanderman as EVP of **Oakwood Homes, LLC,** a Colorado limited liability company.

Witness my hand and official seal.
My Commission expires 6/17/2016.

Karen L. Wilborn
Notary Public

KAREN L. WILBORN NOTARY PUBLIC STATE OF COLORADO

[SIGNATURES AND ACKNOWLEDGEMENTS OF OWNERS ON THE FOLLOWING PAGES]

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Steve Moreno, Clerk and Recorder, Weld County, CO

Solely for the purpose of acknowledging and consenting:

OWNERS:

J DEARMIN LLC, a Colorado limited liability company

By: Debra M. Dearmin
Name: James R. Dearmin by
Title: Debra M. Dearmin
Attorney in fact

STATE OF COLORADO)
CITY AND) SS.
COUNTY OF DENVER)

Subscribed and sworn to before me this 11th day of October, 2013, by Debra M. Dearmin as attorney-in-fact for James R. Dearmin, Manager of **J DEARMIN LLC**, a Colorado limited liability company.

Witness my hand and official seal.
My Commission expires 8/10/2014.

Debra P. Simon
Notary Public

DEBRA P. SIMON NOTARY PUBLIC STATE OF COLORADO

My Commission Expires 08/10/2014

[SIGNATURES AND ACKNOWLEDGEMENTS OF OWNERS ON THE FOLLOWING PAGES]

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Steve Moreno, Clerk and Recorder, Weld County, CO

J GAZ LLC, a Colorado limited liability company

By: Emmalou Gaz
Name: Emmalou Gaz
Title: Attorney-in-fact

STATE OF COLORADO)
CITY AND) SS.
COUNTY OF DENVER)

Subscribed and sworn to before me this 14th day of October, 2013, by Emmalou Gaz as attorney-in-fact for Johnny Gaz, Manager of **J GAZ LLC** a Colorado limited liability company.

Witness my hand and official seal.
My Commission expires 8/10/2014.

Debra P. Simon
Notary Public

DEBRA P. SIMON NOTARY PUBLIC STATE OF COLORADO
My Commission Expires 08/10/2014

[SIGNATURES AND ACKNOWLEDGEMENTS OF OWNERS ON THE FOLLOWING PAGES]

4044917 Pages: 12 of 26
09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO

JACK SHELL FAMILY TRUST

By: Jack Shell
Jack Shell, Trustee

STATE OF COLORADO)
CITY AND) SS.
COUNTY OF DENVER)

Subscribed and sworn to before me this 2nd day of December, 2013 ~~by Jack~~ Shell as Trustee of **JACK SHELL FAMILY TRUST**.

Witness my hand and official seal.
My Commission expires 8/10/14.

Debra P. Simon
Notary Public

DEBRA P. SIMON NOTARY PUBLIC STATE OF COLORADO
My Commission Expires 08/10/2014

[SIGNATURES AND ACKNOWLEDGEMENTS OF OWNERS ON THE FOLLOWING PAGE]

4044917 Pages: 13 of 26
09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO

SONJA SHELL FAMILY TRUST

By: Jack Shell
Jack Shell, Successor Trustee

STATE OF COLORADO)
CITY AND) SS.
COUNTY OF DENVER)

Subscribed and sworn to before me this 2nd day of December, 2013, by Jack Shell as Successor Trustee of **SONJA SHELL FAMILY TRUST**.

Witness my hand and official seal.
My Commission expires 8/10/14.

Debra P. Simon
Notary Public

DEBRA P. SIMON NOTARY PUBLIC STATE OF COLORADO
My Commission Expires 08/10/2014

[SIGNATURES AND ACKNOWLEDGEMENTS OF OWNERS ON THE FOLLOWING PAGE]

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Steve Moreno, Clerk and Recorder, Weld County, CO

WY & K HOLDINGS, LLC,
a Colorado limited liability company

By: Robert E Youle
Name: ROBERT E YOULE
Title: Manager

STATE OF COLORADO)
) SS.
COUNTY OF DENVER)

Subscribed and sworn to before me this 14th day of October, 2013, by ROBERT E YOULE as MANAGER of **WY & K HOLDINGS, LLC,** a Colorado limited liability company.

Witness my hand and official seal.
My Commission expires 03-20-2014.

Roberta J Neal
Notary Public

ROBERTA J NEAL NOTARY PUBLIC STATE OF COLORADO

My Commission Expires 03/20/2014

[END OF SIGNATURES AND ACKNOWLEDGEMENTS]

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09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO

EXHIBIT A

Legal Description of the Erie Highlands Property

The North half of Section 20, Township I North, Range 68 West of the 6th P.M., County of Weld, State of Colorado, except those parcels as conveyed by instruments recorded in Book 509 at Page 79 and in Book 814 at Page 251 and in Book 1179 at Page 541 and under Reception No. 1983198 in Book 1044 and November 8, 2005 at Reception No. 3338315, County of Weld, State of Colorado.

The above legal also described as:

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SECTION 20, AND CONSIDERING THE WEST LINE OF THE NORTHWEST QUARTER OF SECTION 20 TO BEAR NORTH 00°21'37" WEST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE SOUTH 44°24'15" WEST, A DISTANCE OF 42.88 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF WELD COUNTY ROAD NO. 5 AND THE POINT OF BEGINNING;

THENCE SOUTH 00°00'29" WEST, ALONG SAID EASTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 1695.42 FEET TO A POINT ON THE NORTHERLY LINE OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 509 AT PAGE 79;

THENCE SOUTH 78°55'29" WEST, ALONG SAID NORTHERLY LINE, A DISTANCE OF 400.27 FEET TO A POINT ON THE NORTHERLY LINE OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541;

THENCE NORTH 89°59'31" WEST, ALONG SAID NORTHERLY LINE, A DISTANCE OF 27.20 FEET TO THE NORTHWEST CORNER THEREOF;

THENCE SOUTH 00°00'29" WEST, ALONG THE WESTERLY LINE OF SAID PARCEL, A DISTANCE OF 5.33 FEET TO A POINT ON THE NORTHERLY LINE OF THE PARCEL OF LAND DESCRIBED IN SAID BOOK 509 AT PAGE 79;

THENCE SOUTH 78°55'29" WEST, ALONG SAID NORTHERLY LINE, A DISTANCE OF 769.23 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 814 AT PAGE 251;

THENCE ALONG THE NORTHERLY, WESTERLY AND SOUTHERLY LINES OF SAID PARCEL THE FOLLOWING THREE (3) COURSES:

1. CONTINUING SOUTH 78°55'29" WEST, A DISTANCE OF 250.00 FEET;
2. SOUTH 11°04'31" EAST, A DISTANCE OF 125.00 FEET;
3. NORTH 78°55'29" EAST, A DISTANCE OF 250.00 FEET TO THE SOUTHWESTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN SAID BOOK 509 AT PAGE 79;

THENCE CONTINUING NORTH 78°55'29" EAST, ALONG THE SOUTHERLY LINE OF SAID PARCEL, A DISTANCE OF 744.75 FEET TO THE WESTERLY LINE OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN SAID BOOK 1179 AT PAGE 541;

THENCE SOUTH 00°00'29" WEST, ALONG SAID WESTERLY LINE, A DISTANCE OF 76.02 FEET TO THE NORTHERLY LINE OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1044 UNDER RECEPTION NUMBER 1983198;

THENCE SOUTH 89°05'16" WEST, ALONG SAID NORTHERLY LINE, A DISTANCE OF 225.19 FEET TO THE NORTHWESTERLY CORNER THEREOF;

THENCE SOUTH 00°00'29" WEST, ALONG THE WESTERLY LINE OF SAID PARCEL, A DISTANCE OF 650.48 FEET TO A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SECTION 20;

THENCE SOUTH 89°05'16" WEST, ALONG SAID SOUTH LINE OF THE NORTHEAST QUARTER OF SECTION 20, A DISTANCE OF 1962.78 FEET TO THE SOUTHEAST CORNER OF THE NORTHWEST QUARTER OF SECTION 20;

THENCE SOUTH 89°05'29" WEST, ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SECTION 20, A DISTANCE OF 2610.98 FEET;

THENCE NORTH 00°21'37" WEST, PARALLEL WITH THE WEST LINE OF THE NORTHWEST QUARTER OF SECTION 20, A DISTANCE OF 2598.72 FEET TO A POINT ON THE SOUTHERLY RIGHT-OF-WAY LINE OF WELD COUNTY ROAD NO. 8;

THENCE NORTH 88°48'44" EAST, ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE, A DISTANCE OF 2617.94 FEET;

THENCE NORTH 88°48'01" EAST, CONTINUING ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE, A DISTANCE OF 2618.25 FEET TO THE POINT OF BEGINNING;

EXCEPTING THEREFROM THAT PORTION DEDICATED FOR RIGHT-OF-WAY ON NOVEMBER 8, 2011 UNDER RECEPTION NO. 3338315.

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Steve Moreno, Clerk and Recorder, Weld County, CO

EXHIBIT B-1

Erie Highlands Property Zoning Map

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Steve Moreno, Clerk and Recorder, Weld County, CO

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Steve Moreno, Clerk and Recorder, Weld County, CO

ERIE HIGHLANDS ZONING MAP

A PART OF THE NORTH HALF OF
SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST
OF THE SIXTH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO.
305.126 ACRES
RZ-13-00020

OVERALL BOUNDARY DESCRIPTION

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°46'38" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID NORTH LINE, NORTH 88°46'38" EAST, A DISTANCE OF 2,646.08 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE NORTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20, NORTH 88°48'06" EAST, A DISTANCE OF 2648.24 FEET TO THE NORTHEAST CORNER OF SAID SECTION 20;

THENCE ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, SOUTH 00°00'25" WEST, A DISTANCE OF 1720.04 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 508 AT PAGE 79, IN THE OFFICE OF THE CLERK AND RECORDER OF WELD COUNTY;

THENCE DEPARTING SAID EAST LINE AND ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°36'29" WEST, A DISTANCE OF 430.58 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID NORTHERLY BOUNDARY, NORTH 89°39'35" WEST, A DISTANCE OF 27.44 FEET TO THE NORTHWEST CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'25" WEST, A DISTANCE OF 3.36 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 508 AT PAGE 79;

THENCE ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°35'29" WEST, A DISTANCE OF 789.24 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 814 AT PAGE 231, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY, WESTERLY AND SOUTHERLY BOUNDARIES OF SAID PARCEL THE FOLLOWING THREE (3) COURSES:

1) SOUTH 78°35'29" WEST, A DISTANCE OF 250.00 FEET;

2) SOUTH 11°24'31" EAST, A DISTANCE OF 125.00 FEET;

3) NORTH 78°35'29" EAST, A DISTANCE OF 250.00 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL DESCRIBED IN BOOK 508 AT PAGE 79;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL, NORTH 78°35'29" EAST, A DISTANCE OF 744.78 FEET TO A POINT ON THE WESTERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 1179 AT PAGE 541;

THENCE ALONG SAID WESTERLY BOUNDARY, SOUTH 00°00'25" WEST, A DISTANCE OF 78.02 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1044 AT RECEPTION NO. 1883158, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY BOUNDARY OF SAID PARCEL, SOUTH 89°55'06" WEST, A DISTANCE OF 223.16 FEET TO THE NORTHWESTERLY CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'21" WEST, A DISTANCE OF 850.47 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL AND A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'07" WEST, A DISTANCE OF 1,862.78 FEET TO THE CENTER QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20, SOUTH 89°05'28" WEST, A DISTANCE OF 2640.84 FEET TO THE WEST QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, NORTH 00°21'43" WEST, A DISTANCE OF 2826.51 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 305.126 ACRES, (13,291,297 SQUARE FEET), MORE OR LESS.

MEDIUM RESIDENTIAL ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°46'38" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, SOUTH 00°00'25" WEST, A DISTANCE OF 1,720.04 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 508 AT PAGE 79, IN THE OFFICE OF THE CLERK AND RECORDER OF WELD COUNTY AND THE POINT OF BEGINNING;

THENCE DEPARTING SAID EAST LINE AND ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°36'29" WEST, A DISTANCE OF 430.58 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID NORTHERLY BOUNDARY, NORTH 89°39'35" WEST, A DISTANCE OF 27.44 FEET TO THE NORTHWEST CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'25" WEST, A DISTANCE OF 3.36 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 508 AT PAGE 79;

THENCE ALONG SAID NORTHERLY BOUNDARY, SOUTH 78°35'29" WEST, A DISTANCE OF 789.24 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 814 AT PAGE 231, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY BOUNDARY OF SAID PARCEL, SOUTH 78°35'29" WEST, A DISTANCE OF 250.00 FEET;

THENCE DEPARTING SAID NORTHERLY BOUNDARY, SOUTH 89°58'43" WEST, A DISTANCE OF 128.09 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 1,135.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS NORTH 88°37'09" WEST;

THENCE NORTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 31°45'46", AN ARC LENGTH OF 629.31 FEET;

THENCE SOUTH 64°38'03" WEST, A DISTANCE OF 189.11 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHERLY HAVING A RADIUS OF 475.00 FEET;

THENCE WESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'38", AN ARC LENGTH OF 197.67 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 88°48'38" WEST, A DISTANCE OF 398.23 FEET;

THENCE NORTH 01°11'21" WEST, A DISTANCE OF 623.28 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 20.00 FEET;

THENCE NORTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 90°00'00", AN ARC LENGTH OF 31.42 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 88°48'39" WEST, A DISTANCE OF 378.72 FEET;

THENCE NORTH 01°11'21" WEST, A DISTANCE OF 830.07 FEET TO A POINT ON THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID NORTH LINE, NORTH 88°48'38" EAST, A DISTANCE OF 36.88 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE NORTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20, NORTH 88°48'06" EAST, A DISTANCE OF 1,423.51 FEET;

THENCE DEPARTING SAID NORTH LINE, SOUTH 01°11'08" EAST, A DISTANCE OF 282.17 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 475.00 FEET;

THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'52", AN ARC LENGTH OF 197.70 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 25°01'57" EAST, A DISTANCE OF 423.53 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 475.00 FEET;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 18°51'50", AN ARC LENGTH OF 156.38 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 06°10'08" EAST, A DISTANCE OF 258.04 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 450.00 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 89°39'35" EAST, A DISTANCE OF 477.85 FEET TO A POINT ON THE EAST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID EAST LINE, SOUTH 00°00'25" WEST, A DISTANCE OF 58.33 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 57.618 ACRES, (2,509,825 SQUARE FEET), MORE OR LESS.

COMMUNITY COMMERCIAL ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTHEAST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°46'38" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, SOUTH 00°00'25" WEST, A DISTANCE OF 1,661.82 FEET;

THENCE DEPARTING SAID EAST LINE, NORTH 89°39'35" WEST, A DISTANCE OF 477.85 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 450.00 FEET;

THENCE NORTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 83°49'27", AN ARC LENGTH OF 658.35 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 06°10'08" WEST, A DISTANCE OF 258.04 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 475.00 FEET;

THENCE NORTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 18°51'50", AN ARC LENGTH OF 156.38 FEET;

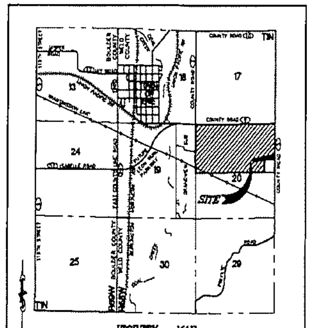
THENCE TANGENT TO SAID CURVE, NORTH 25°01'57" WEST, A DISTANCE OF 423.53 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 475.00 FEET;

THENCE NORTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'52", AN ARC LENGTH OF 197.70 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 01°11'08" WEST, A DISTANCE OF 282.17 FEET TO A POINT ON THE NORTH LINE OF SAID NORTHEAST QUARTER;

THENCE ALONG SAID NORTH LINE, NORTH 88°48'06" EAST, A DISTANCE OF 1,224.73 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 39.550 ACRES, (1,722,839 SQUARE FEET), MORE OR LESS.



VICINITY MAP
SCALE: 1"=3000'

LOW RESIDENTIAL ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°46'38" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID NORTH LINE, NORTH 88°46'38" EAST, A DISTANCE OF 2,611.10 FEET;

THENCE DEPARTING SAID NORTH LINE, SOUTH 01°11'21" EAST, A DISTANCE OF 830.07 FEET;

THENCE SOUTH 88°48'39" WEST, A DISTANCE OF 147.93 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 265.00 FEET;

THENCE SOUTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 63°18'20", AN ARC LENGTH OF 292.80 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 25°30'19" WEST, A DISTANCE OF 174.87 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 440.00 FEET;

THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 25°42'58", AN ARC LENGTH OF 197.46 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 00°12'39" EAST, A DISTANCE OF 38.82 FEET;

THENCE NORTH 89°47'21" EAST, A DISTANCE OF 140.84 FEET;

THENCE SOUTH 00°12'39" EAST, A DISTANCE OF 272.04 FEET;

THENCE SOUTH 53°38'37" WEST, A DISTANCE OF 87.18 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 365.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS NORTH 53°38'37" EAST;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 54°36'37", AN ARC LENGTH OF 347.81 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 88°02'08" EAST, A DISTANCE OF 181.63 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 365.00 FEET;

THENCE NORTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 80°13'28", AN ARC LENGTH OF 574.77 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 01°11'21" WEST, A DISTANCE OF 33.81 FEET;

THENCE NORTH 88°48'39" EAST, A DISTANCE OF 398.23 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHERLY HAVING A RADIUS OF 475.00 FEET;

THENCE EASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'38", AN ARC LENGTH OF 197.67 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 64°38'03" EAST, A DISTANCE OF 189.11 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 1,135.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS SOUTH 81°41'08" WEST;

THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 31°45'46", AN ARC LENGTH OF 629.31 FEET;

THENCE NON-TANGENT TO SAID CURVE, NORTH 89°58'43" EAST, A DISTANCE OF 128.09 FEET TO THE NORTHWESTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 814 AT PAGE 231, IN THE OFFICE OF THE CLERK AND RECORDER OF WELD COUNTY;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 11°04'31" EAST, A DISTANCE OF 125.00 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL, NORTH 78°55'29" EAST, A DISTANCE OF 250.00 FEET TO THE SOUTHWESTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 508 AT PAGE 79, IN SAID RECORDS;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL, NORTH 78°55'29" EAST, A DISTANCE OF 744.78 FEET TO A POINT ON THE WESTERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID WESTERLY BOUNDARY, SOUTH 00°00'25" WEST, A DISTANCE OF 78.02 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1044 AT RECEPTION NO. 1883158, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY BOUNDARY OF SAID PARCEL, SOUTH 89°05'06" WEST, A DISTANCE OF 223.15 FEET TO THE NORTHWESTERLY CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'21" WEST, A DISTANCE OF 850.47 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL AND A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'07" WEST, A DISTANCE OF 1,862.78 FEET TO THE CENTER QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20, SOUTH 89°05'28" WEST, A DISTANCE OF 1102.70 FEET;

THENCE DEPARTING SAID SOUTH LINE, NORTH 47°13'22" WEST, A DISTANCE OF 1013.25 FEET;

THENCE NORTH 00°21'37" WEST, A DISTANCE OF 348.82 FEET;

THENCE SOUTH 89°30'38" WEST, A DISTANCE OF 799.02 FEET TO A POINT ON THE WEST LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID WEST LINE, NORTH 00°21'43" WEST, A DISTANCE OF 1,568.10 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 164.360 ACRES, (7,159,451 SQUARE FEET), MORE OR LESS.

AG-OPEN SPACE ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE WEST QUARTER CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°46'38" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID WEST LINE, NORTH 00°21'43" WEST, A DISTANCE OF 1058.41 FEET;

THENCE DEPARTING SAID WEST LINE, NORTH 89°30'38" EAST, A DISTANCE OF 799.02 FEET;

THENCE SOUTH 00°21'37" EAST, A DISTANCE OF 348.82 FEET;

THENCE SOUTH 47°13'22" EAST, A DISTANCE OF 1013.25 FEET TO A POINT ON THE SOUTH LINE OF SAID NORTHWEST QUARTER;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'28" WEST, A DISTANCE OF 1538.24 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 25.276 ACRES, (1,101,030 SQUARE FEET), MORE OR LESS.

PUBLIC LANDS - INSTITUTIONS ZONING DISTRICT

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTH QUARTER CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°46'38" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID NORTH LINE, SOUTH 88°46'38" WEST, A DISTANCE OF 36.98 FEET;

THENCE DEPARTING SAID NORTH LINE, SOUTH 01°11'21" EAST, A DISTANCE OF 830.07 FEET TO THE POINT OF BEGINNING;

THENCE NORTH 88°48'39" EAST, A DISTANCE OF 378.72 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 20.00 FEET;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 90°00'00", AN ARC LENGTH OF 31.42 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 01°11'21" EAST, A DISTANCE OF 647.08 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 365.00 FEET;

THENCE SOUTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 80°13'28", AN ARC LENGTH OF 574.77 FEET;

THENCE TANGENT TO SAID CURVE, SOUTH 88°02'08" WEST, A DISTANCE OF 181.63 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 365.00 FEET;

THENCE NORTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 54°36'44", AN ARC LENGTH OF 347.81 FEET;

THENCE NON-TANGENT TO SAID CURVE, NORTH 53°38'37" EAST, A DISTANCE OF 87.18 FEET;

THENCE NORTH 00°12'39" WEST, A DISTANCE OF 272.04 FEET;

THENCE SOUTH 89°47'21" WEST, A DISTANCE OF 140.84 FEET;

THENCE NORTH 00°12'39" WEST, A DISTANCE OF 38.82 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE EASTERLY HAVING A RADIUS OF 440.00 FEET;

THENCE NORTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 25°42'58", AN ARC LENGTH OF 197.46 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 25°30'19" EAST, A DISTANCE OF 174.87 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 265.00 FEET;

THENCE NORTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 63°18'20", AN ARC LENGTH OF 292.80 FEET;

THENCE TANGENT TO SAID CURVE, NORTH 88°48'39" EAST, A DISTANCE OF 147.93 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 18.323 ACRES, (798,172 SQUARE FEET), MORE OR LESS.

GENERAL NOTES

1. THE BEARINGS SHOWN HEREON ARE BASED UPON THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF WELD, STATE OF COLORADO, ASSUMED TO BEAR NORTH 88°46'38" EAST, A DISTANCE OF 2646.08 FEET BETWEEN FOUND MONUMENTS AS SHOWN HEREON.
2. NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVERED SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.
3. DISTANCES ON THIS MAP ARE GROUND DISTANCES EXPRESSED IN U.S. SURVEY FEET AND DECIMALS THEREOF. A U.S. SURVEY FOOT IS DEFINED AS EXACTLY 1200/3937 METERS.
4. THIS ZONING MAP IS NOT AN IMPROVEMENT SURVEY PLAT, NOR IS IT A LAND SURVEY PLAT. IT IS INTENDED TO SHOW THE ZONING AREAS DESCRIBED IN THE LEGAL DESCRIPTIONS.
5. ADJACENT TOWN ZONING BASED ON TOWN OF ERIE ZONING MAP WITH A REVISION DATE OF 11/16/2012. COUNTY ZONING INFORMATION FROM COUNTY WEBSITE ZONING MAPPING APPLICATION ACCESSED 04/15/2013.

SURVEYOR'S CERTIFICATE

I, DEREK BROWN, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS ZONING MAP TRULY AND CORRECTLY REPRESENTS THE ABOVE DESCRIBED LEGAL DESCRIPTIONS FOR EACH ZONE DISTRICT.

I ATTEST TO THE ABOVE ON THIS _____ DAY OF __________ 2013.

COLORADO LICENSED PROFESSIONAL LAND SURVEYOR 38064

____
DEREK BROWN
COLORADO REGISTERED PROFESSIONAL LAND SURVEYOR # 38064
FOR AND ON BEHALF OF AZTEC CONSULTANTS, INC.

PLANNING COMMISSION CERTIFICATE

THIS ZONING MAP WAS REVIEWED BY THE PLANNING COMMISSION ON THE _____ DAY OF __________ 2013.

____
CHAIRPERSON DATE

BOARD OF TRUSTEES APPROVAL CERTIFICATE

THIS ZONING MAP IS TO BE KNOWN AS THE ERIE HIGHLANDS ZONING MAP AND IS APPROVED AND ACCEPTED BY ORDINANCE NO. __________ PASSED AND ADOPTED AT THE REGULAR MEETING OF THE BOARD OF TRUSTEES OF ERIE, COLORADO, HELD ON __________ 2013.

____
MAYOR

ATTEST ____________________
TOWN CLERK

CLERK & RECORDER CERTIFICATE

STATE OF COLORADO)
) ss
COUNTY OF WELD)

I DO HEREBY CERTIFY THAT THIS ZONING MAP WAS FILED IN MY OFFICE ON THIS _____ DAY OF __________ 2013 A.D. AND WAS RECORDED AT RECEPTION NUMBER __________.

____
WELD COUNTY CLERK AND RECORDER

AZTEC CONSULTANTS, INC.
AzTec Proj. No. 8255-01

ZONING MAP ERIE HIGHLANDS PART OF THE NORTH HALF SECTION 20, T1N, R68W 6TH P.M. TOWN OF ERIE, WELD COUNTY, COLORADO	DATE OF PREPARATION	2013-05-19
	SCALE	NA
	SHEET 1 OF 2	

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09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO

ERIE HIGHLANDS ZONING MAP

A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO.
305.126 ACRES
RZ-13-00020

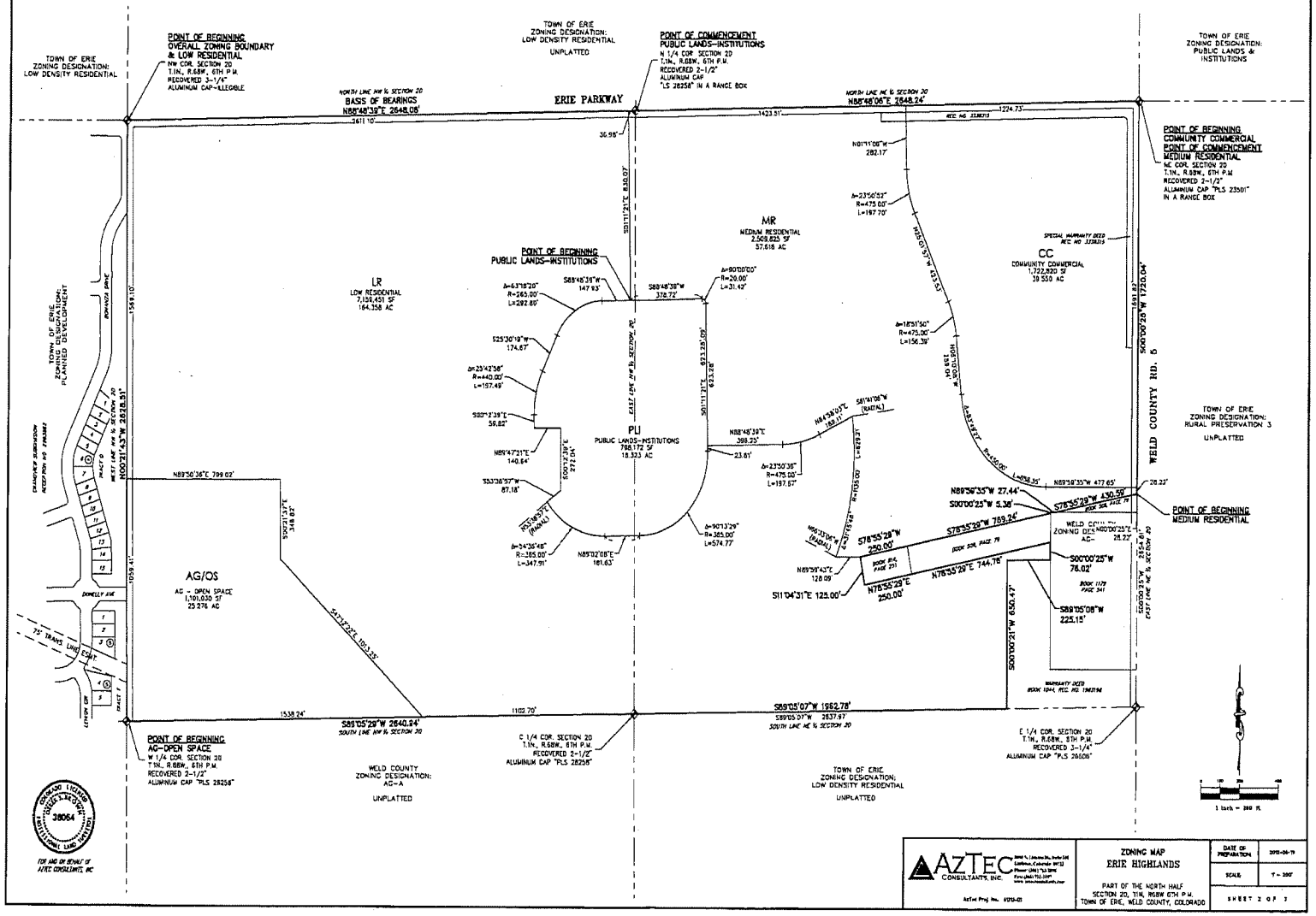

EXHIBIT B-2

Erie Highlands Property PUD Overlay Zoning Map

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09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO

4044917 Pages: 22 of 26
09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO

ERIE HIGHLANDS PUD ZONING MAP

A PORTION OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
305.126 ACRES
PUD-13-00021

OVERALL BOUNDARY DESCRIPTION:

A PARCEL OF LAND BEING A PART OF THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 20, AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'28" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG SAID NORTH LINE, NORTH 88°48'28" EAST, A DISTANCE OF 2,648.08 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE NORTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20, NORTH 88°48'08" EAST, A DISTANCE OF 2648.24 FEET TO THE NORTHEAST CORNER OF SAID SECTION 20;

THENCE ALONG THE EAST LINE OF SAID NORTHEAST QUARTER, SOUTH 00°00'25" WEST, A DISTANCE OF 1720.04 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 309 AT PAGE 79, IN THE OFFICE OF THE CLERK AND RECORDER OF WELD COUNTY;

THENCE DEPARTING SAID EAST LINE AND ALONG SAID NORTHERLY BOUNDARY, SOUTH 79°55'29" WEST, A DISTANCE OF 430.59 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 543, IN SAID RECORDS;

THENCE ALONG SAID NORTHERLY BOUNDARY, NORTH 89°59'35" WEST, A DISTANCE OF 27.44 FEET TO THE NORTHWEST CORNER OF SAID PARCEL;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'25" WEST, A DISTANCE OF 5.26 FEET TO A POINT ON THE NORTHERLY BOUNDARY OF SAID PARCEL DESCRIBED IN BOOK 309 AT PAGE 79;

THENCE ALONG SAID NORTHERLY BOUNDARY, SOUTH 79°55'29" WEST, A DISTANCE OF 799.24 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 309 AT PAGE 79, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY, WESTERLY AND SOUTHERLY BOUNDARIES OF SAID PARCEL THE FOLLOWING THREE (3) COURSES:

1) SOUTH 79°55'29" WEST, A DISTANCE OF 256.00 FEET;

2) SOUTH 11°04'21" EAST, A DISTANCE OF 125.00 FEET;

3) NORTH 79°55'29" EAST, A DISTANCE OF 158.00 FEET TO THE SOUTHWESTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 309 AT PAGE 79, IN SAID RECORDS;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL, NORTH 79°55'29" EAST, A DISTANCE OF 744.76 FEET TO A POINT ON THE WESTERLY BOUNDARY OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1179 AT PAGE 543, IN SAID RECORDS;

THENCE ALONG SAID WESTERLY BOUNDARY, SOUTH 00°00'25" WEST, A DISTANCE OF 76.02 FEET TO THE NORTHEASTERLY CORNER OF THAT PARCEL OF LAND DESCRIBED IN DEED RECORDED IN BOOK 1944 AT RECEPTION NO. 1983186, IN SAID RECORDS;

THENCE ALONG THE NORTHERLY BOUNDARY OF SAID PARCEL, SOUTH 89°05'08" WEST, A DISTANCE OF 225.15 FEET TO THE NORTHWESTERLY CORNER OF SAID PARCEL;

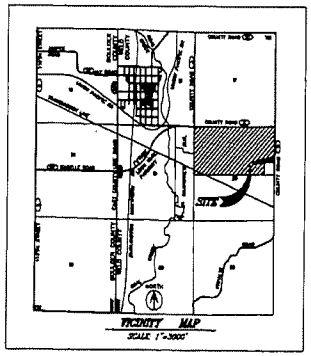
THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 00°00'21" WEST, A DISTANCE OF 858.47 FEET TO THE SOUTHWESTERLY CORNER OF SAID PARCEL, AND A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 20;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'57" WEST, A DISTANCE OF 1,962.78 FEET TO THE CENTER QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20, SOUTH 89°05'29" WEST, A DISTANCE OF 2640.94 FEET TO THE WEST QUARTER CORNER OF SAID SECTION 20;

THENCE ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, NORTH 00°21'46" WEST, A DISTANCE OF 2628.51 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 305.126 ACRES, (13,291,297 SQUARE FEET), MORE OR LESS.



VICINITY MAP
SCALE 1"=3000'

NOTES:
1. THIS PUD ZONING MAP MODIFIED THE DIMENSIONAL STANDARDS SET FORTH IN THE TOWN OF ERIE UDC AS PROVIDED FOR IN SECTION 10.2.7.D.
2. IN THE EVENT THAT THERE IS ANY DISCREPENCY BETWEEN THE CODE AND THIS PUD, THE PUD SHALL CONTROL. ANY PROVISIONS THAT ARE NOT SPECIFICALLY ADDRESSED IN THIS PUD ZONING MAP SHALL COMPLY WITH THE CODE.
3. THE MAXIMUM NUMBER OF UNITS ALLOWED IN THIS PUD IS 994.

SURVEYOR'S CERTIFICATE

I, DEREK BROWN, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS PUD ZONING MAP TRULY AND CORRECTLY REPRESENTS THE ABOVE DESCRIBED LEGAL DESCRIPTIONS FOR EACH PUD OVERLAY ZONE DISTRICT.

I ATTEST TO THE ABOVE ON THIS _____DAY OF _____, 2013.

_____
DEREK BROWN

COLORADO REGISTERED PROFESSIONAL LAND SURVEYOR #

PLANNING COMMISSION CERTIFICATE

THIS PUD ZONING MAP WAS REVIEWED BY THE PLANNING COMMISSION ON THE _____DAY OF _____, 2013.

_____ _____
CHAIRPERSON DATE

BOARD OF TRUSTEES APPROVAL CERTIFICATE

THIS PUD ZONING MAP IS TO BE KNOWN AS THE "ERIE HIGHLANDS PUD ZONING MAP" AND IS APPROVED AND ACCEPTED BY ORDINANCE NO._____, PASSED AND ADOPTED AT THE REGULAR MEETING OF THE BOARD OF TRUSTEES OF ERIE, COLORADO, HELD ON _____, 2013.

_____
MAYOR

ATTEST _____
TOWN CLERK

CLERK & RECORDER CERTIFICATE

STATE OF COLORADO)
) SS.
COUNTY OF WELD)

I DO HEREBY CERTIFY THAT THIS PUD ZONING MAP WAS FILED IN MY OFFICE ON THIS _____ DAY OF _____, 2013 A.D. AND WAS RECORDED AT RECEPTION NUMBER _____.

_____
_____ COUNTY CLERK AND RECORDER

APPLICANT
OAKWOOD HOMES LLC
4908 TOWER ROAD
DENVER, CO 80249
(303) 486-8500
CONTACT: CHAD ELLINGTON

OWNER
J DEARMIN LLC
10343 FEDERAL BOULEVARD
UNIT 515
WESTMINSTER, CO 80260
CONTACT: JAMES DEARMIN

OWNER
J GAZ LLC
4955 WEST 65TH AVENUE
ARVADA, CO 80003
CONTACT: JOHNNY GAZ

OWNER
THE JACK SHELL & SONYA SHELL FAMILY TRUSTS
10015 MEADE COURT
WESTMINSTER, CO 80031
CONTACT: JACK SHELL

OWNER
WYBK HOLDINGS, LLC
28221 HIDDEN VILLAGE DRIVE
EVERGREEN, CO 80439
CONTACT: ROBERT E. YOULE

PLANNER
TERRACINA DESIGN
9025 E KENYON AVE
SUITE 219
DENVER, CO 80237
(720) 263-4866
CONTACT: LAYLA ROSALES

ENGINEER
ENGINEERING PARTNERS
1950 WEST LITTLETON BLVD.
SUITE 109
LITTLETON, COLORADO 80120
(303)709-4680
CONTACT: DAVID FORBES

SURVEYOR
AZTEC CONSULTANTS
8000 S. LINCOLN ST, STE 201
LITTLETON, COLORADO 80122
(303)713-1898
CONTACT: DEREK BROWN

SHEET INDEX

1 COVER
2 PUD PLAN
3 PUD NOTES

Terracina Design
Land Planning & Landscape Architecture
1800 Glenarm Place, Suite 100
Denver, CO 80202
Phone (303) 543-1404
www.terracinadesign.com

PROJECT NAME
ERIE HIGHLANDS
PUD ZONING MAP
TOWN OF ERIE, COLORADO

SHEET TITLE
COVER SHEET

SHEET NUMBER
1
SHEET 1 OF 3

SEPTEMBER 13, 2013

\\Windows\Vol_projects\Aztecdata\Jeermin property-erie\Cad\Jeermin erie highlands-pud zoning.dwg

ERIE HIGHLANDS PUD ZONING MAP

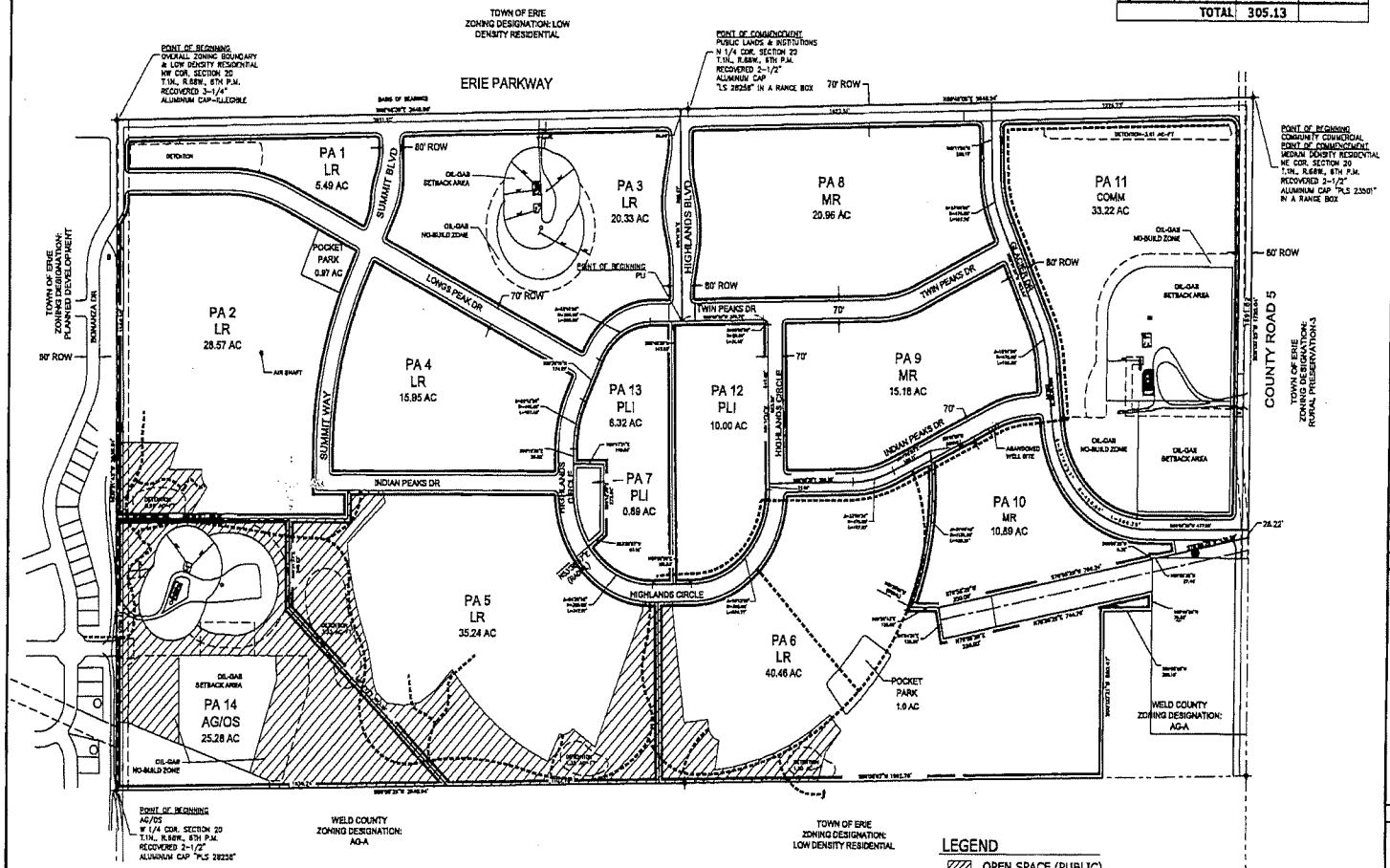
A PORTION OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
305.126 ACRES
PUD-13-00021

PARKS & OPEN SPACE

PARK AREA	ACRES REQUIRED	ACRES TO BE PROVIDED
COMMUNITY PARK	13.87	FEE IN LIEU
NEIGHBORHOOD PARK	8.32	8.32
POCKET PARK	1.39	1.97
OPEN SPACE (PUBLIC)	47.15	32.65 + FEE IN LIEU

DEVELOPMENT SUMMARY

LAND USE	ACRES	% ACRES
Residential	175.66	57.6%
Commercial	33.22	10.9%
School	10.00	3.3%
Parks & Open Space	51.90	17.0%
Right-of-Way	34.35	11.3%
TOTAL	305.13	



Terracina Design
Land Planning • Landscape Architecture
2955 Kalamath, Suite 100
Denver, CO 80205
Phone (303) 343-1115
www.TerracinaDesign.com

PROJECT NAME
ERIE HIGHLANDS
PUD ZONING MAP
TOWN OF ERIE, COLORADO

SHEET TITLE
PUD PLAN

SHEET NUMBER
2
SHEET 2 OF 3

SEPTEMBER 13, 2013

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Steve Moreno, Clerk and Recorder, Weld County, CO

ERIE HIGHLANDS PUD ZONING MAP

A PORTION OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
305.126 ACRES
PUD-13-00021

ARCHITECTURAL STANDARDS-SINGLE FAMILY RESIDENTIAL DETACHED

1. Architectural Variety and Character
   a. Architectural Variety

      i. Design Standards
      (A) No identical model plan elevation shall be repeated directly across any street from the same model plan and elevation.
      (B) No identical model plan elevation shall be repeated more than once within every 4 lots on the same side of any street.
      (C) A minimum of 3 alternative elevations for each model plan shall be submitted to the Town for review.

   b. Architectural Character
   Each single family detached model plan and elevation shall demonstrate the following design attributes:

      i. Design Standards

      (A) Each elevation shall include a minimum of two windows (or one window and one door) per floor.
      (B) Each front and rear elevation shall include more than one wall plane. Articulation that adds shadow and visual interest is encouraged.
      (C) A variety of roof forms should be used. Single unbroken roof pitches should be avoided, except where a single roof treatment is an essential element of the Architectural Style. (e.g. Mansard)
      (D) The main roof should extend beyond the primary façade by a minimum of one foot.
      (E) An elevation of the home that faces a street, park, trail corridor or open space area shall provide an "Enhanced Elevation". An "Enhanced Elevation" shall provide three or more of the following design enhancements listed in (1) through (5) below. Application of the design enhancement shall be applied in a manner that is consistent with the style of the home. Side and rear elevation design enhancements shall be consistent with the design elements of the front elevation.

      (1) The addition of one window unit.
      (2) A change in wall plane by providing one or more of the following options:
      - An additional wall plane change. Minimum six feet in width and one foot projection.
      - A projecting or cantilevered living space.
      - A bay or boxed window.

      (3) A covered porch or deck.
      (4) The addition of architectural detail elements such as: shutters, eave brackets, exposed rafter tails, corbels, lintels, trellises, columns or pilasters.
      (5) The use of a minimum of two exterior cladding materials that can include materials such as masonry (cultured stone, stone, brick, stucco, or tile), lap siding, shingles, board and batten, or other decorative siding treatment.

      (F) Columns or posts extending more than 36 inches above the ground which support structural elements such as porches, decks, or roofs should appear to be of adequate mass to support the structure above. (No exposed 4"x4" posts shall be allowed more than 36 inches above the ground). Columns supporting upper story decks should be 8"x8" minimum finished.

   ii. Materials
      (A) All exterior materials shall be of high quality, used in applications and treated appropriately to provide an attractive and long lasting appearance.
      (B) When masonry cladding is used in locations where its mass is logical and appropriate. In instances where masonry wraps the exterior corner of the home the masonry should continue to a natural transition point such as an inside corner of a projecting wall, a column, a door or window or other logical point. In cases where no such feature exists near the corner, the masonry wrap shall extend at least six feet from the corner.

2. Orientation of Dwellings to the Street

Each residence shall have at least one primary pedestrian doorway for access to the dwelling unit facing and generally visible from the front lot line of the property, and within twelve feet of the most forward plane of the ground level living space. On corner lots, the pedestrian doorway may face any adjacent street. An exception shall be made for alley-loaded single-family detached dwelling units that do not have street frontage but do front onto a park, or landscaped common area . In such case where the dwelling unit does not have street frontage, one primary pedestrian doorway shall be oriented toward a common pedestrian walk that connects to a street.

3. Garages

These regulations for garages shall be applied to non-living space or storage areas within garages whether used for storage of automobiles or other items.

   a. Diversity of Garage Orientation:

      A. Except for garages oriented to alleys, all single family homes shall provide garages that meet one of the requirements below, and a variety in garage orientation by providing a minimum of two of the following garage orientations on any subdivision filing.

      - Recessed garage; where the primary garage door generally faces the front lot line and the garage is recessed a minimum of two feet behind the most forward plane of the main floor living space or a front porch.
      - Projecting garages; where the primary garage door generally faces the front lot line and the garage projects no more than fifteen feet from the front door.
      - Side loaded garages.
      - Garages recessed a minimum of two feet beneath a second floor living space.

   b. Width / Façade Ratio
   The width of a front loaded garage shall not exceed 65% of the width of the front elevation.

   c. Three or More Car Garage Orientation
   The third of more bay of any three or more garage shall either:

      i. Have a different orientation from the first two; or
      ii. Shall be recessed behind the first two by at least two feet when having the same orientation; or
      iii. Shall be tandem to the first two.

4. Front Stoop

For model plans with a front stoop; the front stoop shall include the platform and stairs that are generally in front of a door that can be covered or uncovered. The maximum width of a covered front stoop shall be three feet in width from the side of the front door. Covered platforms that exceed three feet in width from the side of the front door shall be considered a front porch.

5. Front Porches

For model plans with a front porch; the front porch shall be a minimum size of fifty square feet, excluding the stoop with a minimum depth of five feet.

DEVELOPMENT STANDARDS

PLANNING AREA	ZONE DISTRICT	MIN LOT WIDTH	MIN LOT NET AREA (SF)	FRONT SETBACK	FRONT SETBACK (PORCH)	STREET SETBACK	INTERIOR LOT LINE SETBACK	REAR SETBACK	MAX. HEIGHT
PA-1	LR	60(4)	6,000	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-2	LR	45 (4)	4,500	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-3	LR	60 (4)	6,000	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-4	LR	50(4)	5,000	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-5	LR	60 (4)	6,000	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-6	LR	45 (4)	4,500	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-7	MR	45 (4)	4,500	16 (2)	10	10 (1)(4)	5 (1)	20 (3)	35'
PA-8	MR	40 (4)	2,800	16 (2)	10	10 (1)(4)	5 (1)	10	35'

(1) Permitted encroachments. Side setbacks shall allow for encroachments up to twelve(12) inches beyond the building foundation for window wells and above grade features including eaves, counterforts, fireplace box out, stoops, bay windows, room cantilevers and overhangs provided that the living space of the projection does not exceed six (6) feet in width. There shall be no more than two above grade encroachments per elevation totaling no more than twenty (20) sf.
(2) Front loaded garages shall be set back twenty (20) feet. A sixteen(16) foot front setback allowed with side loaded garage
(3) Unenclosed covered patios may project up to eight (8) feet into a rear setback. The projection shall be at least five feet from the property line.
(4) The minimum lot width shall be measured from the front setback line and shall be increased on corner lots to accommodate the additional side on street setback.

LAND USE SUMMARY

TRACT	ZONE DISTRICT	AREA (ACRES)	PRIMARY USE	DWELLING UNITS	PUBLIC OPEN SPACE PROVIDED
LOW DENSITY RESIDENTIAL					
PA 1	LR	5.49	SFD	7	
PA 2	LR	28.57	SFD	112	2.33
PA 3	LR	20.33	SFD	37	
PA 4	LR	15.95	SFD	95	
PA 5	LR	35.24	SFD	95	12.54
PA 6	LR	40.46	SFD	155	3.92
PA 7	LR	0.89	AMENITY	0	
SUBTOTAL		**146.93**			
RIGHT OF WAY		17.43			
SUBTOTAL		**164.36**		**501**	**18.8**
MEDIUM DENSITY RESIDENTIAL					
PA 8	MR	20.96	SFD	120	
PA 9	MR	15.18	SFD	170	
PA 10	MR	10.89	TH/ APT	203	
SUBTOTAL		**47.03**			
RIGHT OF WAY		12.32			
SUBTOTAL		**59.35**		**493**	
COMMUNITY COMMERCIAL					
PA 11		33.22	COMM		
SUBTOTAL		**33.22**			
RIGHT OF WAY		4.60			
SUBTOTAL		**37.82**			
PUBLIC LAND AND INSTITUTIONS					
PA 12		10.00	SCHOOL		
PA 13		8.32	N PARK		
SUBTOTAL		**18.32**			
AGRICULTURAL / OPEN SPACE					
PA 14		25.28	OPEN SPACE		13.86
SUBTOTAL		**25.28**			
TOTAL		305.13		994	32.65

NOTES

1. Density: Dwelling units may be transferred between planning areas in the same zone district as long as the maximum density allowed within that zone district is not exceeded.
2. Erie Parkway: Thirty (30) foot landscape buffer not required when a local road is directly adjacent. (i.e. frontage road condition). Thirty (30)foot landscape buffer is required when lots abut Erie Parkway right of way.
3. Fencing along Erie Parkway shall not exceed six feet in height which may include opaque fencing in straight runs limited to approximately 600 feet in length without a break and shall be limited to 30% of the total frontage of Erie Parkway. Masonry columns shall not exceed six feet in height with a four inch cap and shall be provided on corners of lots a minimum of every three lots for all opaque fencing along Erie Parkway.
4. Double frontage lots abutting collector or local roads shall be an additional 10 feet in depth. A twenty (20) foot landscape buffer will be provided along local and collector roads abutting double frontage lots.
5. Planning areas shown with apartments and townhomes land use designation shall be allowed to develop with lower density uses including single family attached and detached as long as the minimum housing diversity requirements and minimum gross density for the zone district are met.
6. The trail along Indian Peaks Drive within PA-6 and PA-10 shall be located within a landscape tract and meander.

Terracina Design
Land Planning & Landscape Architecture
9035 Kenyon Ave, Ste 219
Denver, CO 80237
Phone: (720) 283-4886
www.TerracinaDesign.com

PROJECT NAME
ERIE HIGHLANDS
PUD ZONING MAP
TOWN OF ERIE, COLORADO

SHEET TITLE
PUD NOTES

SHEET NUMBER
3
SHEET 3 OF 3
SEPTEMBER 13, 2013

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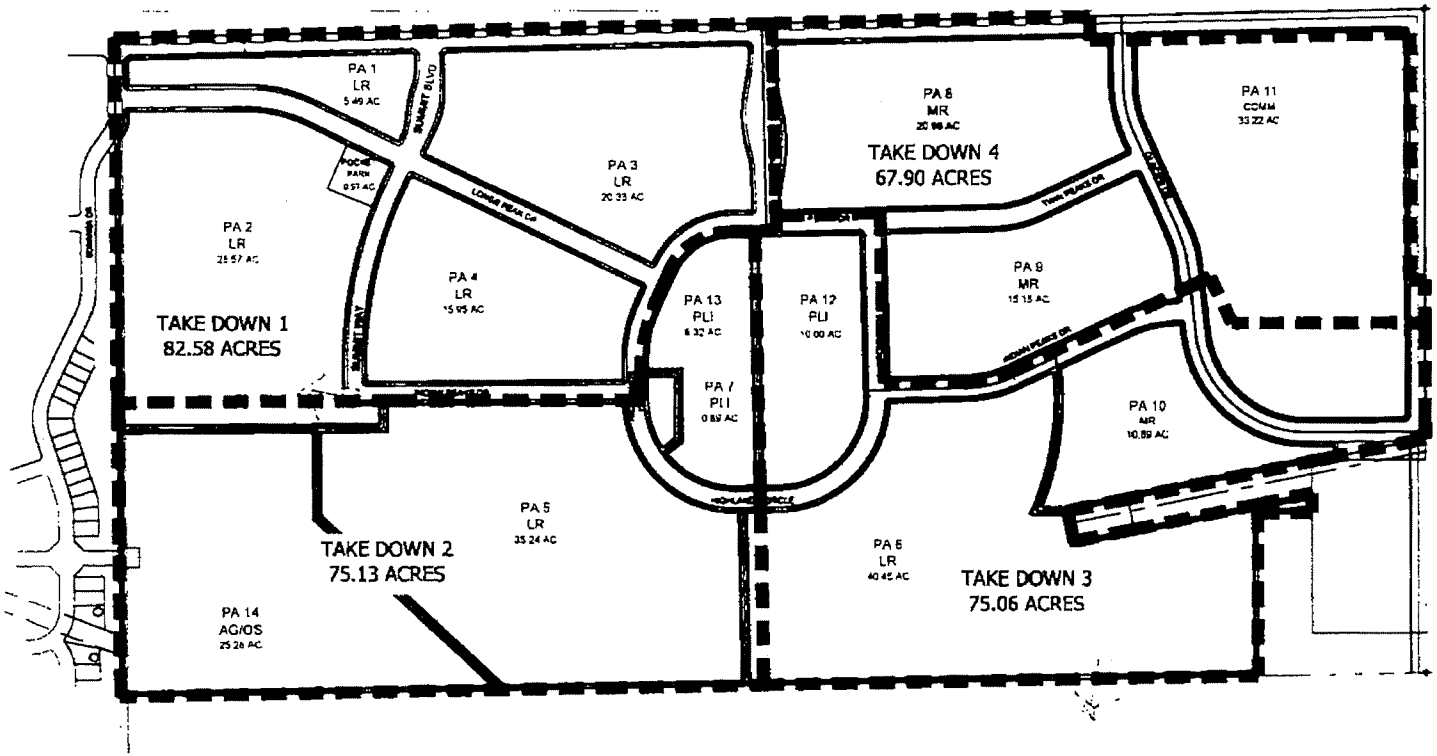
EXHIBIT C

Phasing Map

4044917 Pages: 25 of 26
09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO

4044917 Pages: 26 of 26
09/10/2014 12:16 PM R Fee:$161.00
Steve Moreno, Clerk and Recorder, Weld County, CO



ERIE HIGHTLANDS

Takedown - Phasing Exhibit

Scale in Feet 0 100 200 400 800

October 1, 2013

ALTA/ACSM LAND TITLE SURVEY

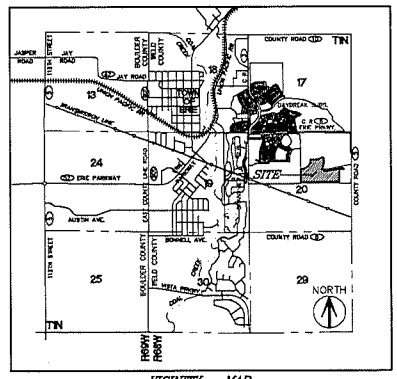
A PORTION OF TRACT L, ERIE HIGHLANDS FILING NO. 1,
LOCATED IN THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO.
SHEET 1 OF 2

TITLE COMMITMENT NOTES

STEWART TITLE GUARANTY COMPANY TITLE COMMITMENT FILE NO. 01330-01207, WITH AN EFFECTIVE DATE OF MAY 14, 2015 AT 8:00 A.M., WAS RELIED UPON FOR RECORD INFORMATION REGARDING RIGHTS-OF-WAY, EASEMENTS AND ENCUMBRANCES. THIS SURVEY DOES NOT REPRESENT A TITLE SEARCH BY AZTEC CONSULTANTS, INC. TO DETERMINE OWNERSHIP, RIGHTS-OF-WAY, EASEMENTS OR OTHER MATTERS OF PUBLIC RECORD.

ITEM NUMBERS BELOW REFER TO THOSE ITEMS AS LISTED UNDER SCHEDULE B – SECTION 2 EXCEPTIONS OF THE ABOVE REFERENCED TITLE COMMITMENT.

1. RIGHTS OR CLAIMS OF PARTIES IN POSSESSION, NOT SHOWN BY THE PUBLIC RECORDS. NOT ADDRESSED AS PART OF THIS SURVEY.
2. EASEMENTS, OR CLAIMS OF EASEMENTS, NOT SHOWN BY THE PUBLIC RECORDS. NOT ADDRESSED AS PART OF THIS SURVEY.
3. ANY ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATION, OR ADVERSE CIRCUMSTANCE AFFECTING THE TITLE THAT WOULD BE DISCLOSED BY AN ACCURATE AND COMPLETE LAND SURVEY OF THE LAND AND NOT SHOWN BY THE PUBLIC RECORDS. SAID MATTERS ARE SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
4. ANY LIEN, OR RIGHT TO A LIEN, FOR SERVICES, LABOR OR MATERIAL HERETOFORE OR HEREAFTER FURNISHED, IMPOSED BY LAW AND NOT SHOWN BY THE PUBLIC RECORDS. NOT ADDRESSED AS PART OF THIS SURVEY.
5. DEFECTS, LIENS, ENCUMBRANCES, ADVERSE CLAIMS OR OTHER MATTERS, IF ANY, CREATED, FIRST APPEARING IN THE PUBLIC RECORDS OR ATTACHING SUBSEQUENT TO THE EFFECTIVE DATE BUT PRIOR TO THE DATE THE PROPOSED INSURED ACQUIRES FOR VALUE OF RECORD THE ESTATE OR INTEREST OR MORTGAGE THEREON COVERED BY THIS COMMITMENT. NOT ADDRESSED AS PART OF THIS SURVEY
6. (A) UNPATENTED MINING CLAIMS; (B) RESERVATIONS OR EXCEPTIONS IN PATENTS OR IN ACTS AUTHORIZING THE ISSUANCE THEREOF; (C) MINERALS OF WHATSOEVER KIND, SUBSURFACE AND SURFACE SUBSTANCES, IN, ON, UNDER AND THAT MAY BE PRODUCED FROM THE LAND, TOGETHER WITH ALL RIGHTS, PRIVILEGES, AND IMMUNITIES RELATING THERETO, WHETHER OR NOT THE MATTERS EXCEPTED UNDER (A), (B) OR (C) ARE SHOWN BY THE PUBLIC RECORDS OR LISTED IN SCHEDULE B. NOT ADDRESSED AS PART OF THIS SURVEY
7. WATER RIGHTS, CLAIMS OR TITLE TO WATER. NOT ADDRESSED AS PART OF THIS SURVEY
8. ANY AND ALL UNPAID TAXES AND ASSESSMENTS AND ANY UNRECEIVED TAX SALES. NOT ADDRESSED AS PART OF THIS SURVEY
9. THE EFFECT OF INCLUSIONS IN ANY GENERAL OR SPECIFIC WATER CONSERVANCY, FIRE PROTECTION, SOIL CONSERVATION OR OTHER DISTRICT OR INCLUSION IN ANY WATER SERVICE OR STREET IMPROVEMENT AREA. NOT ADDRESSED AS PART OF THIS SURVEY
10. RIGHT OF WAY FOR COUNTY ROADS 30 FEET WIDE ON EITHER SIDE OF SECTION AND TOWNSHIP LINES, AS ESTABLISHED BY THE BOARD OF COUNTY COMMISSIONERS FOR WELD COUNTY, RECORDED OCTOBER 14, 1889 IN BOOK 66 AT PAGE 273. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
11. RESERVATION OF ALL ALL COAL AND OTHER MINERALS IN INSTRUMENT RECORDED SEPTEMBER 27, 1945 IN BOOK 1162 AT PAGE 31 AS RECEPTION NO. 962824, TOGETHER WITH THE APPURTENANT RIGHTS TO USE THE SURFACE OF THE LAND. THE COMPANY MAKES NO REPRESENTATION AS TO THE PRESENT OWNERSHIP OF THIS INTEREST. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
12. AN EASEMENT FOR ELECTRIC TRANSMISSION LINE AND INCIDENTAL PURPOSES AS GRANTED TO THE UNITED STATES OF AMERICA IN INSTRUMENT RECORDED JUNE 1, 1951 IN BOOK 1304 AT PAGE 181 AS RECEPTION NO. 1108167. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
13. GRANT OF MINERALS IN INSTRUMENT RECORDED DECEMBER 22, 1967 AS RECEPTION NO. 1511171, TOGETHER WITH THE APPURTENANT RIGHTS TO USE THE SURFACE OF THE LAND. THE COMPANY MAKES NO REPRESENTATION AS TO THE PRESENT OWNERSHIP OF THIS INTEREST. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
14. OIL AND GAS LEASE RECORDED JUNE 17, 1970 AS RECEPTION NO. 1549405.
    AMENDMENT OF OIL AND GAS LEASE RECORDED JUNE 25, 2012 AS RECEPTION NO. 3854517.
    AFFIDAVIT OF PRODUCTION RECORDED AUGUST 2, 2013 AS RECEPTION NO. 3952922. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
15. OIL AND GAS LEASE RECORDED MARCH 23, 1978 AS RECEPTION NO. 1684120.
    AMENDMENT OF OIL AND GAS LEASE RECORDED JUNE 25, 2012 AS RECEPTION NO. 3854517.
    AFFIDAVIT OF PRODUCTION RECORDED AUGUST 2, 2013 AS RECEPTION NO. 3952922. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
16. EASEMENT AS GRANTED TO PANHANDLE EASTERN PIPE LINE COMPANY IN INSTRUMENT RECORDED FEBRUARY 10, 1982 AS RECEPTION NO. 1882642. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED EASEMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
17. NOTICE CONCERNING UNDERGROUND FACILITIES RECORDED JUNE 28, 1988 AS RECEPTION NO. 2058722. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
18. NOTICE CONCERNING UNDERGROUND FACILITIES OF UNITED POWER, INC., FORMERLY UNION RURAL ELECTRIC ASSOCIATION, INC. RECORDED JANUARY 24, 1991 AS RECEPTION NO. 2239296. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
19. RIGHT-OF-WAY GRANT RECORDED MAY 3, 1993 IN BOOK 1381 AT PAGE 948 AS RECEPTION NO. 2331355. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
20. OIL AND GAS LEASE RECORDED AUGUST 2, 1995 AS RECEPTION NO. 2446610.
    AFFIDAVIT OF PRODUCTION RECORDED AUGUST 2, 2013 AS RECEPTION NO. 3952922. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
21. NOTICE OF RIGHT TO USE SURFACE OF LANDS RECORDED DECEMBER 26, 1996 IN BOOK 1583 AT PAGE 410 AS RECEPTION NO. 2528311. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
22. NOTICE OF RIGHT TO USE SURFACE OF LANDS RECORDED DECEMBER 26, 1996 IN BOOK 1583 AT PAGE 411 AS RECEPTION NO. 2528312. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
23. NOTICE OF RIGHT TO USE SURFACE OF LANDS RECORDED AUGUST 3, 1999 AS RECEPTION NO. 2711405. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
24. NOTICE OF OIL AND GAS INTERESTS AND SURFACE USE RECORDED JANUARY 23, 2001 AS RECEPTION NO. 2820923. SAID ITEMS CONTAINED THEREIN ARE SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
25. TEMPORARY CONSTRUCTION EASEMENT AND DEED OF PERPETUAL EASEMENT RECORDED FEBRUARY 15, 2002 AS RECEPTION NO. 2925808. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED EASEMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
26. TEMPORARY CONSTRUCTION EASEMENT AND DEED OF PERPETUAL EASEMENT RECORDED MARCH 28, 2002 AS RECEPTION NO. 2937484. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED EASEMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
27. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT RECORDED MAY 28, 2003 AS RECEPTION NO. 2954714. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN A PORTION OF THE SUBJECT PROPERTY.
28. EASEMENT GRANT RECORDED APRIL 2, 2003 AS RECEPTION NO. 3048212. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED EASEMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
29. RIGHT OF WAY AND EASEMENT AS GRANTED TO THE TOWN OF ERIE IN INSTRUMENT RECORDED NOVEMBER 8, 2006 AS RECEPTION NO. 3338315. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
30. NOTICE OF RIGHT TO USE SURFACE OF LANDS RECORDED DECEMBER 13, 2006 AS RECEPTION NO. 3346988. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
31. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT RECORDED APRIL 21, 2008 AS RECEPTION NO. 3581087. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
32. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT RECORDED OCTOBER 15, 2007 AS RECEPTION NO. 3511023. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
33. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT RECORDED DECEMBER 21, 2007 AS RECEPTION NO. 3525268. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
34. RIGHT-OF-WAY GRANT RECORDED DECEMBER 9, 2011 AS RECEPTION NO. 3810941. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED RIGHT-OF-WAY DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
35. MEMORANDUM OF PURCHASE AGREEMENT RECORDED JUNE 26, 2013 AS RECEPTION NO. 3943189. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
36. ORDINANCE NO. 33-2013 RECORDED NOVEMBER 25, 2013 AS RECEPTION NO. 3998216. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
37. ORDINANCE NO. 35-2013 RECORDED NOVEMBER 25, 2013 AS RECEPTION NO. 3998217. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
38. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 1 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981387 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981859. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
39. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 2 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981388 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981860. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.



VICINITY MAP
SCALE: 1"=3000'

TITLE COMMITMENT NOTES - CONTINUED

40. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 3 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981389 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981861. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
41. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 4 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981400 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981862. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
42. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 5 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981401 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981863. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
43. TERMS AND CONDITIONS OF UNRECORDED COMPATIBLE DEVELOPMENT AND SURFACE USE AGREEMENT DATED JULY 31, 2013, AS EVIDENCED BY MEMORANDUM OF COMPATIBLE DEVELOPMENT AND SURFACE USE AGREEMENT RECORDED DECEMBER 9, 2013 AS RECEPTION NO. 3982954. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
44. TERMINATION AND RELEASE OF ANNEXATION AGREEMENT RECORDED DECEMBER 10, 2013 AS RECEPTION NO. 3983026. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
45. GRANT OF PERMANENT AVIGATION EASEMENT AGREEMENT RECORDED DECEMBER 16, 2013 AS RECEPTION NO. 3984160. THE EASEMENT AS DESCRIBED IN THE ABOVE REFERENCED EASEMENT IS BLANKET IN NATURE AND THEREFORE COULD NOT BE SHOWN HEREON. IT WAS DETERMINED THAT THE ABOVE REFERENCED EASEMENT DOES FALL WITHIN THE SUBJECT PROPERTY.
46. ALL MATTERS AS SHOWN ON ALTA/ACSM LAND TITLE SURVEY RECORDED FEBRUARY 4, 2014 AS RECEPTION NO. 3983955. ALL VISIBLE SITE IMPROVEMENTS AND EASEMENTS OF RECORD THAT FALL WITHIN THE SUBJECT PROPERTY ARE SHOWN HEREON.
47. DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS FOR ERIE HIGHLANDS RECORDED JULY 21, 2014 AS RECEPTION NO. 4032135 AND FIRST AMENDMENT THERETO RECORDED APRIL 3, 2015 AS RECEPTION NO. 4086671. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE "INCLUDABLE AREA" WITHIN THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
48. ALL MATTERS AS SHOWN ON ERIE HIGHLANDS ZONING MAP RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044913. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
49. ALL MATTERS AS SHOWN ON THE PUD ZONING MAP RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044914. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
50. ALL MATTERS AS SHOWN ON THE PLAT OF ERIE HIGHLANDS FILING NO. 1 RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044915. THERE ARE NO EASEMENTS AS SHOWN ON SAID PLAT OF ERIE HIGHLANDS FILING NO. 1 THAT FALL WITHIN THE SUBJECT PROPERTY.
51. ERIE HIGHLANDS PROPERTY VESTED RIGHTS DEVELOPMENT AGREEMENT RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044916. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
52. ERIE HIGHLANDS PROPERTY MASTER PRE-DEVELOPMENT AGREEMENT RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044917. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
53. ERIE HIGHLANDS FILING NO. 1 DEVELOPMENT AGREEMENT RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044918. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE "ERIE HIGHLANDS TAKEDOWN NO. 1" PARCEL AS LISTED IN THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
54. ENCROACHMENT LICENSE AGREEMENT RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044919. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
55. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 1 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050502. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
56. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 2 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050503. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
57. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 3 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050504. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
58. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 4 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050505. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
59. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 5 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050508. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
60. INTERGOVERNMENTAL AGREEMENT BETWEEN THE TOWN OF ERIE COLORADO AND ERIE HIGHLANDS METROPOLITAN DISTRICT NOS. 1-5 RECORDED NOVEMBER 20, 2014 AS RECEPTION NO. 4063179. NOT ADDRESSED AS PART OF THIS SURVEY.
61. SURFACE USE AGREEMENT RECORDED AUGUST 1, 2013 AS RECEPTION NO. 3952726. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
62. ORDER FOR INCLUSION OF LANDS WITHIN THE BOUNDARIES OF THE MUNICIPAL SUBDISTRICT, NORTHERN COLORADO WATER CONSERVANCY DISTRICT RECORDED DISTRICT RECORDED DECEMBER 1, 2014 AS RECEPTION NO. 4085129. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN A PORTION OF SUBJECT PROPERTY.
63. ORDER FOR INCLUSION OF LANDS WITHIN THE BOUNDARIES OF THE NORTHERN COLORADO WATER CONSERVANCY DISTRICT RECORDED DECEMBER 4, 2014 AS RECEPTION NO. 4086298. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN A PORTION OF SUBJECT PROPERTY.

LEGAL DESCRIPTION

(PER STEWART TITLE GUARANTY COMPANY TITLE COMMITMENT FILE NO. 01330-01207)

A PORTION OF TRACT L, ERIE HIGHLANDS FILING NO. 1, AS RECORDED ON SEPTEMBER 10, 2014, AT RECEPTION NO. 4044915 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDERS OFFICE, SITUATED IN THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE CENTER QUARTER OF SAID SECTION 20 AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'39" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO:

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 SOUTH 89°05'29" WEST, A DISTANCE OF 46.82 FEET TO THE SOUTHWEST CORNER OF SAID TRACT L;

THENCE ALONG THE SOUTHWESTERLY BOUNDARY OF SAID TRACT L NORTH 00°50'35" WEST, A DISTANCE OF 709.11 FEET;

THENCE DEPARTING SAID NORTH 89°03'08" EAST, A DISTANCE OF 83.93 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 433.00 FEET;

THENCE NORTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 86°17'36", AN ARC LENGTH OF 655.16 FEET;

THENCE NON-TANGENT TO SAID CURVE, NORTH 00°38'58" WEST, A DISTANCE OF 88.93 FEET;

THENCE NORTH 88°48'39" EAST, A DISTANCE OF 326.44 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHERLY HAVING A RADIUS OF 440.00 FEET;

THENCE EASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°50'36", AN ARC LENGTH OF 183.10 FEET;

THENCE TANGENT TO SAID CURVE NORTH 64°38'03" EAST, A DISTANCE OF 189.11 FEET;

THENCE SOUTH 24°34'48" EAST, A DISTANCE OF 34.69 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 1,135.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS SOUTH 81°41'06" WEST;

THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 31°45'48", AN ARC LENGTH OF 629.21 FEET;

THENCE NON-TANGENT TO SAID CURVE SOUTH 89°38'19" EAST, A DISTANCE OF 128.21 FEET TO THE NORTHWEST CORNER OF A PARCEL RECORDED IN BOOK 814, PAGE 251, IN SAID RECORDS;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 11°04'31" EAST, A DISTANCE OF 125.00 FEET;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL AND THE SOUTHERLY BOUNDARY OF THAT PARCEL OF LAND RECORDED IN BOOK 509 AT PAGE 79, IN SAID RECORDS, NORTH 78°55'29" EAST, A DISTANCE OF 994.76 FEET TO THE SOUTHEAST CORNER OF SAID PARCEL RECORDED IN BOOK 509, PAGE 79, ALSO BEING A POINT ON THE WESTERLY BOUNDARY OF A PARCEL RECORDED IN BOOK 1176, PAGE 541, IN SAID RECORDS;

THENCE ALONG SAID WESTERLY BOUNDARY SOUTH 00°02'25" WEST, A DISTANCE OF 76.32 FEET TO THE NORTHEAST CORNER OF A PARCEL RECORDED AT RECEPTION NO. 1983198, IN SAID RECORDS;

THENCE DEPARTING SAID WESTERLY BOUNDARY AND ALONG THE NORTHERLY AND WESTERLY BOUNDARIES OF SAID PARCEL RECORDED AT RECEPTION NO. 1983198 THE FOLLOWING TWO (2) COURSES:

1) SOUTH 89°05'08" WEST, A DISTANCE OF 225.15 FEET;
2) SOUTH 00°00'21" WEST, A DISTANCE OF 650.47 FEET TO A POINT ON THE SOUTH LINE OF SAID NORTHEAST QUARTER;

THENCE DEPARTING SAID WESTERLY BOUNDARY, ALONG SAID SOUTH LINE SOUTH 89°05'09" WEST, A DISTANCE OF 1,962.78 FEET TO THE POINT OF BEGINNING.

GENERAL NOTES

1. THE FIELD WORK FOR THIS SURVEY WAS PERFORMED BY AN AZTEC CONSULTANTS, INC. SURVEY CREW AND COMPLETED ON MAY 15, 2015.
2. PER C.R.S. 38-51-106, "ALL LINEAL UNITS DEPICTED ON THIS LAND SURVEY PLAT ARE U.S. SURVEY FEET. ONE METER EQUALS 39.37/12 U.S. SURVEY FEET, EXACTLY ACCORDING TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY."
3. THIS SURVEY DOES NOT CERTIFY TO SUBSURFACE FEATURES, IMPROVEMENTS, UTILITIES OR BURIED LINES OF ANY TYPE. LOCATION DEPICTED HEREON ARE DERIVED FROM FIELD SURVEY OF UTILITY FLAGGING / PAINT MARKING, PERFORMED BY DIVERSIFIED UNDERGROUND, INC. ON JULY 09, 2014.
4. THE SURVEYED PARCEL CONTAINS A TOTAL OF 40.421 ACRES OR 1,760,742 SQUARE FEET, MORE OR LESS.
5. THERE WAS NO OBSERVED EVIDENCE OF CURRENT EARTH MOVING WORK, BUILDING CONSTRUCTION OF BUILDING ADDITIONS AT THE TIME OF THIS SURVEY.
6. THERE WAS NO OBSERVED EVIDENCE OF SITE USE AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL.
7. THE SUBJECT PARCEL'S PURPORTED ADDRESS IS VACANT LAND TR L ERIE HIGHLANDS ERIE CO 80516, PER PROVIDED TITLE COMMITMENT.
8. ALL REFERENCES HEREON TO BOOKS, PAGES, MAPS AND RECEPTION NUMBERS ARE PUBLIC DOCUMENTS RECORDED IN WELD COUNTY, COLORADO, CLERK AND RECORDER'S OFFICE.
9. NO BUILDINGS EXIST ON THE SUBJECT PROPERTY.

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED UPON THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF WELD, STATE OF COLORADO, ASSUMED TO BEAR NORTH 88°48'39" EAST, A DISTANCE OF 2646.08 FEET BETWEEN FOUND MONUMENTS AS SHOWN HEREON.

FLOOD ZONE

FLOODPLAIN: BASED ON A GRAPHICAL REPRESENTATION OF FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NO. 08001C0641 J, PANEL 641 OF 615, DATED DECEMBER 18, 2012, THE SUBJECT PROPERTY LIES WITHIN "ZONE X", BEING DEFINED AS "OTHER AREAS ... DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN".

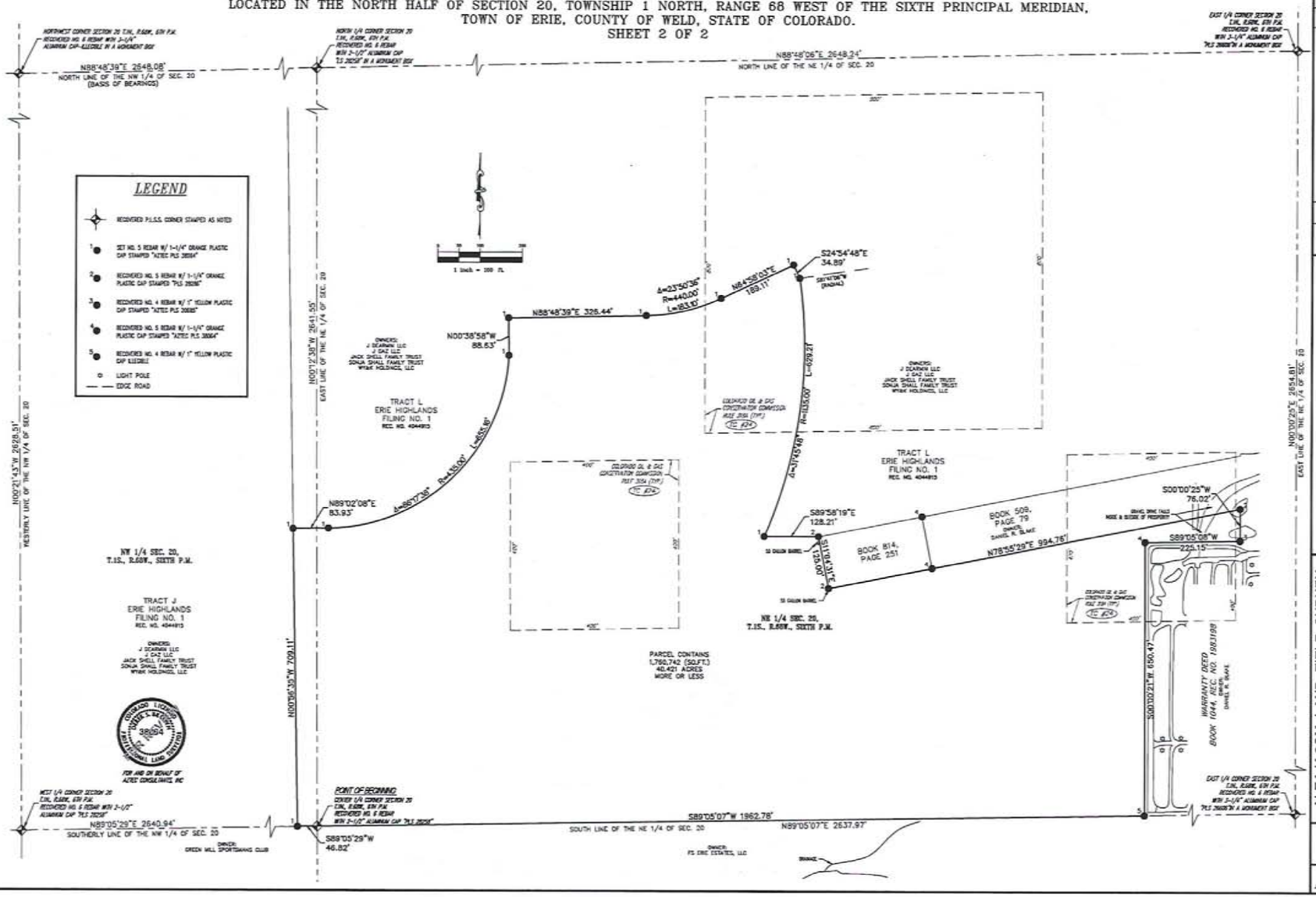
SURVEYOR'S STATEMENT

TO: J DEARMIN, LLC, A COLORADO LIMITED LIABILITY COMPANY; J GAZ, LLC, A COLORADO LIMITED LIABILITY COMPANY; WY&K HOLDINGS, LLC, A COLORADO LIMITED LIABILITY COMPANY; JACK SHELL FAMILY TRUST AND SONJA SHELL FAMILY TRUST; OAKWOOD HOMES, LLC, A COLORADO LIMITED LIABILITY COMPANY; STEWART TITLE GUARANTY COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE M

ALTA/ACSM LAND TITLE SURVEY

A PORTION OF TRACT L, ERIE HIGHLANDS FILING NO. 1,
LOCATED IN THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO.
SHEET 2 OF 2



SCALE 1" = 60'
DRB | JFT
DATE 05/10/16

DATE	BY	REVISION DESCRIPTION	APPV	DATE

AZTEC CONSULTANTS, INC.
300 E. Mineral Ave., Suite 1
Littleton, Colorado 80122
Phone: (303) 713-1898
Fax: (303) 713-1897
www.aztecconsultants.com

ALTA/ACSM LAND TITLE SURVEY
A PORTION OF TRACT L, ERIE HIGHLANDS FILING NO. 1
TOWN OF ERIE, WELD COUNTY, COLORADO

PREPARED FOR
OAKWOOD HOMES
4908 TOWER ROAD, DENVER, CO 80249

SHEET TWO OF 2 SHEETS

JOB NO. 19315-16

ALTA/ACSM LAND TITLE SURVEY

A PORTION OF TRACT J, ERIE HIGHLANDS FILING NO. 1, LOCATED IN THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO.

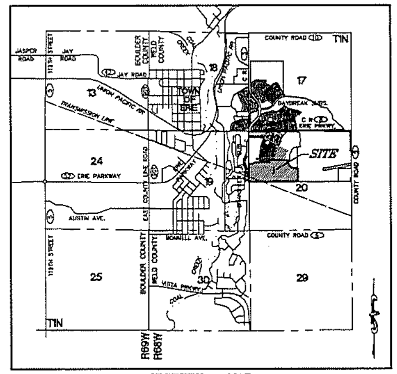
SHEET 1 OF 2

TITLE COMMITMENT NOTES

STEWART TITLE GUARANTY COMPANY TITLE COMMITMENT FILE NO. 01330-61207, WITH AN EFFECTIVE DATE OF MAY 14, 2015 AT 8:00 A.M., WAS RELIED UPON FOR RECORD INFORMATION REGARDING RIGHTS-OF-WAY, EASEMENTS AND ENCUMBRANCES. THIS SURVEY DOES NOT REPRESENT A TITLE SEARCH BY AZTEC CONSULTANTS, INC. TO DETERMINE OWNERSHIP, RIGHTS-OF-WAY, EASEMENTS OR OTHER MATTERS OF PUBLIC RECORD.

ITEM NUMBERS BELOW REFER TO THOSE ITEMS AS LISTED UNDER SCHEDULE B – SECTION 2 EXCEPTIONS OF THE ABOVE REFERENCED TITLE COMMITMENT.

1. RIGHTS OR CLAIMS OF PARTIES IN POSSESSION, NOT SHOWN BY THE PUBLIC RECORDS. NOT ADDRESSED AS PART OF THIS SURVEY.
2. EASEMENTS, OR CLAIMS OF EASEMENTS, NOT SHOWN BY THE PUBLIC RECORDS. NOT ADDRESSED AS PART OF THIS SURVEY.
3. ANY ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATION, OR ADVERSE CIRCUMSTANCE AFFECTING THE TITLE THAT WOULD BE DISCLOSED BY AN ACCURATE AND COMPLETE LAND SURVEY OF THE LAND AND NOT SHOWN BY THE PUBLIC RECORDS. SAID MATTERS ARE SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
4. ANY LIEN, OR RIGHT TO A LIEN, FOR SERVICES, LABOR OR MATERIAL HERETOFORE OR HEREAFTER FURNISHED, IMPOSED BY LAW AND NOT SHOWN BY THE PUBLIC RECORDS. NOT ADDRESSED AS PART OF THIS SURVEY.
5. DEFECTS, LIENS, ENCUMBRANCES, ADVERSE CLAIMS OR OTHER MATTERS, IF ANY, CREATED, FIRST APPEARING IN THE PUBLIC RECORDS OR ATTACHING SUBSEQUENT TO THE EFFECTIVE DATE BUT PRIOR TO THE DATE THE PROPOSED INSURED ACQUIRES FOR VALUE OF RECORD THE ESTATE OR INTEREST OR MORTGAGE THEREON COVERED BY THIS COMMITMENT. NOT ADDRESSED AS PART OF THIS SURVEY.
6. (A) UNPATENTED MINING CLAIMS; (B) RESERVATIONS OR EXCEPTIONS IN PATENTS OR IN ACTS AUTHORIZING THE ISSUANCE THEREOF; (C) MINERALS OF WHATSOEVER KIND, SUBSURFACE AND SURFACE SUBSTANCES, IN, ON, UNDER AND THAT MAY BE PRODUCED FROM THE LAND, TOGETHER WITH ALL RIGHTS, PRIVILEGES, AND IMMUNITIES RELATING THERETO, WHETHER OR NOT THE MATTERS EXCEPTED UNDER (A), (B) OR (C) ARE SHOWN BY THE PUBLIC RECORDS OR LISTED IN SCHEDULE B. NOT ADDRESSED AS PART OF THIS SURVEY.
7. WATER RIGHTS, CLAIMS OR TITLE TO WATER. NOT ADDRESSED AS PART OF THIS SURVEY.
8. ANY AND ALL UNPAID TAXES AND ASSESSMENTS AND ANY UNREDEEMED TAX SALES. NOT ADDRESSED AS PART OF THIS SURVEY.
9. THE EFFECT OF INCLUSIONS IN ANY GENERAL OR SPECIFIC WATER CONSERVANCY, FIRE PROTECTION, SOIL CONSERVATION OR OTHER DISTRICT OR INCLUSION IN ANY WATER SERVICE OR STREET IMPROVEMENT AREA. NOT ADDRESSED AS PART OF THIS SURVEY.
10. RIGHT OF WAY FOR COUNTY ROADS 30 FEET WIDE ON EITHER SIDE OF SECTION AND TOWNSHIP LINES, AS ESTABLISHED BY THE BOARD OF COUNTY COMMISSIONERS FOR WELD COUNTY, RECORDED OCTOBER 14, 1889 IN BOOK 86 AT PAGE 273. SAID RIGHT OF WAY IS SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF. SEE GENERAL NOTE NO. 5.
11. RESERVATION OF ALL ALL COAL AND OTHER MINERALS IN INSTRUMENT RECORDED SEPTEMBER 27, 1945 IN BOOK 1162 AT PAGE 31 AS RECEPTION NO. 942824, TOGETHER WITH THE APPURTENANT RIGHTS TO USE THE SURFACE OF THE LAND. THE COMPANY MAKES NO REPRESENTATION AS TO THE PRESENT OWNERSHIP OF THIS INTEREST. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
12. AN EASEMENT FOR ELECTRIC TRANSMISSION LINE AND INCIDENTAL PURPOSES AS GRANTED TO THE UNITED STATES OF AMERICA IN INSTRUMENT RECORDED JUNE 1, 1951 IN BOOK 1304 AT PAGE 181 AS RECEPTION NO. 1108167. SAID EASEMENT IS SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
13. GRANT OF MINERALS IN INSTRUMENT RECORDED DECEMBER 22, 1967 AS RECEPTION NO. 1511171, TOGETHER WITH THE APPURTENANT RIGHTS TO USE THE SURFACE OF THE LAND. THE COMPANY MAKES NO REPRESENTATION AS TO THE PRESENT OWNERSHIP OF THIS INTEREST. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
14. OIL AND GAS LEASE RECORDED JUNE 17, 1970 AS RECEPTION NO. 1549405.
    AMENDMENT OF OIL AND GAS LEASE RECORDED JUNE 25, 2012 AS RECEPTION NO. 3854517.
    AFFIDAVIT OF PRODUCTION RECORDED AUGUST 2, 2013 AS RECEPTION NO. 3952922. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
15. OIL AND GAS LEASE RECORDED MARCH 23, 1978 AS RECEPTION NO. 1684120.
    AMENDMENT OF OIL AND GAS LEASE RECORDED JUNE 25, 2012 AS RECEPTION NO. 3854517.
    AFFIDAVIT OF PRODUCTION RECORDED AUGUST 2, 2013 AS RECEPTION NO. 3952922. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
16. EASEMENT AS GRANTED TO PANHANDLE EASTERN PIPE LINE COMPANY IN INSTRUMENT RECORDED FEBRUARY 10, 1982 AS RECEPTION NO. 1882642. SAID EASEMENT IS SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
17. NOTICE CONCERNING UNDERGROUND FACILITIES RECORDED JUNE 26, 1986 AS RECEPTION NO. 2058722. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
18. NOTICE CONCERNING UNDERGROUND FACILITIES OF UNITED POWER, INC., FORMERLY UNION RURAL ELECTRIC ASSOCIATION, INC. RECORDED JANUARY 24, 1991 AS RECEPTION NO. 2239296. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
19. RIGHT-OF-WAY GRANT RECORDED MAY 3, 1993 IN BOOK 1381 AT PAGE 948 AS RECEPTION NO. 2331355. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
20. OIL AND GAS LEASE RECORDED AUGUST 2, 1995 AS RECEPTION NO. 2449610.
    AFFIDAVIT OF PRODUCTION RECORDED AUGUST 2, 2013 AS RECEPTION NO. 3952922. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
21. NOTICE OF RIGHT TO USE SURFACE OF LANDS RECORDED DECEMBER 26, 1998 IN BOOK 1583 AT PAGE 410 AS RECEPTION NO. 2526511. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
22. NOTICE OF RIGHT TO USE SURFACE OF LANDS RECORDED DECEMBER 26, 1998 IN BOOK 1583 AT PAGE 411 AS RECEPTION NO. 2526512. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
23. NOTICE OF RIGHT TO USE SURFACE OF LANDS RECORDED AUGUST 3, 1999 AS RECEPTION NO. 2711405. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
24. NOTICE OF OIL AND GAS INTERESTS AND SURFACE USE RECORDED JANUARY 23, 2001 AS RECEPTION NO. 2820923. SAID ITEMS CONTAINED THEREON ARE SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
25. TEMPORARY CONSTRUCTION EASEMENT AND DEED OF PERPETUAL EASEMENT RECORDED FEBRUARY 15, 2002 AS RECEPTION NO. 2925868. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED EASEMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
26. TEMPORARY CONSTRUCTION EASEMENT AND DEED OF PERPETUAL EASEMENT RECORDED MARCH 28, 2002 AS RECEPTION NO. 2937484. SAID EASEMENT IS SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
27. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT RECORDED MAY 28, 2002 AS RECEPTION NO. 2954714. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN A PORTION OF THE SUBJECT PROPERTY.
28. EASEMENT GRANT RECORDED APRIL 2, 2003 AS RECEPTION NO. 3046212. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED EASEMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
29. RIGHT OF WAY AND EASEMENT AS GRANTED TO THE TOWN OF ERIE IN INSTRUMENT RECORDED NOVEMBER 8, 2005 AS RECEPTION NO. 3338315. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
30. NOTICE OF RIGHT TO USE SURFACE OF LANDS RECORDED DECEMBER 13, 2005 AS RECEPTION NO. 3346989. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
31. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT RECORDED APRIL 21, 2006 AS RECEPTION NO. 3381087. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
32. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT RECORDED OCTOBER 15, 2007 AS RECEPTION NO. 3511023. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
33. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT RECORDED DECEMBER 21, 2007 AS RECEPTION NO. 3525268. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
34. RIGHT-OF-WAY GRANT RECORDED DECEMBER 9, 2011 AS RECEPTION NO. 3810841. THE DESCRIBED LOCATION OF THE ABOVE REFERENCED RIGHT-OF-WAY DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
35. MEMORANDUM OF PURCHASE AGREEMENT RECORDED JUNE 28, 2013 AS RECEPTION NO. 3943189. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
36. ORDINANCE NO. 35-2013 RECORDED NOVEMBER 25, 2013 AS RECEPTION NO. 3980216. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
37. ORDINANCE NO. 36-2013 RECORDED NOVEMBER 25, 2013 AS RECEPTION NO. 3980217. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
38. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 1 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981397 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981859. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
39. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 2 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981398 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981860. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.



VICINITY MAP

SCALE: 1"=3000'

TITLE COMMITMENT NOTES - CONTINUED

40. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 3 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981399 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981861. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
41. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 4 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981400 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981862. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
42. ANY EFFECT OF INCLUSION WITHIN ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 5 AS EVIDENCED BY ORDER AND DECREE RECORDED DECEMBER 2, 2013 AS RECEPTION NO. 3981401 AND NOTICE RECORDED DECEMBER 4, 2013 AS RECEPTION NO. 3981863. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
43. TERMS AND CONDITIONS OF UNRECORDED COMPATIBLE DEVELOPMENT AND SURFACE USE AGREEMENT DATED JULY 31, 2013, AS EVIDENCED BY MEMORANDUM OF COMPATIBLE DEVELOPMENT AND SURFACE USE AGREEMENT RECORDED DECEMBER 9, 2013 AS RECEPTION NO. 3982854. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
44. TERMINATION AND RELEASE OF ANNEXATION AGREEMENT RECORDED DECEMBER 10, 2013 AS RECEPTION NO. 3983026. THE SETBACKS AS NOTED WITHIN THE ABOVE REFERENCED DOCUMENT AND ALSO SHOWN ON THE PLAT OF ERIE HIGHLANDS FILING NO. 1, ARE SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
45. GRANT OF PERMANENT AVIGATION EASEMENT AGREEMENT RECORDED DECEMBER 16, 2013 AS RECEPTION NO. 3984166. THE EASEMENT AS DESCRIBED IN THE ABOVE REFERENCED EASEMENT IS BLANKET IN NATURE AND THEREFORE COULD NOT BE SHOWN HEREON. IT WAS DETERMINED THAT THE ABOVE REFERENCED EASEMENT DOES FALL WITHIN THE SUBJECT PROPERTY.
46. ALL MATTERS AS SHOWN ON ALTA/ACSM LAND TITLE SURVEY RECORDED FEBRUARY 4, 2014 AS RECEPTION NO. 3993855. ALL VISIBLE SITE IMPROVEMENTS AND EASEMENTS OF RECORD THAT FALL WITHIN THE SUBJECT PROPERTY ARE SHOWN HEREON.
47. DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS FOR ERIE HIGHLANDS RECORDED JULY 21, 2014 AS RECEPTION NO. 4032135 AND FIRST AMENDMENT THERETO RECORDED APRIL 3, 2015 AS RECEPTION NO. 4095671. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE "INCLUDIBLE AREA" WITHIN THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
48. ALL MATTERS AS SHOWN ON ERIE HIGHLANDS ZONING MAP RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044913. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
49. ALL MATTERS AS SHOWN ON ERIE HIGHLANDS PUD ZONING MAP RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044914. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
50. ALL MATTERS AS SHOWN ON THE PLAT OF ERIE HIGHLANDS FILING NO. 1 RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044915. THE EASEMENTS AS SHOWN ON SAID PLAT OF ERIE HIGHLANDS FILING NO. 1 ARE SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
51. ERIE HIGHLANDS PROPERTY VESTED RIGHTS DEVELOPMENT AGREEMENT RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044916. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
52. ERIE HIGHLANDS PROPERTY MASTER PRE-DEVELOPMENT AGREEMENT RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044917. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
53. ERIE HIGHLANDS FILING NO. 1 DEVELOPMENT AGREEMENT RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044918. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE "ERIE HIGHLANDS TAKEDOWN NO. 1" PARCEL AS LISTED IN THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
54. ENCROACHMENT LICENSE AGREEMENT RECORDED SEPTEMBER 10, 2014 AS RECEPTION NO. 4044919. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT DOES NOT FALL WITHIN THE SUBJECT PROPERTY.
55. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 1 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050502. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
56. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 2 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050503. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
57. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 3 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050504. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
58. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 4 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050505. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
59. ERIE HIGHLANDS METROPOLITAN DISTRICT NO. 5 PUBLIC DISCLOSURE STATEMENT RECORDED OCTOBER 1, 2014 AS RECEPTION NO. 4050506. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN THE SUBJECT PROPERTY.
60. INTERGOVERNMENTAL AGREEMENT BETWEEN THE TOWN OF ERIE COLORADO AND ERIE HIGHLANDS METROPOLITAN DISTRICT NOS. 1-5 RECORDED NOVEMBER 20, 2014 AS RECEPTION NO. 4063179. NOT ADDRESSED AS PART OF THIS SURVEY.
61. SURFACE USE AGREEMENT RECORDED AUGUST 1, 2013 AS RECEPTION NO. 3952706. THE SETBACKS AS NOTED WITHIN THE ABOVE REFERENCED DOCUMENT AND ALSO SHOWN ON THE PLAT OF ERIE HIGHLANDS FILING NO. 1, ARE SHOWN HEREON TO THE BEST OF OUR KNOWLEDGE, INFORMATION AND BELIEF.
62. ORDER FOR INCLUSION OF LANDS WITHIN THE BOUNDARIES OF THE MUNICIPAL SUBDISTRICT, NORTHERN COLORADO WATER CONSERVANCY DISTRICT RECORDED DISTRICT RECORDED DECEMBER 1, 2014 AS RECEPTION NO. 4063129. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN A PORTION OF SUBJECT PROPERTY.
63. ORDER FOR INCLUSION OF LANDS WITHIN THE BOUNDARIES OF THE NORTHERN COLORADO WATER CONSERVANCY DISTRICT RECORDED DECEMBER 4, 2014 AS RECEPTION NO. 4066298. THIS ITEM WAS NOT ADDRESSED OTHER THAN TO IDENTIFY THAT THE DESCRIBED LOCATION OF THE ABOVE REFERENCED DOCUMENT FALLS WITHIN A PORTION OF SUBJECT PROPERTY.

LEGAL DESCRIPTION

(PER STEWART TITLE GUARANTY COMPANY TITLE COMMITMENT FILE NO. 01330-61208)

A PORTION OF TRACT J, ERIE HIGHLANDS FILING NO. 1, AS RECORDED ON SEPTEMBER 10, 2014, AT RECEPTION NO. 4044915 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDERS OFFICE, SITUATED IN THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE WEST QUARTER CORNER OF SAID SECTION 20 AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 88°48'39" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, NORTH 00°21'43" WEST, A DISTANCE OF 974.96 FEET;

THENCE DEPARTING SAID SECTION LINE, NORTH 88°38'17" EAST, A DISTANCE OF 202.88 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 150.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS SOUTH 54°25'57" EAST;

THENCE NORTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 57°07'55", AN ARC LENGTH OF 149.57 FEET;

THENCE NON-TANGENT TO SAID CURVE NORTH 00°23'47" WEST, A DISTANCE OF 20.61 FEET;

THENCE NORTH 89°47'21" EAST, A DISTANCE OF 736.93 FEET;

THENCE NORTH 00°12'39" WEST, A DISTANCE OF 110.00 FEET;

THENCE NORTH 89°47'21" EAST, A DISTANCE OF 960.32 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 20.00 FEET;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 87°50'43", AN ARC LENGTH OF 30.66 FEET TO THE BEGINNING OF A REVERSE CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 435.00 FEET;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 88°35'56", AN ARC LENGTH OF 672.66 FEET;

THENCE TANGENT TO SAID CURVE NORTH 89°02'08" EAST, A DISTANCE OF 97.70 FEET;

THENCE SOUTH 00°56'35" EAST, A DISTANCE OF 709.11 FEET TO A POINT ON THE SOUTH LINE OF SAID NORTHWEST QUARTER;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°05'29" WEST, A DISTANCE OF 2,594.12 FEET TO THE POINT OF BEGINNING.

GENERAL NOTES

1. THE FIELD WORK FOR THIS SURVEY WAS PERFORMED BY AN AZTEC CONSULTANTS, INC. SURVEY CREW AND COMPLETED ON MAY 15, 2015.
2. PER C.R.S. 38-51-106, "ALL LINEAL UNITS DEPICTED ON THIS LAND SURVEY PLAT ARE U.S. SURVEY FEET. ONE METER EQUALS 39.37/12 U.S. SURVEY FEET, EXACTLY ACCORDING TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY."
3. THIS SURVEY DOES NOT CERTIFY TO SUBSURFACE FEATURES, IMPROVEMENTS, UTILITIES OR BURIED LINES OF ANY TYPE. LOCATION DEPICTED HEREON ARE DERIVED FROM FIELD SURVEY OF UTILITY FLAGGING / PAINT MARKING, PERFORMED BY DIVERSIFIED UNDERGROUND, INC. ON JULY 09, 2014.
4. THE SURVEYED PARCEL CONTAINS A TOTAL OF 61.289 ACRES OR 2,669,738 SQUARE FEET, MORE OR LESS.
5. EXCEPTION #10 OF THE TITLE COMMITMENT NOTED HEREON DESCRIBES RIGHT-OF-WAY FOR COUNTY ROADS 30 FEET ON EITHER SIDE OF SECTION AND TOWNSHIP LINES, AS ESTABLISHED BY THE BOARD OF COUNTY COMMISSIONERS FOR WELD COUNTY, RECORDED OCTOBER 14, 1889, IN BOOK 86 AT PAGE 273. PREVIOUS SURVEYS HAVE STATED THAT: IT IS WELD COUNTY'S OPINION THAT SAID DOCUMENT DID NOT DEDICATE RIGHTS-OF-WAY, BUT INSTEAD, RESERVED THE LAND FOR FUTURE DEDICATION. IT IS WELD COUNTY'S CURRENT OPINION THAT THE FEE OWNERSHIP IN THE LAND UNDERLYING EXISTING ROAD REMAINS WITH THE OWNER, AND WHERE ROADWAYS DO EXIST, THERE ARE POSSIBLE ROADWAY USE EASEMENTS OR POSSIBLY "PRESCRIPTIVE RIGHTS".
6. THERE WAS OBSERVED EVIDENCE OF CURRENT EARTH MOVING WORK, BUILDING CONSTRUCTION OF BUILDING ADDITIONS AT THE TIME OF THIS SURVEY.
7. THERE WAS NO OBSERVED EVIDENCE OF SITE USE AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL.
8. THE SUBJECT PARCEL'S PURPORTED ADDRESS IS TR J ERIE HIGHLANDS, ERIE CO 80516, PER PROVIDED TITLE COMMITMENT.
9. ALL REFERENCES HEREON TO BOOKS, PAGES, MAPS AND RECEPTION NUMBERS ARE PUBLIC DOCUMENTS RECORDED IN WELD COUNTY, COLORADO, CLERK AND RECORDER'S OFFICE.
10. NO BUILDINGS EXIST ON THE SUBJECT PROPERTY.
11. THERE ARE NO VISIBLE PHYSICAL IMPROVEMENTS ON THE SUBJECT PROPERTY. THE SITE IS LOCATED WITHIN A RESIDENTIAL CONSTRUCTION PROJECT.

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED UPON THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF WELD, STATE OF COLORADO, ASSUMED TO BEAR SOUTH 88°48'39" WEST, A DISTANCE OF 2648.08 FEET BETWEEN FOUND MONUMENTS AS SHOWN HEREON.

FLOOD ZONE

FLOODPLAIN: BASED ON A GRAPHICAL REPRESENTATION OF FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NO. 08013C0441J, PANEL 441 OF 615, DATED DECEMBER 18, 2012. THE SUBJECT PROPERTY LIES WITHIN "ZONE X", BEING DEFINED AS "OTHER AREAS ... DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN".

SURVEYOR'S STATEMENT

TO: J DEARMIN, LLC, A COLORADO LIMITED LIABILITY COMPANY; J GAZ, LLC, A COLORADO LIMITED LIABILITY COMPANY; WY&K HOLDINGS, LLC, A COLORADO LIMITED LIABILITY COMPANY; JACK SHELL FAMILY TRUST AND SONJA SHELL FAMILY TRUST; OAKWOOD HOMES, LLC, A COLORADO LIMITED LIABILITY COMPANY; STEWART TITLE GUARANTY COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2011 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1-4, 8, 11(B), 13, 16, AND 18 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON MAY 15, 2015.

DATE OF PLAT OR MAP: 06/30/2015

DEREK S. BROWN, PLS NO. 38064
COLORADO LICENSED PROFESSIONAL LAND SURVEYOR
FOR AND ON BEHALF OF AZTEC CONSULTANTS, INC.

COLORADO LICENSED PROFESSIONAL LAND SURVEYOR DEREK S. BROWN 38064

STATUTE OF LIMITATIONS

NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

INDEXING STATEMENT

DEPOSITED THIS ______ DAY OF ______________, 20____ AT

________ M., IN BOOK ____________ OF THE COUNTY SURVEYOR'S

LAND SURVEY/RIGHT-OF-WAY SURVEYS AT PAGE(S) ____________.

RECEPTION NUMBER______________________.

COUNTY SURVEYOR/DEPUTY COUNTY SURVEYOR

AZTEC CONSULTANTS, INC.
300 East Mineral Ave., Suite 1
Littleton, Colorado 80122
Phone: (303) 713-1898
Fax: (303) 713-1897
www.aztecconsultants.com

ALTA/ACSM LAND TITLE SURVEY
A PORTION OF TRACT J, ERIE HIGHLANDS FILING NO. 1
TOWN OF ERIE, WELD COUNTY, COLORADO

PREPARED FOR
OAKWOOD HOMES
4908 TOWER ROAD, DENVER, CO 80249

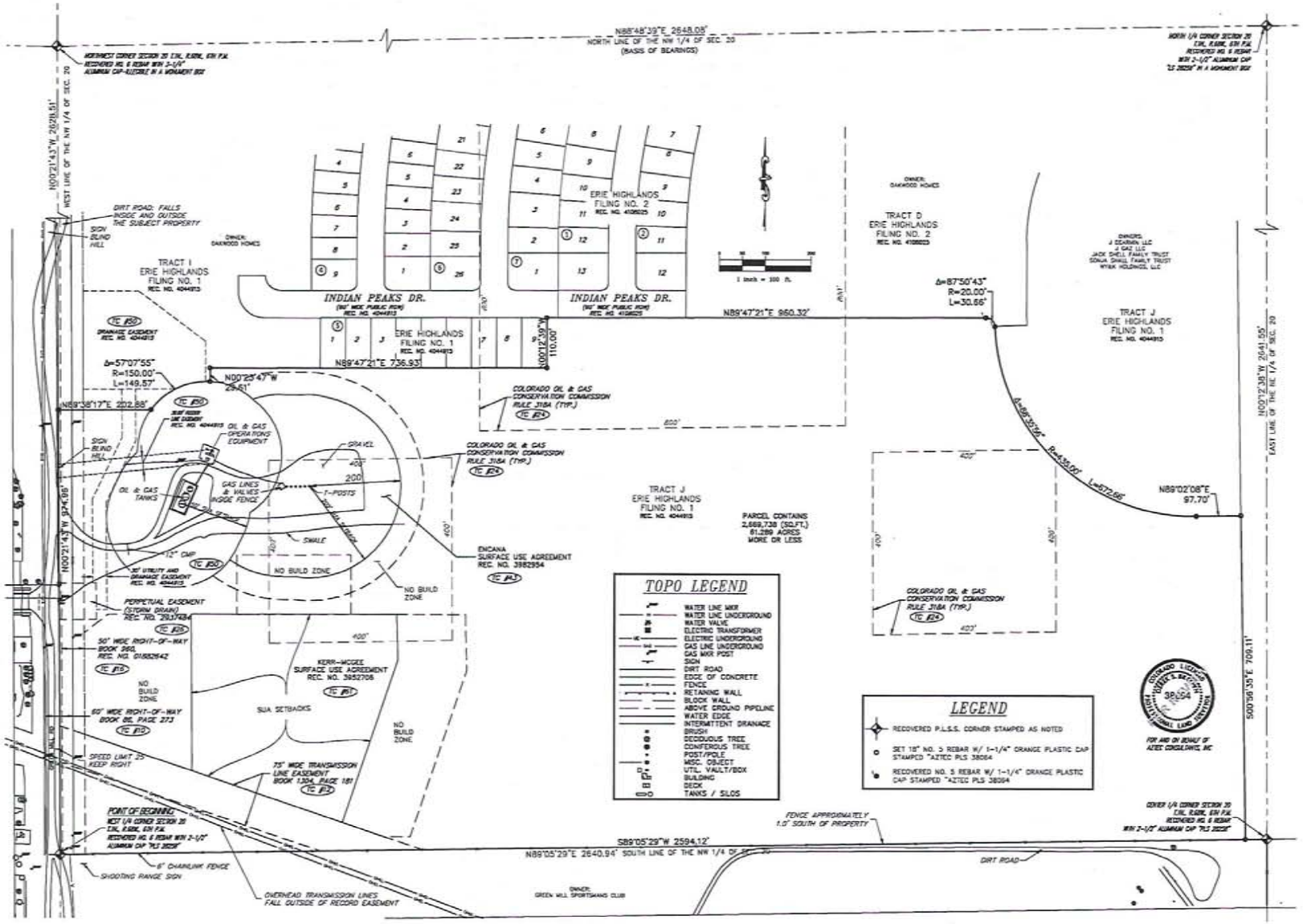
SCALE	DATE	APP'V	REVISION DESCRIPTION	BY	DATE
NA					
DBB / JFT					
06/30/2015					

SHEET ONE OF 2 SHEETS

JOB NO. 19316-17

ALTA/ACSM LAND TITLE SURVEY

A PORTION OF TRACT J, ERIE HIGHLANDS FILING NO. 1,
LOCATED IN THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO.
SHEET 2 OF 2



SCALE	DRAWN	DATE
N.A.	DSB	08/30/2016

DATE	BY	REVISION DESCRIPTION	APPV	DATE

AZTEC CONSULTANTS, INC.
300 East Mineral Ave., Suite 1
Littleton, Colorado 80122
Phone: (303) 713-1898
Fax: (303) 713-1897
www.aztecconsultants.com

ALTA/ACSM LAND TITLE SURVEY
A PORTION OF TRACT J, ERIE HIGHLANDS FILING NO. 1
TOWN OF ERIE, WELD COUNTY, COLORADO

PREPARED FOR
OAKWOOD HOMES
4908 TONER ROAD, DENVER, CO 80249

SHEET TWO OF 2 SHEETS

JOB NO. 19315-17

ERIE HIGHLANDS- PA 5, 6 & 14
SKETCH PLAN

A PART OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
101.7 ACRES- 242 LOTS/15 TRACTS
SK-000676-2015

LEGAL DESCRIPTION:

A PORTION OF TRACT L, ERIE HIGHLANDS FILING NO. 1, AS RECORDED ON SEPTEMBER 10, 2014, AT RECEPTION NO. 4044915 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDERS OFFICE, SITUATED IN THE NORTH HALF OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE CENTER QUARTER OF SAID SECTION 20 AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 89°40'00" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 SOUTH 89°38'28" WEST, A DISTANCE OF 48.82 FEET TO THE SOUTHWEST CORNER OF SAID TRACT L;

THENCE ALONG THE SOUTHWESTERLY BOUNDARY OF SAID TRACT L NORTH 58°58'58" WEST, A DISTANCE OF 759.11 FEET;

THENCE DEPARTING SAID NORTH 89°52'00" EAST, A DISTANCE OF 55.03 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHWESTERLY HAVING A RADIUS OF 425.00 FEET;

THENCE NORTHEASTERLY ALONG SAID CURVE, THROUGH A CENTRAL ANGLE OF 44°17'34", AN ARC LENGTH OF 103.18 FEET;

THENCE NON-TANGENT TO SAID CURVE, NORTH 88°20'00" WEST, A DISTANCE OF 55.00 FEET;

THENCE NORTH 89°40'00" EAST, A DISTANCE OF 326.44 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE NORTHERLY HAVING A RADIUS OF 440.00 FEET;

THENCE EASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 23°32'00", AN ARC LENGTH OF 180.76 FEET;

THENCE TANGENT TO SAID CURVE NORTH 84°08'00" EAST, A DISTANCE OF 199.11 FEET;

THENCE SOUTH 24°04'40" EAST, A DISTANCE OF 34.09 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE WESTERLY HAVING A RADIUS OF 1,135.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS SOUTH 87°47'00" WEST;

THENCE SOUTHERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 31°45'40", AN ARC LENGTH OF 628.21 FEET;

THENCE NON-TANGENT TO SAID CURVE, SOUTH 89°38'18" EAST, A DISTANCE OF 128.21 FEET TO THE NORTHWEST CORNER OF A PARCEL RECORDED IN BOOK 894, PAGE 391, IN SAID RECORDS;

THENCE ALONG THE WESTERLY BOUNDARY OF SAID PARCEL, SOUTH 11°04'31" EAST, A DISTANCE OF 125.00 FEET;

THENCE ALONG THE SOUTHERLY BOUNDARY OF SAID PARCEL AND THE SOUTHERLY BOUNDARY OF THAT PARCEL OF LAND RECORDED IN BOOK 589 AT PAGE 73, IN SAID RECORDS, NORTH 78°51'28" EAST, A DISTANCE OF 394.79 FEET TO THE SOUTHEAST CORNER OF SAID PARCEL RECORDED IN BOOK 589, PAGE 73, ALSO BEING A POINT ON THE WESTERLY BOUNDARY OF A PARCEL RECORDED IN BOOK 1175, PAGE 941, IN SAID RECORDS;

THENCE ALONG SAID WESTERLY BOUNDARY SOUTH 00°08'35" WEST, A DISTANCE OF 79.60 FEET TO THE NORTHEAST CORNER OF A PARCEL RECORDED AT RECEPTION NO. 1980196, IN SAID RECORDS;

THENCE DEPARTING SAID WESTERLY BOUNDARY AND ALONG THE NORTHERLY AND WESTERLY BOUNDARIES OF SAID PARCEL RECORDED AT RECEPTION NO. 1980196 THE FOLLOWING TWO (2) COURSES:

1) SOUTH 89°50'00" WEST, A DISTANCE OF 228.16 FEET;

2) SOUTH 00°00'21" WEST, A DISTANCE OF 690.47 FEET TO A POINT ON THE SOUTH LINE OF SAID NORTHEAST QUARTER;

THENCE DEPARTING SAID WESTERLY BOUNDARY, ALONG SAID SOUTH LINE SOUTH 89°38'00" WEST, A DISTANCE OF 1,340.76 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 49.421 ACRES, (2,153,142 SQUARE FEET), MORE OR LESS

A PORTION OF TRACT J, ERIE HIGHLANDS FILING NO. 1, AS RECORDED ON SEPTEMBER 10, 2014, AT RECEPTION NO. 4044915 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDERS OFFICE, SITUATED IN THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE WEST QUARTER CORNER OF SAID SECTION 20 AND CONSIDERING THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 20 TO BEAR NORTH 89°40'00" EAST, WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;

THENCE ALONG THE WEST LINE OF SAID NORTHWEST QUARTER, NORTH 00°21'40" WEST, A DISTANCE OF 874.66 FEET;

THENCE DEPARTING SAID SECTION LINE, NORTH 89°38'17" EAST, A DISTANCE OF 202.88 FEET TO THE BEGINNING OF A NON-TANGENT CURVE CONCAVE SOUTHEASTERLY HAVING A RADIUS OF 550.00 FEET, THE RADIUS POINT OF SAID CURVE BEARS SOUTH 54°25'57" EAST;

THENCE NORTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 37°37'37", AN ARC LENGTH OF 145.57 FEET;

THENCE NON-TANGENT TO SAID CURVE NORTH 89°22'47" WEST, A DISTANCE OF 29.81 FEET;

THENCE NORTH 89°47'21" EAST, A DISTANCE OF 774.92 FEET;

THENCE NORTH 89°12'58" WEST, A DISTANCE OF 110.84 FEET;

THENCE NORTH 89°47'21" EAST, A DISTANCE OF 948.32 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVE SOUTHWESTERLY HAVING A RADIUS OF 23.00 FEET;

THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 87°59'47", AN ARC LENGTH OF 35.64 FEET TO THE BEGINNING OF A REVERSE CURVE CONCAVE NORTHEASTERLY HAVING A RADIUS OF 430.00 FEET;

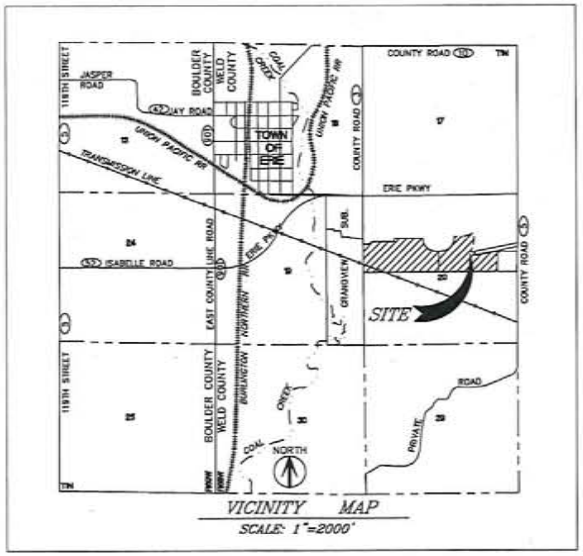
THENCE SOUTHEASTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 08°30'58", AN ARC LENGTH OF 67.08 FEET;

THENCE TANGENT TO SAID CURVE NORTH 88°52'59" EAST, A DISTANCE OF 97.79 FEET;

THENCE SOUTH 00°58'58" EAST, A DISTANCE OF 759.11 FEET TO A POINT ON THE SOUTH LINE OF SAID NORTHWEST QUARTER;

THENCE ALONG SAID SOUTH LINE, SOUTH 89°38'28" WEST, A DISTANCE OF 2,594.10 FEET TO THE POINT OF BEGINNING.

CONTAINING AN AREA OF 51.288 ACRES, (2,233,736 SQUARE FEET), MORE OR LESS.



APPLICANT
OAKWOOD HOMES LLC
4908 TOWER ROAD
DENVER, CO 80249
(303) 486-8500
CONTACT: JOHN CHENEY

OWNER
J DEARMIN LLC
10343 FEDERAL BOULEVARD
UNIT 515
WESTMINSTER, CO 80260
CONTACT: JAMES DEARMIN

OWNER
J GAZ LLC
4955 WEST 65TH AVENUE
ARVADA, CO 80003
CONTACT: JOHNNY GAZ

OWNER
THE JACK SHELL & SONYA SHELL FAMILY TRUSTS
10015 MEADE COURT
WESTMINSTER, CO 80031
CONTACT: JACK SHELL

OWNER
WY&K HOLDINGS, LLC
28221 HIDDEN VILLAGE DRIVE
EVERGREEN, CO 80439
CONTACT: ROBERT E. YOULE

PLANNER
TERRACINA DESIGN
10200 E. GIRARD AVE, A-314
DENVER, CO 80231
(303) 632-8867
CONTACT: LAYLA ROSALES

ENGINEER
CORE CONSULTANTS
1950 WEST LITTLETON BLVD., SUITE 109
LITTLETON, COLORADO 80120
(303)709-4680
CONTACT: DAVID FORBES

SHEET INDEX

1 COVER
2 LAND USE PLAN
3 OPEN SPACE PLAN
4-5 DETAILED SITE PLAN

terracina design
10200 E. Girard Ave, A-314
Denver, CO 80231
(303) 632-8867

PROJECT NAME

ERIE HIGHLANDS- PA 5,6 & 14
SKETCH PLAN
TOWN OF ERIE, COLORADO

SHEET TITLE

COVER SHEET

SHEET NUMBER

1

SHEET 1 OF 5

AUGUST 3, 2015

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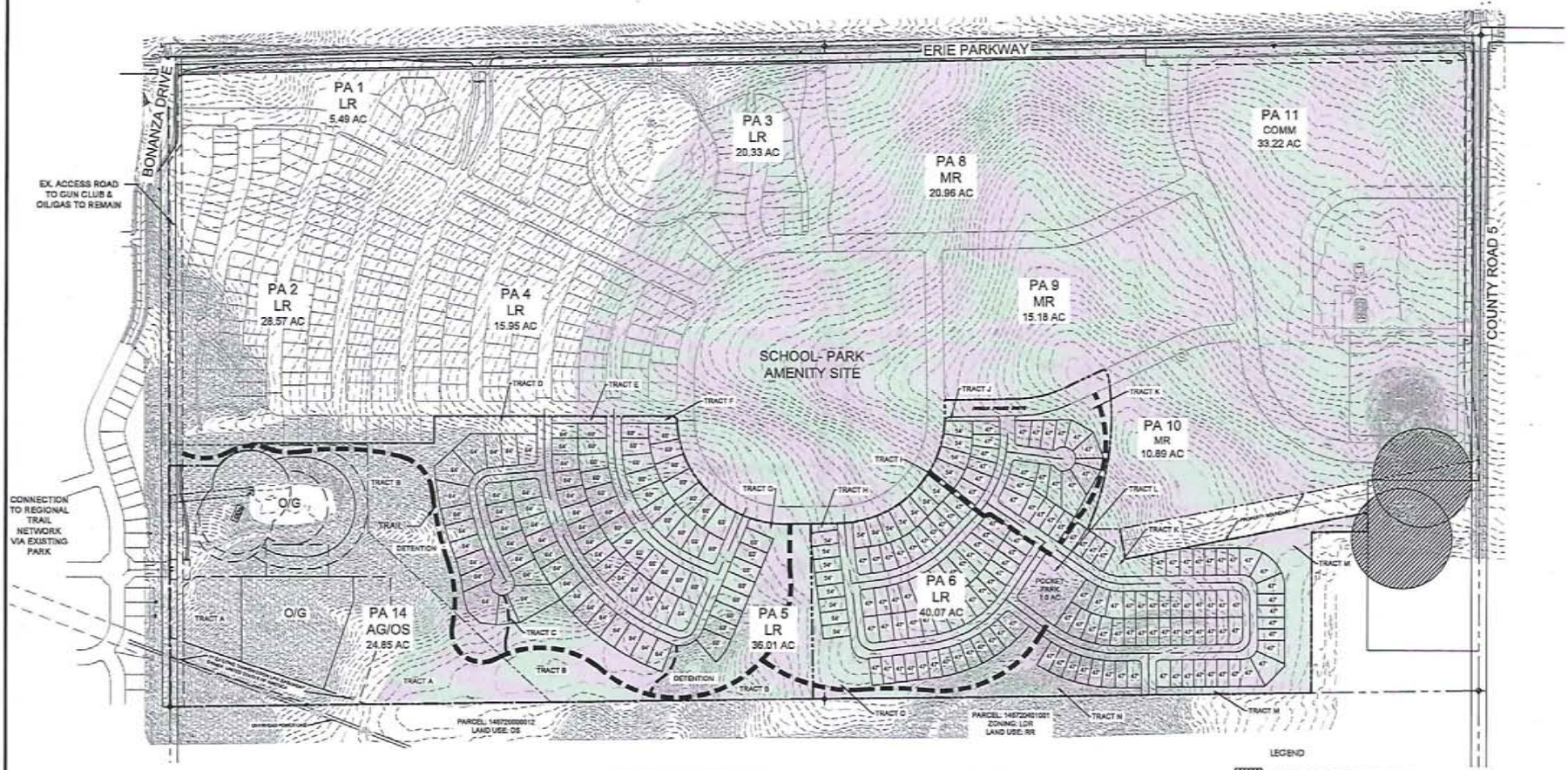
ERIE HIGHLANDS- PA 5, 6 & 14
SKETCH PLAN

A PART OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
101.7 ACRES- 242 LOTS/15 TRACTS
SK-000676-2015



DWELLING UNIT SUMMARY CHART

FILING/PA	UNITS	FILING/PA AREA (AC)	UNITS/ACRE
PA14	0	24.85	0.0
PA5	86	36.01	2.4
PA6	157	40.07	3.9

*LDR zoning district requires 2-6 DU/ACRE.

DEVELOPMENT SUMMARY

LAND USE	ACRES	% ACRES	UNITS	% UNITS	DU/AC
SINGLE FAMILY RESIDENTIAL	54.3	53.4%			
PARK HOUSE (47'X110) MIN.			138	56.8%	
RANCH HOUSE (54'X110) MIN.			19	7.8%	
RANCH HOUSE (60'X110) MIN.			38	15.6%	
OVERLOOK (64'X110) MIN.			48	19.8%	
PUBLIC OPEN SPACE (PA 5, PA 6 & PA 14-A)	31.0	30.5%			
PRIVATE OPEN SPACE	6.4	6.3%			
POCKET PARK	1.0	1.0%			
OIL AND GAS FACILITY	9.0	8.8%			
TOTAL	101.7	100.0%	243	100.0%	2.4

LEGEND
- UNDERMINING - SIGNIFICANT RISK
- UNDERMINING - LOW RISK
- TRAIL
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- 8% OR GREATER SLOPES
- PARCEL BOUNDARY

NORTH

Scale: 1"=200'
0 100 200 400

terracina design
1330 Fort Cheyenne Ave, A-314
Denver, CO 80221
ph: 303.512.0810

PROJECT NAME
ERIE HIGHLANDS- PA 5,6 & 14
SKETCH PLAN
TOWN OF ERIE, COLORADO

SHEET TITLE
LAND USE PLAN

SHEET NUMBER
2

SHEET 2 OF 5

AUGUST 3, 2015

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ERIE HIGHLANDS- PA 5, 6 & 14
SKETCH PLAN

A PART OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
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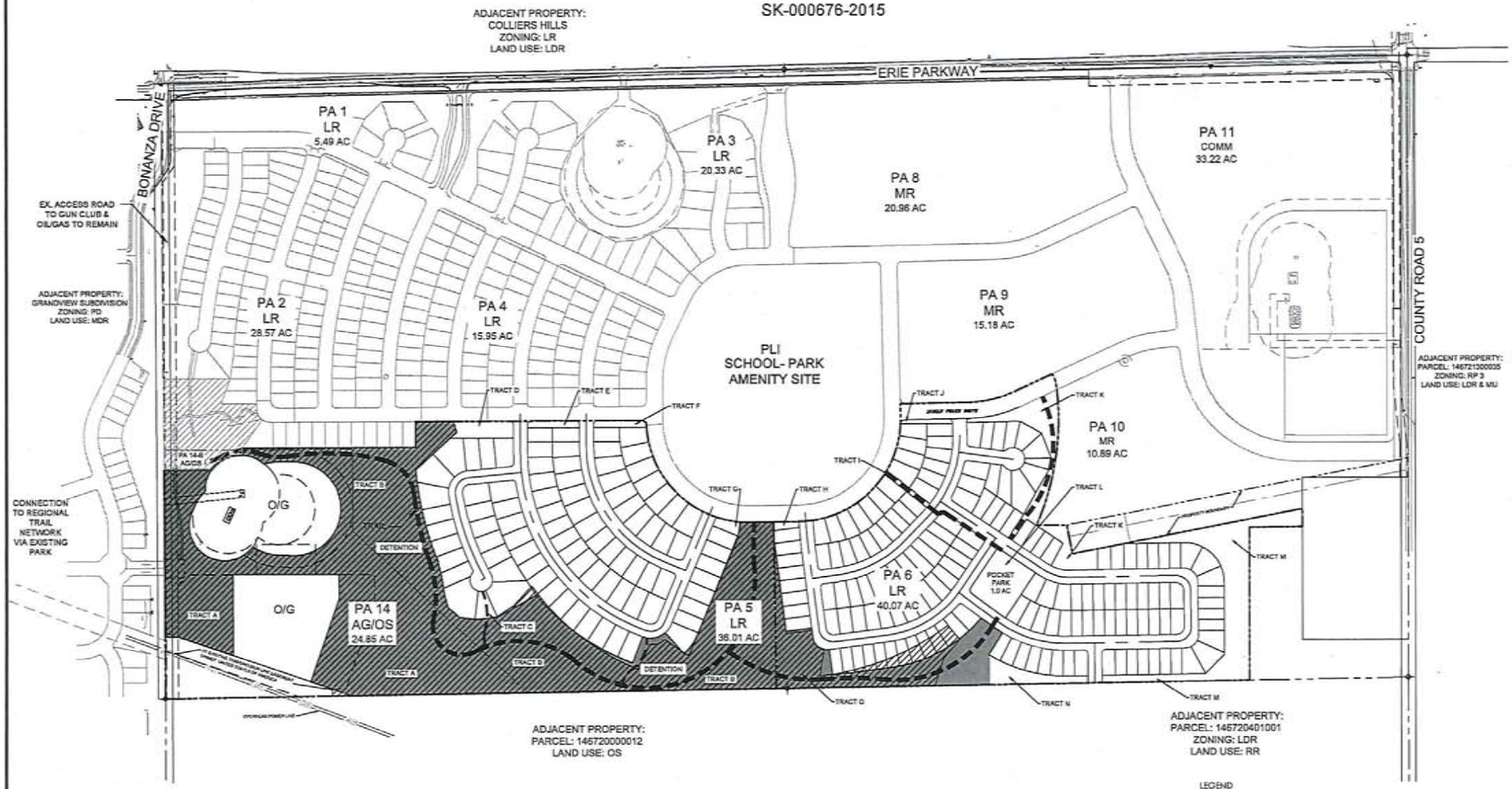


OPEN SPACE DATA			
PUD	ACRES	PROPOSED	ACRES
PA 2	2.39	PA 2	2.39
PA 5	13.72	PA 5	13.92
PA 6	2.74	PA 6	3.39
PA 14	13.77	PA 14-A	13.18
		PA 14-B	0.5
TOTAL	32.62	TOTAL	33.38

LEGEND
- PUBLIC OPEN SPACE - APPROVED PUD
- PUBLIC OPEN SPACE - PROPOSED
- TRAIL

NORTH

Scale: 1"=200'
0 100 200 400

terracina design

PROJECT NAME
ERIE HIGHLANDS- PA 5,6 & 14
SKETCH PLAN
TOWN OF ERIE, COLORADO

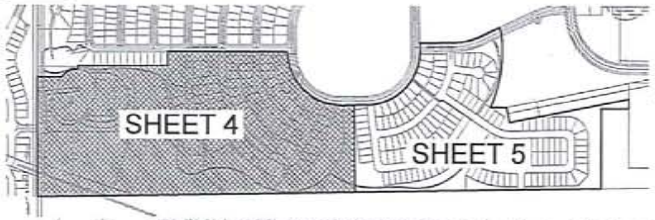
SHEET TITLE
OPEN SPACE PLAN

SHEET NUMBER
3

SHEET 3 OF 5

AUGUST 3, 2015

KEYMAP:



ERIE HIGHLANDS- PA 5, 6 & 14
SKETCH PLAN

A PART OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
101.7 ACRES- 242 LOTS/15 TRACTS
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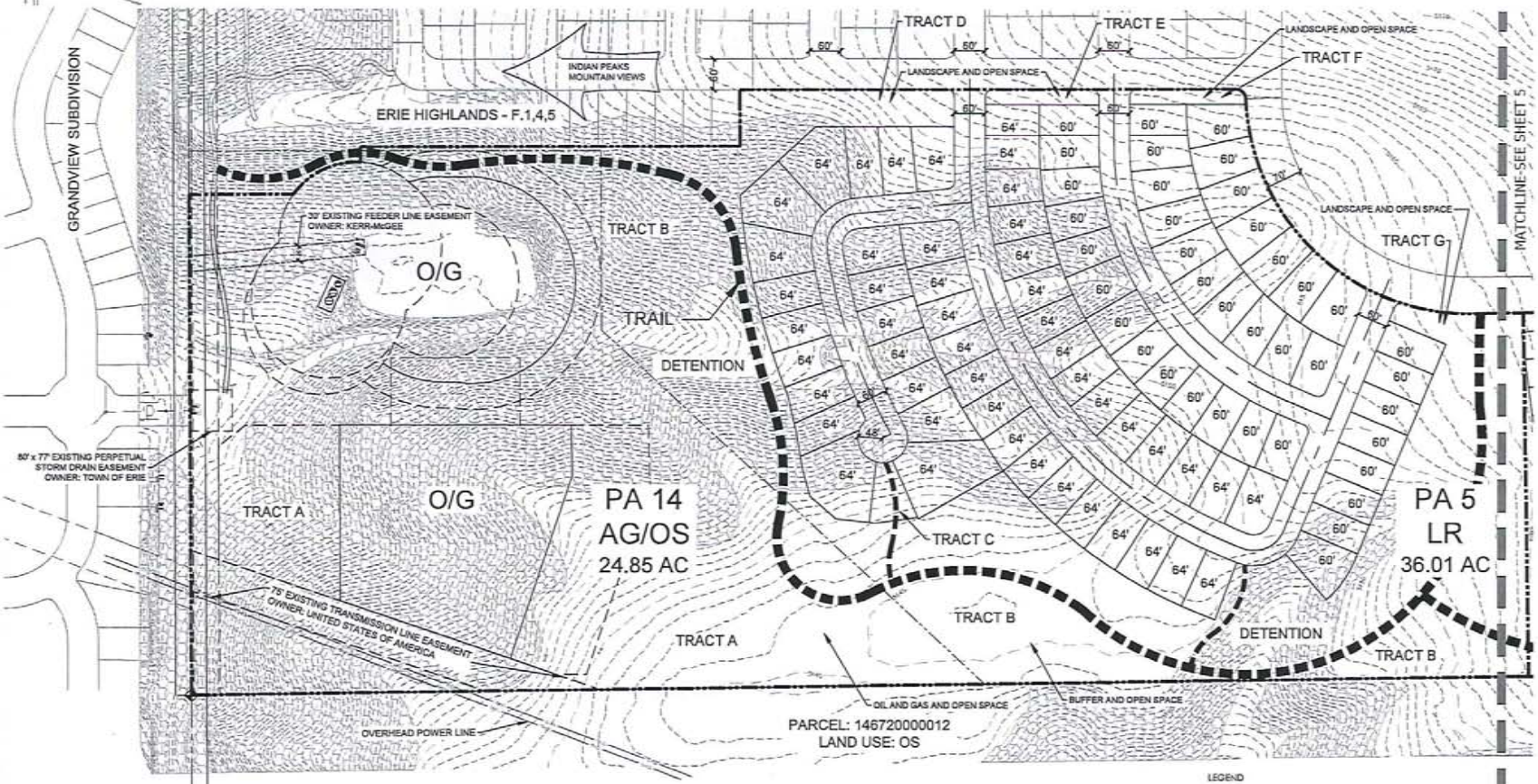

PA 5 LAND SUMMARY CHART

TYPE	AREA (AC)	% OF TOTAL AREA	LOTS	DU/AC
RESIDENTIAL UNITS	17.05	46.8%	86	2.4
TRACTS	14.85	40.8%		
PUBLIC ROW	4.54	12.5%		
TOTAL	36.44	100.0%		

*PA 14 is an open space tract encumbered by Oil + Gas and owned and maintained by the Erie Highlands Metro District.

PA 5 & 14 TRACT SUMMARY CHART

TRACT	AREA (SF)	USE	OWNERSHIP	MAINTENANCE
A	578,993.3	OIL AND GAS AND OPEN SPACE	EHMD	EHMD
B	602,514.1	BUFFER AND OPEN SPACE	EHMD	EHMD
C	7,351.1	LANDSCAPE AND OPEN SPACE	EHMD	EHMD
D	18,076.1	LANDSCAPE AND OPEN SPACE	EHMD	EHMD
E	6,503.4	LANDSCAPE AND OPEN SPACE	EHMD	EHMD
F	6,628.1	LANDSCAPE AND OPEN SPACE	EHMD	EHMD
G	5,340.4	LANDSCAPE AND OPEN SPACE	EHMD	EHMD

*EHMD - ERIE HIGHLANDS METRO DISTRICT

NOTES:

- 8' PROPOSED UTILITY EASEMENT ALONG BACK OF LOTS.
- 6' PROPOSED UTILITY EASEMENT ALONG ROAD RIGHT-OF-WAY.
- EXISTING GRADES ARE SHOWN AT A 1' INTERVAL.
- THERE ARE NO EXISTING FLOODPLAINS, WETLANDS, OR WATER COURSES ON SITE.

LEGEND

- 64' OVERLOOK PRODUCT (64' x 110' MIN. LOT SIZE)
- 60' RANCH HOUSE PRODUCT (60' x 110' MIN. LOT SIZE)
- TRAIL
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- 8% OR GREATER SLOPES
- PARCEL BOUNDARY

NORTH

Scale: 1"=100'

0 50 100 200

terradna design
10200 East Girard Ave, A-314
Denver, CO 80231
ph: 303.632.8867

PROJECT NAME

ERIE HIGHLANDS- PA 5,6 & 14
SKETCH PLAN
TOWN OF ERIE, COLORADO

SHEET TITLE

DETAILED PLAN

SHEET NUMBER

4

SHEET 4 OF 5

AUGUST 3, 2015

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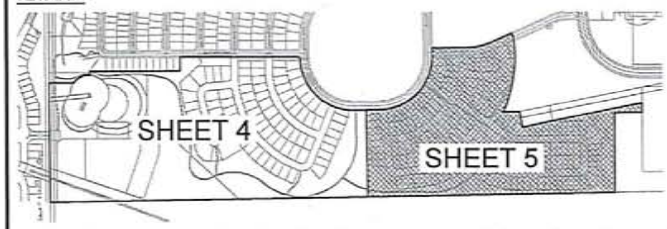
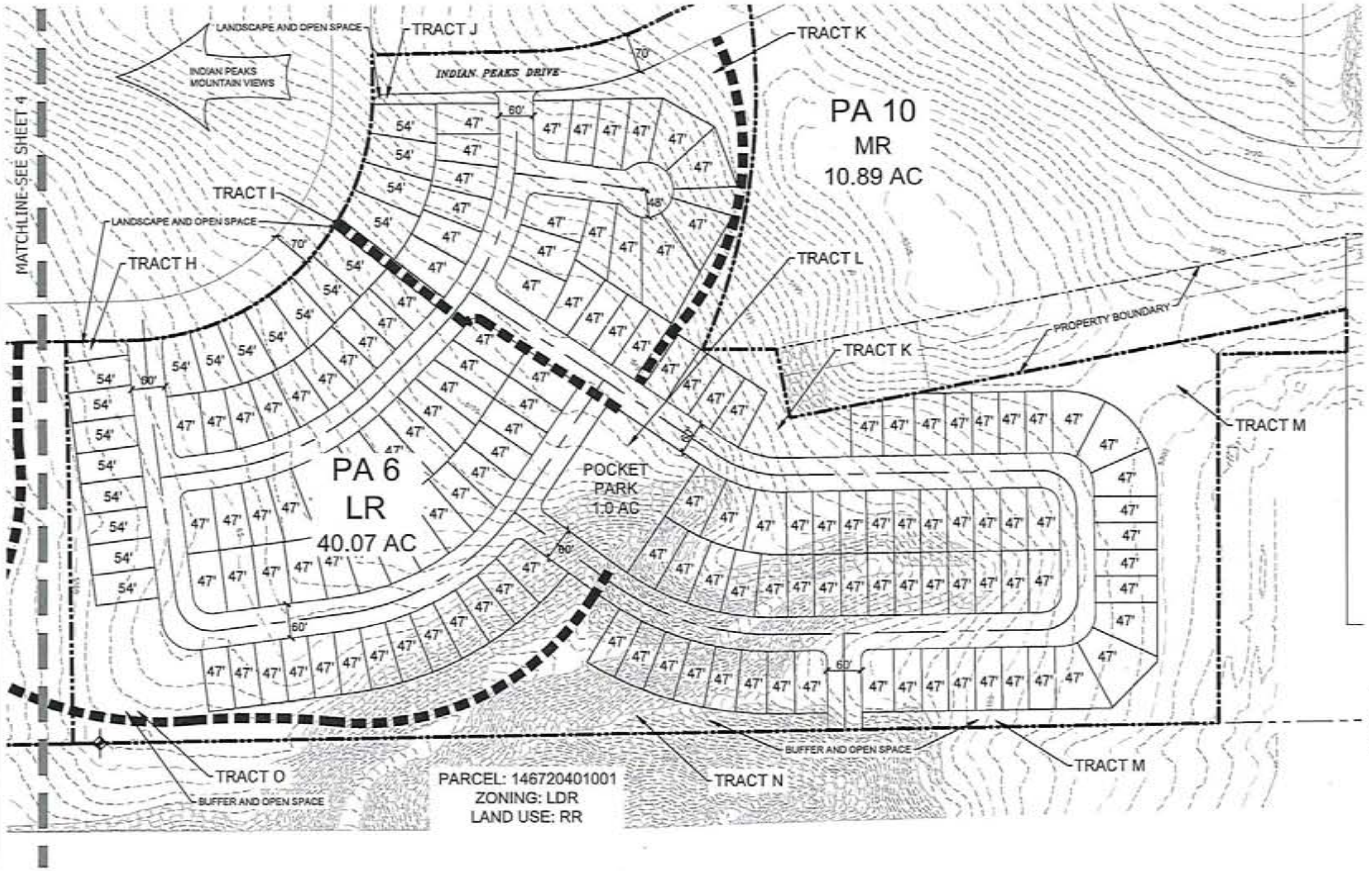
ERIE HIGHLANDS- PA 5, 6 & 14
SKETCH PLAN

A PART OF THE NORTH HALF OF SECTION 20,
TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
101.7 ACRES- 242 LOTS/ 15 TRACTS
SK-000676-2015

KEYMAP:





PA 6 TRACT SUMMARY CHART

TRACT	AREA (SF)	USE	OWNERSHIP	MAINTENANCE
H	3,319.4	LANDSCAPE AND OPEN SPACE	EHMD	EHMD
I	4,597.9	LANDSCAPE AND OPEN SPACE	EHMD	EHMD
J	3,864.9	LANDSCAPE AND OPEN SPACE	EHMD	EHMD
K	75,062.8	BUFFER AND OPEN SPACE	EHMD	EHMD
L	43,637.4	POCKET PARK	EHMD	EHMD
M	126,345.0	BUFFER AND OPEN SPACE	EHMD	EHMD
N	23,112.5	BUFFER AND OPEN SPACE	EHMD	EHMD
O	147,310.6	BUFFER AND OPEN SPACE	EHMD	EHMD

*EHMD - ERIE HIGHLANDS METRO DISTRICT

PA 6 LAND SUMMARY CHART

TYPE	AREA (AC)	% OF TOTAL AREA	LOTS	DU/AC
RESIDENTIAL UNITS	21.93	54.3%	157	3.9
TRACTS	9.81	24.3%		
PUBLIC ROW	8.68	21.5%		
TOTAL	40.42	100.0%		

NOTES:

- 8' PROPOSED UTILITY EASEMENT ALONG BACK OF LOTS.
- 6' PROPOSED UTILITY EASEMENT ALONG ROAD RIGHT-OF-WAY.
- EXISTING GRADES ARE SHOWN AT A 1' INTERVAL
- THERE ARE NO EXISTING FLOODPLAINS, WETLANDS, OR WATER COURSES OF ANY TYPE ON SITE.

LEGEND

- 54' RANCH HOUSE PRODUCT (54' x 110' MIN. LOT SIZE)
- 47' PARK HOUSE PRODUCT (47' x 110' MIN. LOT SIZE)
- TRAIL
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- 8% OR GREATER SLOPES
- PARCEL BOUNDARY

NORTH

Scale: 1"=100'

0 50 100 200

terracina design

PROJECT NAME

ERIE HIGHLANDS- PA 5,6 & 14
SKETCH PLAN
TOWN OF ERIE, COLORADO

SHEET TITLE

DETAILED PLAN

SHEET NUMBER

5

SHEET 5 OF 5

AUGUST 3, 2015

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Engineering Partners, Inc.
Right. On Time.

PHASE III DRAINAGE REPORT
for
ERIE HIGHLANDS

Erie, Colorado

NOVEMBER-2013

Prepared for:

Oakwood Homes LLC
4908 Tower Road
Denver, Colorado 80249
303-486-8500
Contact: John Cheney

Prepared by:

ENGINEERING PARTNERS, INC.
1950 West Littleton Blvd., Suite 109
LITTLETON, CO. 80120
(303) 703-4444

Engineer's Statement:

This report for ERIE HIGHLANDS was prepared by me (or under the direct supervision) in accordance with the provisions of the Town of Erie and Urban Drainage Criteria Manual. I understand that the Town of Erie and its designated town authority do not and will not assume liability for drainage facilities designed by others.

_____

David C. Forbes P.E.
Colorado Professional Engineer 36130
For and on behalf Engineering Partners Inc.

Contents

Final Drainage Report
Contents

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- Site Description 1
- Proposed Project 1

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Appendix A – Site Maps

Appendix B – Calculations

Introduction

Site Location

The 301.6 acre site is located in the north half of Section 20, Township 1 North, Range 68 West of the 6th Principal Meridian, Town of Erie, Weld County, State of Colorado.

The site is bound by Erie Parkway (CR 8) to the north, future Sunset Subdivision to the south, Grandview subdivision to the west and County Road 5 to the east.

The purpose of this drainage report is the address the impacts that this site will have on its surroundings and demonstrate how it will comply with the regulatory requirements as outlined in the Town of Erie standards.

Site Description

The site is mostly undeveloped farmland with moderate weeds and native grasses. The project site was historically mined for coal. A large tailings pile is located in the east central portion of the site. An above-ground gas line valve and associated facilities are located in the center of the northern part of the property. An existing dirt road off Bonanza Drive serves these facilities.

The site elevation ranges from 5205 near the middle of the site to various low points to the north, south, east and west. The lowest elevation is to the west, 5070 near the Donelly Avenue.

U.S. Department of Agriculture, Soil Conservation Service mapping of the area indicates that the soils are:
Colby loam, 3 to 5 percent with a Hydrological Soil group B
Colby loam, 5 to 9 percent with a Hydrological Soil group B
Colombo Clay loam, 1 to 3 percent with a Hydrological Soil group B
Midway-Shingle complex, 5 to 20 percent with a Hydrological Soil group D
Nunn loam, 1 to 3 percent with a Hydrological Soil group C
Weld County loam, 1 to 3 percent with a Hydrological Soil group C
Wiley-Colby complex, 1 to 3 percent with a Hydrological Soil group B.
Wiley-Colby complex, 3 to 3 percent with a Hydrological Soil group B

Refer to the SCS mapping in the appendix.

Proposed Project

The proposed project will include the construction various planning areas. Please refer to the preliminary concept plan in the appendix. The majority of the site will be development as Single Family. Planning areas will be set aside for parks and open space, a future school, commercial pads, and multi-family units.
There will be 254 lots within the ERIE HIGHLANDS Preliminary Plat No. 1. The majority of this drainage will collect near the northwest corner of the site at the intersection of Erie Parkway and Bonanza Drive. Another small Pond, Pond 2, will collect runoff for the southwest portion of the site. Pond 2 will discharge towards its historic route towards Donelly Avenue.

Historic Drainage

Major Basin Description

According to the Flood Insurance Rate Map No. 08013C0441J, Panel 441 of 615, Dated December 18, 2012 the subject property lines within "Zone C", being defined as "Areas of Minimal Flooding (No Shading).
Map has been included in Appendix for your reference.

Site Drainage and Existing Facilities

Existing topography divides the site into six historic basins, H-1 through H-6.

H-1 being 93.4 acres is located in the Southwest corner of the property and surface drains to the intersection of Erie Parkway and Bonanza Drive. An 18" RCP routes the flow across Erie Parkway into the Future Bridgewater subdivision's Irrigation Pond. Soils are 100% B.
Q2= 0.04(93.4) = 3.7 cfs
Q5= 0.13(93.4) = 12.1 cfs
Q10=0.23(93.4) = 21.5 cfs
Q100=0.85(93.4) = 79.4 cfs.

H-2 being 13.2 acres drains a small portion near the western edge of the property. Ultimately this runoff combines with basin H-3. Soils are 70% B and 30% C-D.
Q2= 0.04(9.2) + 0.06(4.0) = 0.6 cfs
Q5= 0.13(9.2) + 0.17(4.0) = 1.9 cfs
Q10=0.23(9.2) + 0.30(4.0) = 3.3 cfs
Q100=0.85(9.2) + 1.0(4.0) = 11.8 cfs.

H-3 being 68.6 acres drains the southwestern portion of the site. This area is collected by an area inlet. A 36" RCP within Donelly Avenue routes the flow though the Grandview Subdivision. The existing storm sewer has the design capacity of 83 cfs. Soils are 40% B and 60% C-D.
Q2= 0.04(27.4) + 0.06(41.2) = 3.6 cfs
Q5= 0.13(27.4) + 0.17(41.2) = 10.6 cfs
Q10=0.23(27.4) + 0.30(41.2) = 18.7 cfs
Q100=0.85(27.4) + 1.0(41.2) = 64.5 cfs.

Basins H-4 and H-5 are comprised of 26.5 and 29.0 acres, respectively. Both sub-basins direct runoff towards an unnamed tributary of Coal Creek. This unnamed tributary lies within the south half of Section 20 and the southeast one-quarter of Section 19, TS 1N, R68W of the 6h PM.
Assume Soils are100% C-D.

Basin H-4:
Q2= .06(26.5) = 1.6 cfs
Q5= 0.17(26.5) = 4.5 cfs
Q10= 0.30(26.5) = 7.9 cfs
Q100=1.0(26.5) = 26.5 cfs

Basin H-5
Q2= .06(29.0) = 1.7 cfs
Q5= 0.17(29.0) = 4.9 cfs
Q10= 0.30(29.0) = 8.7 cfs
Q100=1.0(29.0) = 29.0 cfs

H-6 being 70.9 acres drains the northeast portion of the site. An existing 45"x63" CMP and 36"x42" CMP route the flow across Erie Parkway. Soils are 100% C-D.
Q2= .06(70.9) = 4.3 cfs
Q5= 0.17(70.9) = 12.1 cfs
Q10= 0.30(70.9) = 21.3 cfs
Q100=1.0(70.9) = 70.9 cfs

Proposed (Developed) Drainage

Drainage Design Criteria

The proposed storm drainage facilities for the project are designed to comply with the Town of Erie Standards and Specifications and Urban Drainage and Flood Control District's Drainage Criteria Manual (USDCM) 2008 Edition.

Hydrologic Method and Design Storm Frequencies

The rational method was utilized to determine peak 2-year, 5-year and 100-year flows associated with the proposed improvements from this site, in accordance with the Urban Drainage and Flood Control District, and the Town's Manual.

The storm pipes on the Site will been designed such that the hydraulic grade line (HGL) will remain inside the pipeline for the 5 yr event as required by the Town. All proposed storm sewer systems will discharge to a EURV detention pond. The storm pipe system is designed to capture the 2-year minor storm, inlets sized for 5 year storm and the 100 year storm at appropriate low points. Some 100-year flow will be allowed to surface flow into prospective Ponds.

Future Hydraulic grades will be derived for all pipelines (except local yard drains), and utilized headloss coefficients of 0.5 to 0.9.

Proposed Site Basins

Onsite inlets and the storm pipe system are designed to capture and convey the 5 yr flow, while maintaining the 5 yr HGL within the pipe. Though a portion of the 100 yr flow will be intercepted and routed by these same pipes, the HGL will be outside the pipe. For the purpose of this report we have therefore defined a conservative approach to the 100 event, which presumes that only the 5 yr Q will be captured and routed via the pipe system, and all other flows above and beyond those flow rates, will overflow and surface route to the onsite low points located near EURV Ponds. The 100-year HGL has been confined to rim elevations or less. In areas where the HGL is close we may choose to bolt the manholes.

Table R0-5 was used to calculate the percent impervious based on each areas densities.
The area draining towards Pond 1 has a density of 3.5 units per acre. We have assumed an average 2,500 s.f. home. A density of 4.5 units per acres will be used for future Ponds 3-5.
Pond 6 will have a mix of multi/single family with a large area designated as commercial.

Sub-basin A (6.42 acres) consists of a future multifamily and single family homes. Runoff will be routed to Design Point 1 via sheet and gutter flow, where a proposed 15' Type R inlet will fully capture the 5-year flow. Q_5 = 10.6 cfs and Q_{100} = 26.1 cfs.

Sub-basin B (9.23 acres) consists of a future school site, community-park and single family homes. Runoff will be routed to Design Point 2 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. $Q_5 = 9.4$ cfs and $Q_{100} = 30.0$ cfs.

Sub-basin C (11.73 acres) consists of future single family homes. Runoff will be routed to Design Point 3 via sheet and gutter flow, where a proposed Type C inlet will fully capture the 5-year flow. $Q_5 = 11.7$ cfs and $Q_{100} = 36.9$ cfs.

Sub-basin D (3.63 acres) consists of open space and future Erie Parkway Improvements. Runoff will be routed to Design Point 4 via sheet and gutter flow, where a proposed 15' Type R inlet will fully capture the 5-year flow. $Q_5 = 4.6$ cfs and $Q_{100} = 12.6$ cfs.

Sub-basin E (1.27 acres) consists of single family homes. Runoff will be routed to Design Point 5 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. $Q_5 = 1.30$ cfs and $Q_{100} = 4.2$ cfs.

Sub-basin F (3.47 acres) consists of single family homes and open space. Runoff will be routed to Design Point 6 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. $Q_5 = 3.4$ cfs and $Q_{100} = 10.6$ cfs.

Sub-basin G (6.22 acres) consists of single family homes and open space (Gas well site). Runoff will be routed to Design Point 7, where a proposed Type C inlet will fully capture the 5-year flow. After Erie Parkway is widened there will be a natural low point created. The inlet will intercept these flows just west of the oil pad access road. $Q_5 = 4.6$ cfs and $Q_{100} = 17.7$ cfs.

Sub-basin H (9.10 acres) consists of single family homes and open space (Gas well site). Runoff will be routed to Design Point 8 via sheet and gutter flow, where a proposed 15' Type R inlet will fully capture the 5-year flow. $Q_5 = 5.0$ cfs and $Q_{100} = 23.8$ cfs.

Sub-basin I (1.01 acres) consists of single family homes and open space. Runoff will be routed to Design Point 9 via sheet and gutter flow, where a proposed 5' Type R inlet will fully capture the 5-year flow. $Q_5 = 0.7$ cfs and $Q_{100} = 2.9$ cfs.

Sub-basin J (6.26 acres) consists of single family homes and open space. Runoff will be routed to Design Point 10 via sheet and gutter flow, where a proposed 15' Type R inlet will fully capture the 5-year flow. $Q_5 = 6.6$ cfs and $Q_{100} = 20.7$ cfs.

Sub-basin K (3.36 acres) consists of single family homes and open space. Runoff will be routed to Design Point 11 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. $Q_5 = 3.5$ cfs and $Q_{100} = 11.1$ cfs.

Sub-basin L (3.75 acres) consists of single family homes and open space. Runoff will be routed to Design Point 12 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. $Q_5 = 3.9$ cfs and $Q_{100} = 12.2$ cfs.

Sub-basin M (4.87 acres) consists of single family homes and open space. Runoff will be routed to Design Point 13 via sheet and gutter flow, where a proposed 15' Type R inlet will fully capture the 5-year flow. $Q_5 = 4.9$ cfs and $Q_{100} = 15.7$ cfs.

Sub-basin N (4.04 acres) consists of single family homes and open space. Runoff will be routed to Design Point 14 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. Q_5 = 3.6 cfs and Q_{100} = 11.6 cfs.

Sub-basin O (1.98 acres) consists of single family homes and open space. Runoff will be routed to Design Point 15 via sheet and gutter flow, where a proposed 5' Type R inlet will fully capture the 5-year flow. Q_5 = 2.0 cfs and Q_{100} = 6.4 cfs.

Sub-basin P (8.74 acres) consists of single family homes and open space. Runoff will be routed to Design Point 16 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. Q_5 = 8.8 cfs and Q_{100} = 26.9 cfs.

Sub-basin Q (2.52 acres) consists of single family homes and open space. Runoff will be routed to Design Point 17 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. Q_5 = 2.5 cfs and Q_{100} = 8.1 cfs.

Sub-basin Pond-1 (5.04 acres) consists of single family homes and open space. Runoff will be routed to Design Point J6 and controlled with a EURV outlet structure.
Total to Pond 1: Q_5 = 84.6 cfs and Q_{100} = 257.8 cfs.

Sub-basin R (6.32 acres) consists of single family homes and open space. Runoff will be routed to Design Point 18 via sheet and gutter flow, where a proposed 15' Type R inlet will fully capture the 5-year flow. Q_5 = 7.9 cfs and Q_{100} = 24.5 cfs.

Sub-basin S (4.86 acres) consists of single family homes and open space. Runoff will be routed to Design Point 19 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. Q_5 = 6.5 cfs and Q_{100} = 20.0 cfs.

Sub-basin T (3.78 acres) consists of single family homes and open space. Runoff will be routed to Design Point 20 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. Q_5 = 4.8 cfs and Q_{100} = 14.0 cfs.

Sub-basin W (1.55 acres) consists of single family homes and open space. Runoff will be routed to Design Point 20 via sheet and gutter flow, where a proposed 10' Type R inlet will fully capture the 5-year flow. An emergency channel 5' wide will route flows to Pond 2. Q_5 = 2.1 cfs and Q_{100} = 6.5 cfs.

Sub-basin Pond-2 (2.46 acres) consists of single family homes and open space. Runoff will be routed to Design Point J7 and controlled with a EURV outlet structure.
Total to Pond 2: Q_5 = 22.5 cfs and Q_{100} = 69.6 cfs.

Sub-basin Pond-3 (64.72 acres) will consist of single family homes sites and open space. Runoff will be routed to Design Point J8 via overland, sheet and gutter flow, where a proposed EURV Pond-3 will control flows to existing conditions.
Q_5 = 44.5 cfs and Q_{100} = 197.8 cfs.

Sub-basin Pond-4 (26.47 acres) will consist of single family homes sites and open space. Runoff will be routed to Design Point J9 via overland, sheet and gutter flow, where a proposed EURV Pond-4 will control flows to existing conditions.
Q_5 = 32.9 cfs and Q_{100} = 102.1 cfs.

Sub-basin Pond-5 (29.01 acres) will consist of single family homes sites and open space. Runoff will be routed to Design Point J10 via overland, sheet and gutter flow, where a proposed EURV Pond-5 will control flows to existing conditions.
Q_5 = 36.4 cfs and Q_{100} = 112.6 cfs.

Sub-basin Pond-6 (72.23 acres) will consist of single family homes sites, commercial and open space. Runoff will be routed to Design Point J11 via overland, sheet and gutter flow, where a proposed EURV Pond-6 will control flows to existing conditions.
Q_5 = 125.2 cfs and Q_{100} = 297.6 cfs.

Detention and Water Quality Enhancement Features

Pond 1 and Pond 2 have been designed to treat the water for this Filing. The EURV Water Quality and the 100-year detention pond volumes were calculated with the empirical and Full Spectrum methods per the UDFCD guideline. Water quality enhancement features have been designed as the EDB's (Extended Detention Basin) with forebay and micro pool. The ponds are designed to contain the 100-year volume.

The outlet structure for both ponds has been designed to restrict the 100 yr release rate with the use of a water quality plate and a 100-year orifice plate on the outlet pipe. Allowable release rates have been computed based on the EURV equations. A concrete trickle channel will convey flows for the flared section from the forebay to the micro pool.

Emergency overflow for Pond 1 will be routed onto Erie Parkway. The spillway has been designed to pass the entire 100-year event. The spillway is located on the northwest side of Pond 1.

Emergency flows from Pond 2 will be routed due south toward the newly graded low point just east of Donelly. Additional measures will also be provided offsite to protect the adjacent subdivision from flows. A berm and swale will direct a small about of discharge to Bonanza.

Erosion Control / Stormwater Management Plan

Erosion control features will be installed at strategic locations on the site as soon as construction activities commence. These features, which include VTC at the entrance, inlet protection, diversion ditched, etc are outlined in the stormwater management plans and details. The SWMP includes required erosion control measures, implementation specifications and detail sheets. A State and Town of Erie Stormwater permit will be require prior to any construction.

REQUIRED BEST MANAGEMENT PRACTICES (BMP)

1. Vehicle Tracking Control: This BMP is required at all access points to a construction site that are used by vehicular traffic or construction equipment. **A vehicle tracking control pad will be installed at the construction entrance prior to the mobilization of grading equipment onsite. At no time shall a contractor not use a VTC when entering public ROW.**

2. Inlet Protection: This BMP is required on all existing or proposed storm sewer inlets in the vicinity of the construction site that may receive site runoff. The BMP must be appropriate to the type of storm inlet and appropriate for the ground surface at the inlet. **Inlet protection will be installed on the existing curb inlets adjacent and downstream to the site. Curb socks will be installed in the street flow line just upstream of the inlet protection.**

3. Site Stabilization: **Any remaining soil areas disturbed by grading operations will be seeded and mulched.**

4. Spill Prevention/Containment: This BMP defines the measures proposed for preventing, controlling, or containing spills of fuel, lubricants, or other pollutants and protecting potential pollutants from contact with precipitation or runoff. **The contractor shall provide self-contained tanks for storage of fuel or other potential pollutants (i.e double walled or contained basins).**

5. Chute Washout Containment: This BMP requires that a containment area be designated for the washout of cement truck delivery chutes. This containment area is to be bermed so that wash water is totally contained. Water discharged into the containment area is allowed to infiltrate or evaporate. The dried cement waste is removed and properly disposed of. **Contractor shall locate washout per approved plans.**

6. Street Sweeping: This BMP requires that paved surfaces which are adjacent to construction sites be swept by the close of that business day when sediment and other materials are tracked or discharged on to them. Either sweeping by hand or use of Street Sweepers is acceptable. Street sweepers using water while sweeping is preferred in order to minimize dust. Flushing off paved surfaces with water is prohibited. **The contractor will be required to sweep the existing streets adjacent to the site and along the haul route.**

7. Perimeter Control: This BMP requires that a construction site install a perimeter control measure along the edge of the construction site to prevent, or filter the surface runoff leaving the construction site. The type of perimeter control used shall be determined based on site and location. Maintenance and repair of the control measure shall occur as needed, in a timely manner, but not longer than seven (7) days from the date identified. **Silt fence will be installed along the downstream edge of the area to be graded a grade differential (T) may also be used.**

8. Portable Toilets: Contractor shall locate portable toilets in location that is away from construction activities and runoff. **Contractor shall secure portable toilets due to the high wind gusts in this area.**

9. Construction waste management, such as dumpsters, trash collection and disposal shall occur in a timely manner to limit debris from leaving the site.

CONCLUSIONS

The design of drainage facilities for the Apartments is in compliance with the Urban Drainage and Flood Control District's Drainage Criteria Manual and the Town of Erie Storm Drainage Criteria.

REFERENCES

1) Urban Storm Drainage Criteria Manual, Volumes 1, 2, and 3, Urban Drainage and Flood Control District, June 2001, Revised 2008.
2) Standards and Specifications for Design and Construction of Public Improvements, Town of Erie 1874, 2013 Edition, Town of Erie, Colorado.
3) Soil Survey of Weld County, Colorado, U.S. Department of Agriculture, Soil Conservation Service in cooperation with Colorado Agricultural Experiment Station.

Appendix A – Site Maps

Appendix B – Calculations

COMPOSITE "C" AND "I" VALUES

Subdivision: ERIE HIGHLANDS
Location: ERIE, Colorado

Project Name: ERIE HIGHLANDS
Project No. 13-000
Calculated By: DCF
Checked By:
Date: 11/15/2013

Basin	Total Area (acres)	Area S.F. (acres)	Area Grass (acres)	Area Streets (acres)	Area Comm. (acres)	Area Schools (acres)	Soils (acres)	Composite C_2	Composite C_5	Composite C_{100}	Composite I
A	6.42	6.42	0.00	0.00	0.00	0.00	6.42	0.41	0.45	0.59	65.0
B	9.23	0.00	2.80	0.45	0.84	5.14	9.23	0.23	0.30	0.50	40.6
C	11.73	11.73	0.00	0.00	0.00	0.00	11.73	0.22	0.29	0.49	38.0
D	3.63	0.83	0.85	1.95	0.00	0.00	3.63	0.29	0.35	0.52	54.3
E	1.27	1.27	0.00	0.00	0.00	0.00	1.27	0.22	0.29	0.49	38.0
F	3.47	3.47	0.00	0.00	0.00	0.00	3.47	0.22	0.29	0.49	38.0
G	6.22	1.88	3.76	0.58	0.00	0.00	6.22	0.14	0.21	0.43	19.4
H	9.10	1.60	6.52	0.98	0.00	0.00	9.10	0.07	0.16	0.41	15.8
I	1.01	0.00	0.75	0.26	0.00	0.00	1.01	0.14	0.21	0.43	21.9
J	6.26	6.26	0.00	0.00	0.00	0.00	6.26	0.22	0.29	0.49	38.0
K	3.36	3.36	0.00	0.00	0.00	0.00	3.36	0.22	0.29	0.49	38.0
L	3.75	3.75	0.00	0.00	0.00	0.00	3.75	0.22	0.29	0.49	38.0
M	4.87	4.87	0.00	0.00	0.00	0.00	4.87	0.22	0.29	0.49	38.0
N	4.04	2.18	1.28	0.58	0.00	0.00	4.04	0.19	0.26	0.46	32.7
O	1.98	1.98	0.00	0.00	0.00	0.00	1.98	0.22	0.29	0.49	38.0
P	8.74	8.74	0.00	0.00	0.00	0.00	8.74	0.22	0.29	0.49	38.0
Q	2.52	2.52	0.00	0.00	0.00	0.00	2.52	0.22	0.29	0.49	38.0
POND-1	5.04	1.52	1.72	1.80	0.00	0.00	5.04	0.23	0.30	0.50	41.8
Totals Pond 1	**92.64**										**37.2**
*R	6.32	6.32	0.00	0.00	0.00	0.00	6.32	0.30	0.36	0.59	43.0
*S	4.86	4.86	0.00	0.00	0.00	0.00	4.86	0.30	0.36	0.59	43.0
*T	3.78	3.78	0.00	0.00	0.00	0.00	3.78	0.30	0.36	0.59	43.0
*W	1.55	1.55	0.00	0.00	0.00	0.00	1.55	0.30	0.36	0.59	43.0
*POND-2	2.46	1.09	1.36	0.00	0.00	0.00	2.46	0.15	0.25	0.55	19.1
Totals Pond 2	**18.97**										**39.9**
*POND-3	64.72	38.33	26.39	0.00	0.00	3.85	64.72	0.13	0.23	0.54	15.4
*POND-4	26.47	26.47	0.00	0.00	0.00	0.00	26.47	0.30	0.36	0.59	43.0
*POND-5	29.01	29.01	0.00	0.00	0.00	0.00	29.01	0.30	0.36	0.59	43.0
*POND-6	72.23	40.63	0.00	0.00	31.60	0.00	72.23	0.48	0.54	0.67	68.6

* Use C/D Soils

ingle Family Densites		% Imperv.	2,500 sf Home
Pond 1	3.50	38	
Pond 2	4.50	43	
Pond 3	1.00	21	26.39 acres of open space Pond 3 Area
Pond 4	4.50	43	
Pond 5	4.50	43	
Pond 6	7.5	48	

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado
NOTES:
$T_i = (0.395*(1.1 - C_5)*(L)^{0.5})/(S^{0.33})$
T_t=L/60V (Velocity From Fig. RO-1)
T_c Check = 10+L/180

Project Name: ERIE HIGHLANDS
Project No. 13-000
Calculated By: DCF
Checked By:
Date: 11/15/2013

SUB-BASIN DATA			INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)				Tc CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	C_5	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	MIN. T_c (MIN)	T_c (MIN)
A	6.42	0.45	50	2.0	6.6	850	2.0	2.9	4.9	11.5	900.0	15.0	11.5
B	9.23	0.30	50	2.0	8.1	950	2.5	3.2	4.9	13.0	1000.0	15.6	13.0
C	11.73	0.29	50	2.0	8.2	1075	3.0	3.5	5.1	13.3	1125.0	16.3	13.3
D	3.63	0.35	50	2.0	7.6	776	2.0	2.9	4.5	12.0	826.0	14.6	12.0
E	1.27	0.29	50	2.0	8.2	380	0.8	1.8	3.5	11.7	430.0	12.4	11.7
F	3.47	0.29	50	2.0	8.2	1190	2.5	3.2	6.2	14.4	1240.0	16.9	14.4
G	6.22	0.21	50	2.0	9.0	580	3.0	2.7	3.6	12.6	630.0	13.5	12.6
H	9.10	0.16	50	2.0	9.5	650	3.0	2.7	4.0	13.5	700.0	13.9	13.5
I	1.01	0.21	50	2.0	9.0	600	2.0	2.9	3.4	12.4	650.0	13.6	12.4
J	6.26	0.29	50	2.0	8.2	818	3.5	3.7	3.7	11.9	868.0	14.8	11.9
K	3.36	0.29	50	2.0	8.2	760	3.0	3.5	3.6	11.8	810.0	14.5	11.8
L	3.75	0.29	50	2.0	8.2	780	2.5	3.2	4.1	12.2	830.0	14.6	12.2
M	4.87	0.29	50	2.0	8.2	1080	4.0	4.0	4.5	12.7	1130.0	16.3	12.7
N	4.04	0.26	50	2.0	8.5	780	1.2	2.2	5.9	14.4	830.0	14.6	14.4
O	1.98	0.29	50	2.0	8.2	580	1.3	2.3	4.2	12.4	630.0	13.5	12.4
P	8.74	0.29	50	2.0	8.2	1100	2.5	3.2	5.7	13.9	1150.0	16.4	13.9
Q	2.52	0.29	50	2.0	8.2	850	2.8	3.2	4.4	12.6	900.0	15.0	12.6
POND-1	5.04	0.30	50	2.0	8.1	350	2.0	2.9	2.0	10.1	400.0	12.2	10.1
R	6.32	0.36	50	2.0	7.5	1234	4.0	4.0	5.1	12.6	1284.0	17.1	12.6
S	4.86	0.36	50	2.0	7.5	823	3.5	3.7	3.7	11.2	873.0	14.9	11.2
T	3.78	0.36	50	2.0	7.5	1550	4.0	4.0	6.5	13.9	1600.0	18.9	13.9
W	1.55	0.36	50	2.0	7.5	300	0.8	1.8	2.8	10.3	350.0	11.9	10.3
POND-2	2.46	0.25	50	2.0	8.6	180	2.0	2.9	1.0	9.6	230.0	11.3	9.6
POND-3	64.72	0.23	50	2.0	8.8	1900	4.0	4.0	7.9	16.7	1950.0	20.8	16.7
POND-4	26.47	0.36	50	2.0	7.5	1300	4.0	4.0	5.4	12.9	1350.0	17.5	12.9
POND-5	29.01	0.36	50	2.0	7.5	1150	3.5	3.7	5.2	12.7	1200.0	16.7	12.7
POND-6	72.23	0.54	50	2.0	5.7	1800	2.5	3.2	9.4	15.0	1850.0	20.3	15.0

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado
Design Storm 2-Year

Project Name: ERIE HIGHLANDS
Project No. 13-000
Calculated By: DCF
Checked By:
Date: 11/15/2013

INLET TYPE	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				INLET		PIPE			TRAVEL TIME			Remarks
		Area Desig.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Interception (cfs)	Flowby (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
15' Type R	1	A	6.42	0.41	11.5	2.63	2.56	6.7							6.7	0.5	18	495	15.0	0.6	
10' Type R	2	B	9.23	0.23	13.0	2.12	2.45	5.2	12.0	4.76	2.50	11.9			11.9	2.5	18	766	15.0	0.9	
Type C	3	C	11.73	0.22	13.3	2.58	2.43	6.3													
15' Type R	4	D	3.63	0.29	12.0	1.05	2.50	2.6													
10' Type R	5	E	1.27	0.22	11.7	0.28	2.53	0.7													
10' Type R	6	F	3.47	0.22	14.4	0.76	2.36	1.8	12.9	9.43	2.46	23.2			23.2	2.0	30	750	15.0	0.8	Total flow to J1
Type C	7	G	6.22	0.14	12.6	0.87	2.48	2.2	13.7	10.30	2.41	24.8			24.8	1.5	30	656	15.0	0.7	Tc from DP7 to J2
15' Type R	8	H	9.10	0.07	13.5	0.64	2.42	1.5													
5' Type R	9	I	1.01	0.14	12.4	0.14	2.48	0.4	14.4	11.08	2.35	26.0			26.0	1.5	48	614	15.0	0.7	Total flow to J3
15' Type R	10	J	6.26	0.22	11.9	1.38	2.52	3.5							3.5	3.5	18	325	15.0	0.4	
10" Type R	11	K	3.36	0.22	11.8	0.74	2.52	1.9	12.2	2.12	2.49	5.3			5.3	3.5	18	325	15.0	0.4	
10' Type R	12	L	3.75	0.22	12.2	0.83	2.49	2.1													
15' Type R	13	M	4.87	0.22	12.7	1.07	2.47	2.6	12.7	4.01	2.47	9.9			9.9	1.5	24	285	15.0	0.3	Total flow to J4
10' Type R	14	N	4.04	0.19	14.4	0.77	2.36	1.8	14.4	4.78	2.36	11.3			11.3	1.5	24	700	15.0	0.8	
5' Type R	15	O	1.98	0.22	12.4	0.44	2.49	1.1													
10' Type R	16	P	8.74	0.22	13.9	1.92	2.39	4.6													
10' Type R	17	Q	2.52	0.22	12.6	0.55	2.47	1.4	15.2	7.69	2.29	17.6									Total Flow to J5
Pond-1	J6	Pond-1	5.04	0.23	10.1	1.16	2.75	3.2	15.2	19.93	2.29	45.6									Total Flow to J6

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado
Design Storm 2-Year

Project Name: ERIE HIGHLANDS
Project No. 13-000
Calculated By: DCF
Checked By:
Date: 11/15/2013

INLET TYPE	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				INLET		PIPE			TRAVEL TIME			Remarks
		Area Desig.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Interception (cfs)	Flowby (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
15' Type R	18	R	6.32	0.30	12.6	1.90	2.47	4.7							4.7	3.0	18	670	15.0	0.7	
10' Type R	19	S	4.86	0.30	11.2	1.46	2.59	3.8	13.4	3.35	2.43	8.1			8.1	2.0	24	37	15.0	0.0	
10' Type R	20	T	3.78	0.30	13.9	1.13	2.39	2.7													
10' Type R	21	W	1.55	0.30	10.3	0.47	2.72	1.3													
Pond 2	J7	Pond2	2.46	0.15	9.6	0.37	2.90	1.1	13.4	5.32	2.43	12.9			12.9	2.0	36	156	15.0	0.2	Total Flow to J7, Pond 2
Pond 3	J8	Pond3	64.72	0.13	16.7	8.41	2.12	17.8													Total Flow to Pond 3
Pond 4	J9	Pond4	26.47	0.30	12.9	7.94	2.46	19.5													Total Flow to Pond 4
Pond 5	J10	Pond5	29.01	0.30	12.7	8.70	2.47	21.5													Total Flow to Pond 5
Pond 6	J11	Pond6	72.23	0.48	15.0	34.67	2.30	79.7													Total Flow to Pond 6

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado
Design Storm 5-Year

Project Name: ERIE HIGHLANDS
Project No. 13-000
Calculated By: DCF
Checked By:
Date: 11/15/2013

INLET TYPE	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				INLET		PIPE			TRAVEL TIME			Remarks
		Area Desig.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Interception (cfs)	Flowby (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
15' Type R	1	A	6.42	0.45	11.5	2.89	3.66	10.6							10.6	0.5	18	495	15.0	0.6	
10' Type R	2	B	9.23	0.30	13.0	2.77	3.41	9.4	12.0	5.66	3.60	20.4			20.4	2.5	18	766	15.0	0.9	
Type C	3	C	11.73	0.29	13.3	3.40	3.44	11.7													
15' Type R	4	D	3.63	0.35	12.0	1.27	3.60	4.6													
10' Type R	5	E	1.27	0.29	11.7	0.37	3.63	1.3													
10' Type R	6	F	3.47	0.29	14.4	1.01	3.41	3.4	12.9	11.70	3.45	40.4			40.4	2.0	30	750	15.0	0.8	Total flow to J1
Type C	7	G	6.22	0.21	12.6	1.31	3.51	4.6	13.7	13.01	3.46	45.1			45.1	1.5	30	656	15.0	0.7	Tc from DP7 to J2
15' Type R	8	H	9.10	0.16	13.5	1.46	3.46	5.0													
5' Type R	9	I	1.01	0.21	12.4	0.21	3.52	0.7	14.4	14.68	3.38	49.7			49.7	1.5	48	614	15.0	0.7	Total flow to J3
15' Type R	10	J	6.26	0.29	11.9	1.82	3.62	6.6							6.6	3.5	18	325	15.0	0.4	
10" Type R	11	K	3.36	0.29	11.8	0.97	3.62	3.5	11.8	2.79	3.62	10.1			10.1	3.5	18	325	15.0	0.4	
10' Type R	12	L	3.75	0.29	12.2	1.09	3.56	3.9													
15' Type R	13	M	4.87	0.29	12.7	1.41	3.49	4.9	12.7	5.29	3.49	18.4			18.4	1.5	24	285	15.0	0.3	Total flow to J4
10' Type R	14	N	4.04	0.26	14.4	1.05	3.41	3.6	14.4	6.34	3.41	21.6			21.6	1.5	24	700	15.0	0.8	
5' Type R	15	O	1.98	0.29	12.4	0.57	3.54	2.0													
10' Type R	16	P	8.74	0.29	13.9	2.53	3.49	8.8	15.2	9.45	3.20	30.2			30.2						
10' Type R	17	Q	2.52	0.29	12.6	0.73	3.49	2.5	13.9	10.18	3.49	35.5									Total Flow to J5
Pond-1	J6	Pond-1	5.04	0.30	10.1	1.51	3.80	5.7	15.1	26.37	3.21	84.6									Total Flow to J6

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado
Design Storm 5-Year

Project Name: ERIE HIGHLANDS
Project No. 13-000
Calculated By: DCF
Checked By:
Date: 11/15/2013

INLET TYPE	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				INLET		PIPE			TRAVEL TIME			Remarks
		Area Desig.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Interception (cfs)	Flowby (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
15' Type R	18	R	6.32	0.36	12.6	2.28	3.49	7.9							7.9	3.0	18	670	15.0	0.7	
10' Type R	19	S	4.86	0.36	11.2	1.75	3.69	6.5	13.4	4.02	3.44	13.8			13.8	2.0	24	37	15.0	0.0	
10' Type R	20	T	3.78	0.36	13.9	1.36	3.49	4.8													
10' Type R	21	W	1.55	0.36	10.3	0.56	3.78	2.1													
Pond 2	J7	Pond2	2.46	0.25	9.6	0.62	4.04	2.5	13.4	6.56	3.44	22.5			22.5	2.0	36	156	15.0	0.2	Total Flow to J7, Pond 2
Pond 3	J8	Pond3	64.72	0.23	16.7	14.89	2.99	44.5													Total Flow to Pond 3
Pond 4	J9	Pond4	26.47	0.36	12.9	9.53	3.45	32.9													Total Flow to Pond 4
Pond 5	J10	Pond5	29.01	0.36	12.7	10.44	3.49	36.4													Total Flow to Pond 5
Pond 6	J11	Pond6	72.23	0.54	15.0	39.00	3.21	125.2													Total Flow to Pond 6

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado
Design Storm 100-Year

Project Name: ERIE HIGHLANDS
Project No. 13-000
Calculated By: DCF
Checked By:
Date: 11/15/2013

INLET TYPE	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				INLET		PIPE			TRAVEL TIME			Remarks
		Area Desig.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Interception (cfs)	Flowby (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
15' Type R	1	A	6.42	0.59	11.5	3.79	6.88	26.1					26.1		26.1	0.5	18	495	15.0	0.6	
10' Type R	2	B	9.23	0.50	13.0	4.62	6.50	30.0	12.0	8.40	6.70	56.3	20	10.0	46.1	2.5	24	766	15.0	0.9	FB=10.0 to DP4
Type C	3	C	11.73	0.49	13.3	5.75	6.43	36.9					36.9								30" rcp stub from DP-4
15' Type R	4	D	3.63	0.52	12.0	1.89	6.70	12.6				22.6	20.0	2.6							Includs 10.0 FB from DP2
10' Type R	5	E	1.27	0.49	11.7	0.62	6.79	4.2					4.2								FB=2.6 to DP6
10' Type R	6	F	3.47	0.49	14.4	1.70	6.22	10.6	14.2	18.36	6.24	114.6	13.2	0.0	114.6	2.0	30	750	15.0	0.8	Total flow to J1 - all flow intercepted
Type C	7	G	6.22	0.43	12.6	2.67	6.60	17.7	15.0	21.04	6.16	129.6	17.7		129.6	1.5	30	656	15.0	0.7	Tc from DP7 to J2
15' Type R	8	H	9.10	0.41	13.5	3.73	6.38	23.8				30.4	29.8	0.6							Add 6.6 flowby from DP-13
5' Type R	9	I	1.01	0.43	12.4	0.43	6.62	2.9	15.7	25.20	5.89	148.5	3.5	0.0	148.5	1.5	48	614	15.0	0.7	also 0.6 cfs crown overflow to DP9 Total flow to J3 - all flow intercepted
15' Type R	10	J	6.26	0.49	11.9	3.07	6.76	20.7					17.2	3.5	17.2	3.5	18	325	15.0	0.4	FB to DP 11=3.5
10" Type R	11	K	3.36	0.49	11.8	1.65	6.76	11.1	12.2	4.71	6.66	31.4	14.7	0.8	31.9	3.5	18	325	15.0	0.4	FB to DP 12=0.8
10' Type R	12	L	3.75	0.49	12.2	1.84	6.66	12.2					13.0	0.00	44.90						
15' Type R	13	M	4.87	0.49	12.7	2.39	6.58	15.7	12.7	8.94	6.58	58.8	9.1	6.60	52.2	1.5	24	285	15.0	0.3	FB to Dp8=6.6
10' Type R	14	N	4.04	0.46	14.4	1.86	6.22	11.6	14.4	10.80	6.22	67.2	11.6	0	60.5	1.5	24	700	15.0	0.8	
5' Type R	15	O	1.98	0.49	12.4	0.97	6.64	6.4					9.3	0	9.3						
10' Type R	16	P	8.74	0.49	13.9	4.28	6.28	26.9	15.2	16.05	6.11	98.1	24.0	2.9	33.3						FB to Dp15=2.9Totoal flow=98.1-6.6=91.5
10' Type R	17	Q	2.52	0.49	12.6	1.23	6.58	8.1	15.2	17.28	6.11	105.7			99.1						Total Flow to J5(FB=6.6at DP13)
Pond-1	J6	Pond-1	5.04	0.50	10.1	2.52	7.20	18.1	16.4	45.00	5.73	257.8			257.8						Total Flow to J6

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado
Design Storm 100-Year

Project Name: ERIE HIGHLANDS
Project No. 13-000
Calculated By: DCF
Checked By:
Date: 11/15/2013

INLET TYPE	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				INLET		PIPE			TRAVEL TIME			Remarks
		Area Desig.	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Interception (cfs)	Flowby (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
15' Type R	18	R	6.32	0.59	12.6	3.73	6.58	24.5					17.5	7.0	17.5	3.0	24	670	15.0	0.7	
10' Type R	19	S	4.86	0.59	11.2	2.87	6.97	20.0	13.4	6.60	6.43	42.4	22	5	37.4	2.0	24	37	15.0	0.0	FB=7.0 to DP19 5.0FB to DP20
10' Type R	20	T	3.78	0.59	13.9	2.23	6.28	14.0	13.9	8.83	6.28	55.39	19	0	55.4		30				all flow intercepted
10' Type R	21	W	1.55	0.59	10.3	0.91	7.16	6.5					6.5	0.0							
Pond 2	J7	Pond2	2.46	0.55	9.6	1.35	7.64	10.3	13.9	11.09	6.28	69.6			69.6	2.5	36	238	15.0	0.3	Total Flow to J7. Pond 2
Pond 3	J8	Pond3	64.72	0.54	16.7	34.95	5.66	197.8													Total Flow to Pond 3
Pond 4	J9	Pond4	26.47	0.59	12.9	15.62	6.54	102.1													Total Flow to Pond 4
Pond 5	J10	Pond5	29.01	0.59	12.7	17.12	6.58	112.6													Total Flow to Pond 5
Pond 6	J11	Pond6	72.23	0.67	15.0	48.39	6.15	297.6													Total Flow to Pond 6

SUMMARY RUNOFF TABLE

DESIGN POINT	CONTRIBUTING BASIN	CONTRIBUTING AREA (ACRES)	5-YR Q (CFS)	100-YR Q (CFS)	ACCUMULATIONS 5-YR Q (CFS)	ACCUMULATIONS 100-YR Q (CFS)
1	A	6.42	10.57	26.06		
2	B	9.23	9.44	30.00	20.37	56.30
3	C	11.73	11.69	36.93		
4	D	3.63	4.57	12.65		
5	E	1.27	1.34	4.23		
6	F	3.47	3.43	10.58	40.36	114.57
7	G	6.22	4.58	17.65	45.07	129.58
8	H	9.10	5.03	23.79		
9	I	1.01	0.75	2.88	49.67	148.46
10	J	6.26	6.57	20.74		
11	K	3.36	3.53	11.13	10.10	31.39
12	L	3.75	3.87	12.24		
13	M	4.87	4.92	15.70	18.44	58.81
14	N	4.04	3.59	11.56	21.6	67.15
15	O	1.98	2.03	6.44		
16	P	8.74	8.85	26.87	30.2	91.5
17	Q	2.52	2.55	8.12	35.5	99.1
J6 Pond 1	Pond 1	5.04	5.75	18.14	84.65	257.83
18	R	6.32	7.93	24.54		
19	S	4.86	6.46	19.99	13.83	42.38
20	T	3.78	4.75	13.99		
21	W	1.55	2.11	6.55		
J7 Pond 2	Pond 2	18.97	2.48	10.34	22.54	69.61
J8 Pond 3	Pond 3	64.72	44.51	197.85		
J9 Pond 4	Pond 4	26.47	32.86	102.14		
J10 Pond 5	Pond 5	29.01	36.41	112.62		
J11 Pond 6	Pond 6	72.23	125.20	297.62		

Pond Volume 1
(FAA Method)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado

Project Name: ERIE HIGHLANDS
Project No. 13-000
By: DCF
Checked By:
Date: 6/26/2013

Volume=1/3 x Depth x (A+B+(A*B)^0.5)
A - Upper Surface
B - Lower Surface

Pond-1 Volume

Elevation	Surface Area (square feet)	A+B+(A*B)^0.5	1/3	Depth (feet)	Volume (cubic feet)	Cum. Volume (cubic feet)	Cum.Volume (acre-feet)
5099.80	50	0	0.00	0.00	0		
5100.00	926	1191	0.07	0.00	79	79	0.002
5101.00	7,009	10483	0.33	1.00	3,494	3,574	0.082
5102.00	15,932	33508	0.33	2.00	11,169	14,743	0.338
5103.00	26,748	63323	0.33	3.00	21,108	35,851	0.823
5104.00	38,130	96814	0.33	4.00	32,271	68,122	1.564
5105.00	47,573	128294	0.33	5.00	42,765	110,887	2.546
5106.00	53,127	150973	0.33	6.00	50,324	161,211	3.701
5107.00	58,101	166786	0.33	7.00	55,595	216,807	4.977
5108.00	63,145	181817	0.33	8.00	60,606	277,412	6.369
							100 yr WSEL

Water Quality Volume: 1.55 acre-feet
Water Quality Surface Elevation: 5103.98

EURV Volume 3.67 AF
EURV Surface Elevation: 5105.97
Q100(allowable)=78.74 cfs

100-YR Volume: 6.13 acre feet
100-YR Surface Elevation: 5107.83

MICRO POOL 1- Volume
(FAA Method)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado

Project Name: ERIE HIGHLANDS
Project No. 13-000
By: SAP
Checked By: SAP
Date: 6/24/2013

Volume=1/3 x Depth x (A+B+(A*B)^0.5)
A - Upper Surface
B - Lower Surface

Micro Pool Volume

Elevation	Surface Area (square feet)	A+B+(A*B)^0.5	1/3	Depth (feet)	Volume (cubic feet)	Cum. Volume (cubic feet)	Cum.Volume (acre-feet)
5097.50	1	1	0.00	0.00	0		
5098.00	926	957	0.17	0.70	160	160	0.004
5099.00	926	2778	0.33	1.70	926	1086	0.025
5100.00	926	2778	0.33	2.50	926	2012	0.046

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: _____

Basin ID: _____

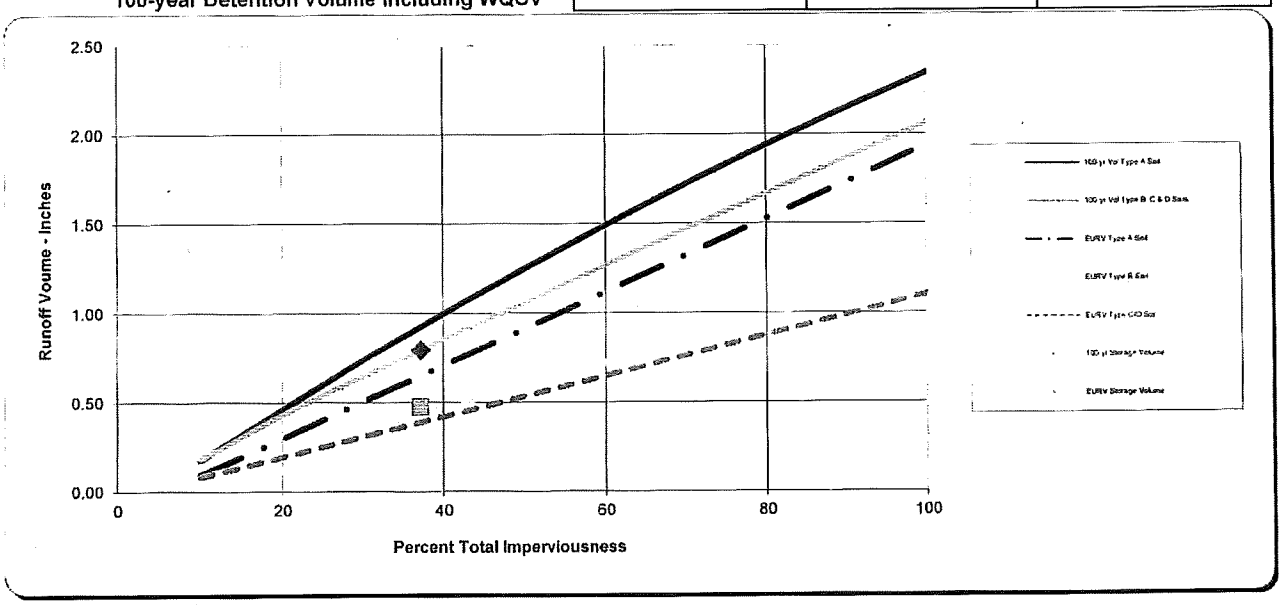
* User input data shown in blue.

Area of Watershed (acres)	92.64	
Subwatershed Imperviousness	37.2%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	37.2%	

Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B	100.0%	92.6
Type C or D		0.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient--α
Initial--f_i	Final--f_o	
4.5	0.6	0.0018

	Detention Volumes [2,5]		Maximum Allowable Release Rate, cfs[3]
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume[4]	0.47	3.67	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV [5]	0.79	6.13	78.74



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: _____

Basin ID: _____

WQCV Design Volume (Input):

Catchment Imperviousness, I_a = 37.2 percent

Catchment Area, A = 92.64 acres

Depth at WQCV outlet above lowest perforation, H = 4 feet

Vertical distance between rows, h = 4.00 inches

Number of rows, NL = 12

Orifice discharge coefficient, C_o = 0.60

Slope of Basin Trickle Channel, S = 0.005 ft / ft

Diameter of holes, D = 1.924 in

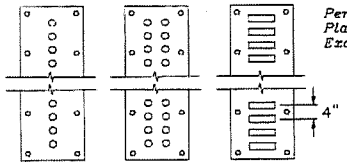
Number of holes per row, N = 1

OR

Height of slot, H = _____ in

Width of slot, W = _____ in

Time to Drain the Pond = 70 hours



Perforated Plate Examples

Outlet Design Information (Output):

Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') 0.475 watershed inches

N/A

Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') 3,667 acre-feet

Outlet area per row, Ao = 2.91 square inches

Total opening area at each row based on user-input above, Ao = 2.91 square inches

Total opening area at each row based on user-input above, Ao = 0.020 square feet

Calculation of Collection Capacity:

Stage ft (input)	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	Row 19	Row 20	Row 21	Row 22	Row 23	Row 23	Σ Flow
	Central Elevations of Rows of Holes in feet																								
	5100.00	5100.33	5100.67	5101.00	5101.33	5101.67	5102.00	5102.33	5102.67	5103.00	5103.33	5103.67													
	Collection Capacity for Each Row of Holes in cfs																								
5100.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000													0.00
5100.30	0.0533	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000													0.05
5100.60	0.0753	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000													0.13
5100.90	0.0922	0.0734	0.0468	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000													0.21
5101.20	0.1065	0.0907	0.0708	0.0435	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000													0.31
5101.50	0.1191	0.1052	0.0886	0.0688	0.0401	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000													0.42
5101.80	0.1304	0.1179	0.1034	0.0870	0.0667	0.0351	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000													0.54
5102.10	0.1409	0.1294	0.1163	0.1020	0.0853	0.0638	0.0307	0.0000	0.0000	0.0000	0.0000	0.0000													0.67
5102.40	0.1506	0.1399	0.1279	0.1150	0.1006	0.0831	0.0615	0.0257	0.0000	0.0000	0.0000	0.0000													0.80
5102.70	0.1598	0.1497	0.1385	0.1268	0.1138	0.0987	0.0813	0.0591	0.0168	0.0000	0.0000	0.0000													0.94
5103.00	0.1684	0.1589	0.1484	0.1375	0.1256	0.1121	0.0972	0.0796	0.0559	0.0000	0.0000	0.0000													1.08
5103.30	0.1766	0.1676	0.1577	0.1475	0.1365	0.1241	0.1109	0.0958	0.0772	0.0533	0.0000	0.0000													1.25
5103.60	0.1845	0.1758	0.1664	0.1568	0.1465	0.1351	0.1230	0.1096	0.0938	0.0753	0.0505	0.0000													1.42
5103.90	0.1920	0.1837	0.1747	0.1656	0.1559	0.1452	0.1340	0.1218	0.1078	0.0922	0.0734	0.0466													1.59
5104.20	0.1993	0.1913	0.1827	0.1739	0.1647	0.1547	0.1442	0.1330	0.1203	0.1065	0.0907	0.0708													1.73
5104.50	0.2063	0.1985	0.1903	0.1819	0.1731	0.1636	0.1537	0.1432	0.1315	0.1191	0.1052	0.0886													1.85
5104.80	0.2130	0.2056	0.1976	0.1895	0.1811	0.1720	0.1627	0.1528	0.1419	0.1304	0.1179	0.1034													1.97
5105.10	0.2196	0.2124	0.2046	0.1969	0.1888	0.1801	0.1712	0.1618	0.1516	0.1409	0.1294	0.1163													2.07
5105.40	0.2259	0.2189	0.2115	0.2040	0.1962	0.1878	0.1793	0.1704	0.1607	0.1506	0.1398	0.1279													2.17
5105.70	0.2321	0.2253	0.2181	0.2108	0.2033	0.1952	0.1870	0.1785	0.1692	0.1598	0.1497	0.1385													2.27
5106.00	0.2382	0.2315	0.2245	0.2174	0.2101	0.2023	0.1945	0.1863	0.1774	0.1684	0.1589	0.1484													2.36
5106.30	0.2440	0.2376	0.2307	0.2238	0.2168	0.2092	0.2016	0.1937	0.1852	0.1766	0.1676	0.1577													2.44
5106.60	0.2498	0.2435	0.2368	0.2301	0.2232	0.2159	0.2085	0.2009	0.1928	0.1845	0.1758	0.1664													2.53
5106.90	0.2554	0.2492	0.2427	0.2362	0.2295	0.2224	0.2152	0.2079	0.2000	0.1920	0.1837	0.1747													2.61
5107.20	0.2609	0.2548	0.2485	0.2421	0.2356	0.2286	0.2217	0.2146	0.2069	0.1993	0.1913	0.1827													2.69
5107.50	0.2663	0.2604	0.2541	0.2479	0.2415	0.2348	0.2280	0.2211	0.2137	0.2053	0.1985	0.1903													2.76
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
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	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
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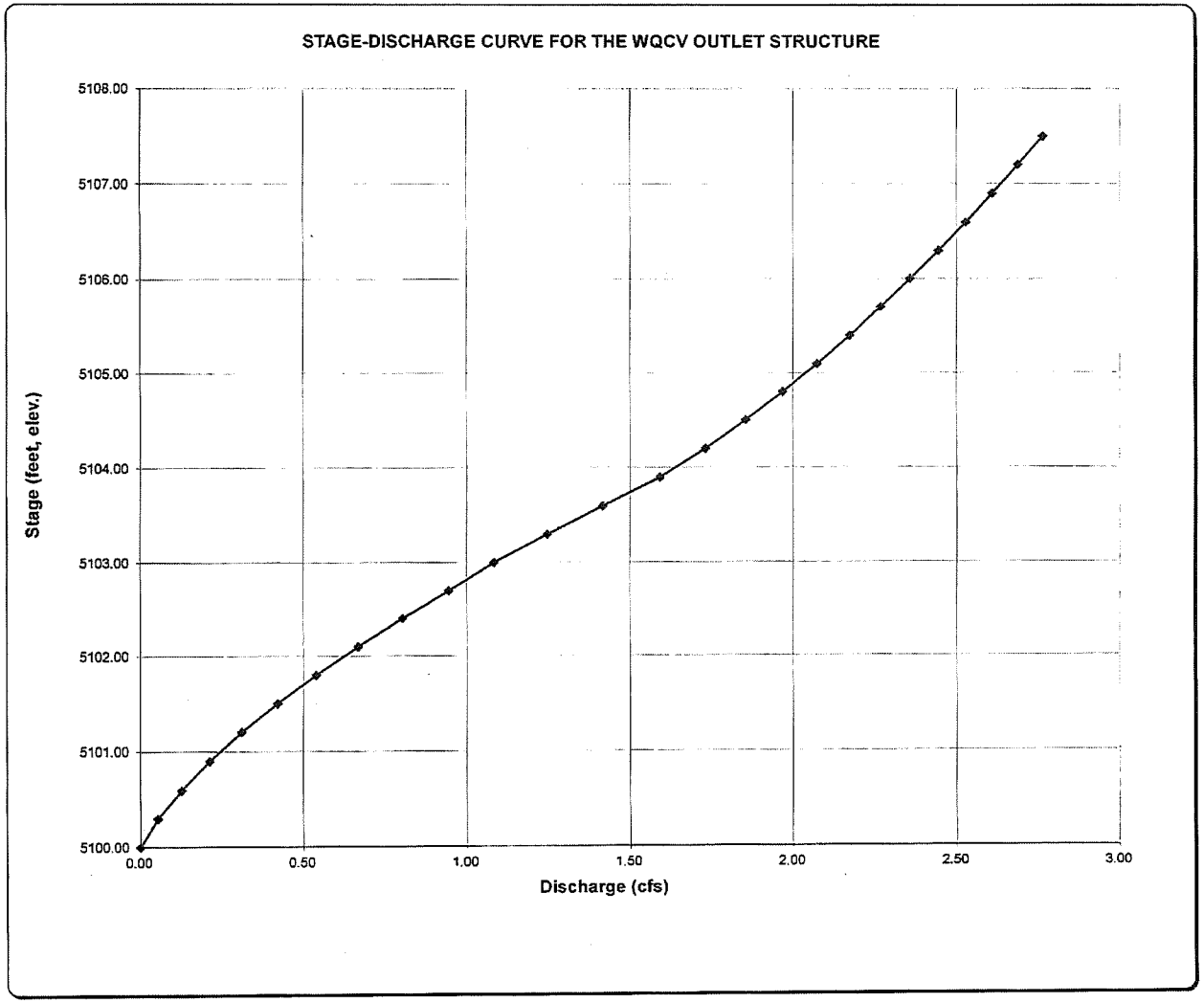
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET



Design Procedure Form: Extended Detention Basin (EDB)

Designer:
Company:
Date: October 9, 2013
Project:
Location:

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 37.2 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.372
C) Contributing Watershed Area	Area = 92.640 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = _____ in
E) Design Concept (Select EURV when also designing for flood control)	Choose One ◉ Water Quality Capture Volume (WQCV) ○ Excess Urban Runoff Volume (EURV)
F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time ($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2)$)	V_{DESIGN}= 1.596 ac-ft
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume ($V_{WQCV\ OTHER} = (d_6*(V_{DESIGN}/0.43))$)	$V_{DESIGN\ OTHER}$= _____ ac-ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{DESIGN\ USER}$= _____ ac-ft
I) Predominant Watershed NRCS Soil Group	Choose One ○ A ◉ B ○ C / D
2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)	L : W = 2.0 : 1
3. Basin Side Slopes A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)	Z = 4.00 ft / ft
4. Inlet A) Describe means of providing energy dissipation at concentrated inflow locations:	

Project: Town of Erie Job #: B-000

Client: Oakwood By: _____ Chk. By: _____ Date: 10.11.13

Subject: Pond 1 Orifice / Spillway Sheet #: 1 of 1

Engineering Partners, Inc.
Right. On Time.
Phone 303-703-4444 Fax 303-703-4530
www.eng-partners.com

Pond # 1 Emergency Spill Way $Q = 3.367 L H^{1.5}$

$Q = 258$ cfs

$H = 1.1'$

$258 = 3.367 (L)(1.1)^{1.5}$ $\underline{L = 66.4'}$ use 70'

Orifice Plate Calculation.

$Q = A \; 0.65 \sqrt{2gh}$

$Q = 78.74$ cfs

$H = 10.63$

$78.74 = A \; (0.65) \sqrt{2(32.2)(10.63)}$

$\frac{78.74}{17.00} = A$ $\pi r^2 = 4.63$

$4.63 = A$ $r^2 = 4.63/\pi$

$r^2 = 1.47$

$r = 1.21'$

Use ≈ $\underline{2.42'}$ Diam Orifice Plate

Trickle Channel Design 3% 100 year.

3' W x 6' Deep @ 1% = Cap = 8.92 cfs ok

Project: Eve Highlands.

Job #:

Client: By: Chk. By:

Date:

Subject: WQCY.

Sheet #: of

Engineering Partners, Inc.
Right. On Time.
Phone 303-703-4444 Fax 303-703-4530
www.eng-partners.com

Pond # 1.

Required = 1.55 ac. ft.

Forebay / Micro Pool Required Size = 0.04 ac. ft.

Two Forebays : 1st @ 60% = 1046 c.F.

2nd @ 40% = 784 c.F.

Pond Volume-2
(FAA Method)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado

Project Name: ERIE HIGHLANDS
Project No. 13-000
By: DCF
Checked By: DCF
Date: 6/24/2013

Volume=1/3 x Depth x (A+B+(A*B)^0.5)
A - Upper Surface
B - Lower Surface

Pond-2 Volume

Elevation	Surface Area (square feet)	A+B+(A*B)^0.5	1/3	Depth (feet)	Volume (cubic feet)	Cum. Volume (cubic feet)	Cum.Volume (acre-feet)
5104.50	150	0	0.00	0.00	0		
5105.00	400	795	0.17	5.00	132	132	0.003
5106.00	4,132	5818	0.33	6.00	1,939	2,072	0.048
5107.00	10,705	21488	0.33	7.00	7,163	9,234	0.212
5108.00	17,213	41492	0.33	8.00	13,831	23,065	0.530
5109.00	21,372	57765	0.33	9.00	19,255	42,320	0.972
5110.00	25,541	70277	0.33	10.00	23,426	65,746	1.509
							100 yr WSEL

Water Quality Volume: 0.341 acre-feet
Water Quality Surface Elevation: 5107.41

100-YR Volume: 1.35 acre feet
100-YR Surface Elevation: 5109.70

EURV Volume 0.79 AF
EURV Surface Elevation: 5108.59
Q100(allowable)=16.98 cfs

MICRO POOL POND 2- Volume
(FAA Method)

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado

Project Name: ERIE HIGHLANDS
Project No. 13-000
By: SAP
Checked By: SAP
Date: 6/24/2013

Volume=1/3 x Depth x (A+B+(A*B)^0.5)
A - Upper Surface
B - Lower Surface

Micro Pool Volume

Elevation	Surface Area (square feet)	A+B+(A*B)^0.5	1/3	Depth (feet)	Volume (cubic feet)	Cum. Volume (cubic feet)	Cum.Volume (acre-feet)
5102.00	1	1	0.00	0.00	0		
5103.00	230	246	0.33	0.70	82	82	0.002
5104.00	230	690	0.33	1.70	230	312	0.007
5104.50	230	690	0.17	2.50	115	427	0.010

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project:
Basin ID:

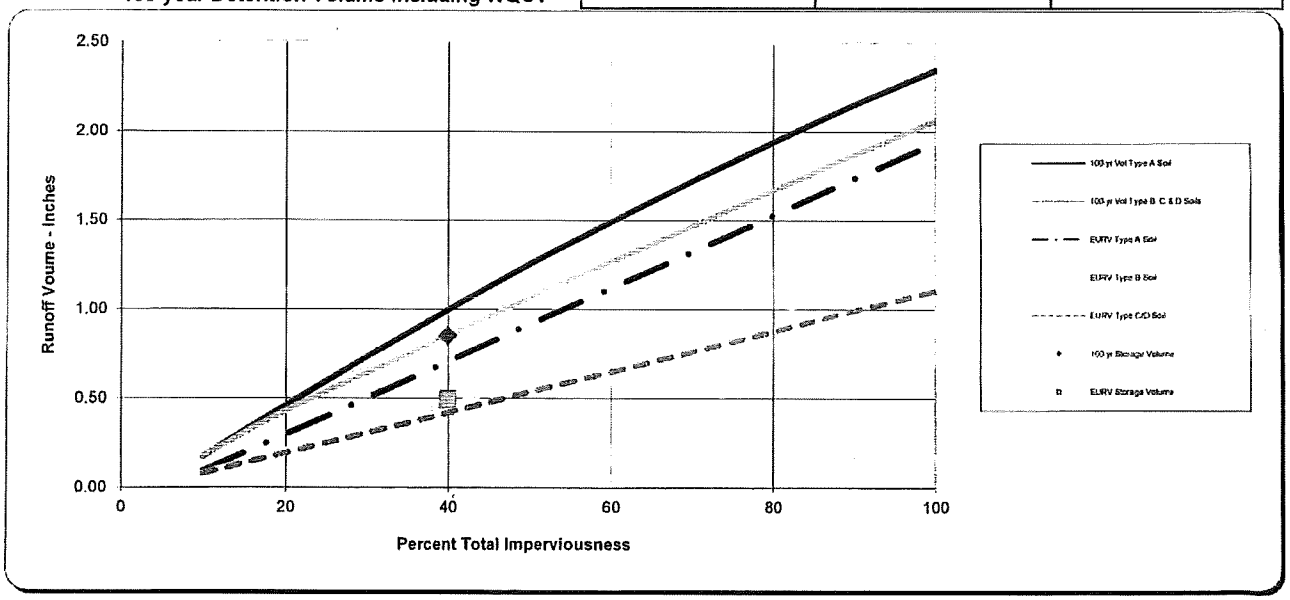
* User input data shown in blue.

Area of Watershed (acres)	18.97	
Subwatershed Imperviousness	39.9%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	39.9%	

Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B	70.0%	13.3
Type C or D	30.0%	5.7

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient--α
Initial--f_i	Final--f_o	
4.05	0.6	0.0018

	Detention Volumes [2,5]		Maximum Allowable Release Rate, cfs[3]
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume[4]	0.50	0.79	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV [5]	0.85	1.35	16.98



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project:

Basin ID:

WQCV Design Volume (Input):

Catchment Imperviousness, I_a = 40.0 percent

Catchment Area, A = 18.97 acres

Depth at WQCV outlet above lowest perforation, H = 3 feet

Vertical distance between rows, h = 4.00 inches

Number of rows, NL = 9

Orifice discharge coefficient, C_o = 0.60

Slope of Basin Trickle Channel, S = 0.005 ft / ft

Diameter of holes, D = 1.067 in

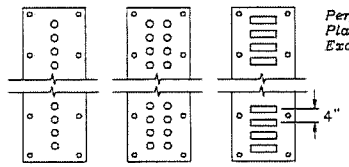
Number of holes per row, N = 1

OR

Height of slot, H = in

Width of slot, W = in

Time to Drain the Pond = 72 hours



Perforated Plate Examples

Outlet Design Information (Output):

Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') 0.498 watershed inches

N/A

Excess Urban Runoff Volume (From 'Full-Spectrum Sheet') 0.787 acre-feet

Outlet area per row, Ao = 0.89 square inches

Total opening area at each row based on user-input above, Ao = 0.89 square inches

Total opening area at each row based on user-input above, Ao = 0.006 square feet

Calculation of Collection Capacity:

Central Elevations of Rows of Holes in feet

Stage ft (Input)	Row 1 5104.50	Row 2 5104.83	Row 3 5105.17	Row 4 5105.50	Row 5 5105.83	Row 6 5106.17	Row 7 5106.50	Row 8 5105.83	Row 9 5107.17	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	Row 19	Row 20	Row 21	Row 22	Row 23	Row 23	Σ Flow
	Collection Capacity for Each Row of Holes in cfs																								
5104.50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000																0.00
5104.80	0.0164	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000																0.02
5105.10	0.0231	0.0155	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000																0.04
5105.40	0.0284	0.0226	0.0143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000																0.07
5105.70	0.0327	0.0279	0.0218	0.0134	0.0000	0.0000	0.0000	0.0000	0.0000																0.10
5106.00	0.0366	0.0323	0.0272	0.0211	0.0123	0.0000	0.0000	0.0000	0.0000																0.13
5106.30	0.0401	0.0362	0.0318	0.0267	0.0205	0.0108	0.0000	0.0000	0.0000																0.17
5106.60	0.0433	0.0398	0.0357	0.0313	0.0252	0.0196	0.0095	0.0000	0.0000																0.21
5106.90	0.0463	0.0430	0.0393	0.0354	0.0309	0.0255	0.0189	0.0079	0.0000																0.25
5107.20	0.0491	0.0460	0.0426	0.0390	0.0350	0.0303	0.0250	0.0182	0.0052																0.29
5107.50	0.0518	0.0488	0.0456	0.0423	0.0386	0.0345	0.0299	0.0245	0.0172																0.33
5107.80	0.0543	0.0515	0.0485	0.0453	0.0419	0.0382	0.0341	0.0294	0.0237																0.37
5108.10	0.0567	0.0540	0.0512	0.0482	0.0450	0.0415	0.0378	0.0337	0.0288																0.40
5108.40	0.0590	0.0565	0.0537	0.0509	0.0479	0.0446	0.0412	0.0374	0.0331																0.42
5108.70	0.0612	0.0588	0.0561	0.0535	0.0506	0.0475	0.0443	0.0409	0.0370																0.45
5109.00	0.0634	0.0610	0.0585	0.0559	0.0532	0.0503	0.0473	0.0440	0.0404																0.47
5109.30	0.0655	0.0632	0.0607	0.0583	0.0557	0.0529	0.0500	0.0470	0.0436																0.50
5109.60	0.0675	0.0653	0.0629	0.0605	0.0580	0.0553	0.0526	0.0497	0.0466																0.52
5109.90	0.0694	0.0673	0.0650	0.0627	0.0603	0.0577	0.0551	0.0524	0.0494																0.54
5110.20	0.0713	0.0693	0.0670	0.0648	0.0625	0.0600	0.0575	0.0549	0.0520																0.56
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
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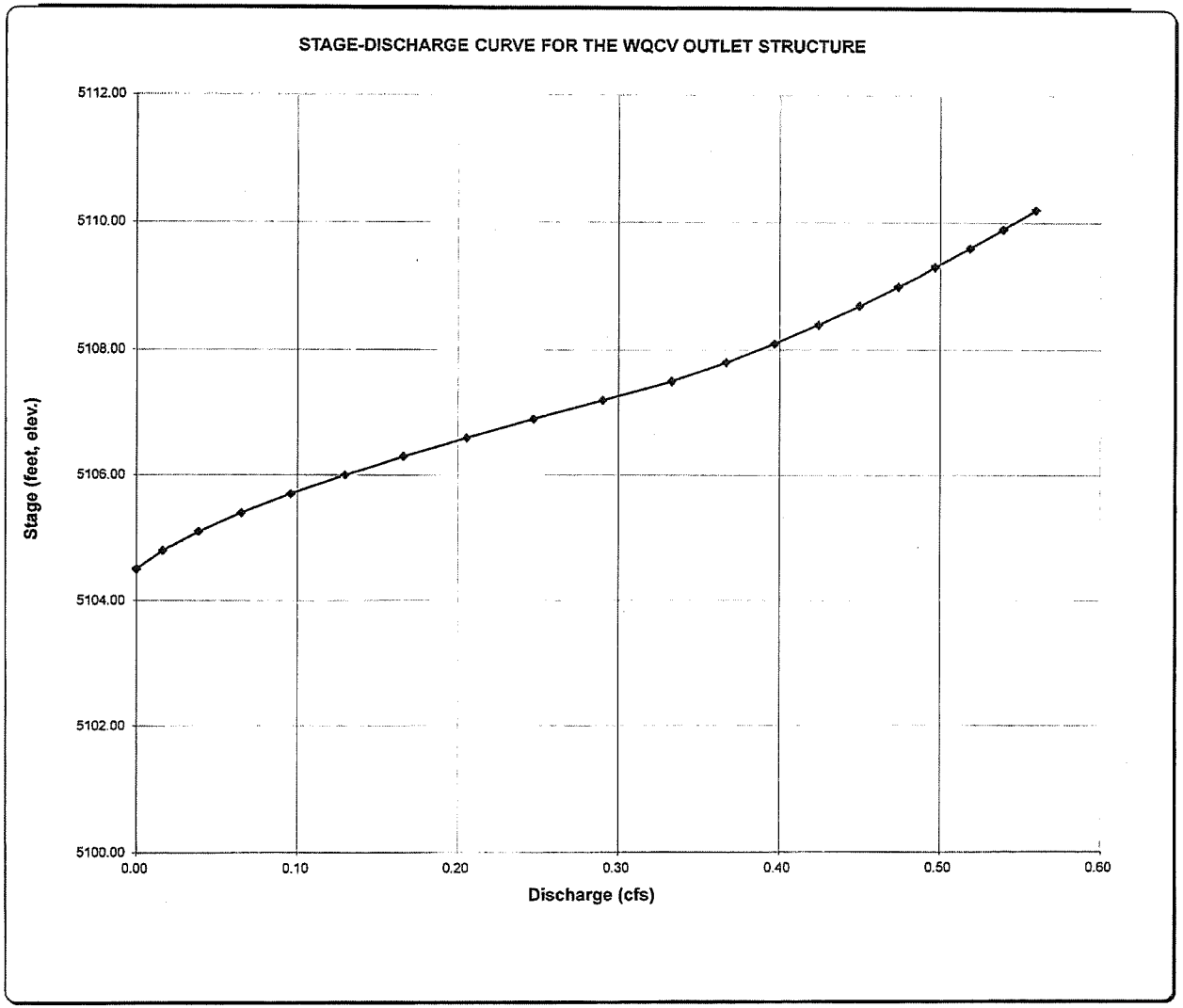
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A
	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																#N/A

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: _____

Basin ID: _____



DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: _____

Basin ID: _____

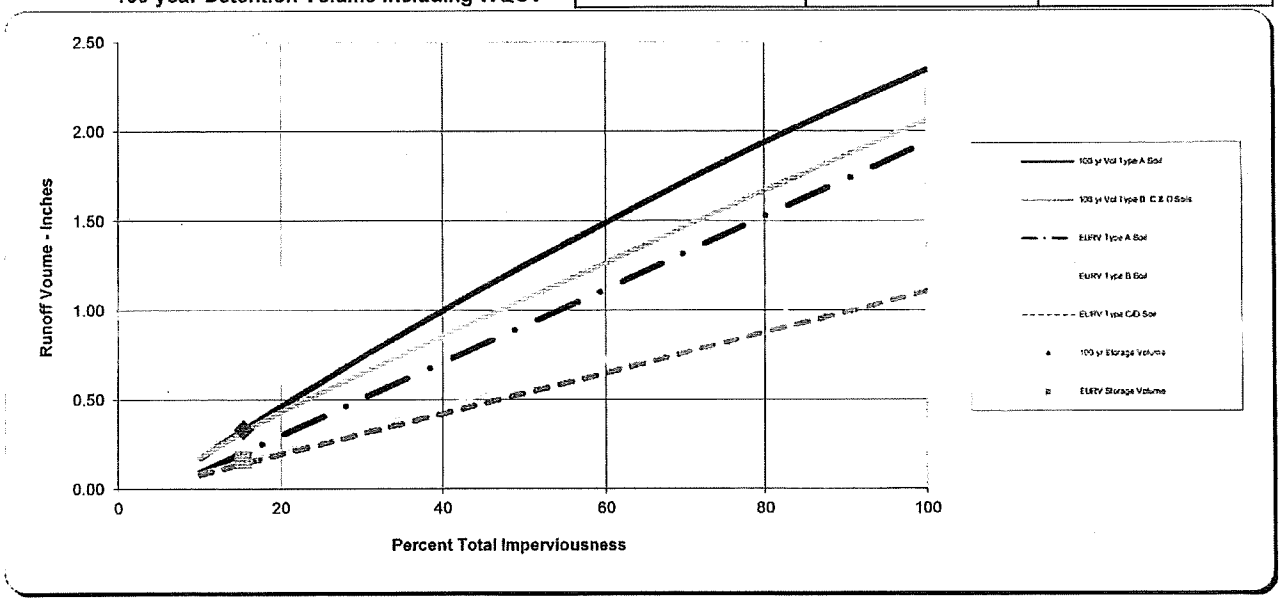
* User input data shown in blue.

Area of Watershed (acres)	64.72	
Subwatershed Imperviousness	15.4%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	15.4%	

Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B	41.0%	26.5
Type C or D	59.0%	38.2

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient--α
Initial--f_i	Final--f_o	
3.615	0.5	0.0018

	Detention Volumes [2,5]		Maximum Allowable Release Rate, cfs[3]
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume[4]	0.16	0.86	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV [5]	0.33	1.80	60.74



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project:
Basin ID:

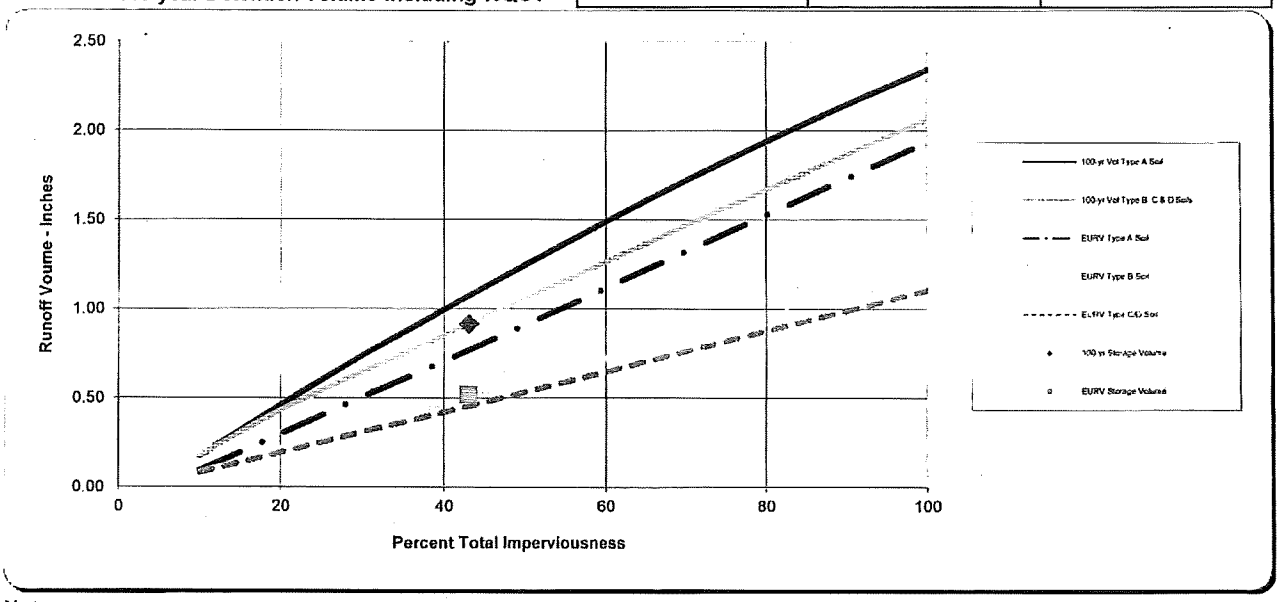
* User input data shown in blue.

Area of Watershed (acres)	26.47	
Subwatershed Imperviousness	43.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	43.0%	

Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B	30.0%	7.9
Type C or D	70.0%	18.5

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient--α
Initial--f_i	Final--f_o	
3.45	0.5	0.0018

	Detention Volumes [2,5]		Maximum Allowable Release Rate, cfs[3]
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume[4]	0.52	1.14	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV [5]	0.92	2.02	25.28



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

Design Procedure Form: Extended Detention Basin (EDB)

Designer: _____
Company: _____
Date: October 9, 2013
Project: _____
Location: _____

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 39.9 %
B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$)	i = 0.399
C) Contributing Watershed Area	Area = 18.970 ac
D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = _____ in
E) Design Concept (Select EURV when also designing for flood control)	Choose One ◉ Water Quality Capture Volume (WQCV) ○ Excess Urban Runoff Volume (EURV)
F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time ($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2$)	V_{DESIGN}= 0.341 ac-ft
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume ($V_{WQCV\ OTHER} = (d_6*(V_{DESIGN}/0.43))$)	$V_{DESIGN\ OTHER}$= _____ ac-ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{DESIGN\ USER}$= _____ ac-ft
I) Predominant Watershed NRCS Soil Group	Choose One ○ A ◉ B ○ C / D
2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.)	L : W = 2.0 : 1
3. Basin Side Slopes	
A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred)	Z = 4.00 ft / ft
4. Inlet	
A) Describe means of providing energy dissipation at concentrated inflow locations.	_____

Project: Eve Highlands

Job #:

Client: By: Chk. By:

Date:

Subject: Pond # 2

Sheet #: of

Engineering Partners, Inc.
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www.eng-partners.com

$Q_{TOTAL} = 69.6$ cfs

Allowable Release = 16.98 cfs

WQCV req = 0.341 ac. ft.

Emergency Spill req Q = $Q = 3.367\,(L)(H)^{1.5}$

$L = 20.7'$

Outlet Control

$Q = A \cdot (.65)(\sqrt{2gh})$

$Q = 16.97$

$H = 7.75'$

$16.97 = A\,(.65)\sqrt{2(32.2)(7.75)}$

$16.97 = A\,(0.65)(22.34)$

$16.67 / 14.52 = A$

$1.148 = A = \pi r^2$

$0.365 = r^2$

$0.604 = r$

$D = 1.2'$ orifice plate

Required WQCV = 0.341 ac ft ✓

Forebay / Micro Pool = 0.01 ac. ft. ✓

Pond #3 (Interim For Sediment)

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project:
Basin ID:

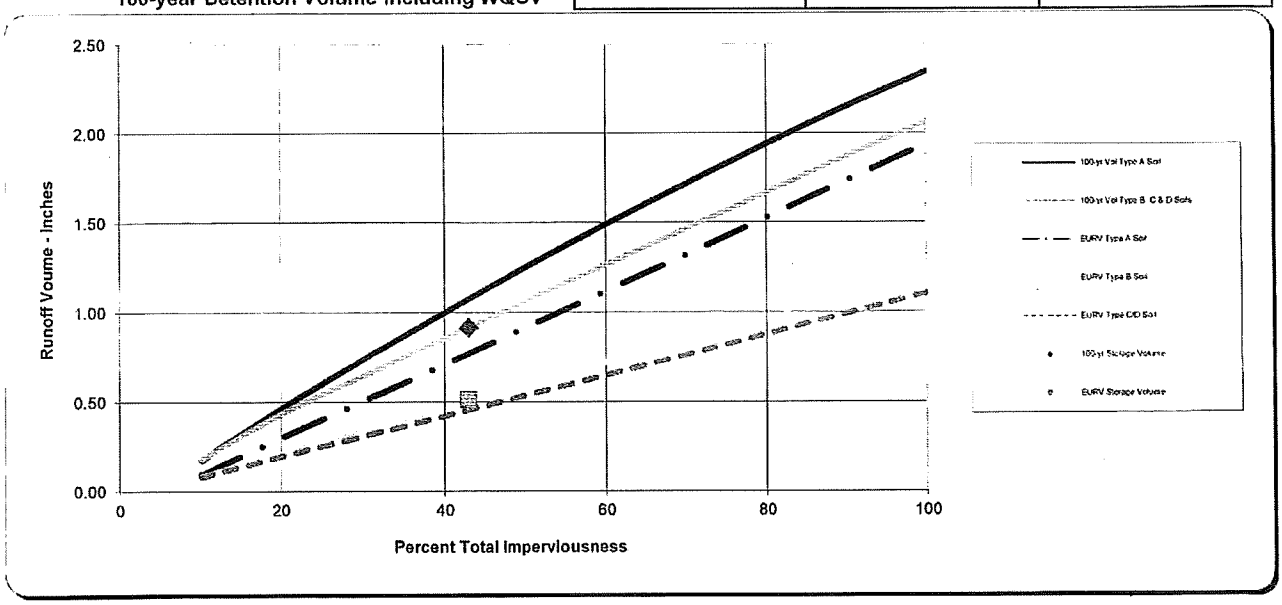
* User input data shown in blue.

Area of Watershed (acres)	29.10	
Subwatershed Imperviousness	43.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	43.0%	

Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B	19.0%	5.5
Type C or D	81.0%	23.6

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient--α
Initial--f_i	Final--f_o	
3.285	0.5	0.0018

	Detention Volumes [2,5]		Maximum Allowable Release Rate, cfs[3]
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume[4]	0.51	1.24	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV [5]	0.92	2.22	28.27



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: _____

Basin ID: _____

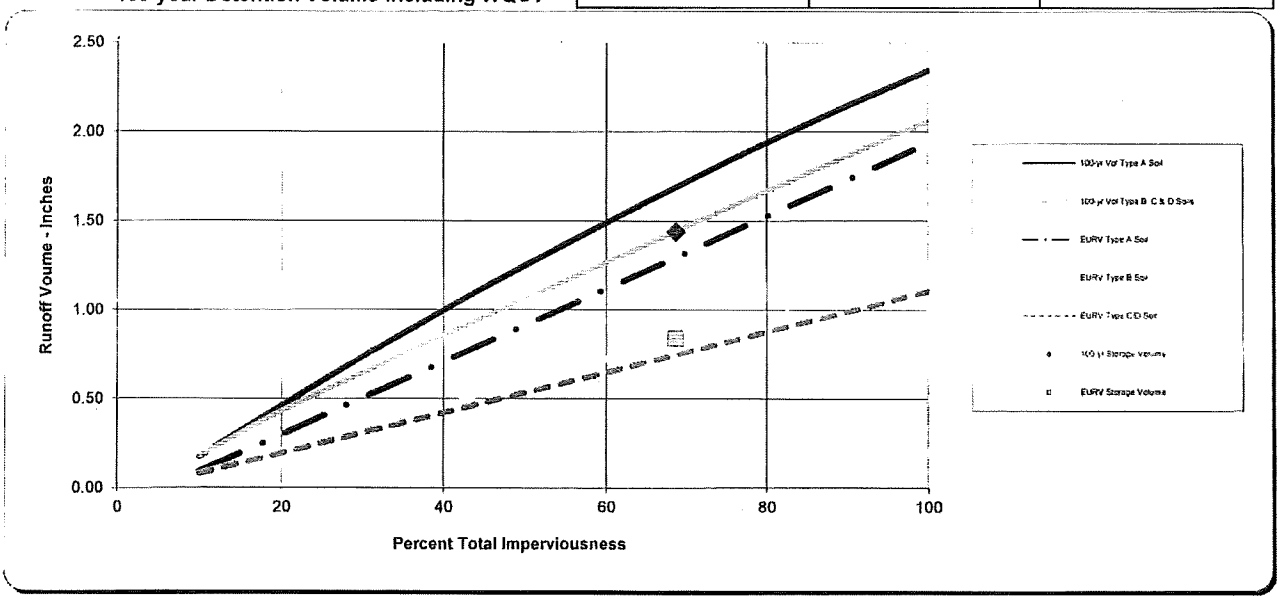
* User input data shown in blue.

Area of Watershed (acres)	72.23	
Subwatershed Imperviousness	68.6%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	68.6%	

Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A		0.0
Type B	16.0%	11.6
Type C or D	84.0%	60.7

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient--α
Initial--f_i	Final--f_o	
3.24	0.5	0.0018

	Detention Volumes [2,5]		Maximum Allowable Release Rate, cfs[3]
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume[4]	0.84	5.04	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV [5]	1.44	8.67	70.50



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

DP 21 Flows
Worksheet for Trapezoidal Channel

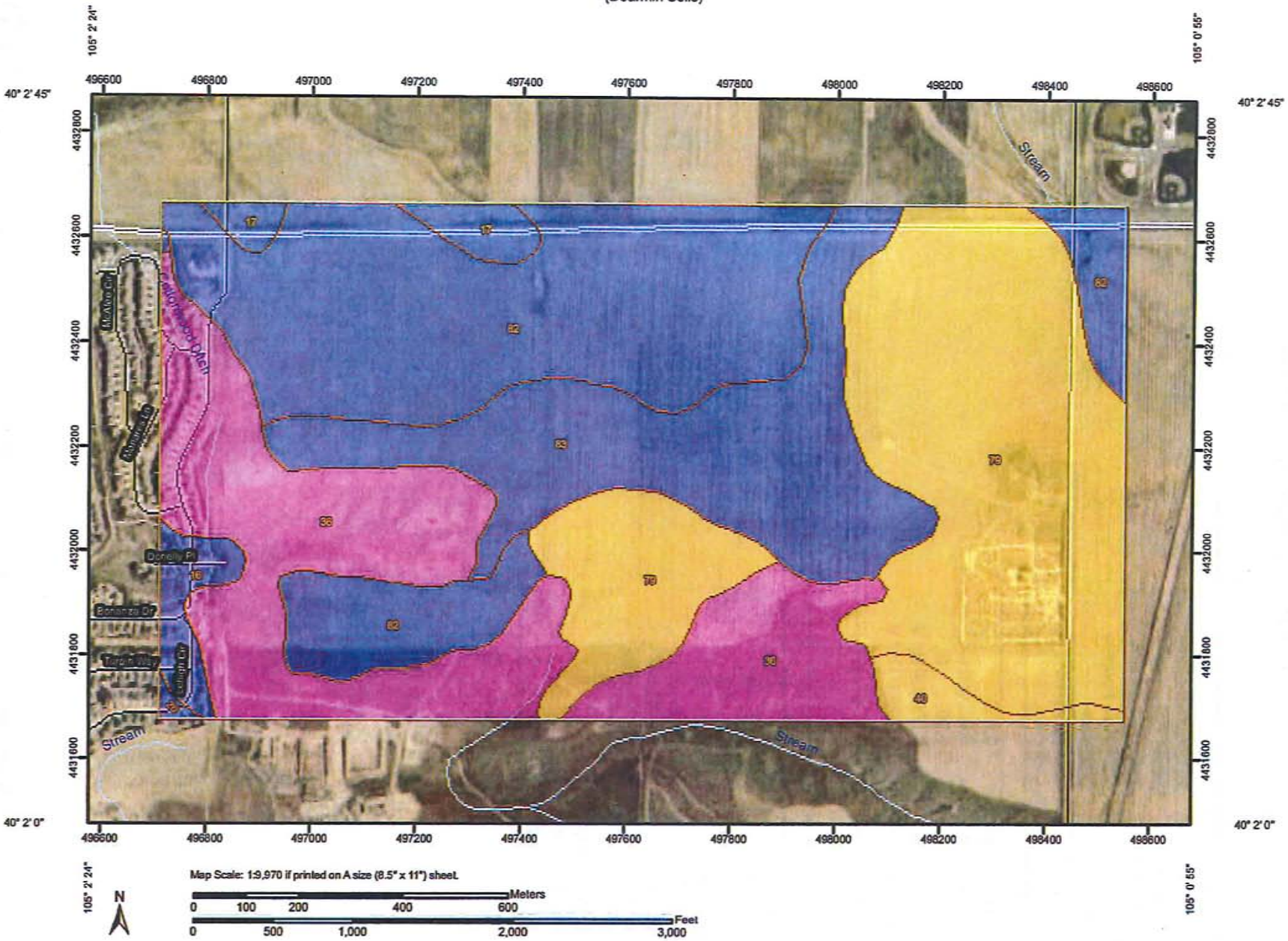
Verify Emergency Capacity.

Project Description	
Project File	x:\13-000-erie\drainage\emergenc.fm2
Worksheet	DP 21 Emergency Flows
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.020000	ft/ft
Depth	1.00	ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	5.00	ft

Results		
Discharge	44.45	cfs
Flow Area	8.00	ft^2
Wetted Perimeter	11.32	ft
Top Width	11.00	ft
Critical Depth	1.08	ft
Critical Slope	0.014861	ft/ft
Velocity	5.56	ft/s
Velocity Head	0.48	ft
Specific Energy	1.48	ft
Froude Number	1.15	
Flow is supercritical.		

Hydrologic Soil Group—Weld County, Colorado, Southern Part
(Dearmin Soils)



USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:9,980 if printed on A size (8.5" × 11") sheet.

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 accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 13N NAD83

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 11, Aug 27, 2009

Date(s) aerial images were photographed: 8/6/2005

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**
16	Colby loam, 3 to 5 percent slopes	B	7.8	1.7%
17	Colby loam, 5 to 9 percent slopes	B	7.6	1.7%
20	Colombo clay loam, 1 to 3 percent slopes	B	0.8	0.2%
36	Midway-Shingle complex, 5 to 20 percent slopes	D	98.2	21.8%
40	Nunn loam, 1 to 3 percent slopes	C	6.8	1.5%
79	Weld loam, 1 to 3 percent slopes	C	130.1	28.9%
82	Wiley-Colby complex, 1 to 3 percent slopes	B	128.3	28.5%
83	Wiley-Colby complex, 3 to 5 percent slopes	B	70.4	15.6%
Totals for Area of Interest			**450.1**	**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

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie.

The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

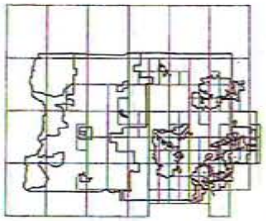
The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

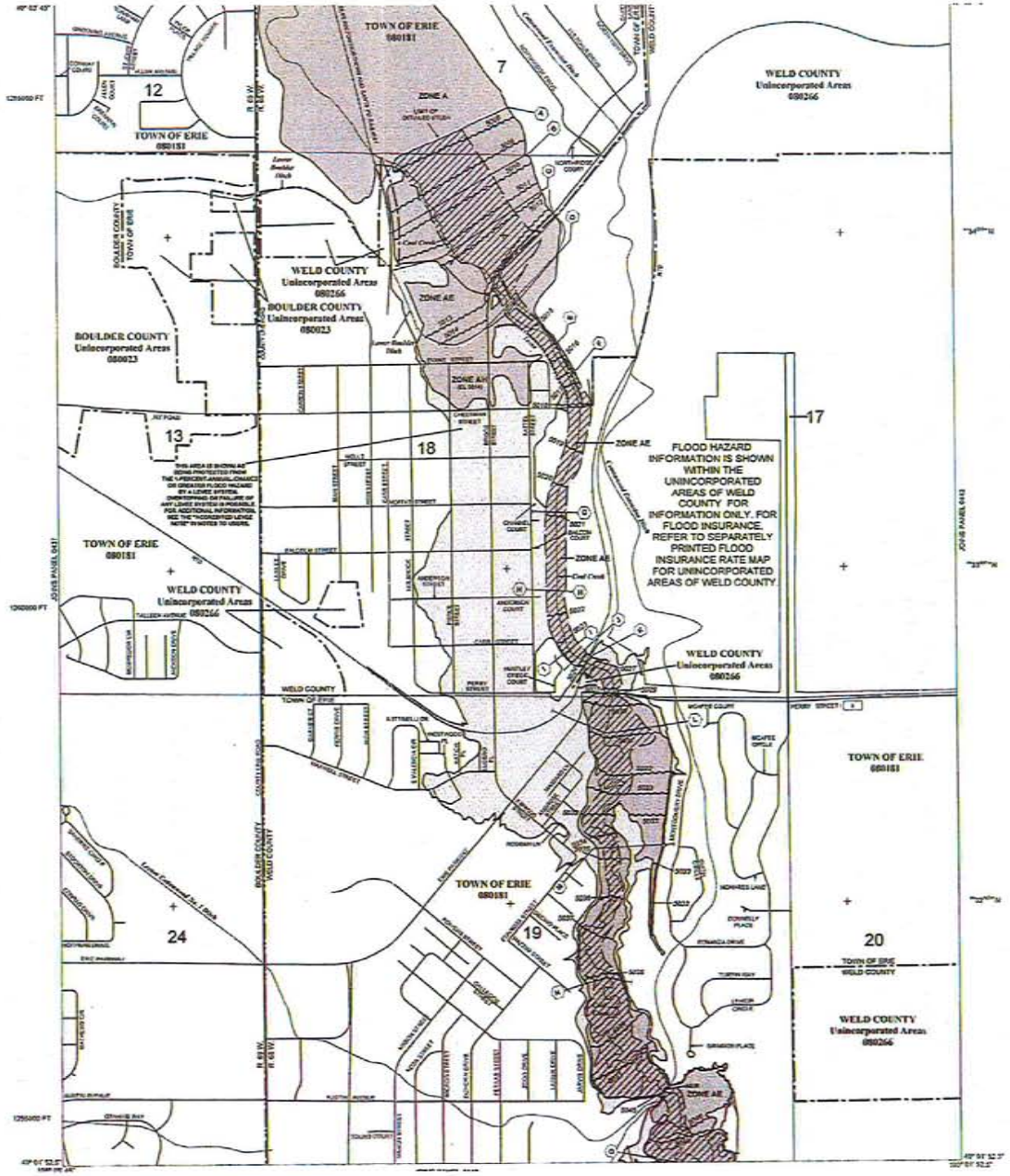
Boulder County Vertical Datum Offset Table

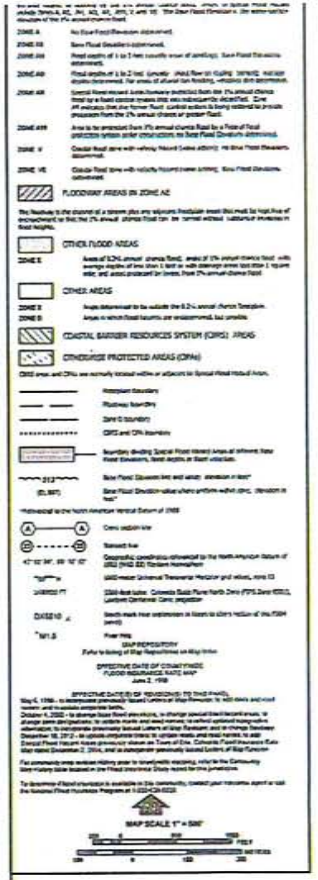
Flooding Source	Vertical Datum Offset (ft)
Coal Creek (within Town of Erie)	2.8

Example: To convert Coal Creek elevations to NAVD 88, 2.8 feet were added to the NGVD 29 elevations.

Panel Location Map







NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0441J

FIRM

FLOOD INSURANCE RATE MAP

BOULDER COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 441 OF 615

MAP NUMBER 08013C0441J

TABLE 800-4
ALLOWABLE RELEASE RATES FOR DETENTION PONDS - CFS/ACRE

	SCS SOIL GROUP*		
CONTROL FREQUENCY	A	B	C & D
2-year	0.02	0.04	0.06
5-year	0.07	0.13	0.17
10-year	0.13	0.23	0.30
25-year	0.24	0.41	0.52
100-year	0.5	0.85	1.00

*SCS soil groups are classified according to their infiltration and transmission rates. The hydrologic soil groups are:

A. - Soils having high infiltration rates even when thoroughly wetted. These consist chiefly of deep, well to excessively drained sands or gravel. These soils have a high rate of water transmission.

B. - Soils having moderate infiltration rates when thoroughly wetted. These consist chiefly of moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

C & D. - Soils having slow infiltration rates when thoroughly wetted. These consist chiefly of soils with a layer that impeded downward movement of water or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.

814.08 Minimum Detention Volume

The minimum required detention volumes should be determined using the following equations (Refer to Urban Storm Drainage Criteria Manual Volume III for water quality release rates):

$V = KA$, (Equation 801)

For the 100-year,
$K_{100} = (1.78I - 0.002I^2 - 3.56)/1000$ (Equation 802)

For the 10-year,

$K_{10} = (0.95I - 1.90)/1000$ (Equation 803)

Where V = required volume for the 100 or 10-year storm (acre-feet),
I = Developed basin impervious (%)
A = Tributary area (Acres)

814.09 Compensating Detention Procedure

Detention facilities with drainage areas less than 160 acres are to be designed using the compensating detention procedure if any runoff is to flow undetained from the subject property. There may be more than one local detention facility on site. The compensating detention procedure requires that the release rates from the detained and undetained areas be equal to the allowable release rates from the total site. Therefore, the more undetained runoff, the less the allowable detention facility release rate. The limit on the undetained area is 5% or 5 acres, whichever is less.

Table RO-3—Recommended Percentage Imperviousness Values

Land Use or Surface Characteristics	Percentage Imperviousness
Business:	
Commercial areas	95
Neighborhood areas	85
Residential:	
Single-family	*
Multi-unit (detached)	60
Multi-unit (attached)	75
Half-acre lot or larger	*
Apartments	80
Industrial:	
Light areas	80
Heavy areas	90
Parks, cemeteries	5
Playgrounds	10
Schools	50
Railroad yard areas	15
Undeveloped Areas:	
Historic flow analysis	2
Greenbelts, agricultural	2
Off-site flow analysis (when land use not defined)	45
Streets:	
Paved	100
Gravel (packed)	40
Drive and walks	90
Roofs	90
Lawns, sandy soil	0
Lawns, clayey soil	0

Table RO-5

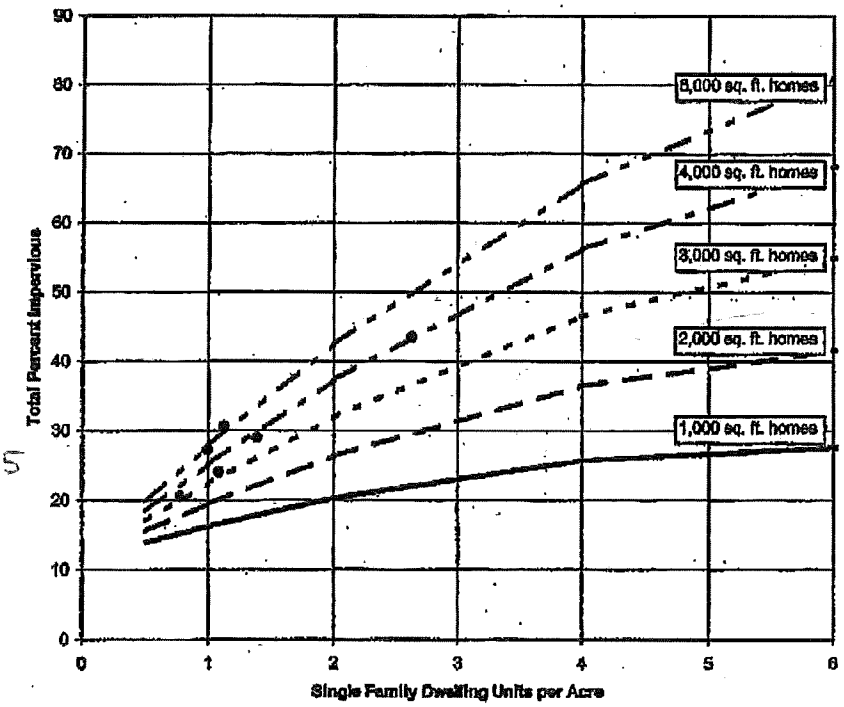
* See Figures RO-3 through RO-5 for percentage imperviousness.

$$C_A = K_A + \left(1.31i^3 - 1.44i^2 + 1.135i - 0.12\right) \text{ for } C_A \geq 0\text{, otherwise } C_A = 0 \qquad \text{(RO-6)}$$

$$C_{CD} = K_{CD} + \left(0.858i^3 - 0.786i^2 + 0.774i + 0.04\right) \qquad \text{(RO-7)}$$

$$C_B = \left(C_A + C_{CD}\right)/2$$

Single Family
Pond 1
Density @ 3.5
Pond 2
Density @ 4.5
Pond 3
Density @ 1.0
Pond 4 & Pond 5
Density @ 4.5
Pond 6
Density @ 7.5



Oakwood
Average S.F.
@ 2,500 sf.

Figure RO-5—Watershed Imperviousness, Single-Family Residential Two-Story Houses

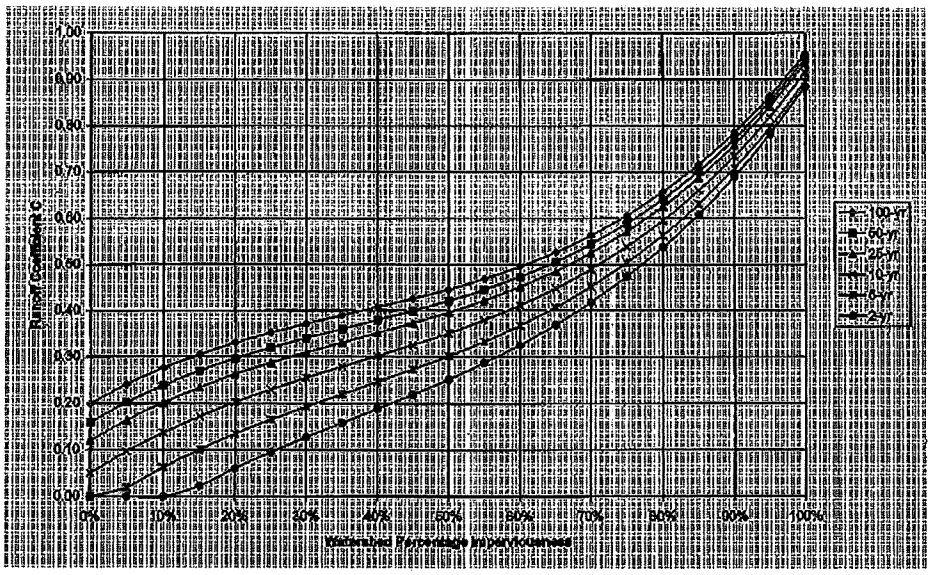


Figure RO-6—Runoff Coefficient, *C*, vs. Watershed Percentage Imperviousness NRCS Hydrologic Soil Group A

Table RO-5— Runoff Coefficients, *C*

Percentage Imperviousness	Type C and D NRCS Hydrologic Soil Groups					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
0%	0.04	0.15	0.25	0.37	0.44	0.50
5%	0.08	0.18	0.28	0.39	0.46	0.52
10%	0.11	0.21	0.30	0.41	0.47	0.53
15%	0.14	0.24	0.32	0.43	0.49	0.54
20%	0.17	0.26	0.34	0.44	0.50	0.55
25%	0.20	0.28	0.36	0.46	0.51	0.56
30%	0.22	0.30	0.38	0.47	0.52	0.57
35%	0.25	0.33	0.40	0.48	0.53	0.57
40%	0.28	0.35	0.42	0.50	0.54	0.58
45%	0.31	0.37	0.44	0.51	0.55	0.59
50%	0.34	0.40	0.46	0.53	0.57	0.60
55%	0.37	0.43	0.48	0.55	0.58	0.62
60%	0.41	0.46	0.51	0.57	0.60	0.63
65%	0.45	0.49	0.54	0.59	0.62	0.65
70%	0.49	0.53	0.57	0.62	0.65	0.68
75%	0.54	0.58	0.62	0.66	0.68	0.71
80%	0.60	0.63	0.66	0.70	0.72	0.74
85%	0.66	0.68	0.71	0.75	0.77	0.79
90%	0.73	0.75	0.77	0.80	0.82	0.83
95%	0.80	0.82	0.84	0.87	0.88	0.89
100%	0.89	0.90	0.92	0.94	0.95	0.96
	TYPE B NRCS HYDROLOGIC SOILS GROUP					
0%	0.02	0.08	0.15	0.25	0.30	0.35
5%	0.04	0.10	0.19	0.28	0.33	0.38
10%	0.06	0.14	0.22	0.31	0.36	0.40
15%	0.08	0.17	0.25	0.33	0.38	0.42
20%	0.12	0.20	0.27	0.35	0.40	0.44
25%	0.15	0.22	0.30	0.37	0.41	0.46
30%	0.18	0.25	0.32	0.39	0.43	0.47
35%	0.20	0.27	0.34	0.41	0.44	0.48
40%	0.23	0.30	0.36	0.42	0.46	0.50
45%	0.26	0.32	0.38	0.44	0.48	0.51
50%	0.29	0.35	0.40	0.46	0.49	0.52
55%	0.33	0.38	0.43	0.48	0.51	0.54
60%	0.37	0.41	0.46	0.51	0.54	0.56
65%	0.41	0.45	0.49	0.54	0.57	0.59
70%	0.45	0.49	0.53	0.58	0.60	0.62
75%	0.51	0.54	0.58	0.62	0.64	0.66
80%	0.57	0.59	0.63	0.66	0.68	0.70
85%	0.63	0.66	0.69	0.72	0.73	0.75
90%	0.71	0.73	0.75	0.78	0.80	0.81
95%	0.79	0.81	0.83	0.85	0.87	0.88
100%	0.89	0.90	0.92	0.94	0.95	0.96

TABLE 800-3

RUNOFF COEFFICIENTS (C) FOR RATIONAL METHOD

		FREQUENCY			
LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	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

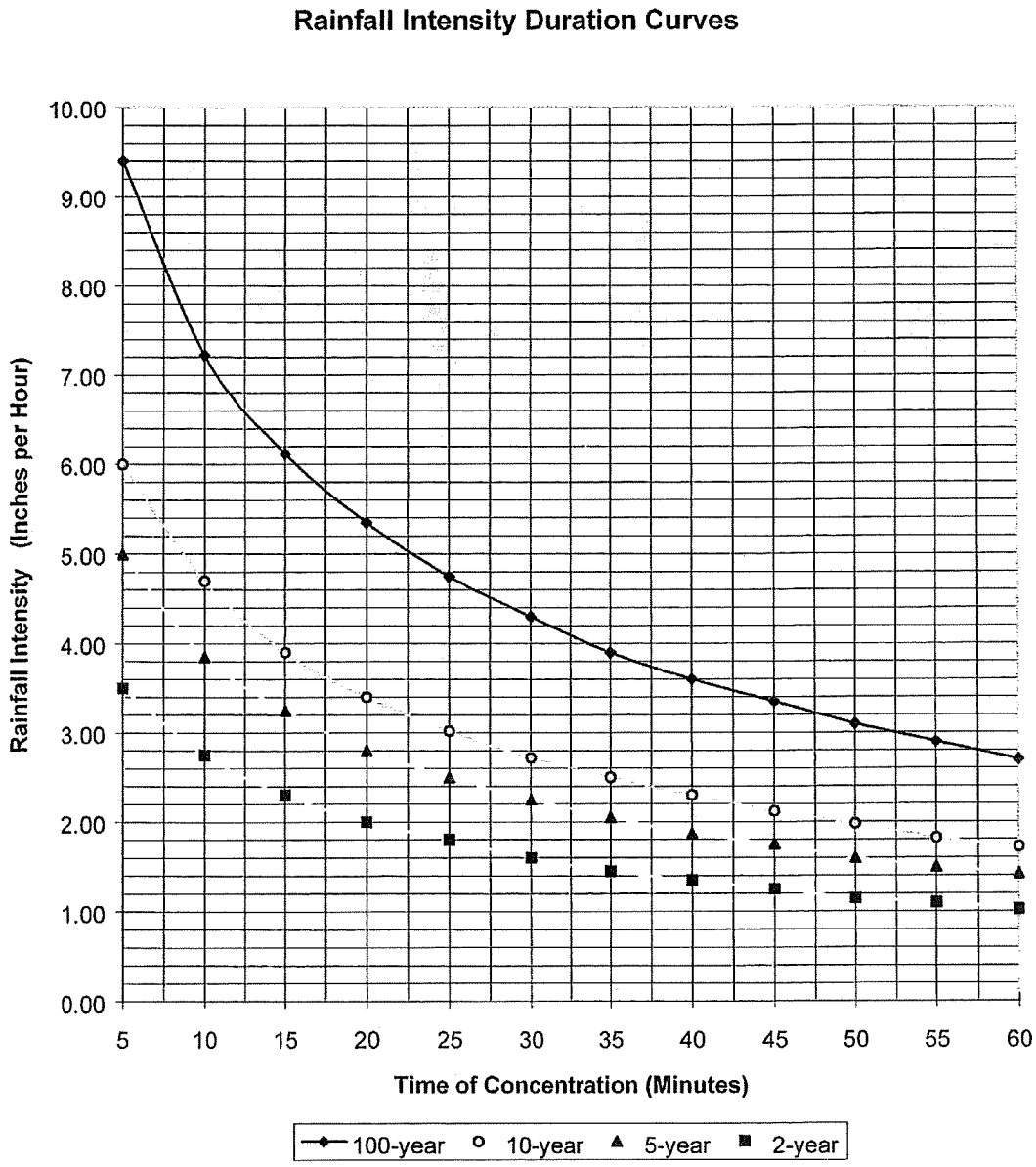
Note: These Rational Formula coefficients may not be valid for large basins.

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

813.06 Rainfall Intensities

The rainfall intensities to be used in the computation of runoff using the Rational Method shall be obtained from the Rainfall Intensity Duration Curves for the Town of Erie, included in these STANDARDS AND SPECIFICATIONS.

** Use Table RO-5, Drainage Criteria Manual. (V.1)



814.00 Detention

814.01 General

On site detention is required for all new development, expansion, and redevelopment. The required minimum detention volume and maximum release rates at these volumes for the 10-year and 100-year storms shall be determined in accordance with the procedure and data set forth in this criteria.

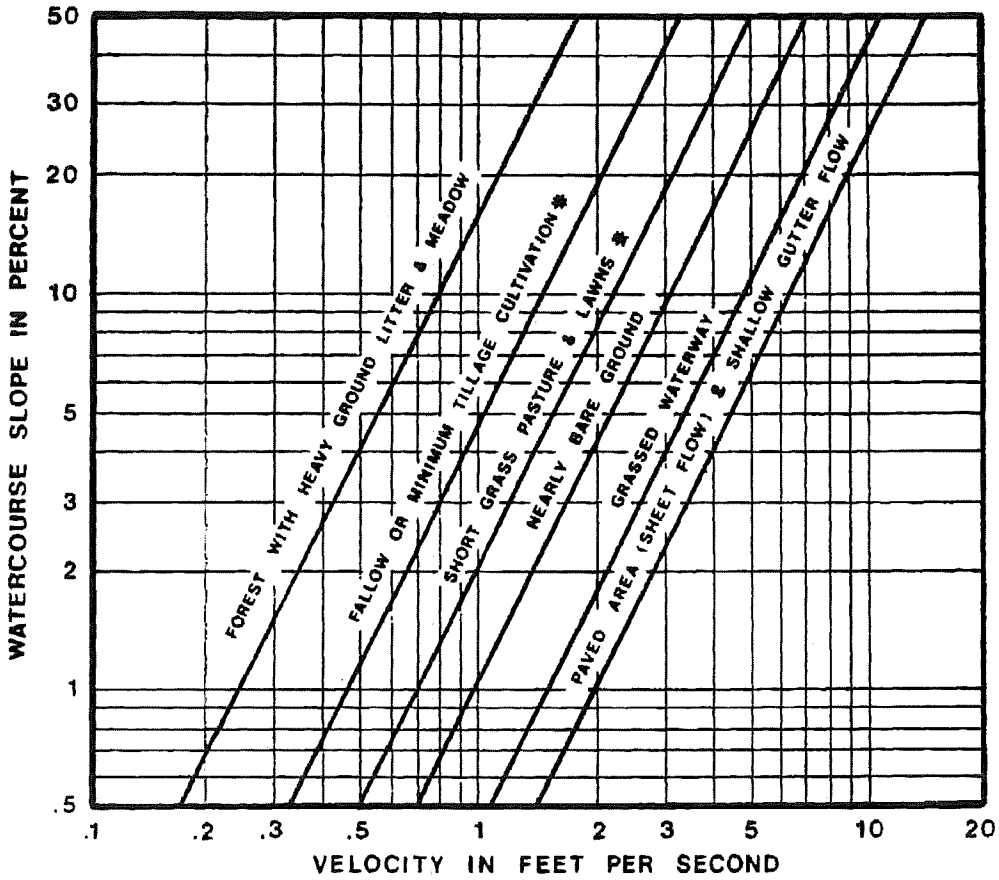


Figure RO-1—Estimate of Average Overland Flow Velocity for Use With the Rational Formula

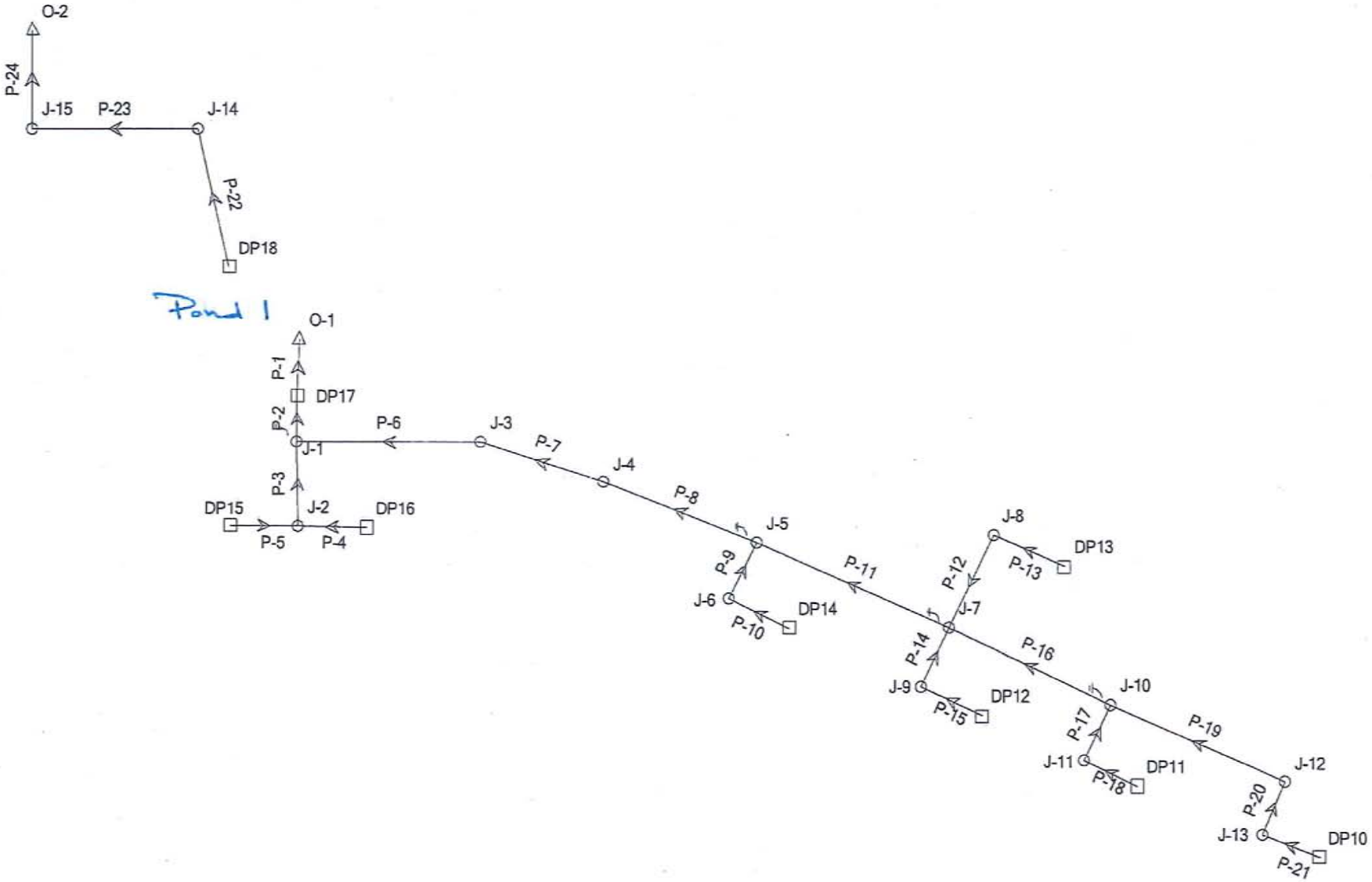
3% of 100-Year
Worksheet for Rectangular Channel

Project Description	
Project File	x:\13-000-erie\drainage\trickle .fm2
Worksheet	Trickle Channel 3% of 100-yr
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.010000	ft/ft
Depth	0.50	ft
Bottom Width	3.00	ft

Results		
Discharge	8.92	cfs
Flow Area	1.50	ft^2
Wetted Perimeter	4.00	ft
Top Width	3.00	ft
Critical Depth	0.65	ft
Critical Slope	0.004594	ft/ft
Velocity	5.94	ft/s
Velocity Head	0.55	ft
Specific Energy	1.05	ft
Froude Number	1.48	
Flow is supercritical.		

Scenario: 5 YR / 100 - yr



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Project Engineer: SCOTT PEASE
StormCAD v5.5 [5.5005]
Page 1 of 1

Scenario: 5 YR

Pipe Report

Label	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Average Velocity (ft/s)
P-1	35.50	21.45	0.009790	48 inch	142.12	5,102.21	5,102.00	5,103.98	5,103.52	6.60	8.12	9.40
P-2	30.20	22.11	0.004975	48 inch	101.31	5,102.42	5,102.31	5,104.29	5,104.32	5.22	4.77	7.03
P-3	10.80	48.67	0.006164	36 inch	52.36	5,102.82	5,102.52	5,104.59	5,104.59	2.50	2.07	5.83
P-4	8.80	19.00	0.010000	30 inch	41.01	5,103.11	5,102.92	5,104.63	5,104.64	2.82	2.44	6.65
P-5	2.00	19.00	0.010000	18 inch	10.50	5,103.61	5,103.42	5,104.64	5,104.64	1.54	1.30	4.58
P-6	21.60	275.00	0.014109	36 inch	79.22	5,106.80	5,102.92	5,108.29	5,104.59	6.14	5.34	9.54
P-7	21.60	158.00	0.035253	36 inch	125.22	5,112.57	5,107.00	5,114.06	5,108.59	6.14	5.69	13.26
P-8	21.60	209.40	0.030611	36 inch	116.69	5,119.18	5,112.77	5,120.67	5,114.36	6.14	5.69	12.61
P-9	3.60	46.20	0.009957	18 inch	10.48	5,121.14	5,120.68	5,121.86	5,121.29	4.26	5.38	5.38
P-10	3.60	18.90	0.010053	18 inch	10.53	5,121.53	5,121.34	5,122.25	5,122.09	4.26	4.07	5.40
P-11	18.29	270.00	0.016037	30 inch	51.94	5,124.01	5,119.68	5,125.46	5,120.70	6.20	9.66	9.66
P-12	4.90	51.20	0.019922	24 inch	31.93	5,125.73	5,124.71	5,126.51	5,125.82	4.32	2.75	7.36
P-13	4.90	27.90	0.010036	24 inch	22.66	5,126.21	5,125.93	5,126.99	5,126.58	4.32	5.58	5.76
P-14	3.90	46.20	0.009957	24 inch	22.57	5,125.17	5,124.71	5,125.86	5,125.82	4.04	2.19	5.38
P-15	3.90	18.90	0.010053	24 inch	22.68	5,125.56	5,125.37	5,126.25	5,125.95	4.04	5.16	5.40
P-16	9.94	280.00	0.017786	30 inch	54.70	5,129.19	5,124.21	5,130.24	5,125.82	5.06	2.98	8.47
P-17	3.50	46.20	0.009957	18 inch	10.48	5,130.65	5,130.19	5,131.36	5,130.79	4.22	5.34	5.34
P-18	3.50	18.90	0.010053	18 inch	10.53	5,131.04	5,130.85	5,131.75	5,131.59	4.22	4.06	5.36
P-19	6.60	280.00	0.040393	24 inch	45.46	5,141.00	5,129.69	5,141.91	5,130.20	4.74	10.31	10.31
P-20	6.60	46.00	0.008696	18 inch	9.79	5,141.60	5,141.20	5,142.59	5,142.10	5.31	5.95	5.95
P-21	6.60	19.00	0.010526	18 inch	10.78	5,142.00	5,141.80	5,142.99	5,142.94	5.31	4.56	6.40
P-22	79.00	103.66	0.026047	54 inch	317.35	5,097.20	5,094.50	5,099.80	5,097.43	8.30	7.19	16.57
P-23	79.00	264.00	0.027652	54 inch	326.99	5,094.30	5,087.00	5,096.90	5,090.00	8.30	7.01	16.93
P-24	79.00	50.00	0.006000	54 inch	152.32	5,086.80	5,086.50	5,089.40	5,088.86	8.30	9.34	9.66

Scenario: 5 YR

Junction Report

Label	Rim Elevation (ft)	Structure Diameter (ft)	Headloss Coefficient	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total System Flow (cfs)
J-1	5,108.64	6.00	0.70	5,104.59	5,104.29	30.20
J-2	5,108.12	5.00	0.60	5,104.64	5,104.59	10.80
J-3	5,112.33	5.00	0.50	5,108.59	5,108.29	21.60
J-4	5,118.41	5.00	0.50	5,114.36	5,114.06	21.60
J-5	5,126.84	5.00	0.60	5,121.03	5,120.67	21.60
J-6	5,126.13	4.00	0.80	5,122.09	5,121.86	3.60
J-7	5,131.92	5.00	0.60	5,125.82	5,125.46	18.29
J-8	5,131.97	4.00	0.60	5,126.68	5,126.51	4.90
J-9	5,131.29	4.00	0.50	5,125.99	5,125.86	3.90
J-10	5,136.37	5.00	0.60	5,130.48	5,130.24	9.94
J-11	5,135.56	4.00	0.80	5,131.59	5,131.36	3.50
J-12	5,147.00	5.00	0.60	5,142.12	5,141.91	6.60
J-13	5,147.00	4.00	0.80	5,142.94	5,142.59	6.60
J-14	5,105.00	6.00	0.50	5,097.43	5,096.90	79.00
J-15	5,090.00	6.00	0.80	5,090.26	5,089.40	79.00

Scenario: 5 YR

Inlet Report

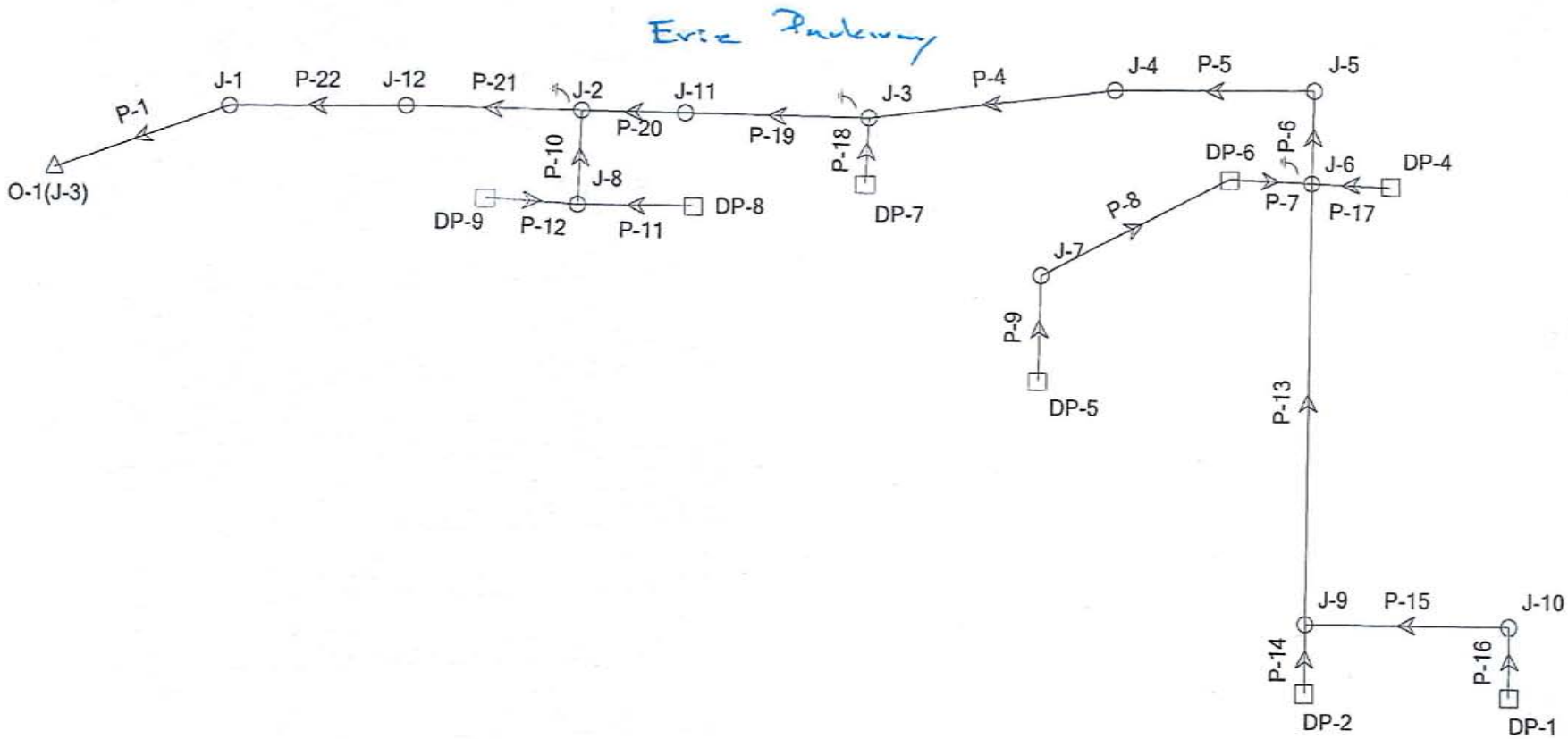
Label	Rim Elevation (ft)	Additional Flow (cfs)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
DP10	5,147.00	6.60	5,143.21	5,142.99
DP11	5,135.29	3.50	5,131.89	5,131.75
DP12	5,130.31	3.90	5,126.38	5,126.25
DP13	5,130.95	4.90	5,127.13	5,126.99
DP14	5,125.78	3.60	5,122.40	5,122.25
DP15	5,107.95	2.00	5,104.66	5,104.64
DP16	5,107.95	8.80	5,104.69	5,104.63
DP17	5,108.08	5.30	5,104.32	5,103.98
DP18	5,100.00	79.00	5,099.80	5,099.80

Scenario: Base-100

Pipe Report

Label	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Average Velocity (ft/s)
P-1	99.10	21.45	0.009790	48 inch	142.12	5,102.21	5,102.00	5,105.23	5,104.73	9.75	10.86	12.23
P-2	91.50	22.11	0.004975	48 inch	101.31	5,102.42	5,102.31	5,106.03	5,105.97	7.67	7.60	9.13
P-3	33.30	48.67	0.006164	36 inch	52.36	5,102.82	5,102.52	5,106.79	5,106.67	4.71	4.71	4.71
P-4	24.00	19.00	0.010000	30 inch	41.01	5,103.11	5,102.92	5,107.06	5,107.00	4.89	4.89	4.89
P-5	9.30	19.00	0.010000	18 inch	10.50	5,103.61	5,103.42	5,107.14	5,107.00	5.26	5.26	5.26
P-6	60.50	275.00	0.014109	36 inch	79.22	5,106.80	5,102.92	5,109.31	5,106.67	9.58	8.56	12.34
P-7	60.50	158.00	0.035253	36 inch	125.22	5,112.57	5,107.00	5,115.08	5,110.02	9.58	8.56	17.56
P-8	60.50	209.40	0.030611	36 inch	116.69	5,119.18	5,112.77	5,121.69	5,115.79	9.58	8.56	16.66
P-9	11.60	46.20	0.009957	18 inch	10.48	5,121.14	5,120.68	5,123.11	5,122.55	6.56	6.56	6.56
P-10	11.60	18.90	0.010053	18 inch	10.53	5,121.53	5,121.34	5,123.88	5,123.64	6.56	6.56	6.56
P-11	52.20	270.00	0.016037	30 inch	51.94	5,124.01	5,119.68	5,126.92	5,122.55	10.63	10.63	10.63
P-12	9.10	51.20	0.019922	24 inch	31.93	5,125.73	5,124.71	5,128.06	5,127.97	2.90	2.90	2.90
P-13	9.10	27.90	0.010036	24 inch	22.66	5,126.21	5,125.93	5,128.18	5,128.13	2.91	2.90	6.82
P-14	13.00	46.20	0.009957	24 inch	22.57	5,125.17	5,124.71	5,128.13	5,127.97	4.14	4.14	4.14
P-15	13.00	18.90	0.010053	24 inch	22.68	5,125.56	5,125.37	5,128.32	5,128.26	4.14	4.14	4.14
P-16	31.40	280.00	0.017786	30 inch	54.70	5,129.19	5,124.21	5,131.10	5,127.97	7.81	6.40	11.53
P-17	14.70	46.20	0.009957	18 inch	10.48	5,130.65	5,130.19	5,132.58	5,131.67	8.32	8.34	8.32
P-18	14.70	18.90	0.010053	18 inch	10.53	5,131.04	5,130.85	5,133.81	5,133.44	8.32	8.32	8.32
P-19	17.20	280.00	0.040393	24 inch	45.46	5,141.00	5,129.69	5,142.50	5,131.67	6.83	5.49	13.47
P-20	17.20	46.00	0.008696	18 inch	9.79	5,141.60	5,141.20	5,144.16	5,142.93	9.73	9.73	9.73
P-21	17.20	19.00	0.010526	18 inch	10.78	5,142.00	5,141.80	5,145.85	5,145.34	9.73	9.73	9.73
P-22	79.00	103.66	0.026047	54 inch	317.35	5,097.20	5,094.50	5,099.80	5,097.43	8.30	7.19	16.57
P-23	79.00	264.00	0.027652	54 inch	326.99	5,094.30	5,087.00	5,096.90	5,090.00	8.30	7.01	16.93
P-24	79.00	50.00	0.006000	54 inch	152.32	5,086.80	5,086.50	5,089.40	5,088.86	8.30	9.34	9.66

Scenario: 5 yr /100-yr



Title: STORM HYDRAULICS - ERIE PKWY - PHASE1
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Project Engineer: SCOTT PEASE
StormCAD v5.5 [5.5005]

Scenario: 5 yr

Pipe Report

Label	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Average Velocity (ft/s)
P-1	49.70	80.32	0.005603	48 inch	107.51	5,105.71	5,105.26	5,107.82	5,107.18	7.37	8.32	8.39
P-4	40.40	200.00	0.017500	42 inch	133.09	5,129.00	5,125.50	5,130.98	5,127.90	7.21	5.74	12.13
P-5	40.40	535.00	0.020561	42 inch	144.26	5,140.00	5,129.00	5,141.98	5,131.38	7.21	5.80	12.86
P-6	40.40	55.00	0.018182	42 inch	135.65	5,141.00	5,140.00	5,142.98	5,142.46	7.21	5.59	12.30
P-7	4.70	20.00	0.025000	24 inch	35.77	5,141.50	5,141.00	5,143.47	5,143.46	1.50	1.50	7.88
P-8	1.30	260.00	0.003846	18 inch	6.51	5,142.50	5,141.50	5,143.52	5,143.49	1.01	0.74	2.88
P-9	1.30	155.00	0.100000	18 inch	33.22	5,158.00	5,142.50	5,158.43	5,143.53	3.14	1.01	9.11
P-10	5.70	24.87	0.147165	36 inch	255.86	5,115.00	5,111.34	5,115.75	5,112.76	4.13	1.73	14.81
P-11	5.00	40.17	0.021907	24 inch	33.48	5,116.88	5,116.00	5,117.67	5,116.54	4.35	7.34	7.66
P-12	0.70	39.07	0.027899	18 inch	17.54	5,117.59	5,116.50	5,117.90	5,116.70	2.65	4.84	4.84
P-13	20.40	740.00	0.022297	30 inch	61.24	5,157.50	5,141.00	5,159.03	5,143.46	6.46	4.17	11.22
P-14	9.80	20.00	0.025000	24 inch	35.77	5,158.00	5,157.50	5,159.30	5,159.42	4.53	3.16	9.71
P-15	10.60	510.00	0.014706	24 inch	27.43	5,165.00	5,157.50	5,166.17	5,159.42	5.57	3.42	8.17
P-16	10.60	20.00	0.025000	24 inch	35.77	5,165.50	5,165.00	5,166.67	5,166.46	5.57	4.33	9.92
P-17	16.30	20.00	0.025000	36 inch	105.45	5,141.50	5,141.00	5,143.40	5,143.46	3.45	2.63	10.82
P-18	4.60	50.00	0.010000	24 inch	22.62	5,126.00	5,125.50	5,127.92	5,127.90	1.48	1.46	5.65
P-19	45.00	530.00	0.011887	48 inch	156.60	5,125.50	5,119.20	5,127.51	5,121.40	7.13	6.35	10.77
P-20	45.00	345.91	0.025035	48 inch	227.27	5,119.00	5,110.34	5,121.01	5,112.76	7.13	5.66	14.08
P-21	49.70	250.00	0.010600	48 inch	147.88	5,110.14	5,107.49	5,112.25	5,109.83	7.37	6.52	10.61
P-22	49.70	276.23	0.004996	48 inch	101.52	5,107.29	5,105.91	5,109.40	5,108.25	7.37	6.52	8.04

Scenario: Base-100

Pipe Report 100 YR

Label	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Average Velocity (ft/s)
P-1	148.50	80.32	0.005603	48 inch	107.51	5,105.71	5,105.26	5,109.92	5,108.84	11.82	12.51	11.82
P-4	114.60	200.00	0.017500	42 inch	133.09	5,129.00	5,125.50	5,132.51	5,129.91	11.91	11.91	11.91
P-5	114.60	535.00	0.020561	42 inch	144.26	5,140.00	5,129.00	5,143.21	5,133.61	12.40	11.91	16.64
P-6	114.60	55.00	0.018182	42 inch	135.65	5,141.00	5,140.00	5,145.36	5,144.64	11.91	11.91	11.91
P-7	17.40	20.00	0.025000	24 inch	35.77	5,141.50	5,141.00	5,146.80	5,146.68	5.54	5.54	5.54
P-8	4.20	260.00	0.003846	18 inch	6.51	5,142.50	5,141.50	5,147.45	5,147.04	2.38	2.38	2.38
P-9	4.20	155.00	0.100000	18 inch	33.22	5,158.00	5,142.50	5,158.79	5,147.50	4.48	2.38	12.87
P-10	33.30	24.87	0.147165	36 inch	255.86	5,115.00	5,111.34	5,119.08	5,119.02	4.71	4.71	4.71
P-11	29.80	40.17	0.021907	24 inch	33.48	5,116.88	5,116.00	5,119.98	5,119.29	9.49	9.49	9.49
P-12	3.50	39.07	0.027899	18 inch	17.54	5,117.59	5,116.50	5,119.33	5,119.29	1.98	1.98	1.98
P-13	46.10	740.00	0.022297	30 inch	61.24	5,157.50	5,141.00	5,159.74	5,146.68	9.93	9.39	13.70
P-14	20.00	20.00	0.025000	24 inch	35.77	5,158.00	5,157.50	5,160.82	5,160.66	6.37	6.37	6.37
P-15	26.10	510.00	0.014706	24 inch	27.43	5,165.00	5,157.50	5,167.45	5,160.66	8.31	8.31	8.31
P-16	26.10	20.00	0.025000	24 inch	35.77	5,165.50	5,165.00	5,168.36	5,168.10	8.31	8.31	8.31
P-17	56.90	20.00	0.025000	36 inch	105.45	5,141.50	5,141.00	5,146.83	5,146.68	8.05	8.05	8.05
P-18	17.70	50.00	0.010000	24 inch	22.62	5,126.00	5,125.50	5,130.22	5,129.91	5.63	5.63	5.63
P-19	129.60	530.00	0.011887	48 inch	156.60	5,125.50	5,119.20	5,128.91	5,123.41	11.36	10.31	13.93
P-20	129.60	345.91	0.025035	48 inch	227.27	5,119.00	5,110.34	5,122.41	5,119.02	11.36	10.31	18.68
P-21	148.50	250.00	0.010600	48 inch	147.88	5,110.14	5,107.49	5,117.72	5,115.04	11.82	11.82	11.82
P-22	148.50	276.23	0.004996	48 inch	101.52	5,107.29	5,105.91	5,113.96	5,111.01	11.82	11.82	11.82

Scenario: Base-100

Junction Report 100 YR

Label	Rim Elevation (ft)	Structure Diameter (ft)	Headloss Coefficient	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total System Flow (cfs)
J-1	5,116.94	6.00	0.50	5,111.01	5,109.92	148.50
J-2	5,122.02	6.00	0.60	5,119.02	5,117.72	148.50
J-3	5,132.00	5.00	0.50	5,129.91	5,128.91	129.60
J-4	5,136.50	5.00	0.50	5,133.61	5,132.51	114.60
J-5	5,147.25	5.00	0.60	5,144.64	5,143.21	114.60
J-6	5,148.00	6.00	0.60	5,146.68	5,145.36	114.60
J-7	5,153.00	4.00	0.50	5,147.50	5,147.45	4.20
J-8	5,123.33	5.00	0.60	5,119.29	5,119.08	33.30
J-9	5,164.50	5.00	0.60	5,160.66	5,159.74	46.10
J-10	5,172.50	5.00	0.60	5,168.10	5,167.45	26.10
J-11	5,127.70	5.00	0.50	5,123.41	5,122.41	129.60
J-12	5,119.00	6.00	0.50	5,115.04	5,113.96	148.50

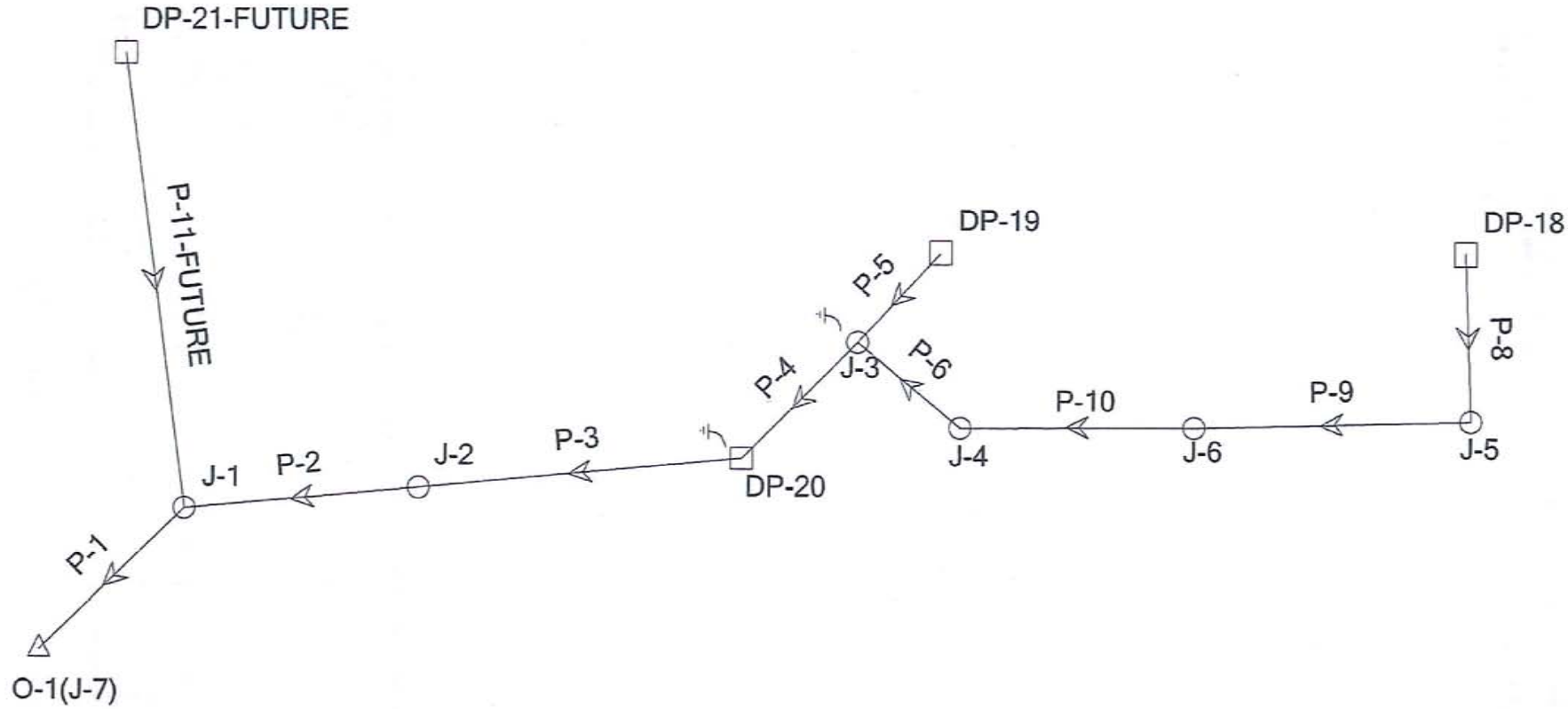
Scenario: Base-100

Inlet Report 100 yr

Label	Rim Elevation (ft)	Additional Flow (cfs)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
DP-9	5,122.34	3.50	5,119.36	5,119.33
DP-8	5,123.36	29.80	5,120.68	5,119.98
DP-7	5,132.50	17.70	5,130.46	5,130.22
DP-4	5,147.80	56.90	5,147.33	5,146.83
DP-1	5,171.50	26.10	5,168.90	5,168.36
DP-2	5,165.80	20.00	5,161.13	5,160.82
DP-5	5,164.90	4.20	5,158.94	5,158.79
DP-6	5,147.80	13.20	5,147.04	5,146.80

5-yr

Scenario: Base-100



Scenario: 5YR

Pipe Report

Label	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Average Velocity (ft/s)
P-1	20.70	30.90	0.004854	36 inch	46.47	5,105.44	5,105.29	5,106.90	5,106.69	6.06	6.38	6.38
P-2	18.60	103.90	0.005005	36 inch	47.18	5,106.16	5,105.64	5,107.54	5,107.19	5.85	5.06	6.28
P-3	18.60	137.80	0.064151	36 inch	168.92	5,115.20	5,106.36	5,116.58	5,107.81	5.85	5.51	15.72
P-4	13.80	44.90	0.018931	24 inch	31.12	5,117.05	5,116.20	5,118.39	5,117.19	6.18	8.93	9.61
P-5	5.90	8.20	0.009756	24 inch	22.34	5,117.33	5,117.25	5,118.36	5,118.39	3.62	3.20	6.00
P-6	7.90	34.30	0.009913	24 inch	22.52	5,118.09	5,117.75	5,119.09	5,118.59	5.03	6.34	6.54
P-8	7.90	35.00	0.011143	24 inch	23.88	5,128.94	5,128.55	5,129.94	5,129.59	5.03	4.81	6.82
P-9	7.90	289.17	0.026732	24 inch	36.99	5,128.35	5,120.62	5,129.35	5,121.25	5.03	9.36	9.36
P-10	7.90	212.49	0.010024	24 inch	22.65	5,120.42	5,118.29	5,121.42	5,119.33	5.03	4.81	6.56
P-11-FUTUR	2.10	335.00	0.034507	18 inch	19.51	5,117.00	5,105.44	5,117.55	5,107.19	3.60	1.19	7.21

Scenario: 5YR

Junction Report

Label	Rim Elevation (ft)	Structure Diameter (ft)	Headloss Coefficient	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total System Flow (cfs)
J-1	5,110.17	5.00	0.50	5,107.19	5,106.90	20.70
J-2	5,114.04	5.00	0.50	5,107.81	5,107.54	18.60
J-3	5,122.32	5.00		5,118.39	5,118.39	13.80
J-4	5,122.64	5.00	0.60	5,119.33	5,119.09	7.90
J-5	5,134.73	5.00	0.60	5,129.59	5,129.35	7.90
J-6	5,127.34	5.00		5,121.42	5,121.42	7.90

Scenario: 5YR

Inlet Report

Label	Rim Elevation (ft)	Additional Flow (cfs)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
DP-19	5,122.08	5.90	5,118.46	5,118.36
DP-20	5,121.70	4.80	5,116.85	5,116.58
DP-18	5,134.19	7.90	5,130.14	5,129.94
DP-21-FUTURE	5,121.00	2.10	5,117.55	5,117.55

Scenario: Base-100

Pipe Report

Label	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Average Velocity (ft/s)
P-1	61.90	30.90	0.004854	36 inch	46.47	5,105.44	5,105.29	5,108.29	5,107.82	8.93	9.72	8.76
P-2	55.40	103.90	0.005005	36 inch	47.18	5,106.16	5,105.64	5,109.62	5,108.91	7.84	7.84	7.84
P-3	55.40	137.80	0.064151	36 inch	168.92	5,115.20	5,106.36	5,117.62	5,110.10	9.08	7.84	21.40
P-4	37.40	44.90	0.018931	24 inch	31.12	5,117.05	5,116.20	5,119.48	5,118.26	11.90	11.90	11.90
P-5	22.00	8.20	0.009756	24 inch	22.34	5,117.33	5,117.25	5,119.56	5,119.48	7.00	7.00	7.00
P-6	24.50	34.30	0.009913	24 inch	22.52	5,118.09	5,117.75	5,119.93	5,119.50	8.09	8.41	7.80
P-8	24.50	35.00	0.011143	24 inch	23.88	5,128.94	5,128.55	5,131.17	5,130.76	7.80	7.80	7.80
P-9	24.50	289.17	0.026732	24 inch	36.99	5,128.35	5,120.62	5,130.10	5,123.04	8.41	7.80	12.59
P-10	24.50	212.49	0.010024	24 inch	22.65	5,120.42	5,118.29	5,123.04	5,120.54	7.80	7.80	7.80
P-11-FUTUR	6.50	335.00	0.034507	18 inch	19.51	5,117.00	5,105.44	5,117.99	5,108.91	5.28	3.68	9.93

Scenario: Base-100

Junction Report

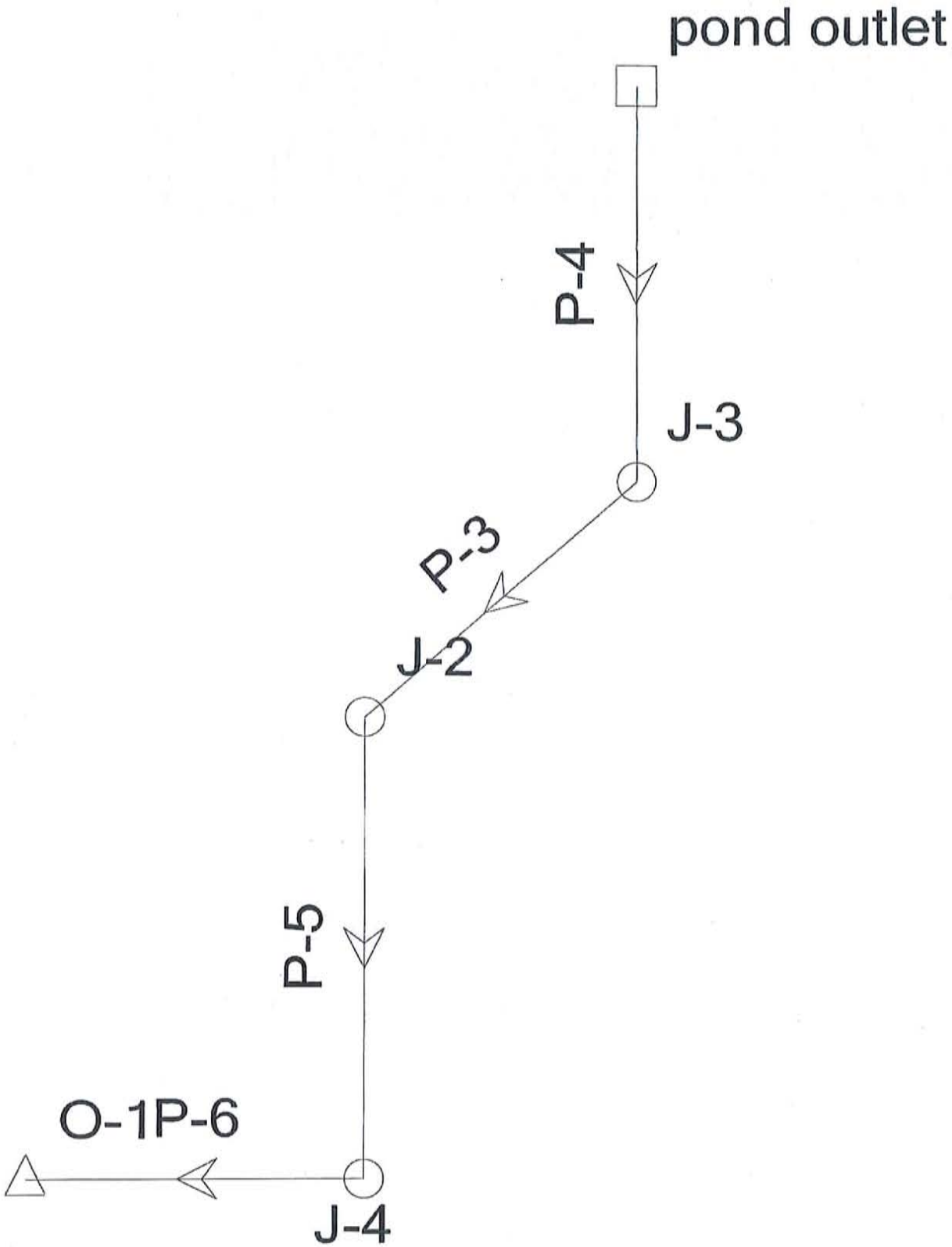
Label	Rim Elevation (ft)	Structure Diameter (ft)	Headloss Coefficient	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total System Flow (cfs)
J-1	5,110.17	5.00	0.50	5,108.91	5,108.29	61.90
J-2	5,114.04	5.00	0.50	5,110.10	5,109.62	55.40
J-3	5,122.32	5.00		5,119.48	5,119.48	37.40
J-4	5,122.64	5.00	0.60	5,120.54	5,119.93	24.50
J-5	5,134.73	5.00	0.60	5,130.76	5,130.10	24.50
J-6	5,127.34	5.00		5,123.04	5,123.04	24.50

Scenario: Base-100

Inlet Report

Label	Rim Elevation (ft)	Additional Flow (cfs)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
DP-19	5,122.08	22.00	5,119.94	5,119.56
DP-20	5,121.70	19.00	5,118.26	5,117.62
DP-18	5,134.19	24.50	5,131.64	5,131.17
DP-21-FUTURE	5,121.00	6.50	5,117.99	5,117.99

Scenario: 5-yr / 100-yr



Scenario: 5-yr

Pipe Report

Label	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Average Velocity (ft/s)
P-3	5.50	150.99	0.052984	18 inch	24.18	5,085.00	5,077.00	5,085.90	5,077.49	4.94	11.08	11.08
P-4	5.50	144.15	0.103920	18 inch	33.86	5,101.98	5,087.00	5,102.88	5,087.41	4.94	14.10	14.10
P-5	5.50	215.18	0.048796	18 inch	23.20	5,075.00	5,064.50	5,075.90	5,065.00	4.94	10.75	10.75
P-6	5.50	84.78	0.026421	36 inch	108.41	5,061.09	5,058.85	5,061.83	5,059.31	4.09	8.03	8.03

Scenario: 5-yr

Junction Report

Label	Rim Elevation (ft)	Structure Diameter (ft)	Headloss Coefficient	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total System Flow (cfs)
J-2	5,081.00	4.00	0.50	5,076.09	5,075.90	5.50
J-3	5,093.00	4.00	0.50	5,086.09	5,085.90	5.50
J-4	5,069.00	5.00	0.60	5,061.98	5,061.83	5.50

Scenario: 5-yr

Inlet Report

Label	Rim Elevation (ft)	Additional Flow (cfs)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
pond outlet	5,107.98	5.50	5,103.07	5,102.88

Scenario: Base

Pipe Report 100 YR

Label	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Velocity In (ft/s)	Velocity Out (ft/s)	Average Velocity (ft/s)
P-3	17.16	150.99	0.052984	18 inch	24.18	5,085.00	5,077.00	5,086.44	5,077.93	9.84	14.85	14.85
P-4	17.16	144.15	0.103920	18 inch	33.86	5,101.98	5,087.00	5,103.42	5,087.76	9.84	19.23	19.23
P-5	17.16	215.18	0.048796	18 inch	23.20	5,075.00	5,064.50	5,076.44	5,065.46	9.84	14.37	14.37
P-6	17.16	84.78	0.026421	36 inch	108.41	5,061.09	5,058.85	5,062.41	5,059.68	5.70	10.78	11.20

Scenario: Base

Junction Report 100 YR

Label	Rim Elevation (ft)	Structure Diameter (ft)	Headloss Coefficient	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Total System Flow (cfs)
J-2	5,081.00	4.00	0.50	5,077.19	5,076.44	17.16
J-3	5,093.00	4.00	0.50	5,087.19	5,086.44	17.16
J-4	5,069.00	5.00	0.60	5,062.72	5,062.41	17.16

Scenario: Base

Inlet Report 100 YR

Label	Rim Elevation (ft)	Additional Flow (cfs)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
pond outlet	5,107.98	17.16	5,104.17	5,103.42

Inlet Design

Subdivision ERIE HIGHLANDS
Location ERIE, Colorado

Project Name: ERIE HIGHLANDS
Project No. 13-000
Calculated By: DCF
Checked By:
Date: 11/15/2013

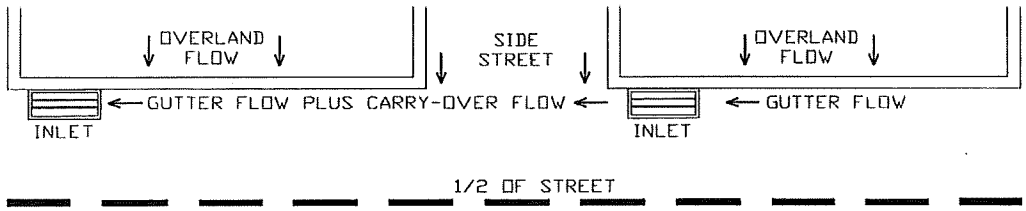
Design Point	5-Year Flow (cfs)	100-Year Flow (cfs)	5- or 100-Year Inlet	Inlet Type	Sump (S) or On-Grade (G)	Max. Sump Depth (ft)	Intercepted (cfs)	Bypass (cfs)
2(future)	9.4	30	100	15'Type R	S	0.48	20	10.0
4(future)	4.6	22.6	100	15'Type R	S	1	20	2.6
8	5.0	29.8	100	15' Type R	S	0.74	29.8	0.6
9	0.7	3.5	100	10' Type R	S	0.17	3.5	0.0
10(future)	6.6	20.7	100	15'Type R	S	0.47	17.2	3.5
11	3.5	14.7	100	10' Type R	S	0.47	14.7	0.8
12	3.9	13.0	100	10' Type R	S	0.47	13.0	0.0
13	4.9	15.7	100	15' Type R	ON GRADE	NA	9.1	6.6
14	3.6	11.6	100	10' Type R	S	0.47	11.6	0.0
15	2.0	9.3	100	10' Type R	S	1.26	9.3	0.0
16	8.8	26.9	100	10' Type R	S	1.26	24.0	2.9
17	2.5	8.1	100	10' Type R	S	0.60	8.1	0.0
18	7.9	24.5	100	15' Type R	S	0.47	17.5	7.0
19	6.5	27.0	100	10' Type R	S	1.00	22.0	5.0
20	4.8	19.0	100	10' Type R	S	1.00	19.0	0.0
21	2.1	6.5	100	10' Type R	S	1.00	6.1	0.4

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-2

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	9.40	30.00	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =	0.00	Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)$ ^ C_3

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	**0.00**	**0.00**	**cfs**

Analysis of Flow Time (Time of Concentration) for a Catchment:

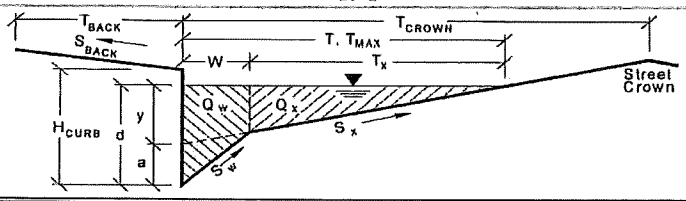
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	**N/A**	**N/A**	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	**9.40**	**30.00**	**cfs**

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	15.0	20.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	5.20	6.40	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

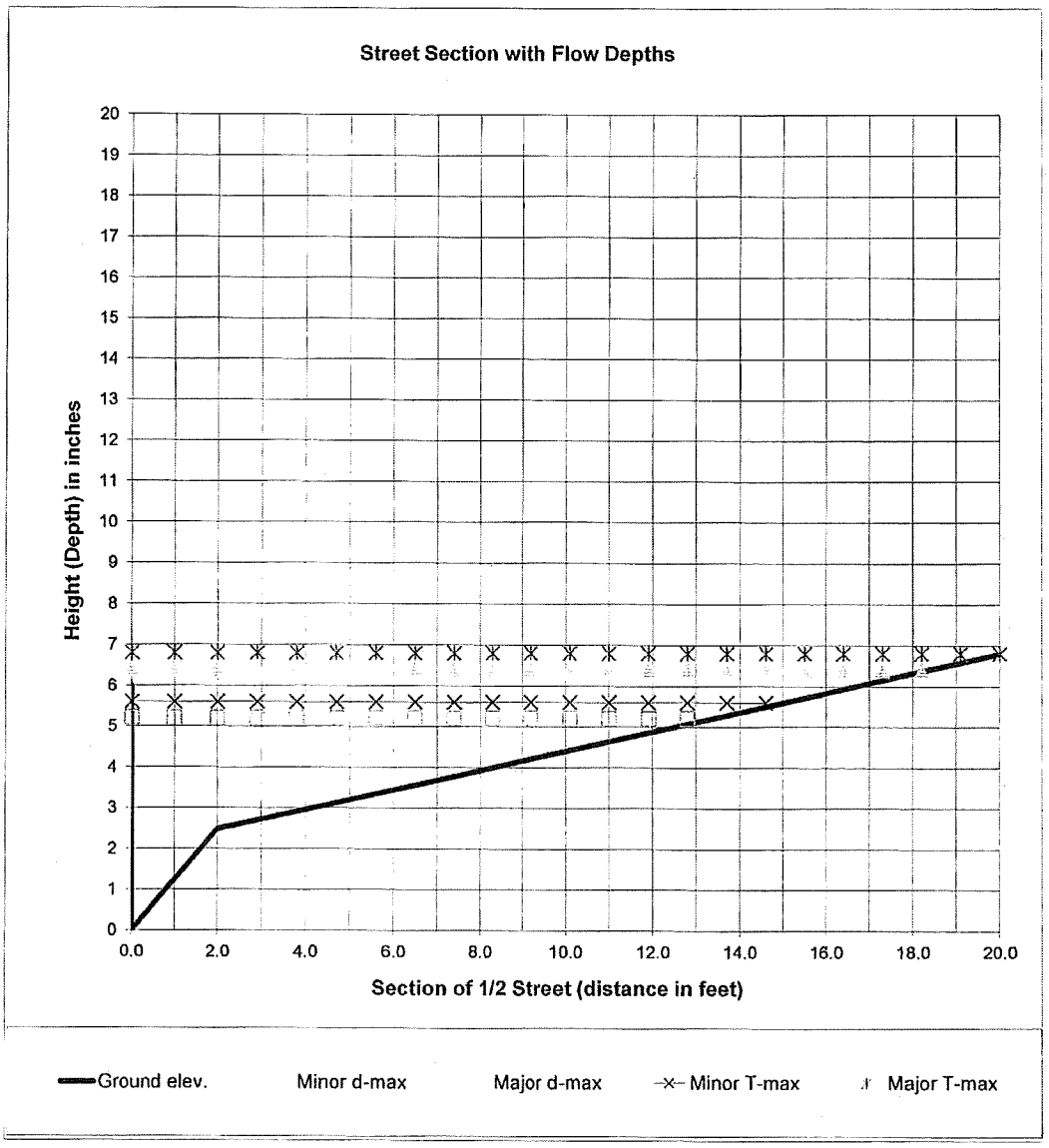
Maximum Gutter Capacity Based On Allowable Water Spread		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.60	4.80	inches
Water Depth with a Gutter Depression	d =	5.60	6.80	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	13.0	18.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.421	0.313	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Gutter Capacity Based on Allowable Gutter Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	13.3	18.3	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	11.3	16.3	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.473	0.343	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d		Minor Storm	Major Storm	
	Q_{allow} =	SUMP	SUMP	cfs

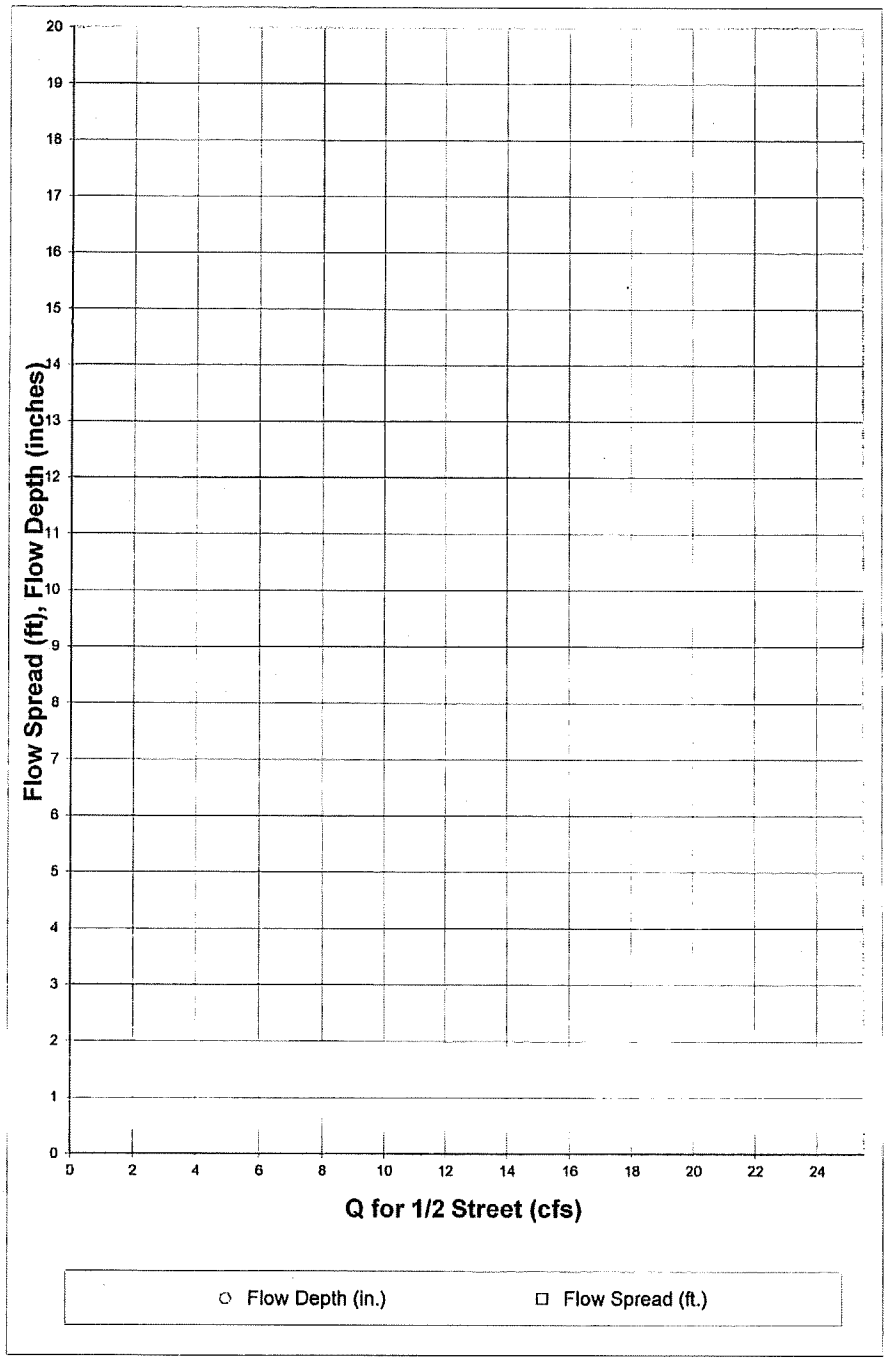
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
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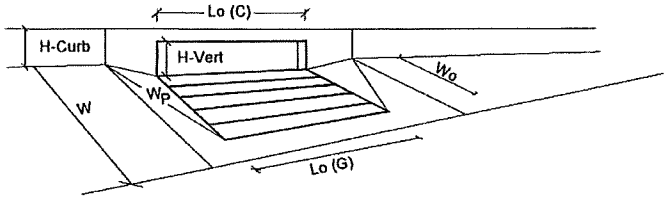
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

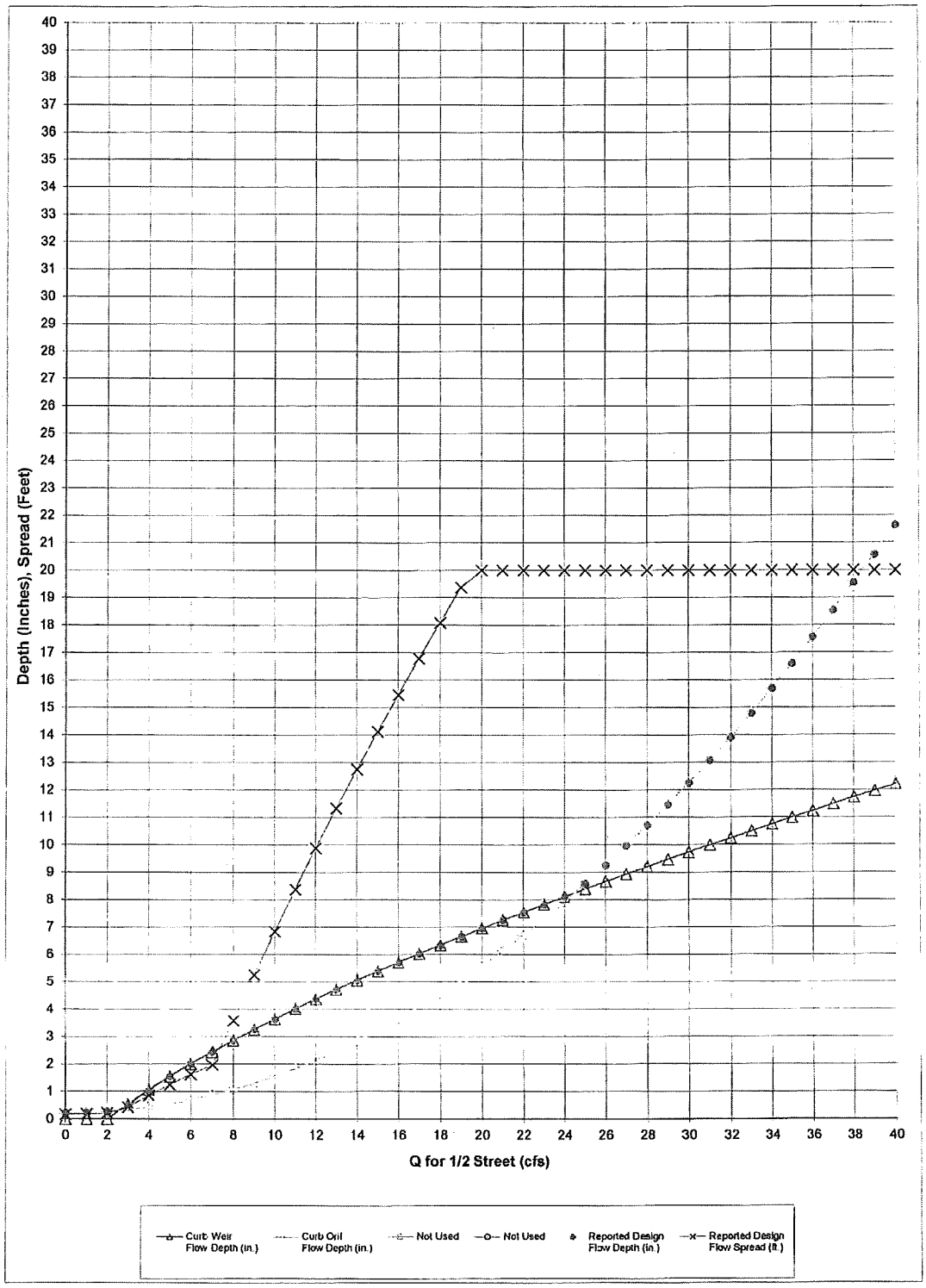
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-2



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 9.4 cfs curb)	d_{w1} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 9.4 cfs curb)	d_{w2} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 9.4 cfs curb)	d_{o1} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 9.4 cfs curb)	d_{o2} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	**inches**
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 9.4 cfs curb)	d_{w1} =	5.04	10.93	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 9.4 cfs curb)	d_{w2} =	5.41	11.73	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 9.4 cfs curb)	d_{o1} =	3.17	11.97	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 9.4 cfs curb)	d_{o2} =	3.40	14.26	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	3.41	12.26	**inches**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.0	15.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	9.4	30.0	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	3.41	12.26	**inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	5.9	20.0	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	5.52	**inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

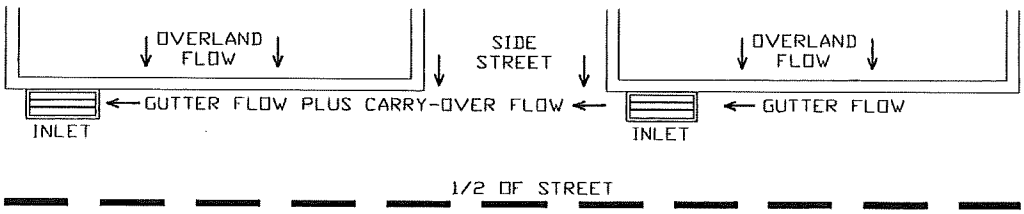
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.23			0.23	0.19
2.00	0.00	0.27			0.27	0.22
3.00	0.53	0.33			0.53	0.43
4.00	1.06	0.43			1.06	0.85
5.00	1.55	0.55			1.55	1.25
6.00	2.01	0.69			2.01	1.62
7.00	2.44	0.87			2.44	1.97
8.00	2.86	1.07			2.86	3.58
9.00	3.26	1.30			3.26	5.25
10.00	3.64	1.55			3.64	6.83
11.00	4.01	1.83			4.01	8.37
12.00	4.37	2.14			4.37	9.87
13.00	4.72	2.47			4.72	11.33
14.00	5.06	2.84			5.06	12.75
15.00	5.39	3.22			5.39	14.12
16.00	5.71	3.64			5.71	15.46
17.00	6.03	4.08			6.03	16.79
18.00	6.34	4.55			6.34	18.08
19.00	6.65	5.04			6.65	19.37
20.00	6.95	5.57			6.95	20.00
21.00	7.25	6.12			7.25	20.00
22.00	7.54	6.69			7.54	20.00
23.00	7.82	7.29			7.82	20.00
24.00	8.11	7.92			8.11	20.00
25.00	8.39	8.58			8.58	20.00
26.00	8.66	9.26			9.26	20.00
27.00	8.93	9.97			9.97	20.00
28.00	9.20	10.71			10.71	20.00
29.00	9.47	11.47			11.47	20.00
30.00	9.73	12.26			12.26	20.00
31.00	9.99	13.08			13.08	20.00
32.00	10.24	13.92			13.92	20.00
33.00	10.50	14.79			14.79	20.00
34.00	10.75	15.69			15.69	20.00
35.00	11.00	16.61			16.61	20.00
36.00	11.24	17.56			17.56	20.00
37.00	11.49	18.54			18.54	20.00
38.00	11.73	19.54			19.54	20.00
39.00	11.97	20.57			20.57	20.00
40.00	12.21	21.63			21.63	20.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-4

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	4.60	22.60	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)$ ^ C_3

	Minor Storm	Major Storm	
Design Storm Return Period, T_t =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

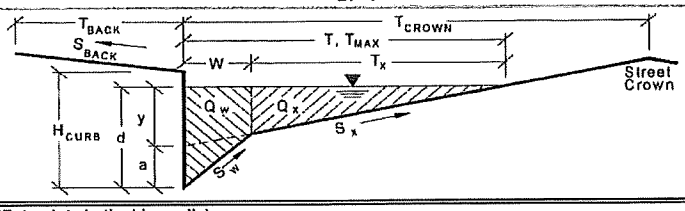
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	4.60	22.60	**cfs**

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-4



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	15.0	20.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	5.20	6.40	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

Maximum Gutter Capacity Based On Allowable Water Spread

		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	3.60	4.80	inches
Water Depth with a Gutter Depression	d =	5.60	6.80	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	13.0	18.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.421	0.313	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

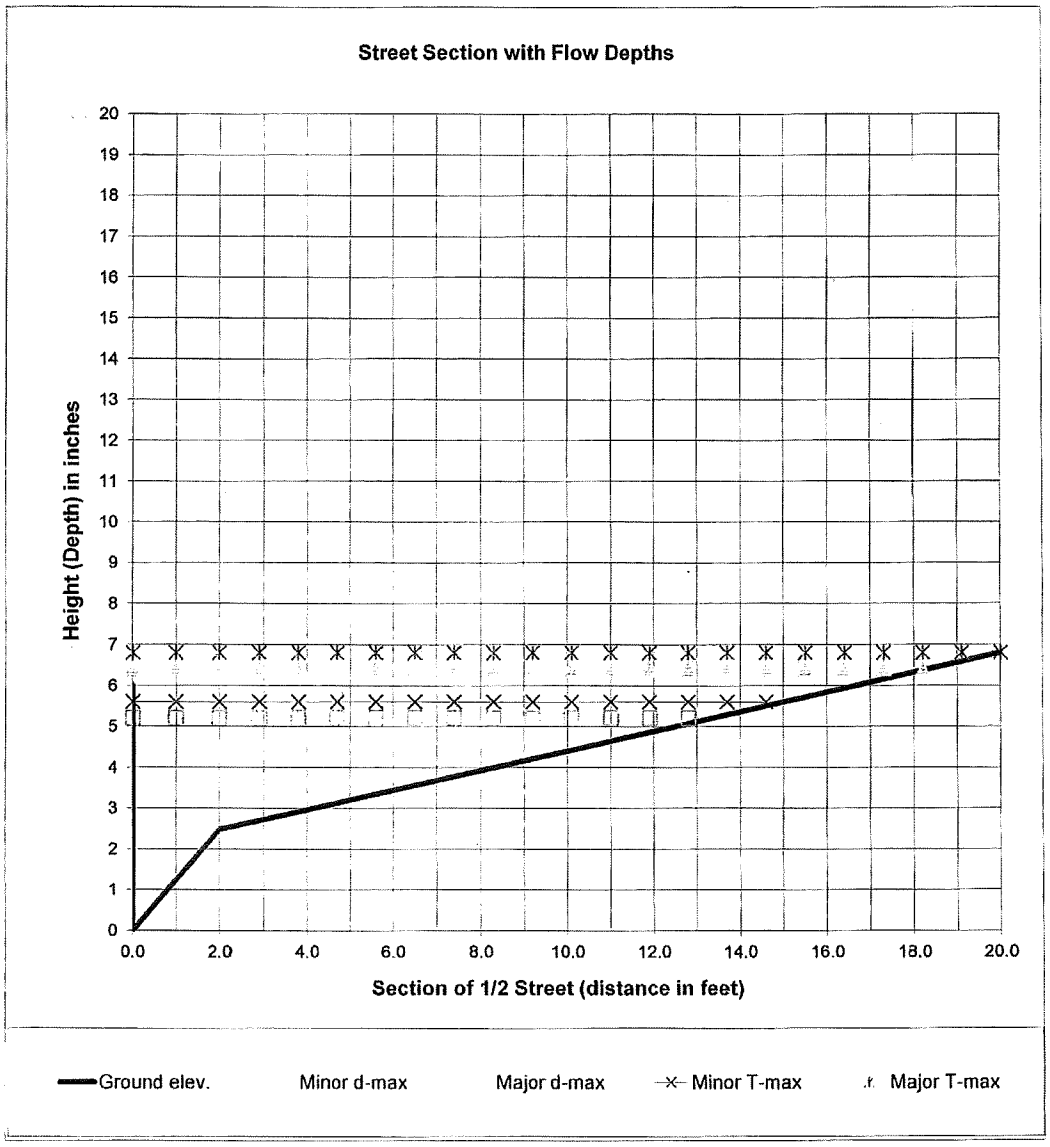
Maximum Gutter Capacity Based on Allowable Gutter Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	13.3	18.3	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	11.3	16.3	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.473	0.343	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	SUMP	SUMP	cfs

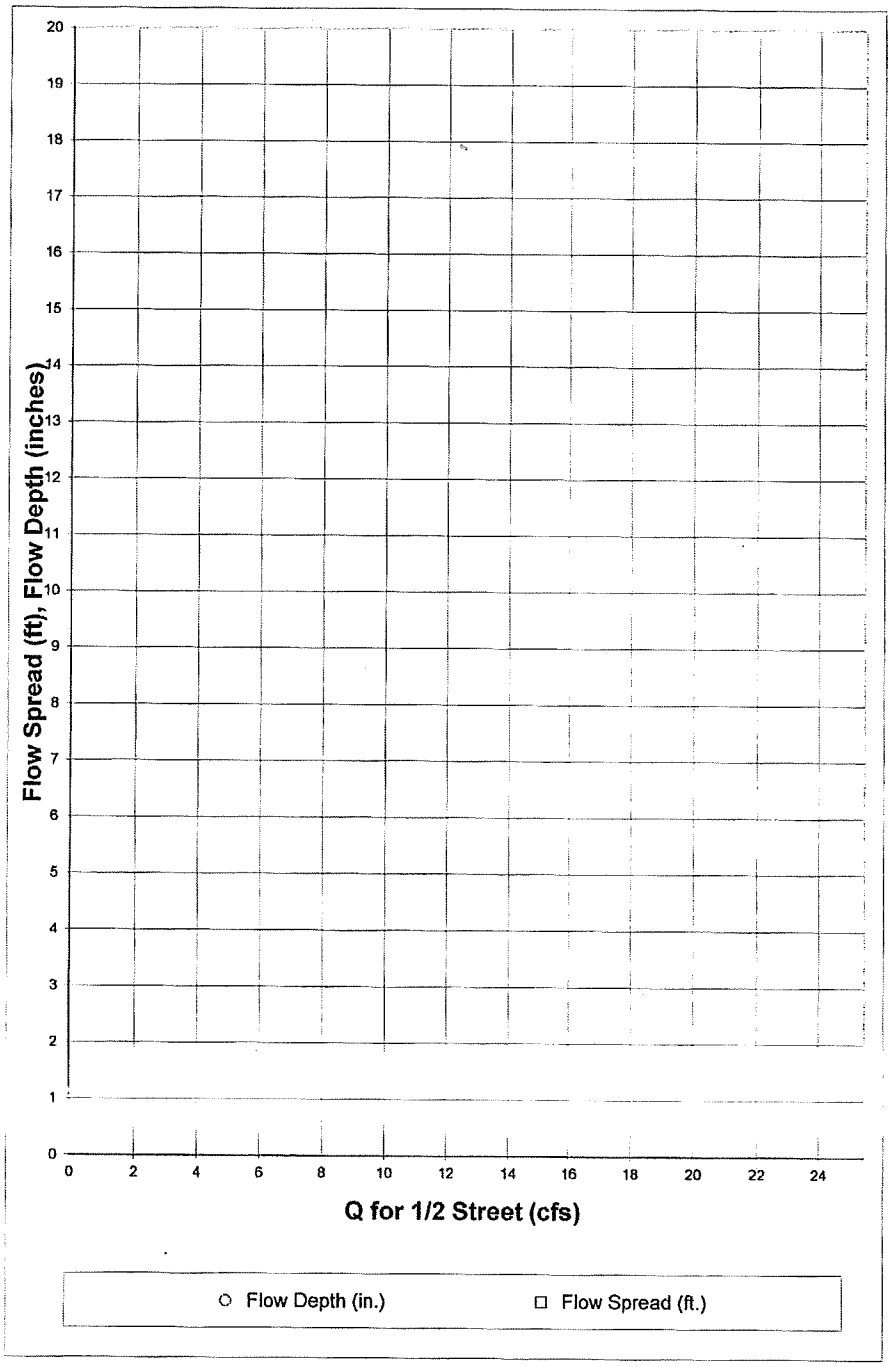
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
4.25		
4.50		
4.75		
5.00		
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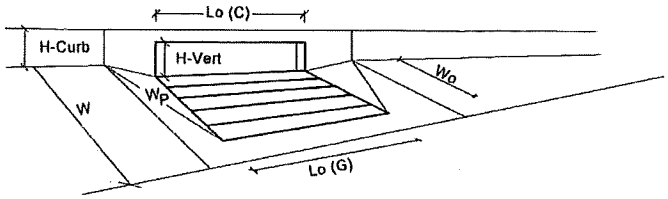
7.00		
7.25		
7.50		
7.75		
8.00		
8.25		
8.50		
8.75		
9.00		
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

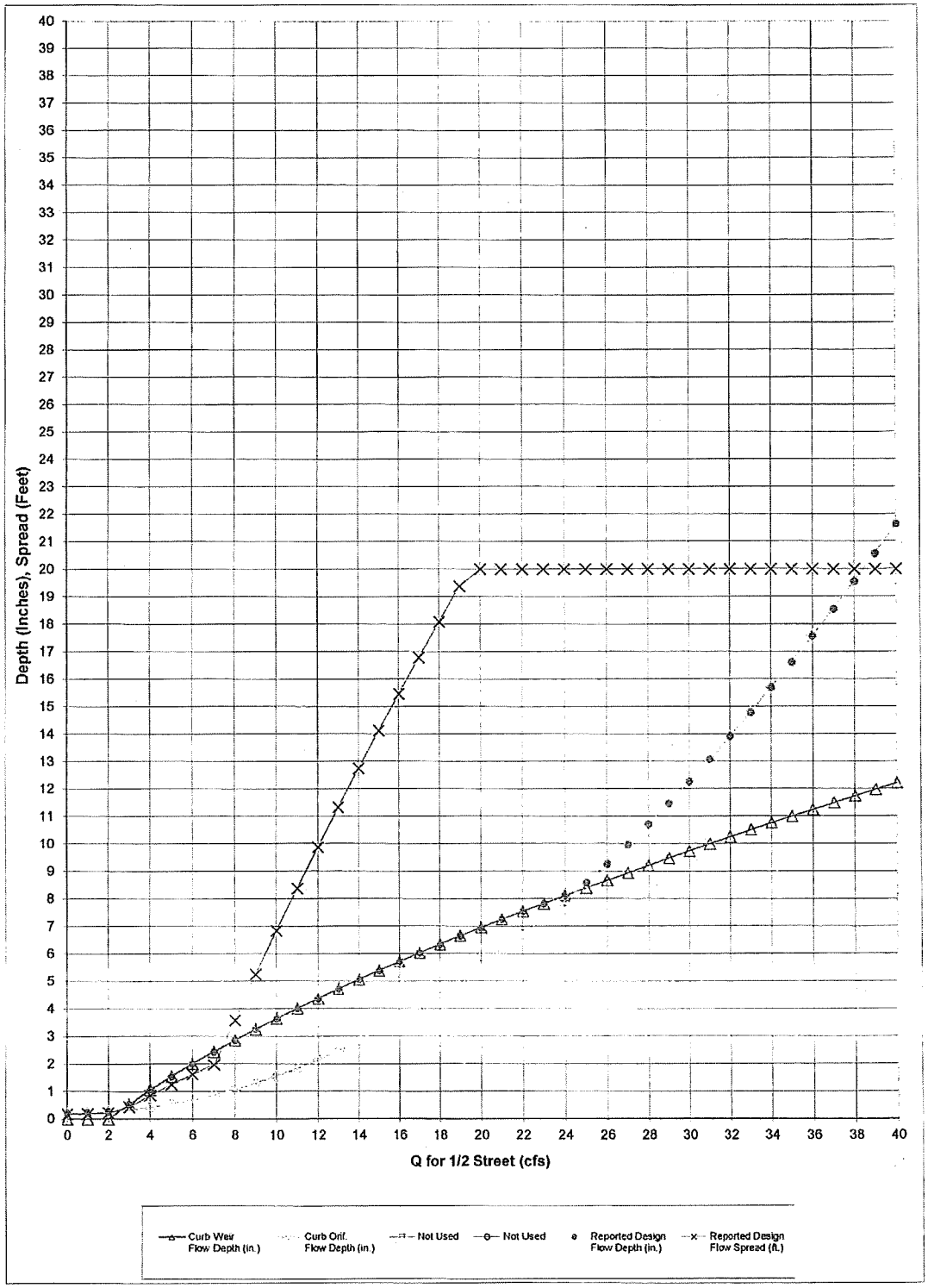
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-4



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.6 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.6 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.6 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.6 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	inches
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.6 cfs curb)	d_{wi} =	3.13	9.05	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.6 cfs curb)	d_{wa} =	3.36	9.71	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.6 cfs curb)	d_{oi} =	2.44	7.75	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.6 cfs curb)	d_{oa} =	2.50	9.05	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	1.36	7.71	inches
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.0	15.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	4.6	22.6	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	1.36	7.71	inches
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	1.1	20.0	ft. >T-Crown
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	0.96	inches


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif. Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

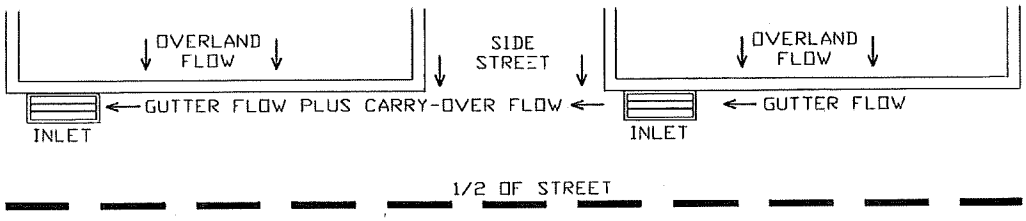
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.23			0.23	0.19
2.00	0.00	0.27			0.27	0.22
3.00	0.53	0.33			0.53	0.43
4.00	1.06	0.43			1.06	0.85
5.00	1.55	0.55			1.55	1.25
6.00	2.01	0.69			2.01	1.62
7.00	2.44	0.87			2.44	1.97
8.00	2.86	1.07			2.86	3.58
9.00	3.26	1.30			3.26	5.25
10.00	3.64	1.55			3.64	6.83
11.00	4.01	1.83			4.01	8.37
12.00	4.37	2.14			4.37	9.87
13.00	4.72	2.47			4.72	11.33
14.00	5.06	2.84			5.06	12.75
15.00	5.39	3.22			5.39	14.12
16.00	5.71	3.64			5.71	15.46
17.00	6.03	4.08			6.03	16.79
18.00	6.34	4.55			6.34	18.08
19.00	6.65	5.04			6.65	19.37
20.00	6.95	5.57			6.95	20.00
21.00	7.25	6.12			7.25	20.00
22.00	7.54	6.69			7.54	20.00
23.00	7.82	7.29			7.82	20.00
24.00	8.11	7.92			8.11	20.00
25.00	8.39	8.58			8.58	20.00
26.00	8.66	9.26			9.26	20.00
27.00	8.93	9.97			9.97	20.00
28.00	9.20	10.71			10.71	20.00
29.00	9.47	11.47			11.47	20.00
30.00	9.73	12.26			12.26	20.00
31.00	9.99	13.08			13.08	20.00
32.00	10.24	13.92			13.92	20.00
33.00	10.50	14.79			14.79	20.00
34.00	10.75	15.69			15.69	20.00
35.00	11.00	16.61			16.61	20.00
36.00	11.24	17.56			17.56	20.00
37.00	11.49	18.54			18.54	20.00
38.00	11.73	19.54			19.54	20.00
39.00	11.97	20.57			20.57	20.00
40.00	12.21	21.63			21.63	20.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-8

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	5.00	29.80	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

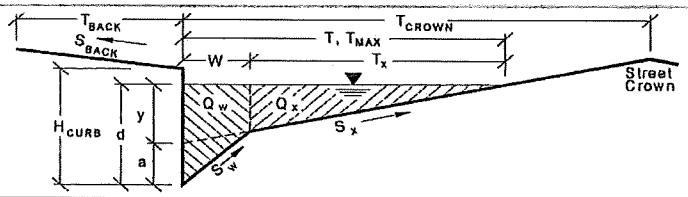
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	5.00	29.80	**cfs**

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-8



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0260	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	21.0	26.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	10.30	inches
Allow Flow Depth at Street Crown (leave blank for no)			X	X = yes

Maximum Gutter Capacity Based On Allowable Water Spread

		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1093	0.1093	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	6.55	8.11	inches
Water Depth with a Gutter Depression	d =	8.55	10.11	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	19.0	24.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.283	0.226	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

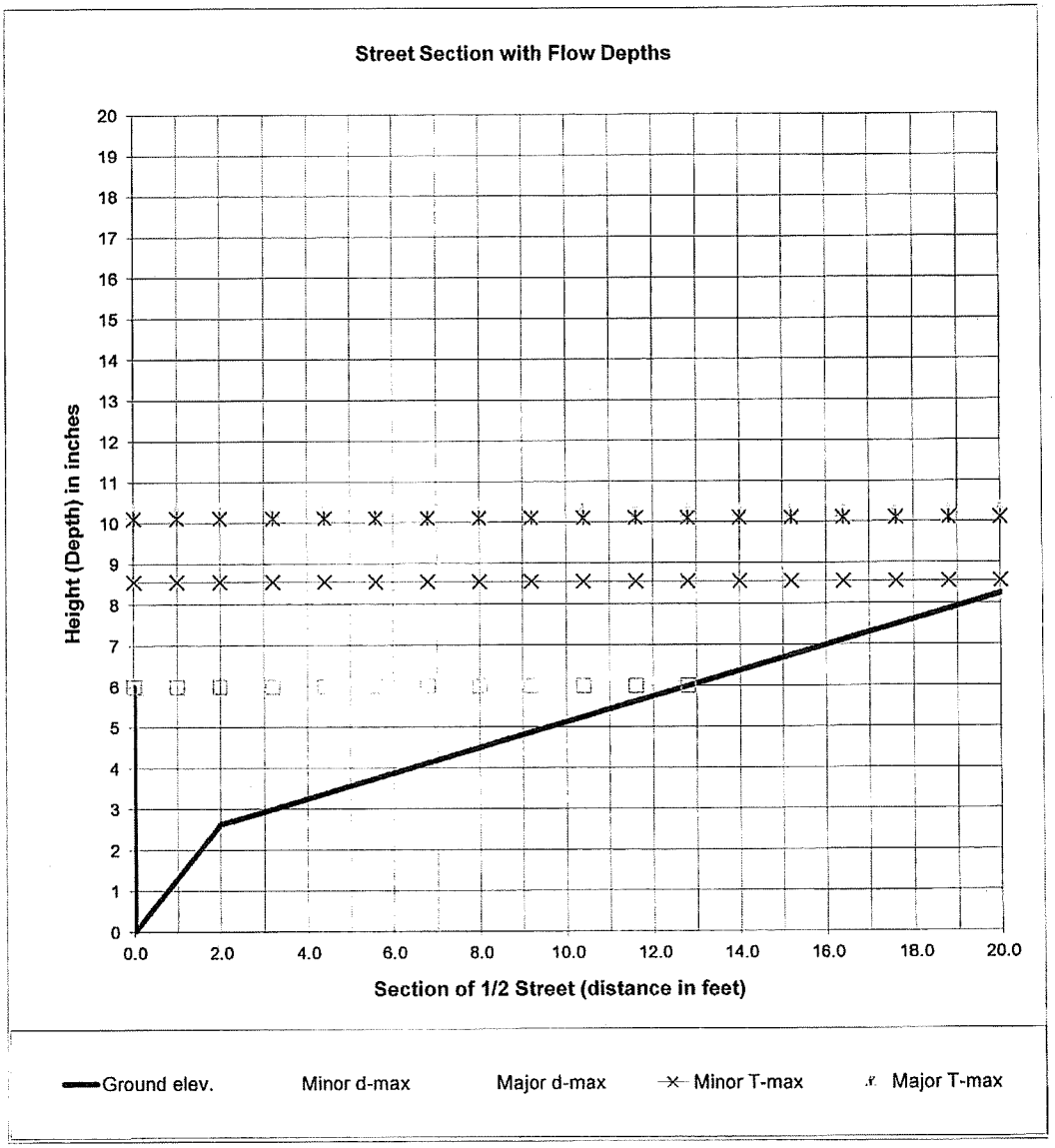
Maximum Gutter Capacity Based on Allowable Gutter Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	12.8	26.6	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	10.8	24.6	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.464	0.221	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor ($d \geq 6$") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	SUMP	SUMP	cfs

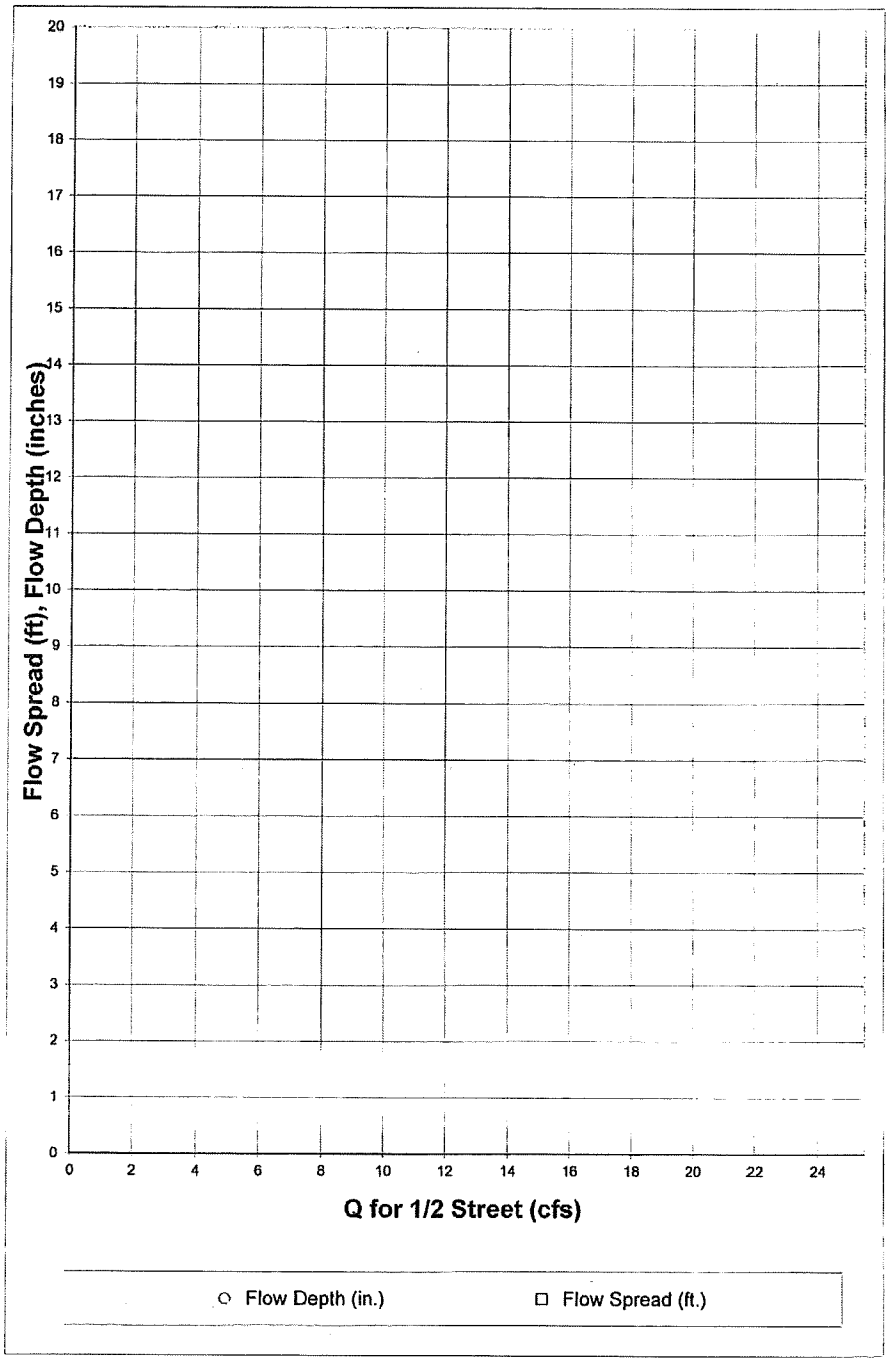
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
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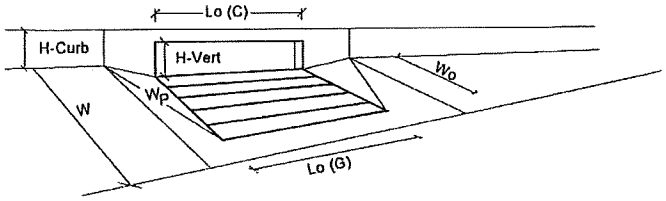
8.00		
8.25		
8.50		
8.75		
9.00		
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

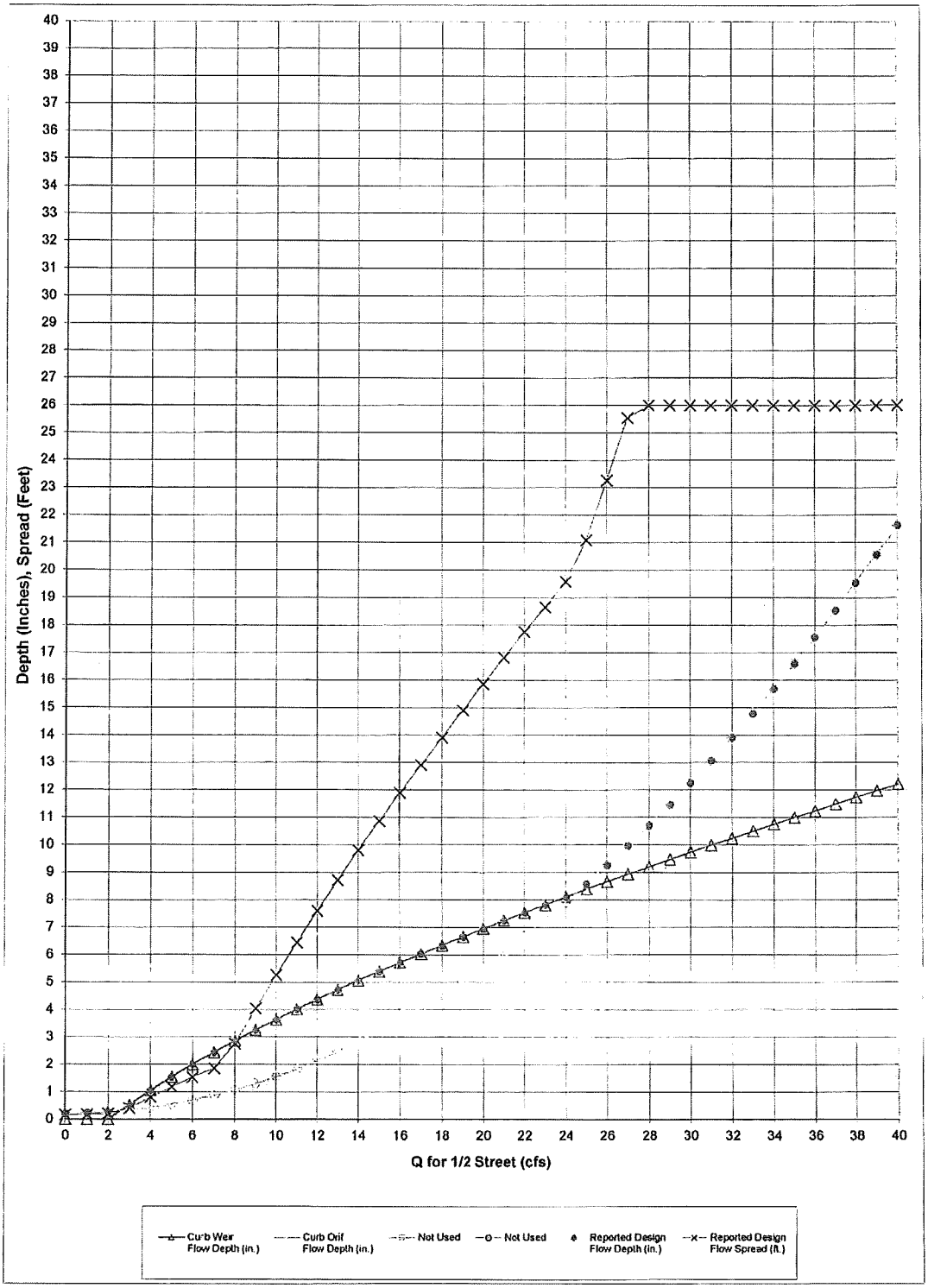
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-8



		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 5 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-wi}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 5 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 5 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 5 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	inches
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 5 cfs curb)	d_{wi} =	3.31	10.88	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 5 cfs curb)	d_{wa} =	3.55	11.68	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 5 cfs curb)	d_{oi} =	2.48	11.84	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 5 cfs curb)	d_{oa} =	2.55	14.10	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	**1.55**	**12.10**	**inches**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.0	15.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	5.0	29.8	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	**1.55**	**12.10**	**inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	**1.2**	**26.0**	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	**0.00**	**2.04**	**inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

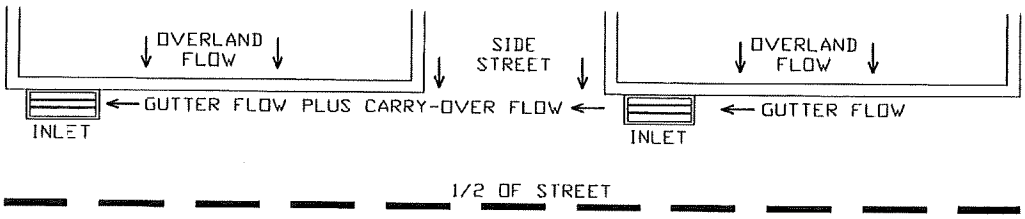
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.16
1.00	0.00	0.23			0.23	0.18
2.00	0.00	0.27			0.27	0.21
3.00	0.53	0.33			0.53	0.40
4.00	1.06	0.43			1.06	0.81
5.00	1.55	0.55			1.55	1.18
6.00	2.01	0.69			2.01	1.53
7.00	2.44	0.87			2.44	1.86
8.00	2.86	1.07			2.86	2.76
9.00	3.26	1.30			3.26	4.04
10.00	3.64	1.55			3.64	5.26
11.00	4.01	1.83			4.01	6.44
12.00	4.37	2.14			4.37	7.59
13.00	4.72	2.47			4.72	8.72
14.00	5.06	2.84			5.06	9.81
15.00	5.39	3.22			5.39	10.86
16.00	5.71	3.64			5.71	11.89
17.00	6.03	4.08			6.03	12.92
18.00	6.34	4.55			6.34	13.91
19.00	6.65	5.04			6.65	14.90
20.00	6.95	5.57			6.95	15.86
21.00	7.25	6.12			7.25	16.83
22.00	7.54	6.69			7.54	17.76
23.00	7.82	7.29			7.82	18.65
24.00	8.11	7.92			8.11	19.58
25.00	8.39	8.58			8.58	21.09
26.00	8.66	9.26			9.26	23.27
27.00	8.93	9.97			9.97	25.54
28.00	9.20	10.71			10.71	26.00
29.00	9.47	11.47			11.47	26.00
30.00	9.73	12.26			12.26	26.00
31.00	9.99	13.08			13.08	26.00
32.00	10.24	13.92			13.92	26.00
33.00	10.50	14.79			14.79	26.00
34.00	10.75	15.69			15.69	26.00
35.00	11.00	16.61			16.61	26.00
36.00	11.24	17.56			17.56	26.00
37.00	11.49	18.54			18.54	26.00
38.00	11.73	19.54			19.54	26.00
39.00	11.97	20.57			20.57	26.00
40.00	12.21	21.63			21.63	26.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-9

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	0.70	3.50	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

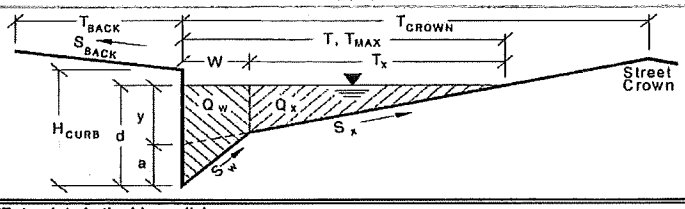
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	0.70	3.50	**cfs**

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-9



Gutter Geometry (Enter data in the blue cells)			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	21.0	26.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	2.10	2.10	inches
Allow Flow Depth at Street Crown (leave blank for no)			X	X = yes

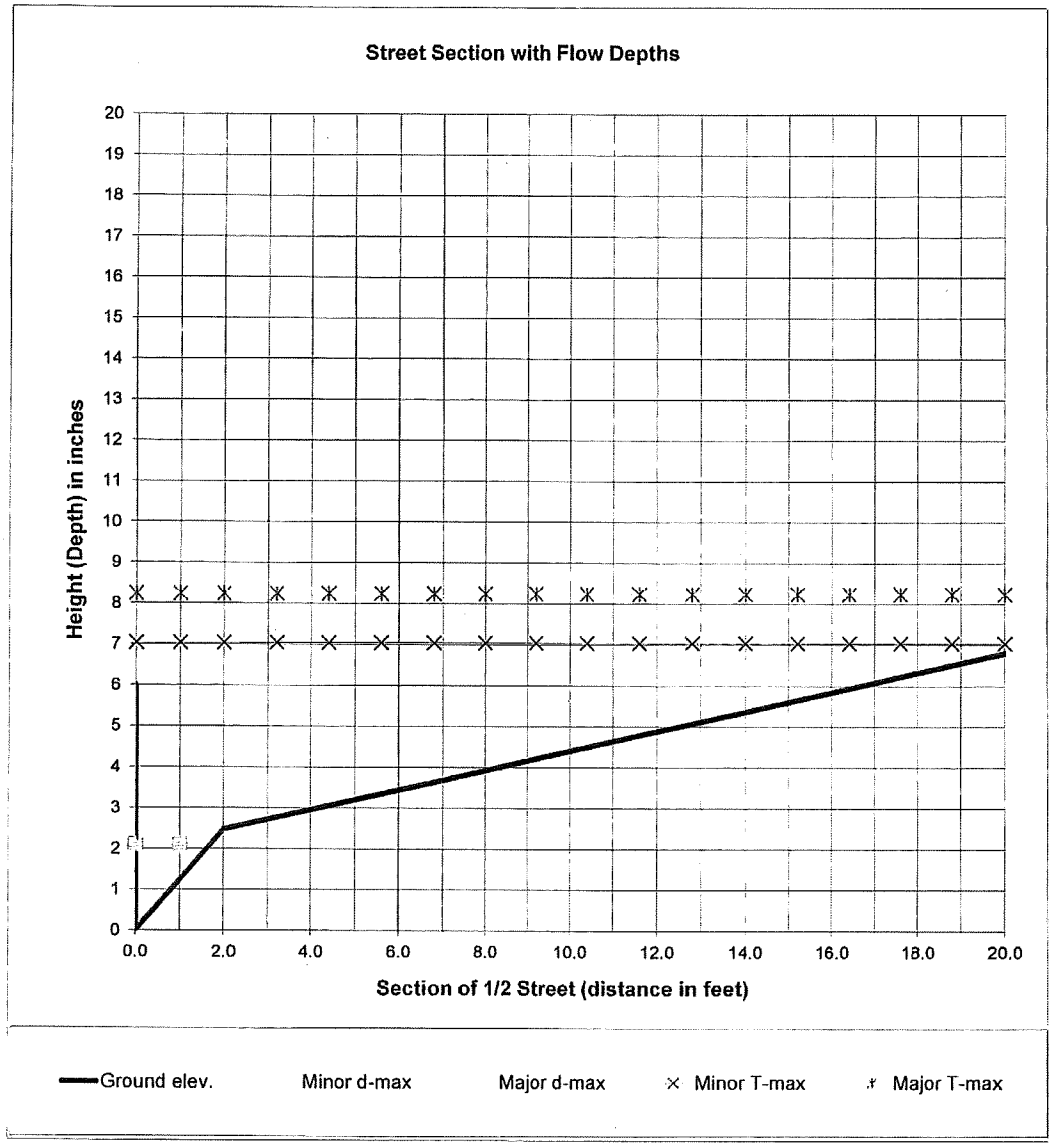
Maximum Gutter Capacity Based On Allowable Water Spread		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	5.04	6.24	inches
Water Depth with a Gutter Depression	d =	7.04	8.24	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	19.0	24.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.297	0.236	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Gutter Capacity Based on Allowable Gutter Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	0.4	0.4	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	0.0	0.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	1.000	1.000	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	#DIV/0!	#DIV/0!	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	#DIV/0!	#DIV/0!	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	#DIV/0!	#DIV/0!	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	SUMP	SUMP	cfs

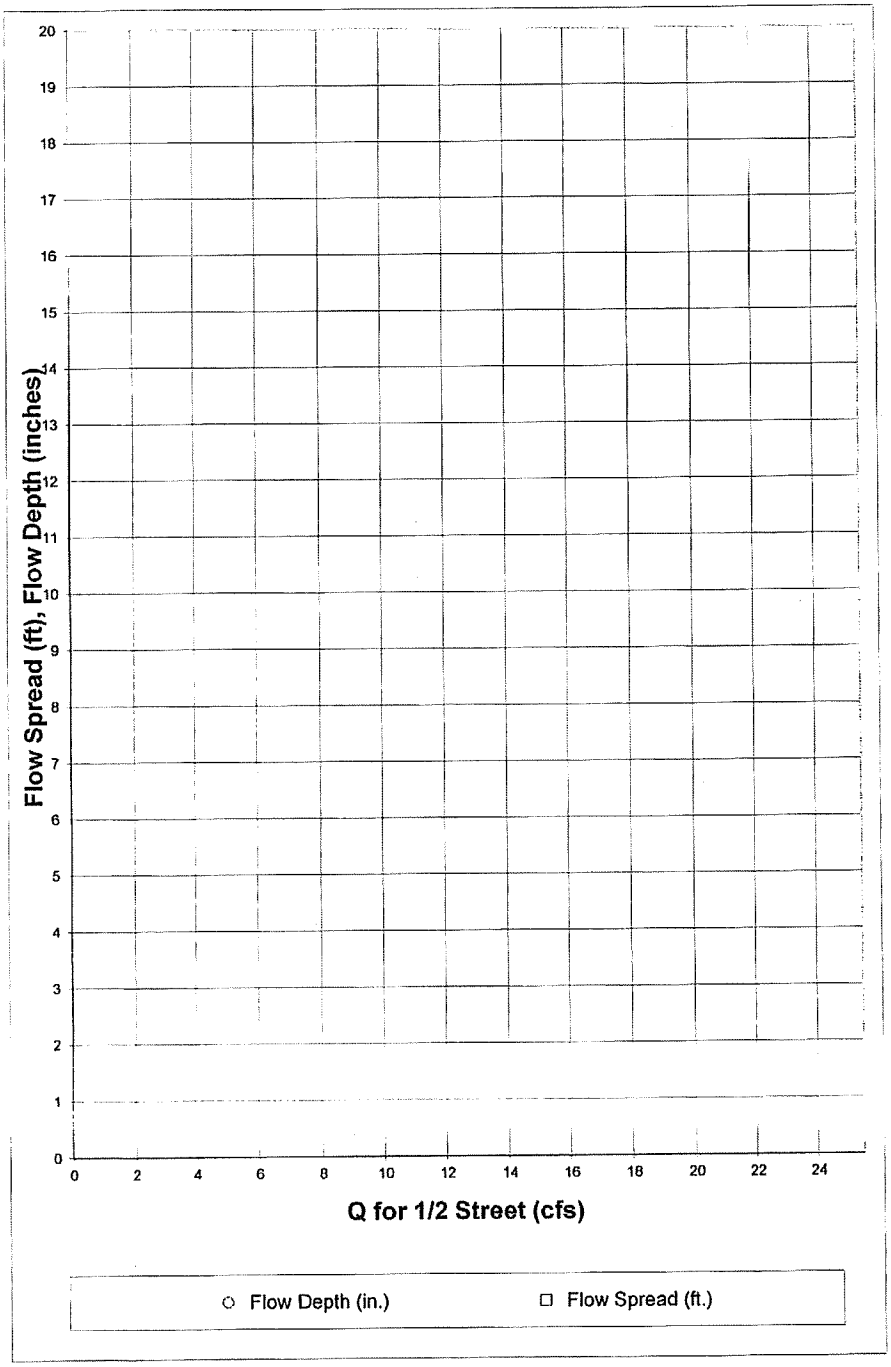
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
4.25		
4.50		
4.75		
5.00		
5.25		
5.50		
5.75		
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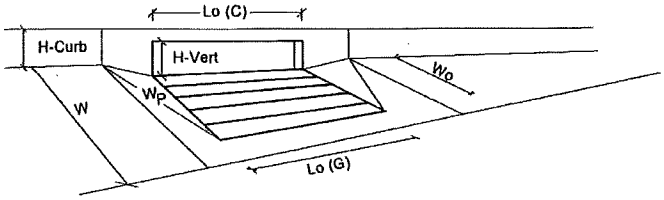
6.50		
6.75		
7.00		
7.25		
7.50		
7.75		
8.00		
8.25		
8.50		
8.75		
9.00		
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

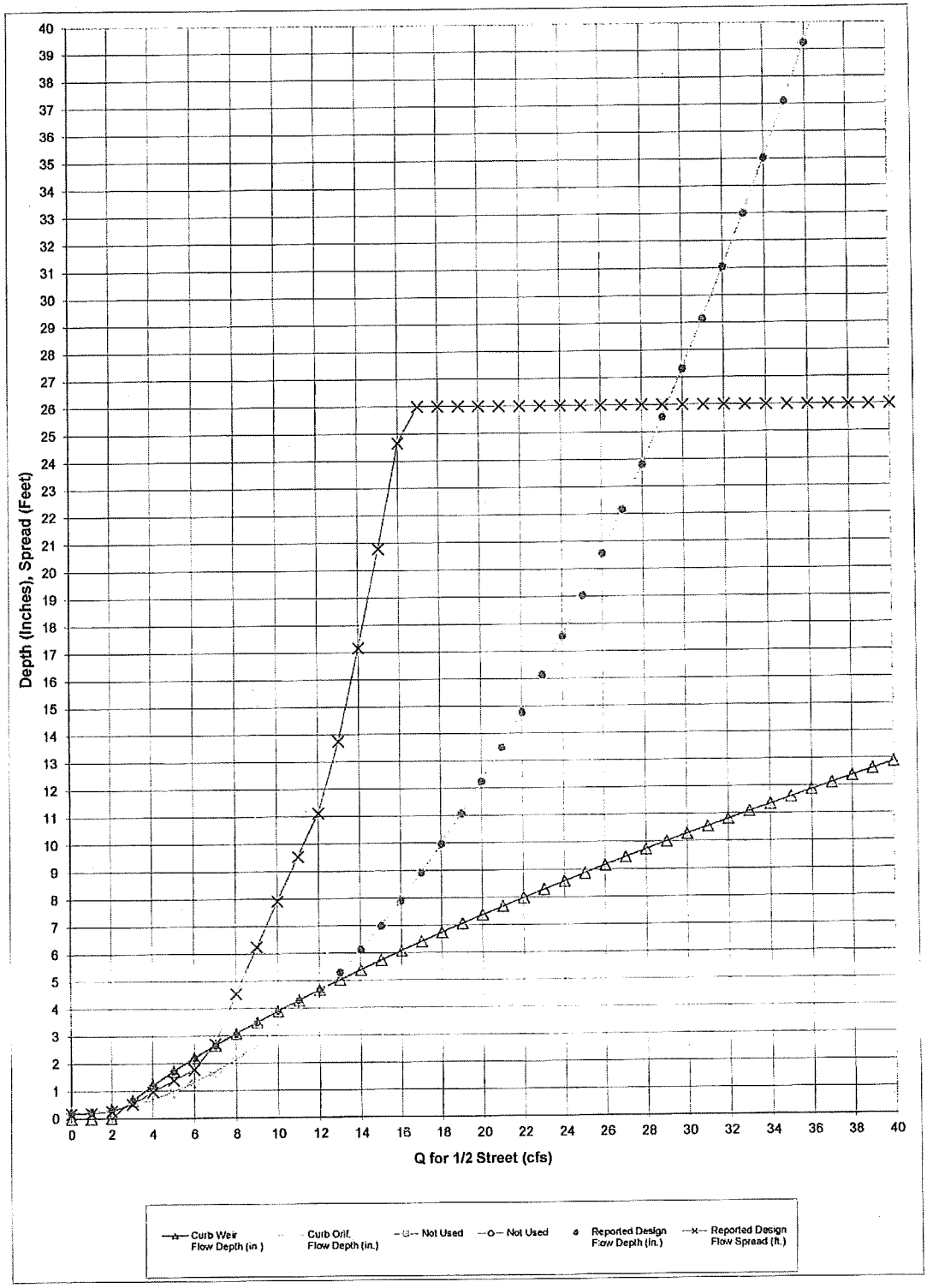
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-9



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 0.7 cfs curb)	d_{wl} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-wl}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 0.7 cfs curb)	d_{wcl} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 0.7 cfs curb)	d_{ol} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 0.7 cfs curb)	d_{ocl} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	**inches**
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 0.7 cfs curb)	d_{wl} =	0.95	2.79	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 0.7 cfs curb)	d_{wcl} =	1.00	2.93	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 0.7 cfs curb)	d_{ol} =	2.22	2.51	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 0.7 cfs curb)	d_{ocl} =	2.23	2.58	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	0.23	0.93	**inches**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	0.7	3.5	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	0.23	0.93	**inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	0.2	0.8	**feet**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	0.00	**inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif. Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

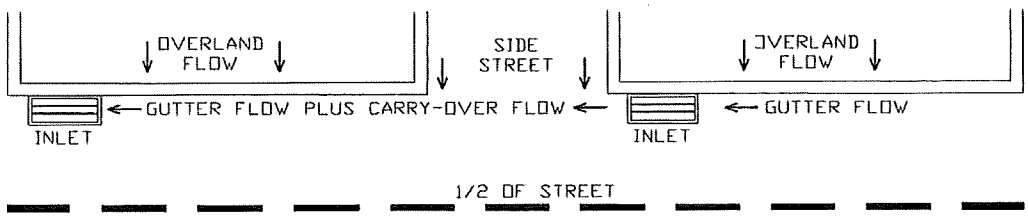
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.24			0.24	0.19
2.00	0.02	0.33			0.33	0.27
3.00	0.65	0.48			0.65	0.52
4.00	1.20	0.69			1.20	0.97
5.00	1.72	0.97			1.72	1.39
6.00	2.20	1.30			2.20	1.77
7.00	2.65	1.69			2.65	2.71
8.00	3.09	2.14			3.09	4.54
9.00	3.50	2.65			3.50	6.25
10.00	3.90	3.22			3.90	7.92
11.00	4.29	3.86			4.29	9.54
12.00	4.67	4.55			4.67	11.12
13.00	5.03	5.30			5.30	13.75
14.00	5.39	6.12			6.12	17.17
15.00	5.74	6.99			6.99	20.79
16.00	6.08	7.92			7.92	24.67
17.00	6.41	8.92			8.92	26.00
18.00	6.74	9.97			9.97	26.00
19.00	7.06	11.08			11.08	26.00
20.00	7.37	12.26			12.26	26.00
21.00	7.68	13.49			13.49	26.00
22.00	7.99	14.79			14.79	26.00
23.00	8.29	16.14			16.14	26.00
24.00	8.58	17.56			17.56	26.00
25.00	8.87	19.04			19.04	26.00
26.00	9.16	20.57			20.57	26.00
27.00	9.45	22.17			22.17	26.00
28.00	9.73	23.82			23.82	26.00
29.00	10.01	25.54			25.54	26.00
30.00	10.28	27.32			27.32	26.00
31.00	10.55	29.15			29.15	26.00
32.00	10.82	31.05			31.05	26.00
33.00	11.09	33.01			33.01	26.00
34.00	11.35	35.03			35.03	26.00
35.00	11.61	37.11			37.11	26.00
36.00	11.87	39.24			39.24	26.00
37.00	12.12	41.44			41.44	26.00
38.00	12.38	43.70			43.70	26.00
39.00	12.63	46.02			46.02	26.00
40.00	12.88	48.40			48.40	26.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-10

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	6.60	20.70	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c) ^ C_3$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

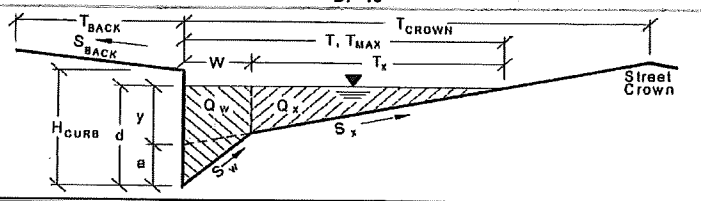
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	6.60	20.70	**cfs**

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-10



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
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 Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	18.00	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

Maximum Gutter Capacity Based On Allowable Water Spread

		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	2.88	4.08	inches
Water Depth with a Gutter Depression	d =	4.88	6.08	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.522	0.371	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

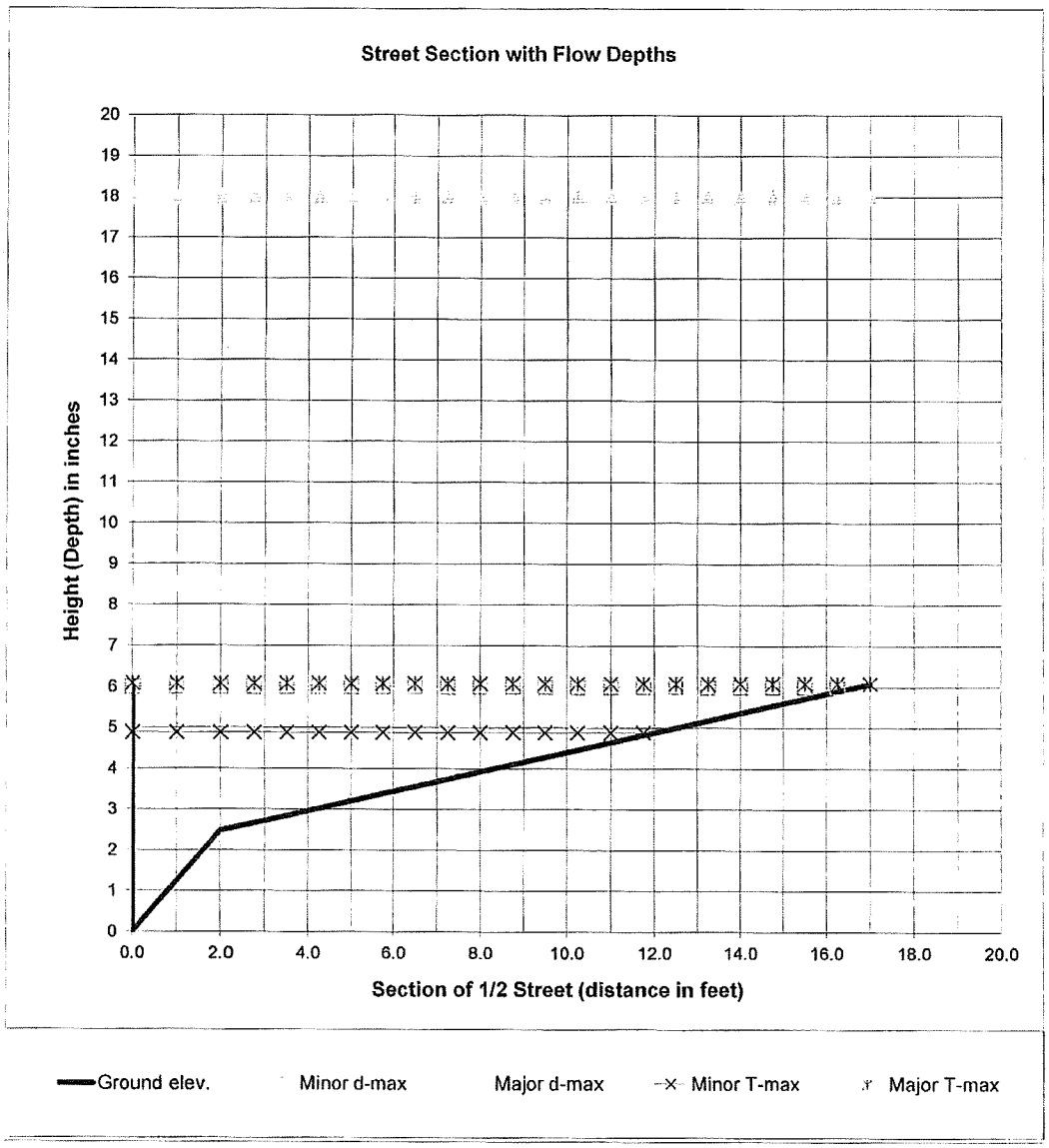
Maximum Gutter Capacity Based on Allowable Gutter Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	66.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	64.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.378	0.086	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	SUMP	SUMP	cfs

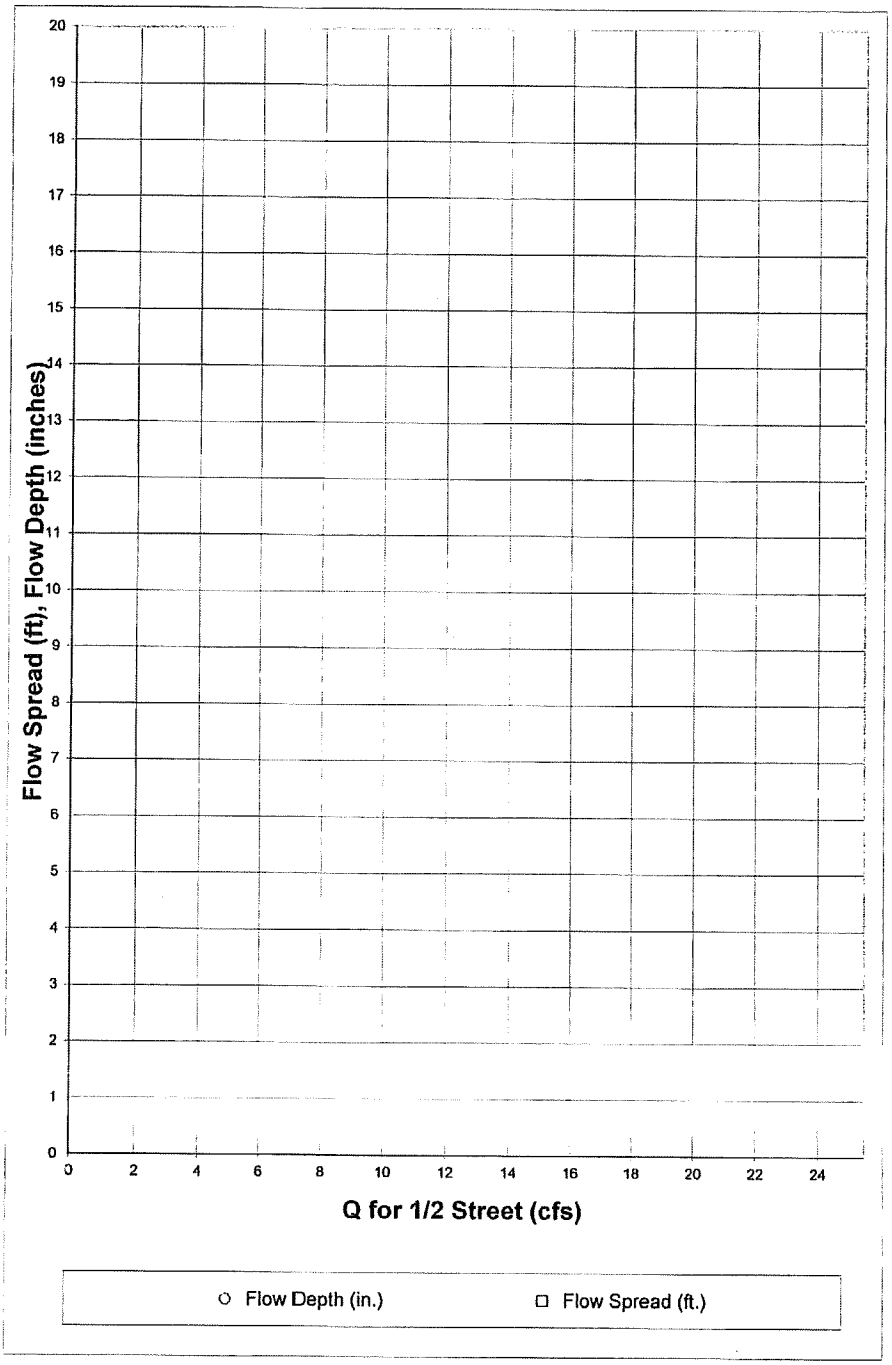
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
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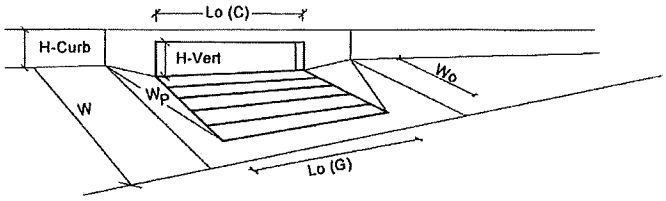
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

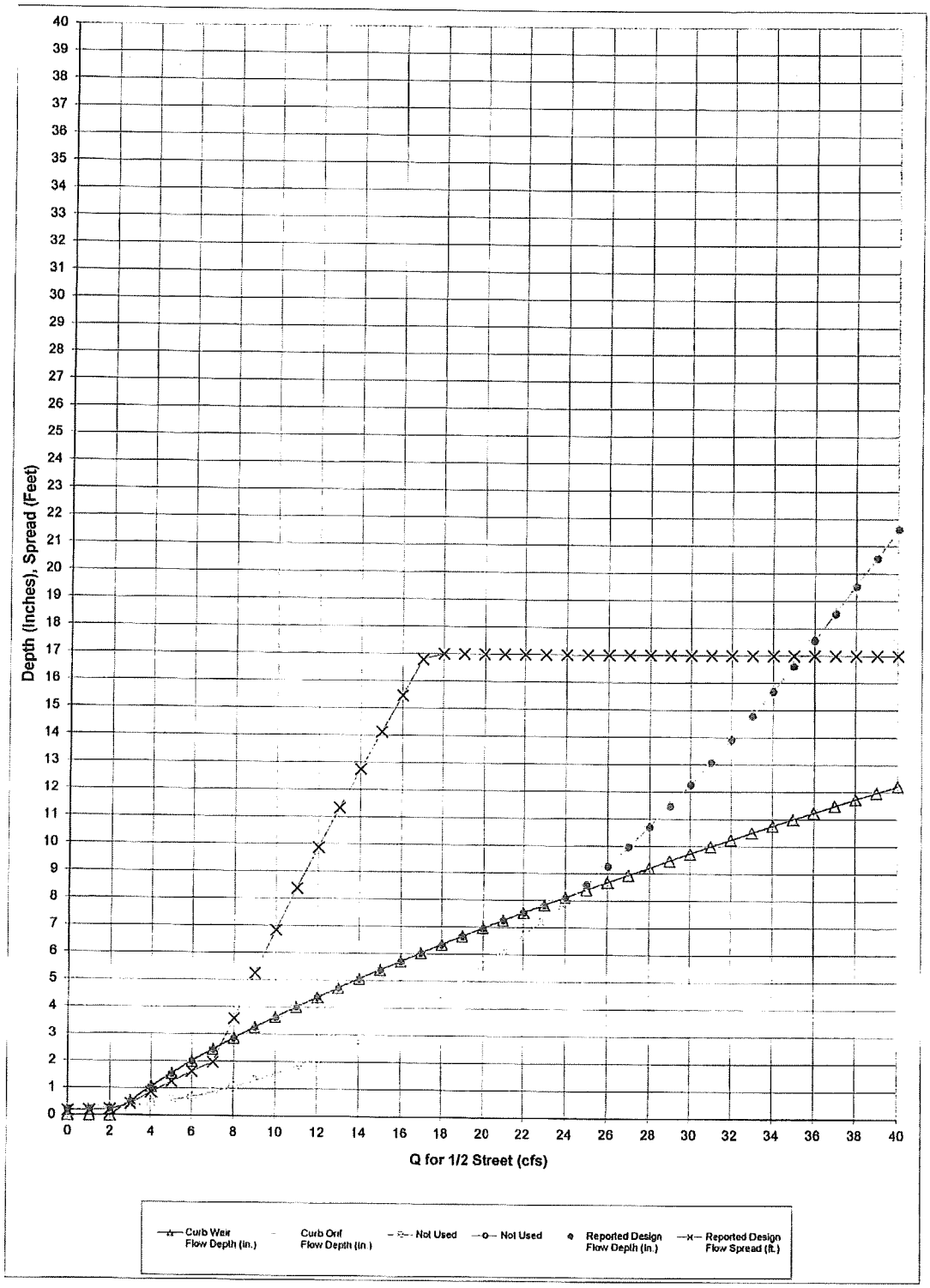
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-10



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 6.6 cfs curb)	d_{wl} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 6.6 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 6.6 cfs curb)	d_{ol} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 6.6 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	**inches**
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 6.6 cfs curb)	d_{wl} =	3.98	8.54	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 6.6 cfs curb)	d_{wa} =	4.27	9.16	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 6.6 cfs curb)	d_{ol} =	2.69	6.86	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 6.6 cfs curb)	d_{oa} =	2.80	7.95	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	2.27	7.16	**inches**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.0	15.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	6.6	20.7	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	2.27	7.16	**inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	1.8	17.0	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	1.08	**inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

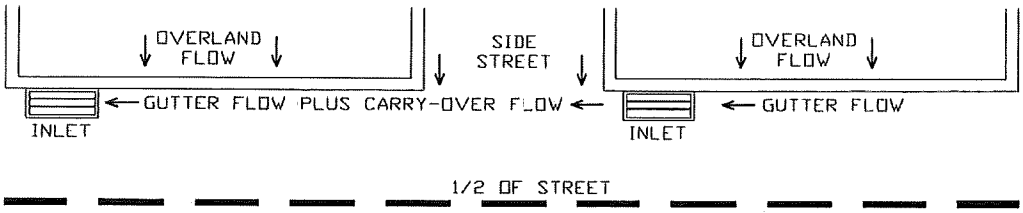
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.23			0.23	0.19
2.00	0.00	0.27			0.27	0.22
3.00	0.53	0.33			0.53	0.43
4.00	1.06	0.43			1.06	0.85
5.00	1.55	0.55			1.55	1.25
6.00	2.01	0.69			2.01	1.62
7.00	2.44	0.87			2.44	1.97
8.00	2.86	1.07			2.86	3.58
9.00	3.26	1.30			3.26	5.25
10.00	3.64	1.55			3.64	6.83
11.00	4.01	1.83			4.01	8.37
12.00	4.37	2.14			4.37	9.87
13.00	4.72	2.47			4.72	11.33
14.00	5.06	2.84			5.06	12.75
15.00	5.39	3.22			5.39	14.12
16.00	5.71	3.64			5.71	15.46
17.00	6.03	4.08			6.03	16.79
18.00	6.34	4.55			6.34	17.00
19.00	6.65	5.04			6.65	17.00
20.00	6.95	5.57			6.95	17.00
21.00	7.25	6.12			7.25	17.00
22.00	7.54	6.69			7.54	17.00
23.00	7.82	7.29			7.82	17.00
24.00	8.11	7.92			8.11	17.00
25.00	8.39	8.58			8.58	17.00
26.00	8.66	9.26			9.26	17.00
27.00	8.93	9.97			9.97	17.00
28.00	9.20	10.71			10.71	17.00
29.00	9.47	11.47			11.47	17.00
30.00	9.73	12.26			12.26	17.00
31.00	9.99	13.08			13.08	17.00
32.00	10.24	13.92			13.92	17.00
33.00	10.50	14.79			14.79	17.00
34.00	10.75	15.69			15.69	17.00
35.00	11.00	16.61			16.61	17.00
36.00	11.24	17.56			17.56	17.00
37.00	11.49	18.54			18.54	17.00
38.00	11.73	19.54			19.54	17.00
39.00	11.97	20.57			20.57	17.00
40.00	12.21	21.63			21.63	17.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-11

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	3.50	14.70	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c) ^ C_3$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

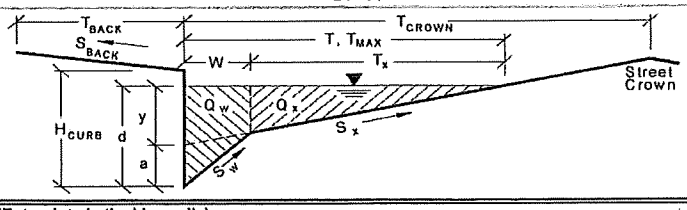
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	3.50	14.70	cfs

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-11



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
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 Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	18.00	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

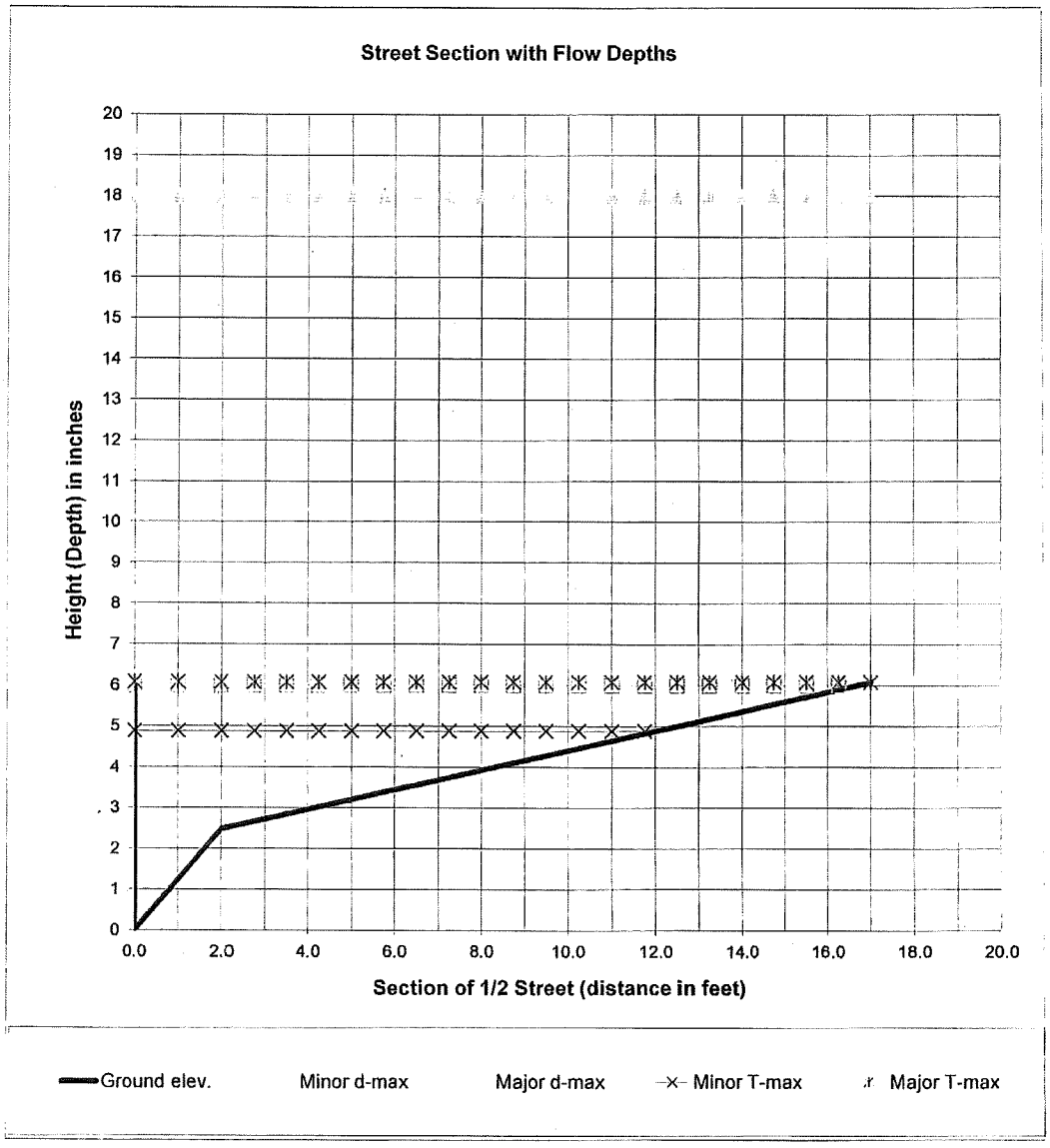
Maximum Gutter Capacity Based On Allowable Water Spread		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	2.88	4.08	inches
Water Depth with a Gutter Depression	d =	4.88	6.08	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.522	0.371	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Gutter Capacity Based on Allowable Gutter Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	66.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	64.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.378	0.086	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	SUMP	SUMP	cfs

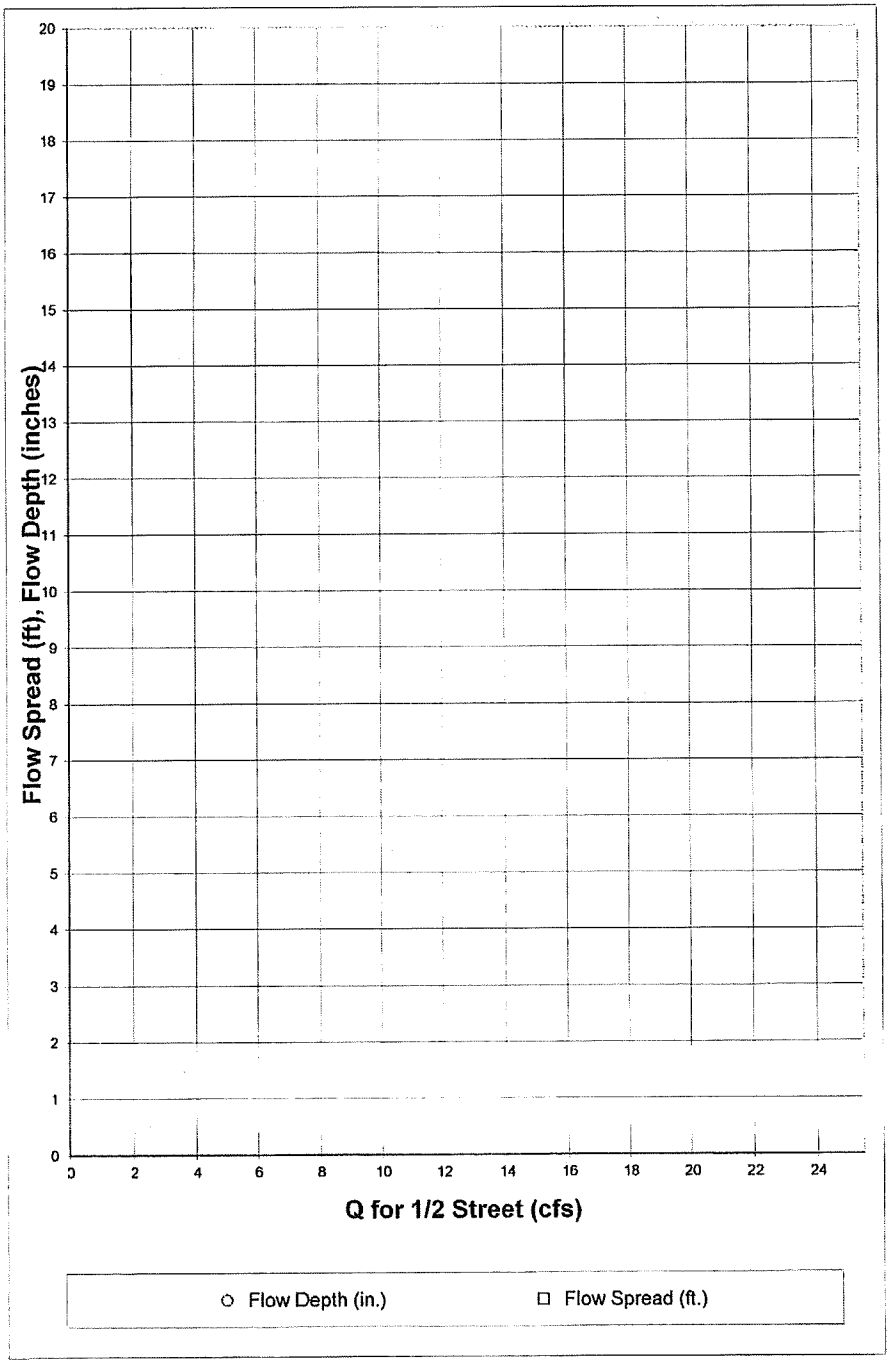
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
4.25		
4.50		
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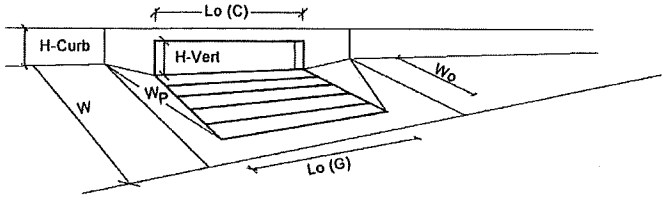
8.00		
8.25		
8.50		
8.75		
9.00		
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

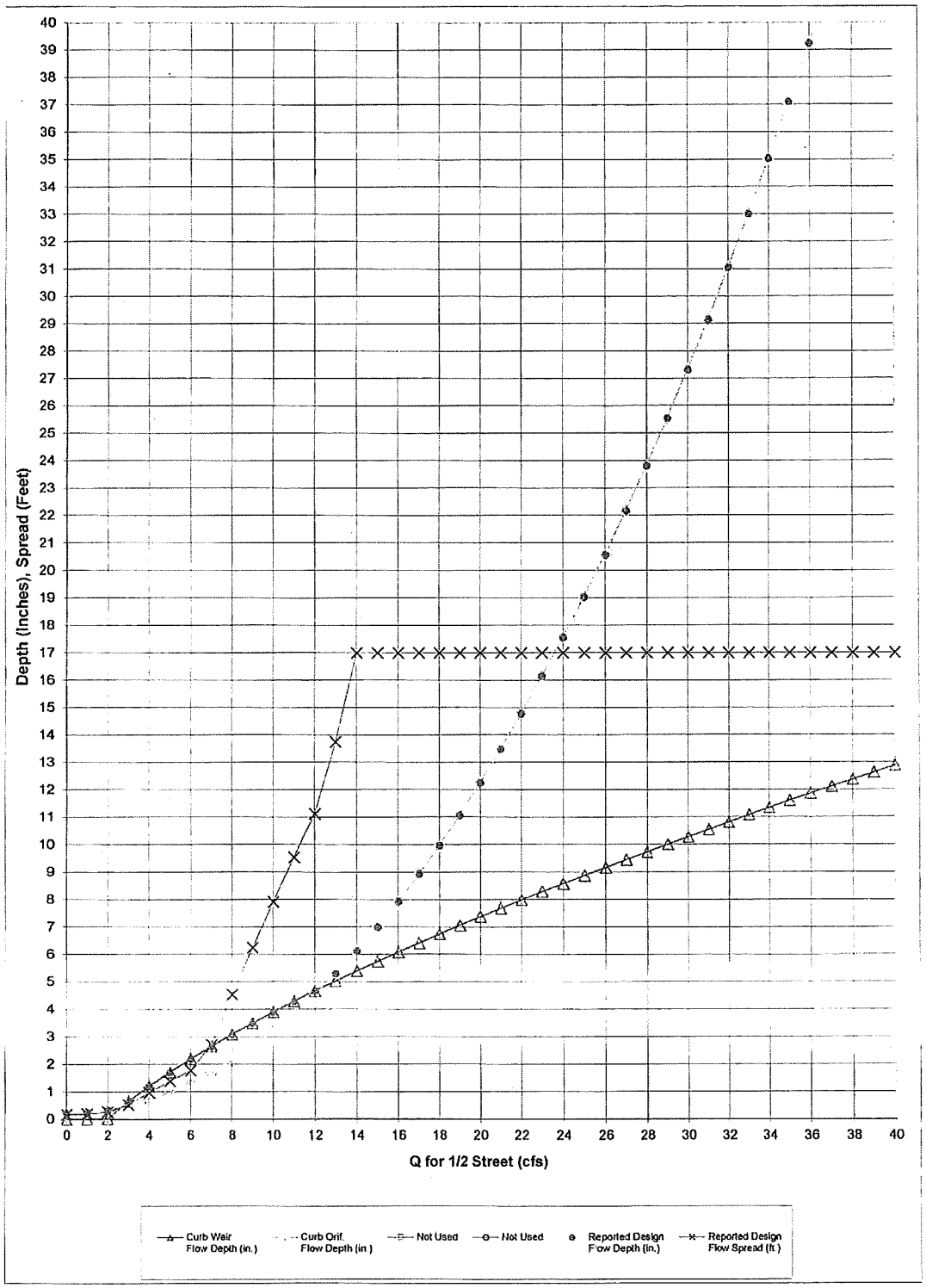
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-11



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.5 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-wi}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.5 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.5 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.5 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	**inches**
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.5 cfs curb)	d_{wi} =	2.79	7.25	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.5 cfs curb)	d_{wa} =	2.93	7.63	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.5 cfs curb)	d_{oi} =	2.51	7.48	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.5 cfs curb)	d_{oa} =	2.58	8.72	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	0.93	6.72	**inches**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	3.5	14.7	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	0.93	6.72	**inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	0.8	17.0	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	0.60	**inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif. Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

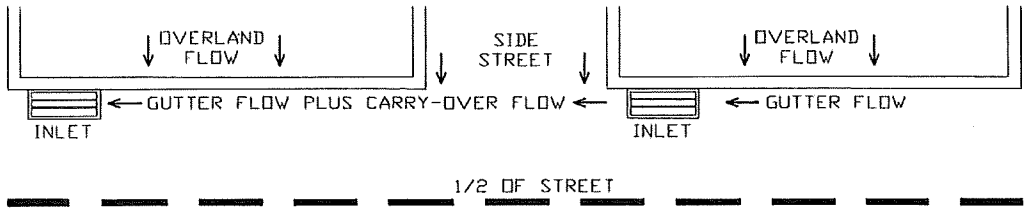
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.24			0.24	0.19
2.00	0.02	0.33			0.33	0.27
3.00	0.65	0.48			0.65	0.52
4.00	1.20	0.69			1.20	0.97
5.00	1.72	0.97			1.72	1.39
6.00	2.20	1.30			2.20	1.77
7.00	2.65	1.69			2.65	2.71
8.00	3.09	2.14			3.09	4.54
9.00	3.50	2.65			3.50	6.25
10.00	3.90	3.22			3.90	7.92
11.00	4.29	3.86			4.29	9.54
12.00	4.67	4.55			4.67	11.12
13.00	5.03	5.30			5.30	13.75
14.00	5.39	6.12			6.12	17.00
15.00	5.74	6.99			6.99	17.00
16.00	6.08	7.92			7.92	17.00
17.00	6.41	8.92			8.92	17.00
18.00	6.74	9.97			9.97	17.00
19.00	7.06	11.08			11.08	17.00
20.00	7.37	12.26			12.26	17.00
21.00	7.68	13.49			13.49	17.00
22.00	7.99	14.79			14.79	17.00
23.00	8.29	16.14			16.14	17.00
24.00	8.58	17.56			17.56	17.00
25.00	8.87	19.04			19.04	17.00
26.00	9.16	20.57			20.57	17.00
27.00	9.45	22.17			22.17	17.00
28.00	9.73	23.82			23.82	17.00
29.00	10.01	25.54			25.54	17.00
30.00	10.28	27.32			27.32	17.00
31.00	10.55	29.15			29.15	17.00
32.00	10.82	31.05			31.05	17.00
33.00	11.09	33.01			33.01	17.00
34.00	11.35	35.03			35.03	17.00
35.00	11.61	37.11			37.11	17.00
36.00	11.87	39.24			39.24	17.00
37.00	12.12	41.44			41.44	17.00
38.00	12.38	43.70			43.70	17.00
39.00	12.63	46.02			46.02	17.00
40.00	12.88	48.40			48.40	17.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-12

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	3.90	13.00	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c) ^ C_3$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

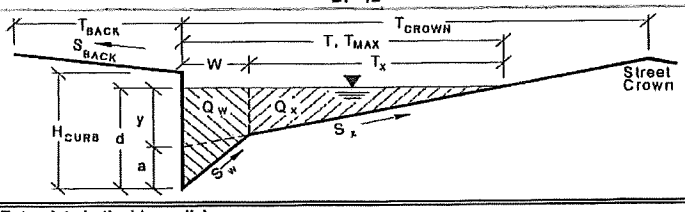
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	3.90	13.00	**cfs**

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-12



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
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 Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	18.00	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

Maximum Gutter Capacity Based On Allowable Water Spread

		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	2.88	4.08	inches
Water Depth with a Gutter Depression	d =	4.88	6.08	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.522	0.371	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

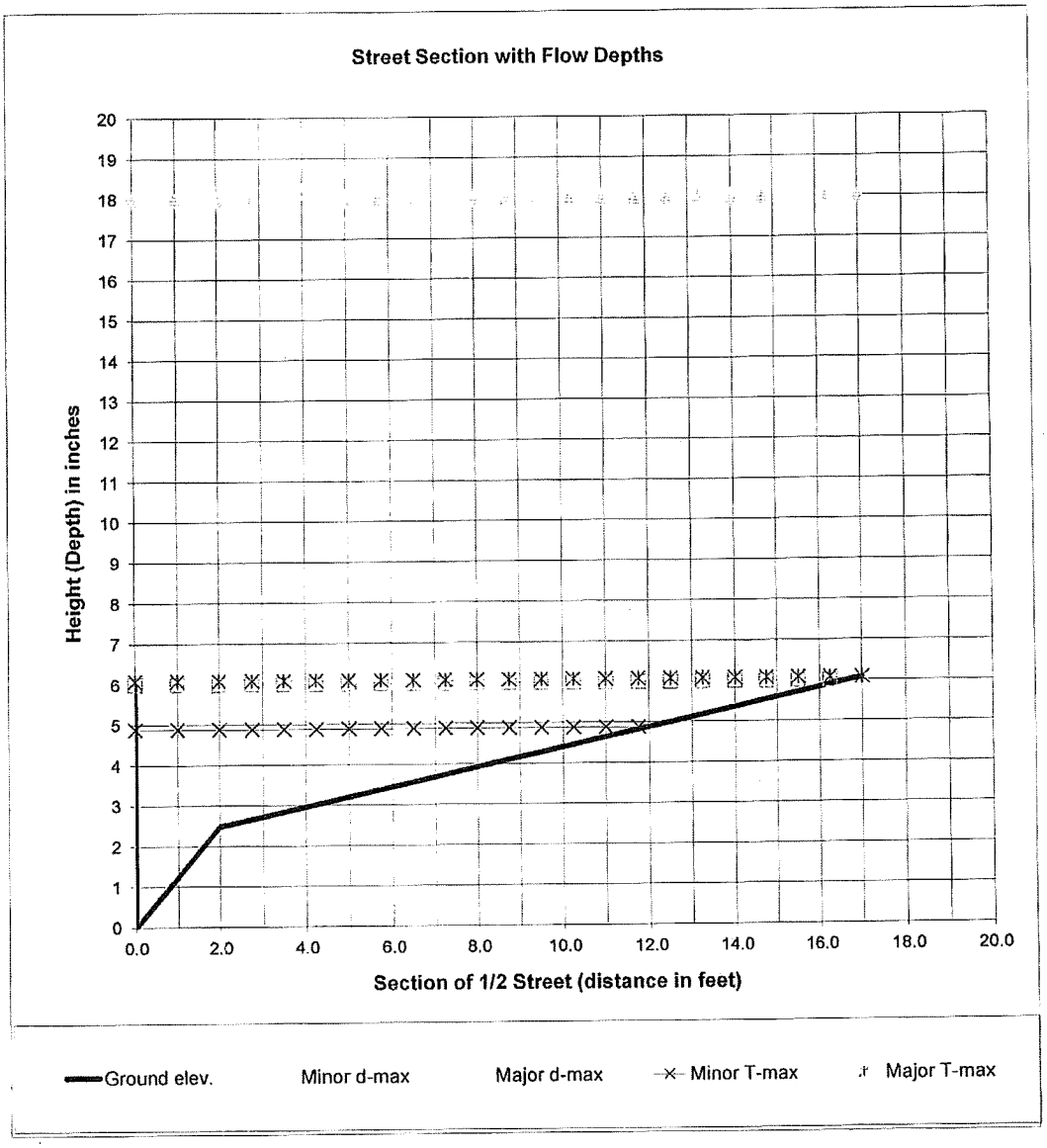
Maximum Gutter Capacity Based on Allowable Gutter Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	66.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	64.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.378	0.086	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	SUMP	SUMP	cfs

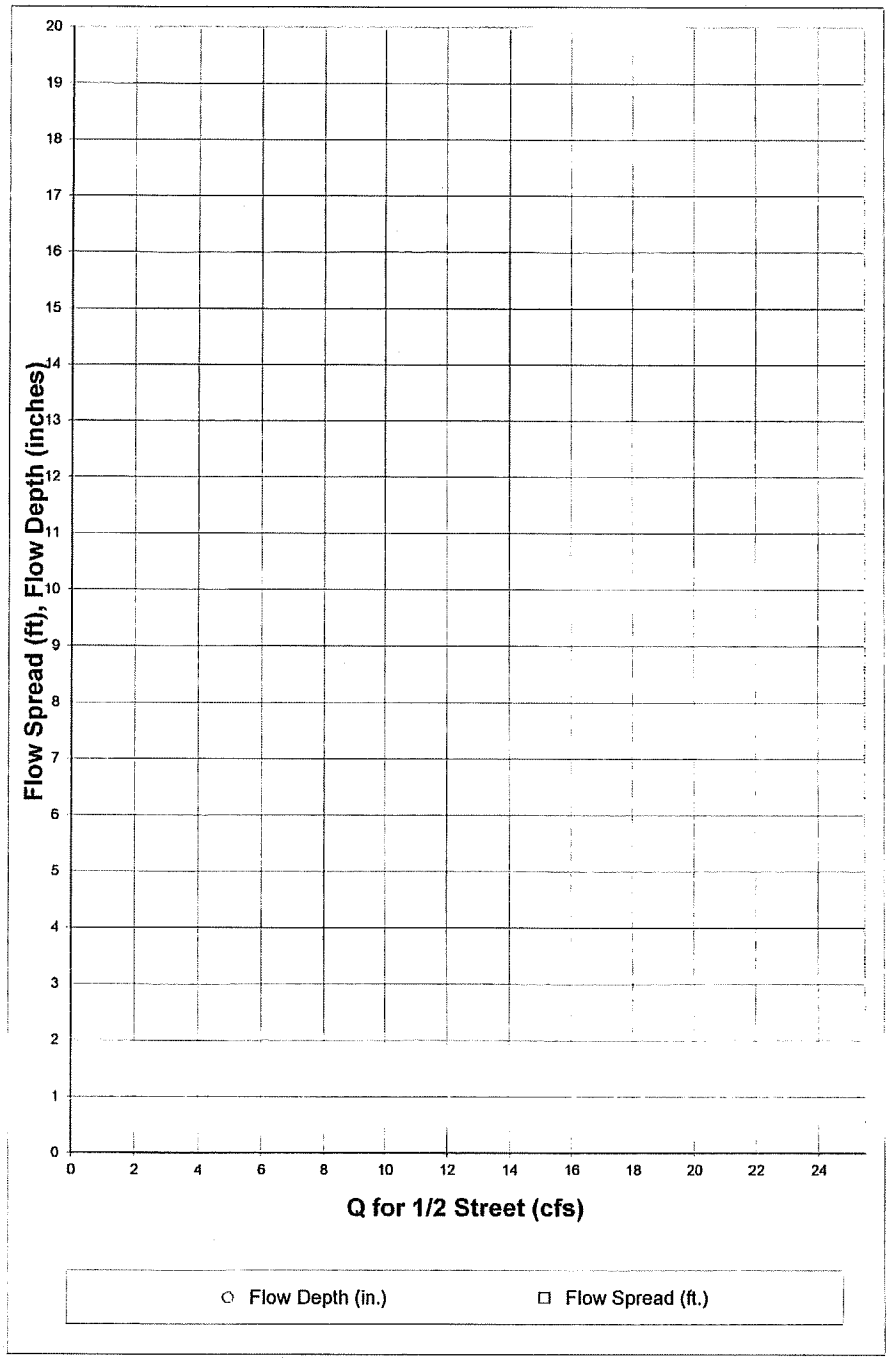
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
4.25		
4.50		
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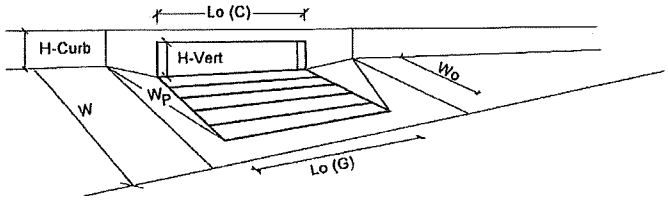
7.75		
8.00		
8.25		
8.50		
8.75		
9.00		
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-12

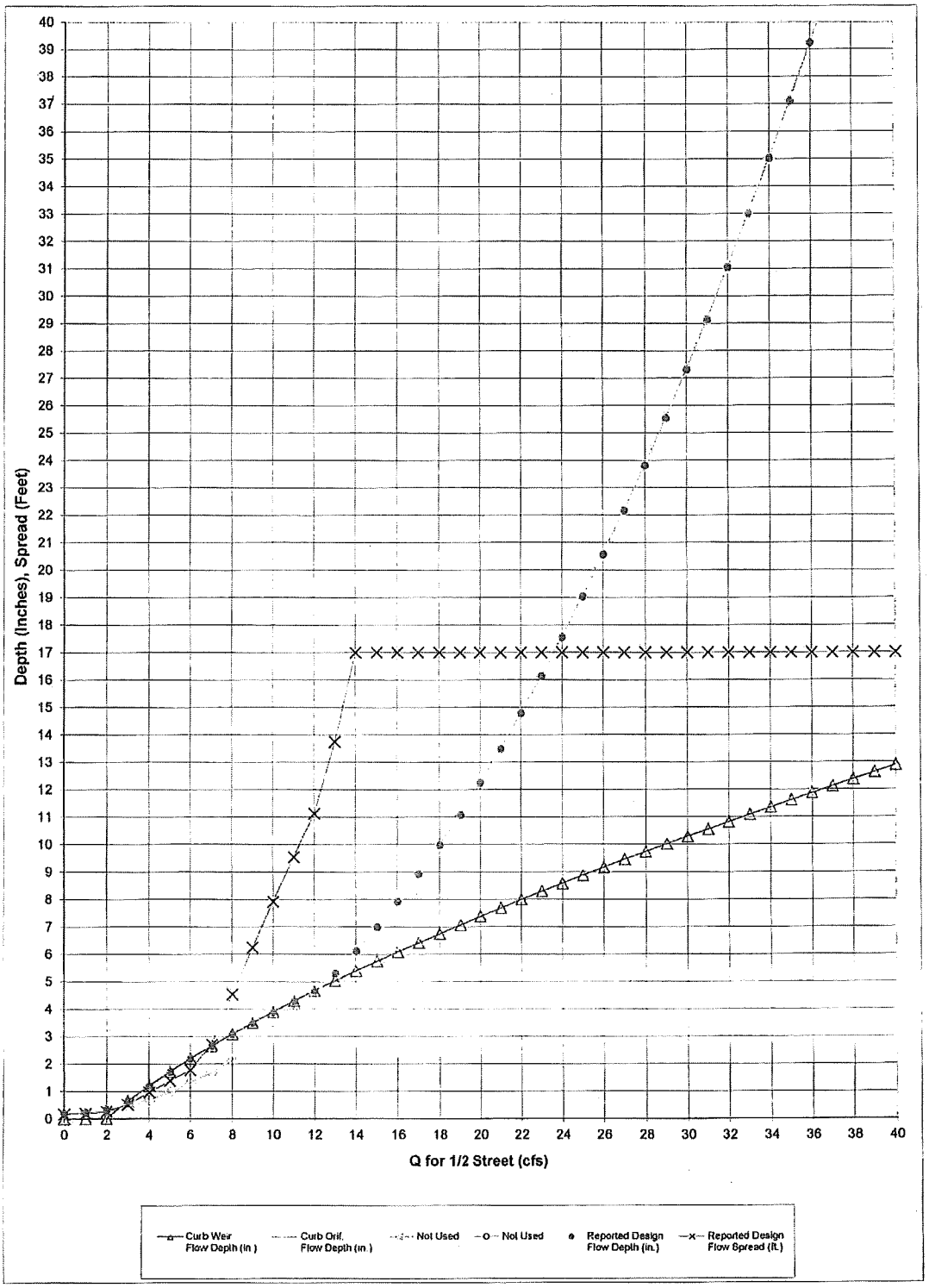


Design Information (input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
Length of a Unit 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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	

Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.9 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.9 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.9 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.9 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	**inches**

Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.9 cfs curb)	d_{wi} =	2.99	6.68	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.9 cfs curb)	d_{wa} =	3.15	7.03	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.9 cfs curb)	d_{oi} =	2.58	6.34	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.9 cfs curb)	d_{oa} =	2.67	7.30	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	**1.15**	**5.30**	**inches**

Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	3.9	13.0	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	**1.15**	**5.30**	**inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	**0.9**	**13.8**	**feet**
Resultant Flow Depth at Street Crown	d_{CROWN} =	**0.00**	**0.00**	**inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif. Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

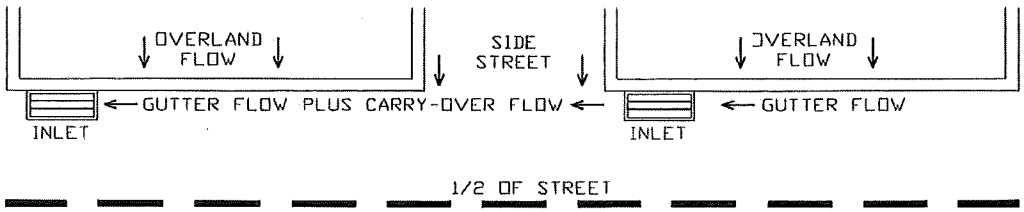
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.24			0.24	0.19
2.00	0.02	0.33			0.33	0.27
3.00	0.65	0.48			0.65	0.52
4.00	1.20	0.69			1.20	0.97
5.00	1.72	0.97			1.72	1.39
6.00	2.20	1.30			2.20	1.77
7.00	2.65	1.69			2.65	2.71
8.00	3.09	2.14			3.09	4.54
9.00	3.50	2.65			3.50	6.25
10.00	3.90	3.22			3.90	7.92
11.00	4.29	3.86			4.29	9.54
12.00	4.67	4.55			4.67	11.12
13.00	5.03	5.30			5.30	13.75
14.00	5.39	6.12			6.12	17.00
15.00	5.74	6.99			6.99	17.00
16.00	6.08	7.92			7.92	17.00
17.00	6.41	8.92			8.92	17.00
18.00	6.74	9.97			9.97	17.00
19.00	7.06	11.08			11.08	17.00
20.00	7.37	12.26			12.26	17.00
21.00	7.68	13.49			13.49	17.00
22.00	7.99	14.79			14.79	17.00
23.00	8.29	16.14			16.14	17.00
24.00	8.58	17.56			17.56	17.00
25.00	8.87	19.04			19.04	17.00
26.00	9.16	20.57			20.57	17.00
27.00	9.45	22.17			22.17	17.00
28.00	9.73	23.82			23.82	17.00
29.00	10.01	25.54			25.54	17.00
30.00	10.28	27.32			27.32	17.00
31.00	10.55	29.15			29.15	17.00
32.00	10.82	31.05			31.05	17.00
33.00	11.09	33.01			33.01	17.00
34.00	11.35	35.03			35.03	17.00
35.00	11.61	37.11			37.11	17.00
36.00	11.87	39.24			39.24	17.00
37.00	12.12	41.44			41.44	17.00
38.00	12.38	43.70			43.70	17.00
39.00	12.63	46.02			46.02	17.00
40.00	12.88	48.40			48.40	17.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-13

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	4.90	15.70	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

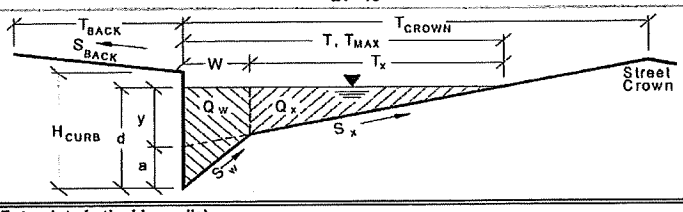
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	4.90	15.70	cfs

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-13



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	25.0	ft
Gutter Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0280	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	20.0	25.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	18.00	inches
Allow Flow Depth at Street Crown (leave blank for no)			X	X = yes

Maximum Gutter Capacity Based On Allowable Water Spread

		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.80	6.00	inches
Water Depth with a Gutter Depression	d =	6.80	8.00	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	18.0	23.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.313	0.246	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	20.5	39.4	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	9.3	12.9	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.1	1.1	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	29.9	53.4	cfs
Flow Velocity Within the Gutter Section	V =	10.1	11.4	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	5.7	7.6	

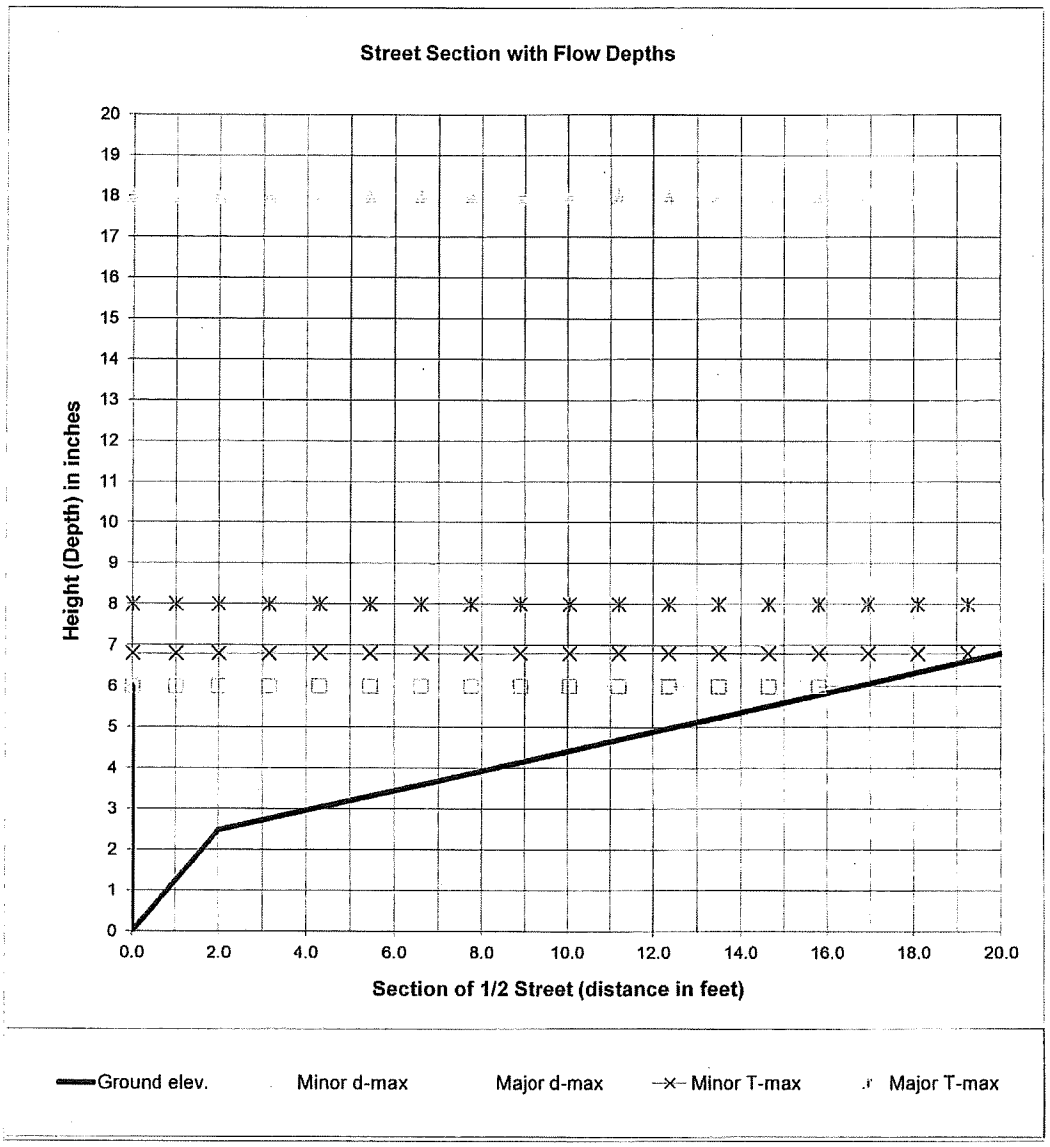
Maximum Gutter Capacity Based on Allowable Gutter Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	66.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	64.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.376	0.086	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	11.9	620.2	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	11.9	428.1	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	7.2	58.2	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	60.0	cfs
Total Discharge for Major & Minor Storm	Q =	19.1	546.4	cfs
Flow Velocity Within the Gutter Section	V =	9.1	20.8	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	4.6	31.3	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	0.79	0.64	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	15.0	348.2	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =	5.62	14.93	inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =	0.00	6.93	inches

		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	15.0	348.2	cfs

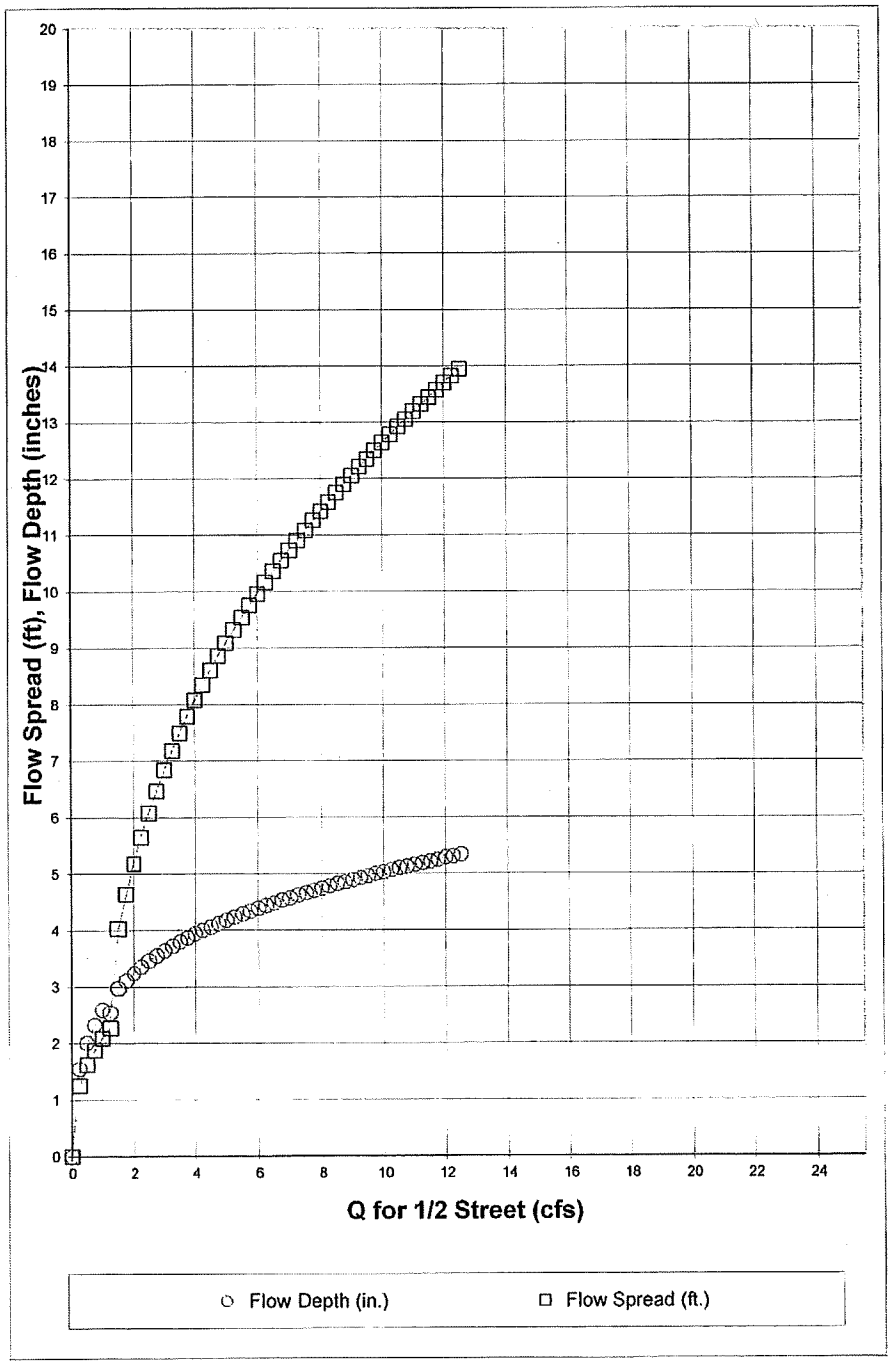
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$

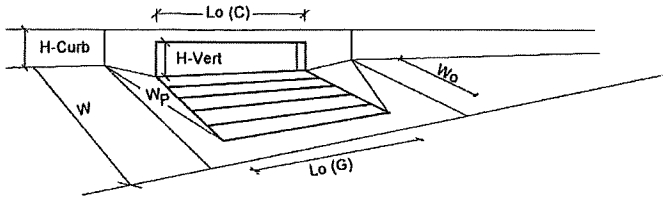


Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00	0.00	0.00
0.25	1.55	1.25
0.50	2.01	1.62
0.75	2.33	1.88
1.00	2.59	2.09
1.25	2.54	2.27
1.50	2.97	4.03
1.75	3.11	4.64
2.00	3.24	5.18
2.25	3.35	5.65
2.50	3.46	6.08
2.75	3.55	6.47
3.00	3.64	6.84
3.25	3.72	7.18
3.50	3.80	7.49
3.75	3.87	7.79
4.00	3.94	8.08
4.25	4.00	8.35
4.50	4.06	8.61
4.75	4.12	8.86
5.00	4.18	9.09
5.25	4.23	9.32
5.50	4.29	9.54
5.75	4.34	9.76
6.00	4.39	9.96
6.25	4.44	10.16
6.50	4.48	10.36
6.75	4.53	10.55
7.00	4.57	10.73
7.25	4.62	10.91
7.50	4.66	11.08
7.75	4.70	11.26
8.00	4.74	11.42
8.25	4.78	11.59
8.50	4.82	11.75
8.75	4.85	11.90
9.00	4.89	12.05
9.25	4.93	12.21
9.50	4.96	12.35
9.75	5.00	12.50
10.00	5.03	12.64
10.25	5.07	12.78
10.50	5.10	12.92
10.75	5.13	13.05
11.00	5.16	13.19
11.25	5.19	13.32
11.50	5.22	13.44
11.75	5.25	13.57
12.00	5.29	13.70
12.25	5.31	13.82
12.50	5.34	13.94

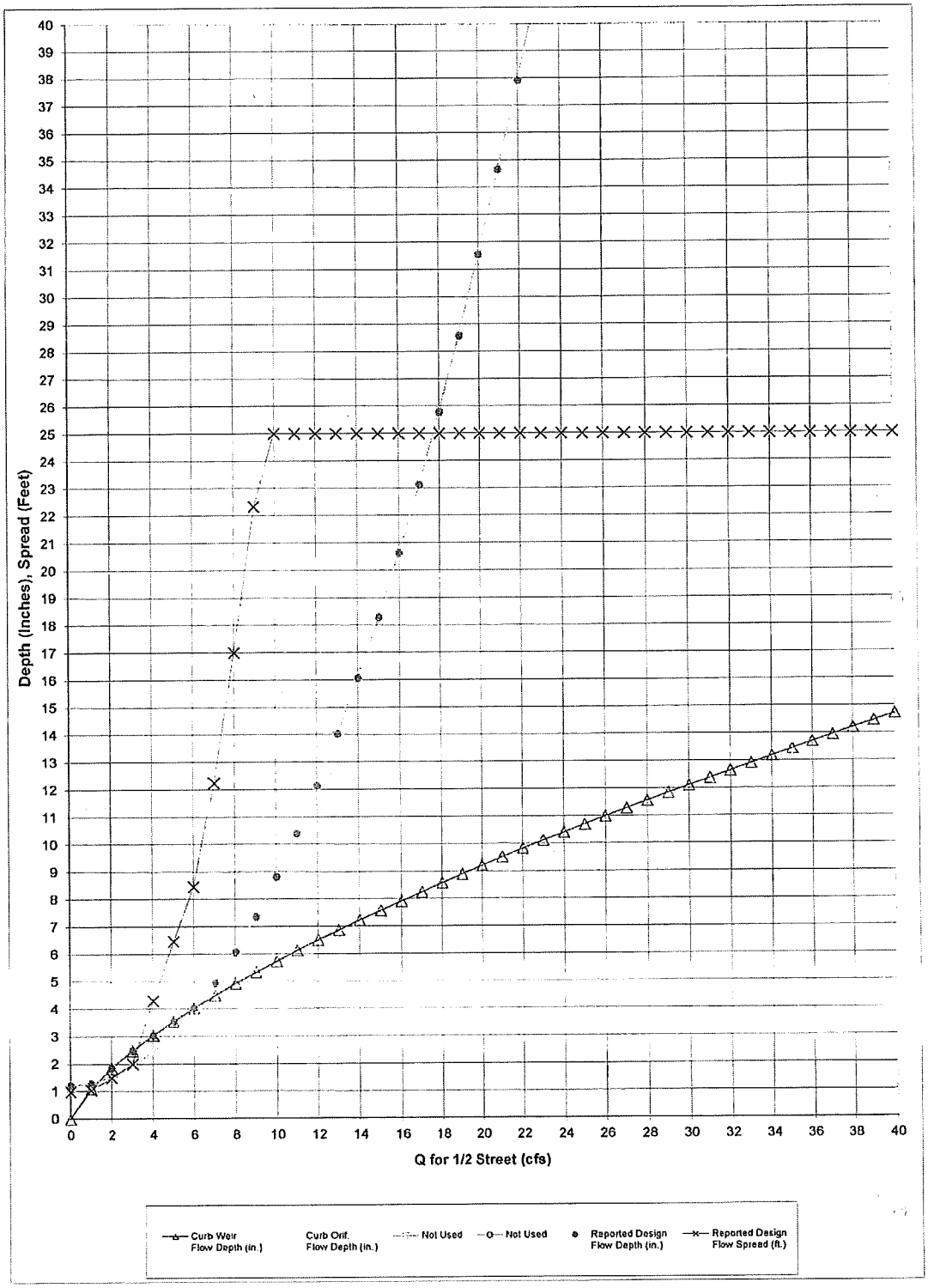
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-13



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	0.17	0.17	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	3.17	3.17	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	3.12	3.12	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.9 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.9 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.9 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.9 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	inches
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.9 cfs curb)	d_{wi} =	3.49	7.58	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.9 cfs curb)	d_{wa} =	3.67	7.97	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.9 cfs curb)	d_{oi} =	2.87	16.53	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.9 cfs curb)	d_{oa} =	3.22	20.08	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	3.50	19.91	inches
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	4.9	15.7	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	3.50	19.91	inches
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	6.3	25.0	ft. >T-Crown
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	11.88	inches


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif. Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

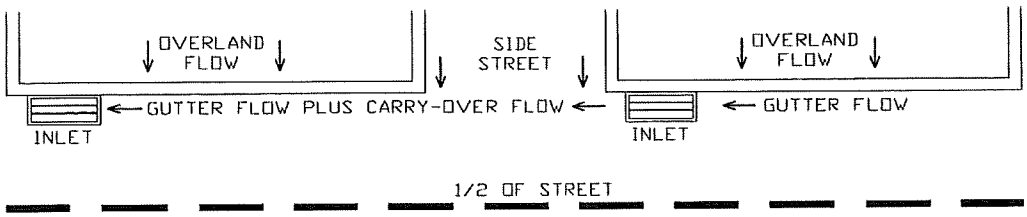
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	1.22			1.22	0.98
1.00	1.10	1.30			1.30	1.05
2.00	1.85	1.53			1.85	1.49
3.00	2.48	1.91			2.48	2.00
4.00	3.03	2.44			3.03	4.29
5.00	3.55	3.12			3.55	6.46
6.00	4.03	3.95			4.03	8.46
7.00	4.48	4.94			4.94	12.25
8.00	4.92	6.08			6.08	17.00
9.00	5.33	7.36			7.36	22.33
10.00	5.73	8.81			8.81	25.00
11.00	6.12	10.40			10.40	25.00
12.00	6.50	12.14			12.14	25.00
13.00	6.86	14.04			14.04	25.00
14.00	7.22	16.08			16.08	25.00
15.00	7.57	18.28			18.28	25.00
16.00	7.91	20.63			20.63	25.00
17.00	8.24	23.13			23.13	25.00
18.00	8.57	25.79			25.79	25.00
19.00	8.89	28.59			28.59	25.00
20.00	9.20	31.55			31.55	25.00
21.00	9.51	34.66			34.66	25.00
22.00	9.82	37.92			37.92	25.00
23.00	10.12	41.33			41.33	25.00
24.00	10.41	44.89			44.89	25.00
25.00	10.70	48.60			48.60	25.00
26.00	10.99	52.47			52.47	25.00
27.00	11.28	56.49			56.49	25.00
28.00	11.56	60.66			60.66	25.00
29.00	11.84	64.98			64.98	25.00
30.00	12.11	69.45			69.45	25.00
31.00	12.38	74.08			74.08	25.00
32.00	12.65	78.85			78.85	25.00
33.00	12.92	83.78			83.78	25.00
34.00	13.18	88.86			88.86	25.00
35.00	13.44	94.09			94.09	25.00
36.00	13.70	99.47			99.47	25.00
37.00	13.95	105.00			105.00	25.00
38.00	14.21	110.69			110.69	25.00
39.00	14.46	116.53			116.53	25.00
40.00	14.71	122.52			122.52	25.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-14

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	3.60	11.60	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c) ^ C_3$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

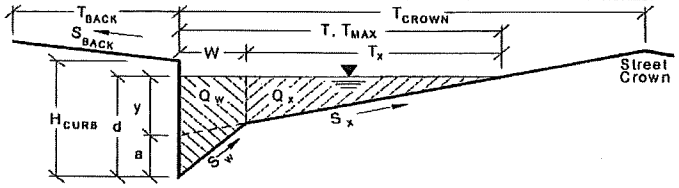
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	3.60	11.60	**cfs**

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-14



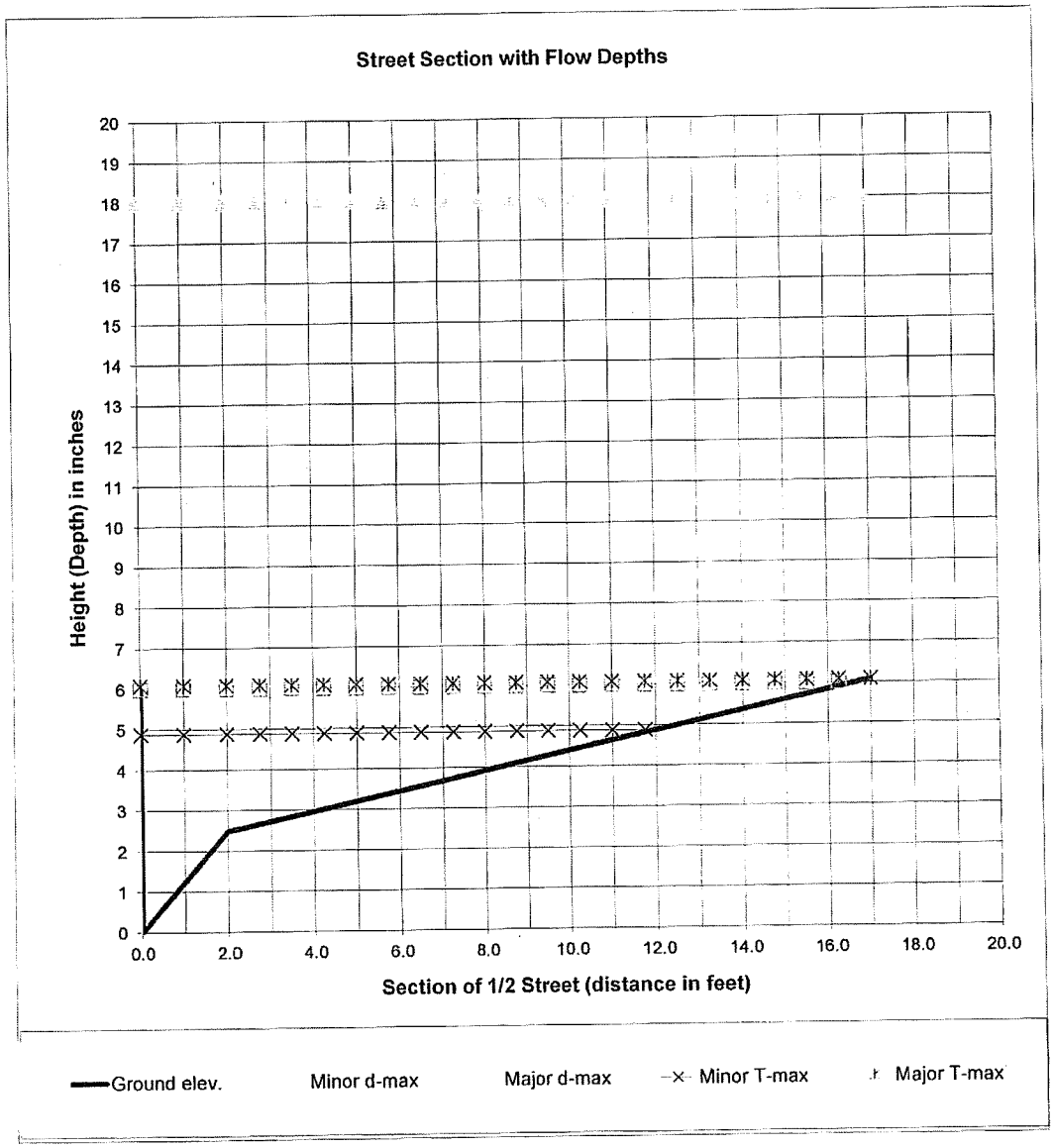
Gutter Geometry (Enter data in the blue cells)				
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0		ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200		ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350		
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00		inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0		ft
Gutter Depression	a =	2.00		inches
Gutter Width	W =	2.00		ft
Street Transverse Slope	S_X =	0.0200		ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000		ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150		
		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	18.00	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

Maximum Gutter Capacity Based On Allowable Water Spread		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	2.88	4.08	inches
Water Depth with a Gutter Depression	d =	4.88	6.08	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.522	0.371	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Gutter Capacity Based on Allowable Gutter Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	66.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	64.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.378	0.086	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches
		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	SUMP	SUMP	cfs

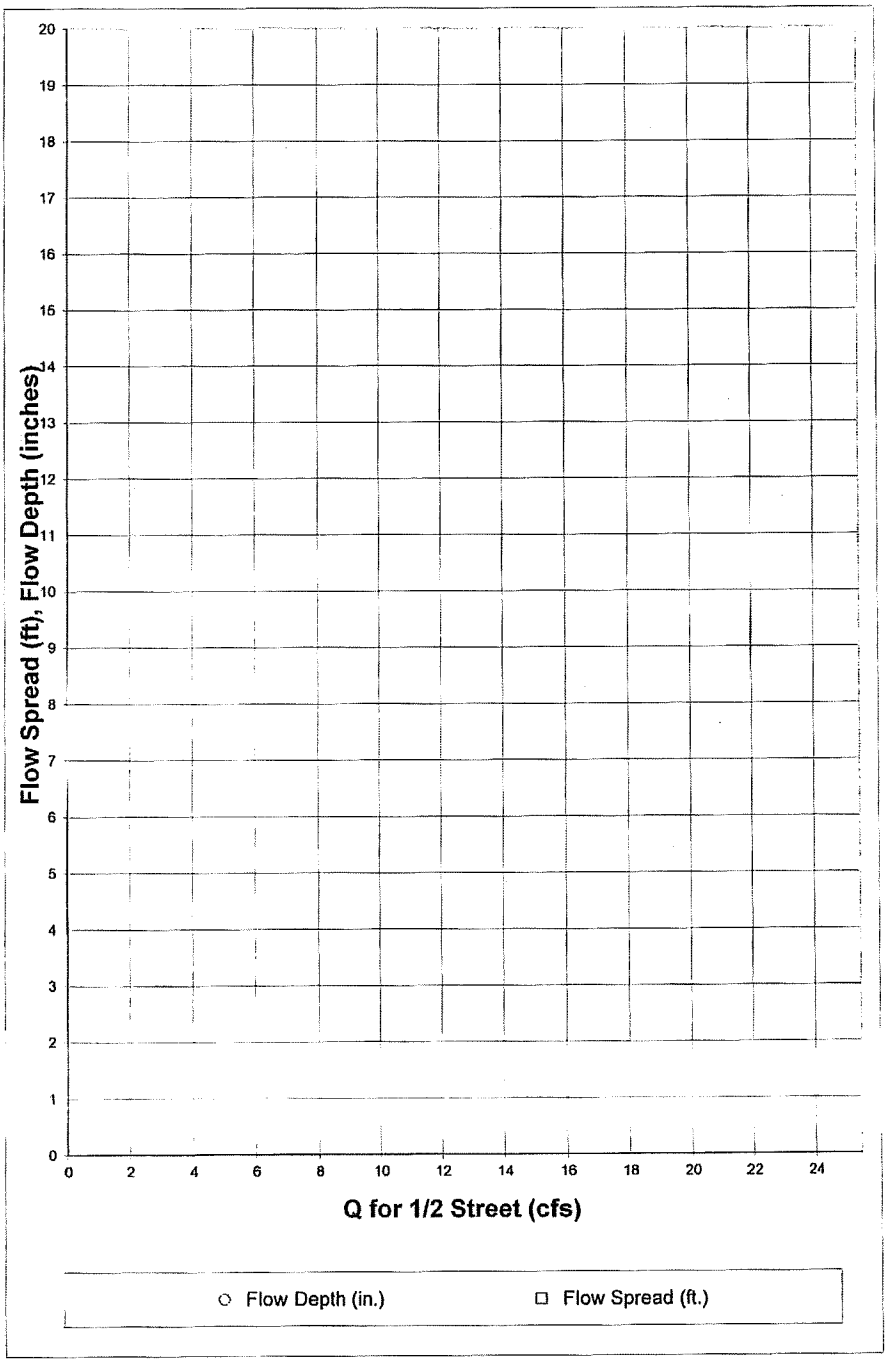
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
4.25		
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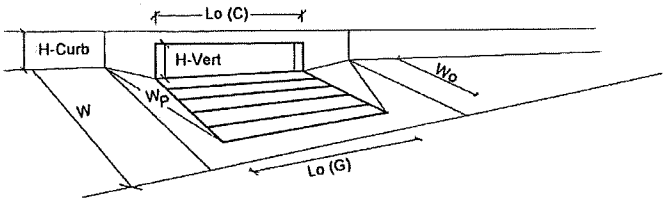
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

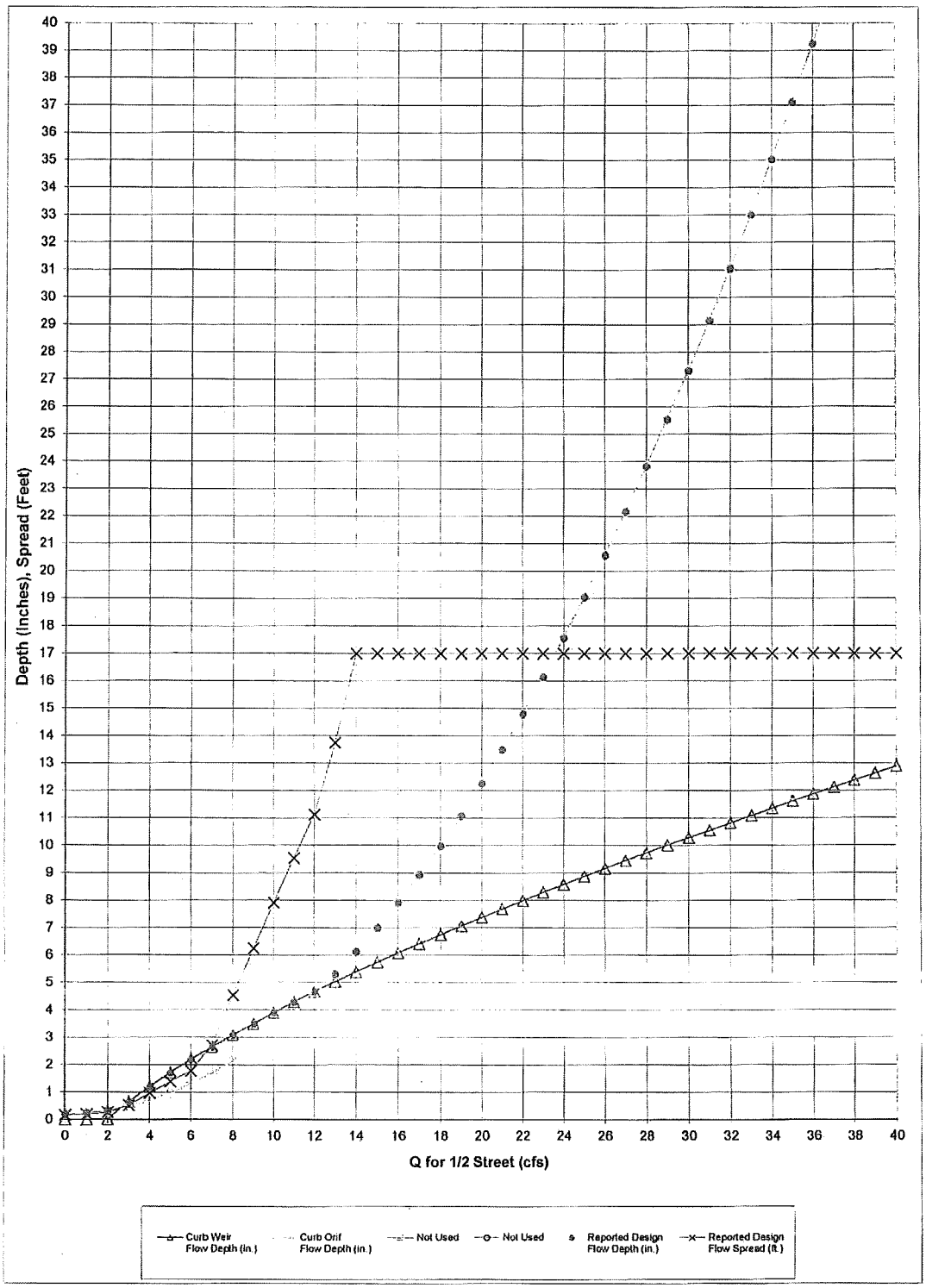
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-14



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.6 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cin}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.6 cfs curb)	d_{wo} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cf}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.6 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.6 cfs curb)	d_{oo} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	**inches**
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.6 cfs curb)	d_{wi} =	2.84	6.19	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.6 cfs curb)	d_{wo} =	2.99	6.52	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 3.6 cfs curb)	d_{oi} =	2.53	5.50	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 3.6 cfs curb)	d_{oo} =	2.60	6.27	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	0.99	4.52	**inches**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	3.6	11.6	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	0.99	4.52	**inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	0.8	10.5	**feet**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	0.00	**inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

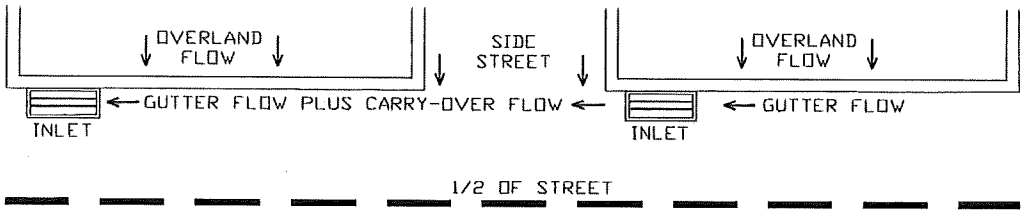
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.24			0.24	0.19
2.00	0.02	0.33			0.33	0.27
3.00	0.65	0.48			0.65	0.52
4.00	1.20	0.69			1.20	0.97
5.00	1.72	0.97			1.72	1.39
6.00	2.20	1.30			2.20	1.77
7.00	2.65	1.69			2.65	2.71
8.00	3.09	2.14			3.09	4.54
9.00	3.50	2.65			3.50	6.25
10.00	3.90	3.22			3.90	7.92
11.00	4.29	3.86			4.29	9.54
12.00	4.67	4.55			4.67	11.12
13.00	5.03	5.30			5.30	13.75
14.00	5.39	6.12			6.12	17.00
15.00	5.74	6.99			6.99	17.00
16.00	6.08	7.92			7.92	17.00
17.00	6.41	8.92			8.92	17.00
18.00	6.74	9.97			9.97	17.00
19.00	7.06	11.08			11.08	17.00
20.00	7.37	12.26			12.26	17.00
21.00	7.68	13.49			13.49	17.00
22.00	7.99	14.79			14.79	17.00
23.00	8.29	16.14			16.14	17.00
24.00	8.58	17.56			17.56	17.00
25.00	8.87	19.04			19.04	17.00
26.00	9.16	20.57			20.57	17.00
27.00	9.45	22.17			22.17	17.00
28.00	9.73	23.82			23.82	17.00
29.00	10.01	25.54			25.54	17.00
30.00	10.28	27.32			27.32	17.00
31.00	10.55	29.15			29.15	17.00
32.00	10.82	31.05			31.05	17.00
33.00	11.09	33.01			33.01	17.00
34.00	11.35	35.03			35.03	17.00
35.00	11.61	37.11			37.11	17.00
36.00	11.87	39.24			39.24	17.00
37.00	12.12	41.44			41.44	17.00
38.00	12.38	43.70			43.70	17.00
39.00	12.63	46.02			46.02	17.00
40.00	12.88	48.40			48.40	17.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-15

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	2.00	9.30	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

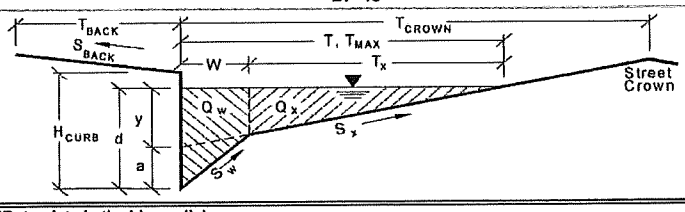
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	2.00	9.30	cfs

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-15



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
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 Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	18.00	inches
Allow Flow Depth at Street Crown (leave blank for no)			X	X = yes

Maximum Gutter Capacity Based On Allowable Water Spread

		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	2.88	4.08	inches
Water Depth with a Gutter Depression	d =	4.88	6.08	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.522	0.371	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Gutter Capacity Based on Allowable Gutter Depth

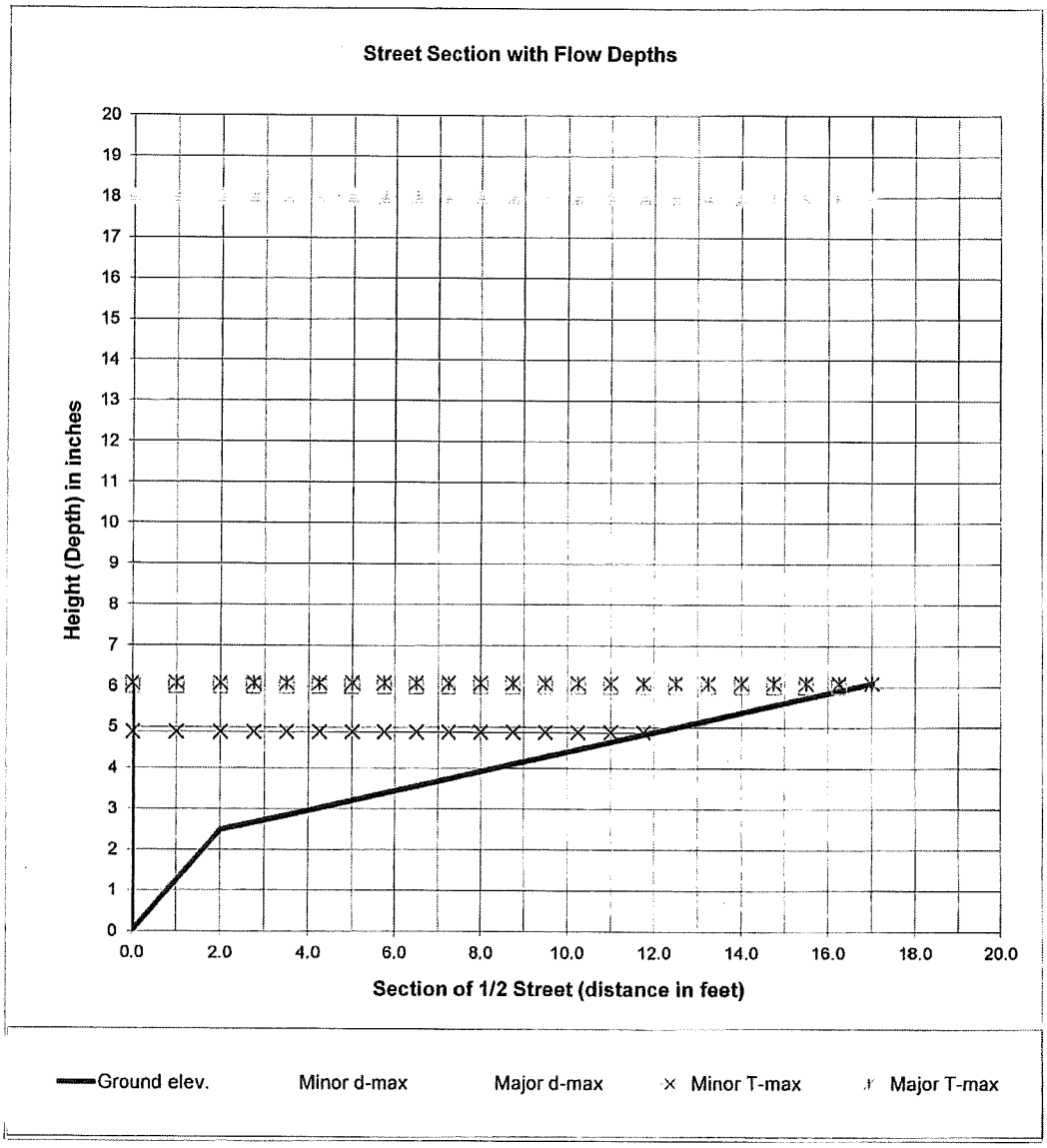
		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	66.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	64.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.378	0.086	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d

		Minor Storm	Major Storm	
	Q_{allow} =	SUMP	SUMP	cfs

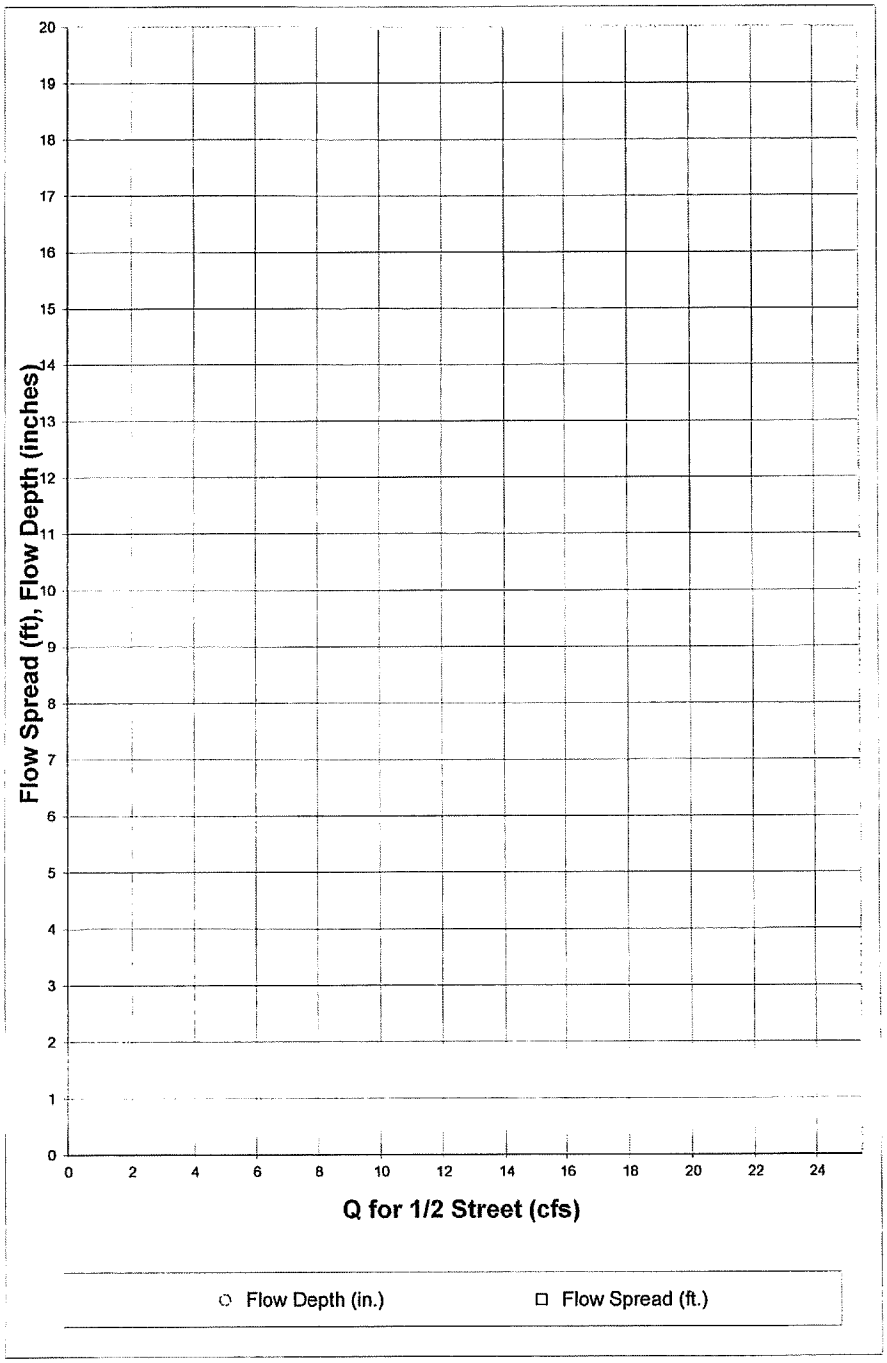
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
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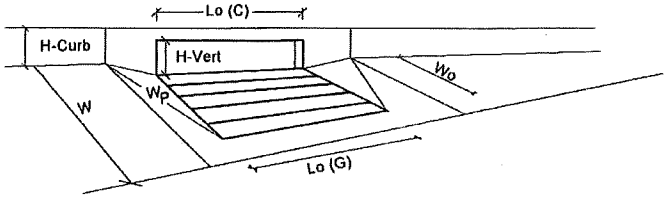
8.25		
8.50		
8.75		
9.00		
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

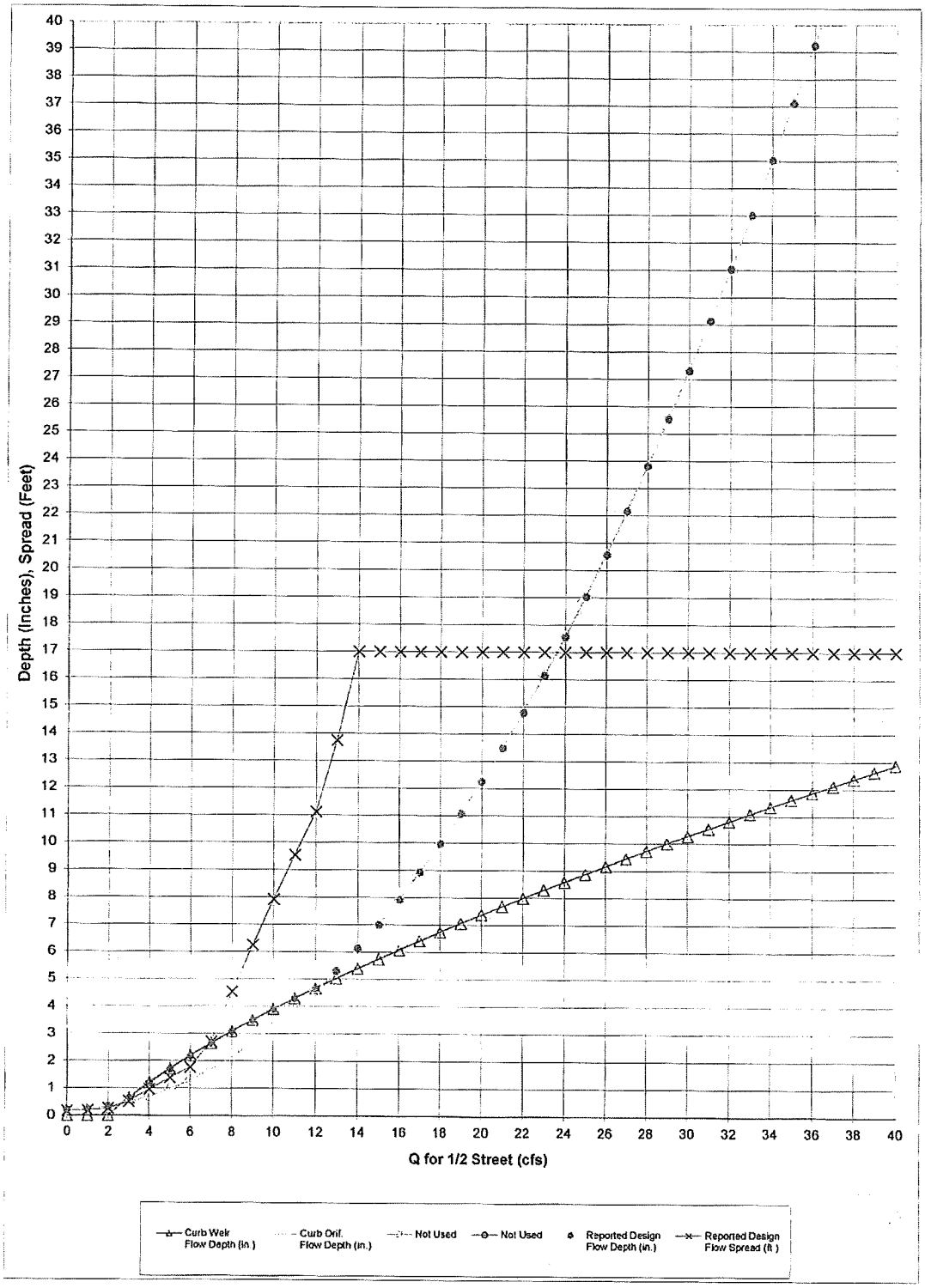
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-15



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 2 cfs curb)	d_{w1} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 2 cfs curb)	d_{w2} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 2 cfs curb)	d_{o1} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 2 cfs curb)	d_{o2} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	inches
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 2 cfs curb)	d_{w1} =	1.92	5.35	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 2 cfs curb)	d_{w2} =	2.02	5.62	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 2 cfs curb)	d_{o1} =	2.31	4.32	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 2 cfs curb)	d_{o2} =	2.33	4.82	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	0.33	3.62	inches
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	2.0	9.3	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	0.33	3.62	inches
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	0.3	6.8	feet
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	0.00	inches


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif. Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

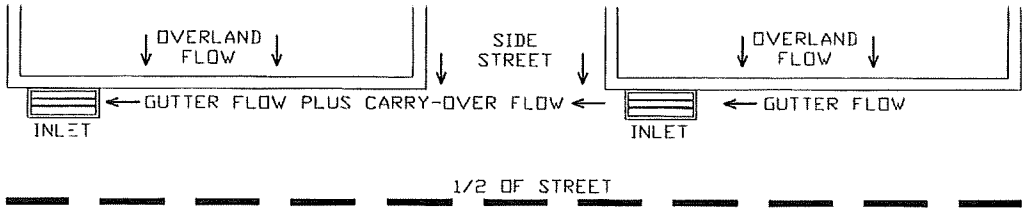
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.24			0.24	0.19
2.00	0.02	0.33			0.33	0.27
3.00	0.65	0.48			0.65	0.52
4.00	1.20	0.69			1.20	0.97
5.00	1.72	0.97			1.72	1.39
6.00	2.20	1.30			2.20	1.77
7.00	2.65	1.69			2.65	2.71
8.00	3.09	2.14			3.09	4.54
9.00	3.50	2.65			3.50	6.25
10.00	3.90	3.22			3.90	7.92
11.00	4.29	3.86			4.29	9.54
12.00	4.67	4.55			4.67	11.12
13.00	5.03	5.30			5.30	13.75
14.00	5.39	6.12			6.12	17.00
15.00	5.74	6.99			6.99	17.00
16.00	6.08	7.92			7.92	17.00
17.00	6.41	8.92			8.92	17.00
18.00	6.74	9.97			9.97	17.00
19.00	7.06	11.08			11.08	17.00
20.00	7.37	12.26			12.26	17.00
21.00	7.68	13.49			13.49	17.00
22.00	7.99	14.79			14.79	17.00
23.00	8.29	16.14			16.14	17.00
24.00	8.58	17.56			17.56	17.00
25.00	8.87	19.04			19.04	17.00
26.00	9.16	20.57			20.57	17.00
27.00	9.45	22.17			22.17	17.00
28.00	9.73	23.82			23.82	17.00
29.00	10.01	25.54			25.54	17.00
30.00	10.28	27.32			27.32	17.00
31.00	10.55	29.15			29.15	17.00
32.00	10.82	31.05			31.05	17.00
33.00	11.09	33.01			33.01	17.00
34.00	11.35	35.03			35.03	17.00
35.00	11.61	37.11			37.11	17.00
36.00	11.87	39.24			39.24	17.00
37.00	12.12	41.44			41.44	17.00
38.00	12.38	43.70			43.70	17.00
39.00	12.63	46.02			46.02	17.00
40.00	12.88	48.40			48.40	17.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-16

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	8.80	26.90	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c) ^ C_3$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

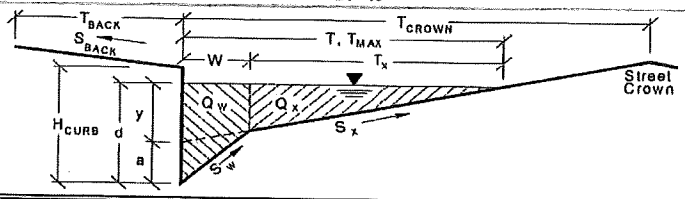
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	8.80	26.90	cfs

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-16



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
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 Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	18.00	inches
Allow Flow Depth at Street Crown (leave blank for no)			X	X = yes

Maximum Gutter Capacity Based On Allowable Water Spread

		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	2.88	4.08	inches
Water Depth with a Gutter Depression	d =	4.88	6.08	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.522	0.371	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Gutter Capacity Based on Allowable Gutter Depth

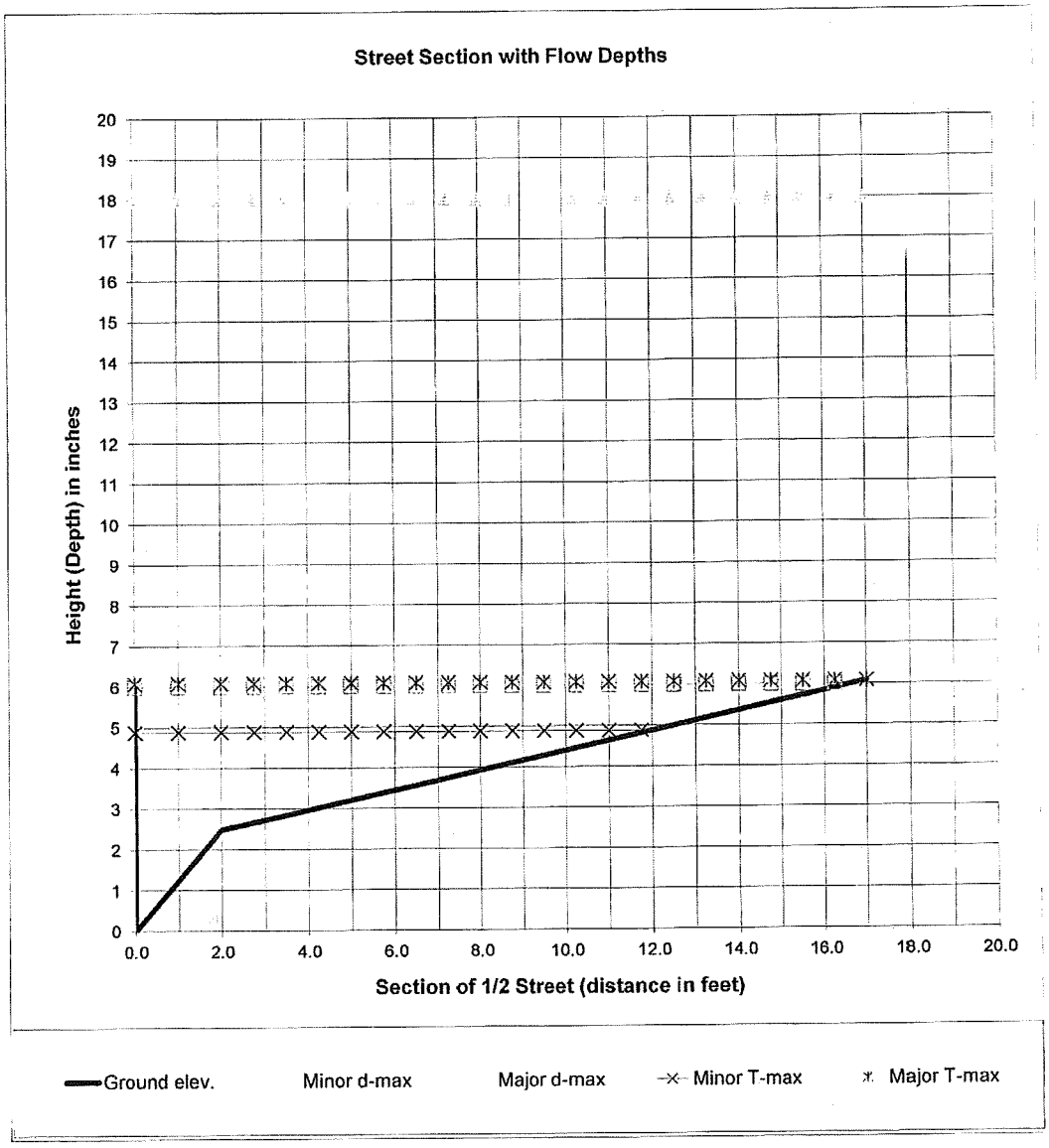
		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	66.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	64.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.378	0.086	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d

	Minor Storm	Major Storm	
Q_{allow} =	SUMP	SUMP	cfs

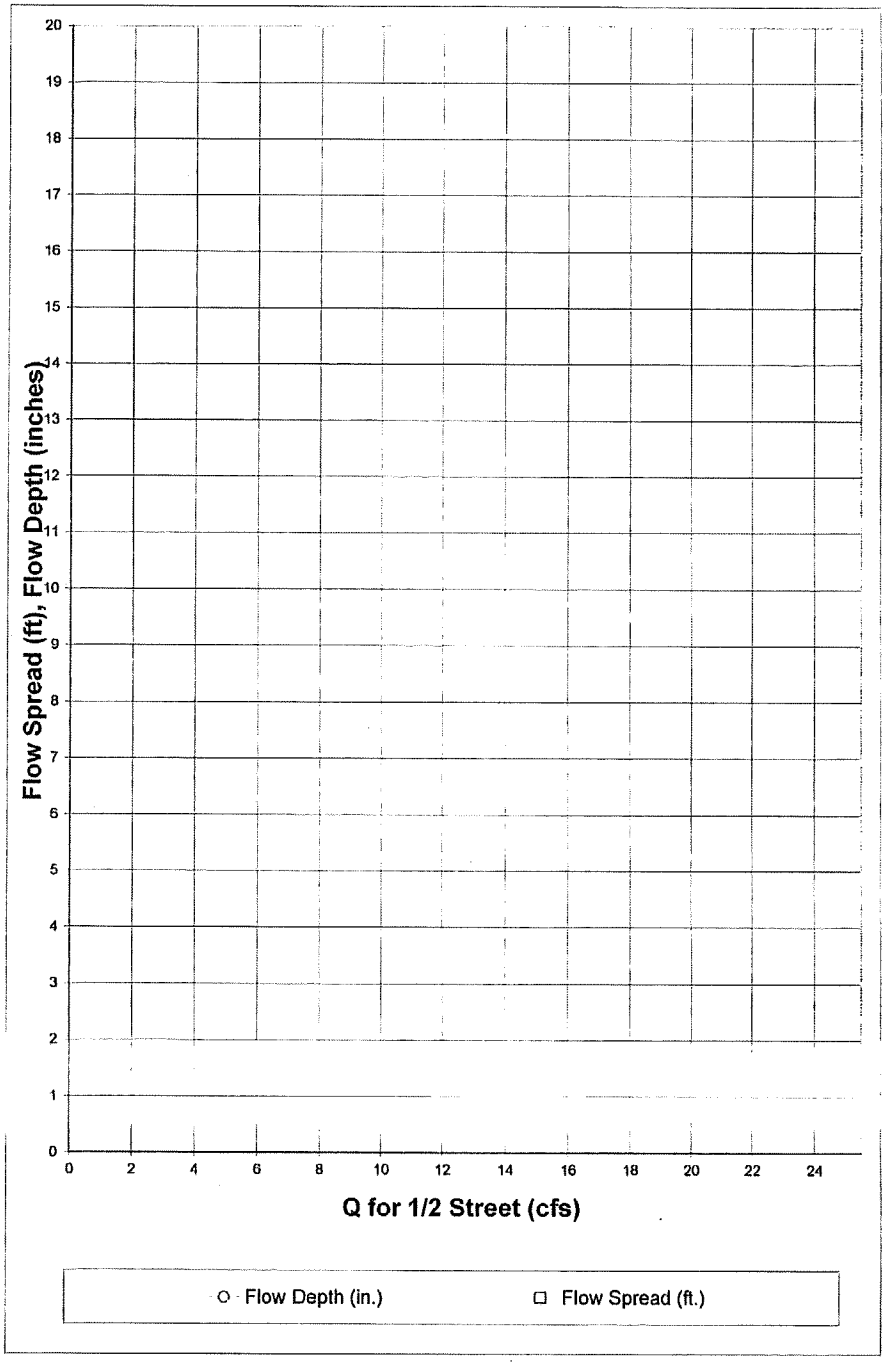
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
4.25		
4.50		
4.75		
5.00		
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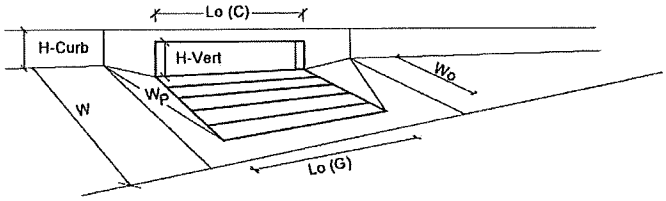
7.75		
8.00		
8.25		
8.50		
8.75		
9.00		
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-16

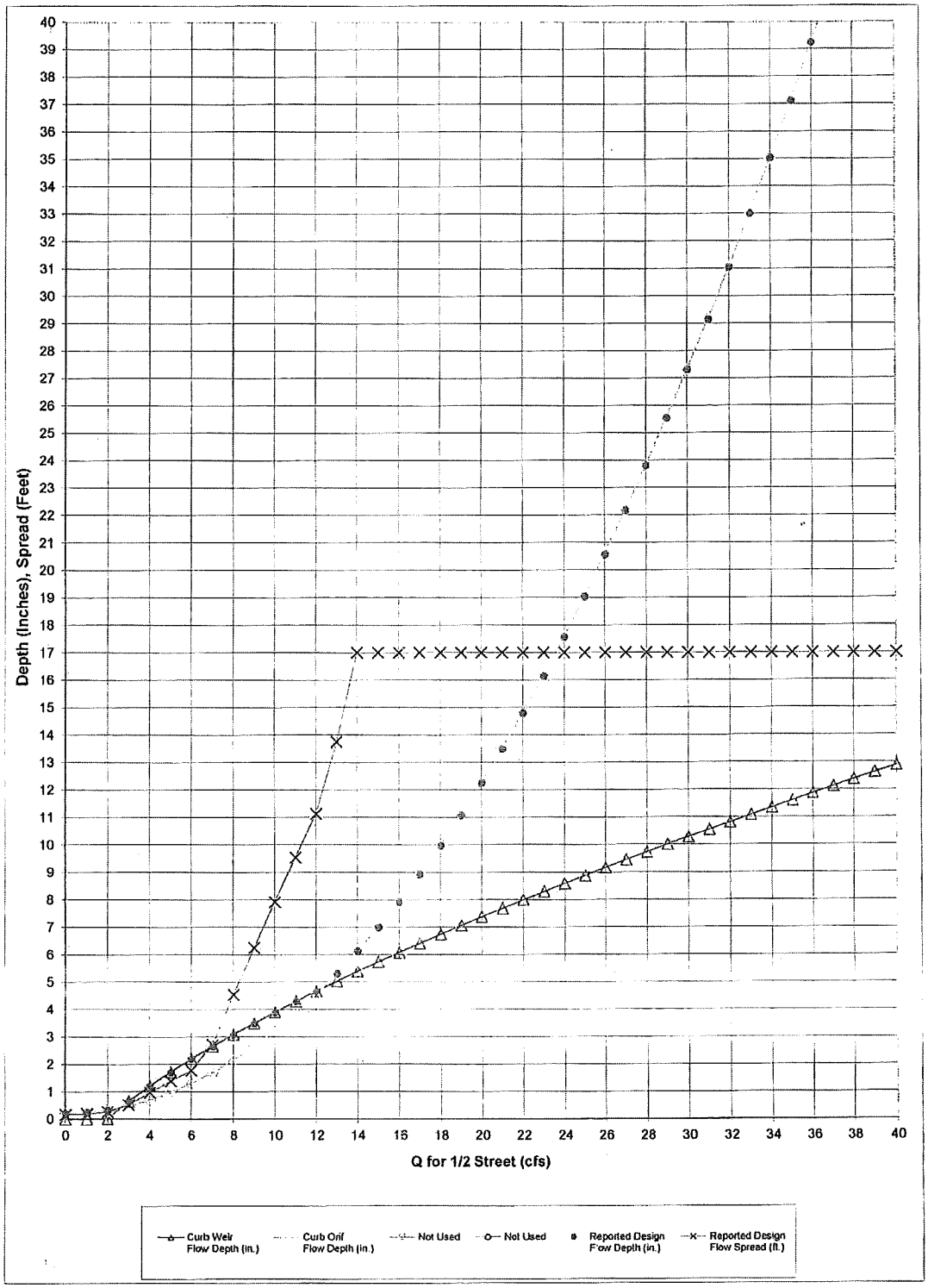


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
Length of a Unit 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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	

Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 8.8 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 8.8 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 8.8 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 8.8 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	**inches**

Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 8.8 cfs curb)	d_{wi} =	5.15	10.85	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 8.8 cfs curb)	d_{wa} =	5.42	11.42	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 8.8 cfs curb)	d_{oi} =	4.10	19.86	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 8.8 cfs curb)	d_{oa} =	4.55	24.01	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	3.42	22.01	**inches**

Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	8.8	26.9	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	3.42	22.01	**inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	5.9	17.0	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	15.96	**inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

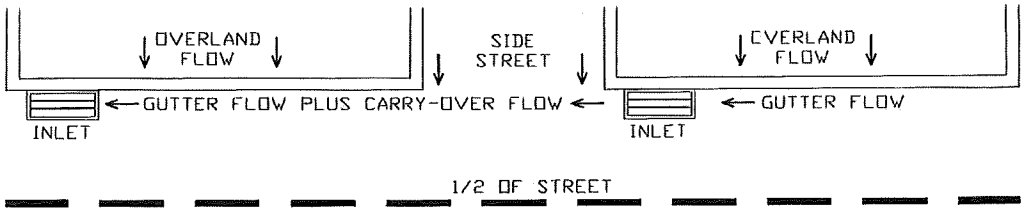
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.24			0.24	0.19
2.00	0.02	0.33			0.33	0.27
3.00	0.65	0.48			0.65	0.52
4.00	1.20	0.69			1.20	0.97
5.00	1.72	0.97			1.72	1.39
6.00	2.20	1.30			2.20	1.77
7.00	2.65	1.69			2.65	2.71
8.00	3.09	2.14			3.09	4.54
9.00	3.50	2.65			3.50	6.25
10.00	3.90	3.22			3.90	7.92
11.00	4.29	3.86			4.29	9.54
12.00	4.67	4.55			4.67	11.12
13.00	5.03	5.30			5.30	13.75
14.00	5.39	6.12			6.12	17.00
15.00	5.74	6.99			6.99	17.00
16.00	6.08	7.92			7.92	17.00
17.00	6.41	8.92			8.92	17.00
18.00	6.74	9.97			9.97	17.00
19.00	7.06	11.08			11.08	17.00
20.00	7.37	12.26			12.26	17.00
21.00	7.68	13.49			13.49	17.00
22.00	7.99	14.79			14.79	17.00
23.00	8.29	16.14			16.14	17.00
24.00	8.58	17.56			17.56	17.00
25.00	8.87	19.04			19.04	17.00
26.00	9.16	20.57			20.57	17.00
27.00	9.45	22.17			22.17	17.00
28.00	9.73	23.82			23.82	17.00
29.00	10.01	25.54			25.54	17.00
30.00	10.28	27.32			27.32	17.00
31.00	10.55	29.15			29.15	17.00
32.00	10.82	31.05			31.05	17.00
33.00	11.09	33.01			33.01	17.00
34.00	11.35	35.03			35.03	17.00
35.00	11.61	37.11			37.11	17.00
36.00	11.87	39.24			39.24	17.00
37.00	12.12	41.44			41.44	17.00
38.00	12.38	43.70			43.70	17.00
39.00	12.63	46.02			46.02	17.00
40.00	12.88	48.40			48.40	17.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-17

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	2.50	8.10	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c) ^ C_3$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

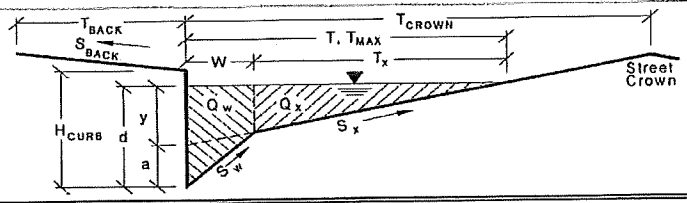
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	2.50	8.10	cfs

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-17



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
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 Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_x =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_o =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	7.00	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

Maximum Gutter Capacity Based On Allowable Water Spread

		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	2.88	4.08	inches
Water Depth with a Gutter Depression	d =	4.88	6.08	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.522	0.371	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Gutter Capacity Based on Allowable Gutter Depth

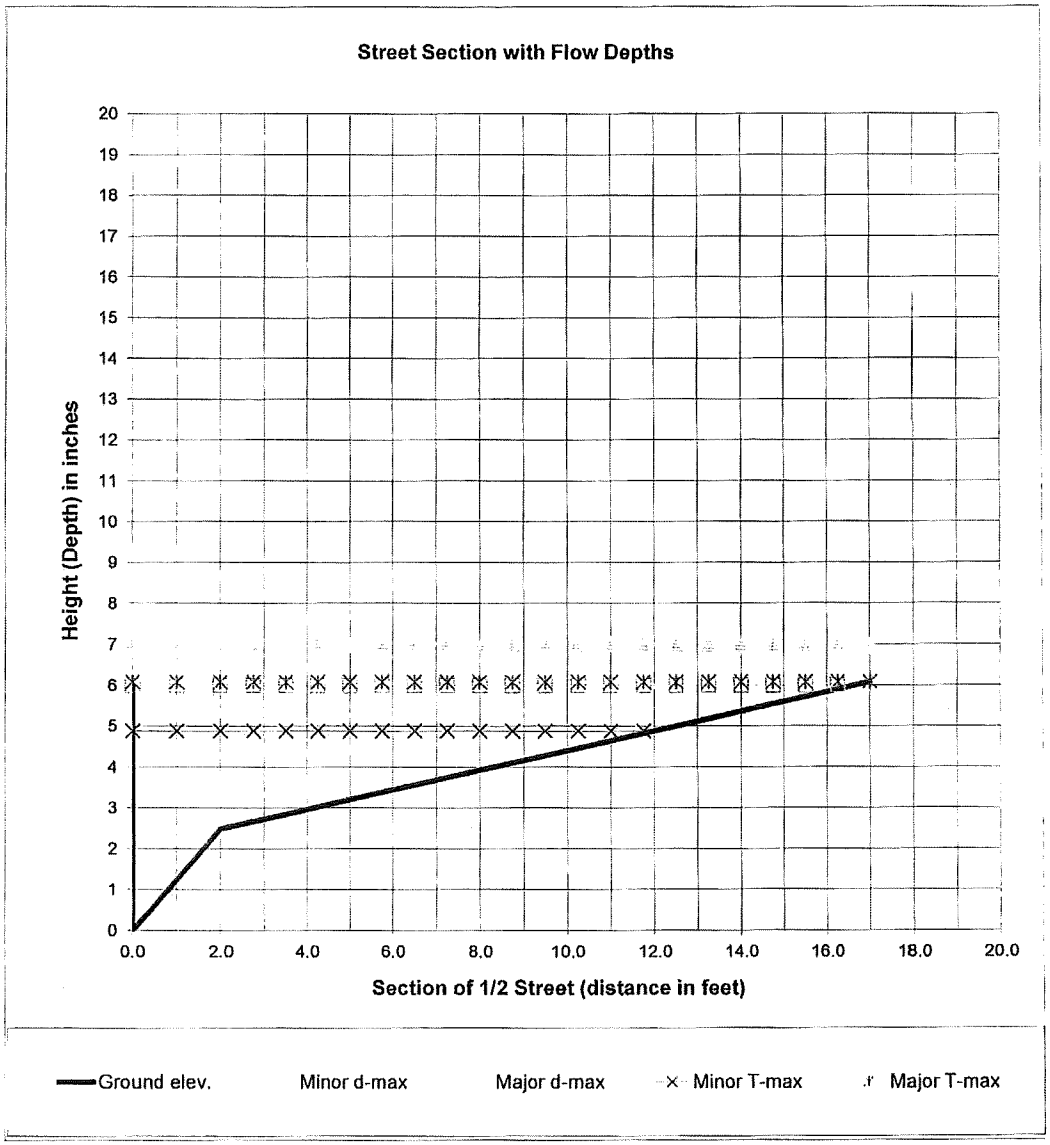
		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	20.8	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	18.8	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.378	0.300	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d

	Minor Storm	Major Storm	
Q_{allow} =	SUMP	SUMP	cfs

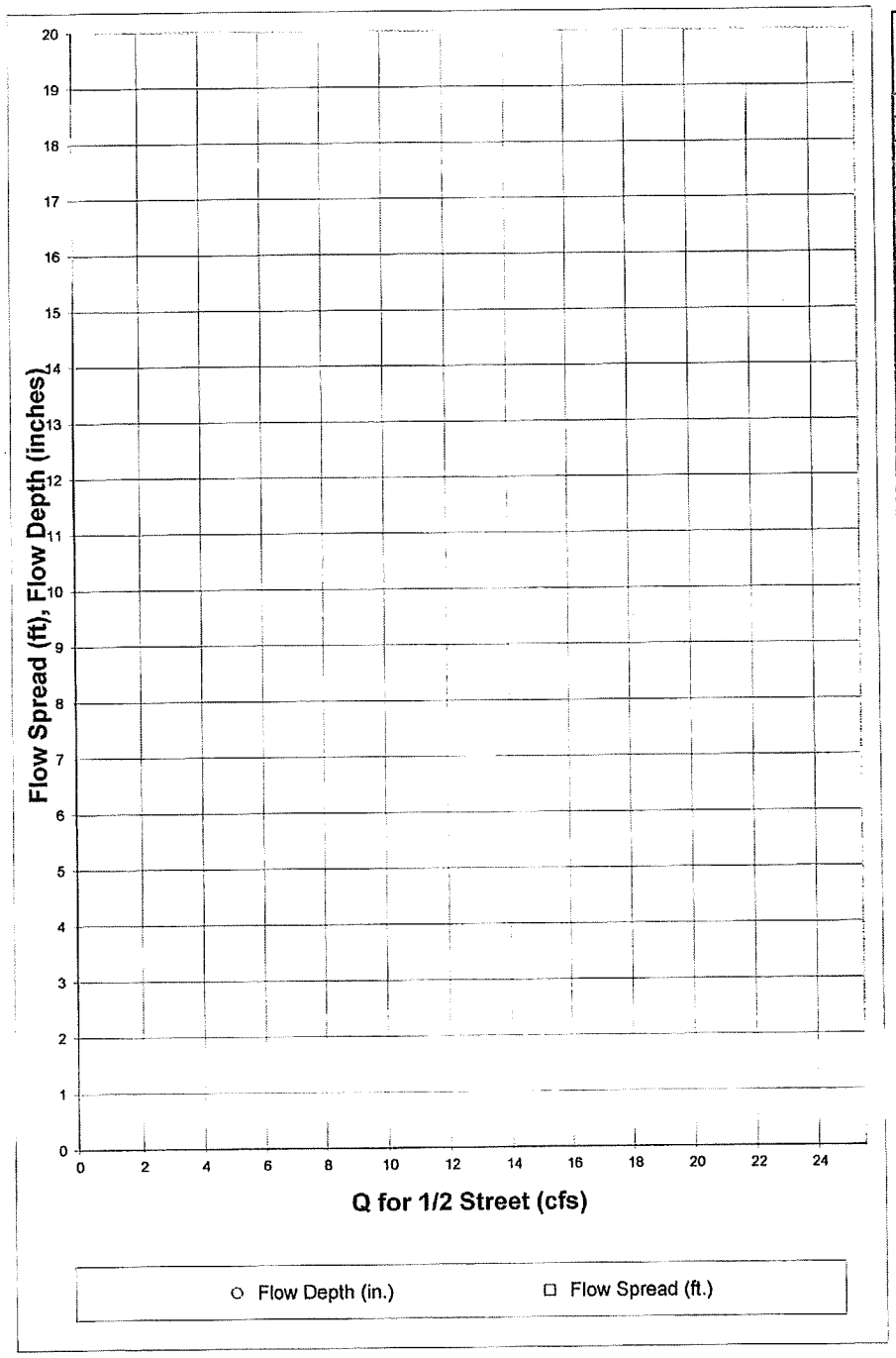
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
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10.75		
11.00		
11.25		
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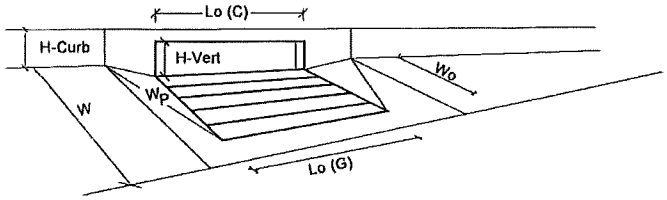
11.75		
12.00		
12.25		
12.50		

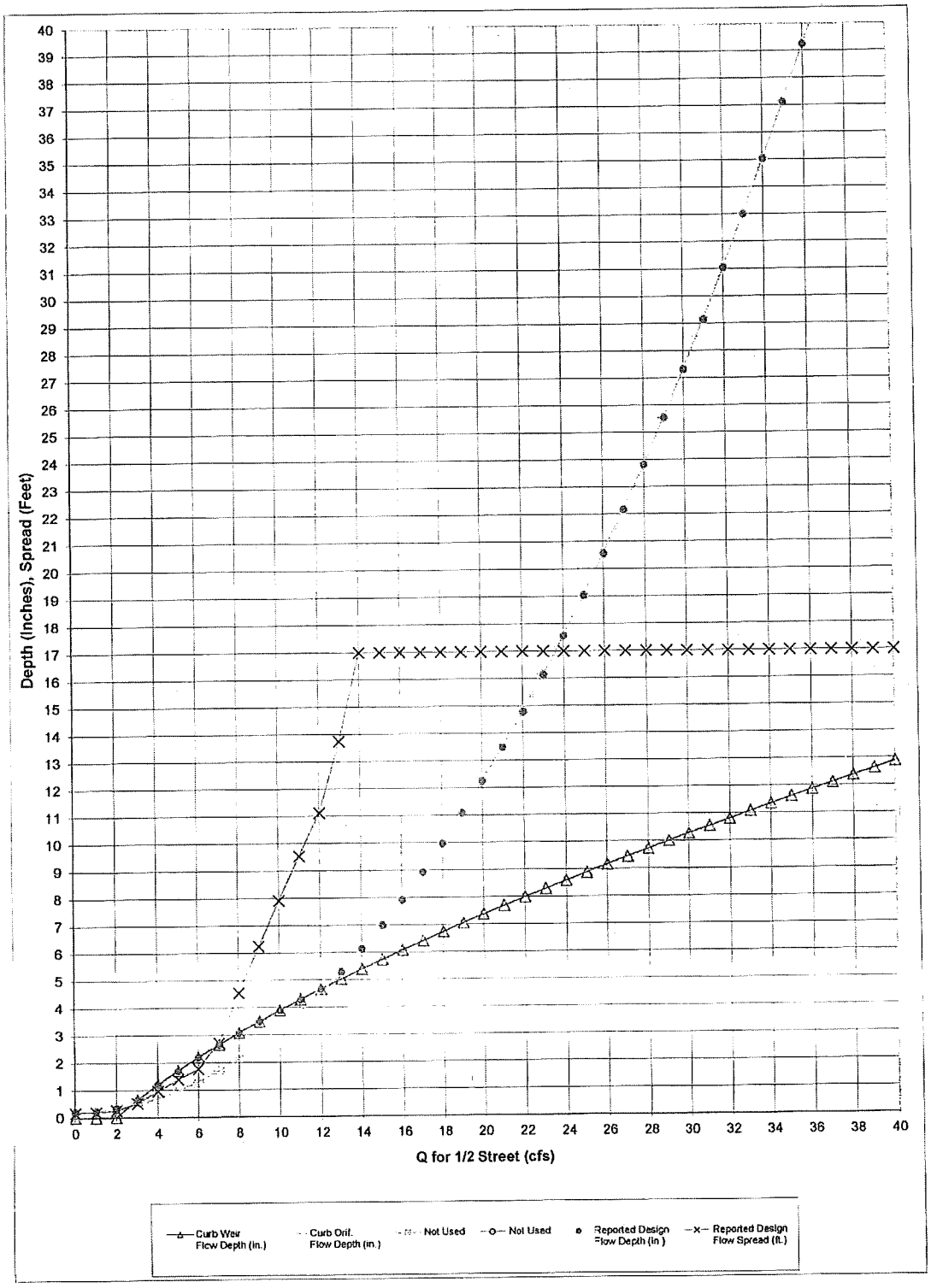
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-17



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 2.5 cfs curb)	d_{wl} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 2.5 cfs curb)	d_{wo} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 2.5 cfs curb)	d_{ol} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 2.5 cfs curb)	d_{oo} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	**Inches**
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 2.5 cfs curb)	d_{wl} =	2.23	4.88	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 2.5 cfs curb)	d_{wo} =	2.34	5.13	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 2.5 cfs curb)	d_{ol} =	2.37	3.81	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 2.5 cfs curb)	d_{oo} =	2.40	4.19	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	0.40	3.13	**Inches**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	2.5	8.1	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	0.40	3.13	**Inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	0.3	4.7	**feet**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	0.00	**Inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif. Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

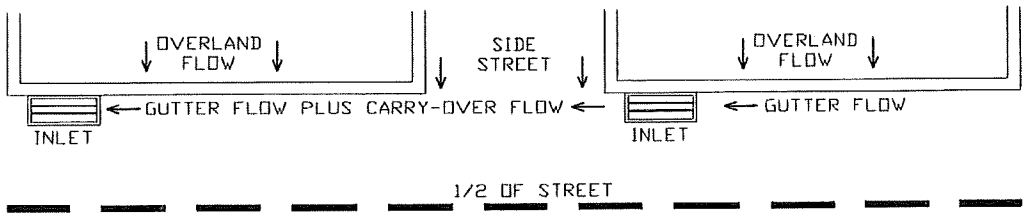
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.24			0.24	0.19
2.00	0.02	0.33			0.33	0.27
3.00	0.65	0.48			0.65	0.52
4.00	1.20	0.69			1.20	0.97
5.00	1.72	0.97			1.72	1.39
6.00	2.20	1.30			2.20	1.77
7.00	2.65	1.69			2.65	2.71
8.00	3.09	2.14			3.09	4.54
9.00	3.50	2.65			3.50	6.25
10.00	3.90	3.22			3.90	7.92
11.00	4.29	3.86			4.29	9.54
12.00	4.67	4.55			4.67	11.12
13.00	5.03	5.30			5.30	13.75
14.00	5.39	6.12			6.12	17.00
15.00	5.74	6.99			6.99	17.00
16.00	6.08	7.92			7.92	17.00
17.00	6.41	8.92			8.92	17.00
18.00	6.74	9.97			9.97	17.00
19.00	7.06	11.08			11.08	17.00
20.00	7.37	12.26			12.26	17.00
21.00	7.68	13.49			13.49	17.00
22.00	7.99	14.79			14.79	17.00
23.00	8.29	16.14			16.14	17.00
24.00	8.58	17.56			17.56	17.00
25.00	8.87	19.04			19.04	17.00
26.00	9.16	20.57			20.57	17.00
27.00	9.45	22.17			22.17	17.00
28.00	9.73	23.82			23.82	17.00
29.00	10.01	25.54			25.54	17.00
30.00	10.28	27.32			27.32	17.00
31.00	10.55	29.15			29.15	17.00
32.00	10.82	31.05			31.05	17.00
33.00	11.09	33.01			33.01	17.00
34.00	11.35	35.03			35.03	17.00
35.00	11.61	37.11			37.11	17.00
36.00	11.87	39.24			39.24	17.00
37.00	12.12	41.44			41.44	17.00
38.00	12.38	43.70			43.70	17.00
39.00	12.63	46.02			46.02	17.00
40.00	12.88	48.40			48.40	17.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-18

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	7.90	24.50	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c) ^ C_3$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

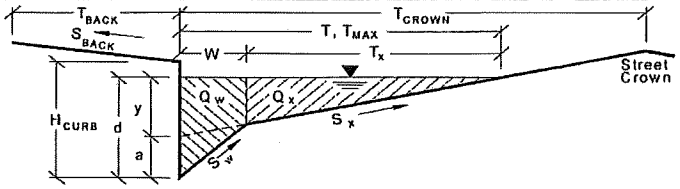
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	minutes
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	7.90	24.50	cfs

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-18



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
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 Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0300	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	10.00	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

Maximum Gutter Capacity Based On Allowable Water Spread

		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1133	0.1133	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	4.32	6.12	inches
Water Depth with a Gutter Depression	d =	6.32	8.12	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.480	0.342	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

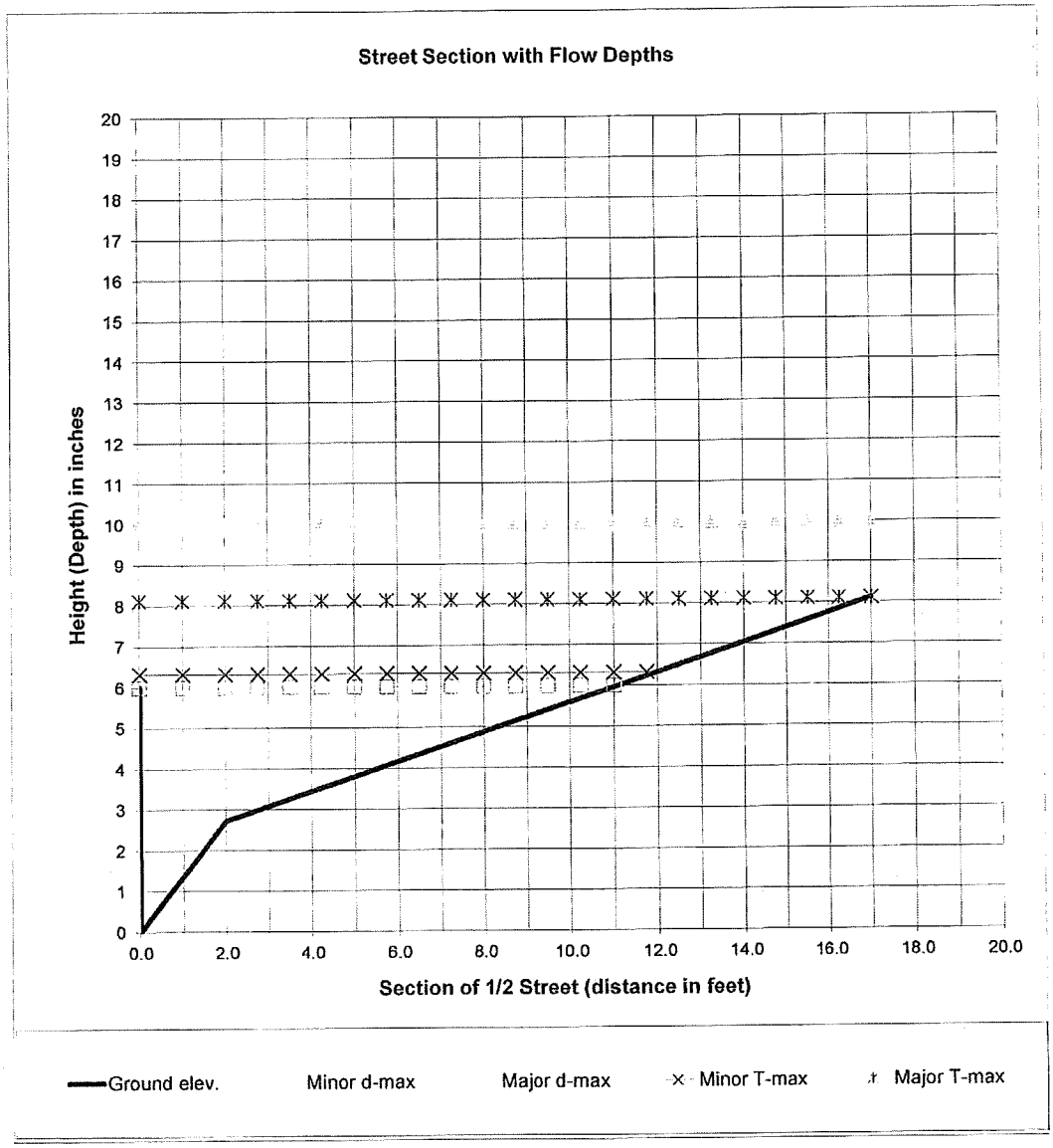
Maximum Gutter Capacity Based on Allowable Gutter Depth

		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	11.1	22.2	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	9.1	20.2	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.515	0.261	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	SUMP	SUMP	cfs

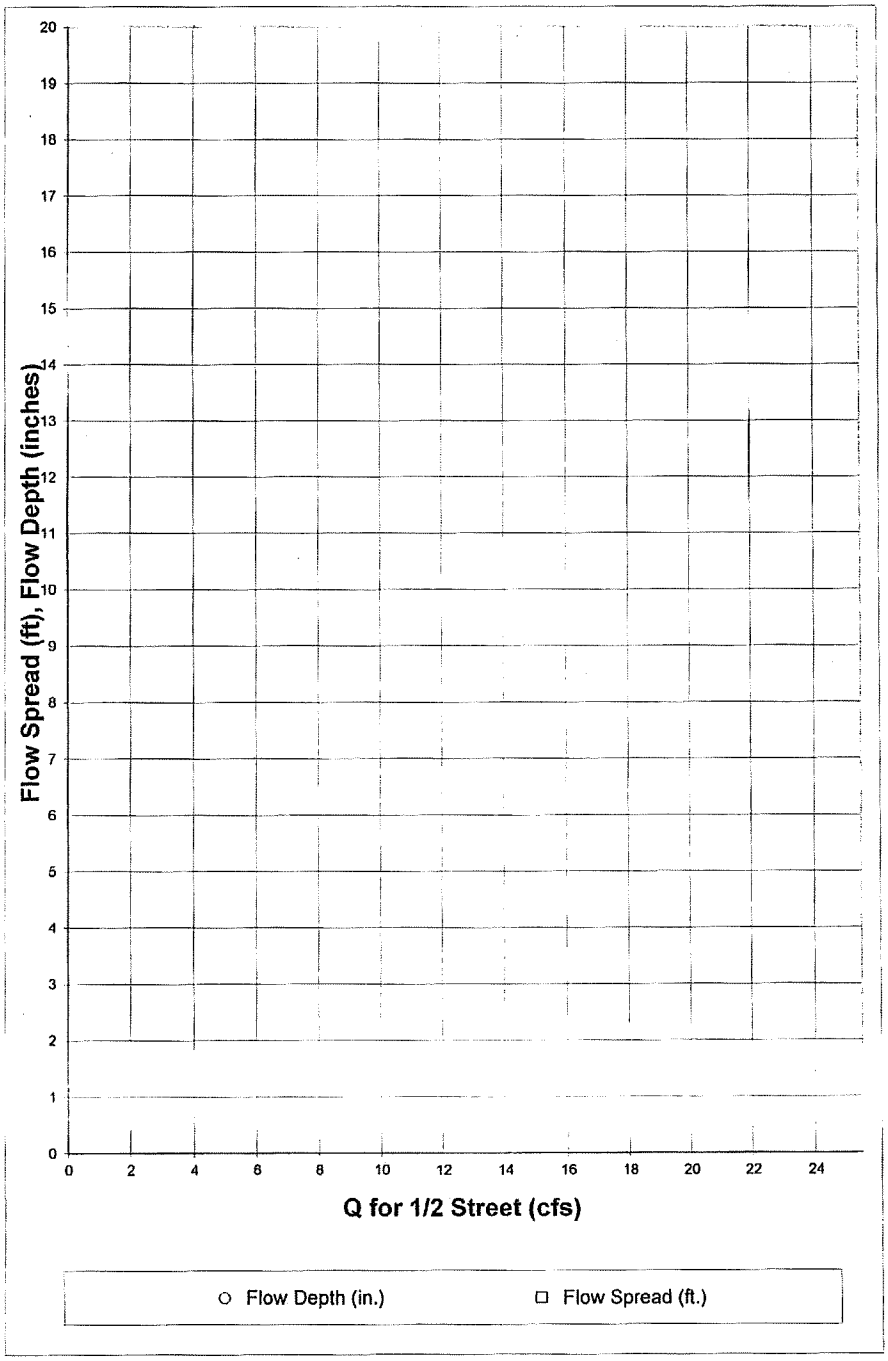
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
4.25		
4.50		
4.75		
5.00		
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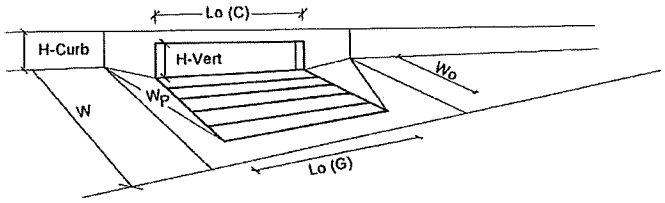
7.25		
7.50		
7.75		
8.00		
8.25		
8.50		
8.75		
9.00		
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

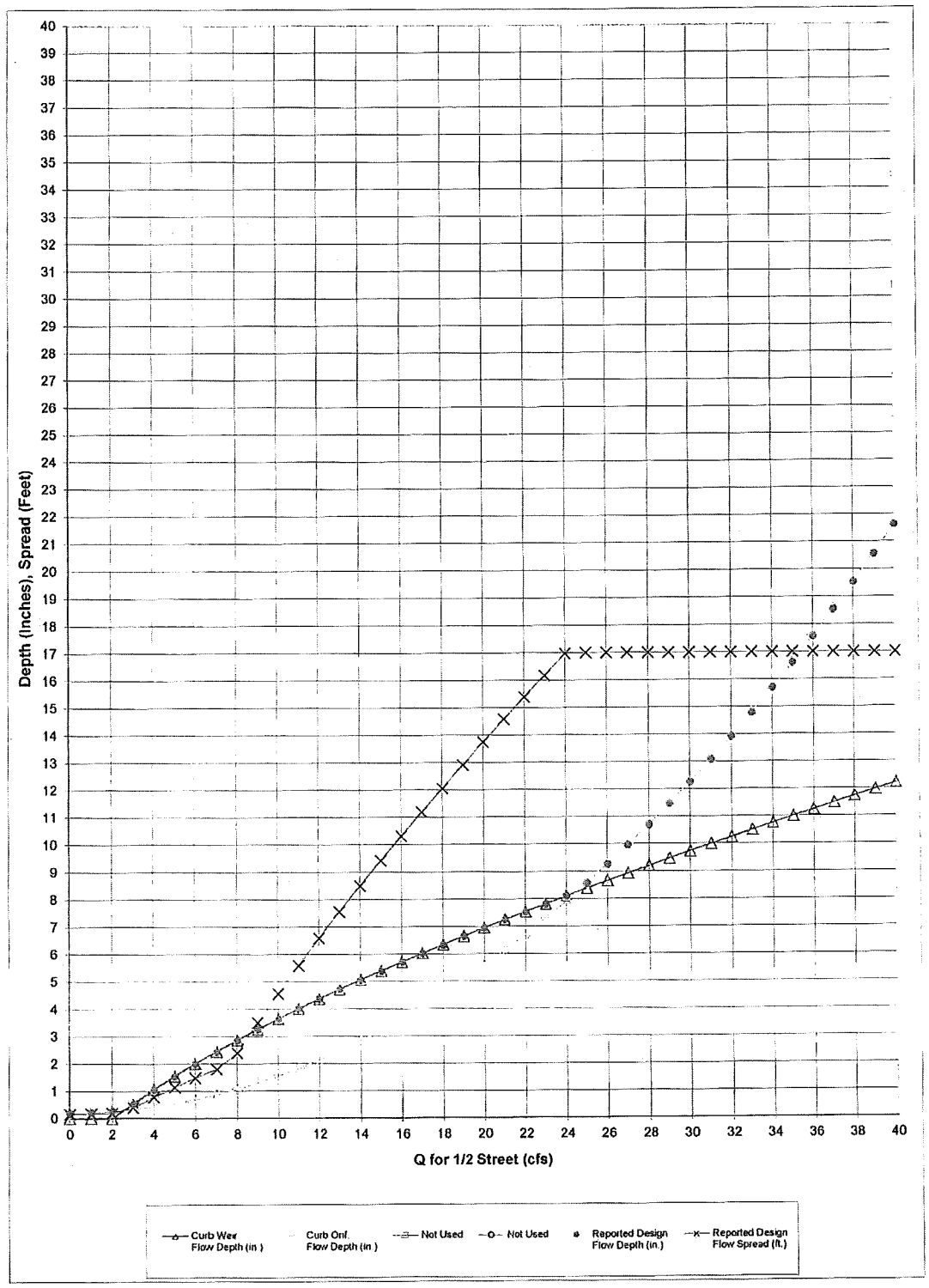
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-18



		MINOR	MAJOR	
Design Information (Input)				
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 7.9 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 7.9 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 7.9 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 7.9 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	**inches**
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 7.9 cfs curb)	d_{wi} =	4.49	9.55	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 7.9 cfs curb)	d_{wa} =	4.82	10.25	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 7.9 cfs curb)	d_{oi} =	2.89	8.72	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 7.9 cfs curb)	d_{oa} =	3.05	10.25	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	2.82	8.26	**inches**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	15.0	15.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	7.9	24.5	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	2.82	8.25	**inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	2.3	17.0	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	0.12	**inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Wer Flow Depth (in)
Curb Orif. Flow Depth (in)
Not Used
Not Used
Raported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

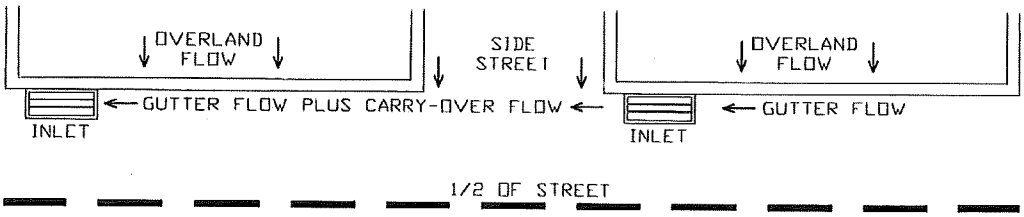
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.15
1.00	0.00	0.23			0.23	0.17
2.00	0.00	0.27			0.27	0.20
3.00	0.53	0.33			0.53	0.39
4.00	1.06	0.43			1.06	0.78
5.00	1.55	0.55			1.55	1.14
6.00	2.01	0.69			2.01	1.48
7.00	2.44	0.87			2.44	1.79
8.00	2.86	1.07			2.86	2.39
9.00	3.26	1.30			3.26	3.50
10.00	3.64	1.55			3.64	4.55
11.00	4.01	1.83			4.01	5.58
12.00	4.37	2.14			4.37	6.58
13.00	4.72	2.47			4.72	7.55
14.00	5.06	2.84			5.06	8.50
15.00	5.39	3.22			5.39	9.42
16.00	5.71	3.64			5.71	10.30
17.00	6.03	4.08			6.03	11.19
18.00	6.34	4.55			6.34	12.05
19.00	6.65	5.04			6.65	12.92
20.00	6.95	5.57			6.95	13.75
21.00	7.25	6.12			7.25	14.58
22.00	7.54	6.69			7.54	15.39
23.00	7.82	7.29			7.82	16.17
24.00	8.11	7.92			8.11	16.97
25.00	8.39	8.58			8.58	17.00
26.00	8.66	9.26			9.26	17.00
27.00	8.93	9.97			9.97	17.00
28.00	9.20	10.71			10.71	17.00
29.00	9.47	11.47			11.47	17.00
30.00	9.73	12.26			12.26	17.00
31.00	9.99	13.08			13.08	17.00
32.00	10.24	13.92			13.92	17.00
33.00	10.50	14.79			14.79	17.00
34.00	10.75	15.69			15.69	17.00
35.00	11.00	16.61			16.61	17.00
36.00	11.24	17.56			17.56	17.00
37.00	11.49	18.54			18.54	17.00
38.00	11.73	19.54			19.54	17.00
39.00	11.97	20.57			20.57	17.00
40.00	12.21	21.63			21.63	17.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-19

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow)

	Minor Storm	Major Storm	
*Q =	6.50	27.00	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

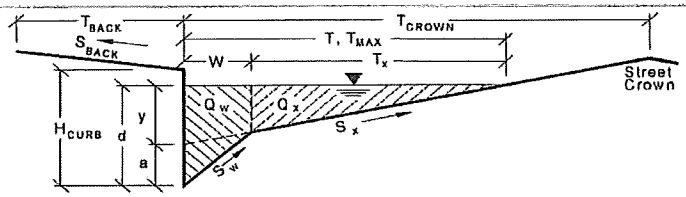
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	6.50	27.00	**cfs**

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-19



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
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 Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	12.00	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

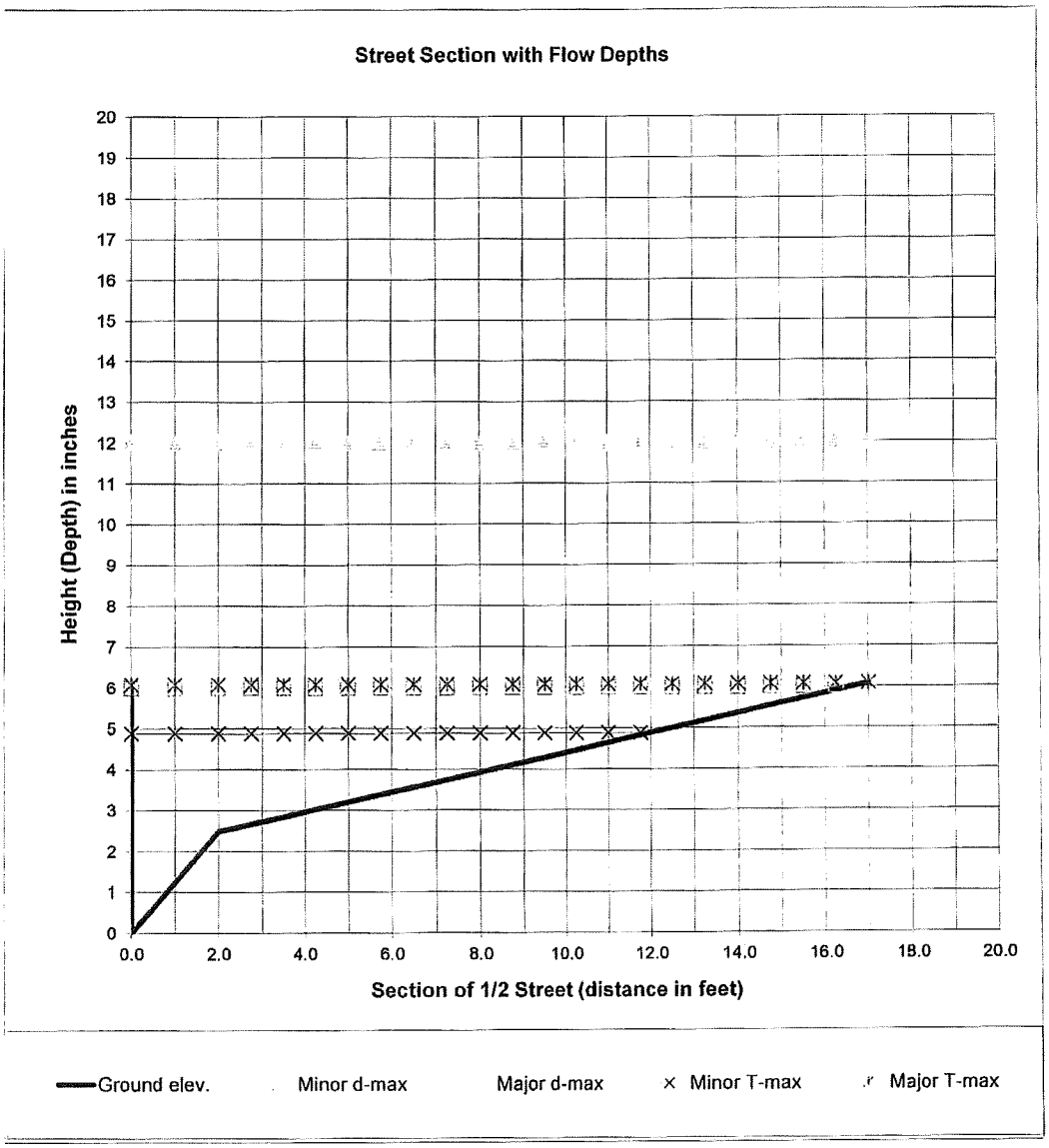
Maximum Gutter Capacity Based On Allowable Water Spread		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	2.88	4.08	inches
Water Depth with a Gutter Depression	d =	4.88	6.08	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.522	0.371	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Gutter Capacity Based on Allowable Gutter Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	41.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	39.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.378	0.142	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d		Minor Storm	Major Storm	
	Q_{allow} =	SUMP	SUMP	cfs

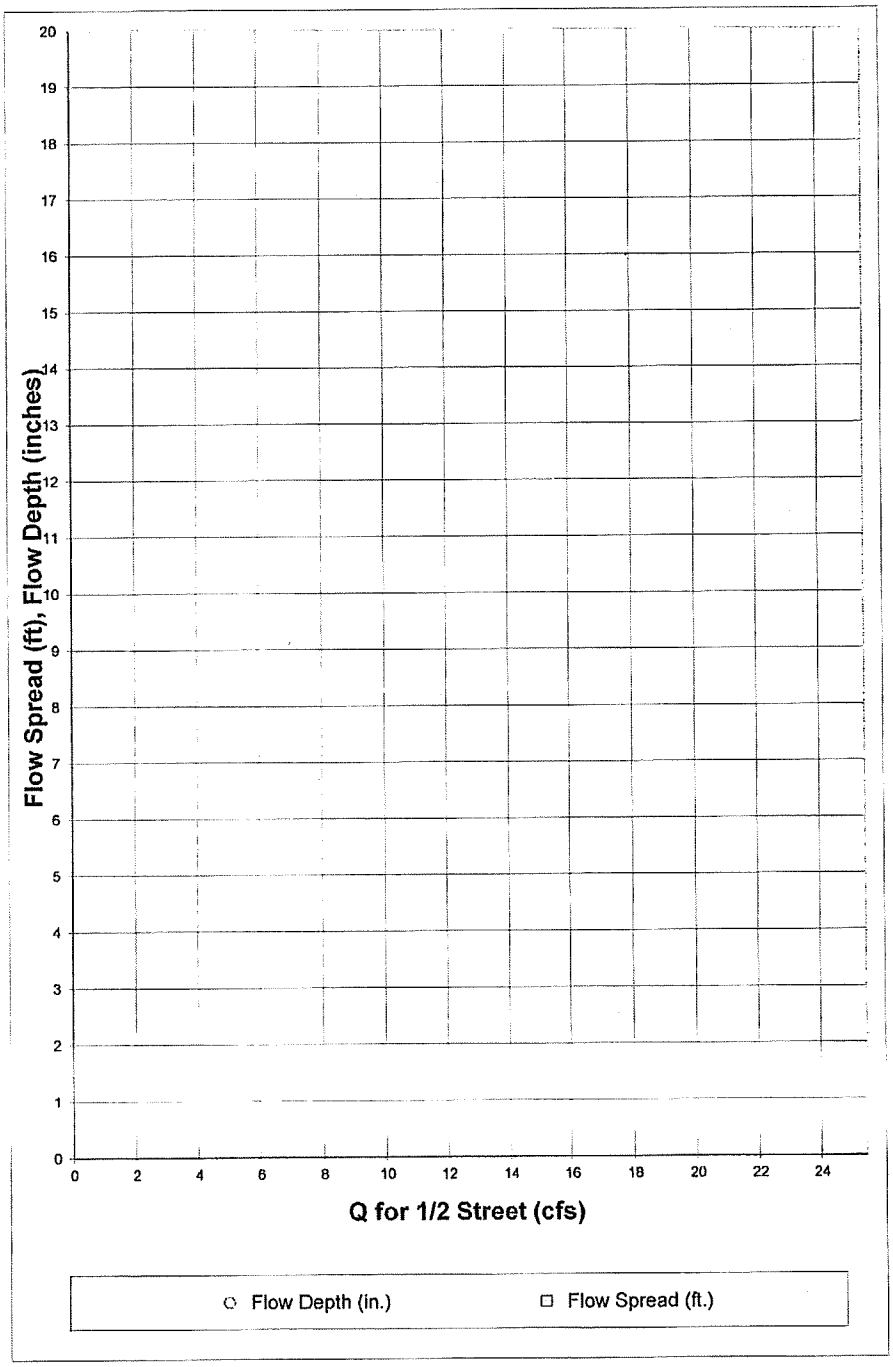
MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$



Q for 1/2 Street (cfs)	Flow Depth (in.)	Flow Spread (ft.)
0.00		
0.25		
0.50		
0.75		
1.00		
1.25		
1.50		
1.75		
2.00		
2.25		
2.50		
2.75		
3.00		
3.25		
3.50		
3.75		
4.00		
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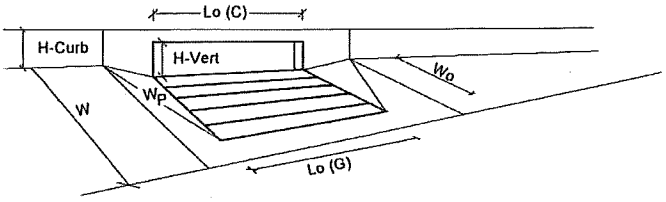
8.25		
8.50		
8.75		
9.00		
9.25		
9.50		
9.75		
10.00		
10.25		
10.50		
10.75		
11.00		
11.25		
11.50		
11.75		
12.00		
12.25		
12.50		

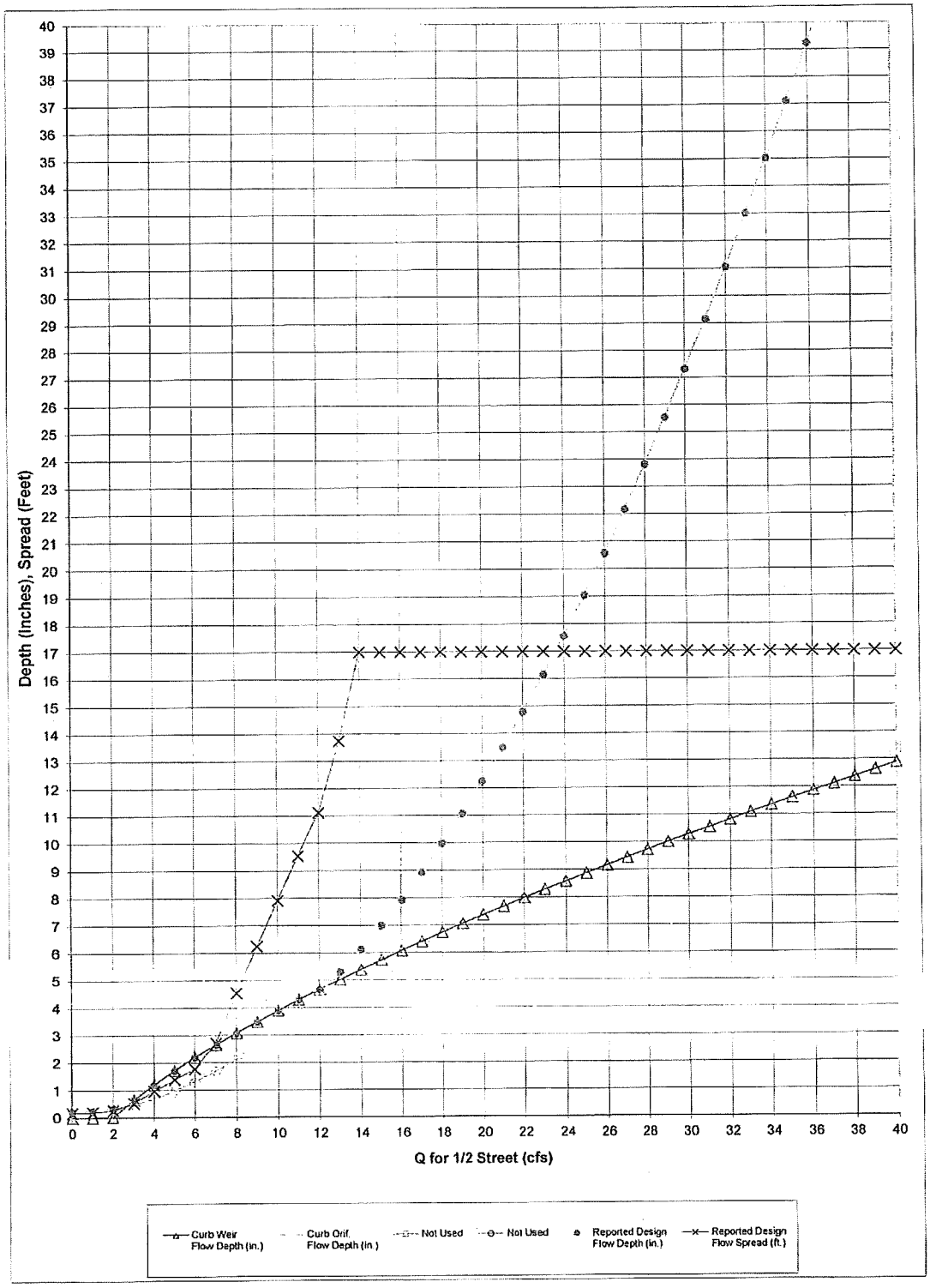
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-19



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 6.5 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb\text{-}un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 6.5 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb\text{-}cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 6.5 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 6.5 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a\text{-}Grate}$ =	N/A	N/A	**Inches**
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 6.5 cfs curb)	d_{wi} =	4.21	10.88	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 6.5 cfs curb)	d_{wa} =	4.43	11.45	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 6.5 cfs curb)	d_{oi} =	3.24	20.00	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 6.5 cfs curb)	d_{oa} =	3.49	24.17	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a\text{-}Curb}$ =	2.43	22.17	**Inches**
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	6.5	27.0	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	2.43	22.17	**Inches**
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	2.0	17.0	**ft. >T-Crown**
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	16.08	**Inches**


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif. Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

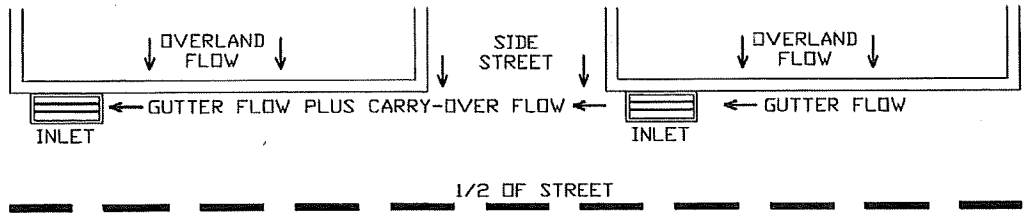
Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.24			0.24	0.19
2.00	0.02	0.33			0.33	0.27
3.00	0.65	0.48			0.65	0.52
4.00	1.20	0.69			1.20	0.97
5.00	1.72	0.97			1.72	1.39
6.00	2.20	1.30			2.20	1.77
7.00	2.65	1.69			2.65	2.71
8.00	3.09	2.14			3.09	4.54
9.00	3.50	2.65			3.50	6.25
10.00	3.90	3.22			3.90	7.92
11.00	4.29	3.86			4.29	9.54
12.00	4.67	4.55			4.67	11.12
13.00	5.03	5.30			5.30	13.75
14.00	5.39	6.12			6.12	17.00
15.00	5.74	6.99			6.99	17.00
16.00	6.08	7.92			7.92	17.00
17.00	6.41	8.92			8.92	17.00
18.00	6.74	9.97			9.97	17.00
19.00	7.06	11.08			11.08	17.00
20.00	7.37	12.26			12.26	17.00
21.00	7.68	13.49			13.49	17.00
22.00	7.99	14.79			14.79	17.00
23.00	8.29	16.14			16.14	17.00
24.00	8.58	17.56			17.56	17.00
25.00	8.87	19.04			19.04	17.00
26.00	9.16	20.57			20.57	17.00
27.00	9.45	22.17			22.17	17.00
28.00	9.73	23.82			23.82	17.00
29.00	10.01	25.54			25.54	17.00
30.00	10.28	27.32			27.32	17.00
31.00	10.55	29.15			29.15	17.00
32.00	10.82	31.05			31.05	17.00
33.00	11.09	33.01			33.01	17.00
34.00	11.35	35.03			35.03	17.00
35.00	11.61	37.11			37.11	17.00
36.00	11.87	39.24			39.24	17.00
37.00	12.12	41.44			41.44	17.00
38.00	12.38	43.70			43.70	17.00
39.00	12.63	46.02			46.02	17.00
40.00	12.88	48.40			48.40	17.00

DESIGN PEAK FLOW FOR ONE-HALF OF STREET BY THE RATIONAL METHOD

Erie Highlands- Phase 1

DP-20

Design Flow = Gutter Flow + Carry-over Flow



Design Flow: ONLY if already determined through other methods:
(local peak flow for 1/2 of street, plus flow bypassing upstream subcatchments):
* If you entered a value here, skip the rest of this sheet and proceed to sheet Q-Allow!

	Minor Storm	Major Storm	
*Q =	4.80	19.00	cfs

Geographic Information: (Enter data in the blue cells):

Subcatchment Area =		Acres
Percent Imperviousness =		%
NRCS Soil Type =		A, B, C, or D

Site: (Check One Box Only)

Site is Urban:	X
Site Is Non-Urban:	

	Slope (ft/ft)	Length (ft)
Overland Flow =		
Gutter Flow =		

Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$

	Minor Storm	Major Storm	
Design Storm Return Period, T_r =			years
Return Period One-Hour Precipitation, P_1 =			inches
C_1 =			
C_2 =			
C_3 =			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b =	0.00	0.00	cfs

Analysis of Flow Time (Time of Concentration) for a Catchment:

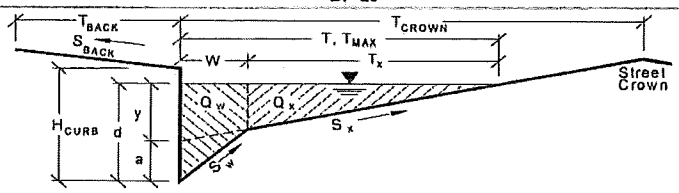
	Minor Storm	Major Storm	
Calculated Design Storm Runoff Coefficient, C =	N/A	N/A	
Calculated 5-yr. Runoff Coefficient, C5 =	N/A	N/A	
Overland Flow Velocity, V_O =	N/A	N/A	fps
Gutter Flow Velocity, V_G =	N/A	N/A	fps
Overland Flow Time, t_O =	N/A	N/A	minutes
Gutter Flow Time, t_G =	N/A	N/A	minutes
Calculated Time of Concentration, T_c =	N/A	N/A	minutes
Time of Concentration by Regional Formula, T_c =	N/A	N/A	minutes
Recommended T_c =	N/A	N/A	minutes
Time of Concentration Selected by User, T_c =	N/A	N/A	**minutes**
Design Rainfall Intensity, I =	N/A	N/A	inch/hr
Calculated Local Peak Flow, Q_p =	N/A	N/A	cfs
Total Design Peak Flow, Q =	4.80	19.00	cfs

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

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

Project: Erie Highlands- Phase 1

Inlet ID: DP-20



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.0200	ft. vert. / ft. horiz
Manning's Roughness Behind Curb	n_{BACK} =	0.0350	
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 Depression	a =	2.00	inches
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.0200	ft. vert. / ft. horiz
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.0000	ft. vert. / ft. horiz
Manning's Roughness for Street Section	n_{STREET} =	0.0150	

		Minor Storm	Major Storm	
Max. Allowable Water Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flow Line for Minor & Major Storm	d_{MAX} =	6.00	12.00	inches
Allow Flow Depth at Street Crown (leave blank for no)				X = yes

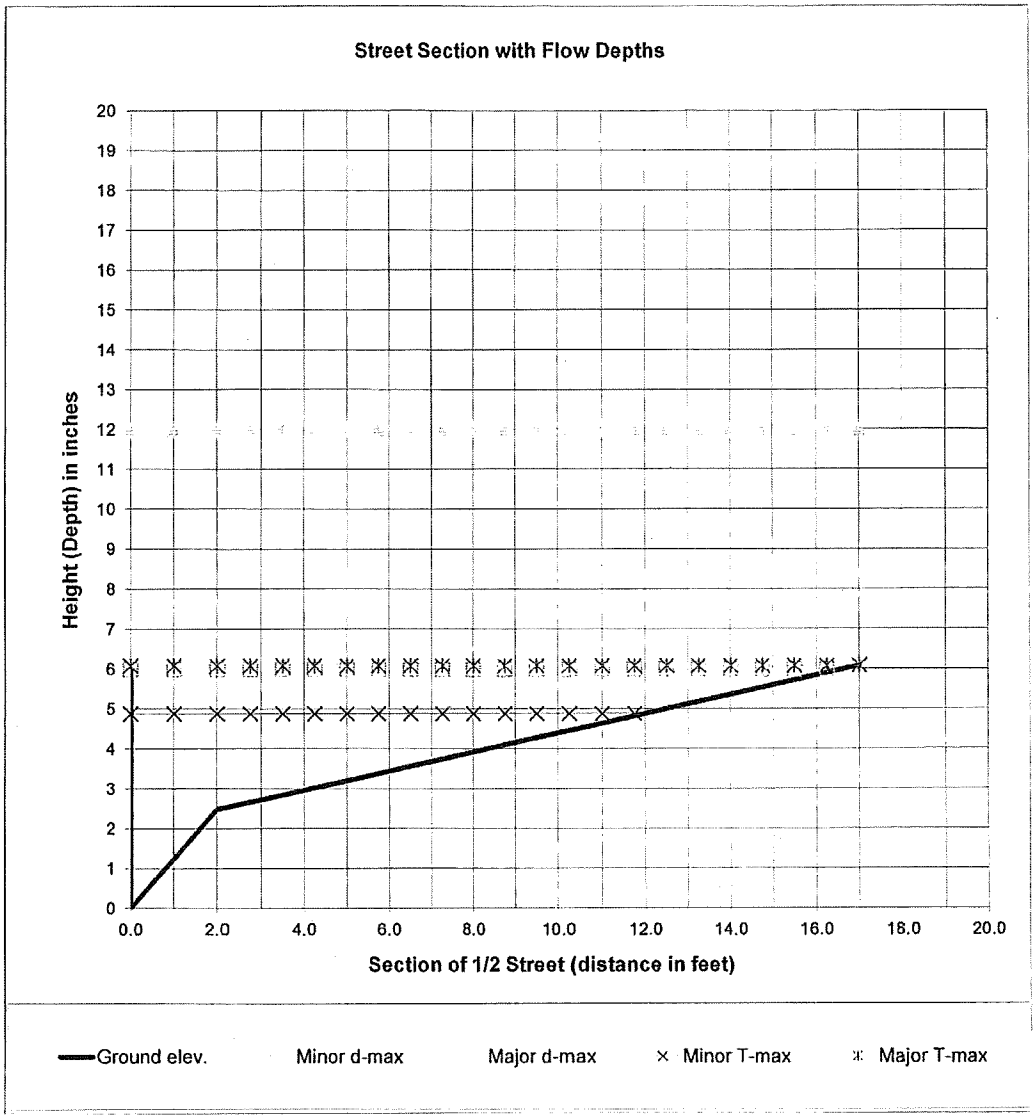
Maximum Gutter Capacity Based On Allowable Water Spread		Minor Storm	Major Storm	
Gutter Cross Slope (Eq. ST-8)	S_W =	0.1033	0.1033	ft/ft
Water Depth without Gutter Depression (Eq. ST-2)	y =	2.88	4.08	inches
Water Depth with a Gutter Depression	d =	4.88	6.08	inches
Allowable Spread for Discharge outside the Gutter Section W (T - W)	T_X =	10.0	15.0	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.522	0.371	
Discharge outside the Gutter Section W, carried in Section T_X	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_T - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Maximum Flow Based On Allowable Water Spread	Q_T =	SUMP	SUMP	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	

Maximum Gutter Capacity Based on Allowable Gutter Depth		Minor Storm	Major Storm	
Theoretical Water Spread	T_{TH} =	16.7	41.7	ft
Theoretical Spread for Discharge outside the Gutter Section W (T - W)	$T_{X\,TH}$ =	14.7	39.7	ft
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_O =	0.378	0.142	
Theoretical Discharge outside the Gutter Section W, carried in Section $T_{X\,TH}$	$Q_{X\,TH}$ =	0.0	0.0	cfs
Actual Discharge outside the Gutter Section W, (limited by distance T_{CROWN})	Q_X =	0.0	0.0	cfs
Discharge within the Gutter Section W (Q_d - Q_X)	Q_W =	0.0	0.0	cfs
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)	Q_{BACK} =	0.0	0.0	cfs
Total Discharge for Major & Minor Storm	Q =	0.0	0.0	cfs
Flow Velocity Within the Gutter Section	V =	0.0	0.0	fps
V*d Product: Flow Velocity Times Gutter Flowline Depth	V*d =	0.0	0.0	
Slope-Based Depth Safety Reduction Factor for Major & Minor (d ≥ 6") Storm	R =	SUMP	SUMP	
Max Flow Based on Allow. Gutter Depth (Safety Factor Applied)	Q_d =	SUMP	SUMP	cfs
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)	d =			inches
Resultant Flow Depth at Street Crown (Safety Factor Applied)	d_{CROWN} =			inches

		Minor Storm	Major Storm	
Max. Allowable Gutter Capacity Based on Minimum of Q_T or Q_d	Q_{allow} =	SUMP	SUMP	cfs

MINOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'

MAJOR STORM max. allowable capacity OK - greater than flow given on sheet 'Q-Peak'



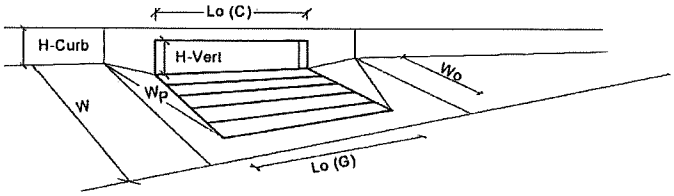
$$Q_x = \frac{0.56}{n} S_x^{5/3} S_L^{1/2} T_x^{8/3} \qquad E_o = \frac{1}{1 + \dfrac{S_w / S_x}{\left[1 + \dfrac{S_w / S_x}{(T/W) - 1}\right]^{8/3} - 1}}$$

$$Q = \frac{Q_x}{1 - E_o}; \; Q_w = Q - Q_x$$

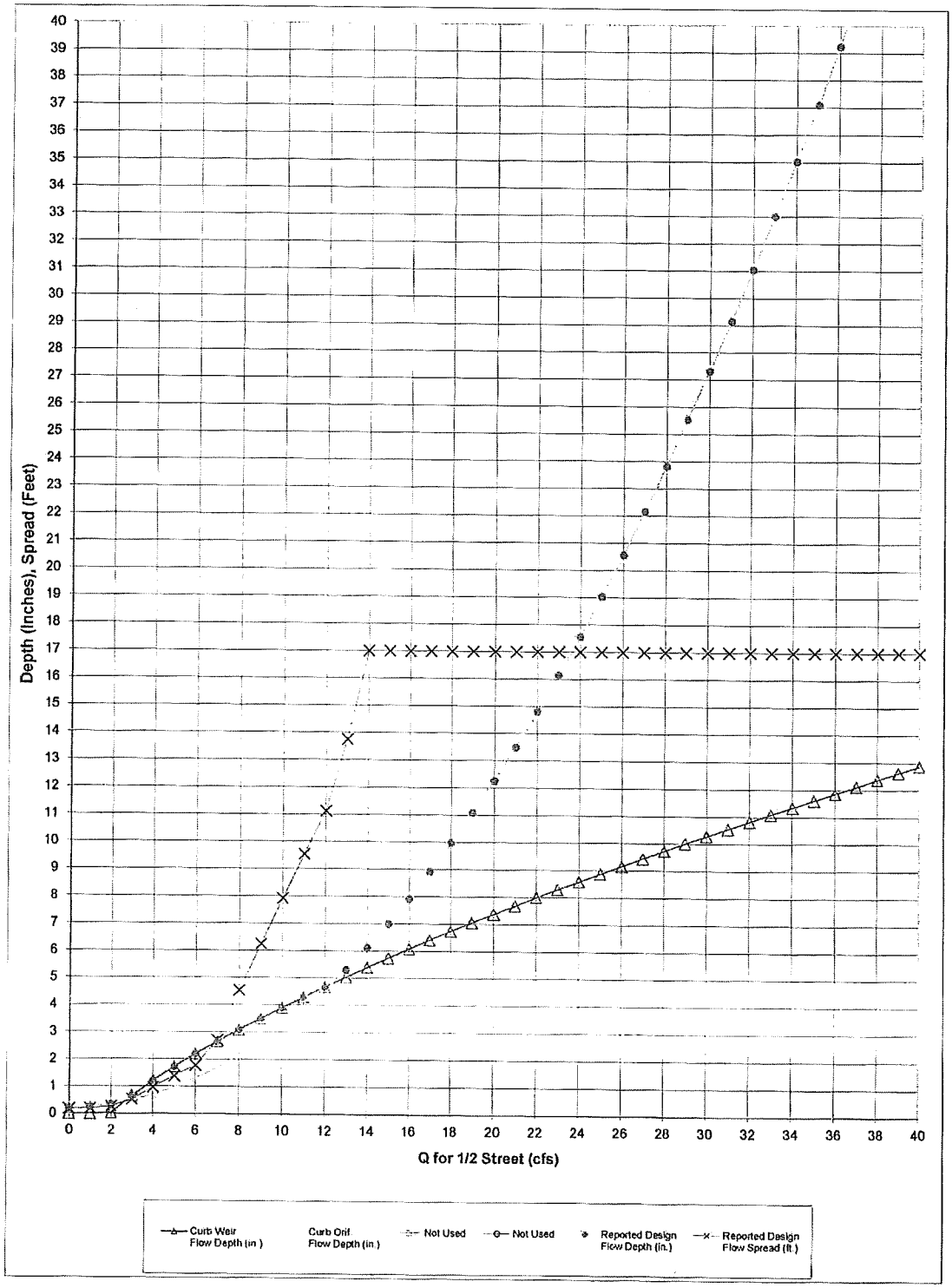
INLET IN A SUMP OR SAG LOCATION

Project = Erie Highlands- Phase 1

Inlet ID = DP-20

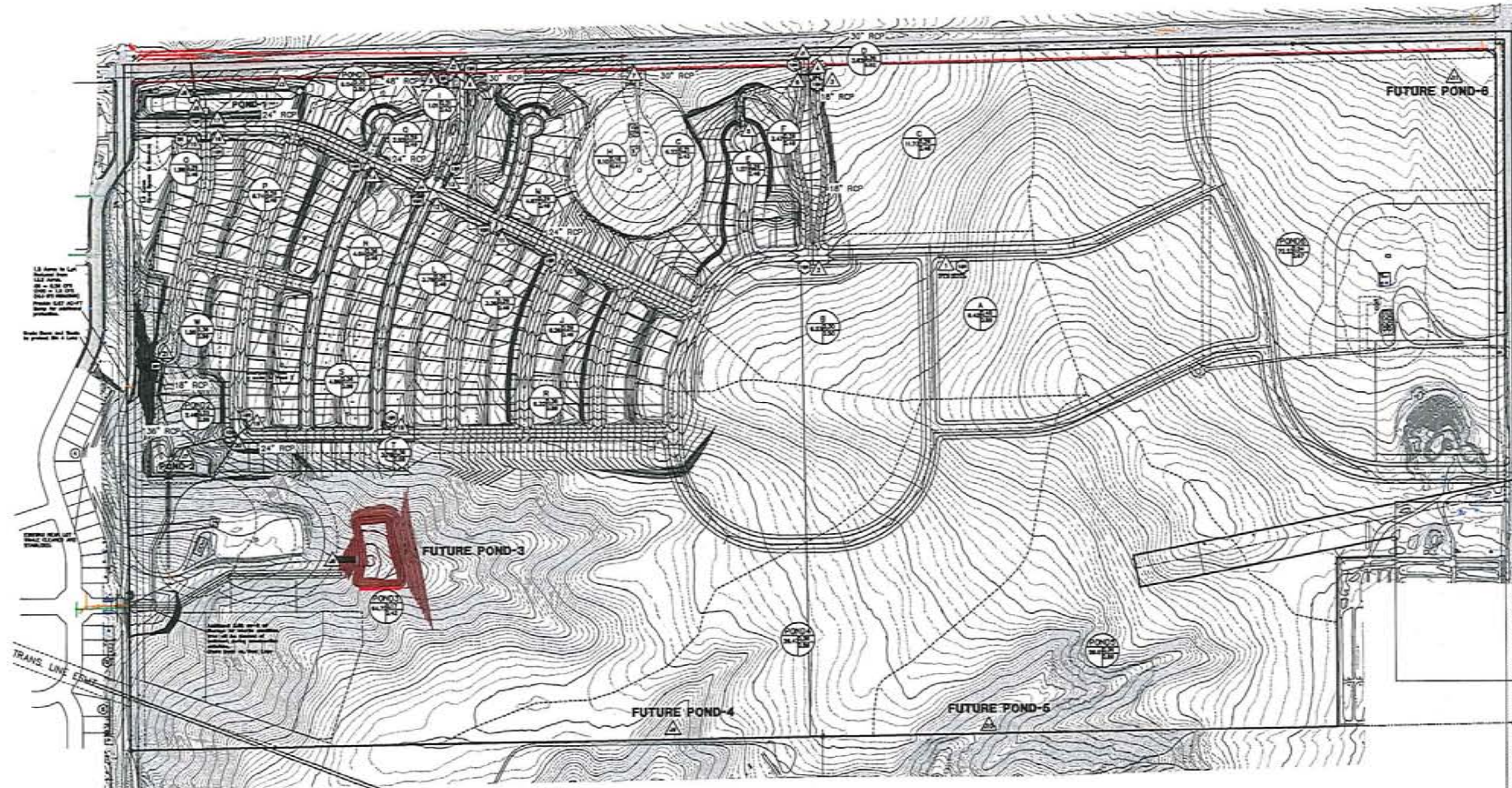


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Grate Information		MINOR	MAJOR	
Length of a Unit 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 3.00)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.67)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	5.00	5.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	4.95	4.95	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	63.4	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 2.30-3.00)	C_w (C) =	2.30	2.30	
Curb Opening Orifice Coefficient (typical value 0.67)	C_o (C) =	0.67	0.67	
Resulting Gutter Flow Depth for Grate Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	N/A	N/A	
Clogging Factor for Multiple Units	Clog =	N/A	N/A	
Grate as a Weir				
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.8 cfs curb)	d_{wi} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-un}$ =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.8 cfs curb)	d_{wa} =	N/A	N/A	inches
This Row Used for Combination Inlets Only	$d_{curb-cl}$ =	N/A	N/A	inches
Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.8 cfs curb)	d_{oi} =	N/A	N/A	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.8 cfs curb)	d_{oa} =	N/A	N/A	inches
Resulting Gutter Flow Depth Outside of Local Depression	$d_{a-Grate}$ =	N/A	N/A	inches
Resulting Gutter Flow Depth for Curb Opening Inlet Capacity in a Sump		MINOR	MAJOR	
Clogging Coefficient for Multiple Units	Coef =	1.00	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	0.10	
Curb as a Weir, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.8 cfs curb)	d_{wi} =	3.44	8.61	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.8 cfs curb)	d_{wa} =	3.62	9.06	inches
Curb as an Orifice, Grate as an Orifice		MINOR	MAJOR	
Flow Depth at Local Depression without Clogging (0 cfs grate, 4.8 cfs curb)	d_{oi} =	2.78	11.02	inches
Flow Depth at Local Depression with Clogging (0 cfs grate, 4.8 cfs curb)	d_{oa} =	2.91	13.09	inches
Resulting Gutter Flow Depth Outside of Local Depression	d_{a-Curb} =	1.62	11.08	inches
Resultant Street Conditions		MINOR	MAJOR	
Total Inlet Length	L =	10.0	10.0	feet
Total Inlet Interception Capacity (Design Discharge from *Q-Peak*)	Q_a =	4.8	19.0	cfs
Resultant Gutter Flow Depth (based on sheet *Q-Allow* geometry)	d =	1.62	11.08	inches
Resultant Street Flow Spread (based on sheet *Q-Allow* geometry)	T =	1.3	17.0	ft. >T-Crown
Resultant Flow Depth at Street Crown	d_{CROWN} =	0.00	5.04	inches


Depth (Inches), Spread (Feet)
Q for 1/2 Street (cfs)
Curb Weir Flow Depth (in.)
Curb Orif Flow Depth (in.)
Not Used
Not Used
Reported Design Flow Depth (in.)
Reported Design Flow Spread (ft.)

Q Intercepted (cfs)	Curb Weir Flow Depth (in.)	Curb Orif. Flow Depth (in.)	Not Used	Not Used	Reported Design Flow Depth (in.)	Reported DesignFlow Spread (ft.)
0.00	0.00	0.21			0.21	0.17
1.00	0.00	0.24			0.24	0.19
2.00	0.02	0.33			0.33	0.27
3.00	0.65	0.48			0.65	0.52
4.00	1.20	0.69			1.20	0.97
5.00	1.72	0.97			1.72	1.39
6.00	2.20	1.30			2.20	1.77
7.00	2.65	1.69			2.65	2.71
8.00	3.09	2.14			3.09	4.54
9.00	3.50	2.65			3.50	6.25
10.00	3.90	3.22			3.90	7.92
11.00	4.29	3.86			4.29	9.54
12.00	4.67	4.55			4.67	11.12
13.00	5.03	5.30			5.30	13.75
14.00	5.39	6.12			6.12	17.00
15.00	5.74	6.99			6.99	17.00
16.00	6.08	7.92			7.92	17.00
17.00	6.41	8.92			8.92	17.00
18.00	6.74	9.97			9.97	17.00
19.00	7.06	11.08			11.08	17.00
20.00	7.37	12.26			12.26	17.00
21.00	7.68	13.49			13.49	17.00
22.00	7.99	14.79			14.79	17.00
23.00	8.29	16.14			16.14	17.00
24.00	8.58	17.56			17.56	17.00
25.00	8.87	19.04			19.04	17.00
26.00	9.16	20.57			20.57	17.00
27.00	9.45	22.17			22.17	17.00
28.00	9.73	23.82			23.82	17.00
29.00	10.01	25.54			25.54	17.00
30.00	10.28	27.32			27.32	17.00
31.00	10.55	29.15			29.15	17.00
32.00	10.82	31.05			31.05	17.00
33.00	11.09	33.01			33.01	17.00
34.00	11.35	35.03			35.03	17.00
35.00	11.61	37.11			37.11	17.00
36.00	11.87	39.24			39.24	17.00
37.00	12.12	41.44			41.44	17.00
38.00	12.38	43.70			43.70	17.00
39.00	12.63	46.02			46.02	17.00
40.00	12.88	48.40			48.40	17.00

DEVELOPED DRAINAGE PLAN
ERIE HIGHLANDS
ERIE, CO



SUMMARY RUNOFF TABLE

[illegible]
[illegible]

POND-1 WATER QUALITY/DETENTION

	VOL. REQ'D	VOL. PROV.	DEPTH	RELEASE RATE
CURV WATER QUALITY	3.67 AC-FT	3.67 AC-FT	6.1'	
DETENTION POND 100 YR	6.13 AC-FT	6.13 AC-FT	8.8'	78.74 CFS

POND-2 WATER QUALITY/DETENTION

	VOL. REQ'D	VOL. PROV.	DEPTH	RELEASE RATE
CURV WATER QUALITY	0.79 AC-FT	0.79 AC-FT	4.1	
DETENTION POND 100 YR	1.35 AC-FT	1.35 AC-FT	5.2	16.96 CFS

POND-3 WATER QUALITY/DETENTION

	VOL. REQ'D	VOL. PROV.	DEPTH	RELEASE RATE
CURV WATER QUALITY	0.66 AC-FT	0.66 AC-FT	TBD	
DETENTION POND 100 YR	1.8 AC-FT	2.0 AC-FT	TBD	60.74 CFS

POND-4 WATER QUALITY/DETENTION

	VOL. REQ'D	VOL. PROV.	DEPTH	RELEASE RATE
CURV WATER QUALITY	1.14 AC-FT	1.14 AC-FT	TBD	
DETENTION POND 100 YR	2.00 AC-FT	2.02 AC-FT	TBD	23.28 CFS

POND-5 WATER QUALITY/DETENTION

	VOL. REQ'D	VOL. PROV.	DEPTH	RELEASE RATE
CURV WATER QUALITY	1.24 AC-FT	1.24 AC-FT	TBD	
DETENTION POND 100 YR	2.22 AC-FT	2.22 AC-FT	TBD	26.26 CFS

POND-6 WATER QUALITY/DETENTION

	VOL. REQ'D	VOL. PROV.	DEPTH	RELEASE RATE
CURV WATER QUALITY	3.04 AC-FT	3.04 AC-FT	TBD	
DETENTION POND 100 YR	8.67 AC-FT	8.67 AC-FT	TBD	70.50 CFS

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- FLOWLINE
- DRAINAGE DIRECTION
- A – BASIN DESIGNATION; B – BASIN AREA; C – 5-YEAR RUNOFF COEFFICIENT; D – 100-YEAR RUNOFF COEFFICIENT
- N – DESIGN POINT
- 5' TYPE R INLET
- 10' TYPE R INLET

DRAINAGE PLAN – DEVELOPED
ERIE HIGHLANDS
JOB NO. 13-000

SHEET 1 OF 1

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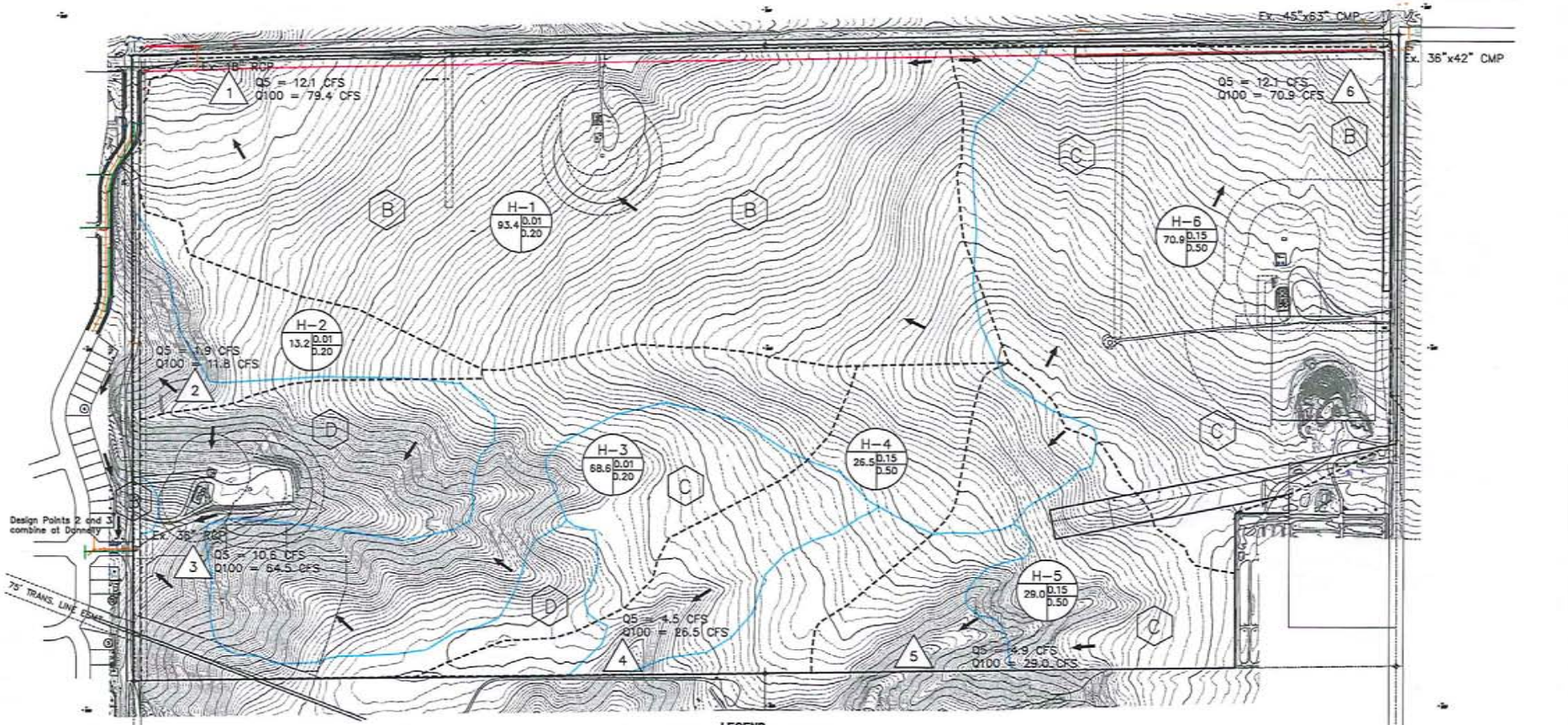
HISTORIC DRAINAGE PLAN
ERIE HIGHLANDS
ERIE, CO



LEGEND

- EXISTING CONTOUR
- DRAINAGE DIRECTION
- A – BASIN DESIGNATION
- B – BASIN AREA
- C – 5-YEAR RUNOFF COEFFICIENT
- D – 100-YEAR RUNOFF COEFFICIENT
- N – DESIGN POINT
- HYDROLOGIC SOIL GROUP
- DRAINAGE BASIN

DRAINAGE PLAN – HISTORIC
ERIE HIGHLANDS
JOB NO. 13-000

SHEET 1 OF 1

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January 25, 2013

Ms. Kristin Schwartz
A. G. Wassenaar, Inc.
2180 South Ivanhoe Street
Denver, Colorado 80221

Dear Ms. Schwartz:

The purpose of this letter is to describe the results of a reconnaissance-level cultural resource investigation of the Dearmin Property, which is a 300-acre parcel east of Erie in Weld County, Colorado (Figure 1). This report includes the results of a Class I investigation as well as an on-site examination of the parcel. It was prepared by Centennial Archaeology, Inc. (Centennial) for A.G. Wassenaar, Inc. The results of this report are provided as an in-house reconnaissance document, which will not be submitted to any federal, state, or local agencies for review. The proposed project area encompasses the north half of the following section (Figure 2):

Township 1 North – Range 68 West, Section 20

Centennial requested a file search of Section 20 through the Colorado Office of Archaeology and Historic Preservation/State Historic Preservation Office (SHPO). The results of this file search were received on January 22, 2013. Records included in the file search results consist of archaeological investigations that have been conducted in the area, cultural resources (prehistoric and historic archaeological sites) that have been recorded previously in the area, and GIS shapefiles of the cultural resources. Historic U.S. Geological Survey (USGS) maps were consulted for evidence of transportation routes, homesteads, or other resources that may have once been present. Additionally, General Land Office (GLO) records available through the Bureau of Land Management (BLM) – Colorado State Office website were examined to determine if homestead patents or other records of early historic use exist.

The Class I research revealed that two previous investigations have been undertaken, and that a single historic site has been recorded previously within the study area. The projects are a Class III (intensive field) survey of a transmission line, and an archeological inventory of farms and ranches in Weld and Broomfield Counties. The known site is the Hoyt to Terry Street Transmission Line (site No. 5WL3154.1), which has been officially evaluated as not eligible for the National Register of Historic Places. This transmission line traverses the extreme southwestern corner of the study parcel on a northwest/southeast axis.

A review of the 1967 Erie 7.5' USGS Quadrangle revealed the presence of an unnamed small mine or prospecting pit near the eastern boundary of the property. No other historic features are present within the project area on this map. The mine/prospecting pit does not appear in the 1904 Niwot 15' USGS Quadrangle, and is discussed further in the results of the on-site examination.

GLO land patent records indicate that the NW¼ of the section was patented by Robert George and the NE¼ was patented by Thomas Maguire. Both patents were issued on February 25, 1870. No further information regarding either of these individuals could be found. No historic buildings, roads, or other materials appear in this location on the 1864 GLO survey plat.

The on-site examination of the property was conducted by Kristin A. Gensmer on January 24, 2013. The majority of the property has been plowed, thus disturbing any surface-level manifestations of cultural resources in the project area. Reconnaissance consisted of a vehicular survey of the northern, eastern, and western property boundaries and pedestrian survey along the southern boundary and the drainages. No prehistoric cultural materials were observed.

Historic evidence includes the transmission line (Figure 3), the small mine or prospecting pit (Figures 4 and 5), and two sandstone outcrops on which historic and modern debris were observed (Figure 6). The mine or prospecting pit consists of a large, irregular hole that is estimated to be about 3 meters deep. It is bordered on the east and west by spoils heaps that range in height from 1 to 2 meters, and on the north by a spoils pile that is approximately 7 meters high. The pit appears to have been abandoned for many years. Russian thistle and assorted forbs grow in the pit and on the spoils piles, which are slumping into the pit. Low, concrete walls are present along the south side, suggesting that a barrier wall or concrete foundation was once present but has since been removed. The appearance of the pit suggests that it was associated with the coal mining industry, which dominated the Erie economy during the late 19th and early and middle 20th centuries (Town of Erie Historic Preservation Board 2009). The rock outcrops consist of two unplowed areas that are approximately 60 meters apart, and are situated along the drainage in the southwestern part of the property. Large sandstone slabs and historic debris including a corroded metal pipe, a sanitary can, and colorless and amber bottle glass that may have been removed from the surrounding agricultural field have been piled on the outcrops. All of these materials appear to be from the 20th century and are not likely to yield additional information regarding the history of the property. Additionally, a large, corroded metal box was observed in a drainage near the western boundary. No identifying markers were present on this item, and it may be associated with modern activities.

Reference Cited

Town of Erie Historic Preservation Board
2009 *A Selected Timeline of Erie's History.* Electronic document, www.erieco.gov/DocumentCenter/Home/View/176, accessed January 25, 2013.

Please contact me if you have questions or need any additional information.

Sincerely,

Kristin A. Gensmer
Historical Archaeologist

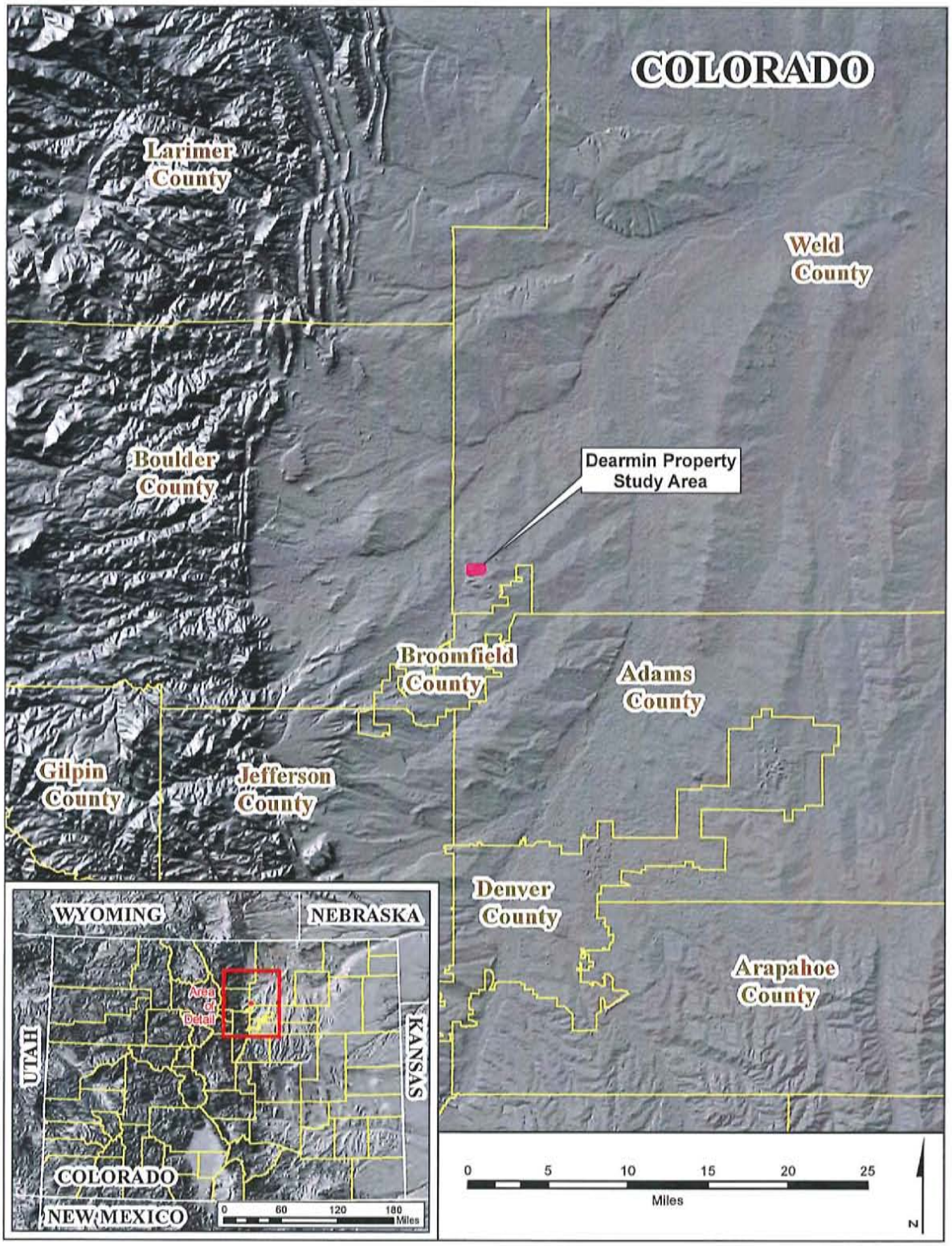

Figure 1. Study area overview map.

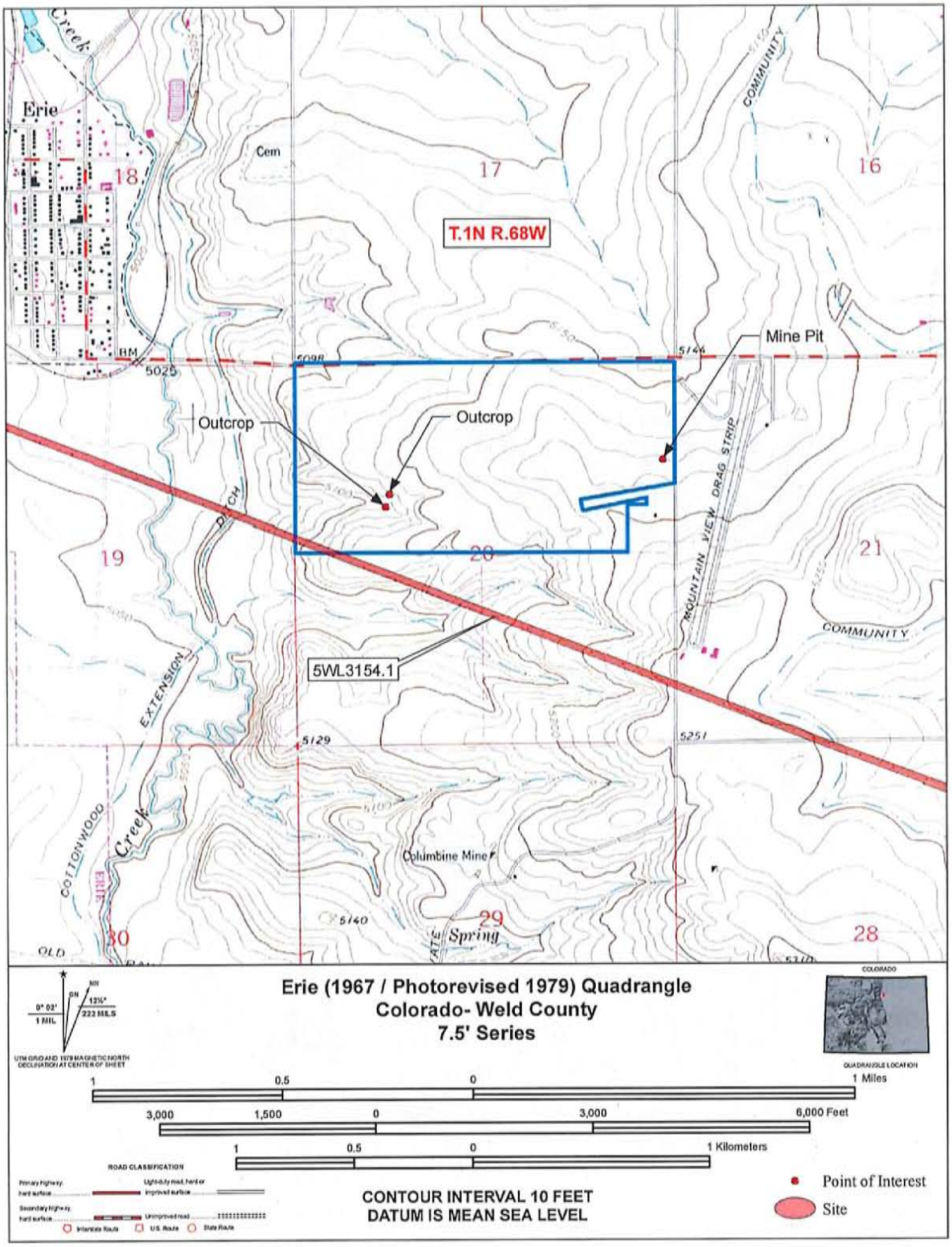

Figure 2. Map of study area at 1:24,000 scale showing previously recorded cultural materials and historic cultural resources within the study area.

Figure 3. View of site 5WL3154.1, looking southeast.

Figure 4. View of mine or prospecting pit, looking northwest.

Figure 5. View of spoils heap north of mine or prospecting pit, looking northwest.

Figure 6. View of sandstone outcrops, looking north.

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LIMITED SUBSURFACE INVESTIGATION REPORT

DEARMIN PROPERTY
ERIE, COLORADO

PREPARED FOR:

HC DEVELOPMENT AND MANAGEMENT SERVICES, INC.
4908 TOWER ROAD
DENVER, COLORADO 80237

JANUARY 2, 2013
PROJECT NUMBER: E12687.E2

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GROUND WATER SAMPLING METHODS	9
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ATTACHMENTS

FIGURES	ATTACHMENT A
SOIL BORING LOGS	ATTACHMENT B
LABORATORY REPORTS	ATTACHMENT C

INTRODUCTION

As requested, A. G. Wassenaar, Inc. (AGW) conducted a limited subsurface investigation at the Dearmin Property in Erie, Colorado. The project was completed to evaluate the potential presence of common regulated petroleum compounds in soils and/or ground water in areas where petroleum production equipment operates or has operated in the past. Investigated areas included three tank batteries with associated natural gas wells near the east, north, and west boundaries of the property. In addition, the area adjacent to a plugged and abandoned production well at the east-central portion of the property was also investigated. Other portions of the property were not included in the study.

The subject property is generally undeveloped agricultural land, except for the equipment described above. Based on site observations and topographic information from the U.S. Geological Survey Quadrangle Map for this area, the investigated areas generally slope toward the northeast to northwest, except for the western tank battery area that slopes to the south to southwest. Figure 1 in Attachment A illustrates the site location and topography.

To conduct this investigation, AGW retained a drilling contractor to advance a total of twelve (12) boreholes for soil and/or ground water collection (three at each of the four areas investigated). Soils collected during the investigation were evaluated in the field by AGW and selected samples were forwarded to a laboratory for analytical testing. Ground water samples were also collected for laboratory analysis from boreholes that were not dry. Details regarding the methods used during the project, along with a summary of the field results, laboratory results, and conclusions are presented below.

PREPARATION FOR FIELD SOIL BORING

In accordance with Colorado laws, AGW and the drilling contractor, Drilling Engineers, Inc. (DEI) of Fort Collins, Colorado, contacted the Utility Notification Center of Colorado (UNCC) and associated utility/oil companies to locate subsurface utilities in the proposed boring areas prior to borehole advancement.

To locate potential private utilities or abandoned pipelines in proposed boring locations not covered by UNCC, AGW also retained Underground Consulting Solutions (UCS) of Englewood, Colorado.

On November 27, 2012, Mr. Joseph Pieterick of AGW held a site locate meeting with the UNCC associated locators and a UCS locator to mark buried pipelines in the proposed drilling areas. Based on the results of the locate meeting, no conflicting pipelines were present at the planned borehole locations.

As requested, AGW also contacted Mr. Travis Low of the property owners group, and Mr. Brian Murray of Encana Oil and Gas USA, Inc. (Encana), the operator of the tank batteries, prior to conducting field work. The purpose of these contacts was to determine potential borehole offset requirements from the tank battery equipment. Based on a conversation with Mr. Low, he had no specific offset requirements. Mr. Murray requested that Mr. Matthew Harrison of Encana be consulted regarding their requirements. Mr. Harrison indicated that the proposed boreholes needed to be outside of the gravel/road base covered portions of their tank battery lease areas. In addition, he indicated that an Encana Ground Disturbance Authorization (GDA) form needed to be completed for each drilling area. To comply with these requirements, Joseph Pieterick of AGW met with Mr. Scott Downey of Encana at the property on November 27, 2012, completed the GDA forms, and submitted the forms to Mr. Harrison for approval before the drilling activities began.

Prior to conducting the field activities, AGW prepared a Health and Safety Plan (HASP). In accordance with Encana requirements, AGW also prepared a Job Safety Analysis (JSA). Prior to beginning each day of field work, AGW and DEI employees involved in the activities conducted a review of the HASP and JSA to discuss potential project hazards and safety procedures.

DRILLING AND SOIL SAMPLING METHODS

On December 12 and 13, 2012, DEI utilized a CME-75 truck mounted auger rig to advance a total of twelve (12) boreholes and assist with soil sample collection. The borehole locations were selected to be adjacent to and generally downgradient of the production tank battery equipment and active and abandoned gas wells (based on USGS topographic map data and field observations). The boreholes were designated as A through D, D1, and E through K.

Boreholes A, B, and C were drilled north and east of Encana's William H. Peltier 1A-20H tank battery, along Weld County Road (WCR)-5. Boreholes D, D1, and E were placed north and northeast of the buried William H. Peltier #1 plugged and abandoned well head, based on GPS well location

data provided by the Colorado Oil and Gas Conservation Commission (COGCC). Boreholes F, G, and H were advanced west and north of Encana's William H. Peltier #2 production tank battery, along WCR-8 (also called Erie Parkway). The final three boreholes, I, J, and K, were placed west and south of Encana's William H. Peltier 12-20 production tank battery and production well, east of Green Mill Road. Figure 2 in Attachment A illustrates the tank battery and abandoned well areas that were investigated. Figures 3 through 6 identify the specific borehole locations.

To advance the boreholes, DEI utilized 4-inch outside diameter solid-stem augers. During drilling, AGW collected representative soil samples using a split-spoon core sampler and drill cuttings for field evaluation at approximate 5 foot intervals. The boreholes were advanced to depths ranging from 35.3 to 40.0 feet below ground surface (bgs). During drilling, ground water was encountered immediately at boreholes B and C, but not at the other ten boreholes.

To control potential cross-contamination, DEI utilized clean augers prior to drilling. In addition, AGW cleaned the split-spoon core samplers , the steel soil sampling scoop, and water level measuring equipment between uses with an Alconox® detergent and municipal water solution followed by a municipal water rinse. The AGW technicians also wore a new pair of disposable nitrile gloves at each location to control potential cross-contamination.

To allow for field screening of the soil samples with a photoionization detector (PID), AGW placed a portion of each soil sample into a new dedicated sealable plastic bag. Selected samples were also placed into new laboratory-supplied glass jars for potential analytical testing.

One soil sample from each of the areas investigated was submitted for analytical testing, except for the William H. Peltier #2 tank battery area where two samples were submitted. The samples forwarded for analytical testing were generally selected based on the highest PID results, typically from near the assumed ground water table depth. None of the soil samples collected exhibited obvious petroleum odors or staining. During the project, a total of five soil samples were submitted for laboratory analysis.

After collection, the jars containing the soil samples were immediately sealed, labeled, and placed into a cooler with ice (a preservative). AGW subsequently delivered them to an independent laboratory for analytical testing. During this project, AGW followed chain-of-custody procedures in general accordance with U.S. Environmental Protection Agency (EPA) guidelines. A discussion of the laboratory methods and results is presented later in this report.

Due to relatively slow ground water recharge into the boreholes following drilling and soil sampling, ground water sampling was delayed until December 17, 2012 (four to five days after drilling). To control potential collapsing soils and allow for subsequent ground water collection, dedicated temporary PVC well pipes and screens were placed into six of the boreholes, including B, D1, G, H, I and J. Other boreholes exhibiting stable soil conditions did not have temporary well pipe and screens inserted. The tops of all boreholes were sealed with a temporary plastic cover prior to ground water sampling to control potential addition of surface water or debris. The temporary well pipes were removed following ground water sampling and all of the boreholes were backfilled with soils not exhibiting evidence of contamination.

SOIL FIELD SCREENING METHODS AND RESULTS

A portion of each soil sample was transferred into a dedicated sealable plastic bag for field evaluation and screening with a PID. PID screening detects volatile organic compounds (VOCs) with an ionization potential of 10.6 electron volts (eV) or less, including many compounds found in crude oil, petroleum condensate, and refined petroleum products. This instrument provides a semi-quantitative analysis.

AGW accomplished the PID screening by inserting the PID probe into the individual sealed sample bags and recording the instrument response. Generally PID readings greater than 10 parts per million (ppm, based on calibration to isobutylene) suggest the presence of VOCs above natural background concentrations. However, PID readings can exceed that value due to variations in moisture, temperature, soil type, and the presence of natural organic materials in the soils or shallow bedrock (e.g. traces of coal). During this project, PID results ranged from 0.0 ppm to 30.8 ppm. PID readings above 10 ppm were identified in soil samples from boreholes D, E, F and H; however, none of the subject soil samples exhibited petroleum odors or staining. Therefore, it is likely that the readings are the result of vapors from natural organic materials in the soils, including fine layers of coal and organic-containing claystones and siltstones that were observed. The absence of significant petroleum

in these soils was verified through analytical testing discussed later in this report. The specific PID results are presented on the soil boring logs in Attachment B.

AGW also evaluated each soil sample to identify the general lithologic type, color, moisture content, and if present, evidence of suspect staining and/or odors. Soils observed during the project generally consisted of brown to gray silty to sandy clays with variable percentages of sand overlaying weathered claystone, with some interbedded weathered siltstones, and sandstone. Traces of coal, iron, and calcite were also present in the soils. As previously indicated, AGW did not observe obvious petroleum odors or staining in any of the soil samples.

Ground water was encountered during drilling at boreholes B and C at the William H. Peltier 1A-20H battery. Ground water also accumulated later at boreholes J and K at the William H. Peltier 12-20 battery, but not at the other sites. Individual boring logs describing the soils, PID readings, and ground water measurements (when present) in more detail are included in Attachment B.

SOIL ANALYTICAL METHODS AND RESULTS

Following collection, field evaluation, and PID screening, AGW delivered the five selected soil samples to Accutest® Mountain States Laboratory, Inc. (Accutest®) in Wheat Ridge, Colorado for analysis. Accutest® analyzed the soil samples for Gasoline Range Organics (GRO) by EPA Method 8260B, for Diesel Range Organics (DRO) by EPA Method 8015B, and for Benzene, Toluene, Ethylbenzene, and Total Xylenes (BTEX) following EPA Method 8260B. GRO and DRO analysis quantifies a wide range of petroleum compounds. The GRO and DRO results are generally added together to obtain a Total Petroleum Hydrocarbon (TPH) value for comparison to the TPH regulatory standard published by the COGCC. BTEX testing quantifies specific regulated compounds that are commonly present in crude oil, petroleum condensate, and refined petroleum products.

Tables 1, 2, 3, and 4, below, summarize the soil analytical results for the William H. Peltier 1A-20H tank battery, William H. Peltier #1 plugged and abandoned wellhead, William H. Peltier #2 tank battery, and William H. Peltier12-20 tank battery sites, respectively. Copies of the laboratory reports are included in Attachment C. The analytical results are also illustrated on Figure 7 in Attachment A.

Table 1
Soil Analytical Results
Dearmin Property, Erie, Colorado
William H. Peltier 1A-20H Tank Battery
December 12, 2012

Sample Number	Depth (Feet)	PID Result (ppm)	GRO (mg/kg)*	DRO (mg/kg)	TPH** (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
A-7	34-35	5.9	ND	4.98	4.98	ND	ND	ND	ND
COGCC Standards***	--	--	--	--	500	0.17	85	100	175

* mg/kg: Milligrams per kilogram (parts per million).
** GRO and DRO values are added to obtain the TPH value per COGCC rules.
*** Standards published by the COGCC in Table 910-1, effective May 30, 2011.
ND: Not detected.

Table 2
Soil Analytical Results
Dearmin Property, Erie, Colorado
William H. Peltier #1 Plugged and Abandoned Well Site
December 12, 2012

Sample Number	Depth (Feet)	PID Result (ppm)	GRO (mg/kg)*	DRO (mg/kg)	TPH** (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
D-5	24-25	11.3	ND	5.27	5.27	ND	ND	ND	ND
COGCC Standards***	--	--	--	--	500	0.17	85	100	175

* mg/kg: Milligrams per kilogram (parts per million).
** GRO and DRO values are added to obtain the TPH value per COGCC rules.
*** Standards published by the COGCC in Table 910-1, effective May 30, 2011.
ND: Not detected.

Table 3
Soil Analytical Results
Dearmin Property, Erie, Colorado
William H. Peltier #2 Tank Battery
December 13, 2012

Sample Number	Depth (Feet)	PID Result (ppm)	GRO (mg/kg)*	DRO (mg/kg)	TPH** (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
F-5	24-25	19.2	ND	ND	ND	ND	ND	ND	ND
F-8	39-40	30.8	ND	ND	ND	ND	ND	ND	ND
COGCC Standards***	--	--	--	--	500	0.17	85	100	175

* mg/kg: Milligrams per kilogram (parts per million).
** GRO and DRO values are added to obtain the TPH value per COGCC rules.
*** Standards published by the COGCC in Table 910-1, effective May 30, 2011.
ND: Not detected.

Table 4
Soil Analytical Results
Dearmin Property, Erie, Colorado
William H. Peltier 12-20 Tank Battery
December 13, 2012

Sample Number	Depth (Feet)	PID Result (ppm)	GRO (mg/kg)*	DRO (mg/kg)	TPH** (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
J-6	29-30	5.2	ND	ND	ND	ND	ND	ND	ND
COGCC Standards ***	--	--	--	--	500	0.17	85	100	175

* mg/kg: Milligrams per kilogram (parts per million).
** GRO and DRO values are added to obtain the TPH value per COGCC rules.
*** Standards published by the COGCC in Table 910-1, effective May 30, 2011.
ND: Not detected.

To evaluate soil analytical results, AGW compared identified concentrations to regulatory standards published on Table 910-1 of the COGCC 900 series rules, effective May 30, 2011. The results of the analytical results for each of the four areas investigated are discussed below.

William H. Peltier 1A-20H Tank Battery Soil Analytical Results

Analytical results from the sample A-7, collected from borehole A at a depth of 34 to 35 feet, identified a trace of DRO, but no GRO or BTEX compounds. The TPH concentration of 4.98 milligrams per kilogram (mg/kg) derived by adding DRO and GRO is significantly less than the COGCC regulatory standard of 500 mg/kg. The results are consistent with the low PID readings and physical observations.

William H. Peltier #1 Plugged and Abandoned Well Soil Analytical Results

Results from the sample D-5, collected from borehole D at a depth of 24 to 25 feet, identified a trace of DRO, but no GRO or BTEX compounds. The TPH concentration of 5.27 mg/kg (derived by adding DRO and GRO) is significantly less than the COGCC regulatory standard of 500 mg/kg. The results are consistent with the low PID readings and physical observations.

William H. Peltier #2 Tank Battery Soil Analytical Results

Analytical results from samples F-5 and F-8, collected from borehole F, at depths of 24 to 25 feet and 39 to 40 feet, respectively, did not contain any detected DRO, GRO, or BTEX compounds. Sample F-8 exhibited the highest PID reading measured during this project. The analytical results are consistent with physical observations which did not identify and petroleum odors or staining in any of the soils.

William H. Peltier 12-20 Tank Battery Soil Analytical Results

Analytical results from sample J-6, collected from borehole J at a depth of 29 to 30 feet, did not contain any detected DRO, GRO, or BTEX compounds. The analytical results are consistent with the low PID readings and physical observations which did not identify and petroleum odors or staining.

GROUND WATER SAMPLING METHODS

On the days of drilling, ground water only accumulated in two of the boreholes, B and C, so ground water sampling was postponed to allow additional time for recharge in the remaining boreholes. Consequently, AGW returned to the site on December 17, 2012 to conduct ground water sampling at the boreholes containing sufficient water.

Prior to sampling, AGW measured the depth to ground water (if present) in each borehole using a clean electronic water level indicator tape. Prior to use and between boreholes, the water level tape was cleaned in a solution of municipal water and Alconox® detergent followed by a municipal water rinse. During this project, ground water accumulated at boreholes B, C and J only. At boreholes B and C it was between 24.1 and 25.4 feet bgs. At borehole J it was 28.3 feet bgs.

To collect the ground water samples AGW utilized a new dedicated disposable plastic bailer attached to nylon cord at each borehole sampled. Following the depth measurements, the dedicated bailers were lowered into the subject boreholes to retrieve the water samples. Collected water was transferred into three acid-preserved glass vials supplied by the laboratory at each borehole. The

filled sample vials were immediately sealed, labeled, and placed into a cooler with ice (a preservative). On the day of collection, AGW delivered the samples to Accutest® for analytical testing. During this project, AGW followed chain-of-custody procedures in general accordance with EPA guidelines.

Following completion of the ground water sampling, AGW removed the temporary PVC well pipes and backfilled the boreholes to grade with the soil cuttings.

GROUND WATER ANALYTICAL METHODS AND RESULTS

Accutest® analyzed the ground water samples for BTEX using EPA Method 8021B. BTEX testing quantifies common regulated petroleum compounds.

Table 5, below, summarizes the ground water BTEX results. A copy of the laboratory report is included in Attachment C. The results are also illustrated on Figure 8 in Attachment A.

Table 5
Ground Water Analytical Results
Dearmin Property, Erie, Colorado
December 17, 2012

Borehole / Sample Number	Site Location	Benzene (ug/L)*	Toluene (ug/L)	Ethylbenzene (ug/L)	Xylenes (ug/L)
B	W. H. Peltier 1A-20H	ND	ND	ND	ND
C	W. H. Peltier 1A-20H	ND	ND	ND	ND
J	W. H. Peltier 12-20	ND	ND	ND	ND
K	W. H. Peltier 12-20	ND	ND	ND	ND
COGCC Standards**	--	5	560	700	1,400

* ug/L = Micrograms per liter (parts per billion).
** BTEX standards published by the COGCC in Table 910-1, effective May 30, 2011.
ND: Not detected above the laboratory Method detection limit.

To evaluate the ground water analytical results, AGW normally compares detected compound concentrations to the regulatory standards published by the COGCC in Table 910-1 of their 900 Series rules. However, based on the ground water analytical results, no BTEX compounds were identified above their respective detection limits or regulatory standards. As previously discussed, ground water did not accumulate in boreholes at the William H. Peltier #1 plugged and abandoned well site or at the William H. Peltier #2 tank battery.

CONCLUSIONS

Between December 12 and 17, 2012, AGW conducted a limited subsurface investigation at the Dearmin Property in Erie, Colorado. The project was completed to evaluate the potential presence of common regulated petroleum compounds in soils and/or ground water in four areas where petroleum production equipment is operating or has operated in the past. Investigated areas included three tank batteries and a plugged and abandoned production well. Other portions of the property were not included in the study.

To conduct the project, a total of twelve (12) boreholes were drilled for soil and ground water sampling adjacent to the tank battery related equipment and at the plugged and abandoned well (three boreholes in each area). Soil samples were collected at 5 foot intervals from each borehole for observation and screening with a PID meter. Selected soil samples were submitted for analytical testing (based on PID readings and proximity to the ground water table). Soil PID screening results ranged from 0.0 to 30.8 ppm, and none of the samples exhibited evidence of petroleum odors or staining.

Based on the soil analytical results, trace concentrations of DRO less than the respective COGCC regulatory standard for DRO/TPH were detected in soil samples from boreholes A and D at the William H. Peltier 1A-20H tank battery and William H. Peltier #1 plugged and abandoned gas well area. No GRO or BTEX compounds were detected in the soils from these two boreholes. In addition, none of the other analyzed soil samples from any of the areas investigated contained detected DRO, GRO, or BTEX, including the sample exhibiting the highest PID result. The detected DRO concentrations were consistent with field observations which did not identify petroleum odors or staining in any of the soil samples.

During drilling, ground water accumulated in two of the boreholes, B and C. Consequently, ground water sampling was postponed a minimum of four days to allow additional time for recharge in the remaining boreholes. When AGW returned to the site on December 17, 2012 to conduct ground water sampling, two additional boreholes, J and K, also contained sufficient water to sample. Boreholes B, C, J and K at the William H. Peltier 1A-20H tank battery and William H. Peltier 12-20 tank battery were sampled on that date for BTEX analysis. Based on the analytical results, none of the ground water samples contained detected BTEX. Ground water did not accumulate in boreholes at the William H. Peltier #1 plugged and abandoned well area or William H. Peltier #2 tank battery during this project.

The combined project results did not identify significant petroleum concentrations in soils or ground water (where present) at the four subject sampling areas on the Dearmin property. Consequently, no additional investigation is recommended at this time.

LIMITATIONS

This report summarizes AGW's findings associated with limited subsurface investigation at the subject portions of the Dearmin Property. Although AGW completes thorough studies, no warranty is made of its accuracy, completeness, and timeliness based on information obtained from third party sources. Findings are a reflection of, and within, the scope-of-work and limitations of the work performed. No parties, except the Clients, are authorized to review this report unless they agree to waive any possible claims against A. G. Wassenaar, Inc., arising from such use. If in the future, limited localized petroleum impacts are encountered, they should be addressed in accordance with applicable state and federal regulations.

Thank you for the opportunity to assist you with this project. If you have any questions regarding the contents of this report, or other environmental issues, please contact us at (303) 759-8373.

Sincerely,

A. G. WASSENAAR, INC.

Joseph D. Pieterick, P.G.
Senior Geologist

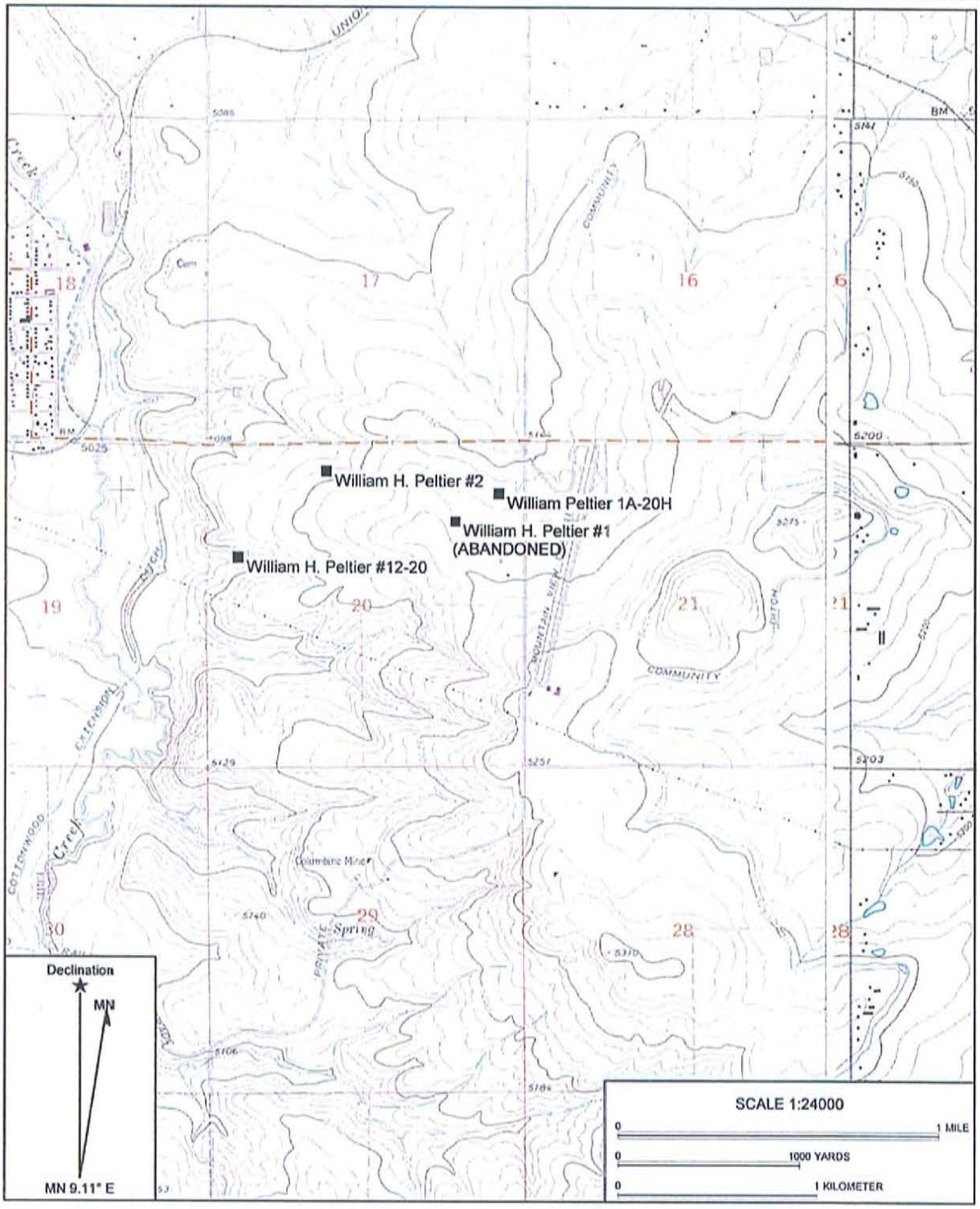
Brian J. Glade, P.E.
Vice President

JDP/BJG/dd

Attachments

ATTACHMENT A

FIGURES



LEGEND

■ SITE LOCATIONS

NOTE: ALL LOCATIONS ARE APPROXIMATE

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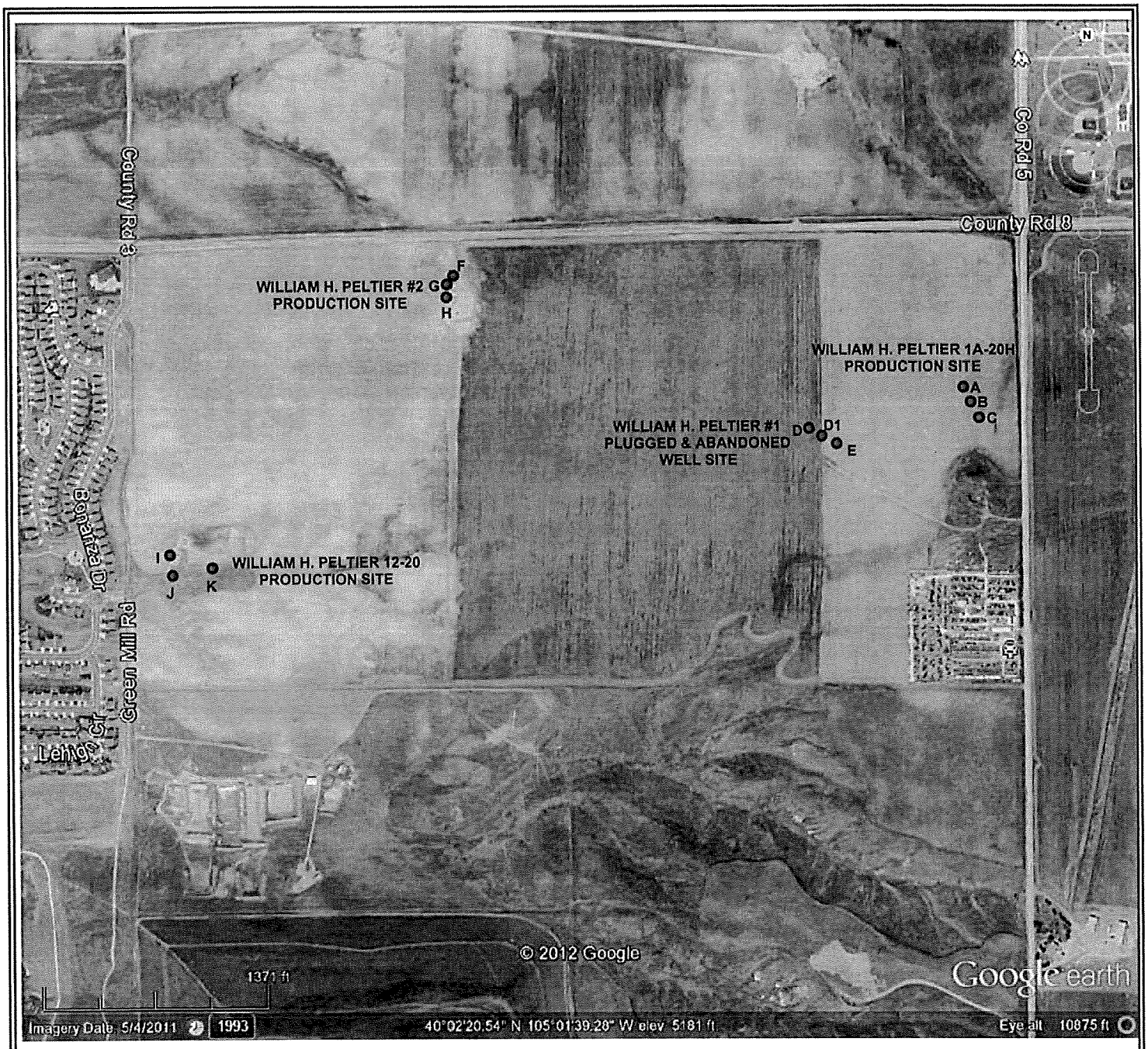
DEARMIN PROPERTY
ERIE, COLORADO
TOPOGRAPHIC MAP
DECEMBER 2012
FIGURE 1
AGW PROJECT NUMBER E12687.E2



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N

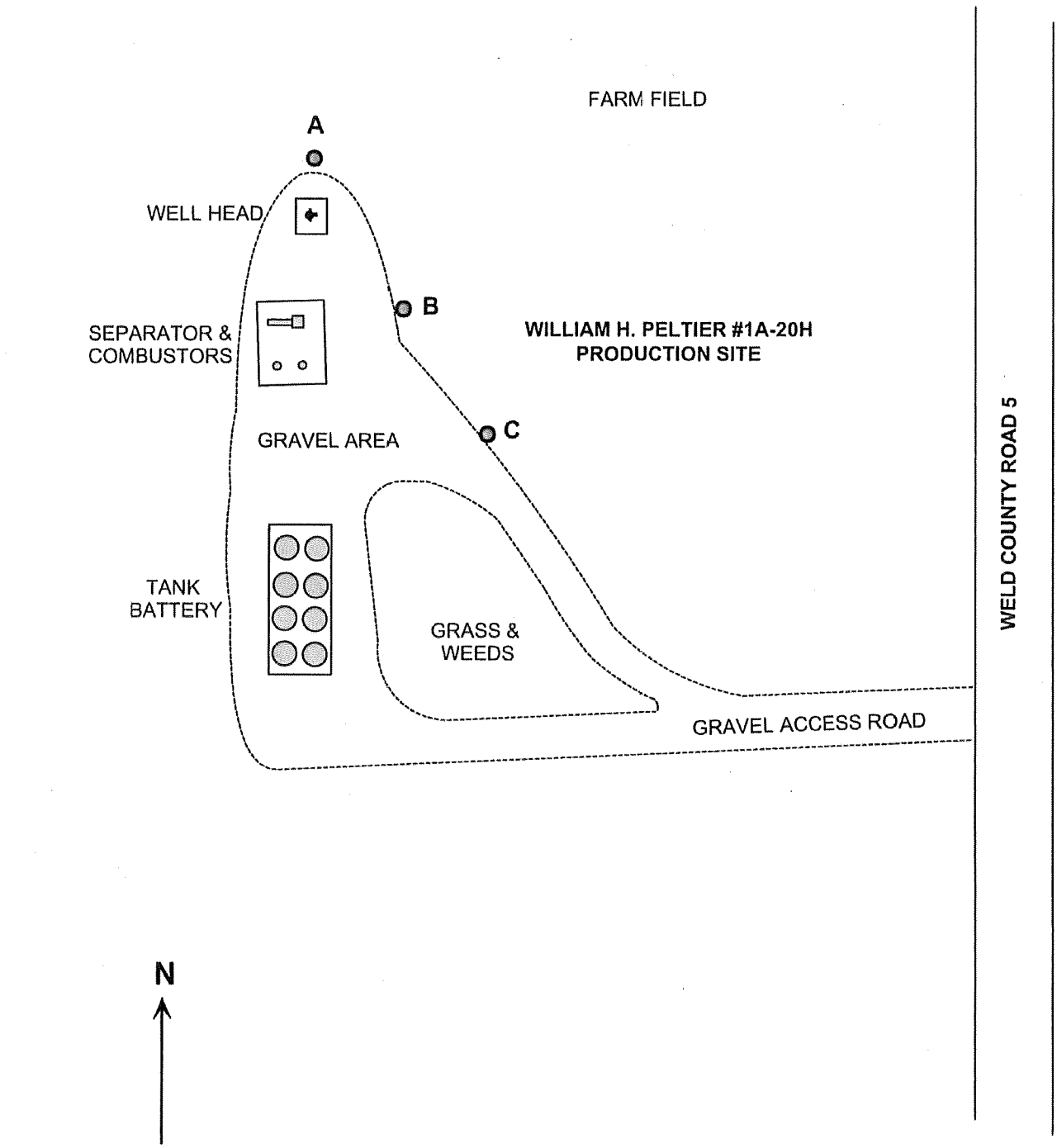
APPROXIMATE SCALE:
1" = 850'

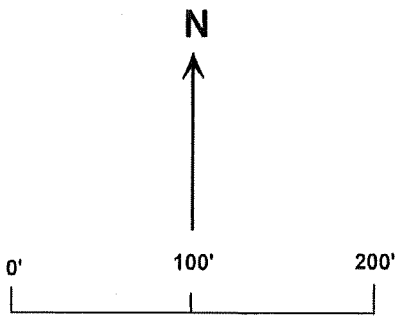
LEGEND

o - BOREHOLE LOCATIONS

DEARMIN PROPERTY
ERIE, COLORADO
INVESTIGATION LOCATIONS
DECEMBER 2012
FIGURE 2
AGW PROJECT NUMBER E12687.E2

NOTE: ALL LOCATIONS ARE APPROXIMATE





APPROXIMATE SCALE:
1" = 100'

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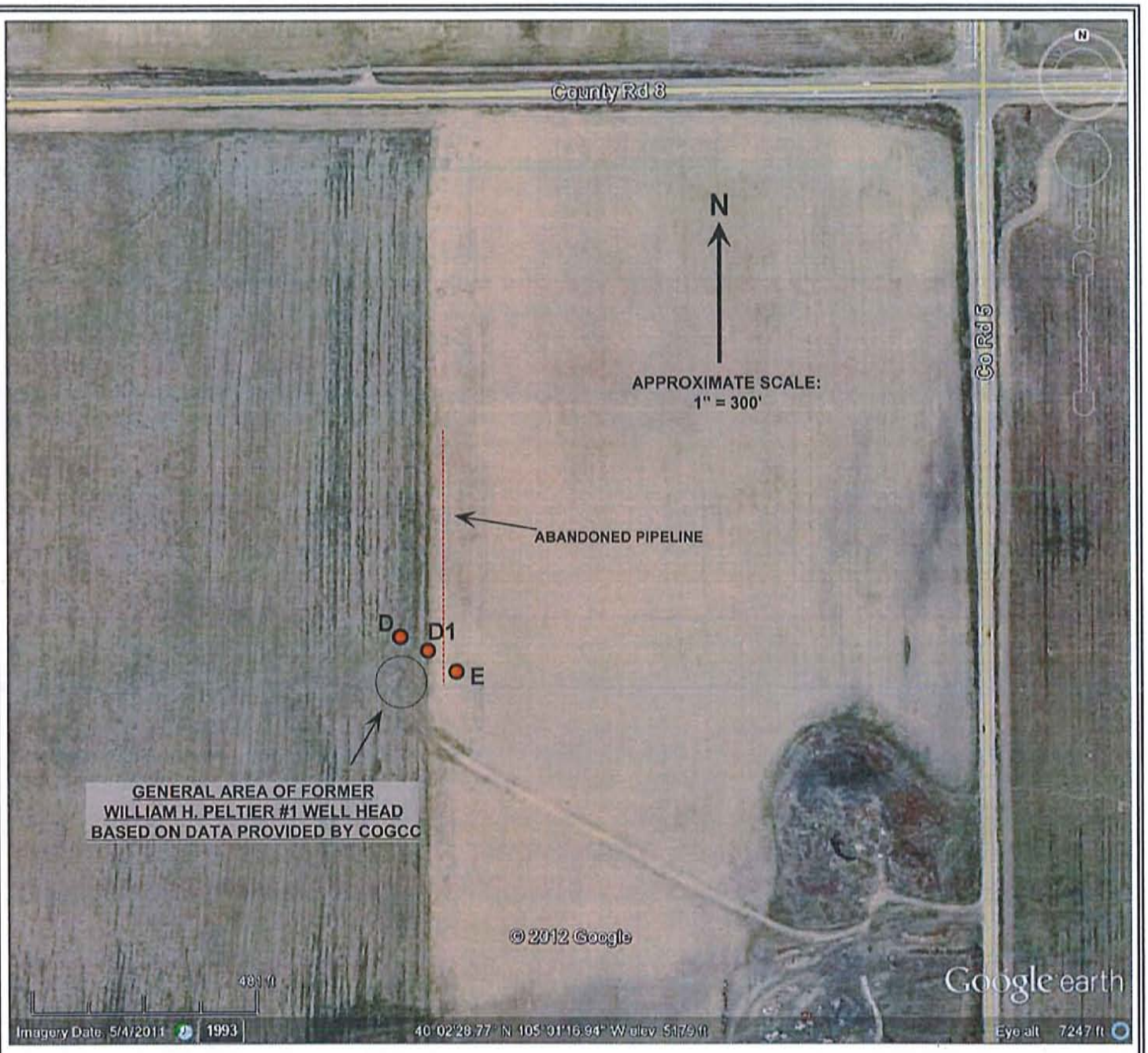
WILLIAM H. PELTIER #1A-20H
PRODUCTION SITE
ERIE, COLORADO
BOREHOLE LOCATIONS
NOVEMBER 2012
FIGURE 3
AGW PROJECT NUMBER E12687.E2

LEGEND

BOREHOLE LOCATIONS

NOTE: ALL LOCATIONS ARE APPROXIMATE



LEGEND

● BOREHOLE LOCATIONS

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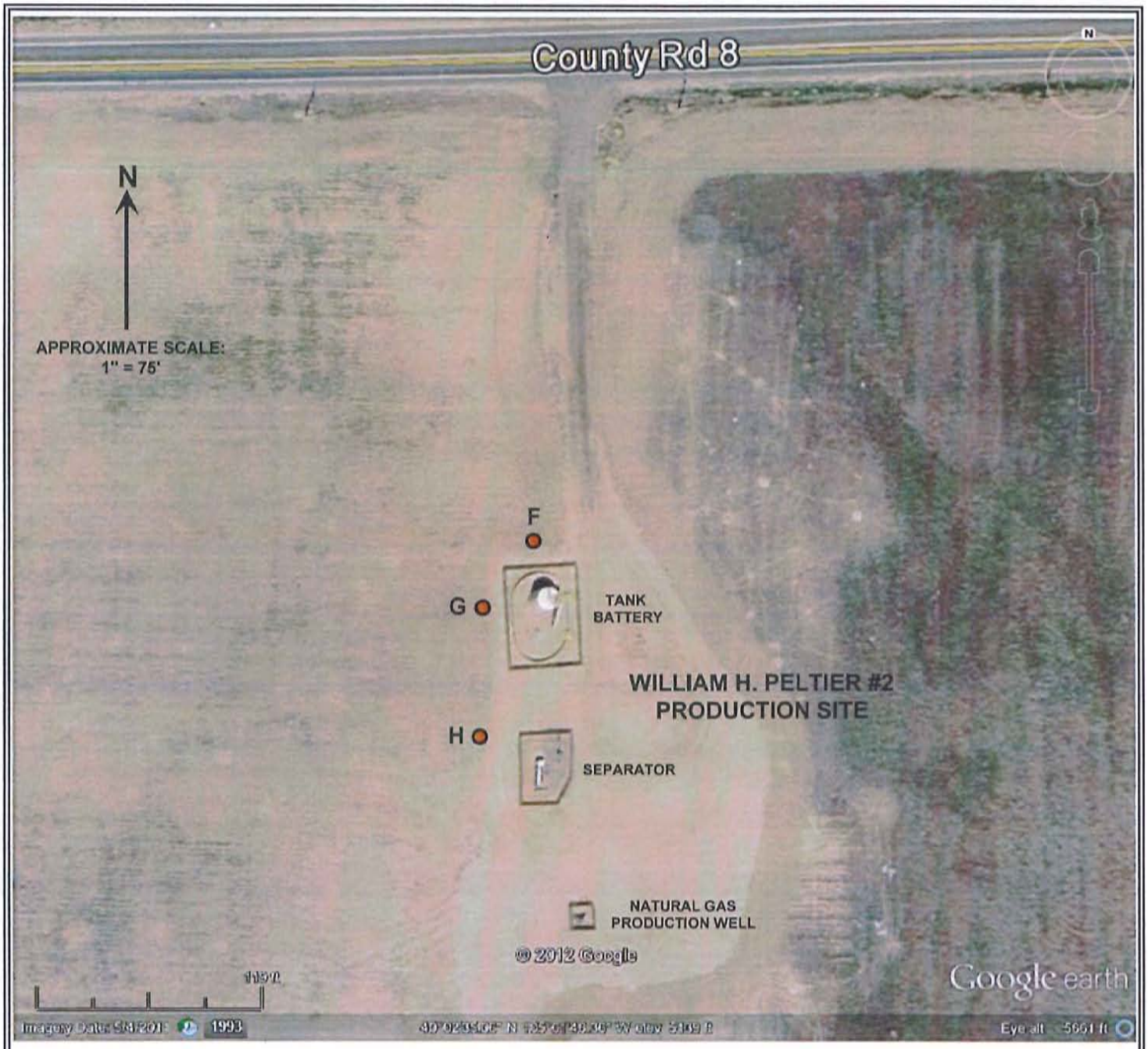
WILLIAM H. PELTIER #1
PLUGGED & ABANDONED PRODUCTION WELL
ERIE, COLORADO
BOREHOLE LOCATIONS
DECEMBER 2012
FIGURE 4
AGW PROJECT NUMBER E12687.E2

NOTE: ALL LOCATIONS ARE APPROXIMATE



LEGEND

● BOREHOLE LOCATIONS

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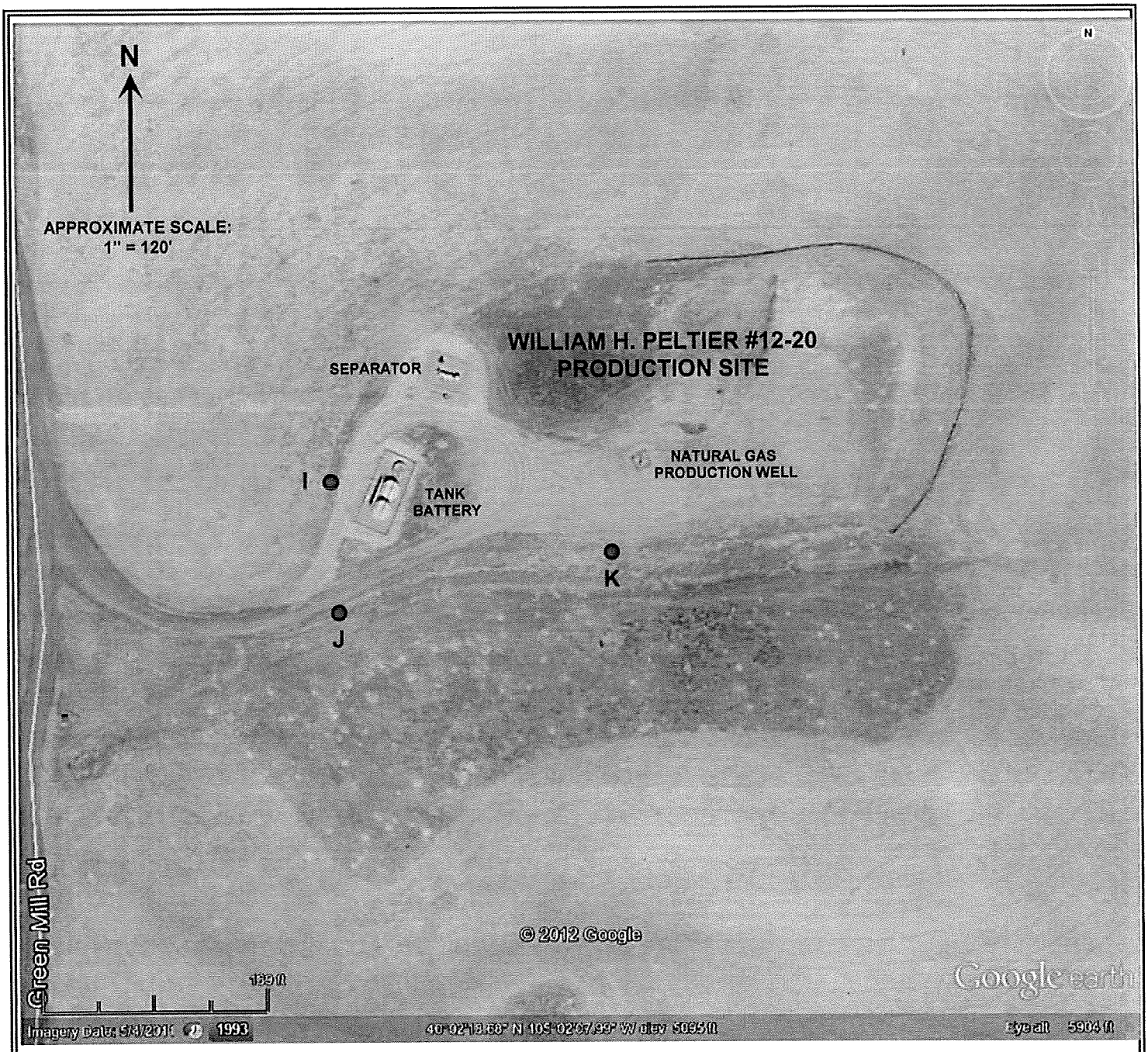
WILLIAM H. PELTIER #2
PRODUCTION SITE
ERIE, COLORADO
BOREHOLE LOCATIONS
DECEMBER 2012
FIGURE 5
AGW PROJECT NUMBER E12687.E2

NOTE: ALL LOCATIONS ARE APPROXIMATE



LEGEND

● BOREHOLE LOCATIONS

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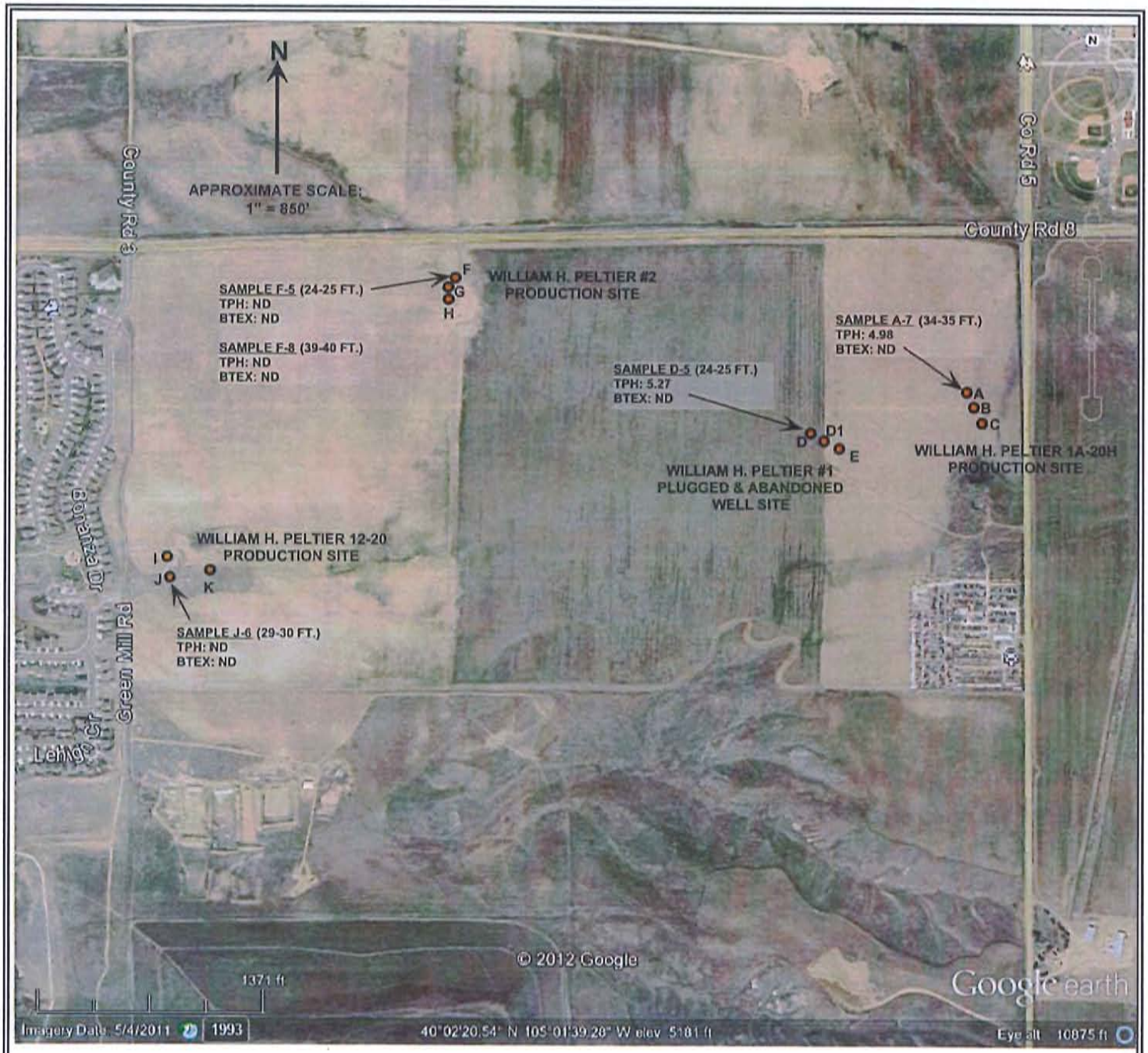
WILLIAM H. PELTIER #12-20
PRODUCTION SITE
ERIE, COLORADO
BOREHOLE LOCATIONS
DECEMBER 2012
FIGURE 6
AGW PROJECT NUMBER E12687.E2

NOTE: ALL LOCATIONS ARE APPROXIMATE



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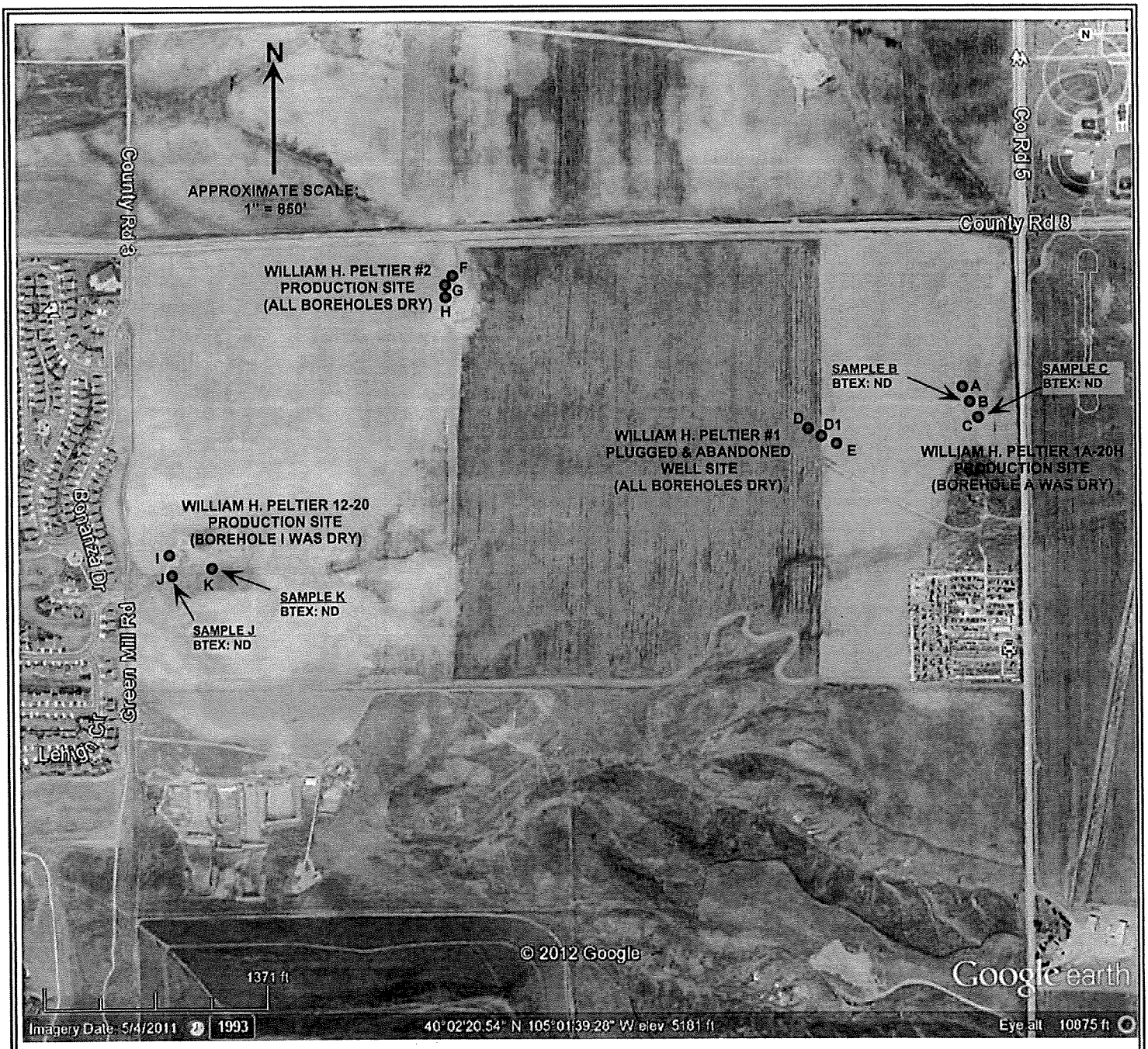
LEGEND

- ● - BOREHOLE LOCATIONS
- TPH - TOTAL PETROLEUM HYDROCARBONS
- BTEX - BENZENE, TOLUENE, ETHYLBENZENE & XYLENES
- ND - NOT DETECTED

NOTE: VALUES ARE IN MILLIGRAMS PER KILOGRAM (mg/kg)

DEARMIN PROPERTY
ERIE, COLORADO
SOIL ANALYTICAL RESULTS
DECEMBER 2012
FIGURE 7
AGW PROJECT NUMBER E12687.E2

NOTE: ALL LOCATIONS ARE APPROXIMATE



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LEGEND

- ● - BOREHOLE LOCATIONS
- BTEX - BENZENE, TOLUENE, ETHYLBENZENE & XYLENES
- ND - NOT DETECTED

NOTE: NO BTEX COMPOUNDS WERE IDENTIFIED ABOVE THE LABORATORY DETECTION LIMITS OR COGCC REGULATORY STANDARDS.

DEARMIN PROPERTY
ERIE, COLORADO
GROUND WATER ANALYTICAL RESULTS
DECEMBER 2012
FIGURE 8
AGW PROJECT NUMBER E12687.E2

NOTE: ALL LOCATIONS ARE APPROXIMATE

ATTACHMENT B

SOIL BORING LOGS

A.G. Wassenaar Inc.
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BORING NUMBER A

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/12/12 COMPLETED 12/12/12
GROUND ELEVATION
HOLE SIZE 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL CHECKED BY JDP
AT END OF DRILLING Dry
NOTES W.H. Peltier #1A-20H Site
120hrs AFTER DRILLING Dry

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					Brown silty-sandy clay (fine grained sands), trace calcite, slightly moist	
	AU					
5	AU A-1		1.1			
	AU					
10	AU A-2		2.6			
	AU					
15	AU A-3		2.4			
	AU				19.0	
20	AU A-4		3.5		Grey weathered silty claystone, moist	
					21.5	
	AU				Red Brown weathered sandstone	
					23.5	
25	AU A-5		1.3		Grey weathered silty claystone, trace fine sands, trace iron, slightly moist	
	AU					
30	AU A-6		3.8			
	AU					
35	AU A-7		5.9			
	AU					
40	AU A-8		1.7		40.0	
					Bottom of hole at 40.0 feet.	

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER B

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Properly
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/12/12 **COMPLETED** 12/12/12
GROUND ELEVATION _____ **HOLE SIZE** 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING 27.0 ft
LOGGED BY BVL **CHECKED BY** JDP
AT END OF DRILLING 24.4 ft
NOTES W.H. Peltier #1A-20H Site
120hrs AFTER DRILLING 24.1 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0	SS B-1	5-9-9-9 (18)	0.0		Light brown silty- sandy clay (fine grained sands), damp	
	AU				4.0	
5	SS B-2	7-5-6-6 (11)	0.0		Tan silt with clay, dry	
	AU				9.0	
10	SS B-3	15-13-15-14 (28)	0.0		Brown silty clay, trace sand, calcareous, damp	
	AU				14.0	
15	SS B-4	13-21-35-45 (56)	0.0		Grey calcareous silty clay, trace iron, damp	
	AU				16.0 Grey weathered claystone with sand and slit, trace iron, trace coal, interbedded with weathered sandstone, damp	
20	SS B-5	11-17-50 (67)	0.0			
	AU					
25	SS B-6	22-50	0.0			
	AU				27.0 Grey weathered sandy claystone, trace iron, trace coal, wet	
30	SS B-7	34-50	1.5			
	AU					
35	SS B-8	38-40-50/4"	0.2		35.3	
					Bottom of hole at 35.3 feet.	

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER C

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/12/12 COMPLETED 12/12/12
GROUND ELEVATION
HOLE SIZE 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL CHECKED BY JDP
AT END OF DRILLING 28.4 ft
NOTES W.H. Peltier #1A-20H Site
120hrs AFTER DRILLING 25.1 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0	AU C-1		2.2		Light brown silty-sandy clay (fine grained sands), damp	
	AU					
5	AU C-2		2.2			
	AU					
					9.0	
10	AU C-3		1.2		Brown silty clay, trace sand, calcareous, damp	
	AU					
15	AU C-4		2.4			
	AU					
20	AU C-5		0.7		20.0	
	AU				Grey weathered claystone with sand and slit, trace iron, interbedded with weathered sandstone, slightly moist to damp	
25	AU C-6		0.0			
	AU					
30	AU C-7		1.2			
	AU				33.0	
					34.0 Sandstone	
35	AU C-8		1.3		Grey weathered claystone with sand and slit, trace iron, interbedded with weathered sandstone, slightly moist to damp	
	AU					
40	AU C-9		0.9		40.0	
					Bottom of hole at 40.0 feet.	

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER D

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/12/12 **COMPLETED** 12/12/12
GROUND ELEVATION _____ **HOLE SIZE** 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL **CHECKED BY** JDP
AT END OF DRILLING Dry
NOTES W.H. Peltier #1 Abandoned Well Site
120hrs AFTER DRILLING Dry

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					Brown silty-sandy clay (fine grained sands), calcareous, damp	
	AU					
5	AU D-1		0.0			
	AU					
10	AU D-2		0.8			
	AU					
15	AU D-3		3.2			
	AU					
					19.0	
20	AU D-4		4.5		Grey weathered silty claystone, trace fine sands, trace iron, dry to slightly moist	
	AU					
25	AU D-5		11.3			
	AU					
30	AU D-6		6.7			
	AU					
35	AU D-7		5.8			
	AU					
40	AU D-8		0.5		40.0	
					Bottom of hole at 40.0 feet.	

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER D1

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/12/12 COMPLETED 12/12/12
GROUND ELEVATION
HOLE SIZE 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL CHECKED BY JDP
AT END OF DRILLING Dry
NOTES W.H. Peltier #1 Abandoned Well Site
120hrs AFTER DRILLING Dry

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0	SS D1-1	5-13-10-9 (23)	0.0		Brown silty-sandy clay (fine grained sands), calcareous, dry	
	AU				4.0	
5	SS D1-2	9-5-4-7 (9)	0.3		Light Brown very sandy clay, trace silt, calcareous, dry	
	AU					
10	SS D1-3	8-9-10-13 (19)	0.6		11.0	
	AU				Brown coarse sand with silt, calcareous, damp	
					14.0	
15	SS D1-4	20-27-34-50 (61)	1.4		15.0 Brown sandy-silty clay, calcareous, slightly moist	
	AU				Brown-grey weathered sandy claystone, calcareous, trace iron, slightly moist	
20	SS D1-5	23-32-36-50 (68)	0.2		21.0	
	AU				Light brown/white/grey weathered silty-clayey sandstone, calcareous, trace iron, slightly moist	
25	SS D1-6	18-50	1.1		25.0	
	AU				Grey weathered claystone with sand, calcareous, trace iron, slightly moist	
30	SS D1-7	14-35-50 (85)	0.5			
	AU					
35	SS D1-8	22-37-38-50 (75)	0.7		36.0	
	AU				Light grey weathered sandy claystone, calcareous, trace iron, slightly moist	
					39.3	
	SS D1-9	50			Bottom of hole at 39.3 feet.	

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER E

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/12/12 **COMPLETED** 12/12/12
GROUND ELEVATION _____ **HOLE SIZE** 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL **CHECKED BY** JDP
AT END OF DRILLING Dry
NOTES W.H. Peltier #1 Abandoned Well Site
120hrs AFTER DRILLING Dry

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					Brown sily-sandy clay (fine grained sands), calcareous, dry to slightly moist, trace of small gravel	
	AU					
5	AU E-1		1.2			
	AU					
10	AU E-2		0.4			
	AU					
15	AU E-3		0.4		15.0	
					Grey weathered claystone, trace fine sands, trace iron, dry to slightly moist	
	AU					
20	AU E-4		3.8			
	AU					
25	AU E-5		5.1			
	AU					
30	AU E-6		10.2		30.0	
					Grey weathered claystone, trace iron, slightly moist	
	AU					
35	AU E-7		7.9			
	AU					
40	AU E-8		3.4		40.0	
					Bottom of hole at 40.0 feet.	

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER F

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/13/12 COMPLETED 12/13/12
GROUND ELEVATION
HOLE SIZE 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL CHECKED BY JDP
AT END OF DRILLING Dry
NOTES W.H. Peltier #2 Site
120hrs AFTER DRILLING Dry

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					Brown silty clay, trace fine sand, slightly moist	
	AU					
5	AU F-1		0.0			
	AU					
10	AU F-2		3.4			
	AU					
15	AU F-3		1.4			
	AU					
20	AU F-4		4.6			
	AU					
25	AU F-5		19.2		25.0	
					Brown highly weathered claystone, slightly moist	
	AU					
30	AU F-6		3.0			
	AU					
35	AU F-7		6.0		35.0	
					Light brown weathered siltsone, dry	
	AU					
40	AU F-8		30.8		40.0	
					Bottom of hole at 40.0 feet.	

ENVIRONMENTAL BH E12687.E2.GPJ GINT US.GDT 12/20/12

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER G

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/13/12 **COMPLETED** 12/13/12
GROUND ELEVATION _____ **HOLE SIZE** 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL **CHECKED BY** JDP
AT END OF DRILLING Dry
NOTES W.H. Peltier #2 Site
120hrs AFTER DRILLING Dry

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0	SS G-1	3-4-2-2 (6)	0.0		Brown sandy clay, trace silt, slightly moist	
	AU				4.0	
5	SS G-2	2-2-2-2 (4)	0.2		Brown clayey sand, trace silt, slightly moist	
	AU				9.0	
10	SS G-3	2-2-4-14 (6)	0.6		Brown sandy-silty clay, trace iron, slightly moist	
					11.0	
	AU				Gray highly weathered claystone intermixed with light brown weathered sandstone, trace iron, dry to slightly moist	
15	SS G-4	10-23-50 (73)	0.1			
	AU					
20	SS G-5	50	0.8			
	AU					
25	SS G-6	50	0.7			
					27.0	
	AU				28.0 REFUSAL. HOLE MOVED APPROXIMATELY 10 FEET SOUTH.	
					Light brown weathered silty sandstone (fine grained), dry	
30	SS G-7	50	0.6			
	AU					
35	SS G-8	50	1.2			
	AU				39.2	
	SS G-9	50	1.1		Bottom of hole at 39.2 feet.	

ENVIRONMENTAL BH E12687.E2.GPJ GINT US.GDT 12/20/12

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER H

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/13/12 COMPLETED 12/13/12
GROUND ELEVATION
HOLE SIZE 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL CHECKED BY JDP
AT END OF DRILLING Dry
NOTES W.H. Peltier #2 Site
120hrs AFTER DRILLING Dry

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					Brown silty clay, trace fine sand, calcareous, slightly moist	
	AU					
5	AU H-1		1.6			
	AU					
10	AU H-2		1.6			
	AU					
15	AU H-3		3.0			
	AU					
20	AU H-4		10.4		20.0	
					Red-brown and brown weathered siltstone/claystone, dry	
	AU					
25	AU H-5		1.2			
	AU					
30	AU H-6		5.4			
	AU					
35	AU H-7		4.0		35.0	
					Light brown weathered siltstone/claystone, dry	
	AU					
40	AU H-8		3.2		40.0	
					Bottom of hole at 40.0 feet.	

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER I

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/13/12 **COMPLETED** 12/13/12
GROUND ELEVATION ____ **HOLE SIZE** 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL **CHECKED BY** JDP
AT END OF DRILLING Dry
NOTES W.H. Pettier #12-20 Site
120hrs AFTER DRILLING Dry

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0	SS I-1	6-5-6-6 (11)	0.0		Brown silty-sandy clay, dry	
	AU				4.0	
5	SS I-1	19-19-24-32 (43)	0.0		Light gray silty-clayey sand (fine-grained), trace iron, dry to slightly moist	
	AU					
10	SS I-3	25-42-50-14 (92)	0.0			
	AU				14.0	
15	SS I-4	24-14-11-34 (25)	0.9		Light gray, white, yellow and orange weathered fine-grained sandstone, slightly moist	
	AU				19.0	
20	SS I-5	27-50	0.6		Gray weathered claystone, trace iron, trace sand (fine-grained), trace coal, dry to slightly moist	
	AU					
25	SS I-6	31-38	0.6			
	AU					
30	SS I-7	34-50	0.5			
	AU					
35	SS I-8	50	0.0			
	AU				39.0	
	SS I-9	50	1.1		40.0 Yellow-brown weathered sandstone, trace iron, trace coal, dry to slightly moist	

Bottom of hole at 39.3 feet.

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER J

CLIENT HC Development and Management Services
PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2
PROJECT LOCATION Erie, Colorado
DATE STARTED 12/13/12 COMPLETED 12/13/12
GROUND ELEVATION
HOLE SIZE 4 inch
DRILLING CONTRACTOR Drilling Engineers
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers
AT TIME OF DRILLING Dry
LOGGED BY BVL CHECKED BY JDP
AT END OF DRILLING Dry
NOTES W.H. Peltier #12-20 Site
▽ 96hrs AFTER DRILLING 28.3 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					Brown sandy- clayey silt, dry	
	AU					
5	AU J-1		0.8			
	AU					
10	AU J-2		4.4			
	AU					
					14.0	
15	AU J-3		5.4		Brown sandy-silty clay, dry to slightly moist	
	AU					
20	AU J-4		6.2			
	AU					
25	AU J-5		6.0			
	AU				▽	
30	AU J-6		5.2			
	AU					
					34.0	
35	AU J-7		1.3		Brown highly weathered claystone, trace sand, trace silt, dry to slightly moist	
	AU					
					39.0	
40	AU J-8		4.8		40.0 Gray weathered sandy claystone, dry to slightly moist	
					Bottom of hole at 40.0 feet.	

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

BORING NUMBER K

CLIENT HC Development and Management Services	PROJECT NAME Dearmin Property
PROJECT NUMBER E12687.E2	PROJECT LOCATION Erie, Colorado
DATE STARTED 12/13/12 COMPLETED 12/13/12	GROUND ELEVATION ____ HOLE SIZE 4 inch
DRILLING CONTRACTOR Drilling Engineers	GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Augers	AT TIME OF DRILLING Dry
LOGGED BY BVL CHECKED BY JDP	AT END OF DRILLING Dry
NOTES W.H. Peltier #12-20 Site	▽ 96hrs AFTER DRILLING 35.0 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	PID (ppm)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0					Brown silty-sandy clay, dry	
	AU					
5	AU K-1		0.0			
	AU					
10	AU K-2		1.0			
	AU					
					14.0	
15	AU K-3		0.0		Brown silty clay, dry to slightly moist	
	AU					
20	AU K-4		0.0			
	AU					
					24.0	
25	AU K-5		1.8		Gray and light gray weathered sandy (fine-grained) claystone, trace iron, dry to slightly moist	
	AU					
30	AU K-6		2.6			
	AU					
					34.0	
35	AU K-7		3.3		▽ Dark gray/black weathered silty claystone, dry to slightly moist	
	AU					
40	AU K-8		2.4		40.0	
					Bottom of hole at 40.0 feet.	

ATTACHMENT C

LABORATORY REPORTS

Mountain States ACCUTEST LABORATORIES

12/21/12

Technical Report for

A.G. Wassenaar, Inc.

Dearmin Prop. - E12687.E2

Accutest Job Number: D41921

Sampling Dates: 12/12/12 - 12/13/12

Report to:

A.G. Wassenaar, Inc.
2180 S Ivanhoe Street Suite 5
Denver, CO 80222
pieterickj@agwassenaar.com

ATTN: Joseph Pieterick

Total number of pages in report: **29**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Brad Madadian
Laboratory Director

Client Service contact: Renea Jackson 303-425-6021

Certifications: CO, ID, NE, NM, ND (R-027) (PW), UT (NELAP CO00049), TX (T104704511-12-1)

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Sample Summary

A.G. Wassenaar, Inc.

Job No: D41921

Dearmin Prop. - E12687.E2

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
D41921-1	12/12/12	12:55 JP	12/17/12	SO	Soil	A-7
D41921-2	12/12/12	15:40 BL	12/17/12	SO	Soil	D-5
D41921-3	12/13/12	16:45 BL	12/17/12	SO	Soil	F-5
D41921-4	12/13/12	16:50 BL	12/17/12	SO	Soil	F-8
D41921-5	12/13/12	12:55 BL	12/17/12	SO	Soil	J-6

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

ACCUTEST LABORATORIES

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CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	A.G. Wassenaar, Inc.	**Job No**	D41921
Site:	Dearmin Prop. - E12687.E2	**Report Date**	12/21/2012 8:37:35 AM

On 12/17/2012, 5 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 4 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D41921 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260B

Matrix SO **Batch ID:** V5V1528

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D41921-1MS, D41921-1MSD were used as the QC samples indicated.

Extractables by GC By Method SW846-8015B

Matrix SO **Batch ID:** OP7116

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D41921-4MS, D41921-4MSD were used as the QC samples indicated.

Wet Chemistry By Method SM19 2540B M

Matrix SO **Batch ID:** GN18130

- The data for SM19 2540B M meets quality control requirements.

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

Summary of Hits

Job Number: D41921
Account: A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2
Collected: 12/12/12 thru 12/13/12

3

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D41921-1	A-7					
TPH-DRO (C10-C28)		4.98 J	7.6	4.5	mg/kg	SW846-8015B
D41921-2	D-5					
TPH-DRO (C10-C28)		5.27 J	7.5	4.5	mg/kg	SW846-8015B
D41921-3	F-5					
No hits reported in this sample.						
D41921-4	F-8					
No hits reported in this sample.						
D41921-5	J-6					
No hits reported in this sample.						

Mountain States
ACCUTEST
LABORATORIES

4

Sample Results

Report of Analysis

Accutest Laboratories

Report of Analysis

Client Sample ID:	A-7		
Lab Sample ID:	D41921-1	Date Sampled:	12/12/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846 8260B	Percent Solids:	87.9
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V25017.D	1	12/19/12	BD	n/a	n/a	V5V1528
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.09 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	63	31	ug/kg	
108-88-3	Toluene	ND	130	63	ug/kg	
100-41-4	Ethylbenzene	ND	130	24	ug/kg	
1330-20-7	Xylene (total)	ND	250	130	ug/kg	
	TPH-GRO (C6-C10)	ND	13000	6300	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	95%		64-130%
460-00-4	4-Bromofluorobenzene	100%		62-131%
17060-07-0	1,2-Dichloroethane-D4	102%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	A-7		
Lab Sample ID:	D41921-1	Date Sampled:	12/12/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846-8015B SW846 3546	Percent Solids:	87.9
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD20689.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	4.98	7.6	4.5	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	66%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

4.2

4

Client Sample ID:	D-5		
Lab Sample ID:	D41921-2	Date Sampled:	12/12/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846 8260B	Percent Solids:	88.6
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V25022.D	1	12/19/12	BD	n/a	n/a	V5V1528
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.02 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	63	31	ug/kg	
108-88-3	Toluene	ND	130	63	ug/kg	
100-41-4	Ethylbenzene	ND	130	24	ug/kg	
1330-20-7	Xylene (total)	ND	250	130	ug/kg	
	TPH-GRO (C6-C10)	ND	13000	6300	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	95%		64-130%
460-00-4	4-Bromofluorobenzene	99%		62-131%
17060-07-0	1,2-Dichloroethane-D4	100%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

4.2

4

Client Sample ID:	D-5		
Lab Sample ID:	D41921-2	Date Sampled:	12/12/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846-8015B SW846 3546	Percent Solids:	88.6
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD20690.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	5.27	7.5	4.5	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	63%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

4.3

4

Client Sample ID:	F-5		
Lab Sample ID:	D41921-3	Date Sampled:	12/13/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846 8260B	Percent Solids:	87.9
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V25023.D	1	12/19/12	BD	n/a	n/a	V5V1528
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.03 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	63	32	ug/kg	
108-88-3	Toluene	ND	130	63	ug/kg	
100-41-4	Ethylbenzene	ND	130	24	ug/kg	
1330-20-7	Xylene (total)	ND	250	130	ug/kg	
	TPH-GRO (C6-C10)	ND	13000	6300	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	96%		64-130%
460-00-4	4-Bromofluorobenzene	99%		62-131%
17060-07-0	1,2-Dichloroethane-D4	101%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	F-5		
Lab Sample ID:	D41921-3	Date Sampled:	12/13/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846-8015B SW846 3546	Percent Solids:	87.9
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD20692.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.6	4.5	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	66%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	F-8		
Lab Sample ID:	D41921-4	Date Sampled:	12/13/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846 8260B	Percent Solids:	94.3
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V25024.D	1	12/19/12	BD	n/a	n/a	V5V1528
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.03 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	56	28	ug/kg	
108-88-3	Toluene	ND	110	56	ug/kg	
100-41-4	Ethylbenzene	ND	110	21	ug/kg	
1330-20-7	Xylene (total)	ND	220	110	ug/kg	
	TPH-GRO (C6-C10)	ND	11000	5600	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	96%		64-130%
460-00-4	4-Bromofluorobenzene	97%		62-131%
17060-07-0	1,2-Dichloroethane-D4	100%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

4.4

4

Client Sample ID:	F-8		
Lab Sample ID:	D41921-4	Date Sampled:	12/13/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846-8015B SW846 3546	Percent Solids:	94.3
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD20668.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.1	4.2	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	73%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	J-6		
Lab Sample ID:	D41921-5	Date Sampled:	12/13/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846 8260B	Percent Solids:	87.1
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V25025.D	1	12/19/12	BD	n/a	n/a	V5V1528
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.06 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	64	32	ug/kg	
108-88-3	Toluene	ND	130	64	ug/kg	
100-41-4	Ethylbenzene	ND	130	24	ug/kg	
1330-20-7	Xylene (total)	ND	260	130	ug/kg	
	TPH-GRO (C6-C10)	ND	13000	6400	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	94%		64-130%
460-00-4	4-Bromofluorobenzene	99%		62-131%
17060-07-0	1,2-Dichloroethane-D4	98%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	J-6		
Lab Sample ID:	D41921-5	Date Sampled:	12/13/12
Matrix:	SO - Soil	Date Received:	12/17/12
Method:	SW846-8015B SW846 3546	Percent Solids:	87.1
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD20693.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.6	4.6	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	48%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Mountain States ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

Accutest Laboratories Mountain States
4036 Yarrington Street Wheat Ridge, Co 80033
TEL. 303-425-6021 877-737-4521
FAX 303-425-6021

PAGE 1 OF 1

FED-EX Tracking #:
Accutest Quote #:
Bottle Order Control #:
Accutest Job #: D41921

Client / Reporting Information

Company Name: A. G. WISSENAAR, INC.
Street Address: 2180 S. IVANHOE ST. #5
City / State / Zip: DENVER, CO 80222
Project Contact: JOE PIETERICK, pieterick@agwissenaar.com
Phone #: 303-217-5110 Fax #: 303-759-4074
Sampler(s) Name(s): JOE PIETERICK Phone #: 303-981-2107

Project Information

Project Name: DENVER – E12687.E2
Street: –
City: –
Project #: E12687.E2
Client PO#: E12687.E2
Project Manager: JOE PIETERICK

Billing Information (if different from Report to):
Company Name:
Street Address:
City / State / Zip:
Attention: PO#:

Requested Analysis (see TEST CODE sheet)

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MeOH	ENCORE	Bisulfate	BTEX (8260)	GRO (8260)	DRO (8015)	LAB USE ONLY
	A-7		12-12-12	12:55	JD/	SOIL	2										X	X	X	01
	D-5		12-12-12	3:40	BVL		2										X	X	X	02
	F-5		12-13-12	4:45	BVL		2										X	X	X	03
	F-8		12-13-12	4:50	BVL		2										X	X	X	04
	J-6		12-13-12	12:55	BVL		2										X	X	X	05

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL - Sludge; SED - Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB - Field Blank; EB - Equipment Blank; RB - Rinse Blank; TB - Trip Blank

Turnaround Time (Business days)
- ☐ Std. 10 Business Days
- ☒ Std. 5 Business Days (By Contract only)
- ☐ 5 Day RUSH
- ☐ 3 Day EMERGENCY
- ☐ 2 Day EMERGENCY
- ☐ 1 Day EMERGENCY

Approved By (Accutest PM) / Date:

Emergency & Rush T/A data available VIA Lablink

Data Deliverable Information
- ☐ Commercial "A" (Level 1)
- ☐ Commercial "B" (Level 2)
- ☐ Commercial "B" +Narrative
- ☐ FULLT1 (Level 3+4)
- ☐ State Forms
- ☐ EDD Format
- ☐ PDF

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler	Date Time	Received By	Relinquished By	Date Time	Received By
1 [signature]	12-12-12 4:06	1 [signature]	2		2
3		3	4		4
5		5			

Custody Seal # 110 ☐ Intact ☐ Not Intact
Preserved where applicable ☐
On Ice ☒ Cooler Temp. 4.0

D41921: Chain of Custody
Page 1 of 2

5.1 5

ACCUTEST LABORATORIES

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: D41921 **Client:** A.G WASSENAAR, INC **Immediate Client Services Action Required:** No

Date / Time Received: 12/17/2012 4:06:00 PM **No. Coolers:** 1 **Client Service Action Required at Login:** No

Project: DEARMIN - E12687.E2 **Airbill #'s:** HD

Cooler Security	Y or N		Y or N
1. Custody Seals Present:	☑ ☐	3. COC Present	☑ ☐
2. Custody Seals Intact:	☑ ☐	4. Smpl Dates/Time OK	☑ ☐

Cooler Temperature	Y or N
1. Temp criteria achieved:	☑ ☐
2. Cooler temp verification:	Infared gun
3. Cooler media:	Ice (bag)

Quality Control Preservation	Y or N	N/A
1. Trip Blank present / cooler:	☐ ☐	
2. Trip Blank listed on COC:	☐ ☐	
3. Samples preserved properly:	☑ ☐	
4. VOCs headspace free:	☐ ☐	☑

Sample Integrity - Documentation	Y or N
1. Sample labels present on bottles:	☑ ☐
2. Container labeling complete:	☑ ☐
3. Sample container label / COC agree:	☑ ☐

Sample Integrity - Condition	Y or N
1. Sample recvd within HT:	☑ ☐
2. All containers accounted for:	☑ ☐
3. Condition of sample:	Intact

Sample Integrity - Instructions	Y or N	N/A
1. Analysis requested is clear:	☑ ☐	
2. Bottles received for unspecified tests	☐ ☑	
3. Sufficient volume rec'd for analysis:	☑ ☐	
4. Compositing instructions clear:	☐ ☐	☑
5. Filtering instructions clear:	☐ ☐	☑

Comments

5.1 5

D41921: Chain of Custody
Page 2 of 2

Mountain States ACCUTEST LABORATORIES

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D41921
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1528-MB	5V25014.D	1	12/19/12	BD	n/a	n/a	V5V1528

The QC reported here applies to the following samples: Method: SW846 8260B

D41921-1, D41921-2, D41921-3, D41921-4, D41921-5

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	50	25	ug/kg	
100-41-4	Ethylbenzene	ND	100	19	ug/kg	
108-88-3	Toluene	ND	100	50	ug/kg	
1330-20-7	Xylene (total)	ND	200	100	ug/kg	
	TPH-GRO (C6-C10)	ND	10000	5000	ug/kg	

CAS No.	Surrogate Recoveries		Limits
2037-26-5	Toluene-D8	95%	64-130%
460-00-4	4-Bromofluorobenzene	93%	62-131%
17060-07-0	1,2-Dichloroethane-D4	102%	70-130%

6.1.1

6

Blank Spike Summary

Job Number: D41921
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1528-BS	5V25015.D	1	12/19/12	BD	n/a	n/a	V5V1528

The QC reported here applies to the following samples: Method: SW846 8260B

D41921-1, D41921-2, D41921-3, D41921-4, D41921-5

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	50	44.0	88	70-130
100-41-4	Ethylbenzene	50	43.2	86	70-130
108-88-3	Toluene	50	43.1	86	70-130
1330-20-7	Xylene (total)	150	134	89	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	98%	64-130%
460-00-4	4-Bromofluorobenzene	97%	62-131%
17060-07-0	1,2-Dichloroethane-D4	97%	70-130%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D41921
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1528-BS	5V25016.D	1	12/19/12	BD	n/a	n/a	V5V1528

The QC reported here applies to the following samples: Method: SW846 8260B

D41921-1, D41921-2, D41921-3, D41921-4, D41921-5

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
	TPH-GRO (C6-C10)	2200	2010	91	58-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	99%	64-130%
460-00-4	4-Bromofluorobenzene	94%	62-131%
17060-07-0	1,2-Dichloroethane-D4	97%	70-130%

* = Outside of Control Limits.

6.2.2

6

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D41921
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D41921-1MS	5V25018.D	1	12/19/12	BD	n/a	n/a	V5V1528
D41921-1MSD	5V25019.D	1	12/19/12	BD	n/a	n/a	V5V1528
D41921-1	5V25017.D	1	12/19/12	BD	n/a	n/a	V5V1528

The QC reported here applies to the following samples: Method: SW846 8260B

D41921-1, D41921-2, D41921-3, D41921-4, D41921-5

CAS No.	Compound	D41921-1 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	ND		3140	3600	115	3430	109	5	64-139/30
100-41-4	Ethylbenzene	ND		3140	3430	109	3300	105	4	68-136/30
108-88-3	Toluene	ND		3140	3380	108	3260	104	4	60-130/30
1330-20-7	Xylene (total)	ND		9420	10700	114	10300	109	4	58-142/30

CAS No.	Surrogate Recoveries	MS	MSD	D41921-1	Limits
2037-26-5	Toluene-D8	96%	97%	95%	64-130%
460-00-4	4-Bromofluorobenzene	104%	105%	100%	62-131%
17060-07-0	1,2-Dichloroethane-D4	97%	96%	102%	70-130%

* = Outside of Control Limits.

6.3.1

6

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D41921
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D41921-1MS	5V25020.D	1	12/19/12	BD	n/a	n/a	V5V1528
D41921-1MSD	5V25021.D	1	12/19/12	BD	n/a	n/a	V5V1528
D41921-1	5V25017.D	1	12/19/12	BD	n/a	n/a	V5V1528

The QC reported here applies to the following samples: Method: SW846 8260B

D41921-1, D41921-2, D41921-3, D41921-4, D41921-5

CAS No.	Compound	D41921-1 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
	TPH-GRO (C6-C10)	ND		138000	120000	87	122000	88	2	14-174/30

CAS No.	Surrogate Recoveries	MS	MSD	D41921-1	Limits
2037-26-5	Toluene-D8	98%	97%	95%	64-130%
460-00-4	4-Bromofluorobenzene	101%	101%	100%	62-131%
17060-07-0	1,2-Dichloroethane-D4	97%	96%	102%	70-130%

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D41921
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7116-MB	FD20660.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036

The QC reported here applies to the following samples: Method: SW846-8015B

D41921-1, D41921-2, D41921-3, D41921-4, D41921-5

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	6.7	4.0	mg/kg	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	90%	35-130%

Blank Spike Summary

Job Number: D41921
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7116-BS	FD20662.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036

The QC reported here applies to the following samples: Method: SW846-8015B

D41921-1, D41921-2, D41921-3, D41921-4, D41921-5

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	667	617	93	48-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	92%	35-130%

7.2.1

7

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D41921
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7116-MS	FD20664.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036
OP7116-MSD	FD20666.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036
D41921-4	FD20668.D	1	12/19/12	AV	12/18/12	OP7116	GFD1036

The QC reported here applies to the following samples: Method: SW846-8015B

D41921-1, D41921-2, D41921-3, D41921-4, D41921-5

7.3.1

7

CAS No.	Compound	D41921-4 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	ND		705	613	87	580	82	6	20-168/30

CAS No.	Surrogate Recoveries	MS	MSD	D41921-4	Limits
84-15-1	o-Terphenyl	84%	76%	73%	35-130%

* = Outside of Control Limits.

Mountain States
ACCUTEST
LABORATORIES

12/19/12

Technical Report for

A.G. Wassenaar, Inc.

Dearmin Prop. - E12687.E2

Accutest Job Number: D41920

Sampling Date: 12/17/12

Report to:

A.G. Wassenaar, Inc.
2180 S Ivanhoe Street Suite 5
Denver, CO 80222
pieterickj@agwassenaar.com

ATTN: Joseph Pieterick

Total number of pages in report: **17**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Brad Madadian
Laboratory Director

Client Service contact: Renea Jackson 303-425-6021

Certifications: CO, ID, NE, NM, ND (R-027) (PW), UT (NELAP CO00049), TX (T104704511-12-1)

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Sample Summary

A.G. Wassenaar, Inc.

Job No: D41920

Dearmin Prop. - E12687.E2

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
D41920-1	12/17/12	08:57 JP	12/17/12	AQ	Ground Water	B
D41920-2	12/17/12	09:03 JP	12/17/12	AQ	Ground Water	C
D41920-3	12/17/12	11:15 JP	12/17/12	AQ	Ground Water	K
D41920-4	12/17/12	11:23 JP	12/17/12	AQ	Ground Water	J

ACCUTEST LABORATORIES

2

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	A.G. Wassenaar, Inc.	**Job No**	D41920
Site:	Dearmin Prop. - E12687.E2	**Report Date**	12/19/2012 2:14:40 PM

On 12/17/2012, 4 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 4 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D41920 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GC By Method SW846 8021B

Matrix AQ **Batch ID:** GTA1018

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D41909-1MS, D41909-1MSD were used as the QC samples indicated.
- D41920-4: Sample was not preserved to a pH < 2.

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

Summary of Hits

Job Number: D41920
Account: A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2
Collected: 12/17/12

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method

D41920-1 B

No hits reported in this sample.

D41920-2 C

No hits reported in this sample.

D41920-3 K

No hits reported in this sample.

D41920-4 J

No hits reported in this sample.

Mountain States ACCUTEST LABORATORIES

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	B		
Lab Sample ID:	D41920-1	Date Sampled:	12/17/12
Matrix:	AQ - Ground Water	Date Received:	12/17/12
Method:	SW846 8021B	Percent Solids:	n/a
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TA17919.D	1	12/18/12	SK	n/a	n/a	GTA1018
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	1.0	ug/l	
1330-20-7	Xylenes (total)	ND	2.0	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	91%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

4.2

4

Client Sample ID:	C		
Lab Sample ID:	D41920-2	Date Sampled:	12/17/12
Matrix:	AQ - Ground Water	Date Received:	12/17/12
Method:	SW846 8021B	Percent Solids:	n/a
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TA17920.D	1	12/18/12	SK	n/a	n/a	GTA1018
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	1.0	ug/l	
1330-20-7	Xylenes (total)	ND	2.0	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	88%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	K		
Lab Sample ID:	D41920-3	Date Sampled:	12/17/12
Matrix:	AQ - Ground Water	Date Received:	12/17/12
Method:	SW846 8021B	Percent Solids:	n/a
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	TA17921.D	1	12/18/12	SK	n/a	n/a	GTA1018
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	1.0	ug/l	
1330-20-7	Xylenes (total)	ND	2.0	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	91%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	J		
Lab Sample ID:	D41920-4	Date Sampled:	12/17/12
Matrix:	AQ - Ground Water	Date Received:	12/17/12
Method:	SW846 8021B	Percent Solids:	n/a
Project:	Dearmin Prop. - E12687.E2		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	TA17922.D	1	12/18/12	SK	n/a	n/a	GTA1018
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	1.0	ug/l	
1330-20-7	Xylenes (total)	ND	2.0	2.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	89%		60-140%

(a) Sample was not preserved to a pH < 2.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Mountain States ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

Accutest Laboratories Mountain States
4036 Youngfield Street Wheat Ridge, Co 80033
TEL. 303-425-6021 877-737-4521
FAX 303-425-6021

PAGE ___ OF ___

Pro-Ex Tracking #: | Bottle Order Control #: | Accutest Quote #: | Accutest Job #: D41920

Client / Reporting Information

Company Name: A.G. WASSENAAR, INC.
Street Address: 2180 S. IVANHOE ST. #5
City, State, Zip: DENVER, CO 80222
Project Contact: JOE PIETERICK, E-mail: pieterickjoe@agwassenaar.com
Phone #: 303-217-5110, Fax #: 303-759-4074
Sampler(s) Name(s): JOE PIETERICK, Phone #:

Project Information

Project Name: DEARMIN PROP. — E12687.E2
Street: —
City: —
Project #: E12687.E2
Client PO#: E12687.E2
Project Manager: JOE PIETERICK

Billing Information (if different from Report to)

Company Name:
Street Address:
City, State, Zip:
Attention: PO#:

Requested Analysis (see TEST CODE sheet): BTEX (8021)

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL - Sludge; SED - Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB - Field Blank; EB - Equipment Blank; RB - Rinse Blank; TB - Trip Blank

Accutest Sample #	Field ID / Point of Collection	MS/MSD/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	MeOH	BNA2	NaOH	DI Water	NaOH	ZnOAc	Other	BTEX (8021)	LAB USE ONLY
	B		12-17-12	8:57	JP	GW	3	✓								X	01
	~~A~~ C		12/17/12	9:03	BVL	GW	3	✓								X	02
	K		12/17/12	11:15	BVL	GW	3	✓								X	03
	J		12-17-12	11:23	JP	GW	3	✓								X	04

Turnaround Time (Business days)
- ☐ Std. 10 Business Days
- ☒ Std. 5 Business Days (By Contract only)
- ☐ 5 Day RUSH
- ☐ 3 Day EMERGENCY
- ☐ 2 Day EMERGENCY
- ☐ 1 Day EMERGENCY

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM) / Date:

Data Deliverable Information
- ☐ Commercial "A" (Level 1)
- ☐ Commercial "B" (Level 2)
- ☐ Commercial "B" +NoneEve
- ☐ FULL1! (Level 3+4)
- ☐ State Forms
- ☐ EDD Format
- ☐ PDF

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
	12-17-12 / 4:05pm	1	2		2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished By: 5	Date Time:	Received By: 5	Custody Seal # 140 ☐ Intact	Preserved where applicable ☐	On Ice ☒ Cooler Temp. 4.0

D41920: Chain of Custody
Page 1 of 2

ACCUTEST LABORATORIES

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: D41920 **Client:** A.G WASSENAAR, INC **Immediate Client Services Action Required:** No

Date / Time Received: 12/17/2012 4:05:00 PM **No. Coolers:** 1 **Client Service Action Required at Login:** No

Project: DEARMIN PROP. - E12687.E2 **Airbill #'s:** HD

Cooler Security	Y or N		Y or N
1. Custody Seals Present:	☑ ☐	3. COC Present	☑ ☐
2. Custody Seals Intact:	☑ ☐	4. Smpl Dates/Time OK	☑ ☐

Cooler Temperature	Y or N
1. Temp criteria achieved:	☑ ☐
2. Cooler temp verification:	Infared gun
3. Cooler media:	Ice (bag)

Quality Control Preservation	Y or N	N/A
1. Trip Blank present / cooler:	☐ ☐	
2. Trip Blank listed on COC:	☐ ☐	
3. Samples preserved properly:	☑ ☐	
4. VOCs headspace free:	☐ ☐	☑

Sample Integrity - Documentation	Y or N
1. Sample labels present on bottles:	☑ ☐
2. Container labeling complete:	☑ ☐
3. Sample container label / COC agree:	☑ ☐

Sample Integrity - Condition	Y or N
1. Sample recvd within HT:	☑ ☐
2. All containers accounted for:	☑ ☐
3. Condition of sample:	Intact

Sample Integrity - Instructions	Y or N	N/A
1. Analysis requested is clear:	☑ ☐	
2. Bottles received for unspecified tests	☐ ☑	
3. Sufficient volume rec'd for analysis:	☑ ☐	
4. Compositing instructions clear:	☐ ☐	☑
5. Filtering instructions clear:	☐ ☐	☑

Comments

Accutest Laboratories
V (303) 425-6021
4036 Youngfield Street
F. (303) 425-6854
Wheat Ridge, CO
www.accutest.com

5.1

5

D41920: Chain of Custody
Page 2 of 2

Mountain States ACCUTEST LABORATORIES

GC Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D41920
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GTA1018-MB	TA17911.D	1	12/18/12	SK	n/a	n/a	GTA1018

The QC reported here applies to the following samples: Method: SW846 8021B

D41920-1, D41920-2, D41920-3, D41920-4

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
100-41-4	Ethylbenzene	ND	2.0	1.0	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
1330-20-7	Xylenes (total)	ND	2.0	2.0	ug/l	

CAS No.	Surrogate Recoveries		Limits
120-82-1	1,2,4-Trichlorobenzene	90%	60-140%

Blank Spike Summary

Job Number: D41920
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GTA1018-BS	TA17912.D	1	12/18/12	SK	n/a	n/a	GTA1018

The QC reported here applies to the following samples: Method: SW846 8021B

D41920-1, D41920-2, D41920-3, D41920-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
71-43-2	Benzene	27.2	22.8	84	70-130
100-41-4	Ethylbenzene	45.6	38.0	83	70-130
108-88-3	Toluene	212	172	81	70-130
1330-20-7	Xylenes (total)	216	196	91	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
120-82-1	1,2,4-Trichlorobenzene	95%	60-140%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D41920
Account: AGWCODN A.G. Wassenaar, Inc.
Project: Dearmin Prop. - E12687.E2

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D41909-1MS	TA17914.D	1	12/18/12	SK	n/a	n/a	GTA1018
D41909-1MSD	TA17915.D	1	12/18/12	SK	n/a	n/a	GTA1018
D41909-1	TA17913.D	1	12/18/12	SK	n/a	n/a	GTA1018

The QC reported here applies to the following samples: Method: SW846 8021B

D41920-1, D41920-2, D41920-3, D41920-4

CAS No.	Compound	D41909-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	ND		27.2	23.7	87	23.3	86	2	55-133/30
100-41-4	Ethylbenzene	ND		45.6	38.2	84	37.7	83	1	63-130/30
108-88-3	Toluene	ND		212	173	82	171	81	1	70-130/30
1330-20-7	Xylenes (total)	ND		216	197	91	195	90	1	64-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D41909-1	Limits
120-82-1	1,2,4-Trichlorobenzene	96%	97%	94%	60-140%

* = Outside of Control Limits.

A.G. Wassenaar
Geotechnical and Environmental Consultants Inc.
2180 South Ivanhoe Street, Suite 5
Denver, Colorado 80222-5710
303-759-8373 Fax 303-759-4874
www.agwassenaar.com

PHASE I ENVIRONMENTAL SITE ASSESSMENT

DEARMIN PROPERTY
WELD COUNTY, COLORADO

PREPARED FOR

HC DEVELOPMENT AND MANAGEMENT SERVICES, INC.
4908 TOWER ROAD
DENVER, COLORADO 80237

NOVEMBER 1, 2012
PROJECT NUMBER E12625.E1

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FIGURES

1. VICINITY MAP
2. SITE MAP

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B. USER QUESTIONNAIRE
C. TOPOGRAPHIC MAPS AND AERIAL PHOTOGRAPHS
D. PUBLIC RECORDS RESEARCH
E. QUALIFICATIONS
F. REFERENCES

EXECUTIVE SUMMARY

As requested, A. G. Wassenaar, Inc. (AGW) has conducted a Phase I Environmental Site Assessment (ESA) for the subject property identified as the Dearmin Property located in Weld County, Colorado. The subject property was evaluated for potentially significant on-site environmental contamination through a property inspection, a review of historical property uses, interviews with individuals associated with the property, and a review of environmental records available from government agencies.

AGW's inspection included visual and physical observations of the subject property to identify possible contamination or contamination sources, and a drive-by survey of the nearby area. The site is positioned southwest of the intersection of County Road 8 and County Road 5 in Weld County, Colorado. The site is approximately 300 acres in size, and is rectangular in shape, with two excepted parcels at the southeast corner. The majority of the property is vacant and appears to be used for agricultural purposes. Three producing oil and gas wells; William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H, are located on the subject property near the western boundary, northern boundary, and eastern boundary, respectively. Buried natural gas lines run along the western and northern site boundaries. Overhead utilities are positioned along the northern site boundary and traverse a portion of the southwest corner of the site. Pad mounted transformers were observed along the northern site boundary and near the southwest corner of the subject property. Buried water and sewer pipes were indicated to be present on the western site boundary. A historic mine shaft and associated air shaft and mine waste pile, are located near the southeast corner of the site, just north of the excluded parcel.

The subject property is positioned within a mixed use neighborhood. County Road 8 (Erie Parkway) delineates the northern property boundary, while vacant, agricultural fields are located further north. A radio tower and Erie High School were located northeast of the subject property. The Mountain View Drag Strip is located east of County Road 5 which is positioned along the eastern site boundary. A vehicle junkyard is positioned within the excepted parcel in the southeast corner of the site. The Green Mill shooting range and a cluster of landfills are positioned to the south of the site. The unimproved Green Mill Road is in place along the western site boundary while residential homes within the Grandview development and overhead utilities are in place immediately west of the property. Vacant land was observed to the north, east, and south of the site. Any releases that may have occurred at the vehicle junkyard within the excepted parcel near the southeast corner are likely to be: considered de minimus, in small quantities, and exclusively associated with surficial contamination. Therefore, AGW does not believe that the junkyard poses a significant environmental threat to the subject property.

Historical research for the vicinity of the subject property was conducted in order to identify any past uses that have or may have negatively impacted the natural resources of the subject property. Our review of historical resources revealed that coal mining activities have been conducted on the subject property since the early 1900s, including associated historical mining structures used for bookeeping. One oil and gas well historically operated on the eastern portion of the site, in addition to the three wells that are currently in use. Demolition records for the former historical mining structures are unavailable, however, based upon observations made during the site reconnaissance (i.e. no irregular mounds), and aerial photographs, it is assumed that the buildings were demolished and the associated building debris recycled or disposed of off-site. However, if future development

of the property unearths building debris, construction activities should be halted until a Colorado Department of Public Health and Environment (CDPHE) certified asbestos Building Inspector can assess the debris. Available reports, including Western Environment and Ecology Inc.'s "Mine Subsidence Investigation, Horst Property, Section 20, Township 1 North, Range 68 West, Erie, Colorado" dated April 4, 2000, should be reviewed regarding issues of subsidence on the property, prior to development of the site.

Records of the U. S. Environmental Protection Agency, the Colorado Department of Public Health & Environment, the Colorado Department of Labor and Employment, and the Colorado Oil and Gas Conservation Commission were evaluated for information on hazardous materials and land sources of pollutants/hazards of potential concern, including known complaints and spills. A review of public records maintained by these agencies revealed eight solid waste landfill sites within one-half mile of the subject property; and three producing oil and gas wells, one plugged and abandon oil and gas well, and five permitted locations were located on the subject property. Files were reviewed regarding the cluster of landfills located one-half mile to the south of the site, and based on available information, location on the opposite side of the drainage, the presence of deep ground water, and the low probability of hazardous materials migrating onto the subject property, it is the opinion of AGW that these landfill sites do not pose a significant environmental threat to the subject property. Records maintained by regulatory agencies were reviewed and **the producing William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H oil and gas wells and associated tank batteries, in addition to the historic plugged and abandoned William H. Peltier #1 oil and gas well, are recognized environmental conditions in relation to the subject property.**

We have performed a Phase I ESA in general conformance with the scope-of-work and limitations of American Standard of Testing Materials (ASTM) Standard Practice Designation E 1527-05 for the property identified as the Dearmin Property located in Weld County, Colorado. Any exceptions, or deletions from this practice are described in Section 12.0 of this report.

This assessment has revealed no evidence of recognized environmental conditions in connection with the property with the exception of the following:

- **The on-site and producing William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H oil and gas wells and associated tank batteries, in addition to the historic plugged and abandoned William H. Peltier #1 oil and gas well.**

The following items are not considered recognized environmental conditions; however, AGW has determined these issues to be important environmental considerations which should be understood in connection with the property:

- Oil and gas wells raise a concern from a land development standpoint. Structures should not be constructed within the required set back of operational wells and production equipment. Additionally, the five permitted locations will likely be drilled and have associated wells in the future. Based on this, if future development is planned for the subject property, AGW recommends that appropriate setbacks be placed from all oil and gas wells located on the property.

- An oil and gas pipeline runs below the ground surface along the western and northern boundaries of the site. Although AGW did not observe any environmental indicators (such as broken ground surface or soil staining) that a leak has occurred within this high pressure gas pipeline, it has the potential to leak in the future. If a leak occurs, appropriate remedial actions should be taken and AGW should be contacted immediately.
- While not an environmental concern, former underground coal mining operations in the area have led to subsidence issues across the subject property. AGW strongly recommends reviewing available reports such as: Western Environment and Ecology Inc.'s "Mine Subsidence Investigation, Horst Property, Section 20, Township 1 North, Range 68 West, Erie, Colorado" dated April 4, 2000 and CTL Thompson, Inc.'s "Geological and Preliminary Geotechnical Investigation, Horst Property, County Roads 5 and 8, Weld County, Colorado" dated June 1, 2000, regarding subsidence issues in the area.
- Demolition records for the historical mining structures are unavailable, but based on observations made during the site reconnaissance (i.e. no irregular mounds), it is assumed that the buildings were demolished and the associated building debris recycled or disposed of off-site. However, if future development of the property unearths building debris, construction activities should be halted until a Colorado Department of Health and Environment (CDPHE) certified asbestos Building Inspector can assess the debris.

This report was written to summarize AGW's findings during a Phase I ESA of the subject property. Although AGW completes thorough studies, no warranty is made of the accuracy, completeness, and timeliness of information obtained from government or third party sources. No parties, except the Client, are authorized to review this report unless they agree to waive any possible claims against A.G. Wassenaar, Inc., arising from such use.

Phase I Environmental Site Assessment
Dearmin Property
Weld County, Colorado
November 1, 2012

1.0 INTRODUCTION

As requested, A. G. Wassenaar, Inc. (AGW) has completed a Phase I Environmental Site Assessment (ESA) for the subject property, identified as the Dearmin Property in Weld County, Colorado. The project was conducted for HC Development and Management Services, Inc.

2.0 PURPOSE AND SCOPE OF WORK

AGW's assessment is designed to be in general accordance with Phase I ESAs as established by the American Society of Testing and Materials (ASTM), Standard Practice Designation E 1527-05. The assessment consists of a site reconnaissance to identify potential environmental problems; interviews with individuals having knowledge of the subject site; a review of publicly available records pertaining to environmental resources at the subject site; and a report documenting AGW's findings, opinion, and conclusions.

This report will identify *recognized environmental conditions* which have been identified in relation to the subject property (if any) and provide recommendations for any further action. The term recognized environmental condition is defined as the presence or likely presence of any hazardous substances or petroleum products on the property under conditions that indicate an existing release, past release, or material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water of the property. The term

includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimus 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 enforcement action if brought to the attention of appropriate government agencies.

3.0 SITE DESCRIPTION

The subject property can generally be described as a portion of the Northern 1/2 of Section 20; Township 1 North, Range 68 West of the Sixth Principal Meridian. The site is positioned southwest of the intersection of County Road 8 and County Road 5 in Weld County, Colorado. Physical setting information for the site is described in Table I below.

Table I
Physical Setting

Elevation of Subject Property	Approximately 5,100 to 5,200 feet above sea level	Source: USGS Topographic Map, Erie, Colorado, 1967 (revised 1979)
Topographic Gradient	Gentle slope to northwest.	
Closest Surface Water	Drainage located to the south	

4.0 SITE RECONNAISSANCE

The property was inspected by Ms. Kristin Schwartz on October 24, 2012. The inspection included a thorough visual survey of the subject property (including a physical inspection of the property grounds for visible signs of contamination or contamination sources), as well as a drive-by survey of the nearby area. Site maps of the property are included as Figures 1 and 2 in this report, and photographs taken during the site visit are included in Attachment A.

4.1 Property Grounds

The site is positioned southwest of the intersection of County Road 8 and County Road 5 in Weld County, Colorado. The site is approximately 300 acres in size, and is rectangular in shape, with two excepted parcels at the southeast corner. The majority of the property is vacant and appears to be used for agricultural purposes. Three producing oil and gas wells; William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H, are located on the subject property near the western boundary, northern boundary, and eastern boundary, respectively. Buried natural gas lines run along the western and northern site boundaries. Although AGW did not observe any environmental indicators (such as broken ground surface or soil staining) that a leak has occurred within this high pressure gas pipeline, it has the potential to leak in the future. If a leak occurs, appropriate remedial actions should be taken and AGW should be contacted immediately. Overhead utilities are positioned along the northern site boundary and traverse a portion of the southwest corner of the site. Pad mounted transformers were observed along the northern site boundary and near the southwest corner of the subject property. Buried water and sewer pipes were indicated to be present on the western site boundary. A historic mine shaft and associated air shaft and mine waste pile, are located near the southeast corner of the site, just north of the excluded parcel. Acid mine drainage, and other common environmental concerns associated with former mining activities and waste piles, are unlikely to be a problem with coal mine waste piles, but rather with mineral mine waste piles. Therefore, the coal waste pile on the subject property is not a recognized environmental condition in relation to the subject property. **AGW identifies the William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H oil and gas wells and tank batteries as recognized environmental conditions in relation to the subject property.** Further discussion of these, and former, on-site oil and gas wells can be found in Section 7.1 of this report.

Site reconnaissance observations are detailed in Table II below, and shown in Figure 1 and Attachment A of this report.

Table II

Site Reconnaissance Observations	
Current Use of Subject Property	The majority of the parcel is currently vacant and appears to be used primarily for agricultural purposes. One historic mine shaft and associated mine waste pile are located near the southeast site boundary. Three producing oil wells and associated tank batteries are in place at the western, northern, and eastern site boundaries. A natural gas pipeline runs along the western and northern site boundaries.
Configuration	Rectangular in shape with a two excepted parcels at the southeast corner.
Boundaries	North- Weld Country Road 8 (Erie Parkway), overhead electrical lines, pad mounted transformers, and agricultural land. A radio tower and Erie High School are in place to the northeast of the site. East- Weld County Road 5, Mountain View Drag Strip, and vacant land. South- Green Mill shooting range, a cluster of landfills, overhead utilities, and vacant land. A vehicle junkyard is located in the excepted parcel of land near the southeast corner of the property. West- Unimproved Green Mill Road, residential homes within the Grandview development, and a fire department.
Vegetation	Short grasses and weeds, mainly exposed soils.
Topography	Mild elevation changes throughout the site with a general slope to the south and west.
Structures or other improvements on the subject property	Three oil and gas wells with associated batteries and separators, overhead electrical lines, pad-mounted transformers, and buried natural gas pipelines.
Roads adjoining the property and roads, streets, parking facilities on subject property	Weld County Road 8 (Erie Parkway) to the north, Weld County Road 5 to the east, unimproved Green Mill Road to the west, unimproved roads extending from the property boundaries towards the oil wells, and an unimproved road in place north of the vehicle junkyard.
Debris	Inert debris observed in various locations on the subject property. Debris located near the mine shaft and mine waste pile includes, but is not limited to: a couch, tires, an empty 55 gallon drum, broken electrical equipment, abandoned motor boat, and wooden scraps.

Table II (continued)

Site Reconnaissance Observations	
Hazardous substances and petroleum products stored on the subject property	None observed
Storage Tanks	Storage / separation tanks in place adjacent to all three oil wells.
Vent pipes	None observed
Utility lines	Overhead utility lines are in place along the northern boundary and near the southwest corner of the site. Buried natural gas lines are present along the west and north property boundaries. Water and sewer pipelines were indicated to be in place at the western site boundary.
Odors	None observed
Pools of Liquid	None observed
Drums	An empty 55 gallon drum was observed near the historic mine shaft. No staining was observed near the drum and no liquids were present inside, therefore, it is not considered a recognized environmental condition.
Unidentified Substance Containers	None observed
PCBs	One pad mounted transformer is in place near the southwest portion of the site and several are in place along the northern boundary of the site. These appear to be relatively new and, therefore, are unlikely to contain PCBs.
Pits, ponds, or lagoons	None observed
Wetlands	None observed
Stained soil or pavement	Black colored soil was stockpiled near the historic coal mine shaft at the southeast portion of the site. Coal waste piles are not a concern in regards to acid mine drainage and other common environmental concerns associated with historical mining activities. Therefore, the coal waste pile is not a recognized environmental condition.
Stressed vegetation	None observed
Wells	Three oil wells and associated tank batteries are in place near the western, northern, and eastern site boundaries.

AGW recommends reviewing available files, including: Western Environment and Ecology Inc.'s "Mine Subsidence Investigation, Horst Property, Section 20, Township 1 North, Range 68 West, Erie, Colorado" dated April 4, 2000; CTL Thompson, Inc. "Geological and Preliminary Geotechnical Investigation, Horst Property, County Roads 5 and 8, Weld County, Colorado" dated June 1, 2000; A.G. Wassenaar's "Preliminary Geotechnical Study for Site Development Proposed 305 Acre Residential Development, Weld County Road 5 at Weld County Road 8, Erie, Colorado" dated December 30, 2004; Michael W. West and Associates, Inc. "Engineering Geology and Mine Subsidence Study, Highland Park Subdivision near Erie, Weld County, Colorado" dated March 23, 2005; and CTL Thompsons's "Subsidence Investigation, Highland Park Subdivision, Weld County, Colorado" dated August 25, 2005, regarding subsidence issues on the subject property.

4.2 Surrounding Properties

The subject property is positioned within a mixed use neighborhood. County Road 8 (Erie Parkway) delineates the northern property boundary, while vacant, agricultural fields are located further north. A radio tower and Erie High School were located northeast of the subject property. The Mountain View Drag Strip is located east of County Road 5 which is positioned along the eastern site boundary. A vehicle junkyard is positioned within the excepted parcel in the southeast corner of the site. The Green Mill shooting range and a cluster of landfills are positioned to the south of the site. The unimproved Green Mill Road is in place along the western site boundary while residential homes within the Grandview development and overhead utilities are in place immediately west of the property. Vacant land was observed to the north, east, and south of the site. Any releases that may have occurred at the vehicle junkyard within the excepted parcel near the southeast corner are likely to be: considered de minimus, in small quantities, and exclusively associated with surficial contamination.

Therefore, AGW does not believe that the junkyard poses a significant environmental threat to the subject property.

5.0 INTERVIEWS

James Dearmin, Property Owner

Mr. Dearmin was interviewed by telephone on October 26, 2012. Mr. Dearmin purchased the property around 1981 and has historically used the land for growing wheat. No significant use of pesticides, herbicides, or insecticides was reported by Mr. Dearmin nor were any of these chemicals ever stored on the property. He indicated that mining operations began on the property around the turn of the 19th century and ceased approximately 50-60 years ago. Mr. Dearmin believes buildings previously located on the subject property were used for mine bookkeeping, and were torn down in the 1930s. He stated that the mining shaft, located on the subject property, approximately 700 feet deep, was closed down by the State and testing regarding subsidence has been conducted on the site. According to Mr. Dearmin, the waste pile has been in place since the beginning of the mining operations. Mr. Dearmin stated that the subject property is a permitted, but never used, landfill site. Mr. Dearmin believes the vehicle junkyard adjacent to the site has been in operation for approximately 30 years, during which he has never witnessed any improper disposal of substances by the owner. Additionally, Mr. Dearmin acknowledged the three oil and gas wells currently operating on his property. He indicated that the well located near the northern boundary starting production in, approximately, 1956 and that the well located near the eastern boundary was drilled within the last year. Mr. Dearmin informed AGW that he is unaware of any dumping, hazardous waste disposal, or other environmental concerns on the subject property or within the surrounding area.

Douglas Ikenberry, Colorado Department of Public Health and Environment, Solid Waste Unit

AGW conducted an interview with Mr. Ikenberry on October 29, 2012. This interview is included in Section 7.1 of this report..

6.0 SITE HISTORY

The historic land use of the subject property and the surrounding areas were examined with the purpose of interpreting, where possible, the past activities that have or may have negatively impacted the natural resources of the site. The references reviewed included: USGS Topographic Maps of Niwot, Colorado, dated 1902; and Erie, Colorado, dated 1948, 1966, 1971, and 1978; and aerial photographs dated 1937, 1979, and 1985. Copies of Topographic Maps and Aerial Photographs are included in Attachment D.

6.1 USGS Topographical Maps

Table III
Topographical Maps

USGS Topographical Map	Direction	Description
Niwot Quadrangle, 15-minute map: 1902	Subject Property	Vacant land
	North	Downtown Erie positioned less than one mile northwest, several roads and drainages are in place less than one mile north. One structure is visible within a quarter mile northwest of the site.
	East	An improved road and unimproved road are in place to the east / northeast, abutting the northeast corner of the subject property. Otherwise, vacant land.
	South	Two drainages traverse from east to west, otherwise, vacant land.
	West	Two railroads, including the Burlington and Missouri River Railroad, and improved roads are in place less than one mile west, directly south of downtown Erie.

Table III (continued)

USGS Topographical Map	Direction	Description
Erie Quadrangle, 7.5-minute map: 1948	Subject Property	An inactive State Mine, dump, and two associated structures are positioned near the southeast corner of the property. Otherwise, vacant land.
	North	Weld County Road 8 in place at the northern boundary. A mine dump is in place within a quarter mile northwest of the property and the Clayton Mine (inactive) is located within a mile to the northeast. Roads no longer depicted and the Erie Cemetery is in place to the northwest.
	East	Weld County Road 5 in place at the eastern boundary, otherwise, vacant land.
	South	Pipeline traverses from northwest to southeast across the property to the south. The Columbine Mine (inactive), dump, and associated structures are positioned approximately one mile south of the subject property. One drainage outlet is located within a quarter mile south.
	West	The Cottonwood Extension Ditch in place to the west of the subject property, otherwise, vacant land.
Erie Quadrangle, 7.5-minute map: 1966	Subject Property	One structure and mine prospect/shaft is located near the southeast corner of the subject property. Otherwise, vacant land.
	North	Mine dump no longer depicted. One unimproved road and outbuilding are in place within a mile north of the property. Otherwise, no visible changes.
	East	Mountain View Drag Strip and associated building are place directly east of County Road 5. Otherwise, no visible changes.
	South	One additional drainage outlet in place and most of the structures associated with the Columbine Mine are no longer depicted. Otherwise, no visible changes.
	West	No visible changes
Erie Quadrangle, 7.5-minute map: 1971	Subject Property	No visible changes
	North	No visible changes
	East	No visible changes
	South	No visible changes
	West	No visible changes

Table III (continued)

USGS Topographical Map	Direction	Description
Erie Quadrangle, 7.5-minute map: 1978	Subject Property	No visible changes
	North	Additional structures visible in downtown Erie, northwest of the site. Unimproved road and outbuilding no longer depicted. Otherwise, no visible changes.
	East	Additional structures located south of the Mountain View Drag Strip.
	South	An unimproved road in place approximately one-half mile south.
	West	An unimproved road in place at the western boundary of the property and additional unimproved roads visible to the east.
Erie Quadrangle, 7.5-minute map: 1967 (revised 1979)	Subject Property	No visible changes
	North	No visible changes
	East	No visible changes
	South	No visible changes
	West	No visible changes

Historical research indicates that mining operations began on the subject property in the early 1900s. The mine reportedly produced 3,518,912 tons of sub-bituminous grade coal prior to its closure in 1946, according to a subsidence investigation report by Western Environment and Ecology, Inc. (Western Environment), dated April 4, 2000. Mining operations consisted of underground coal mining, and was classified as a modified room and pillar mine, with entries approximately ten feet wide and rooms approximately 20 feet wide and 150 feet long. Access to the mine was through a shaft, approximately 330 feet deep, according to Western Environment, and was located on the eastern portion of the subject property. AGW recommends reviewing Western Environment's report, as well as other available reports discussed in Section 4; prior to development regarding issues of subsidence in relation to the subject property.

6.2 Aerial Photographs

Table VI
Aerial Photographs

Aerial Photograph	Direction	Description
1937	Subject Property	Several structures and unimproved roads associated with the State Mine are present near the southeast corner of the site. Several drainages traverse the southern portion of the site. Weld County Road 8 is in place delineating the sites northern boundary. Otherwise, vacant land.
	North	Predominately vacant land with a drainages located directly north.
	East	Weld County Road 8 is in place along the eastern site boundary. An unimproved road is visible to the east originating from the mining activities on site.
	South	Vacant land with drainages traversing most of the land.
	West	A stream is present within a quarter mile east.
1979	Subject Property	One oil and gas well with associated unimproved road is visible on the eastern portion of the site. Some of the structures and unimproved roads associated with the mine are no longer depicted. Otherwise, vacant land.
	Surrounding Properties	Mountain View Drag Strip and associated buildings are in place to the east. County Road 3 is located on the western site boundary. Some grading activities are visible to the south.
1985	Subject Property	No significant changes.
	Surrounding Properties	Additional structures are in place along the drag strip to the east. Grading activities and agricultural land is present to the south of the property. An oil and gas well is located north of the property.

Demolition records for the former historical outbuilding are unavailable, however, based upon observations made during the site reconnaissance (i.e. no irregular mounds), and aerial photographs, it is assumed that the building was demolished and the associated building debris recycled or disposed of off-site. However, if future development of the property unearths building debris, construction activities should be halted until a Colorado Department of Public Health and Environment (CDPHE) certified asbestos Building Inspector can assess the debris.

7.0 PUBLIC RECORDS REVIEW

A review of public records was completed by Satisfi Environmental Information (Satisfi) of Castle Rock, Colorado. This record search was defined to meet or exceed the ASTM guidelines for a Phase I ESA records search. The search area defined by ASTM varies from adjacent properties to a maximum of a one mile radius.

The information reviewed for this assessment includes the following: National Priorities List (NPL) Superfund sites; State equivalent NPL sites (SPL); facilities investigated for potential releases of hazardous materials to the environment (Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS); hazardous waste facilities (RCRA); documented spills or hazardous releases; leaking underground storage tanks (LUST); registered USTs and ASTs; and solid or hazardous waste landfills. Summarized data follows with specific information and mapping details contained in Attachment E.

Table V
Summary of Publicly Available Environmental Records

Federal Databases		Approximate Minimum Search Distance	Results
NPL	The National Priorities List (NPL) is the USEPA's database of uncontrolled or abandoned hazardous waste facilities that have been listed for priority remedial actions under the Superfund Program.	1.0	0
CORRACT	The USEPA maintains a database of RCRA facilities that are undergoing "corrective action". A "corrective action" order is issued when there has been a release of hazardous waste or constituents into the environment from a RCRA facility.	1.0	0
TSD	The USEPA maintains a database of RCRA facilities associated with treatment, storage, or disposal (TSD) of hazardous waste.	0.50	0
CERCLIS	The CERCLIS database is a compilation of facilities that USEPA has or is currently investigating for a release or threatened release of hazardous substances subject to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980.	0.50	0
Spill	The Emergency Response Notification System (ERNS) is a listing compiled by the USEPA and the Coast Guard's National Response Center of reported releases of petroleum and hazardous substances to the air, soil and/or water.	0.25	0

Table V (continued)

Federal Databases		Approximate Minimum Search Distance	Results
Generator	The US EPA's Resource Conservation and Recovery Act (RCRA) database identifies facilities that generate hazardous waste. Large quantity generators (LQG) produce at least 1,000 kg/month of hazardous waste or 1 kg/ month of acutely hazardous waste. Small quantity generators (SQG) produce 100 to 1,000 kg/ month of hazardous waste. Conditionally exempt small quantity generators (CESQG) generate less than 100 kg/month of hazardous waste.	0.25	0
Other	The US EPA's Resource Conservation and Recovery Act (RCRA) database also identifies facilities that are transporters of hazardous waste, former generators, and suspected generators. Non-generators that have been inspected or have sent in notifications are also included.	0.25	0
State Databases			
VCL	State Voluntary Cleanup Lists include sites that are being cleaned up or that have applied for a No Action Determination from the State.	0.50	0
Solid Waste	State lists of solid waste facilities. This category also includes lists compiled from various local agencies.	0.50	8
Tank Leak	State list of leaking underground storage tanks (LUSTs) and above-ground tank leaks. This category also includes LUST Trust sites where no responsible party has been identified.	0.50	0
Tank	State list of registered underground storage tanks (USTs) and above-ground storage tanks (ASTs).	0.25	0
AUL	Activity and Use Limitations include sites with either Engineering Controls or Institutional Controls that are intended to prevent exposure to contamination that has been left in place.	0.25	0
Oil and Gas Wells	Colorado Oil and Gas Commission- In general, oil and gas production wells present an environmental hazard during all stages of their use, including: initial construction and development, production, and through underground or surface transport. At each stage of the process of oil and gas production, significant potential for hydrocarbon release is present	On Site	9

7.1 Solid or Hazardous Waste Landfill Sites

Table VI
Landfill Sites

Map ID	Site Name and Location	Distance (miles)	Recognized Environmental Condition?
1	Horst/Dearmin Historic Landfill	0.34 SE	No, based on available information
1	Horst SWDS (AKA Erie SWDS) 2240 Weld County Road 5	0.09 SE	No, based on available information

Table VI (continued)

Map ID	Site Name and Location	Distance (miles)	Recognized Environmental Condition?
2	Denver Regional Landfill / Denver Regional Landfil North and South 1441 Weld County Road 6	0.50 SE	No, based on location and available information
2	Colorado Landfill Historic Landfill	0.50 SE	No, based on location and available information
2	Laidlaw South 1441 Weld County Road 6	0.50 SE	No, based on location and available information
2	Laidlaw North Weld County Road 6	0.50 SE	No, based on location and available information
2	Laidlaw North Weld County Road 6	0.50 SE	No, based on location and available information
2	Erie Landfill Road 6 & 5 Address Not Reported	0.50 SE	No, based on location and available information

The Horst SWDS (Erie SWDS) located at 2240 Weld County Road 5 is listed as a registered landfill and is located on the subject property. During an interview with the property owner, included in Section 5.0 of this report, he explained that the subject property has received a permit to operate as a landfill, however, landfill activities have never taken place at this location due to subsidence issues. In addition, no evidence of landfill activities was noted during the site visit. Based on this information, it is the opinion of AGW that the natural resources of the subject property have not been compromised due to landfill activities at this location.

A cluster of landfills which have all changed names several times are located less than one mile south of the subject property. On October 29, 2012, AGW conducted an interview with Douglas Ikenberry of the Colorado Department of Public Health and Environment regarding these landfill sites. He stated that the Old Erie Landfill, located directly east of the Denver Regional Landfill, opened in the 1960s, and is now closed. Monitoring events at this site as well as at the Denver

Regional North Landfill, have indicated very low levels of volatile organic compounds (VOCs). These, in addition to the discovery of a sulfate leachate, led to the installation of a clay wall sump along the northern boundary of the landfill. Furthermore, Mr. Ikenberry indicated that the northern half of the Denver Regional Landfill was permitted in 1979, pre-dating RCRA Subtitle D, and therefore no liner is in place. The Denver Regional Landfill North is currently closed and post closure monitoring is being performed at this site.

Mr. Ikenberry reported that currently, monitored iron levels are exceeding the secondary standards at the Denver Regional North landfill and it is undergoing investigation. They believe that this exceedance is due to an alternate source demonstration and not resulting from the contents within the landfill. This alternate source is believed to be iron oxide contained with the Laramie rock formation, which the landfill sits on top of. Recent spikes in iron levels near the clay sump have led to the installation of two monitoring wells; one monitoring the top soil and the other monitoring deeper bedrock, to determine the source of these high iron levels. Mr. Ikenberry stated that all of the landfills in this vicinity are located within the Laramie Formation, enclosed in claystone, and that sand lenses in the area are not continuous. Additionally, he indicated that the landfills and subject property are on top of the Laramie Fox Hills aquifer which is located approximately 300 - 400 feet below ground surface, and that most of the ground water in the area, if encountered, would likely be perched groundwater entrained in pockets within the claystone or sandstone.

Based on available information, location on the opposite side of the drainage, the presence of deep ground water, and the low probability for hazardous materials migrating onto the subject property,

it is the opinion of AGW that these landfill sites do not pose a significant environmental threat to the subject property.

7.2 Oil and Gas Production Wells

The Colorado Oil and Gas Commission (COGCC) maintains a database record of all oil and gas wells located within the state. In general, oil and gas production wells present an environmental hazard during all stages of their use, including: initial construction and development, production, and through underground or surface transport. At each stage of the process of oil and gas production, significant potential for hydrocarbon release is present. Nine oil and gas wells; three currently active, one no longer in use, and five permitted locations, are documented on the subject property. The three producing oil and gas wells; William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H, are located on the western, northern, and eastern site boundaries, respectively. The William Peltier well #1 while not currently active, was formerly located on the eastern portion of the site. The oil and gas wells on the subject property are summarized in Table VII below:

Table VII
Oil and Gas Wells

Map ID	Well Name	Location	Operator	Spud Date	Status
1	Williams H. Peltier #12-20	SWNW 20 1N 68W 6PM	Encana Oil and Gas (USA) Inc.	2007	PR- Producing
2	William Peltier #11-20	SWNW 20 1N 68W 6PM	Encana Oil and Gas (USA) Inc.	N/A	XX- Permit Location
3	William Peltier #2-0-20	SWNW 20 1N 68W 6PM	Encana Oil and Gas (USA) Inc.	N/A	XX- Permit Location

Table VII (continued)

Map ID	Well Name	Location	Operator	Spud Date	Status
4	William Peltier #4-2-20	SWNW 20 1N 68W 6PM	Encana Oil and Gas (USA) Inc.	N/A	XX- Permit Location
5	William Peltier #2-4-20	SWNW 20 1N 68W 6PM	Encana Oil and Gas (USA) Inc.	N/A	XX- Permit Location
6	William Peltier #22-20	SWNW 20 1N 68W 6PM	Encana Oil and Gas (USA) Inc.	N/A	XX- Permit Location
7	William H. Peltier #2	NENW 20 1N 68W 6PM	Encana Oil and Gas (USA) Inc.	1985	PR- Producing
8	William H. Peltier #1	NENE 20 1N 68W 6PM	Vessels Oil and Gas Co.	1974	PA- Plugged and Abandoned
9	William Peltier #1A-20H	NENE 20 1N 68W 6PM	Encana Oil and Gas (USA) Inc.	2011	PR- Producing

After review of the information contained within the COGCC including status, spud dates of the producing wells, and on-site locations, **AGW identifies the William Peltier #1 plugged and abandoned well and the William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H producing wells and associated tank batteries as recognized environmental conditions in relation to the subject property.**

Oil and gas wells raise a concern from a land development standpoint. Structures should not be constructed within a certain distance of operational wells and production equipment. Additionally, the five permitted locations will likely be drilled and have associated wells in the future. Based on this, if future development is planned for the subject property, AGW recommends that appropriate setbacks be placed from all oil and gas wells located on the property.

7.3 Unmapped Sites

Five unmapped sites were listed during the Satisfi records search. This site could not be mapped accurately because of inadequate addresses or street maps. Unmapped listings are reported by Satisfi on the chance that their location might be revealed during the course of a site visit or other research. However, unless there is some specific reason to believe that a listing is nearby and of potential concern, there is no requirement in the ASTM standard to attempt to verify the location of these listings. Based on available information, there is no reason to believe this listing is within one mile of the subject property.

8.0 ENVIRONMENTAL LIENS

On October 29, 2012 AGW corresponded with Mr. Chad Ellington of HC Development and Management Services, Inc., to inquire about any known environmental liens associated with the subject property. Mr. Ellington indicated that he is unaware of any existing environmental liens associated with the subject property. A review of public records was completed by Satisfi. This record search was defined to meet or exceed the ASTM guidelines for a Phase I ESA record search. The search area defined by ASTM for activity and use limitations (AULs) is from adjacent properties to a maximum of a quarter-mile radius. The information reviewed for this assessment did not identify AULs associated with the subject property.

9.0 FINDINGS AND OPINION

- The site is positioned southwest of the intersection of County Road 8 and County Road 5 in Weld County, Colorado. The site is approximately 300 acres in size, and

is rectangular in shape, with two excepted parcels at the southeast corner. The majority of the property is vacant and appears to be used for agricultural purposes. Three producing oil and gas wells; William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H, are located on the subject property near the western boundary, northern boundary, and eastern boundary, respectively. Buried natural gas lines run along the western and northern site boundaries. Overhead utilities are positioned along the northern site boundary and traverse a portion of the southwest corner of the site. Pad mounted transformers were observed along the northern site boundary and near the southwest corner of the subject property. Buried water and sewer pipes were indicated to be present on the western site boundary. A historic mine shaft and associated air shaft and mine waste pile, are located near the southeast corner of the site, just north of the excluded parcel.

- The subject property is positioned within a mixed use neighborhood. County Road 8 (Erie Parkway) delineates the northern property boundary, while vacant, agricultural fields are located further north. A radio tower and Erie High School were located northeast of the subject property. The Mountain View Drag Strip is located east of County Road 5 which is positioned along the eastern site boundary. A vehicle junkyard is positioned within the excepted parcel in the southeast corner of the site. The Green Mill shooting range and a cluster of landfills are positioned to the south of the site. The unimproved Green Mill Road is in place along the western site boundary while residential homes within the Grandview development and overhead utilities are in place immediately west of the property. Vacant land was observed to the north, east, and south of the site. Any releases that may have occurred at the

vehicle junkyard within the excepted parcel near the southeast corner are likely to be: considered de minimus, in small quantities, and exclusively associated with surficial contamination. Therefore, AGW does not believe that the junkyard poses a significant environmental threat to the subject property.

- Historical research for the vicinity of the subject property was conducted in order to identify any past uses that have or may have negatively impacted the natural resources of the subject property. Our review of historical resources revealed that coal mining activities have been conducted on the subject property since the early 1900s, including associated historical mining structures used for bookkeeping. One oil and gas well historically operated on the eastern portion of the site, in addition to the three wells that are currently in use. Demolition records for the former historical mining structures are unavailable, however, based upon observations made during the site reconnaissance (i.e. no irregular mounds), and aerial photographs, it is assumed that the buildings were demolished and the associated building debris recycled or disposed of off-site. However, if future development of the property unearths building debris, construction activities should be halted until a Colorado Department of Public Health and Environment (CDPHE) certified asbestos Building Inspector can assess the debris. Available reports, including Western Environment and Ecology Inc.'s "Mine Subsidence Investigation, Horst Property, Section 20, Township 1 North, Range 68 West, Erie, Colorado" dated April 4, 2000, should be reviewed regarding issues of subsidence on the property, prior to development of the site.

- Records of the U. S. Environmental Protection Agency, the Colorado Department of Public Health & Environment, the Colorado Department of Labor and Employment, and the Colorado Oil and Gas Conservation Commission were evaluated for information on hazardous materials and land sources of pollutants/hazards of potential concern, including known complaints and spills. A review of public records maintained by these agencies revealed eight solid waste landfill sites within one-half mile of the subject property; and three producing oil and gas wells, one plugged and abandon oil and gas well, and five permitted locations were located on the subject property. Files were reviewed regarding the cluster of landfills located one-half mile to the south of the site, and based on available information, location on the opposite side of the drainage, the presence of deep ground water, and the low probability of hazardous materials migrating onto the subject property, it is the opinion of AGW that these landfill sites do not pose a significant environmental threat to the subject property. Records maintained by regulatory agencies were reviewed and **the producing William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H oil and gas wells and associated tank batteries, in addition to the historic plugged and abandoned William H. Peltier #1 oil and gas well, are recognized environmental conditions in relation to the subject property.**

10.0 CONCLUSION

We have performed a Phase I ESA in general conformance with the scope-of-work and limitations of American Standard of Testing Materials (ASTM) Standard Practice Designation E 1527-05 for

the property identified as the Dearmin Property located in Weld County, Colorado. Any exceptions, or deletions from this practice are described in Section 12.0 of this report.

This assessment has revealed no evidence of recognized environmental conditions in connection with the property with the exception of the following:

- **The on-site and producing William H. Peltier #12-20, William H. Peltier #2, and William Peltier 1A-20H oil and gas wells and associated tank batteries, in addition to the historic plugged and abandoned William H. Peltier #1 oil and gas well.**

The following items are not considered recognized environmental conditions; however, AGW has determined these issues to be important environmental considerations which should be understood in connection with the property:

- Oil and gas wells raise a concern from a land development standpoint. Structures should not be constructed within the required set back of operational wells and production equipment. Additionally, the five permitted locations will likely be drilled and have associated wells in the future. Based on this, if future development is planned for the subject property, AGW recommends that appropriate setbacks be placed from all oil and gas wells located on the property.
- An oil and gas pipeline runs below the ground surface along the western and northern boundaries of the site. Although AGW did not observe any environmental indicators (such as broken ground surface or soil staining) that a leak has occurred within this

high pressure gas pipeline, it has the potential to leak in the future. If a leak occurs, appropriate remedial actions should be taken and AGW should be contacted immediately.

- While not an environmental concern, former underground coal mining operations in the area have lead to subsidence issues across the subject property. AGW strongly recommends reviewing available reports such as: Western Environment and Ecology Inc.'s "Mine Subsidence Investigation, Horst Property, Section 20, Township 1 North, Range 68 West, Erie, Colorado" dated April 4, 2000 and CTL Thompson, Inc. "Geological and Preliminary Geotechnical Investigation, Horst Property, County Roads 5 and 8, Weld County, Colorado" dated June 1, 2000, regarding subsidence issues in the area.
- Demolition records for the historical outbuilding are unavailable, but based on observations made during the site reconnaissance (i.e. no irregular mounds), it is assumed that the building was demolished and the associated building debris recycled or disposed of off-site. However, if future development of the property unearths building debris, construction activities should be halted until a Colorado Department of Health and Environment (CDPHE) certified asbestos Building Inspector can assess the debris.

11.0 LIMITATIONS

The professional judgements expressed in this report meet the standard of care for our profession. Environmental issues (among others) not included in the scope of work for this project include radon, lead-based paint, and asbestos testing, and wetlands and endangered species evaluations. The

collection and specific laboratory analyses of environmental samples were not part of the scope of this Phase I ESA; therefore, no specific quantitative environmental data was generated.

AGW's assessment is limited to identifying potential environmental liabilities associated with the property of concern. Not identifying hazardous or toxic materials on the property should not be interpreted as a guarantee that these materials do not exist. It is merely a statement indicating that the probability of contamination on the subject property should be minimal based on site characteristics, and the historical and current uses of the site and surrounding areas. This opinion is rendered based upon property inspection, information from interviews with knowledgeable persons regarding property history, and information provided by governmental and regulatory agencies. Information is obtained on a reasonably ascertainable basis as it pertains to costs, timeliness, and availability, and is believed to be from reliable sources; however no responsibility is assumed for its accuracy since AGW was not retained to verify publicly available information.

12.0 DEVIATIONS

This Phase I ESA has been completed in general accordance with ASTM Practice E 1527-05. We are aware of no significant deviations from this standard.

Thank you for the opportunity to serve you on this project. If you have any questions regarding the contents of this report or should you require additional information, please do not hesitate to call.

Sincerely,

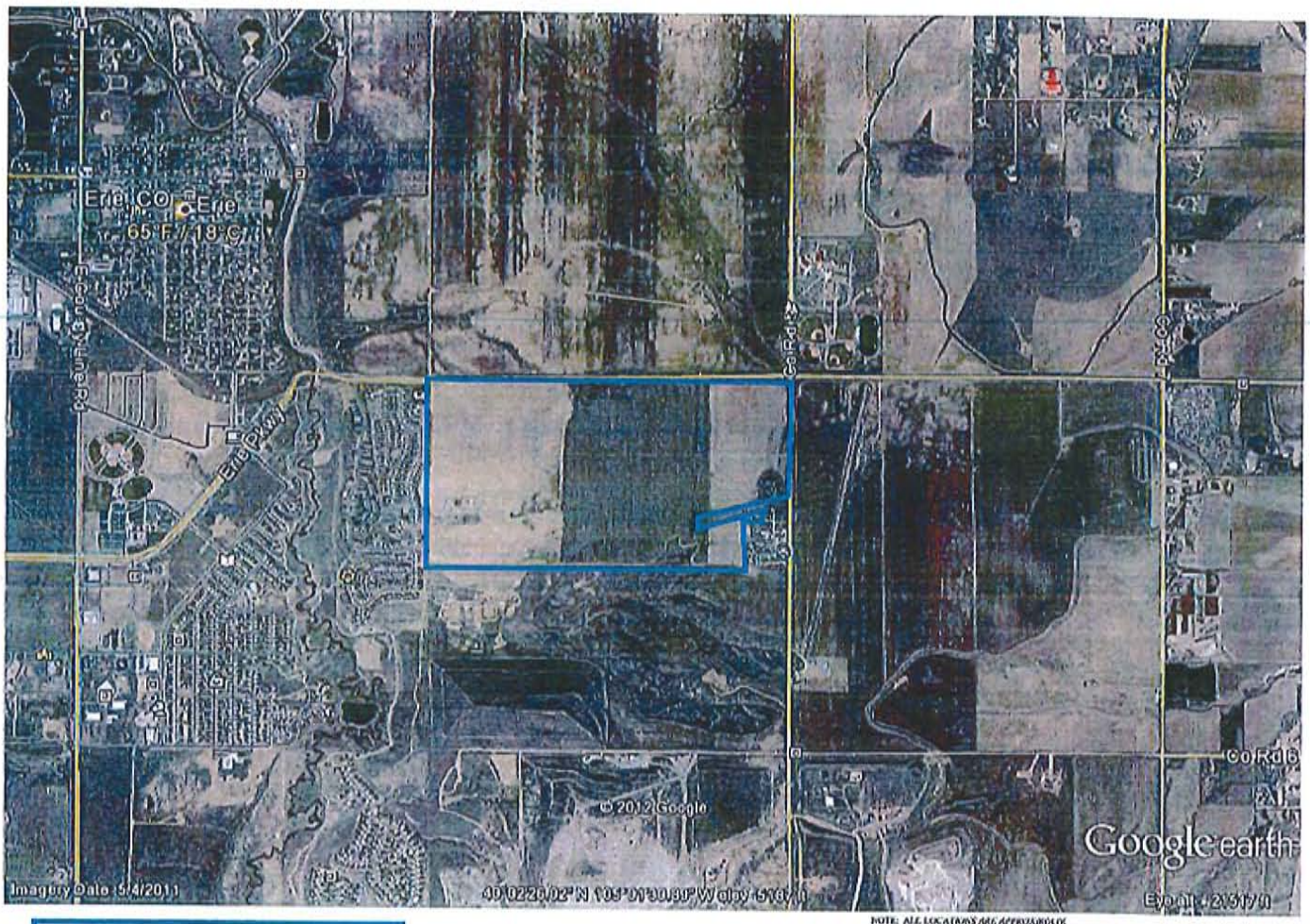
A. G. WASSENAAR, INC.

Kristin A. Schwartz
Environmental Scientist

Rachel A. Peterson, P.G.
Project Manager

I, Rachel A. Peterson, declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in 312.10 of 40 CFR 312 and I have specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

KAS/RAP/dd

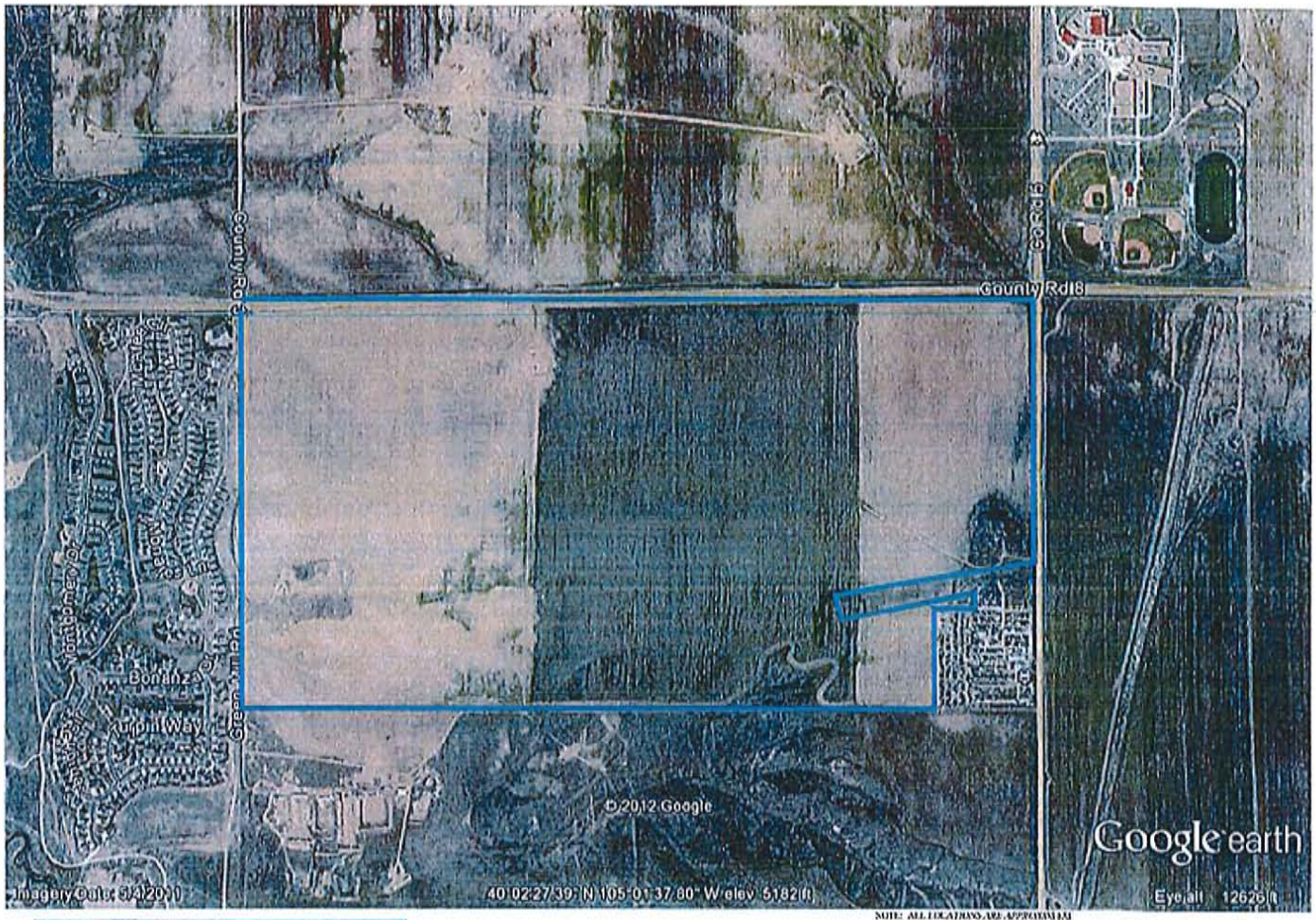


NOTE: ALL LOCATIONS ARE APPROXIMATE

Approximate Subject Property

N

A.G. Wassenaar Geotechnical and Environmental Consultants, Inc.	
Dearmin Property Erie, Colorado	Project No. E12625.E1 Figure 1 Vicinity Map



NOTE: ALL LOCATIONS ARE APPROXIMATE

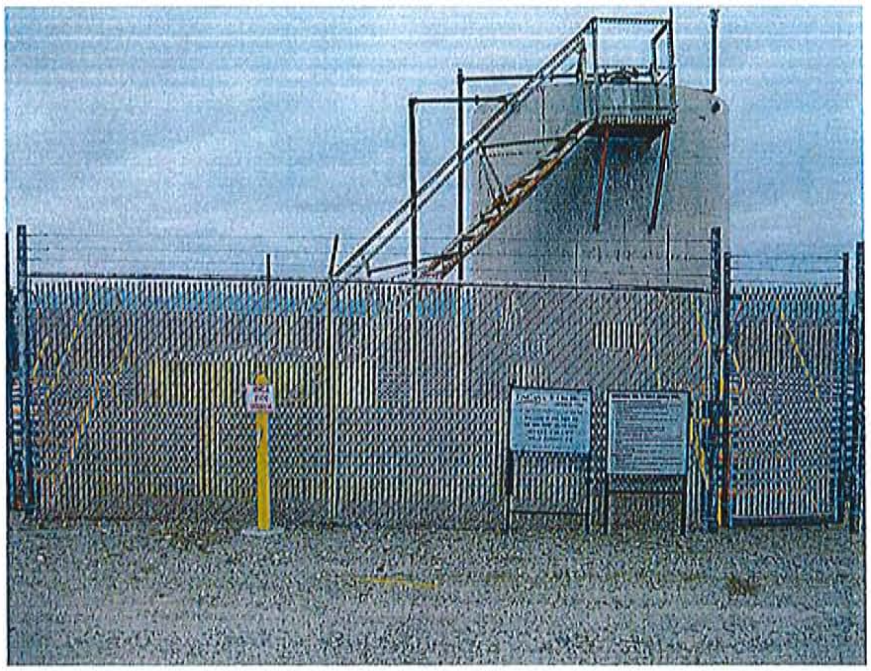
Approximate Subject Property

N

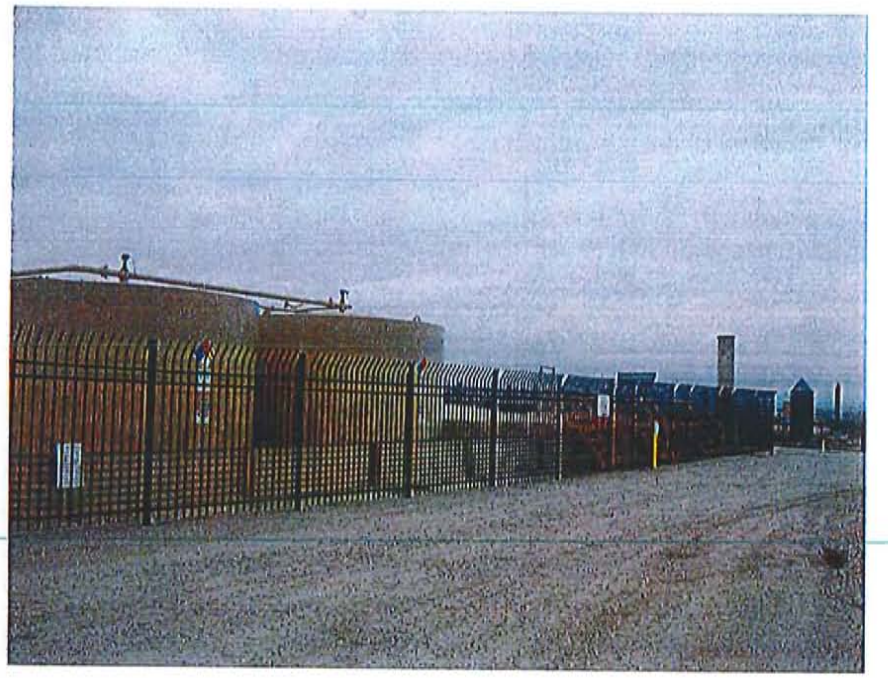
A.G. Wassenaar Geotechnical and Environmental Consultants Inc.	
Dearmin Property Erie, Colorado	Project No. E12625.E1 Figure 2 Site Map

ATTACHMENT A
PHOTOGRAPHS

William H. Peltier #12-20 oil and gas well location and tank battery depicted on the western portion of the site.



William H. Peltier #2 oil and gas well location and tank battery depicted on the northern portion of the site.



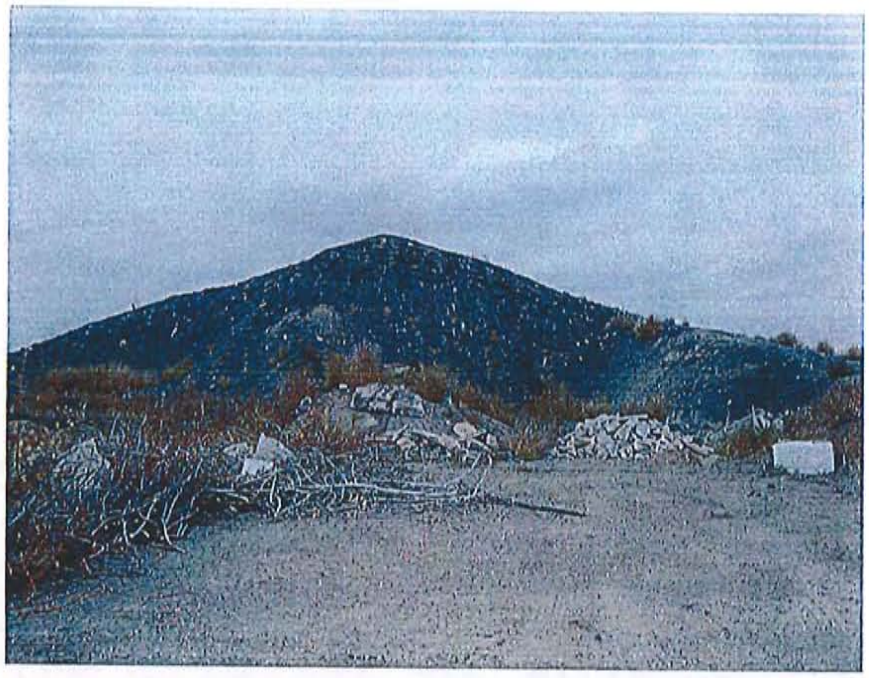
William Peltier #1A-20H oil and gas well, battery, and separator depicted on the eastern portion of the site.

Looking towards the west across the majority of the site from the eastern boundary.

View to the north across the site from the central portion of the subject property.

Looking to the south across the western portion of the site from the northern boundary.

Various debris depicted north of the vehicle junkyard which is located in the excluded parcel near the southeast corner of the site.



Mine waste pile and various debris located near the southeast portion of the site is depicted.

ATTACHMENT B
USER QUESTIONNAIRE

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants
2180 South Ivanhoe Street, Suite 5
Denver, Colorado 80222-5710
303-759-8373 Fax 303-759-4874
www.agwassenaar.com

USER QUESTIONNAIRE

INTRODUCTION

In order to qualify for on of the *Landowner Liability Protections (LLPs)*[35] offered by the Small Business Liability Relief and Brownfields Revitalization Act of 2001 (the "*Brownfields Amendments*"),[36] the *user* must provide the following information (if available) to the *environmental professional.* Failure to provide this information could result in a determination that *"all appropriate inquiry"* is not complete

(1.) Environmental cleanup liens that are filed or recorded against the site (40 CFR 312.25).
Are you aware of any environmental cleanup liens against the *property* that are filed or recorded under federal, tribal, state or local law? No

(2.) Activity and land use limitations that are in place on the site or that have been filed or recorded in a registry (40 CFR 312.26).
Are you aware of any AULs, such as *engineering controls*, land use restrictions or *institutional controls* that are in place at the site and/or have been filed or recorded in a registry under federal, tribal, state or local law?
No

(3.) Specialized knowledge or experience of the person seeking to qualify for the LLP (40 CFR 312.28).
As the user of this ESA do you have any specialized knowledge or experience related to the property or nearby properties? For example, are you involved in the same line of business as the current or former *occupants* of the *property* or an adjoining *property* so that you would have specialized knowledge of the chemicals and processes used by this type of business?
NO

(4.) Relationship of the purchase price to the fair market value of the *property* if it were not contaminated (40 CFR 312.29).
Does the purchase price being paid for this *property* reasonably reflect the fair market value of the *property*? If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the *property*? Yes, N/A

(5.) Commonly known or reasonably ascertainable information about the *property* (40 CFR 312.30).
Are you aware of commonly known or *reasonably ascertainable* information about the *property* that would help the *environmental professional* to identify conditions indicative of releases or threatened releases? For example, as *user*, No
(a.) Do you know the past uses of the *property*? No
(b.) Do you know of specific chemicals that are present or once were present at the *property*? No
(c.) Do you know of spills or other chemical releases that have taken place at the *property*? No
(d.) Do you know of any environmental cleanups that have taken place at the *property*? NO

(6.) The degree of obviousness of the presence of likely presence of contamination at the *property*, and the ability to detect the contamination by appropriate investigation (40 CFR 312.31).
As the *user* of this ESA, based on your knowledge and experience related to the *property* are there any *obvious* indicators that point to the presence or likely presence of contamination at the *property*? No

COMPLETED BY: Chad M. Ellington, Oakwood Homes, LLC
DATE: 10/29/12

---

[35] *Landowner Liability Protections*, or LLPs, is the term used to describe the three types of potential defenses to Superfund liability in EPA's *Interim Guidance Regarding Criteria Landowners Must Meet in Order to Qualify for Bona Fide Prospective Purchaser, Contiguous Property Owner, or Innocent Landowner Limitations on CERCLA Liability ("Common Elements"* Guide) issued on March 6, 2003.
[36] P.L. 107-118.

ATTACHMENT C
TOPOGRAPHIC MAPS AND AERIAL PHOTOGRAPHS

TOPOGRAPHIC MAPS

Subject Property

Dearmin Property
SW of County Road 5 & Erie Parkway
Erie, CO 80516

October 9, 2012

Performed For: A.G. Wassenaar, Inc
2180 S Ivanhoe Street
Denver, CO 80222
Attn: Kristin Schwartz
Ref: E12625.E1

The following maps were found:

Year	Map Name	Size	1:Scale	Note
1978	Erie	7.5'	24,000	
1971	Erie	7.5'	24,000	
1966	Erie	7.5'	24,000	
1948	Erie	7.5'	24,000	
1902	Niwot	15.'	62,500	Earliest found.

These 7.5' US Geological Survey maps covered most cities by the 1930's, and most remote areas by the 1960's. (Please note that maps are identified here by the year of the survey or aerial photo used to make or revise the map, rather than the year of publication.) Some maps changed names over time; to find them, a unique geographic index of the entire USGS collection is searched. If the 7.5' maps do not go back to 1940, earlier 15' maps are included. Any adjoining maps within 1/8 mile of the Subject Property are also included.

Please note that the accuracy and suitability of public and private records cannot be guaranteed, nor can this research. No warranty is made or implied. By using this report, the reader agrees to assume all related risk and to release Satisfi from liability for any damages. However, if this report is not 100% satisfactory, a full refund will be issued.

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environmental information

TOPOGRAPHIC MAPS SYMBOLS

This Key to Symbols is also available at http://mac.usgs.gov/isb/pubs/booklets/symbols/buildings.html

BUILDINGS AND RELATED FEATURES

Building	
School; church	
Built-up Area	
Racetrack	
Airport	
Landing strip	
Well (other than water); windmill	
Tanks	
Covered reservoir	
Gaging station	
Landmark object (feature as labeled)	
Campground; picnic area	
Cemetery: small; large	Cem

MINES AND CAVES

Quarry or open pit mine	
Gravel, sand, clay, or borrow pit	
Mine tunnel or cave entrance	
Prospect; mine shaft	
Mine dump	Mine dump
Tailings	Tailings

RIVERS, LAKES, AND CANALS

Intermittent stream	
Intermittent river	
Disappearing stream	
Perennial stream	
Perennial river	
Small falls; small rapids	
Large falls; large rapids	
Masonry dam	
Dam with lock	
Dam carrying road	
Perennial lake; Intermittent lake or pond	
Dry lake	
Narrow wash	
Wide wash	Wash
Canal, flume, or aqueduct with lock	
Elevated aqueduct, flume, or conduit	
Aqueduct tunnel	
Well or spring; spring or seep	

ROADS AND RELATED FEATURES

Roads on Provisional edition maps are not classified as primary, secondary, or light duty. They are all symbolized as light duty roads.

Primary highway	
Secondary highway	
Light duty road	
Unimproved road	
Trail	
Dual highway	
Dual highway with median strip	
Road under construction	U. C.
Underpass; overpass	
Bridge	
Drawbridge	
Tunnel	

RAILROADS AND RELATED FEATURES

Standard gauge single track; station	
Standard gauge multiple track	
Abandoned	
Under construction	
Narrow gauge single track	
Narrow gauge multiple track	
Railroad in street	
Juxtaposition	
Roundhouse and turntable	

TRANSMISSION LINES AND PIPELINES

Power transmission line: pole; tower	
Telephone line	Telephone
Aboveground oil or gas pipeline	
Underground oil or gas pipeline	Pipeline

CONTOURS

Topographic	
Intermediate	
Index	
Supplementary	
Depression	
Cut; fill	
Bathymetric	
Intermediate	
Index	
Primary	
Index Primary	
Supplementary	

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TOPOGRAPHIC MAPS SYMBOLS

This Key to Symbols is also available at http://mac.usgs.gov/isb/pubs/booklets/symbols/buildings.html

SUBMERGED AREAS AND BOGS

- Marsh or swamp
- Submerged marsh or swamp
- Wooded marsh or swamp
- Submerged wooded marsh or swamp
- Rice field
- Land subject to inundation

GLACIERS AND PERMANENT SNOWFIELDS

- Contours and limits
- Form lines

COASTAL FEATURES

- Foreshore flat
- Rock or coral reef
- Rock bare or awash
- Group of rocks bare or awash
- Exposed wreck
- Depth curve; sounding
- Breakwater, pier, jetty, or wharf
- Seawall

MARINE SHORELINE

Topographic maps

- Approximate mean high water
- Indefinite or unsurveyed

Topographic-bathymetric maps

- Mean high water
- Apparent (edge of vegetation)

BATHYMETRIC FEATURES

- Area exposed at mean low tide; sounding datum
- Channel
- Offshore oil or gas: well; platform
- Sunken rock

VEGETATION

- Woods
- Scrub
- Orchard
- Vineyard
- Mangrove

SURFACE FEATURES

- Levee
- Sand or mud area, dunes, or shifting sand
- Intricate surface area
- Gravel beach or glacial moraine
- Tailings pond

BOUNDARIES

- National
- State or territorial
- County or equivalent
- Civil township or equivalent
- Incorporated city or equivalent
- Park, reservation, or monument
- Small park

LAND SURVEY SYSTEMS

U.S. Public Land Survey System

- Township or range line
- Location doubtful
- Section line
- Location doubtful
- Found section corner; found closing corner
- Witness corner; meander corner

Other land surveys

- Township or range line
- Section line
- Land grant or mining claim; monument
- Fence line

CONTROL DATA AND MONUMENTS

- Aerial photograph roll and frame number* 3 - 20

Horizontal control

- Third order or better, permanent mark
- With third order or better elevation
- Checked spot elevation
- Coincident with section corner
- Unmonumented*

Vertical control

- Third order or better, with tablet
- Third order or better, recoverable mark
- Bench mark at found section corner
- Spot elevation

Boundary monument

- With tablet
- Without tablet
- With number and elevation
- U.S. mineral or location monument

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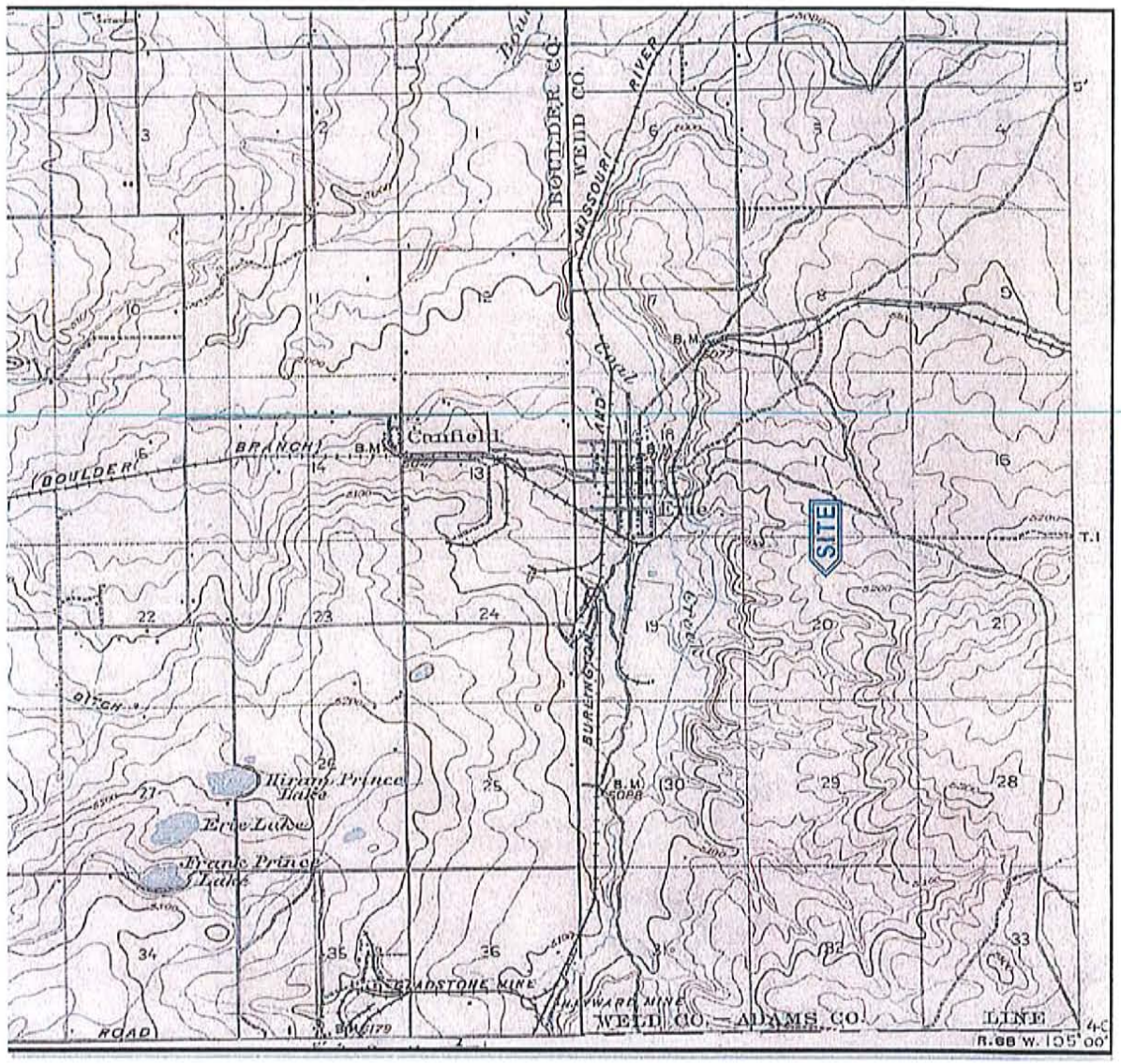
TOPOGRAPHIC MAPS 1902

1902 15' Niwot Quadrangle

Earliest found.



These 7.5' US Geological Survey maps covered most cities by the 1930's, and most remote areas by the 1960's. (Please note that maps are identified here by the year of the survey or aerial photo used to make or revise the map, rather than the year of publication.) Some maps changed names over time; to find them, a unique geographic index of the entire USGS collection is searched. If the 7.5' maps do not go back to 1940, earlier 15' maps are included. Any adjoining maps within 1/8 mile of the Subject Property are also included.

See Symbol Key Original scale = 1:62500 |------- ~1 mile -------| NORTH

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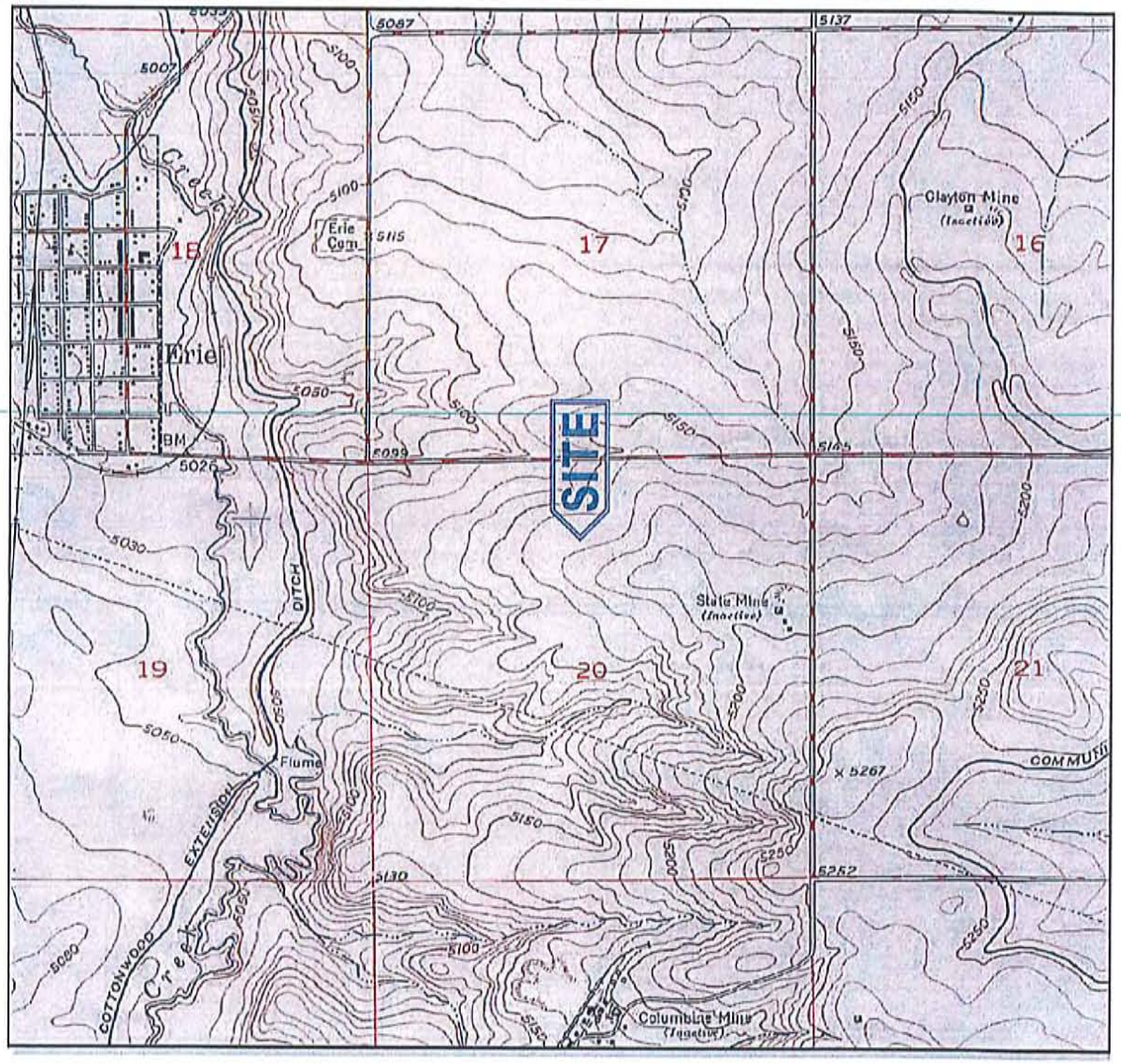
TOPOGRAPHIC MAPS 1948

1948 7.5' Erie Quadrangle



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See Symbol Key

Original scale = 1:24000 |---------- ~1 mile ----------|

NORTH

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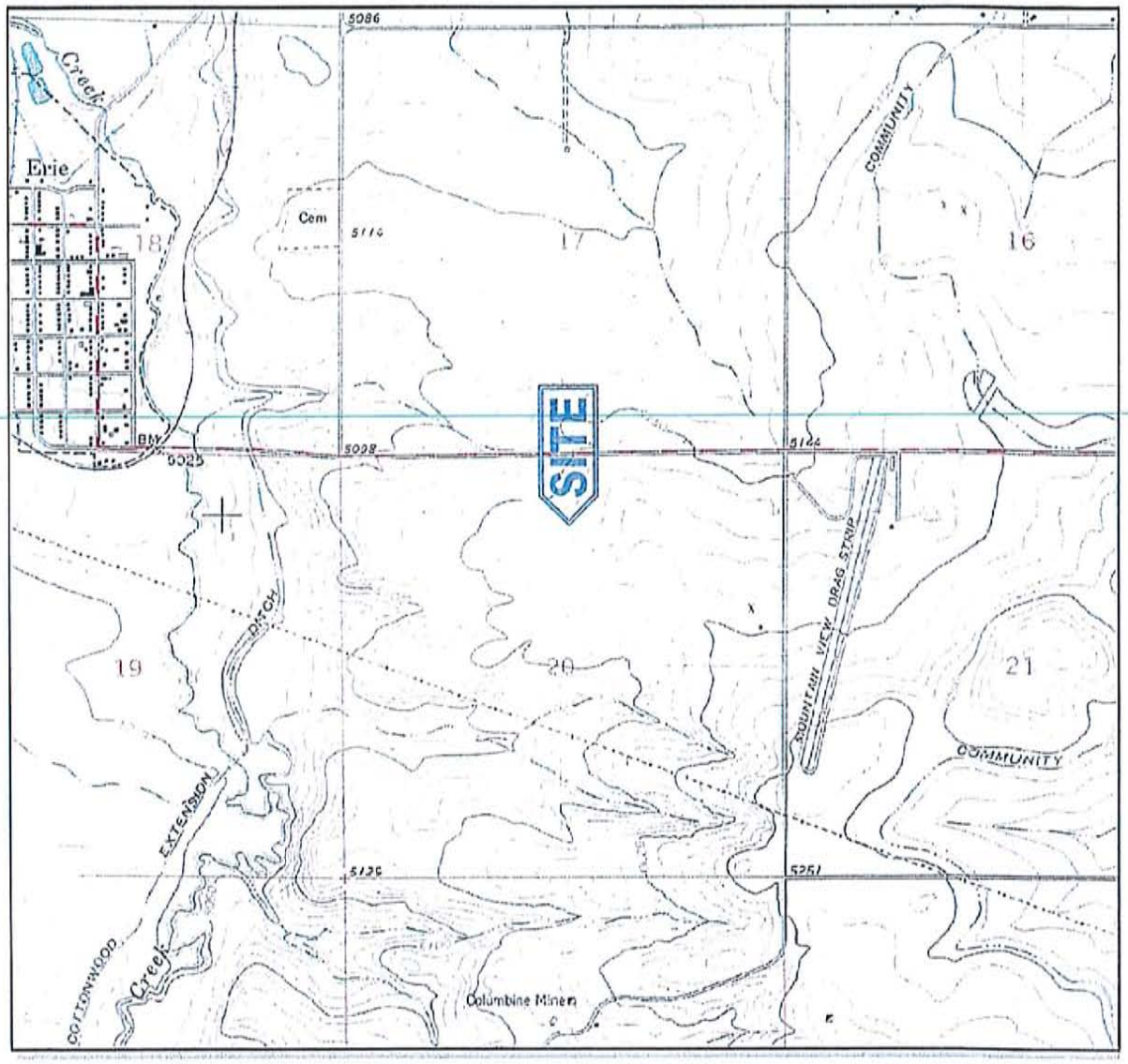
TOPOGRAPHIC MAPS 1966

1966 7.5' Erie Quadrangle



These 7.5' US Geological Survey maps covered most cities by the 1930's, and most remote areas by the 1960's. (Please note that maps are identified here by the year of the survey or aerial photo used to make or revise the map, rather than the year of publication.) Some maps changed names over time; to find them, a unique geographic index of the entire USGS collection is searched. If the 7.5' maps do not go back to 1940, earlier 15' maps are included. Any adjoining maps within 1/8 mile of the Subject Property are also included.

See Symbol Key Original scale = 1:24000 |---------- ~1 mile ----------| NORTH

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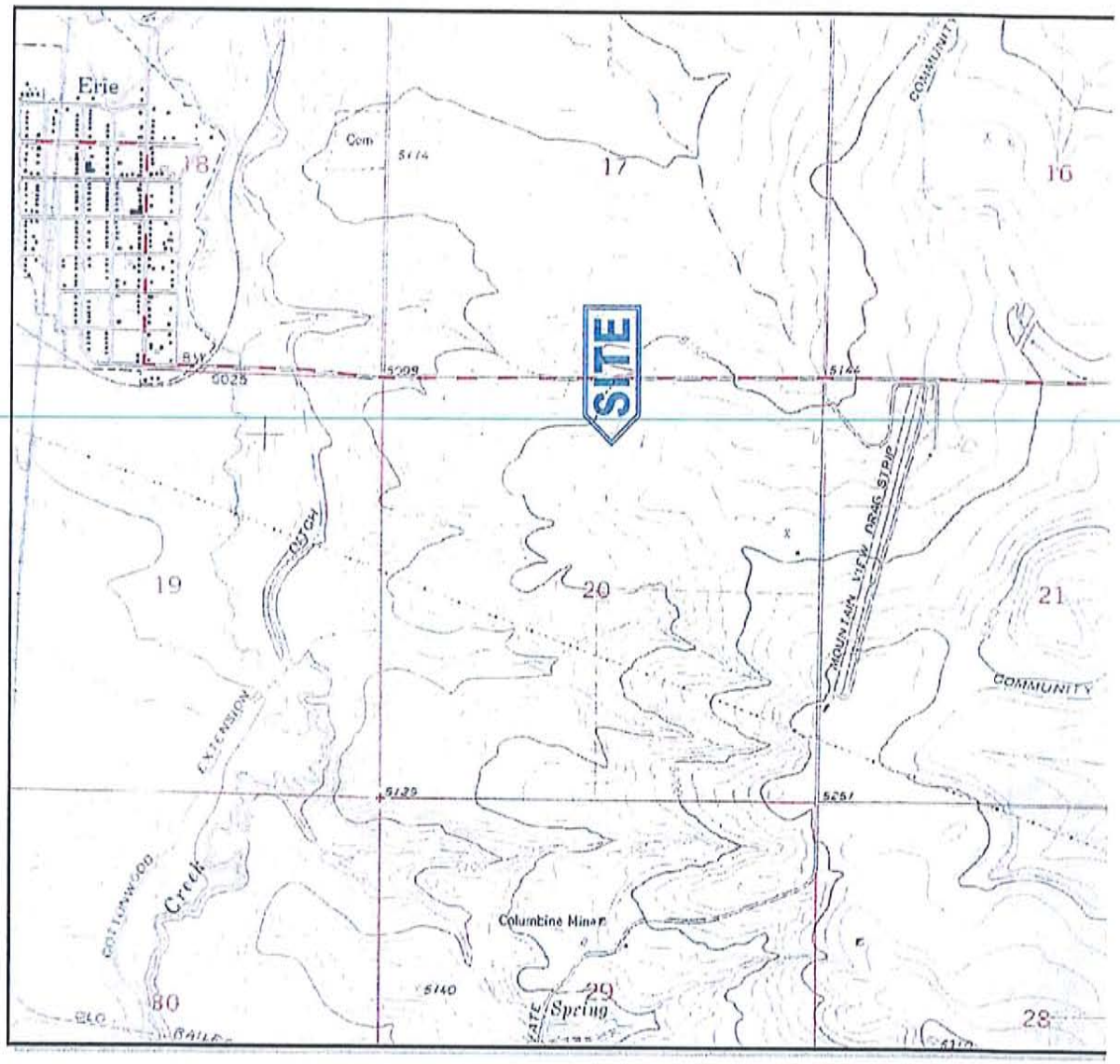
TOPOGRAPHIC MAPS 1971

1971 7.5' Erie Quadrangle



These 7.5' US Geological Survey maps covered most cities by the 1930's, and most remote areas by the 1960's. (Please note that maps are identified here by the year of the survey or aerial photo used to make or revise the map, rather than the year of publication.) Some maps changed names over time; to find them, a unique geographic index of the entire USGS collection is searched. If the 7.5' maps do not go back to 1940, earlier 15' maps are included. Any adjoining maps within 1/8 mile of the Subject Property are also included.

See Symbol Key

Original scale = 1:24000 |---------- ~1 mile ----------|

NORTH

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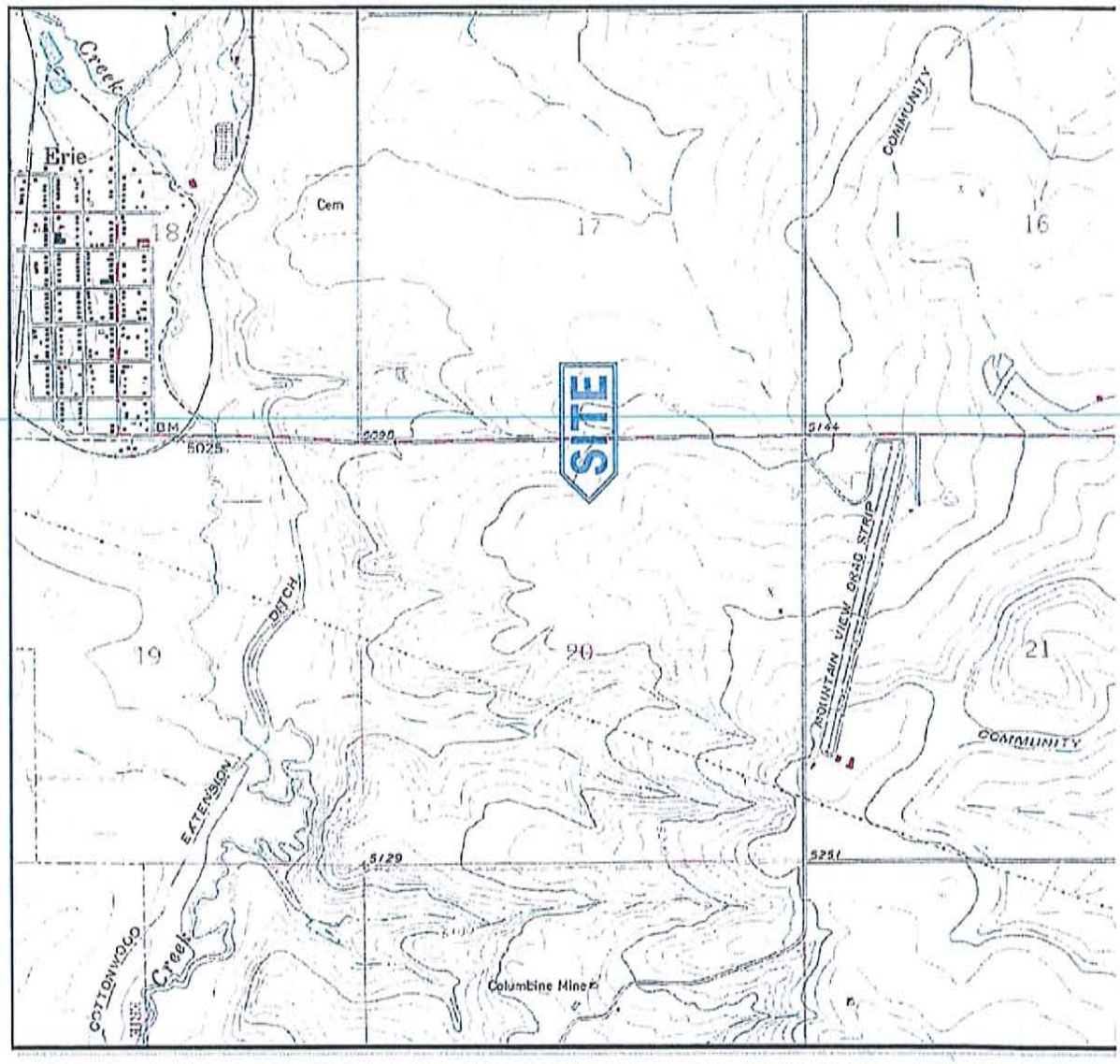
Dearmin Property, SW of County Road 5 & Erie Parkway, Erie, CO
For A.G. Wassenaar, Inc

TOPOGRAPHIC MAPS 1978

1978 7.5' Erie Quadrangle



These 7.5' US Geological Survey maps covered most cities by the 1930's, and most remote areas by the 1960's. (Please note that maps are identified here by the year of the survey or aerial photo used to make or revise the map, rather than the year of publication.) Some maps changed names over time; to find them, a unique geographic index of the entire USGS collection is searched. If the 7.5' maps do not go back to 1940, earlier 15' maps are included. Any adjoining maps within 1/8 mile of the Subject Property are also included.

See Symbol Key Original scale = 1:24000 |---------- ~1 mile ----------| NORTH

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Dearmin Property, SW of County Road 5 & Erie Parkway, Erie, CO
For A.G. Wassenaar, Inc

AERIAL PHOTOGRAPHS

Subject Property

Dearmin Property
SW of County Road 5 & Erie Parkway
Erie, CO 80516

October 9, 2012

Performed For: A.G. Wassenaar, Inc
2180 S Ivanhoe Street
Denver, CO 80222
Attn: Kristin Schwartz
Ref: E12625.E1

The following photos were ordered:

Year	Note
1985	
1979	
1937	Earliest found.

The Colorado Aerial Photo Service (CAPS) collection covers most developed areas of the Front Range annually from 1948. The originals are enlarged to a scale that is intended to show the Subject Property and the properties that surround it. The originals can be viewed in stereo and under high-power magnification at CAPS, 2757 W. Second Avenue in Denver, for a minimal handling fee. Call CAPS at 303-934-2419 or 800-215-2681 to have prints pulled and waiting.

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1937

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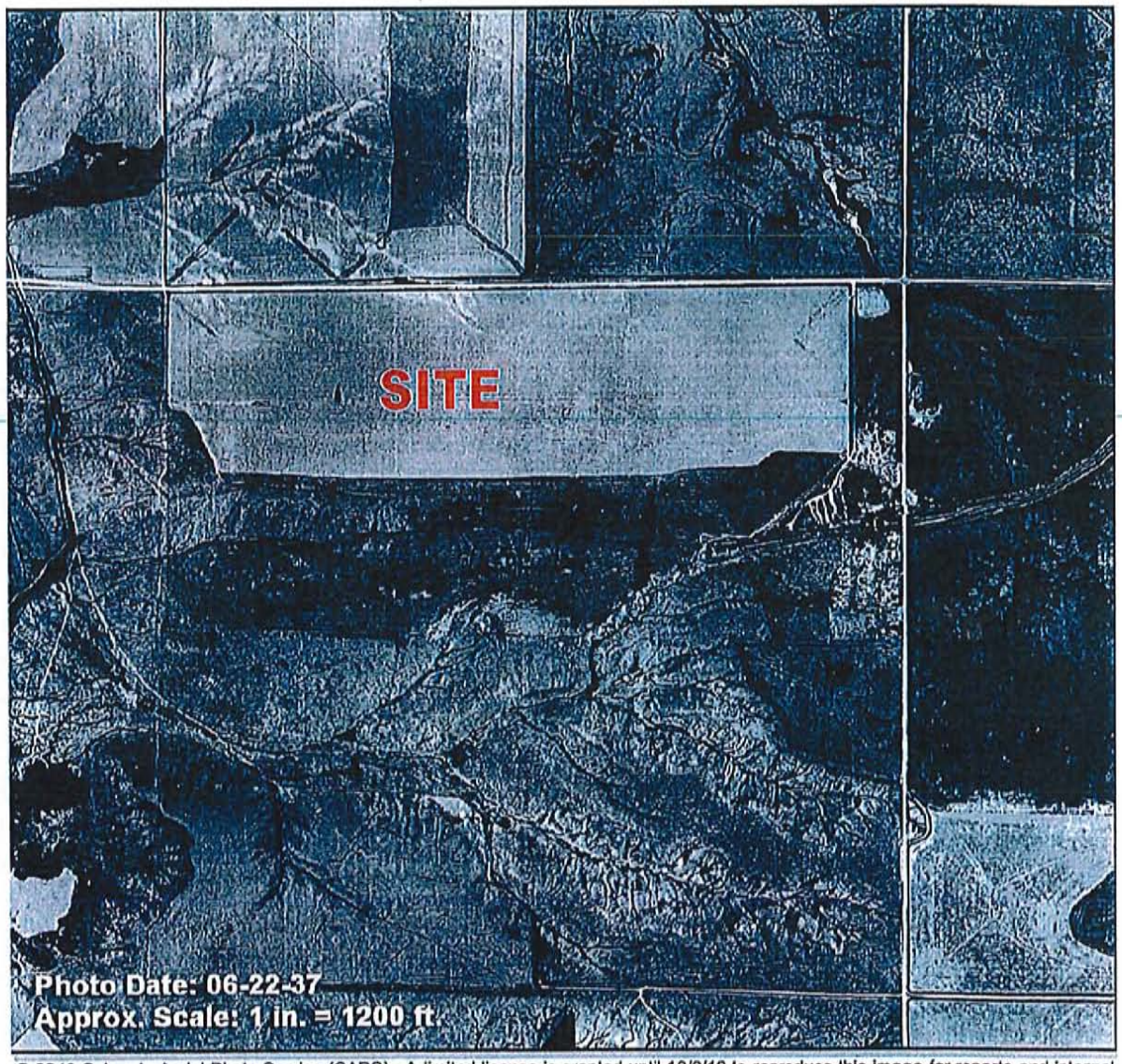

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NORTH

AERIAL PHOTOGRAPHS 1979

1979

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NORTH

AERIAL PHOTOGRAPHS 1985

1985

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NORTH

ATTACHMENT D
PUBLIC RECORDS RESEARCH

InfoMap
Technologies Incorporated

Environmental FirstSearch ™ Report

Target Property: DEARMIN PROPERTY

ERIE CO 80516

Job Number: E12625.E1

PREPARED FOR:

A.G. Wassenaar, Inc

2180 S Ivanhoe Street

Denver, CO 80222

by Satisfi, Inc

720-200-9472

10-08-12

Tel: (610) 430-7530 *Fax: (610) 430-7535*

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Environmental FirstSearch
Site Information Report

Request Date:	10-08-12	**Search Type:**	AREA
Requestor Name:	Brian Peterson		0.46 sq mile(s)
Standard:	ASTM-05	**Job Number:**	E12625.E1
		Filtered Report	

Target Site:

ERIE CO 80516

Demographics

Sites:	13	**Non-Geocoded:**	5	**Population:**	NA
Radon:	NA				

Site Location

	Degrees (Decimal)	Degrees (Min/Sec)		UTMs
Longitude:	-105.027722	-105:1:40	**Easting:**	497634.984
Latitude:	40.0402	40:2:25	**Northing:**	4432009.292
Elevation:	N/A		**Zone:**	13

Comment

Comment:

Additional Requests/Services

Adjacent ZIP Codes: 0 Mile(s)

ZIP Code	City Name	ST	Dist/Dir	Sel

Services:

	Requested?	Date
Fire Insurance Maps	No	
Aerial Photographs	No	
Historical Topos	No	
City Directories	No	
Title Search/Env Liens	No	
Municipal Reports	No	
Online Topos	No	

Environmental FirstSearch

1 Mile Radius from Area

Single Map:

, ERIE CO 80516

Source: 2005 U.S. Census TIGER Files

Area Polygon .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

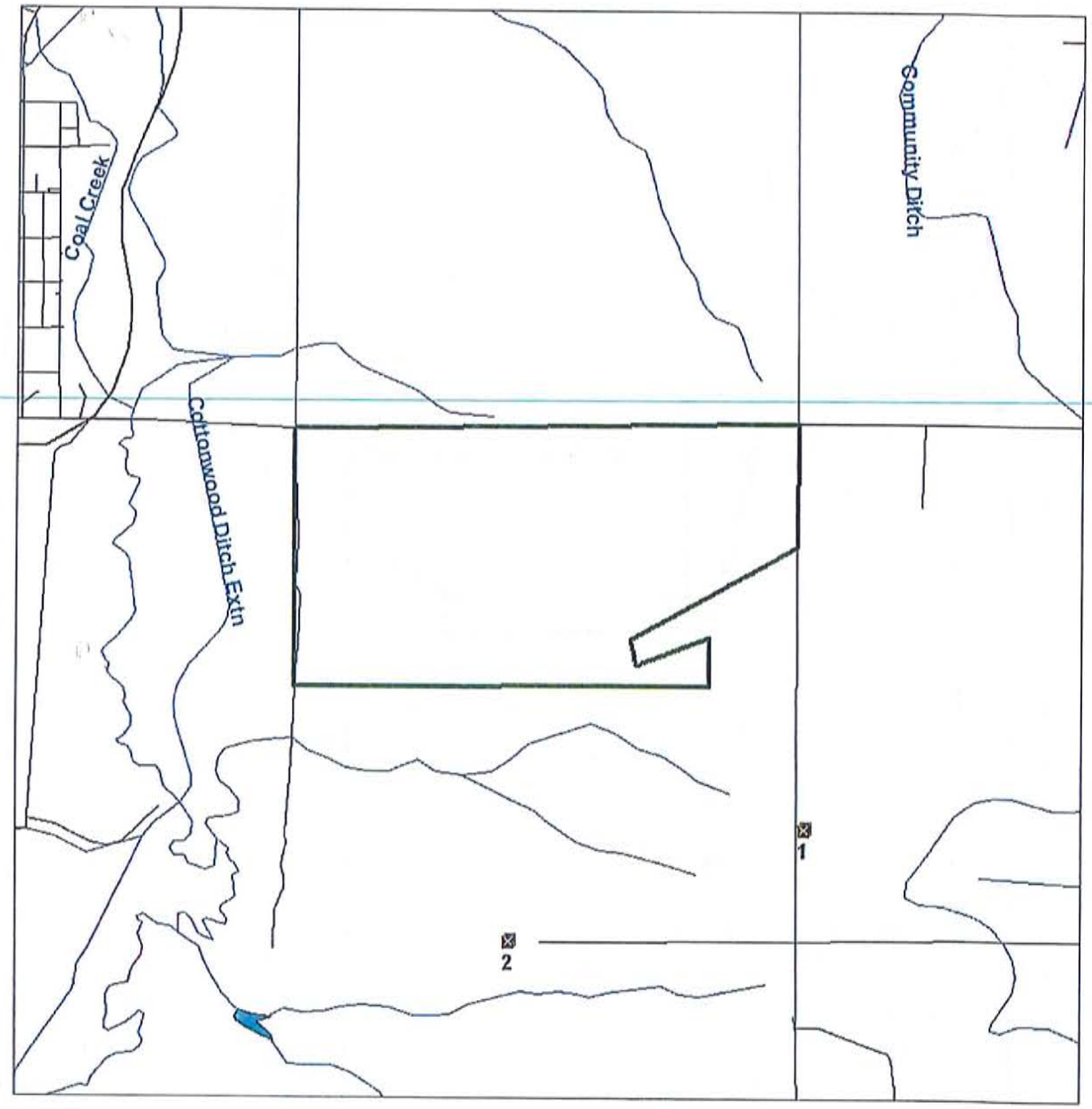
Railroads .....

Environmental FirstSearch

.5 Mile Radius from Area

Single Map:

, ERIE CO 80516



Source: 2005 U.S. Census TIGER Files

Area Polygon .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

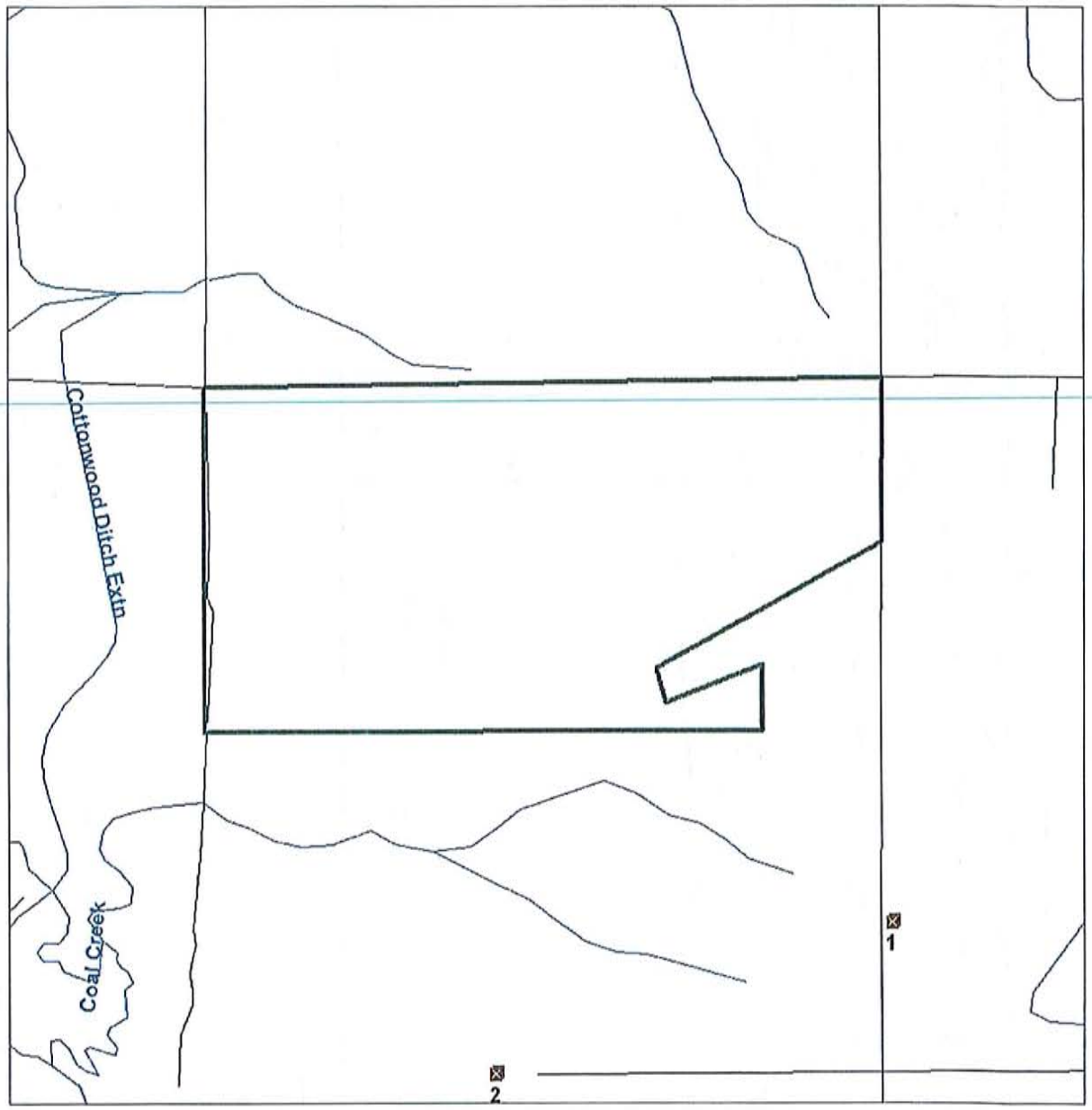
Railroads .....

Environmental FirstSearch

.25 Mile Radius from Area

Single Map:

, ERIE CO 80516



Source: 2005 U.S. Census TIGER Files

Area Polygon .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

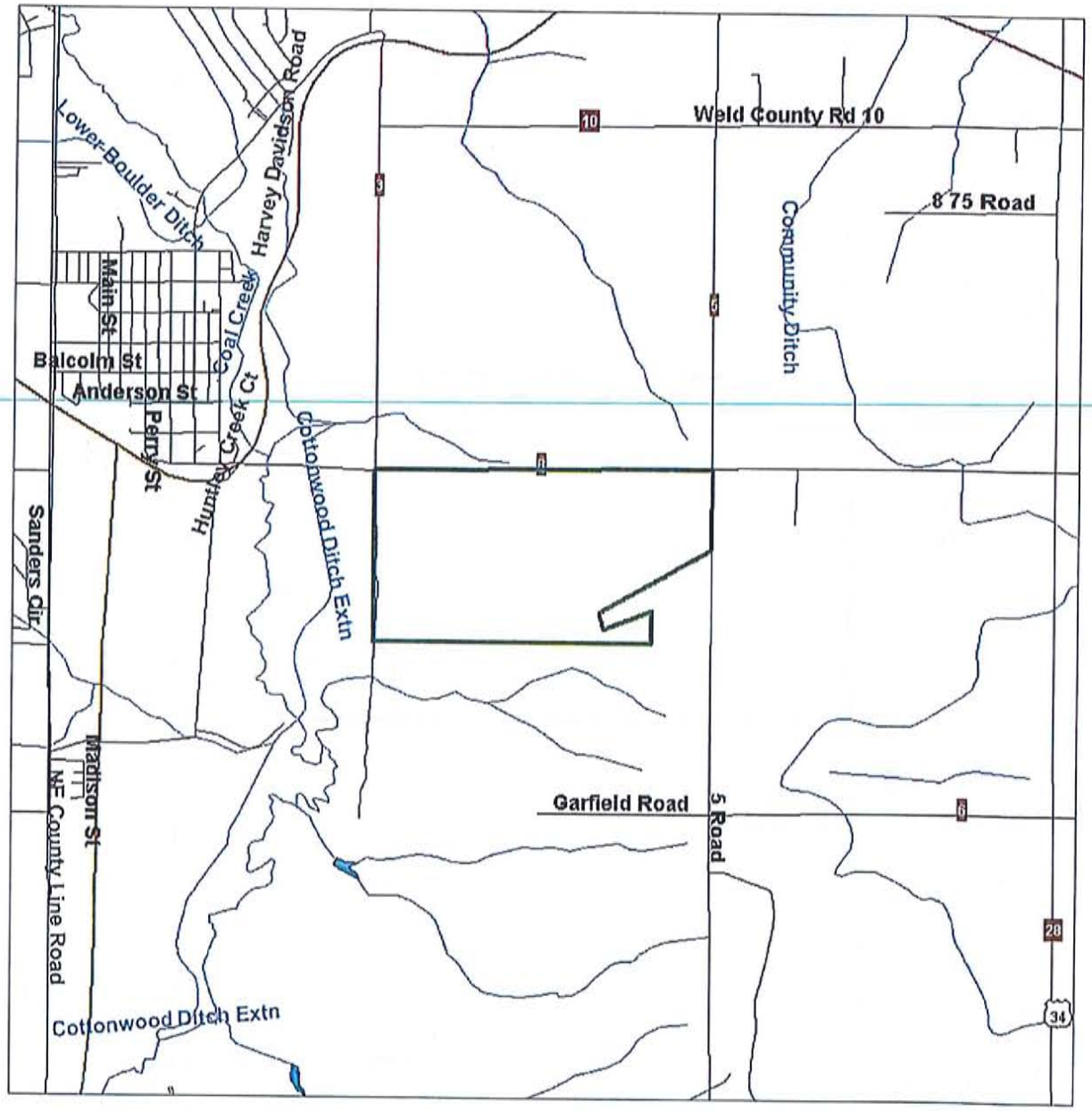
Railroads .....

Environmental FirstSearch

1 Mile Radius from Area

Site Locus Map:

, ERIE CO 80516



Source: 2005 U.S. Census TIGER Files

Area Polygon .....

Identified Site, Multiple Sites, Receptor .....

NPL, DELNPL, Brownfield, Solid Waste Landfill (SWL), Hazardous Waste

Triballand.....

Railroads .....

Environmental FirstSearch
Search Summary Report

Target Site:

ERIE CO 80516

FirstSearch Summary

Database	Sel	Updated	Radius	Site	1/8	1/4	1/2	1/2>	ZIP	TOTALS
NPL	Y	09-20-12	1.00	0	0	0	0	0	0	0
NPL Delisted	Y	09-20-12	0.50	0	0	0	0	-	0	0
CERCLIS	Y	08-01-12	0.50	0	0	0	0	-	0	0
NFRAP	Y	08-01-12	0.50	0	0	0	0	-	0	0
RCRA COR ACT	Y	09-11-12	1.00	0	0	0	0	0	0	0
RCRA TSD	Y	09-11-12	0.50	0	0	0	0	-	0	0
RCRA GEN	Y	09-11-12	0.25	0	0	0	-	-	0	0
RCRA NLR	Y	09-11-12	0.25	0	0	0	-	-	0	0
Federal Brownfield	Y	07-15-12	0.25	0	0	0	-	-	0	0
ERNS	Y	10-04-12	0.25	0	0	0	-	-	1	1
Tribal Lands	Y	12-15-08	1.00	0	0	0	0	0	0	0
State/Tribal Sites	Y	08-01-07	1.00	0	0	0	0	0	0	0
State Spills 90	Y	07-15-12	0.25	0	0	0	-	-	0	0
State/Tribal SWL	Y	07-01-11	0.50	0	1	0	7	-	4	12
State/Tribal LUST	Y	07-17-12	0.50	0	0	0	0	-	0	0
State/Tribal UST/AST	Y	07-17-12	0.25	0	0	0	-	-	0	0
State/Tribal EC	Y	04-24-12	0.25	0	0	0	-	-	0	0
State/Tribal VCP	Y	07-11-12	0.50	0	0	0	0	-	0	0
Federal IC/EC	Y	09-18-12	0.25	0	0	0	-	-	0	0
Meth Labs	Y	12-02-11	0.25	0	0	0	-	-	0	0
- TOTALS -				0	1	0	7	0	5	13

Notice of Disclaimer

Due to the limitations, constraints, inaccuracies and incompleteness of government information and computer mapping data currently available to InfoMap Technologies, certain conventions have been utilized in preparing the locations of all federal, state and local agency sites residing in InfoMap Technologies's databases. All EPA sites are depicted by a rectangle approximating their location and size. The boundaries of the rectangles represent NPL and state landfill the eastern and western most longitudes; the northern and southern most latitudes. As such, the mapped areas may exceed the actual areas and do not represent the actual boundaries of these properties. All other sites are depicted by a point representing their approximate address location and make no attempt to represent the actual areas of the associated property. Actual boundaries and locations of individual properties can be found in the files residing at the agency responsible for such information.

Waiver of Liability

Although InfoMap Technologies uses its best efforts to research the actual location of each site, InfoMap Technologies does not and can not warrant the accuracy of these sites with regard to exact location and size. All authorized users of InfoMap Technologies's services proceeding are signifying an understanding of InfoMap Technologies's searching and mapping conventions, and agree to waive any and all liability claims associated with search and map results showing incomplete and or inaccurate site locations.

Environmental FirstSearch
Sites Summary Report

Target Property: ERIE CO 80516 **JOB:** E12625.E1

TOTAL: 13 **GEOCODED:** 8 **NON GEOCODED:** 5 **SELECTED:** 13

Map ID	Dist/Dir	DB Type	Site Name/ID/Status	Address	ElevDiff	Page No.
1	0.34 SE	SWL	HORST/DEAMIN 12-137/HISTORIC	UNKNOWN ERIE CO	N/A	1
1	0.09 SE	SWL	HORST SWDS (AKA ERIE SWDS) 12-1366/HISTORIC	2240 WELD CTY 5 ERIE CO	N/A	2
2	0.50 SE	SWL	DENVER REGIONAL LANDFILL, FKA-LAID 4-05/HISTORIC	1441 WCR 6 ERIE CO	N/A	3
2	0.50 SE	SWL	COLORADO LANDFILL 5-04/HISTORIC	NO ADDRESS REPORTED ERIE CO	N/A	4
2	0.50 SE	SWL	LAIDLAW SOUTH 12-14/HISTORIC	1441 WELD CO ROAD LAFAYETTE CO	N/A	5
2	0.50 SE	SWL	LAIDLAW NORTH 12-1365/HISTORIC	1441 WELD 6 ROAD ERIE CO	N/A	6
2	0.50 SE	SWL	LAIDLAW NORTH 123-LFL-020	1441 WELD COUNTY ROAD ERIE CO	N/A	7
2	0.50 SE	SWL	DENVER REGIONAL LANDFILL (SOUTH) 123-LFL-025	1441 WELD COUNTY ROAD ERIE CO	N/A	7

Environmental FirstSearch
Sites Summary Report

Target Property: ERIE CO 80516 **JOB:** E12625.E1

TOTAL: 13 **GEOCODED:** 8 **NON GEOCODED:** 5 **SELECTED:** 13

Map ID	Dist/Dir	DB Type	Site Name/ID/Status	Address	ElevDiff	Page No.
	NON GC	*SWL*	*OLD ERIE LANDFILL 12-1367/HISTORIC*	*UNKNOWN ERIE CO*	*N/A*	*8*
	NON GC	*SWL*	*NEWHAUSER DUMP 12-1371/HISTORIC*	*UNKNOWN ERIE CO*	*N/A*	*9*
	NON GC	*SWL*	*LANDFILL SYSTEMS, INC. 5-05/HISTORIC*	*NO ADDRESS REPORTED ERIE CO*	*N/A*	*10*
	NON GC	*SWL*	*AL CARTON DUMP 12-1368/HISTORIC*	*UNKNOWN ERIE CO*	*N/A*	*11*
	NON GC	*ERNS*	*ATLAS VAN LINES (ALLEGED PRP) 224837*	*ERIE LANDFILL (POTENTIAL DU ERIE CO*	*N/A*	*12*

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516

JOB: E12625.E1

SWL

SEARCH ID: 10 **DIST/DIR:** 0.34 SE **ELEVATION:** **MAP ID:** 1

NAME: HORST/DEAMIN
ADDRESS: UNKNOWN
ERIE CO
WELD
CONTACT:
SOURCE: CDPHE/COUNTY

REV: 12/01/08
ID1: 12-137
ID2: 00070-0002200
STATUS: HISTORIC
PHONE:

COLORADO HISTORIC LANDFILLS

STATUS : CO Old Waste Sites

; Acres- 50 - 100
Type- LANDFILL
Fill- REFUSE.
Oper/Ownr/Othr- , ,

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516 **JOB:** E12625.E1

SWL

SEARCH ID: 2 **DIST/DIR:** 0.13 SE **ELEVATION:** **MAP ID:** 3

NAME:	HORST SWDS (AKA ERIE SWDS)	REV:	12/01/08
ADDRESS:	2240 WELD CTY 5	ID1:	12-1366
	ERIE CO	ID2:	00070-0002196
	WELD	STATUS:	HISTORIC
CONTACT:		PHONE:	
SOURCE:	CDPHE/COUNTY		

COLORADO HISTORIC LANDFILLS

STATUS : CO Old Waste Sites

Type- LANDFILL
Oper/Ownr/Othr- LANDFILL SYSTEMS, INC./ /, DANIAL

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516

JOB: E12625.E1

SWL

SEARCH ID: 9 **DIST/DIR:** 0.50 SE **ELEVATION:** **MAP ID:** 2

NAME:	DENVER REGIONAL LANDFILL, FKA-LAIDLAW	REV:	12/01/08
ADDRESS:	1441 WCR 6	ID1:	4-05
	ERIE CO	ID2:	00070-0000369
	WELD	STATUS:	HISTORIC
CONTACT:		PHONE:	
SOURCE:	CDPHE/COUNTY		

COLORADO HISTORIC LANDFILLS

STATUS : Weld County CO Recent Waste Sites

TRS- T1N/R68W/S29
TYPE- Landfills
REGUL D- Permit 972
CONTACT- Ron Pickett
303-673-9431, c303-884-8053

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516 **JOB:** E12625.E1

SWL

SEARCH ID: 8 **DIST/DIR:** 0.50 SE **ELEVATION:** **MAP ID:** 2

NAME:	COLORADO LANDFILL	REV:	12/01/08
ADDRESS:	NO ADDRESS REPORTED	ID1:	5-04
	ERIE CO	ID2:	00070-0000396
	WELD	STATUS:	HISTORIC
CONTACT:		PHONE:	
SOURCE:	CDPHE/COUNTY		

COLORADO HISTORIC LANDFILLS

STATUS : Weld County CO Old Landfills

TRS- E2,NE4 1/68/29
No other details available

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516

JOB: E12625.E1

SWL

SEARCH ID: 5 **DIST/DIR:** 0.50 SE **ELEVATION:** **MAP ID:** 2

NAME:	LAIDLAW SOUTH	REV:	12/01/08
ADDRESS:	1441 WELD CO ROAD LAFAYETTE CO WELD	ID1:	12-14
		ID2:	00070-0002230
		STATUS:	HISTORIC
CONTACT:		PHONE:	
SOURCE:	CDPHE/COUNTY		

COLORADO HISTORIC LANDFILLS

STATUS : CO Old Waste Sites

COVERED DAILY: YES. OPEN BURNING: NO. WASTE IMPOUNDMENT: NO. LEACHATE: YES. SLUDGE POND: NO. TIRE PILES: NO. ; TRS-TIN R68W SSW20; Acres- 160/; Volume- 300K CY/QTR; Opened- 1981; Last Inspn- 6/1/1988
Type- LANDFILL
Fill- FLY ASH: NO. BIOMEDICAL: NO. ASBESTOS: YES.
Monitored- GROUNDWATER: YES. METHANE: YES. LINER:

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516 **JOB:** E12625.E1

SWL

SEARCH ID: 4 **DIST/DIR:** 0.50 SE **ELEVATION:** **MAP ID:** 2

NAME:	LAIDLAW NORTH	**REV:**	12/01/08
ADDRESS:	1441 WELD 6 ROAD	**ID1:**	12-1365
	ERIE CO	**ID2:**	00070-0002195
	WELD	**STATUS:**	HISTORIC
CONTACT:		**PHONE:**	
SOURCE:	CDPHE/COUNTY		

COLORADO HISTORIC LANDFILLS

STATUS : CO Old Waste Sites

COVERED DAILY: YES. OPEN BURNING: NO. WASTE IMPOUNDMENT: NO. LEACHATE: YES. SLUDGE POND: NO. TIRE PILES: NO. ; TRS-T1N R68W N29; Acres- 80/; Volume- 300K CY/QTR; Opened- 12/13/1984; Last Inspn- 6/1/1988
Type- LANDFILL
Fill- FLY ASH: YES. BIOMEDICAL: NO. ASBESTOS: NO.
Monitored- GROUNDWATER: YES. METHANE: YES. LINER:

Target Property: ERIE CO 80516

JOB: E12625.E1

SWL

SEARCH ID: 3 **DIST/DIR:** 0.50 SE **ELEVATION:** 5166 **MAP ID:** 2

NAME: LAIDLAW NORTH
ADDRESS: 1441 WELD COUNTY ROAD
ERIE CO
WELD
CONTACT:
SOURCE: CDPHE

REV: 07/01/11
ID1: 123-LFL-020
ID2: 798
STATUS:
PHONE:

STATUS : Per CDPHE: Closed, but date not reported.

Location Confirmed- + OR - 30 METERS, CENTRUS
Type- LANDFILL
Opened- 5/19/1999
Closed- Closed, but date not reported.
Mapped by Colorado Dept of Health and Environment
OPERATOR-LAIDLAW WASTE SYSTEMS 3036739431
OWNER-LAIDLAW WASTE SYSTEMS 3032885558

SWL

SEARCH ID: 1 **DIST/DIR:** 0.50 SE **ELEVATION:** 5166 **MAP ID:** 2

NAME: DENVER REGIONAL LANDFILL (SOUTH)
ADDRESS: 1441 WELD COUNTY ROAD
ERIE CO
CONTACT:
SOURCE: CDPHE

REV: 07/01/11
ID1: 123-LFL-025
ID2: 445
STATUS:
PHONE:

STATUS : Per CDPHE: Currently Open

Location Confirmed- + OR - 30 METERS, CENTRUS
Type- LANDFILL
Opened- 1/1/1979
Closed- Currently Open
Mapped by Colorado Dept of Health and Environment
OPERATOR-WASTE CONNECTIONS, INC 3036739431
OWNER-WASTE CONNECTIONS, INC

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516 **JOB:** E12625.E1

SWL

SEARCH ID: 13 **DIST/DIR:** NON GC **ELEVATION:** **MAP ID:**

NAME: OLD ERIE LANDFILL
ADDRESS: UNKNOWN
ERIE CO
WELD
CONTACT:
SOURCE: CDPHE/COUNTY

REV: 12/01/08
ID1: 12-1367
ID2: 00070-0002197
STATUS: HISTORIC
PHONE:

COLORADO HISTORIC LANDFILLS

STATUS : CO Old Waste Sites

AT FORMER LANDFILL NUMEROUS CHEMICALS. HAZARD TYPE: METHANE. IMPACT: GW.; Acres- 10 - 50
Type- LANDFILL
Fill- SLUDGE.
Oper/Ownr/Othr- / / PRATT PROPERTY LANDF, ,

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516

JOB: E12625.E1

SWL

SEARCH ID: 12 **DIST/DIR:** NON GC **ELEVATION:** **MAP ID:**

NAME: NEWHAUSER DUMP
ADDRESS: UNKNOWN
ERIE CO
WELD
CONTACT:
SOURCE: CDPHE/COUNTY

REV: 12/01/08
ID1: 12-1371
ID2: 00070-0002201
STATUS: HISTORIC
PHONE:

COLORADO HISTORIC LANDFILLS

STATUS : CO Old Waste Sites

; Acres- 10 - 50
Type- LANDFILL
Fill- REFUSE.
Oper/Ownr/Othr- / / NEWHAUSER, ,

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516

JOB: E12625.E1

SWL

SEARCH ID: 11 **DIST/DIR:** NON GC **ELEVATION:** **MAP ID:**

NAME: LANDFILL SYSTEMS, INC.
ADDRESS: NO ADDRESS REPORTED
ERIE CO
WELD
CONTACT:
SOURCE: CDPHE/COUNTY

REV: 12/01/08
ID1: 5-05
ID2: 00070-0000397
STATUS: HISTORIC
PHONE:

COLORADO HISTORIC LANDFILLS

STATUS : Weld County CO Old Landfills

TRS- S2,SW4 1/68/20
No other details available

Environmental FirstSearch
Site Detail Report

Target Property: ERIE CO 80516

JOB: E12625.E1

SWL

SEARCH ID: 7 **DIST/DIR:** NON GC **ELEVATION:** **MAP ID:**

NAME: AL CARTON DUMP
ADDRESS: UNKNOWN
ERIE CO
WELD
CONTACT:
SOURCE: CDPHE/COUNTY

REV: 12/01/08
ID1: 12-1368
ID2: 00070-0002198
STATUS: HISTORIC
PHONE:

COLORADO HISTORIC LANDFILLS

STATUS : CO Old Waste Sites

USED FOR SEPTIC TANK and GREASE TRAP CLE. IMPACT: SW.; Acres- 1 - 10
Type- LANDFILL
Fill- LIQUIDS.
Oper/Ownr/Othr- , ,

Target Property: ERIE CO 80516 **JOB:** E12625.E1

ERNS

SEARCH ID: 6 **DIST/DIR:** NON GC **ELEVATION:** **MAP ID:**

NAME: ATLAS VAN LINES (ALLEGED PRP)
ADDRESS: ERIE LANDFILL (POTENTIAL DUMPING SIT
ERIE CO
WELD
CONTACT:
SOURCE: EPA

REV: 7/10/91
ID1: 224837
ID2:
STATUS:
PHONE:

SPILL INFORMATION
DATE OF SPILL: 7/10/91 **TIME OF SPILL:** 0000

PRODUCT RELEASED (1): BLACK POWDER TONER
QUANTITY (1): 0
UNITS (1): UNK

PRODUCT RELEASED (2):
QUANTITY (2):
UNITS (2):

PRODUCT RELEASED (3):
QUANTITY (3):
UNITS (3):

MEDIUM/MEDIA AFFECTED

AIR:	NO	**GROUNDWATER:**	NO
LAND:	YES	**FIXED FACILITY:**	NO
WATER:	NO	**OTHER:**	NO

WATERBODY AFFECTED BY RELEASE: NONE

CAUSE OF RELEASE

DUMPING:	YES	**EQUIPMENT FAILURE:**	NO
NATURAL PHENOMENON:	NO	**OPERATOR ERROR:**	NO
OTHER CAUSE:	NO	**TRANSP. ACCIDENT:**	NO
UNKNOWN:	NO		

ACTIONS TAKEN: NOTIFIED STAN MAY - COLO DEPT OF HEALTH, CDH WILL NOTIFY COUNTIES.
RELEASE DETECTION: POTENTIAL RELEASE OF HAZARDOUS MATERIAL AT SOLID WASTE D FACILITY ALLEGED DUMPING - POTENTIAL
MISC. NOTES: AT THIS POINT, THIS IS STILL AT POTENTIAL DUMPING ONLY. STORED BLACK P OWDER TONER FROM STORAGE-TEK. TRANSFER BY WESTERN DISPOSAL FOR ATLAS VAN LINES FROM WAREHOUSE. THOUSANDS OF POUNDS CURRENTLY STORED.

DISCHARGER INFORMATION
DISCHARGER ID: 224837 **DUN and BRADSTREET :**
TYPE OF DISCHARGER:
NAME OF DISCHARGER: ATLAS VAN LINES (ALLEGED PRP)
ADDRESS: 111 S. PRATT PARKWAY
LONGMONT CO

Environmental FirstSearch Descriptions

NPL: *EPA* NATIONAL PRIORITY LIST - The National Priorities List is a list of the worst hazardous waste sites that have been identified by Superfund. Sites are only put on the list after they have been scored using the Hazard Ranking System (HRS), and have been subjected to public comment. Any site on the NPL is eligible for cleanup using Superfund Trust money.
A Superfund site is any land in the United States that has been contaminated by hazardous waste and identified by the Environmental Protection Agency (EPA) as a candidate for cleanup because it poses a risk to human health and/or the environment.
FINAL - Currently on the Final NPL
PROPOSED - Proposed for NPL

NPL DELISTED: *EPA* NATIONAL PRIORITY LIST Subset - Database of delisted NPL sites. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.
DELISTED - Deleted from the Final NPL

CERCLIS: *EPA* COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY INFORMATION SYSTEM (CERCLIS)- CERCLIS is a database of potential and confirmed hazardous waste sites at which the EPA Superfund program has some involvement. It contains sites that are either proposed to be or are on the National Priorities List (NPL) as well as sites that are in the screening and assessment phase for possible inclusion on the NPL.
PART OF NPL- Site is part of NPL site
DELETED - Deleted from the Final NPL
FINAL - Currently on the Final NPL
NOT PROPOSED - Not on the NPL
NOT VALID - Not Valid Site or Incident
PROPOSED - Proposed for NPL
REMOVED - Removed from Proposed NPL
SCAN PLAN - Pre-proposal Site
WITHDRAWN - Withdrawn

NFRAP: *EPA* COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY INFORMATION SYSTEM ARCHIVED SITES - database of Archive designated CERCLA sites that, to the best of EPA's knowledge, assessment has been completed and has determined no further steps will be taken to list this site on the National Priorities List (NPL). This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.
NFRAP – No Further Remedial Action Plan
P - Site is part of NPL site
D - Deleted from the Final NPL
F - Currently on the Final NPL
N - Not on the NPL
O - Not Valid Site or Incident
P - Proposed for NPL
R - Removed from Proposed NPL
S - Pre-proposal Site
W – Withdrawn

RCRA COR ACT: *EPA* RESOURCE CONSERVATION AND RECOVERY INFORMATION SYSTEM SITES - Database of hazardous waste information contained in the Resource Conservation and Recovery Act Information (RCRAInfo), a national program management and inventory system about hazardous waste handlers. In general, all generators, transporters, treaters, storers, and disposers of hazardous waste are required to provide information about their activities to state environmental agencies. These agencies, in turn pass on the information to regional and national EPA offices. This regulation is governed by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984.
RCRAInfo facilities that have reported violations and subject to corrective actions.

RCRA TSD: *EPA* RESOURCE CONSERVATION AND RECOVERY INFORMATION SYSTEM TREATMENT, STORAGE, and DISPOSAL FACILITIES. - Database of hazardous waste information contained in the Resource Conservation and Recovery Act Information (RCRAInfo), a national program management and inventory system about hazardous waste handlers. In general, all generators, transporters, treaters, storers, and disposers of hazardous waste are required to provide information about their activities to state environmental agencies. These agencies, in turn pass on the information to regional and national EPA offices. This regulation is governed by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984.
Facilities that treat, store, dispose, or incinerate hazardous waste.

RCRA GEN: *EPA/MA DEP/CT DEP* RESOURCE CONSERVATION AND RECOVERY INFORMATION SYSTEM GENERATORS - Database of hazardous waste information contained in the Resource Conservation and Recovery Act Information (RCRAInfo), a national program management and inventory system about hazardous waste handlers. In general, all generators, transporters, treaters, storers, and disposers of hazardous waste are required to provide information about their activities to state environmental agencies. These agencies, in turn pass on the information to regional and national EPA offices. This regulation is governed by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984.
Facilities that generate or transport hazardous waste or meet other RCRA requirements.
LGN - Large Quantity Generators
SGN – Small Quantity Generators
VGN – Conditionally Exempt Generator.
Included are RAATS (RCRA Administrative Action Tracking System) and CMEL (Compliance Monitoring & Enforcement List) facilities.
CONNECTICUT HAZARDOUS WASTE MANIFEST – Database of all shipments of hazardous waste within, into or from Connecticut. The data includes date of shipment, transporter and TSD info, and material shipped and quantity. This data is appended to the details of existing generator records.
MASSACHUSETTES HAZARDOUS WASTE GENERATOR – database of generators that are regulated under the MA DEP.
VQN-MA = generates less than 220 pounds or 27 gallons per month of hazardous waste or waste oil.
SQN-MA = generates 220 to 2,200 pounds or 27 to 270 gallons per month of waste oil.
LQG-MA = generates greater than 2,200 lbs of hazardous waste or waste oil per month.

RCRA NLR: *EPA* RESOURCE CONSERVATION AND RECOVERY INFORMATION SYSTEM SITES - Database of hazardous waste information contained in the Resource Conservation and Recovery Act Information (RCRAInfo), a national program management and inventory system about hazardous waste handlers. In general, all generators, transporters, treaters, storers, and disposers of hazardous waste are required to provide information about their activities to state environmental agencies. These agencies, in turn pass on the information to regional and national EPA offices. This regulation is governed by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984.
Facilities not currently classified by the EPA but are still included in the RCRAInfo database. Reasons for non classification:
Failure to report in a timely matter.
No longer in business.
No longer in business at the listed address.
No longer generating hazardous waste materials in quantities which require reporting.

ERNS: *EPA/NRC* EMERGENCY RESPONSE NOTIFICATION SYSTEM (ERNS) - Database of incidents reported to the National Response Center. These incidents include chemical spills, accidents involving chemicals (such as fires or explosions), oil spills, transportation accidents that involve oil or chemicals, releases of radioactive materials, sightings of oil sheens on bodies of water, terrorist incidents involving chemicals, incidents where illegally dumped chemicals have been found, and drills intended to prepare responders to handle these kinds of incidents. Data since January 2001 has been received from the National Response System database as the EPA no longer maintains this data.

Tribal Lands: *DOI/BIA* INDIAN LANDS OF THE UNITED STATES - Database of areas with boundaries established by treaty, statute, and (or) executive or court order, recognized by the Federal Government as territory in which American Indian tribes have primary governmental authority. The Indian Lands of the United States map layer shows areas of 640 acres or more, administered by the Bureau of Indian Affairs. Included are

Federally-administered lands within a reservation which may or may not be considered part of the reservation. BUREAU OF INDIAN AFFIARS CONTACT - Regional contact information for the Bureau of Indian Affairs offices.

State/Tribal Sites: ***CDPHE*** CO SPL - Colorado does not have an official State Priority List (SPL). However, there are a number of sites that the state seems to place in this sort of category. Some are officially a Natural Resource Damages Site (NRDS) or Private Cleanup Site (Non-Superfund), but they're listed on the state's web page of Superfund sites (www.cdphe.state.co.us/hm/sf_sites.htm). Others are UMTRA (Uranium Mill Tailing Remedial Action) mill tailing cleanup sites (www.cdphe.state.co.us/hm/umsites.htm). Thousands of UMTRA "vicinity properties" have also been identified where mill tailings were used as sand in concrete, roadbase, trenches, bricks, etc. Such properties have been remediated in Durango, Grand Junction, Fruita, Palisade, Gunnison, Maybell, Naturita and Rifle, but some unidentified tailings may still remain in and around these communities. CDPHE's list of vicinity properties is not publicly available and was not searched for this report. Property-specific information is available through the CDPHE Grand Junction office. See www.cdphe.state.co.us/hm/rptailng.htm.

State Spills 90: ***CDPHE*** ENVIRONMENTAL RELEASE AND INCIDENT DATABASE - This is a database of reported spills in Colorado.

State/Tribal SWL: ***CDPHE*** DATABASE OF ACTIVE SOLID WASTE MANAGEMENT FACILITIES - Listing of Active solid waste facilities and transfer stations.
DATABASE OF ACTIVE SOLID WASTE MANAGEMENT FACILITIES - Listing of Active solid waste facilities and transfer stations.
CO Historic Landfills - This proprietary database represents a compilation of eleven local, regional and state agency sources. The agencies generated these lists on a one-time basis and do not expect to update them. A more detailed description of the applicable source is included with any findings reported from this database. The eleven sources are:

1. Adams County CO Old Landfills
2. Arapahoe County CO Old Landfills
3. Douglas County CO Old Landfills
4. Weld County CO Old Landfills
5. Boulder County CO Old Landfills
6. Jefferson County CO Old Landfills
7. Denver CO Methane Study
8. CO Methane Study
9. DRCOG Methane Study
10. Denver CO Old Fil Sites
11. CO Old Waste Sites

State/Tribal LUST: ***COSTIS*** DATABASE OF LEAKING UNDERGROUND STORAGE TANKS - Colorado Department of Labor and Employment's Colorado Storage Tank Information System (COSTIS) provides this data.
LUST Trust Tanks - This is an old list of locations where tank leaks were suspected and LUST (Leaking Underground Storage Tank) Trust funds were used in an effort to identify the source. Often, the facility responsible for the leak was found nearby, and that facility was then entered into the LUST database. In other cases, however, the source was never identified, and nothing was ever entered into the LUST database. When responsibility for the tank program was transferred from CDPHE (Colorado Department of Public Health & Environment) to CDLE (Colorado Department of Labor & Employment) in the '90s, this old LUST Trust list was never entered into the new COSTIS database (Colorado Storage Tank Information System). Few people at CDLE are aware of this old list, and any files associated with the listings have apparently been discarded or misplaced.

State/Tribal UST/AST: ***COSTIS*** DATABASE OF UNDERGROUND STORAGE TANKS - Colorado Department of Labor and Employment's Colorado Storage Tank Information System (COSTIS) provides this data.

State/Tribal EC: ***CDPHE*** ENVIRONMENTAL COVENANTS - 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. When a contaminated site is not cleaned up completely, land use restrictions may be used to ensure that the selected cleanup remedy is

adequately protective of human health and the environment.

State/Tribal VCP: *CDPHE* THE VOLUNTARY CLEANUP AND REDEVELOPMENT PROGRAM PROGRAM - 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. Cleanup decisions are based on existing standards and the proposed use of the property. The actual cleanup and verification is the owner's responsibility.

RADON: *NTIS* NATIONAL RADON DATABASE - EPA radon data from 1990-1991 national radon project collected for a variety of zip codes across the United States.

Meth Labs: *US DOJ* NATIONAL CLANDESTINE LABORATORY REGISTER - Database of 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 U.S. Department of Justice ("the Department"), and the Department has not verified the entry and does not guarantee its accuracy. All sites that are included in this data set will have an id that starts with NCLR.

Environmental FirstSearch Database Sources

NPL: *EPA* Environmental Protection Agency

Updated quarterly

NPL DELISTED: *EPA* Environmental Protection Agency

Updated quarterly

CERCLIS: *EPA* Environmental Protection Agency

Updated quarterly

NFRAP: *EPA* Environmental Protection Agency.

Updated quarterly

RCRA COR ACT: *EPA* Environmental Protection Agency.

Updated quarterly

RCRA TSD: *EPA* Environmental Protection Agency.

Updated quarterly

RCRA GEN: *EPA/MA DEP/CT DEP* Environmental Protection Agency, Massachusetts Department of Environmental Protection, Connecticut Department of Environmental Protection

Updated quarterly

RCRA NLR: *EPA* Environmental Protection Agency

Updated quarterly

ERNS: *EPA/NRC* Environmental Protection Agency

Updated annually

Tribal Lands: *DOI/BIA* United States Department of the Interior

Updated annually

State/Tribal Sites: *CDPHE* The Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division

Updated annually

State Spills 90: ***CDPHE*** CDPHE Hazardous Materials and Waste Management Division

Updated annually

State/Tribal SWL: ***CDPHE*** The Colorado Department of Public Health and Environment Hazardous Materials and Waste Management DivisionPublic Safety

Updated annually

State/Tribal LUST: ***COSTIS*** The Colorado Department of Labor and Employment/Division of Oil and Public Safety

Updated semi-annually

State/Tribal UST/AST: ***COSTIS*** The Colorado Department of Labor and Employment/Division of Oil and Public Safety

Updated semi-annually

State/Tribal EC: ***CDPHE*** rado Department of Public Health and Environment Hazardous Materials and Waste Management Division

Updated annually

State/Tribal VCP: ***CDPHE*** The Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division

Updated annually

RADON: ***NTIS*** Environmental Protection Agency, National Technical Information Services

Updated periodically

Meth Labs: ***US DOJ*** U.S. Department of Justice

Updated when available

Environmental FirstSearch
Street Name Report for Streets within .5 Mile(s) of Target Property

Target Property: ERIE CO 80516

JOB: E12625.E1

Street Name	Dist/Dir	Street Name	Dist/Dir
8 Rd	0.43 NW		
Carr St	0.50 NW		
County Road 3	0.02 NW		
County Road 5	0.00 --		
County Road 6	0.50 SE		
County Road 8	0.00 --		
Garfield Rd	0.50 SE		
Huntley Creek Ct	0.46 NW		
Kattell St	0.49 NW		
Perry St	0.43 NW		
Weld Co Rd 8	0.00 --		
Weld County Rd 3	0.02 NW		
Weld County Rd 5	0.00 --		
Weld County Rd 8	0.00 --		

ATTACHMENT E
QUALIFICATIONS

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants
2180 South Ivanhoe Street, Suite 5
Denver, Colorado 80222-5710
303-759-8373 Fax 303-759-4874
www.agwassenaar.com

RESUME

KRISTIN A. SCHWARTZ
Environmental Scientist

EDUCATION:

B.S., Environmental Engineering, University of Colorado at Boulder 2011.

EXPERIENCE:

Ms. Schwartz joined A.G. Wassenaar in July 2012 as a staff Environmental Scientist for the Environmental Department. Ms. Schwartz's field experience includes assisting with characterizing and monitoring surface water contamination due to acid mine draining; conducting site investigations to determine how to most effectively remediate abandon mine shafts and adits; and determining bioremdiation and chemical treatment solutions for wastewater treatment plants. This involves: water and soil sampling for identification and analysis, core sampling preparation, GPS site mapping, characterizing and measuring site specifications, oversight of remedial construction activities, and coordinating with landowners and contractors.

In addition to fieldwork, her responsibilities included technical report writing, review, and presentation, data analysis, analytical review and interpretation, proposal preparation, and regulatory compliance.

Previous to joining A.G. Wassenaar, Inc., Ms. Schwartz gained environmental remediation and government regulatory experience working as an Environmental Protection Specialist Intern for the Department of Natural Resources Inactive Mines program.

TRAINING:

40 Hour OSHA HAZWOPER certification
Engineer in Training (EIT) status awarded

MEMBERSHIPS:

American Water Works Association (AWWA)
World Environment Federation (WEF)

A.G. Wassenaar Inc.
Geotechnical and Environmental Consultants

2180 South Ivanhoe Street, Suite 5
Denver, Colorado 80222-5710
303-759-8373 Fax 303-759-4874
www.agwassenaar.com

RESUME
RACHEL A. PETERSON, P.G.
Environmental Geologist

EDUCATION:
B.S., Geology, University of Alaska Fairbanks, 2001

EXPERIENCE:
A.G. Wassenaar, Inc, Environmental Geologist, December 2002-present
Ms. Peterson has over nine years of experience in the environmental consulting industry, performing and managing diverse soil, ground water, and vapor investigation and remediation projects. Management duties include: the organization of project teams, planning, scheduling and coordination of geologic and hydrogeologic investigations and preparing proposals and technical reports.

Ms. Peterson's field experience includes conducting drilling, sampling, and testing programs to identify soil and ground water contamination; implementing bioremediation and chemical treatment technologies; and overseeing soil excavation projects. She conducts underground storage tank removal assessments, and has operated and maintained active remediation systems. Ms. Peterson also has experience performing ground water and risk assessment modeling. She is experienced in negotiating with government agencies to achieve project closure and has assisted clients in receiving several million dollars worth of state reimbursement funds for qualifying projects. Ms. Peterson also manages, conducts and reviews Phase I Environmental Site Assessments.

Ms. Peterson prepares Stormwater Management Plans (SWMP) and conducts SWMP inspections for construction sites in accordance with the Colorado Discharge Permit System. Ms. Peterson also has experience with baseline water well testing in accordance with Colorado Oil and Gas Conservation Commission (COGCC) Rule 318A. Ms. Peterson is a State of Colorado and federally licensed asbestos building inspector and has been involved in numerous comprehensive asbestos inspections.

Previous to joining A.G. Wassenaar, Inc., Ms. Peterson gained research experience working for the Alaska Division of Geological and Geophysical Surveys in collaboration with the Alaska Volcano Observatory.

TRAINING AND CERTIFICATIONS:
State of Wyoming - Licensed Professional Geologist, No. PG-3747
EPA AHERA, Colorado Asbestos Building Inspector
40 Hour OSHA Environmental Health and Safety for Hazardous Waste Site Operations
American Red Cross and National Safety Council standard first aid and CPR training
Oilfield safety training

MEMBERSHIPS:
Rocky Mountain Association of Environmental Professionals: Board Member and Past President
Colorado Hazardous Waste Management Society
National Ground Water Association
Colorado Oil and Gas Association (COGA)

ATTACHMENT F
REFERENCES

REFERENCES

Colorado Oil and Gas Conservation Commission. COGCC GIS Online. <http://www.oil-gas.state.co.us/>

CTL/Thompson, Inc. "Geologic and Preliminary Geotechnical Investigation, Horst Property, County Roads 5 and 8, Weld County, Colorado". 1 June 2000.

CTL/Thompson, Inc. "Phase I Environmental Site Assessment, Horst Property, Section 20 Parcel, Weld County Road 5 and Weld County Road 6, Erie, Colorado". 5 November 1999.

CTL/Thompson, Inc. "Phase II Environmental Site Assessment, Horst Property, West Parcel, Southwest of Weld County Roads 5 & 8, Erie, Colorado, Job No. 31,288". 1 June 2000.

Dearmin, James. Property Owner. Personal Interview. 29 October 2012.

Ikenberry, Douglas. Colorado Department of Public Health and Environment- Solid Waste Unit. Telephone Interview. 29 October 2012.

Satisfi Environmental Information. Environmental Database Search. "Dearmin Property, Erie, CO 80516". 8 October 2012.

Satisfi Environmental Information. Aerial Photographs. Dated 1937, 1979, and 1985.

Satisfi Environmental Information. Topographic Maps, Eric Quadrangle dated 1948, 1966, 1971, and 1978. 9 October 2012.

Satisfi Environmental Information. Topographic Maps, Niwot Quadrangle dated 1902. 9 October 2012.

United States Department of the Interior, Geological Survey (USGS) Topographic Map, Erie, Colorado Quadrangle:1967 (revised 1979).

Western Environment and Ecology, Inc. "Mine Subsidence Investigation, Horst Property, Section 20, Township 1 North, Range 68 West, Erie, Colorado". 4 April 2000.

PHASE I DRAINAGE REPORT
FOR
ERIE HIGHLANDS
PLANNING AREAS 5 AND 6
ERIE, CO
PROJECT NO. 15-023

PREPARED FOR:

OAKWOOD HOMES
4908 TOWER ROAD
DENVER, CO 80249

PREPARED BY:

CORE CONSULTANTS, INC.
1950 W. LITTLETON BOULEVARD, SUITE 109
LAKEWOOD, CO 80228
PHONE: 303-825-7100
CONTACT: DAVID FORBES
CORE PROJECT NUMBER: 15-023

JULY 30, 2015

APPROVAL BLOCKS

I. ENGINEER'S STATEMENT:

I affirm that this report and plan for the Phase I Drainage design of Erie Highlands, Planning Areas 5 and 6 was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Erie Standards and Specifications for Design and Construction for the owners thereof. I understand that the Town of Erie does not and will not assume liability for drainage facilities designed by others.

_____

David Forbes, P.E.
Colorado Professional Engineer
License #36130

II. OWNER/DEVELOPER'S STATEMENT:

Oakwood Homes hereby certifies that the drainage facilities for Erie Highlands, Planning Areas 5 and 6 shall be constructed according to the design presented in this report. I understand that the Town of Erie does not and will not assume liability for the drainage facilities designed and/or certifies by my engineer and that the Town of Erie review drainage plans pursuant to the Municipal Code; but cannot, on behalf of Erie Highlands, Planning Area 6, guarantee that final drainage design review will absolve Oakwood Homes and/or their successors and/or assigns of future liability for improper design.

_____

OAKWOOD HOMES

_____

PRINTED NAME

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- A. SITE LOCATION 3
- B. DESCRIPTION OF PROPERTY 3

II. DRAINAGE BASINS AND SUB-BASINS 3
- A. MAJOR DRAINAGE BASINS 3
- B. MINOR DRAINAGE BASINS 4

III. DRAINAGE FACILITY DESIGN 4
- A. GENERAL CONCEPT 4
- B. SPECIFIC DETAILS 4
- C. ADAPTATIONS FROM CRITERIA 5

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APPENDIX A –CALCULATIONS

- VICINITY MAP
- FIRM MAP
- SCS SOILS MAPS
- PERCENT IMPERVIOUS CALCULATIONS
- RUNOFF COEFFICIENT CALCULATIONS
- DETENTION STORAGE CALCULATIONS

APPENDIX B MAPS

- REFERENCE MATERIAL
- DETAILED DRAINAGE PLAN

I. General Location and Description

A. Site Location

This Phase I Drainage Report provides remediation for changes in the drainage patterns resulting from the development of the proposed Erie Highlands Planning Areas 5 and 6. The site is bound by Erie Highlands filings to the north, junkyard to the east, future Sunset subdivision to the south and, and oil and gas facilities to the west. The site located in Section 20, Township 1 North, Range 68 West of the 6th Principal Meridian, Town of Erie, Weld County, Colorado. A vicinity map for the site can be found in Appendix A. The site has no major drainageways or storm drainage facilities within these planning areas.

B. Description of Property

Planning Areas 5 and 6 are currently undeveloped old-farmland, and total approximately 93.2 acres. A portion of Planning Area 5 was overlot graded with a temporary sediment pond. The site has naturally occurring slopes ranging from 1 to 20 percent and is covered with native vegetation. Soil types consist of Colby loam, Midway-Shingle complex, Weld loam and Wiley-Colby complex. These soils are classified as hydrologic group B, D and C. A soils map can be found in Appendix A.

II. Drainage Basins and Sub-Basins

A. Major Drainage Basins

The site will follow the historic drainage patterns for the site with some minor rerouting due to the proposed roadways and residential lots. The proposed improvements to the site include single-family detached lots, roadways, open space, and associated infrastructure. Runoff will generally drain south and west toward proposed detention ponds. The site drainage will not be impacted by any irrigation facilities.

The site falls within Zone X, as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels 08013C0441J and 08013C0442J. A map is not printed for panel 08013C0442J, but has been confirmed to be Zone X. A copy of the FEMA FIRM maps can be found in Appendix A.

B. Minor Drainage Basins

This Phase I report will upgrade the drainage patters as outlined Phase III drainage report for Erie Highlands Filing 1. Minor Drainage Basins for Planning Areas 5-6 will be delineated using the proposed site plan and grading. The developed minor basins will include overland flow, and storm sewer collection systems which will direct stormwater to the proposed outfall points. Flows will be released at historic rates. Details will be given in the Phase II report.

III. DRAINAGE FACILITY DESIGN

A. GENERAL CONCEPT

This Phase I Drainage Report is in accordance with the *Town of Erie Standards and Specifications* (Reference A), and the *Urban Drainage and Flood Control District (UDFCD) Storm Drainage Criteria Manual* (Reference B). These manuals were used as a basis of design for the site. Planning Area 5 will discharge into Pond 3. Presently Pond 3 is being used as a temporary sediment pond. This pond will be redesigned to accommodate developed flow per Town standards for release rates and open space. Planning Area 6 will discharge to the south by means of a new pond located in the Pond 4 area. Size and limits will be detailed in the Phase II report. Preliminary sizes are included for all ponds.

The site will follow the historic drainage patterns for the site with some minor rerouting due to the proposed roadways and residential lots. Runoff will generally drain south and west toward proposed detention ponds. The site drainage will not be impacted by any irrigation facilities. Flows will be released at historic rates.

Water quality measures will be included in the design of the proposed detention ponds for the site. The ponds will be designed as an extended detention basin which will incorporate structures which will release flows for the excess urban runoff volume (EURV), and the 100-year storm event. Water quality storage volume will be provided in each detention pond.

The general concept for the drainage design is to maintain the historic drainage patterns and release rates for the site. By doing this, it reduces the impact to the existing channels.

B. SPECIFIC DETAILS

Drainage sub-basins for the site are less than 160 acres, so the Rational Method can be used in determining the flow rates for the site in the future Phase III drainage reports for the site. The sub-basins will be delineated based on the existing and proposed topography developed for the project.

The intensity-frequency curves to be used in the Rational Method calculations were taken from the Town of Erie Standards and Specifications. All drainage facilities will be analyzed and designed for both the minor (5-year, I=1.43 in) and major (100-year, I=2.70 in) storm events. Time of concentration calculations were used to determine the rainfall intensity

Hydraulic calculations for street and inlet capacity will be based on the design charts in Section 815 of the Town of Erie Standards and Specifications, and design spreadsheets provided by the Urban Drainage. Complete Hydraulic calculations will be provided in the Phase III drainage report for the site. Hydraulic Grade Lines (HGL) will be calculated using the Bentley program StormCAD.

ADAPTATIONS FROM CRITERIA

There will be no requested adaptations.

IV. Summary

The drainage design for Erie Highlands Planning Area 6 conform to The Town of Erie Standards and Specifications, and Urban Flood Control Districts' Drainage Criteria Manual where applicable.

V. REFERENCES

A. Town of Erie, Standards and Specifications, January 2015.

B. Drainage Criteria Manual, Volumes 1, 2, & 3, Urban Drainage and Flood Control District, June 2001, Revised April 2008, Updated November 2010.

C. Phase III Drainage Report for Erie Highlands, Erie, Colorado, November 2013, by Engineering Partners, Inc.

APPENDIX A

HYDROLOGIC CALCULATIONS

VICINITY MAP

FIRM MAP

SOILS MAP

PERCENT IMPERVIOUSNESS CALCULATIONS

RUNOFF COEFFICIENT CALCULATIONS

DETENTION STORAGE CALCULATIONS

VICINITY MAP
ERIE HIGHLANDS
PLANNING AREAS 5–6

PROJECT: ERIE HIGHLANDS
PLANNING AREAS 5- 6
VICINITY MAP
DATE: 7/29/15

CORE CONSULTANTS

CIVIL ENGINEERING
DEVELOPMENT CONSULTING
LAND SURVEYING
303.703.4444
1950 W. Littleton Blvd., Ste. 109
Littleton, CO 80120

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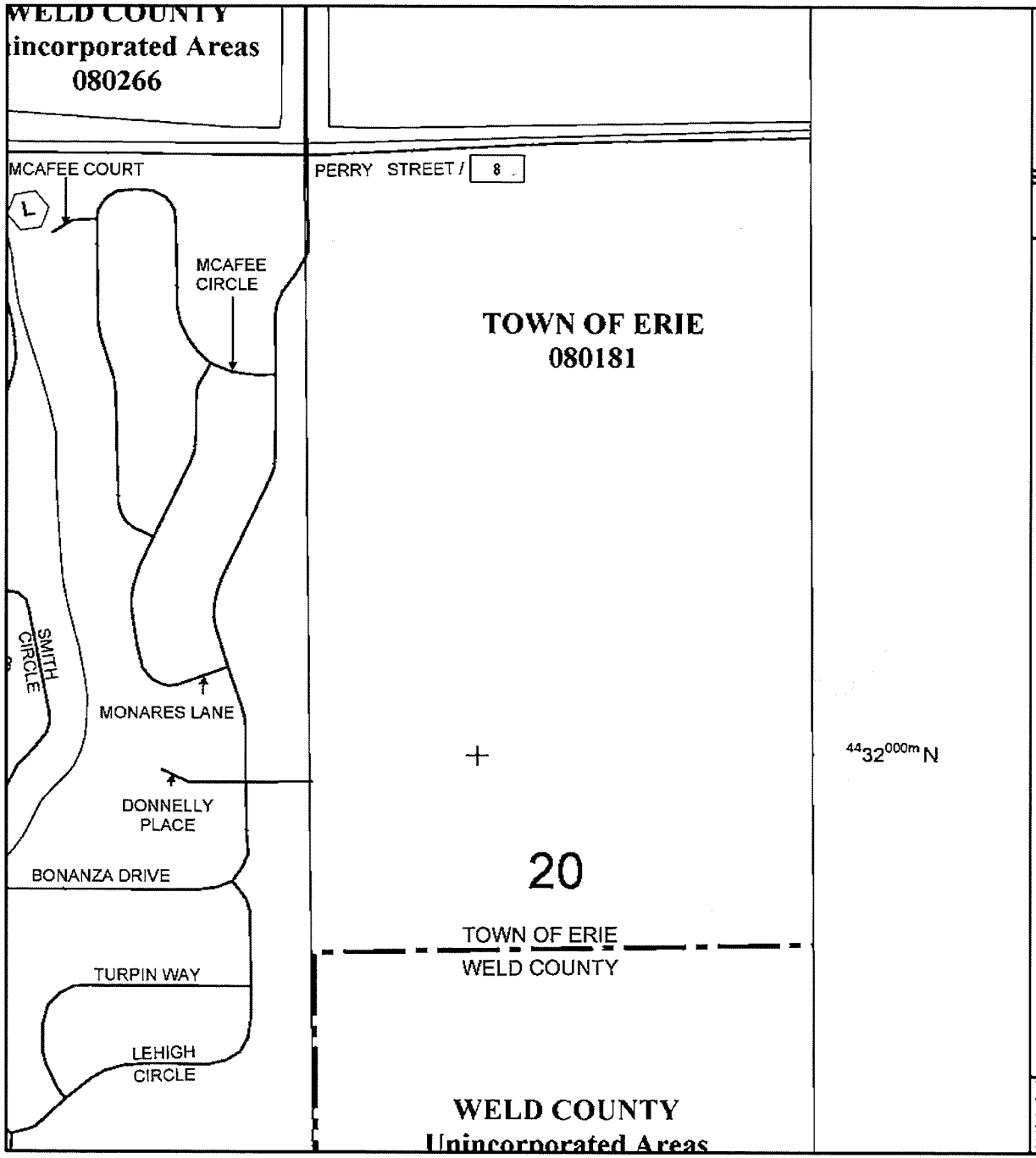


MAP SCALE 1" = 500'

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
BOULDER COUNTY	080023	0441	J
ERIE, TOWN OF	080181	0441	J

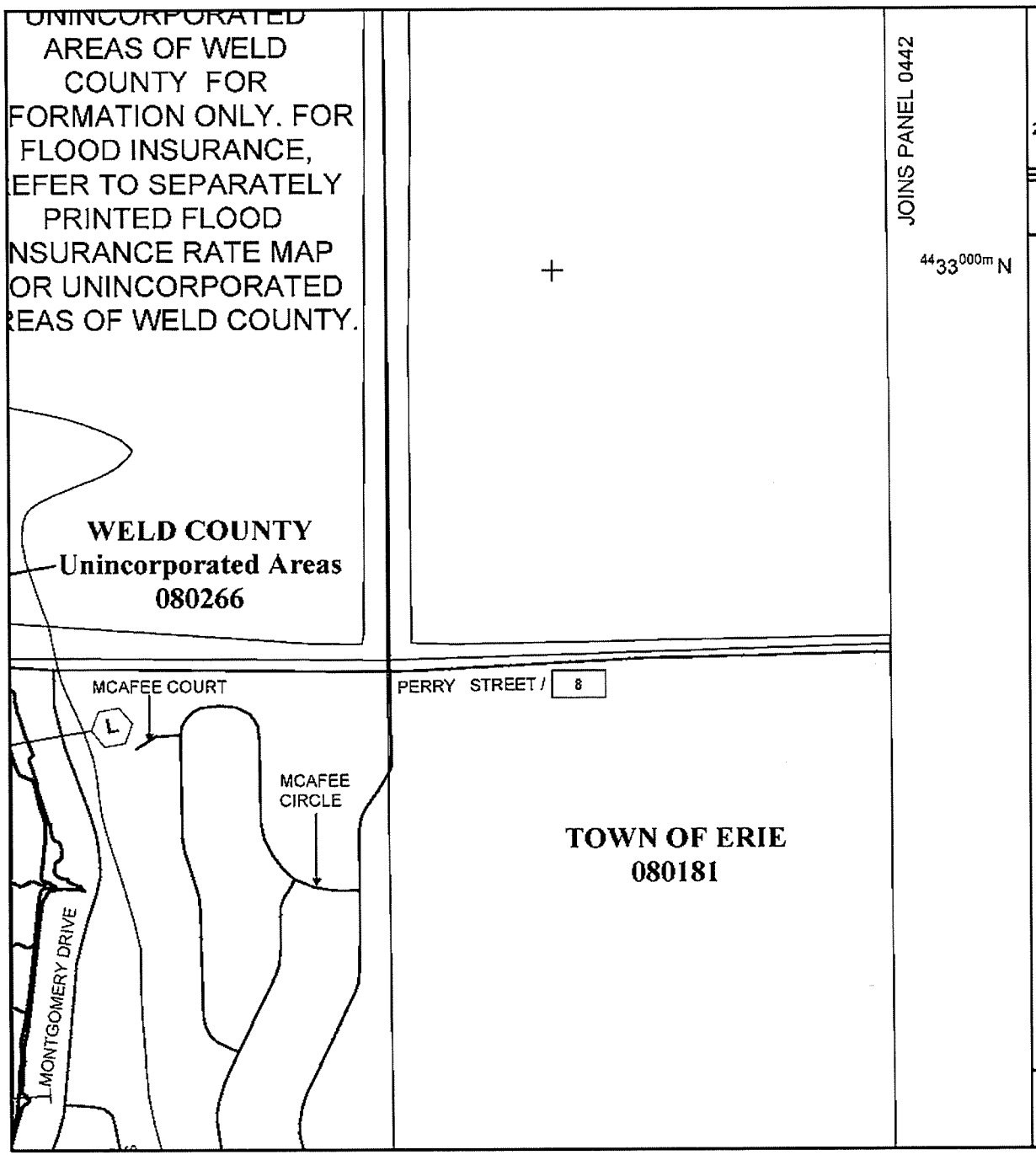
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

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



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)

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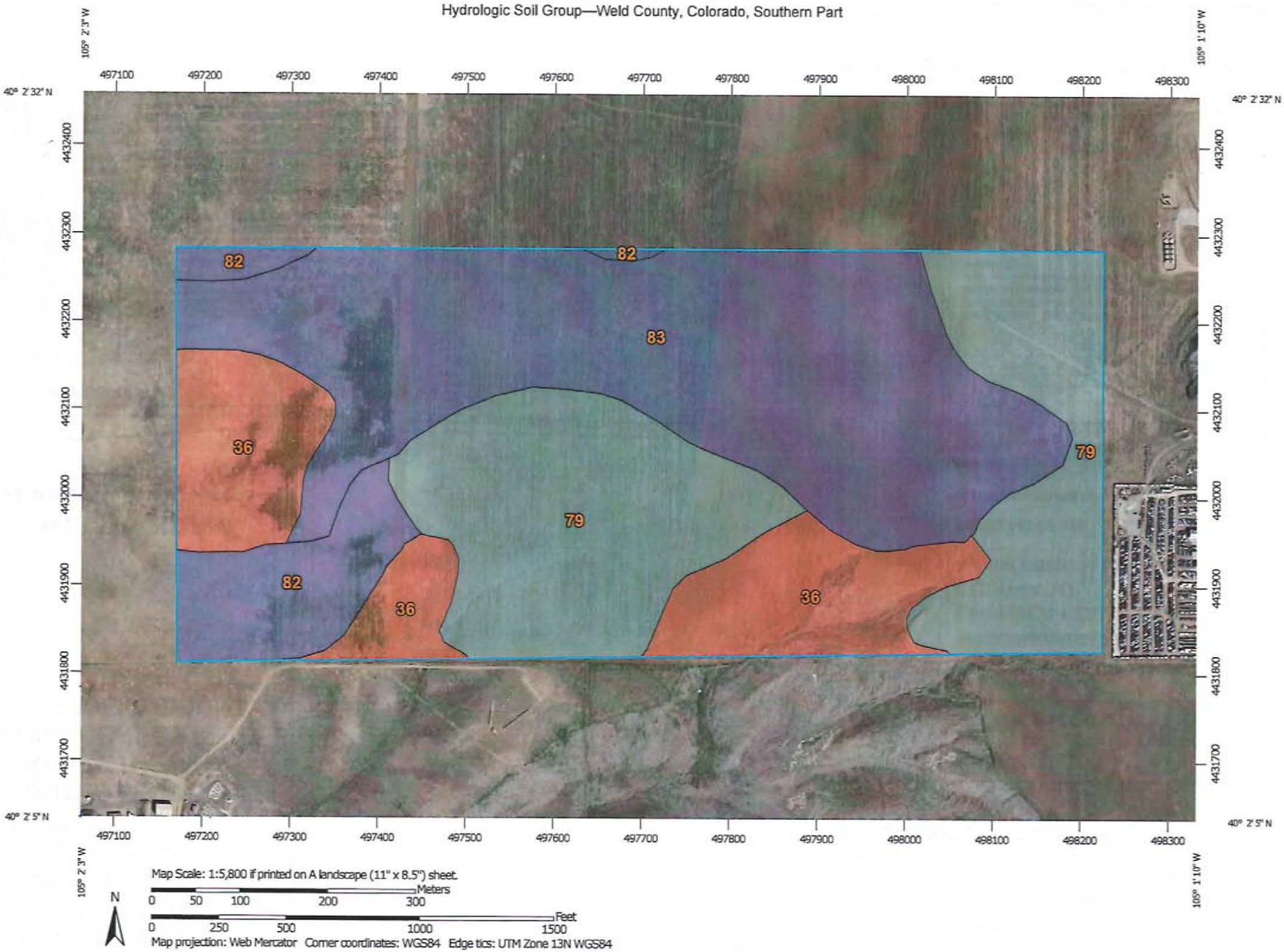
Hydrologic Soil Group—Weld County, Colorado, Southern Part



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: http://websoilsurvey.nrcs.usda.gov
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 13, Sep 23, 2014

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

Date(s) aerial images were photographed: Mar 16, 2012—Apr 13, 2012

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**
36	Midway-Shingle complex, 5 to 20 percent slopes	D	21.7	17.9%
79	Weld loam, 1 to 3 percent slopes	C	39.4	32.5%
82	Wiley-Colby complex, 1 to 3 percent slopes	B	9.8	8.0%
83	Wiley-Colby complex, 3 to 5 percent slopes	B	50.5	41.6%
Totals for Area of Interest			**121.4**	**100.0%**

Planning Areas 5-6
Proposed Conditions
Composite Percent Imperviousness

CORE Project # 15-023
7/30/2015
dcf

COMPOSITE BASIN -WEIGHTED "C" CALCULATIONS

-REFERENCE USDCM Volume 1 - Figures RO-3 thorough RO-5

	Residential							Lawns				
	Single Family		Multi-Unit	Multi-Unit				Clay Soil				
	3.8 DU's/Ac	4.6 DU's/Ac	(detached)	(attached)	School	Streets: Paved	Parks	2-7% Slope	>7% Slope	Historic		
% Imperv.	40.00%	45.00%	60.00%	75.00%	50.00%	100.00%	5.00%	5.00%	5.00%	2.00%		
											Total	Percent
BASIN	Area	Area	Area	Area		Area	Area	Area	Area	Area	Area	Impervious
PA5		23.85			3.85		6.70			6.20	40.60	32.3%
POND 4		2.30								6.50	8.80	13.2%
PA 6		31.30								8.10	39.40	36.2%
OS		1.90								2.50	4.40	20.6%

COMPOSITE DEVELOPED BASIN -WEIGHTED "C" CALCULATIONS
-REFERENCE UDFCD V.1 RUNOFF 2.7

$C_A = K_A + (1.31i^3 - 1.44i^2 + 1.135i - 0.12)$ for C_A > or = 0, otherwise $C_A = 0$ (RO-6)
$C_B = (C_A + C_{CD})/2$
$C_{CD} = K_{CD} + (0.858i^3 - 0.786i^2 + 0.774i + 0.04)$ (RO-7)
i = % imperviousness/100 expressed as a decimal
K_A = Correction factor for Type A soils
K_{CD} = Correction factor for Type C and Type D soils

Correction Factors, K_A & K_{CD}

Soil Type	Storm Return Period		
	5-year	25-Year	100-Year
A	-0.08i + 0.09	-0.19i + 0.24	-0.25i + 0.32
C or D	-0.10i + 0.11	-0.28i + 0.33	-0.39i + 0.46

Basin ID	% Imperv.	i	Soil Type	Correction Factors, K_A & K_{CD}			Runoff Coefficients, C			Basin Area	Total Area	Weighted Runoff Coefficients, C		
				5-Year	25-Year	100-Year	5-Year	25-Year	100-Year			5-Year	25-Year	100-Year
PA5	32.31%	0.32	A	0.06	0.18	0.24	0.20	0.32	0.38		40.6	0.29	0.45	0.53
			B	-	-	-	0.26	0.40	0.48	16.20				
			C or D	0.08	0.24	0.33	0.31	0.48	0.57	24.40				
POND 4	13.24%	0.13	A	0.08	0.21	0.29	0.09	0.22	0.29		8.8	0.23	0.42	0.54
			B	-	-	-	0.16	0.32	0.42					
			C or D	0.10	0.29	0.41	0.23	0.42	0.54	8.80				
PA 6	36.16%	0.36	A	0.06	0.17	0.23	0.23	0.34	0.39		39.4	0.33	0.49	0.58
			B	-	-	-	0.28	0.41	0.49					
			C or D	0.07	0.23	0.32	0.33	0.49	0.58	39.40				
OS	20.57%	0.21	A	0.07	0.20	0.27	0.14	0.26	0.33		4.4	0.26	0.45	0.55
			B	-	-	-	0.20	0.36	0.44					
			C or D	0.09	0.27	0.38	0.26	0.45	0.55	4.40				

EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Erie Highlands PA5
Basin ID: Pond 3

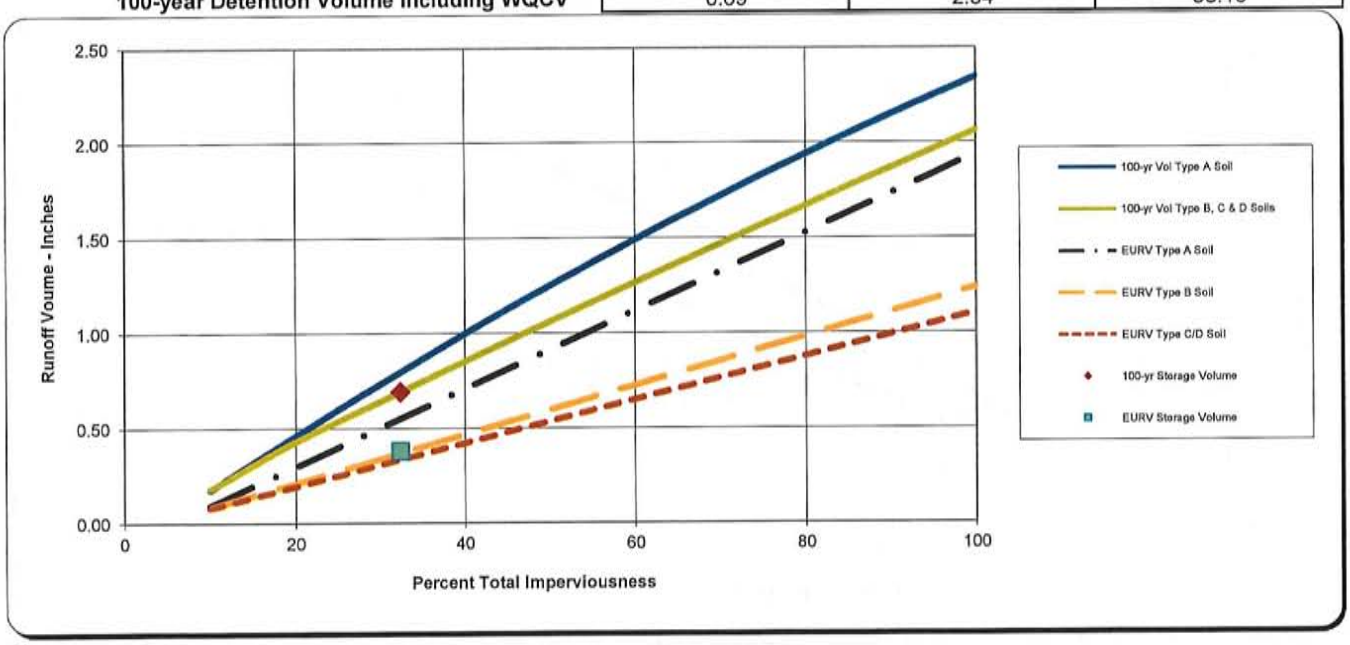
* User input data shown in blue.

Area of Watershed (acres)	40.60	
Subwatershed Imperviousness	32.3%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	32.3%	

Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	40.0%	16.2
Type C or D	60.0%	24.4

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient--α
Initial--f_i	Final--f_o	
3.6	0.5	0.0018

	Detention Volumes [2,5]		Maximum Allowable Release Rate, cfs[3]
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume[4]	0.38	1.2942	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV [5]	0.69	2.34	38.16



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Erie Highlands PA6
Basin ID: Pond 4

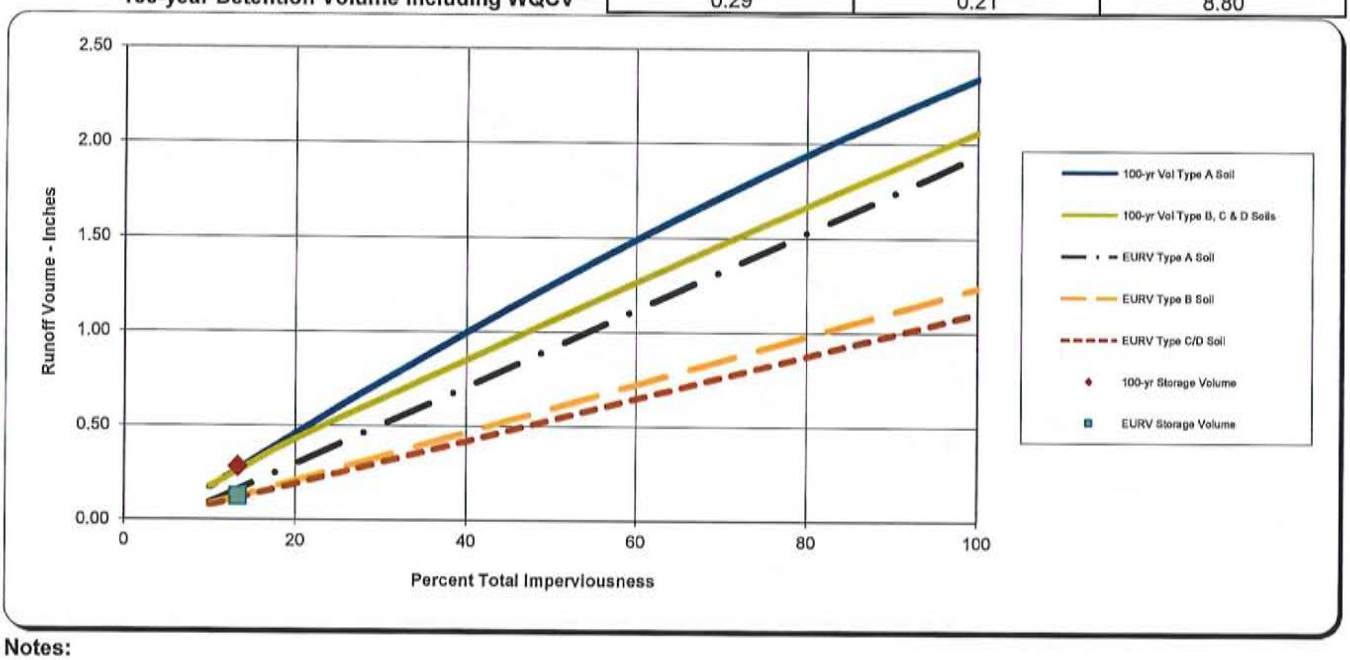
* User input data shown in blue.

Area of Watershed (acres)	8.80	
Subwatershed Imperviousness	13.2%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	13.2%	

Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	0.0%	0.0
Type C or D	100.0%	8.8

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient--α
Initial--f_i	Final--fo	
3	0.5	0.0018

	Detention Volumes [2,5]		Maximum Allowable Release Rate, cfs[3]
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume[4]	0.13	0.0938	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV [5]	0.29	0.21	8.80



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

EXCESS URBAN RUNOFF CONTROL (FULL-SPECTRUM) DETENTION SIZING

Project: Erie Highlands PA6
Basin ID: PA 6

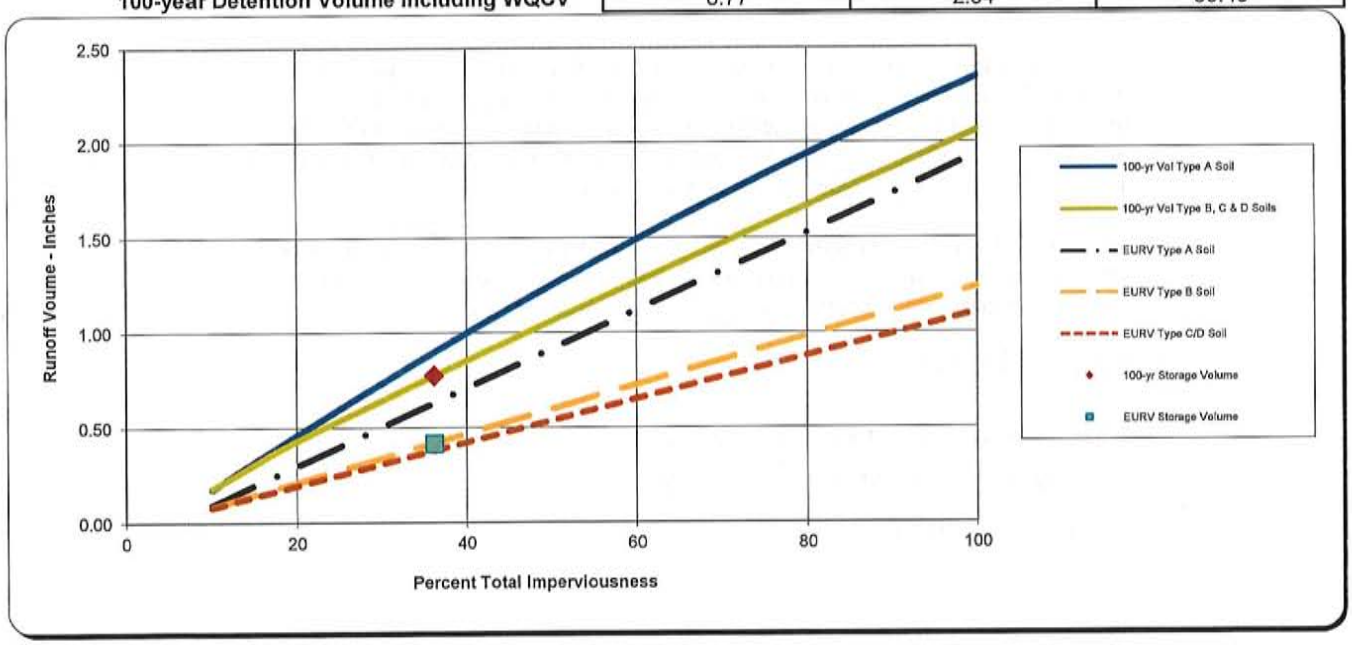
* User input data shown in blue.

Area of Watershed (acres)	39.40	
Subwatershed Imperviousness	36.2%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	36.2%	

Hydrologic Soil Type	Percentage of Area	Area (acres)
Type A	0.0%	0.0
Type B	0.0%	0.0
Type C or D	100.0%	39.4

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		Decay Coefficient--α
Initial--f_i	Final--f_o	
3	0.5	0.0018

	Detention Volumes [2,5]		Maximum Allowable Release Rate, cfs[3]
	(watershed inches)	(acre-feet)	
Excess Urban Runoff Volume[4]	0.42	1.3655	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume Including WQCV [5]	0.77	2.54	39.40



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) 100-yr detention volume includes EURV. No need to add more volume for WQCV or EURV

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

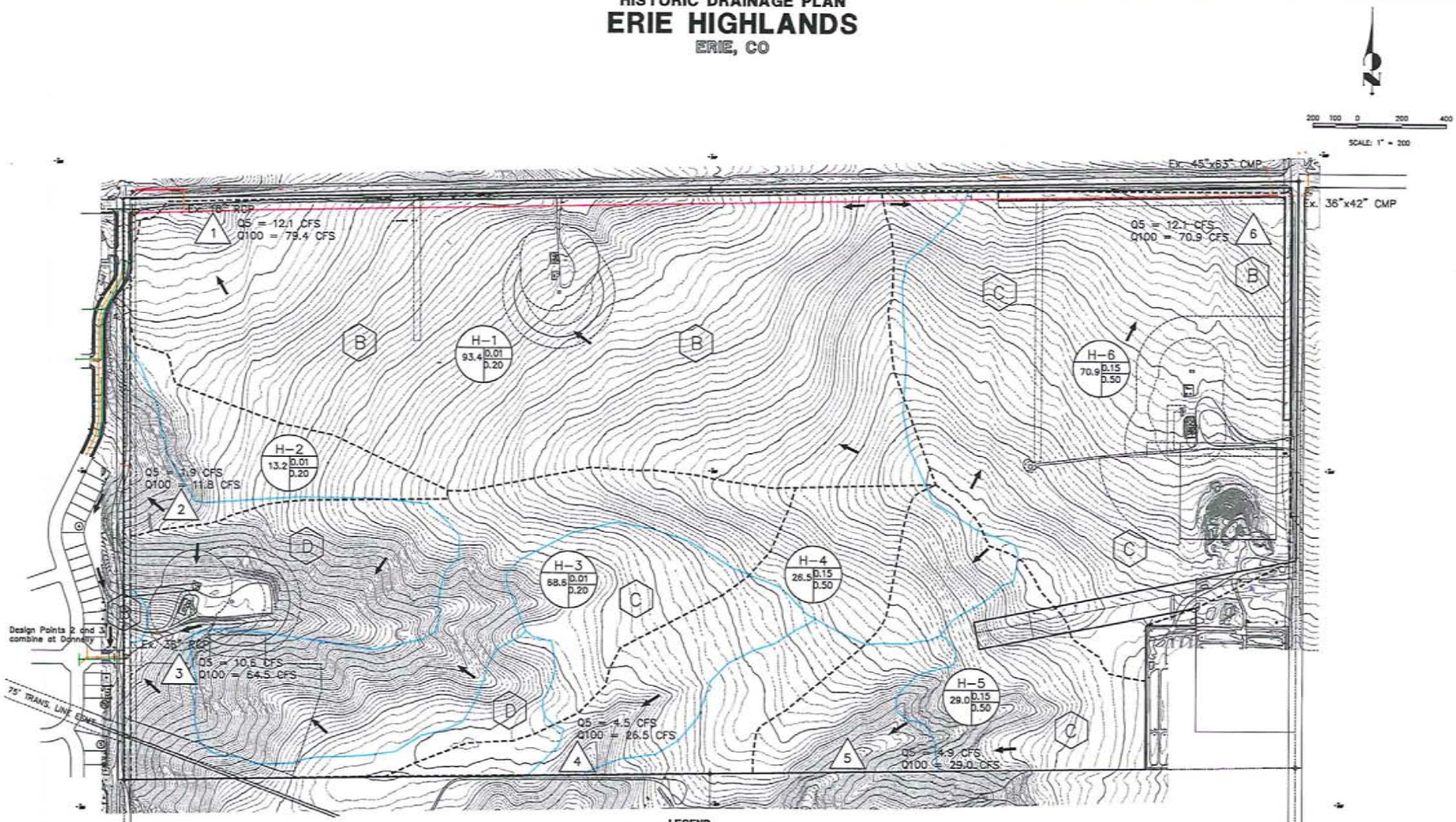
APPENDIX B

MAPS

REFERENCE MATERIAL

DRAINAGE MAPS

HISTORIC DRAINAGE PLAN
ERIE HIGHLANDS
ERIE, CO



DRAINAGE PLAN – HISTORIC
ERIE HIGHLANDS
JOB NO. 13-000

SHEET 1 OF 1

Engineering Partners, Inc
Right. On Time.
1960 W. Littleton Blvd., Suite 100
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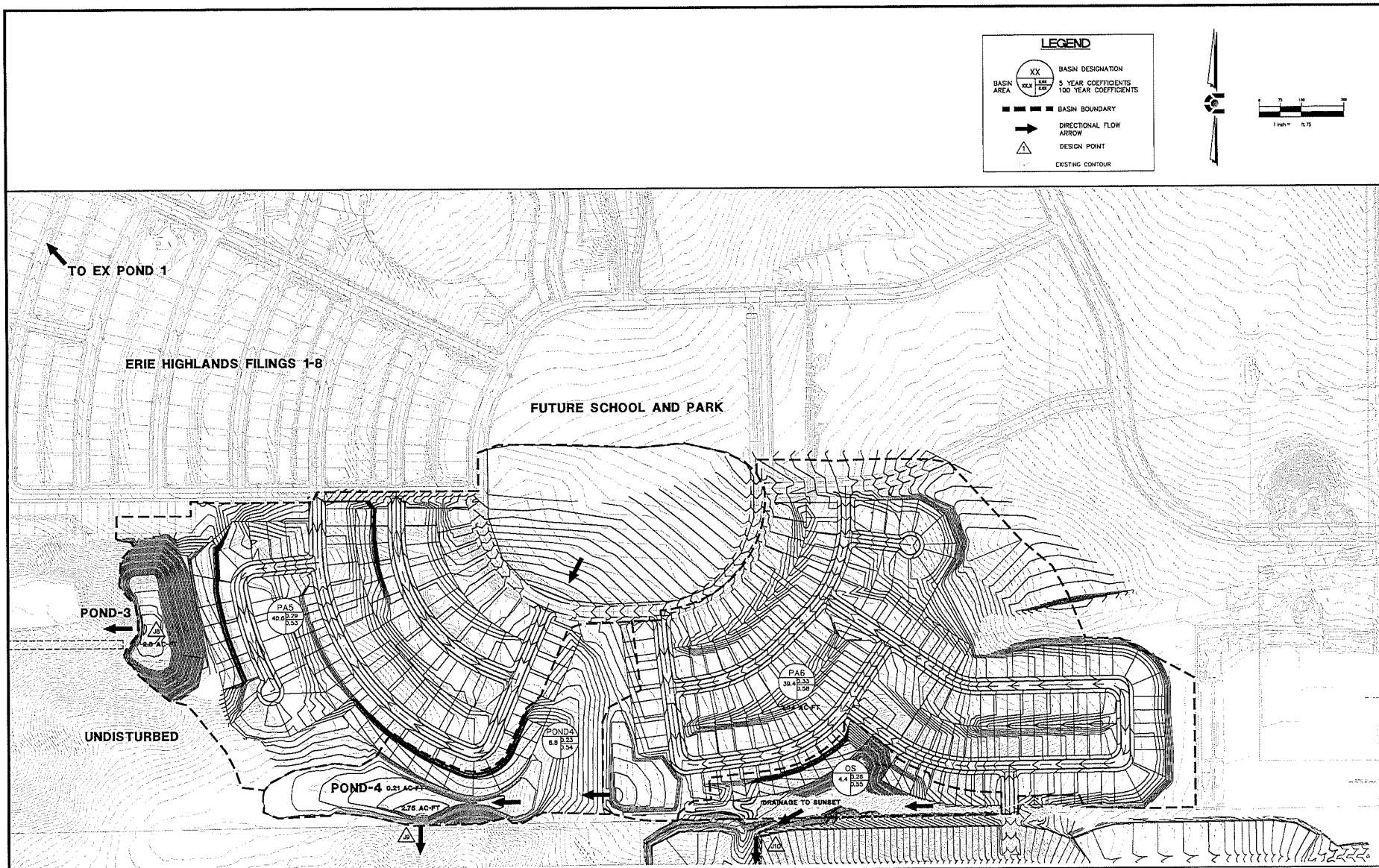

CORE CONSULTANTS

CIVIL ENGINEERING
DEVELOPMENT CONSULTING
LAND SURVEYING
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Littleton, CO 80120

811

REVISIONS

#	DESCRIPTION	DATE	BY

PHASE I DRAINAGE PLAN FOR

ERIE HIGHLANDS PLANNING AREAS 5-6

TOWN OF ERIE, COLORADO

INITIAL PLAN
RELEASE: 7/29/2015
DESIGNED BY: DCF
DRAWN BY: DCF
CHECKED BY: DCF

JOB NO.
15-023

SHEET
1 OF 1

SUBSIDENCE INVESTIGATION
ERIE HIGHLANDS
WELD COUNTY, COLORADO

Prepared For:

OAKWOOD HOMES, LLC
4908 Tower Road
Denver, Colorado 80249

Attention: Mr. Jerry Jacobs

Project No. DN40,851-110

August 25, 2005
(Updated July 9, 2013)

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EXECUTIVE SUMMARY

We investigated conditions and developed opinions regarding subsidence risk for the subject property. The Boulder Valley #1 Mine is located below the site. A rock tunnel was constructed to connect the west portion of the mine to the east portion of the mine. The mines are separated by a fault. The mine was operated between 1917 and 1947 and is located under areas planned for residential and commercial development.

Mine conditions were explored by reviewing previously performed investigations and drilling 7 borings. The floor of the coal seam was found at depths ranging from 199 to 325 feet. Three shafts were identified from Colorado Geologic Survey (CGS) maps that lie on or adjacent to the property. The main shaft is located near the southeastern boundary of the site. One air shaft lies off the property near the southeast portion of the site and one air shaft is located on the western portion of the site.

Our analysis indicates the risk of future subsidence propagating to the surface is low for areas where the thickness of bedrock above the mine coal seam is greater than 90 feet. The three shafts located on or adjacent to the property, and a 200 feet radius around each shaft will be classified as significant risk. The remaining mine areas have adequate bedrock thickness and were classified as low risk (Figure 2). We have located the shafts. If development is planned in the shaft areas, we recommend mitigation be conducted or the areas avoided. If mitigation of the shafts is planned, we also recommend the State of Colorado and governing municipality be presented with the mitigation plan for review prior to construction.

Based upon our analysis we believe residential or commercial construction is feasible in areas rated low risk. No restrictions or special building requirements are necessary. We believe the risk of caving or trough subsidence affecting overlying development in these areas is low.

Development in mined areas rated as significant is not recommended without mitigation. Mitigation would involve a drilling and grouting program.

SCOPE

This report presents the results of our Subsidence Investigation for the Erie Highlands in Weld County, Colorado (Figure 1). The purpose of this investigation was to evaluate the condition and extent of mining and analyze the risk of subsidence. A portion of the Boulder Valley #1 Mine, which lies beneath the property, was investigated. The report includes the results of our historical research, field investigation, discussions of the extent of mining, subsidence mechanisms, and engineering analyses of subsidence risk. A discussion of practical mitigation methods is also included. Our investigation was performed in general conformance with our proposal (No. DN 05-0641 dated July 6, 2005).

PREVIOUS INVESTIGATION

We reviewed previous investigations and considered them in our evaluation. These included:

1. "Mine Subsidence Investigation Horst Property Sec. 20 Township 1 North Range 68 West Erie, Colorado," by Western Environment and Ecology, Inc., Project No. 167-003-02, dated April 4, 2000.

2. "Engineering Geology and Mine Subsidence Study, Proposed Residential Development near Erie, Weld County, Colorado," by Michael W. West and Associates, Inc., Project No. 04624, dated January 10, 2005.

3. Draft Report – "Engineering Geology and Mine Subsidence Study Highland Park Subdivision, Near Erie, Weld County, Colorado," by Michael W. West and Associates, Inc., Project No. 04624, dated March 23, 2005.

HISTORICAL RESEARCH

Mining began in the Boulder-Weld coal field in the late 1800s. We researched available Mine maps from the CGS. Existing maps indicate the Boulder Valley #1 Mine is below a portion of the site (Figure 1). Mines in the area were typically accessed by vertical hoist shafts. Air shafts were also typically excavated parallel to the entry and possibly at other locations depending upon the size of the mine. Once the entry and shaft penetrated the mineable coal layer, motor roads or haulways were cut parallel and perpendicular to the strike of the seam. Rooms typically 20 feet wide and 100 to 300 feet long were cut with pillars approximately 15 to 40 feet wide between rooms for support. Typically about 30 to 60 percent extraction was achieved by room and pillar mining.

Upon completion of the room and pillar operation, pillars were partially or fully removed using retreat mining techniques. Typically, 15 to 25-foot wide sections of support pillars were removed leaving "stump" pillars. After retreat mining, the remaining pillars and roof coal were shaved resulting in 75 to 85 percent extraction in a given panel. However, barrier pillars left to protect haulways resulted in overall extractions on the order of 50 to 70 percent.

MINE	OPERATION YEARS	REPORTED PRODUCTION
Boulder Valley #1	1910 - 1947	3,518,912

INVESTIGATION

Our investigation was developed to evaluate the potential for surface subsidence resulting from abandoned underground coal mining. After reviewing available information the investigation plan was developed to:

1. Obtain geologic data on lithology and stratigraphy of the mine overburden;

2. Explore mine conditions: mine locations, depth to mining, seam thickness, mine extraction, voids and rubble zones;

3. Analyze subsidence potential; and

4. Formulate recommendations for development.

Seven exploratory borings were drilled using rotary drilling techniques. Drilling was conducted by N.R. Bideau Drilling of Casper, Wyoming. Boring locations and elevations were surveyed in the field by Carroll and Lange. Borings were logged using gamma, density, and a borehole caliper. Geophysical logging was conducted by Colog of Golden, Colorado. The location of exploratory borings is shown on Figure 1. Boring logs and a summary of conditions found are presented in Appendix A.

SUBSURFACE CONDITIONS

Bedrock of the Laramie Formation is present under the overburden soils and consist of claystone, shale and scattered beds of sandstone and lignite. The Laramie Formation produced economically important beds of coal. Locations of coal deposits are controlled by faulting. Mining within these coal beds has been documented in surrounding areas.

Surficial Soils

The alluvium consists of sandy clays. The depth of alluvium varied from nine to twenty-two feet at our boring locations.

Neither the natural alluvium nor the fill have substantial strength. Experience indicates the alluvium tends to flow into mine voids and will not arch to resist subsidence forces. For analysis purposes, the strengths of the surficial soils are assumed to be nil.

Bedrock

The surficial soils are underlain by bedrock consisting of interbedded claystones and shales. The stratigraphy of the bedrock was erratic across the site. The bedrock above the coal seam consisted of claystone and shale of varying thickness.

Coal Seam

The roof of the mineable coal seam was encountered at depths ranging from 199 to 325 feet below the ground surface. The coal seam thickness ranged from 5 to 8 feet.

MINE CONDITIONS

A general picture of the subsurface was developed by researching available mine records, previous subsidence investigations and previous geologic and geotechnical studies. Additional field explorations by our firm were performed to better define the subsurface conditions and subsidence hazard.

The depth of mining reported on existing mine maps appears to be fairly accurate. We found a 5 to 8 foot thick coal seam, which would have been the likely mineable seam, at depths ranging from 199 to 325 feet. Additional thinner seams (coal riders) were found throughout. The relative thinness and poor quality coal lead us to believe mining of these seams was not done. The results of our borings and geophysical logging showed the over bearing bedrock to be intact.

The thickness of bedrock above the mined seam ranged from 173 to 306 feet. The thickness of bedrock was over 90 feet above undermined areas within this property.

The locations of the mined areas were estimated considering the mine maps, drilling results, and geologic conditions. An accurate extent of mining cannot be determined without a more extensive drilling program than was conducted for this

investigation. Mine maps can be inaccurate due to pillar robbing or surveying discrepancies. We used a combination of methods to estimate the extent of mining with a sufficient degree of confidence to formulate development recommendations. The location/extent of the Boulder Valley #1 Mine is discussed below.

Boulder Valley #1 Mine: The mine maps show some detail including an outline of the mine area, haulways and extraction zones. The maps show the main shaft for this mine in the southeast corner of the investigation area. There are two mapped air shafts for this mine. One air shaft is located off of the property, southeast of the site. The other air shaft was located in the field by using a front end loader. It is located in the western portion of the site. The mine appears to extend across the eastern two-thirds of the property, with a smaller part of the mine in the western portion of the site. The smaller mine is connected to the larger mine by a rock tunnel. The rock tunnel extends through a fault to connect the two mines. The mine had between 173 and 306 feet of bedrock cover.

SUBSIDENCE MECHANISMS

When coal is mined underground, the rock overlying the extraction is stressed and will subside into the extraction. The occurrence of subsidence and the mechanisms by which the overburden rock is distressed and displaced depend upon physical properties of the overburden, coal and floor materials, the size of individual extractions and extraction ratios achieved. Subsidence may be caused as a result of failure of the mine roof, coal pillars or mine floor materials. Subsidence may take the form of sinkholes or a chimney-type cave, a gently sagging or trough-type subsidence, or settlement of backfill materials in entry or air shafts. The following paragraphs discuss potential subsidence mechanisms.

Caving Subsidence

Subsidence can produce sinkholes or depressions at the ground surface by caving of materials overlying comparatively shallow mine working. Caving occurs as

the roof over an opening begins to fracture and collapse into the space where the extraction has occurred. This process continues until the space is either occupied by debris or the caving continues to the surface. Caving is more common over room and pillar operations. The depth to mining is important when determining whether or not the subsidence feature will reach the surface. Also important are the thickness of the extraction and bulking and strength characteristics of the overburden rock.

The size of sinkholes caused by caving is controlled by the geometry of the mine and properties of the overburden. The depth of the sinkholes depends on the depth to mining, thickness of the extraction, and bulking properties of the overburden. The areal extent of surface depressions is largely controlled by the size of the mine opening. Research has found that sinkholes typically are circular or elliptical in shape and usually not larger than the size of the extraction causing them.

Trough Subsidence

Trough-type subsidence is a sagging of the overburden triggered where large extraction ratios and panel sizes are achieved, both in areas of room and pillar mining and longwall mining. This generally occurs as a caving of the immediate roof followed by sagging of overlying strata. Trough-type subsidence is the common mechanism over longwall mines in the United States and Europe. However, troughs which develop over partial extractions differ greatly from those which occur over longwall mining. Oravecz (1977) found the magnitude of subsidence above partial extractions is considerably smaller than subsidence which develops over total extraction mines. The presence of internal barriers and the low width to depth ratios helps reduce the magnitude of displacement.

Trough-type subsidence over room and pillar mining will be localized as compared to the area-wide troughs developed by longwall mining. As with sinkholes, the depth and areal extent of troughs will depend on the depth to mining, physical properties of the overburden, and extraction ratios achieved. The shape of depressions will be irregular due to the presence of remnant pillars. Like longwall

mining, subsidence over retreat mining will develop rapidly due to recompression of rubble or re-orientation of beds which have sagged.

Shaft Collapse

The subsidence hazard associated with entry or air shafts is high because of the sudden and significant nature of movement. Although small in area, shafts can be dangerous because of the haphazard way in which they were backfilled in the past. Typically, shafts were filled with debris left over from the mining operation, including timbers, mine waste, and trash. Over a period of time, the debris plugged in the shaft can loosen and settle, leading to dramatic subsidence at the surface.

EVALUATION OF SUBSIDENCE POTENTIAL

Our investigation furthered the understanding of the subsidence potential in this area by providing detailed information regarding the existing subsurface conditions and mine locations. Our analysis was intended to determine a minimum bedrock thickness above the coal seam beyond which caving subsidence would not be expected to reach the surface. We used three analysis methods which included mine geometry, bulking factor and computer modeling.

Mine Geometry

One method of evaluating whether caving subsidence will propagate to the surface can be addressed through the mine geometry. The critical dimensions effecting subsidence are the thickness of cover or overburden height (H) and the extraction thickness (h). Piggot and Eynon (1977) suggest subsidence will not propagate to the ground surface over room and pillar workings where the overburden to extraction thickness ratio (H/h) exceeds 10. The overburden alluvium is primarily clayey sands and sandy clays and possess very little strength to prevent caving, therefore, only the bedrock thickness is considered. Using a coal seam extraction thickness of 8 feet, caving is not expected to propagate through more than 80 feet of bedrock.

Bulking Factor

Caving of the roof above a mine can continue until the extraction and collapse area is filled with broken and bulked rock or the caving reaches the surface. The height to which caving can occur is based on the coal seam thickness and the bulking of the collapsed rock. The increase in the volume of the collapsed rock is referred to in terms of its "Bulking Factor" (Piggot and Eynon, 1977). The Bulking Factor was calculated in terms of thickness and defined as the original extraction height minus any remaining void divided by the height of the rubble zone above the mine roof. Typical bulking factors for this coal strata range from 30% to 50% (Piggot 1997). Assuming a conical shaped collapse with a conservative Bulking Factor of 40%, as measured from old mine maps, results in a collapse height of 60 feet. Applying a factor of safety of 1.5 results in a bedrock thickness of 90 feet.

$H = 3h/B$ for conical collapse

H = Collapse height above mined coal seam roof.

B = Bulking Factor (0.40)

h = Original extraction thickness (8.0 feet)

Computer Modeling

The Finite Element Method (FEM) program Adina was used. The model was based on typical physical properties representative of the strata to simulate the process of roof failure and void propagation independent of the bulking process. Our analysis supported that underground subsidence would not propagate to the surface in areas of greater than 90 feet of bedrock cover.

SUBSIDENCE POTENTIAL

As discussed previously, analysis methods included mine geometry, bulking factors, computer modeling and evaluation of historical events. Analysis results are summarized below.

Our investigation and analysis indicates there is risk of caving subsidence reaching surface in areas where the bedrock above the coal seam is less than 80 to 90 feet thick. Undermined areas with a bedrock thickness in excess of 90 feet are judged to have a low risk of caving subsidence. This is a conservative choice based upon the methods used. A map showing estimated areas of low and significant subsidence risk is presented on Figure 2.

Mine Geometry	80-foot bedrock thickness
Bulking Factor	90-foot bedrock thickness

Considering the nature of sinkhole subsidence, we believe the potential damage to building, roadways and utilities are likely to be high in significant risk areas (areas with less than 90 feet of bedrock cover). The surface effects of subsidence can result in property damage from vertical settlement, horizontal ground strain, and tilt or rotation. Severe ground movements from sinkhole subsidence can destroy building foundations and disrupt utilities.

Our study of available mine maps and investigation at the site indicate the presence of three shafts on or adjacent to the site that effect subsidence risk on the subject property. Shaft collapse does pose a risk, and the hazard associated with shafts should be considered high. We recommend a 200 foot radius be extended from the location of the shafts, and the area be classified as "significant" subsidence potential. If development is planned near the shafts, we recommend subsidence mitigation be performed. We also recommend that prior to any construction, the State of Colorado and any governing municipality be given the mitigation plans for review.

DEVELOPMENT CONSIDERATIONS AND MITIGATION ALTERNATIVES

The following is a discussion of development and/or mitigation alternatives for the identified risk areas.

Low Risk Areas

The subsidence risk is judged low for most of the site with the exception of shaft areas. We believe residential or commercial construction is feasible in areas rated as low risk. No extraordinary restrictions or special building requirements are necessary. Typical building code requirements for foundation walls to be reinforced to simply span a minimum of 15 feet should apply. If shafts are located and mitigated (grouted) then these areas will revert to a low risk category with no restrictions.

In areas where bedrock is near the minimum thickness care must be taken that the bedrock is not disturbed during construction, such as during basement construction, utility installation or deep sub-excavation. Any excavation into the bedrock surface will decrease the bedrock thickness and could change the subsidence potential from low to significant. If development approaches any high risk zone additional drilling should be performed to verify adequate bedrock thickness.

Placing lots or building envelopes over grouted shaft areas is considered safe from an engineering viewpoint. We anticipate notifying homeowners through the Soils and Foundation Summary report of undermined areas and shafts. You may consider locating building areas and/or lots outside of shaft areas to reduce homeowner concerns as much as practical. Construction over mitigated shafts should be feasible in roadway, detention ponds or commercial areas provided the owner is aware of the condition.

There is a small possibility that unmapped air shafts exist. Considering the information available we believe the risk of this condition occurring and causing a future subsidence event is small. The risk is not eliminated. Grading above the mined areas should be observed to attempt to identify any shafts to reduce the risk as much as possible. If a shaft subsidence event occurs in the future then filling and grouting would be required.

Significant Risk Areas

We do not recommend buildings, roads or major utilities be constructed over significant risk areas. Shaft areas should be avoided (200 foot radius) or mitigated as discussed below. This property does not appear to have any significant risk areas except for those around the shafts.

Shaft Areas

Three shafts are located on or adjacent to the property. These three shafts were the only shafts found on mine maps. Full depth grouting is the recommended mitigation method for these shafts. Concrete plugs or slabs at the ground surface are not recommended since overburden soils could flow into the shaft areas if it subsides. Depending on the size/location of the shafts we anticipate 1 to 4 grout columns, full depth will be required. The grout is intended to fill voids and compact the backfill material. We are available to assist in preliminary pricing and monitoring during grouting, if desired.

LIMITATIONS

Our investigation was planned to obtain a level of information necessary to perform an analysis and evaluation of the subsidence hazard. Our conclusions regarding the risk of future subsidence were based on our investigation and analysis, a review of available mine records, previous studies and our experience. However, there is no guarantee that the government agencies will allow development in these areas. Based on data from other reports and our investigation, they may deny any development of the area, limit development type or require additional investigation and analysis prior to approval. There is no method, to our knowledge, of eliminating all risk of subsidence effects. If additional data becomes available concerning unreported mining or additional subsidence features develop in the area, we should be contacted to evaluate the situation.

We believe this investigation was conducted with that level of skill and care ordinarily used by geotechnical engineers practicing in this area at this time. No warranty, express or implied, is made. We appreciate the opportunity to provide this service. If we can further explain our opinions and conclusions as contained in this report, please contact us.

CTL | THOMPSON, INC.

Matthew A. Best
Engineering Technician

Reviewed by:

Gregg M. Tateyama
Project Engineer

MAB:DBT/mab/bg
(7 copies sent)

Reviewed by:

Damon B. Thomas, P.E.
Project Manager
7-9-13

APPENDIX A

DRILL LOG SUMMARY

Table A-1
EXPLORATORY DRILLING
Highland Park Subdivision
CTL | T Project No. DN40,851

Boring No.	Depth of Bedrock	Depth of Void	Depth of Rubble	Depth of Coal	Depth of Floor	Bedrock Thickness	Total Depth
1	9	255	257	-	273	256	280
2	14	-	-	320	325	306	340
3	12	235	244	-	253	233	260
4	22	-	-	250	258	-	280
5	18	-	-	152	157	-	260
6	18	-	-	201	207	183	240
7	18	184	195	-	199	173	220

APPENDIX B

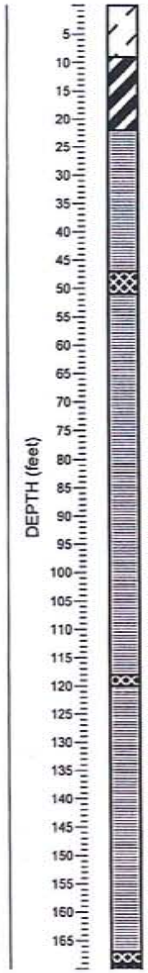
BOREHOLE AND ELECTRIC LOGS

PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-1

ELEVATION	TESTING BY: MB	ENGINEER: MB



DESCRIPTION

ALLUVIUM (CLAY, SANDY-BROWN, RUST, GRAY).

WEATHERED SHALE - RUST, GRAY, BROWN.

SHALE-GRAY.

COAL - BLACK, SOFT - MODERATE QUALITY

SHALE-GRAY.

COAL - BLACK, SOFT - MODERATE QUALITY

SHALE-GRAY.

COAL - BLACK, SOFT - MODERATE QUALITY

CPT_DN40851-110-G1.GPJ CPT.GDT 8/16/05

PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-1

ELEVATION	TESTING BY: MB	ENGINEER: MB

DESCRIPTION

SHALE - GRAY.

COAL - BLACK, SOFT - MODERATE QUALITY.

SHALE - GRAY.

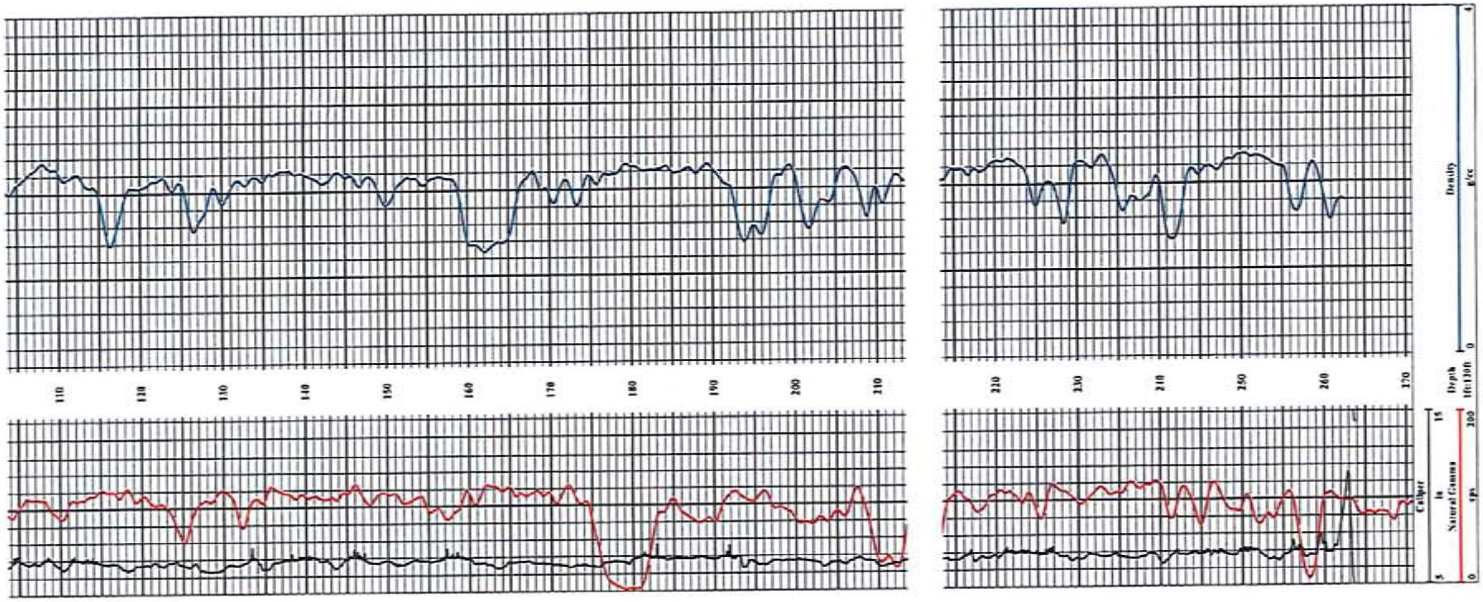
VOID-RETURNS LOST.

RUBBLE.

FLOOR.

CPT_DN40851-110-G1.GPJ CPT.GDT 8/16/05

FIG. B- 1



COLOG

A DIVISION OF LUNA ENGINEERING COMPANY

310 Quail Street
Suite K
Lakewood, Colorado
80215
Office: 303.279.8171
FAX: 303.278.9135
www.colog.com

Natural Gamma
Caliper
Density

Company	CTL Thompson
Well	TH-1
Field	Highland Park
County	Weld
State	Colorado

COMPANY CTL Thompson
WELL TH-1
FIELD Highland Park
COUNTY Weld STATE Colorado

LOCATION
QTR SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM GROUND LEVEL ELEVATION NA
LOG MEAS. FROM GROUND LEVEL 0.0 ft ABOVE PERMINANT DATUM
DRILLING MEAS. FROM GROUND LEVEL

DATE ACQUIRED	25 July, 2005
RUN NUMBER	1
LOG TYPE	Natural Gamma
DEPTH-DRILLER	280'
DEPTH-LOGGER	271'
BTM LOG INTERVAL	271'
TOP LOG INTERVAL	0'
RECORDED BY	G. Sanchuck
WITNESSED BY	M. Herr
PROBE TYPE, S/N	RAMETP UPM 1403
LOGGING SPEED	10 ft/min
A.S.D.E.	1.2
SAMPLE INTERVAL	0.2'

BOREHOLE RECORD

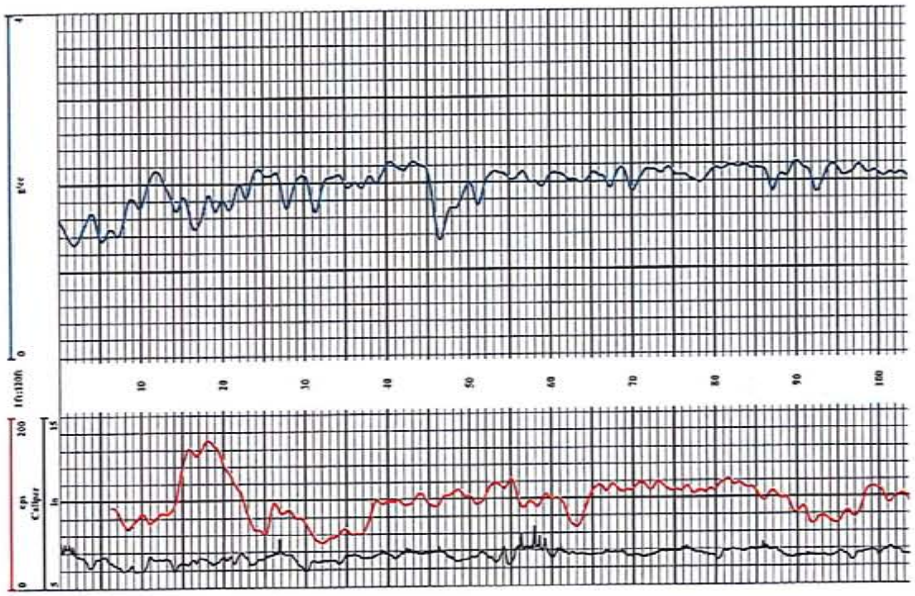
RUN No.	BIT	FROM	TO
1	8"	20'	120'
	6"	6.5.	20'

CASING RECORD

SIZE	WGT.	FROM	TO

COMMENTS
NA - Not Available, NA - Not Applicable

Density
Depth
Natural Gamma



PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-2

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-2

DEPTH (feet): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165

ELEVATION (feet)

DESCRIPTION

ALLUVIUM (CLAY, SANDY - BROWN, RUST, GRAY).

WEATHERED SHALE - RUST, GRAY, BROWN.

SHALE - GRAY.

CPT_DN40851-110-GLGPJ_CPT.GDT_8/16/05

PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-2

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-2

DEPTH (feet): 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335

ELEVATION (feet)

DESCRIPTION

SHALE - GRAY.

COAL - BLACK, SOFT - MODERATE QUALITY.

SHALE - GRAY.

COAL - BLACK, SOFT - MODERATE QUALITY.

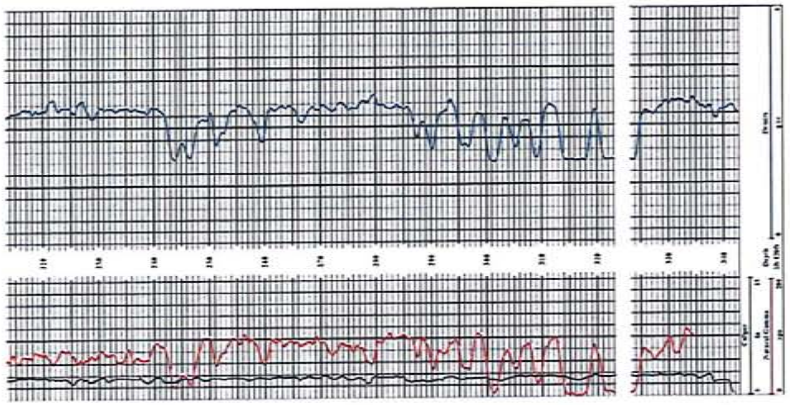
SHALE - GRAY.

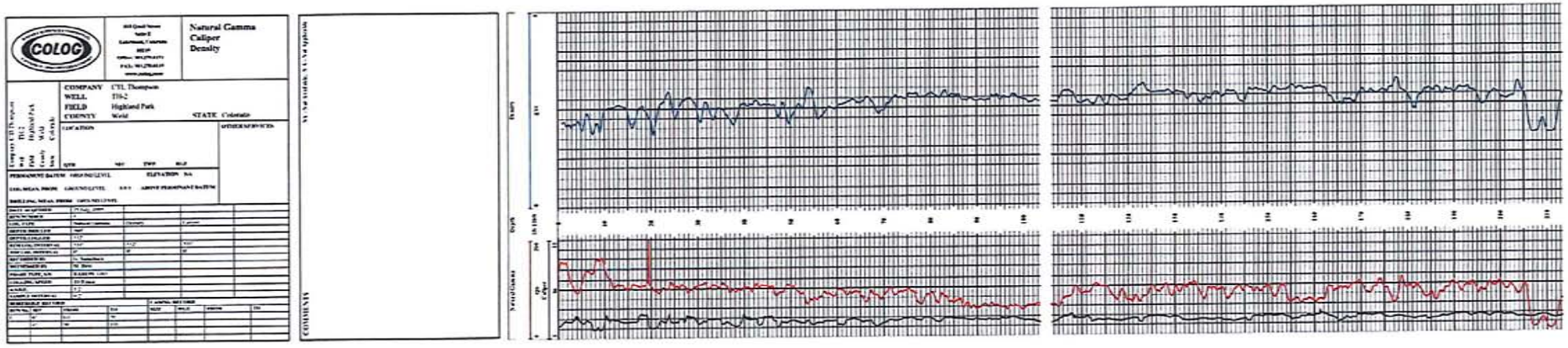
COAL - BLACK, SOFT - MODERATE QUALITY.

SHALE - GRAY.

CPT_DN40851-110-GLGPJ_CPT.GDT_8/16/05

FIG. B- 2




COLOG
Natural Gamma
Caliper
Density
COMPANY CTL Thompson
WELL TH-2
FIELD Highland Park
COUNTY Weld
STATE Colorado
COMMENTS

PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-3

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-3

ELEVATION (feet)

DESCRIPTION

ALLUVIUM (CLAY, SANDY - BROWN, RUST, GRAY).

WEATHERED SHALE - RUST, GRAY, BROWN.

SHALE - GRAY.

COAL - BLACK, SOFT - MODERATE QUALITY.

SHALE - GRAY.

COAL - BLACK, SOFT - MODERATE QUALITY.

SHALE - GRAY.

COAL - BLACK, SOFT - MODERATE QUALITY.

CPT DN40851-110-G1.GPJ CPT.GDT 8/16/05

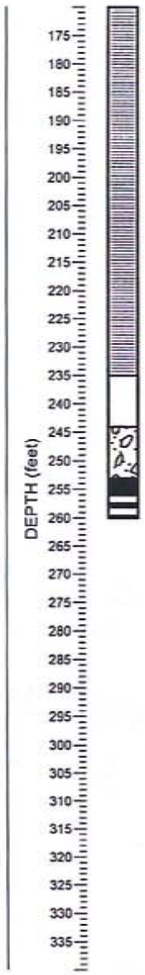
PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-3

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-3



ELEVATION (feet)

DESCRIPTION

SHALE - GRAY.

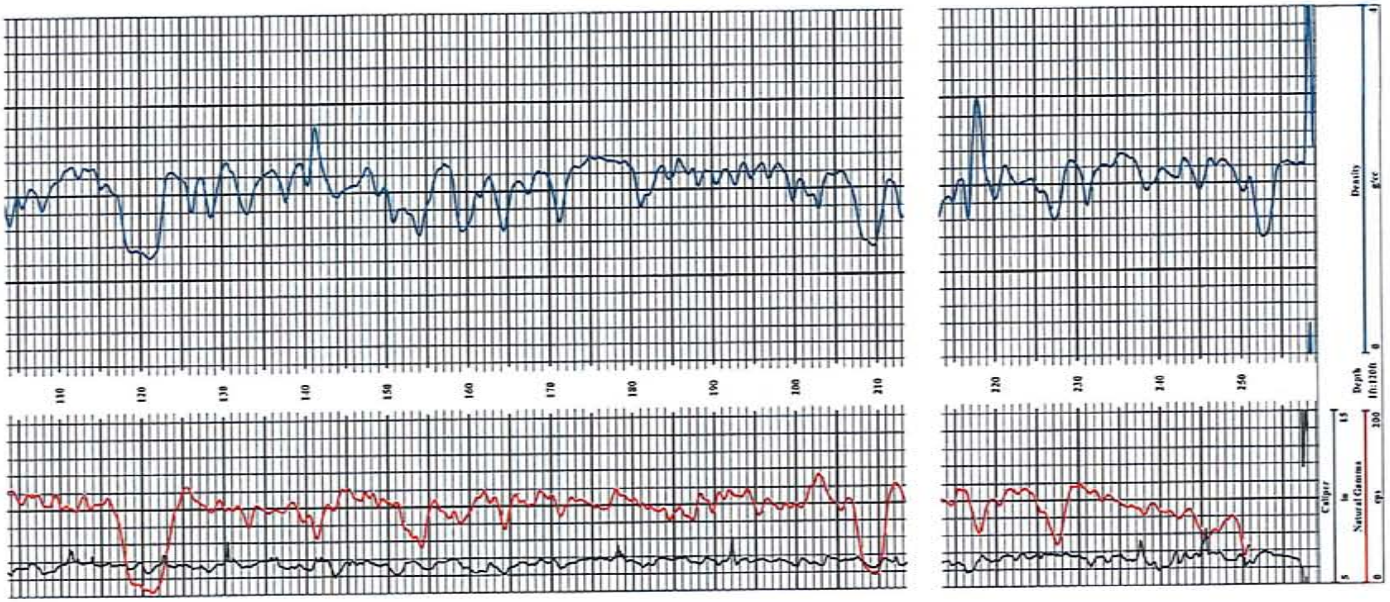
VOID - RETURNS LOST.

FIRM RUBBLE.

FLOOR.

CPT DN40851-110-G1.GPJ CPT.GDT 8/16/05

FIG. B- 3



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Suite E
Lakewood, Colorado
80215
Office: 303.279.0171
FAX: 303.279.0135
www.colog.com

Natural Gamma
Caliper
Density

COMPANY	CTL Thompson
WELL	TH-3
FIELD	Highland Park
COUNTY	Weld
STATE	Colorado

Company CTL Thompson
Well TH-3
Field Highland Park
County Weld
State Colorado

LOCATION

QTR SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM GROUND LEVEL ELEVATION NA

LOG MEAS. FROM GROUND LEVEL 0.0 ft ABOVE PERMINANT DATUM

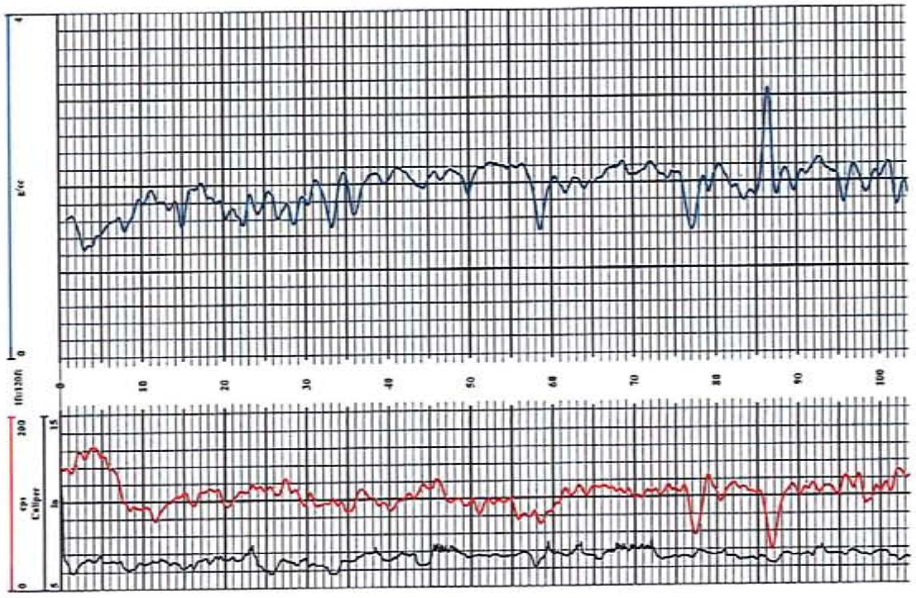
DRILLING MEAS. FROM GROUND LEVEL

DATE ACQUIRED	25 July, 2005			
RUN NUMBER	1			
LOG TYPE	Natural Gamma	Density	Caliper	
DEPTH-DRILLER	260'			
DEPTH-LOGGER	259'			
BTM LOG INTERVAL	250'	256'	256'	
TOP LOG INTERVAL	0'	0'	0'	
RECORDED BY	G. Samchuck			
WITNESSED BY	M. Roe			
PROBE TYPE, S/N	RADIPP 1431			
LOGGING SPEED	10 ft/min			
A.N.B.E.	1.2			
SAMPLE INTERVAL	0.5'			

BOREHOLE RECORD				CASING RECORD			
RUN No.	SIZE	FROM	TO	SIZE	WGT.	FROM	TO
1	6"	G.L.	20'				
	4"	20'	T.D.				

COMMENTS

NA - Not Available, NA - Not Applicable



PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-4

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-4

DEPTH (feet): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165

ELEVATION (feet)

DESCRIPTION

ALLUVIUM (CLAY, SANDY, BROWN, RUST, GRAY).

SHALE, RUST, GRAY, CEMENTED SANDSTONE LAYERS THROUGHOUT.

CPT_DN40851.110.G1.GPJ_CPT.GDT_8/24/01

PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-4

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-4

DEPTH (feet): 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335

ELEVATION (feet)

DESCRIPTION

COAL, BLACK, SOFT, LOW QUALITY.

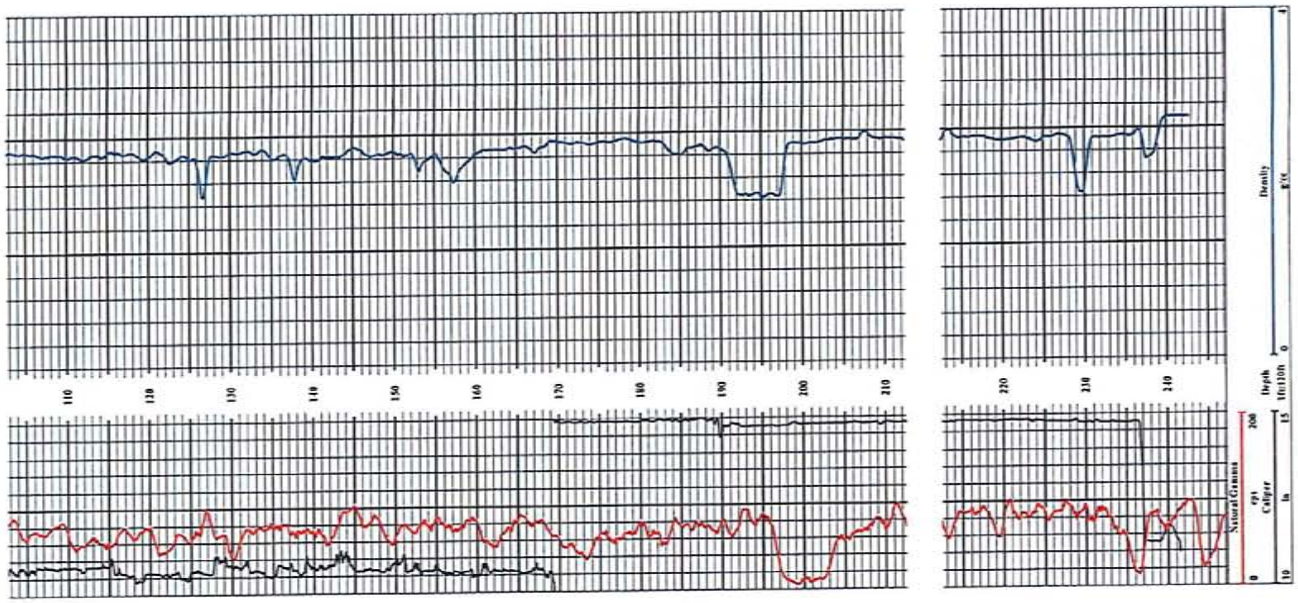
SHALE, GRAY.

COAL, BLACK, SOFT, LOW QUALITY.

SANDSTONE, GRAY, TAN.

CPT_DN40851.110.G1.GPJ_CPT.GDT_8/24/01

FIG. B- 4



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80215
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FAX: 303.278.0135
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Natural Gamma
Caliper
Density

COMPANY	CTL Thompson
WELL	TH-4
FIELD	Highland Park
COUNTY	Weld
STATE	Colorado

Company CTL Thompson
Well TH-7
Field Highland Park
County Weld
State Colorado

LOCATION

QTR SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM GROUND LEVEL ELEVATION NA

LOG MEAS. FROM GROUND LEVEL 0.0 ft ABOVE PERMINANT DATUM

DRILLING MEAS. FROM GROUND LEVEL

DATE ACQUIRED	29 July, 2005			
RUN NUMBER	1	2	3	
LOG TYPE	Natural Gamma	Density	Caliper	
DEPTH-DRILLER	260'			
DEPTH-LOGGER	249'			
BTM LOG INTERVAL	248'	247'	242'	
TOP LOG INTERVAL	0'	0'	0'	
RECORDED BY	M. Culig			
WITNESSED BY	M. Best			
PROBE TYPE, S/N	KLP, MGX II			
LOGGING SPEED	15' /min			
A.S.B.E.	1.2			
SAMPLE INTERVAL	0.2'			

BOREHOLE RECORD

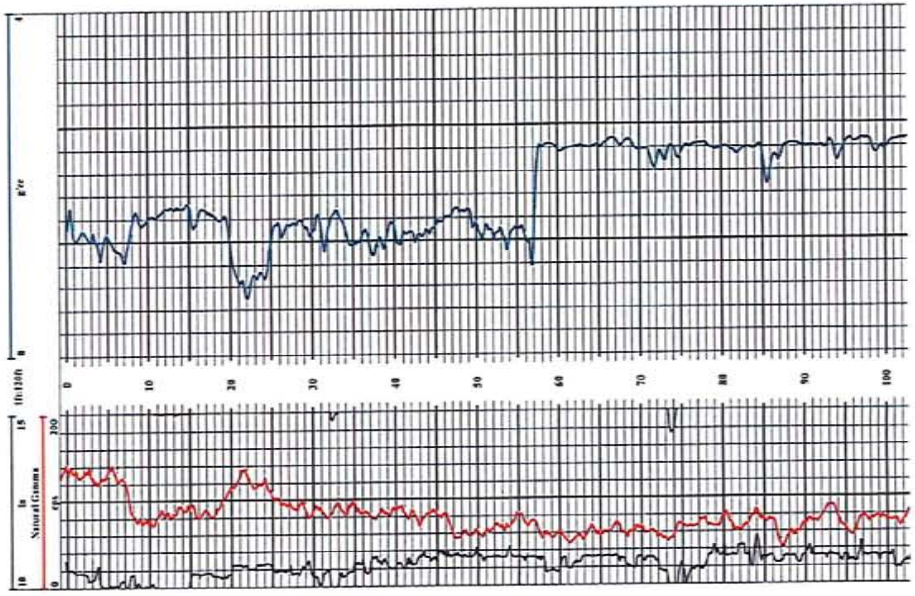
RUN No.	BIT	FROM	TO
1	6"	0'	110

CASING RECORD

SIZE	WGT.	FROM	TO

COMMENTS

NA - Not Available, NA - Not Applicable



PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-5

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-5

DEPTH (feet): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165

ELEVATION (feet)

DESCRIPTION

ALLUVIUM (CLAY, SANDY, BROWN, RUST, GRAY).

SHALE, BROWN, GRAY.

COAL, BLACK, SOFT, LOW QUALITY.

SANDSTONE, GRAY, TAN.

CPT_DN40851-110-G1.GPJ CPT.GDT 8/24/05

PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-5

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-5

DEPTH (feet): 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335

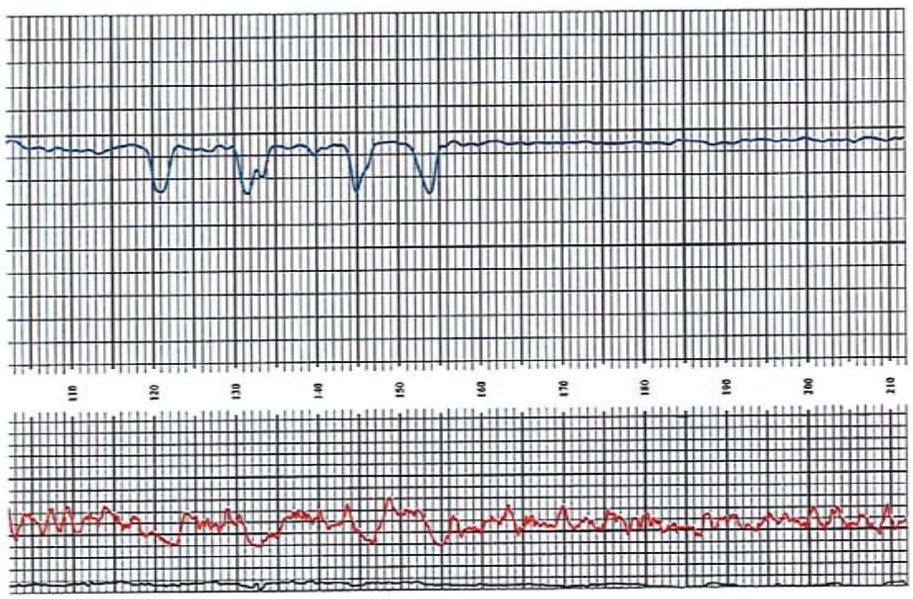
ELEVATION (feet)

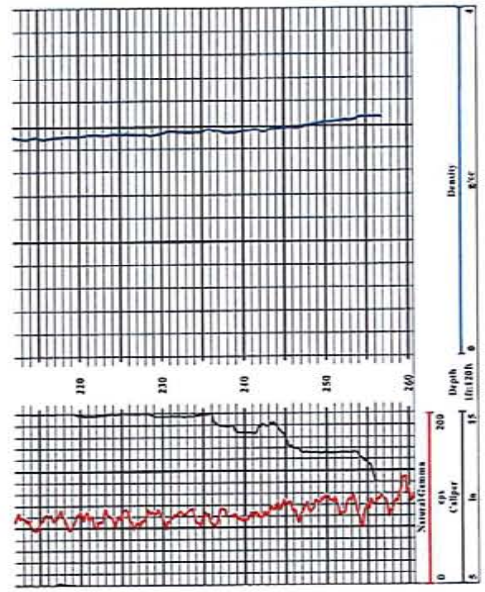
DESCRIPTION

SANDSTONE, GRAY, TAN.

CPT_DN40851-110-G1.GPJ CPT.GDT 8/24/05

FIG. B- 5





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FAX: 303.278.0135
www.colog.com

Natural Gamma Caliper Density

COMPANY	CTL Thompson
WELL	TH-5
FIELD	Highland Park
COUNTY	Weld
STATE	Colorado

Company CTL Thompson
Well TH-5
Field Highland Park
County Weld
State Colorado

LOCATION

QTR SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM GROUND LEVEL ELEVATION NA

LOG MEAS. FROM GROUND LEVEL 0.0 ft ABOVE PERMINANT DATUM

DRILLING MEAS. FROM GROUND LEVEL

DATE ACQUIRED	29 July, 2005			
RUN NUMBER	1	2	3	
LOG TYPE	Natural Gamma	Density	Caliper	
DEPTH-DRILLER	261'			
DEPTH-LOGGER	261'			
BTM LOG INTERVAL	261'	257'	244.3'	
TOP LOG INTERVAL	0'	0'	0'	
RECORDED BY	G. Bauer			
WITNESSED BY	M. Best			
PROBE TYPE, S/N	CLP 197n			
LOGGING SPEED	15 ft/min			
A.S.B.E.	1.2			
SAMPLE INTERVAL	0.2'			

BOREHOLE RECORD

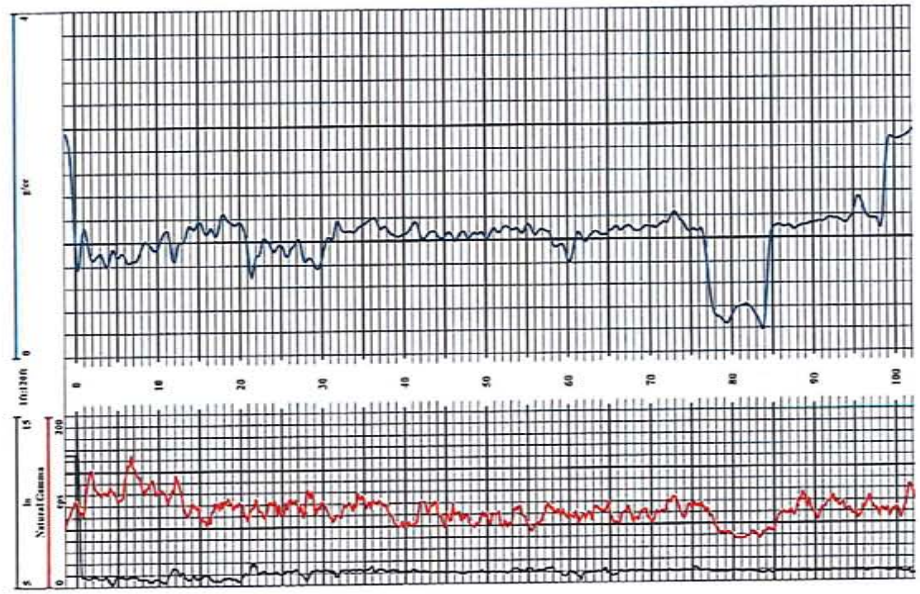
RUN No.	BIT	FROM	TO
1	6"	0'	1.0

CASING RECORD

SIZE	WGT.	FROM	TO

COMMENTS

NA - Not Available, N/A - Not Applicable



PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-6

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-6

DEPTH (feet): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165

ELEVATION (feet)

DESCRIPTION

ALLUVIUM (CLAY, SAND, BROWN, RUST, GRAY).

SHALE, RUST, GRAY.

COAL, BLACK, SOFT, MODERATE QUALITY.

SHALE, RUST, GRAY.

COAL, BLACK, SOFT, MODERATE QUALITY.

SHALE, RUST, GRAY.

COAL, BLACK, SOFT, MODERATE QUALITY.

SHALE, RUST, GRAY.

CPT_DN40851x110-G1.GPJ_CPT.GDT_82405

PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-6

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-6

DEPTH (feet): 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335

ELEVATION (feet)

DESCRIPTION

SHALE, GRAY.

COAL, BLACK, GOOD QUALITY.

SHALE, GRAY.

CPT_DN40851x110-G1.GPJ_CPT.GDT_82405

FIG. B-6

PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-7

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-7

ELEVATION (feet)

DESCRIPTION

ALLUVIUM (CLAY, SANDY, BROWN, RUST, GRAY).

SHALE, BROWN, GRAY, RUST.

COAL, BLACK, SOFT, LOW QUALITY.

SHALE, GRAY, RUST.

COAL, BLACK, SOFT, LOW QUALITY.

SHALE, BROWN, GRAY, RUST.

INTERBEDDED SHALE/SANDSTONE, GRAY.

COAL, BLACK, SOFT, LOW QUALITY.

SHALE, GRAY.

CPT_DN40851-110-G1.GPJ_CPT.GDT_8/24/05

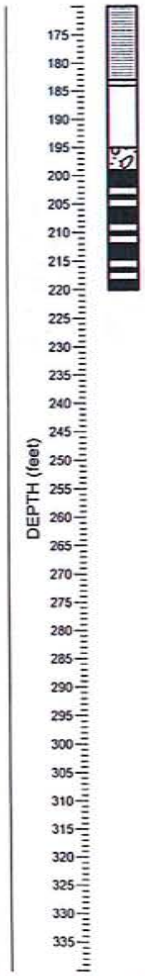
PROJECT NO. DN40,851-110
PROJECT NAME HIGHLAND PARK SUBDIVISION

CTL/THOMPSON, INC. (303) 825-0777
1971 WEST 12TH AVENUE DENVER, COLORADO 80204

BORING NUMBER TH-7

ELEVATION	TESTING BY: MB	ENGINEER: MB

TH-7



ELEVATION (feet)

DESCRIPTION

SHALE, GRAY.

CEMENTED SANDSTONE, RUST.

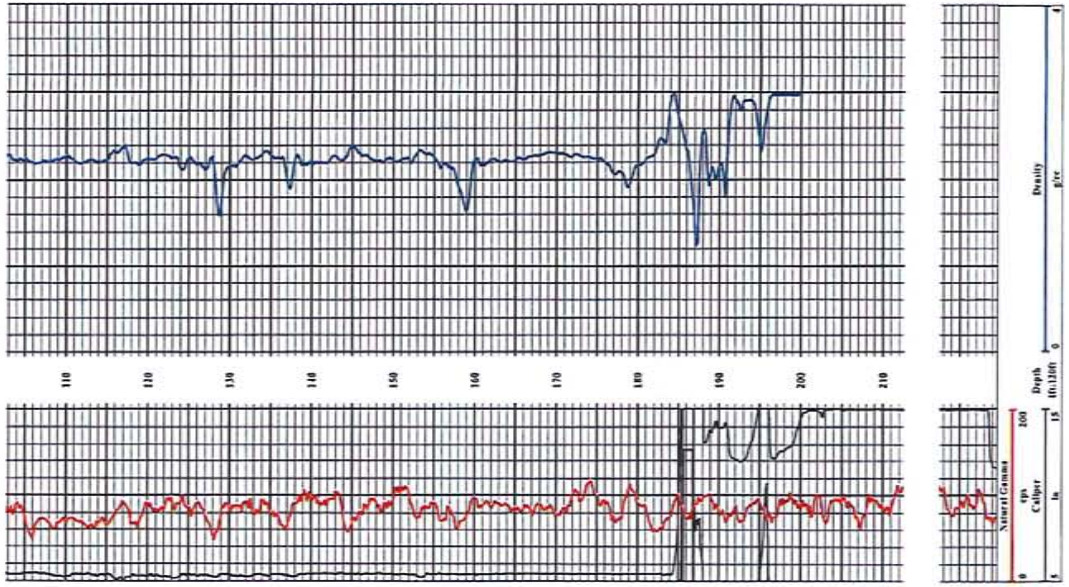
VOID, RETURNS LOST.

FIRM RUBBLE.

FLOOR.

CPT_DN40851-110-G1.GPJ_CPT.GDT_8/24/05

FIG. B- 7



COLOG

818 Quail Street
Suite E
Lakewood, Colorado
80215
Office: 303.279.0171
FAX: 303.278.0135
www.cologs.com

Natural Gamma
Caliper
Density

COMPANY	CTL Thompson
WELL	TH-7
FIELD	Highland Park
COUNTY	Weld
STATE	Colorado

Company CTL Thompson
Well TH-7
Field Highland Park
County Weld
State Colorado

LOCATION

QTR SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM GROUND LEVEL ELEVATION NA

LOG MEAS. FROM GROUND LEVEL 0.0 ft ABOVE PERMINANT DATUM

DRILLING MEAS. FROM GROUND LEVEL

DATE ACQUIRED	29 July, 2009			
RUN NUMBER	1	2	3	
LOG TYPE	Natural Gamma	Density	Caliper	
DEPTH-DRILLER	220'			
DEPTH-LOGGER	220'			
BTM LOG INTERVAL	219'	200'	219'	
TOP LOG INTERVAL	0'	0'	0'	
RECORDED BY	G. Bauer			
WITNESSED BY	M. Best			
PROBE TYPE, S/N	RAB/PS/ 2021			
LOGGING SPEED	25 ft/min			
A.R.E.	1.2			
SAMPLE INTERVAL	0.2'			

BOREHOLE RECORD

RUN No.	BIT	FROM	TO
1	6"	0'	TD

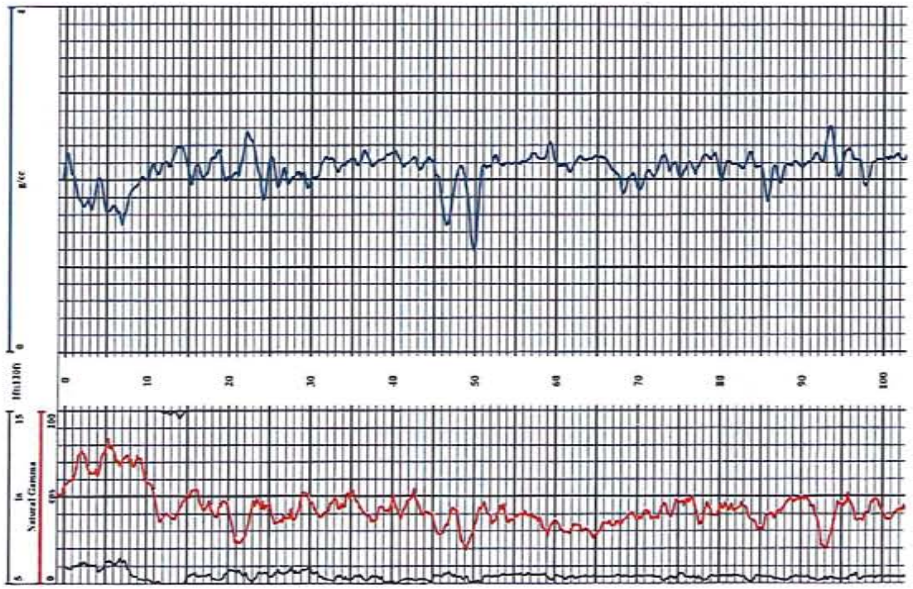
CASING RECORD

SIZE	WGT.	FROM	TO

COMMENTS

NA - Not Available, NA - Not Applicable

Density
Depth
Caliper



APPENDIX C

PHOTOLOG

Coal Waste Stockpile Near Main Shaft

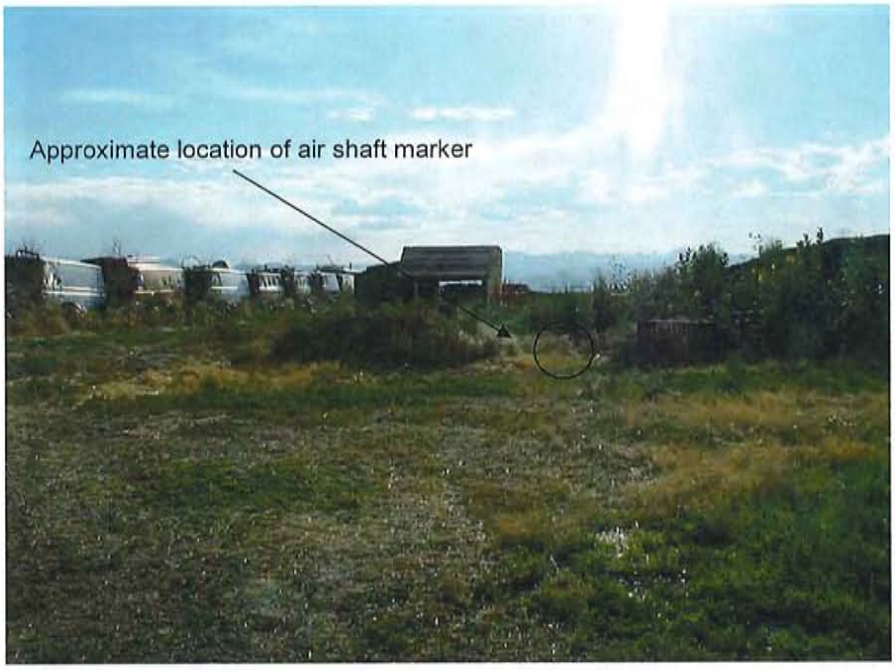
Concrete Structures and Machinery from Coal Mine

PHOTOLOG

ERIE HIGHLANDS

Project No. DN40,851-110

FIG. C-1



Overview of Air Shaft - 1

Mined Land Reclamation Marker - Boulder Valley #1 Air Shaft - 1

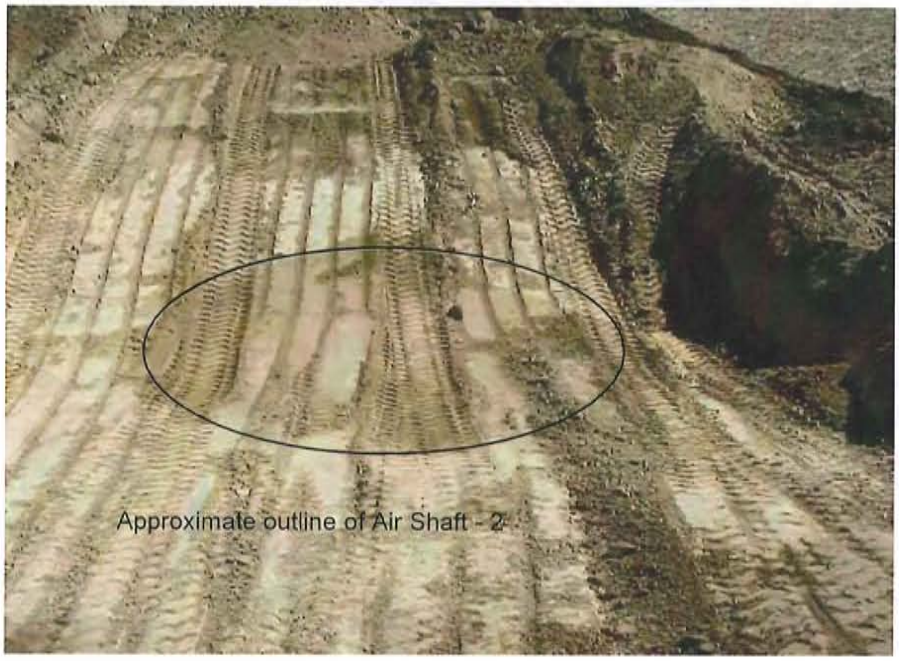
PHOTOLOG

ERIE HIGHLANDS

Project No. DN40,851-110

FIG. C-2

Closeup view of the Air Shaft - 1 Marker



Overview of the location of Air Shaft - 2 at 4 feet below grade

PHOTOLOG

ERIE HIGHLANDS

Project No. DN40,851-110

FIG. C-3

Overivew of Air Shaft - 2 at 13 feet deep

Debris found in backfill material of Air Shaft - 2

PHOTOLOG

ERIE HIGHLANDS

Project No. DN40,851-110

FIG. C-4

LEGEND:

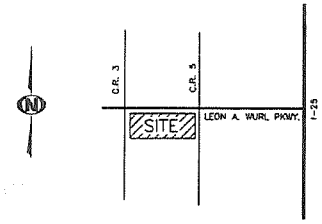
TH-2 ● INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING WHERE COAL WAS ENCOUNTERED

TH-1 ○ INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING WHERE MINE WORKINGS WERE ENCOUNTERED

INDICATES UNDERMINED AREA

INDICATES AREA NOT INCLUDED IN THIS INVESTIGATION

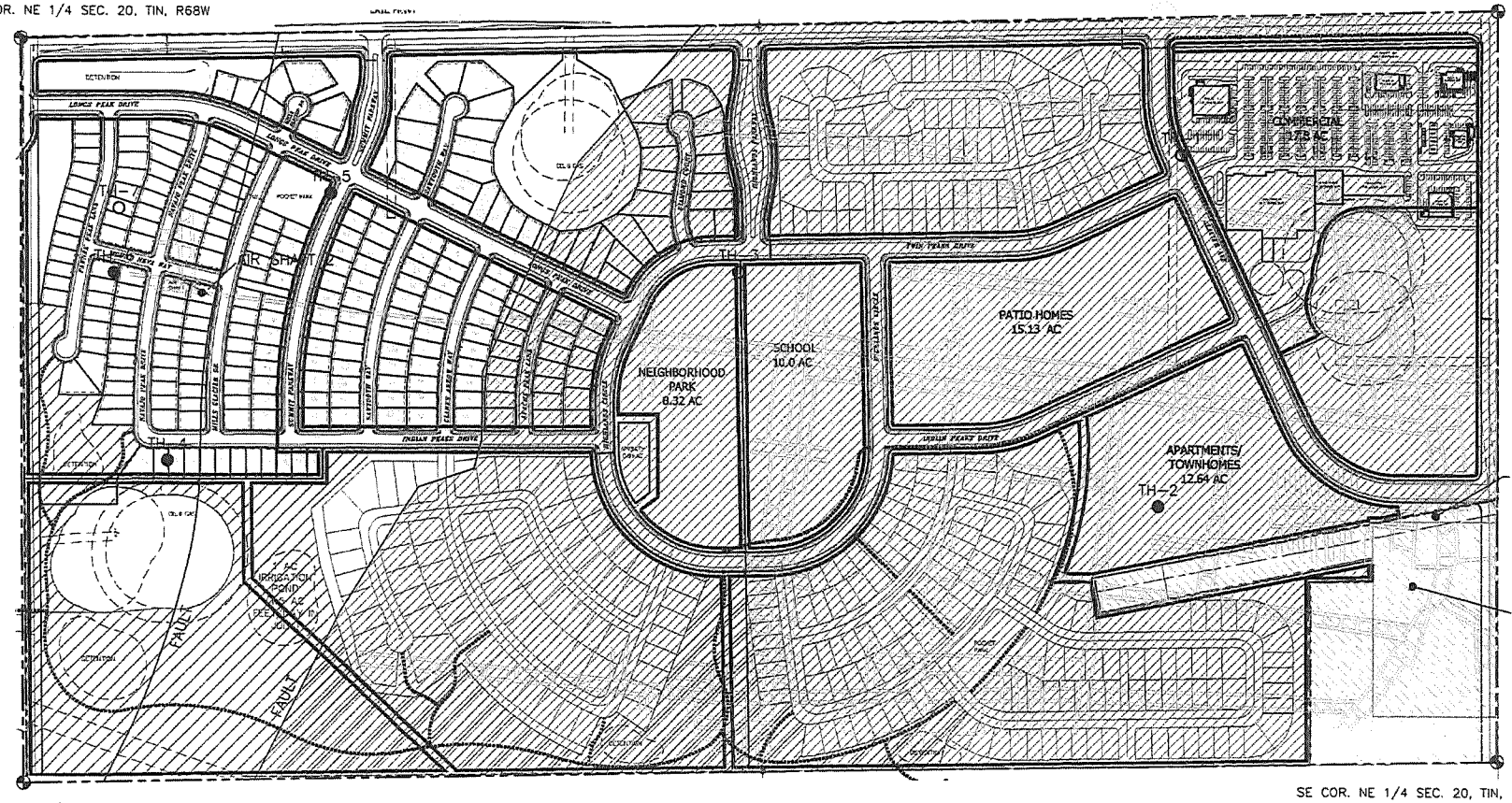
SCALE: 1"= 400'



VICINITY MAP
NOT TO SCALE

NW COR. NE 1/4 SEC. 20, TIN, R68W

NE COR. NE 1/4 SEC. 20, TIN, R68W



SW COR. NE 1/4 SEC. 20, TIN, R68W

SE COR. NE 1/4 SEC. 20, TIN, R68W

OAKWOOD HOMES, LLC
ERIE HIGHLANDS
Project No. DN40,851-110

Locations of Exploratory Borings

Fig. 1

F:\40's\DN40851.000\1102. Reports\R1 REV June 2013\DN40851-110-R1-Rev june 2013-F1.dwg, 7/22/2013 9:41:26 AM, rstanisic

LEGEND:

TH-2 ● INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING WHERE COAL WAS ENCOUNTERED

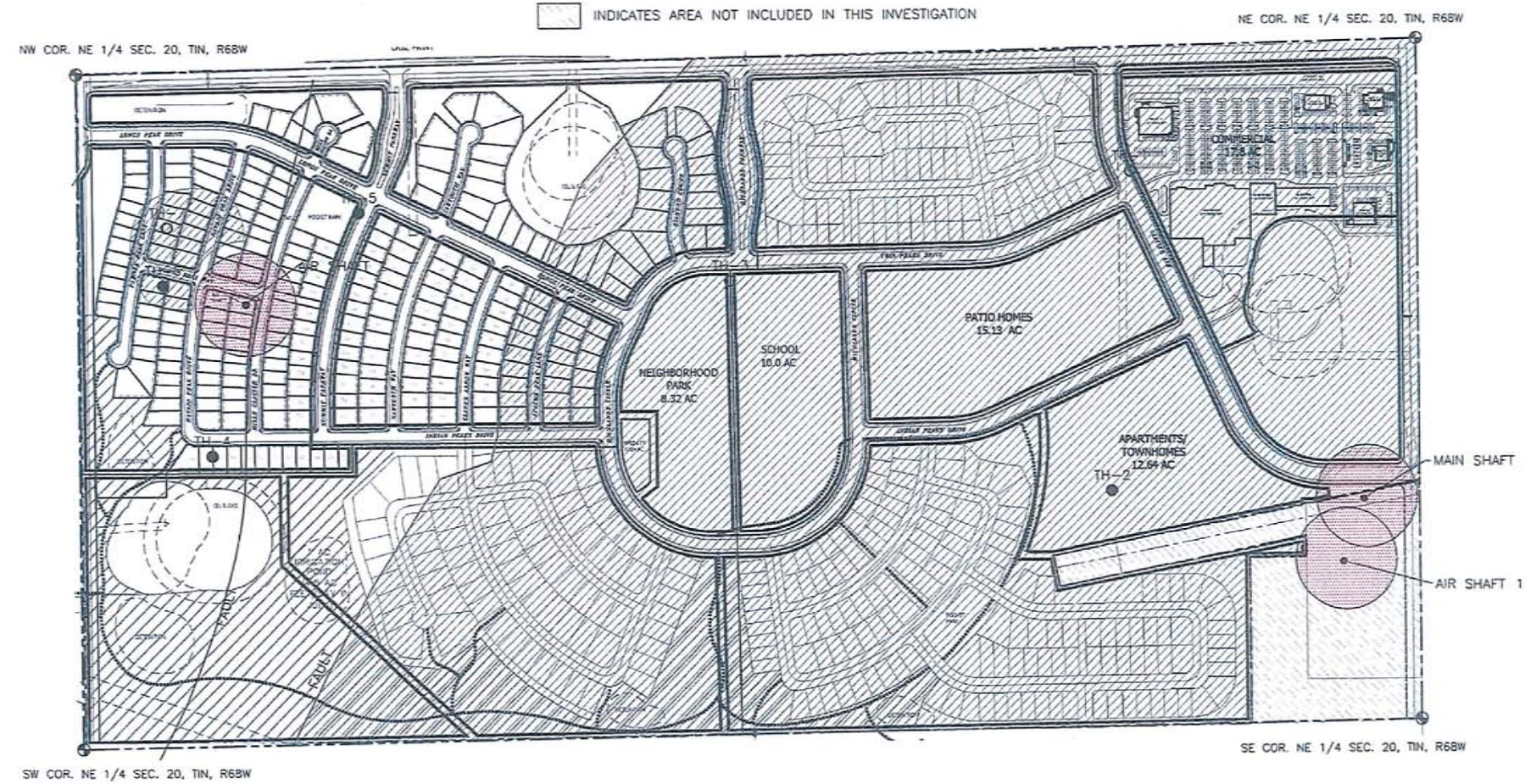
TH-1 ○ INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING WHERE MINE WORKINGS WERE ENCOUNTERED

LOW RISK

SIGNIFICANT RISK

INDICATES AREA NOT INCLUDED IN THIS INVESTIGATION

SCALE: 1"= 400'



OAKWOOD HOMES, LLC
ERIE HIGHLANDS
Project No. DN40,851-110

Subsidence Potential

Fig. 2

T:\40's\DN40851.000\110\2. Reports\R1 REV June 2013\DN40851-110_F2-REV R1 June 2013-D.dwg, 7/22/2013 9:57:21 AM, rstanitic

Dearmin Property
Ecological Site Assessment-
Vegetation, Wildlife, Wetlands, Special Status Species

Prepared For:

A.G. Wassenaar, Inc.
2180 South Ivanhoe Street, Suite 5
Denver, Colorado 80222

Prepared By:

Wildland Consultants, Inc.
1001 Jefferson Drive
Berthoud, CO 80513

January 2013

Table of Contents

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2.1 General Site Description and Plant Communities	1
2.2 Wetlands and Waters of the United States	2
2.3 Threatened, Endangered and Special Status Species	2
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3.0 Conclusions and Recommendations	4
4.0 Literature Cited	5
Attachment A- Site Photos, Site Inventory Map	6

Dearmin Property, Ecological Site Assessment- Vegetation, Wildlife, Wetlands, Special Status Species

1.0 Introduction

The Dearmin site is located just southeast of the original Erie townsite, within the Erie city limits. The site includes approximately 300 acres of undeveloped land. County Road 8 runs along the north boundary, County Road 5 along the east, Green Mill Road along the west, and undeveloped land (and a shooting range) borders the south boundary. Attachment A includes a Site Inventory Map showing site location and site photos.

Wildland Consultants, Inc. (WCI) completed an Ecological Assessment of the site to determine if the project area supports important plant communities, wetlands, wildlife habitat, or potential habitat for special status species. Mr. Eric Berg of WCI completed a field review and literature review to complete this assessment. Mr. Berg is a Certified Wildlife Biologist and Certified Professional Wetland Scientist with over 20 years of experience working in Colorado.

2.0 Site Description, Vegetation, Wildlife

WCI completed a field review of the site on January 20th, 2013. A formal wetland delineation was not completed. No surveys for special status species were completed. The field review was designed to identify potential ecological issues that may need to be addressed as the project is developed.

2.1 General Site Description and Plant Communities

The dominant existing land-use on the development site is open space/fallow farm land used for growing winter wheat. There appears to be an abandoned underground coal mine in the southeast site corner. There are 3 oil and gas well pads on the site.

There are 2 small remnant native grassland communities on the site, associated with 2 small steep drainage basins. These small native grassland areas are in poor condition. The dominant plant community on the site is agricultural land. Weedy plants are found along field margins and

roads(kochia, sunflower, cheatgrass, Canada thistle, and cheatgrass). Invasive and noxious weeds present include: Canada thistle and field bindweed.

There are no streams, defined drainages, or riparian habitat on the site. (Attachment A, site photos).

2.2 Wetlands and Waters of the United States

Regulatory Background-

Wetlands and waters of the United States are protected under the Section 404 of the Clean Water Act (CWA). Discharge of fill or dredged materials to wetlands is regulated by the CWA. A permit from the Army Corps of Engineers (ACOE) may be needed for any discharge of any fill materials into wetlands. To be considered jurisdictional by the ACOE a wetland needs to have a nexus or connection to other wetlands and waters. Only jurisdictional wetlands require permits for fill.

Site Conditions-

There are no National Wetland Inventory (NWI) mapped wetlands on the site (NWI 2013). During the field reconnaissance WCI did not locate any other wetland areas or potential wetland areas on the site. The nearest wetlands are along Coal Creek approximately 0.4 miles to the west. The site does support 2 drainage swales with steeper slopes that have not been farmed. There are no wetlands or defined stream channels in these 2 swales.

2.3 Threatened, Endangered and Special Status Species

WCI reviewed habitat conditions on the site to determine if the area provides potential habitat to any federally listed species that are protected under the Endangered Species Act (ESA). Species that are federally listed (formerly listed as Endangered or Threatened) are protected by the ESA. The U.S. Fish and Wildlife Service (USFWS) is the federal agency responsible for administering the ESA. Based on a search of the USFWS database there are several listed species that have the potential to occur in Boulder County (USFWS 2013). WCI reviewed this list prior to completing the field review. Based on habitat and site conditions the following species have the potential to occur in the general region of the proposed development.

Plants-

Two federally listed (Threatened) plant species, the Ute ladies' tresses orchid (*Spiranthes diluvialis*) and the Colorado butterfly plant (*Guara neomexicana*) have potential to occur in the general region.

The Ute ladies'-tresses orchid has been documented in areas with seasonally wet soils and wet meadows nears springs, lakes, or perennial streams and their associated flood plains below 6,500 feet above sea level in the South Platte River Drainage (USFWS 1992a). Known populations of this species occur in Nevada, Utah, and eastern and western Colorado (USFWS 1992b). Several historically documented populations are known to occur along the Front Range and in Boulder County in Colorado.

The Colorado butterfly plant is a perennial plant endemic to moist and mesic areas in southeastern Wyoming, north-central Colorado, and western Nebraska (USFWS 2000). It typically grows on sub-irrigated alluvial soils at elevations between 5000 and 6400 feet. Populations are commonly found in floodplains and drainage bottoms and in depressions along slow-moving streams (Fertig 2000, O'Kane 1988a). Populations are known to occur in Weld and Larimer Counties, Colorado (Floyd 1995, USFWS 2010).

No known populations of either species are located near the development site. The site does not support any wetlands, wet meadows, or streams or other potential habitat areas. Impacts to listed plant species are not expected.

Wildlife-

The only Federally listed wildlife species that has the potential to occur in the region of the development site is the Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Preferred habitat for the Preble's meadow jumping mouse includes thick shrubby riparian habitat along regional streams and rivers (Armstrong et al. 1997). Critical habitat has been established for this species in Boulder County. The development site is not within or near a Critical Habitat area. There are no known populations of Preble's meadow jumping mouse anywhere near the development site.

The development site is dominated by tilled lands. There is no potential habitat (riparian zones, streams, drainages) for the Preble's meadow jumping mouse within or near the site. The nearest potential habitat is along Coal Creek approximately 0.4 miles west of the site.

2.4 Other Wildlife Species

WCI did not locate any raptor stick nests (nests in trees) on the site. There are no large trees present.

There are no known bald eagle nests or bald eagle roost on or near the site (NDIS 2013). There are no known great blue heron or other communal nesting waterbird rookeries located on or near the site. There are a few other migratory birds potentially present on and adjacent to the site (meadow larks are likely common breeders on the site during the spring and summer). The site is not mapped as being critical or crucial wildlife habitat (NDIS 2013).

Even thought the site is tilled the site does support a large and diffuse/low density black-tailed prairie dog colony. The colony density is higher along the western 1/3 but prairie dogs are present scattered through the site. This colony extends onto other adjacent properties. This

colony provides potential nesting habitat to the burrowing owl. The colony also provides foraging habitat to area raptors. Two ferruginous hawks (a relatively rare species in Boulder County) and an immature bald eagle were observed foraging on the site during the January field review.

The development site does not provide a wildlife movement corridor.

3.0 Conclusions and Recommendations

Wetlands-

Development of the site will not impact wetlands. Permits should not be required from the ACOE for site development.

Threatened and Endangered Species-

Preble's Meadow Jumping Mouse-

The project will not impact potential habitat for the Prebles' meadow jumping mouse.

Ute Ladies' Tresses Orchid, Colorado Butterfly Plant-

The project will not impact potential habitat for the Ute ladies' tresses orchid or Colorado butterfly plant.

Wildlife-

The site will not impact any key wildlife habitat areas, migration corridors, or raptor nesting sites.

Black-Tailed Prairie Dog Colony-

Prairie dog colonies provide raptor foraging areas, potential nesting sites for the burrowing owl, and always seem to be of public interest/concern for development projects in the Boulder County area. Prior to development the prairie dog colony would have to be removed or the prairie dogs would have to be trapped and relocated. Live trapping and relocating prairie dogs is difficult. There are currently no agencies, or landowners who are accepting prairie dogs for release in the area. Removal should only be completed by a licensed control company. There could be an option to donate humanely killed prairie dogs to a local raptor rehabilitation center to be used as food. The local public may comment on any project where a prairie dog colony has to be removed.

A nest survey for burrowing owls should be completed prior to any prairie dog control, or site grading (within the prairie dog colony) if that activity is proposed for the period of burrowing owl activity (March 1 to October 31). This survey should be completed according to standard CDOW protocol.

Town of Erie Requirements-

The Town of Erie has specific code/development environmental review requirements however there are no wetlands, or other areas that should require buffers or site avoidance. The Town will likely require that prairie dog control be completed by a licensed and approved contractor.

4.0 Literature Cited

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Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado Rare Plant Field Guide. Colorado Natural Heritage Program.

USFWS 2013. Mountain and Prairie Website.

USFWS. 1992a. Interim Survey Requirements for Spiranthes diluvialis. 8 pp.

___. 1992b. Final Rule to List the Plant *Spiranthes diluvialis* (Ute ladies'-tresses orchid) as a Threatened Species. CFR 50 Part 17. 7 pp.

Attachment A- Site Photos, Site Inventory Map

Photo 1. View from NW corner to east, tilled land

Photo 2. View to east from west edge of site, prairie dogs and tilled land

Photo 3. View to east from west edge, drainage swale, poor quality grassland, prairie dogs

Photo 4. View to east from SW corner, tilled land, shooting range fence.

Photo 5. View to west from NE project corner.

Photo 6. View to south from NE project corner.

Photo 7. View to the west along southern site boundary.

Photo 8. Old coal mine along eastern site edge.

Photo 10. View to west from site center, fallow land.

Photo 11. Drainage swale along south site boundary, native grassland.

Co Rd 5
County Rd 8
County Rd 3
Green Mill Rd

ALDRIDGE TRANSPORTATION CONSULTANTS, LLC

Advanced Transportation Planning and Traffic Engineering

TRAFFIC IMPACT STUDY

for

ERIE HIGHLANDS

ERIE, COLORADO

Prepared for:

Engineering Partners, Inc.
1950 W. LITTLETON BLVD #109
LITTLETON, CO 80120

Prepared by:
JOHN M.W. ALDRIDGE, PE, PTOE, AICP
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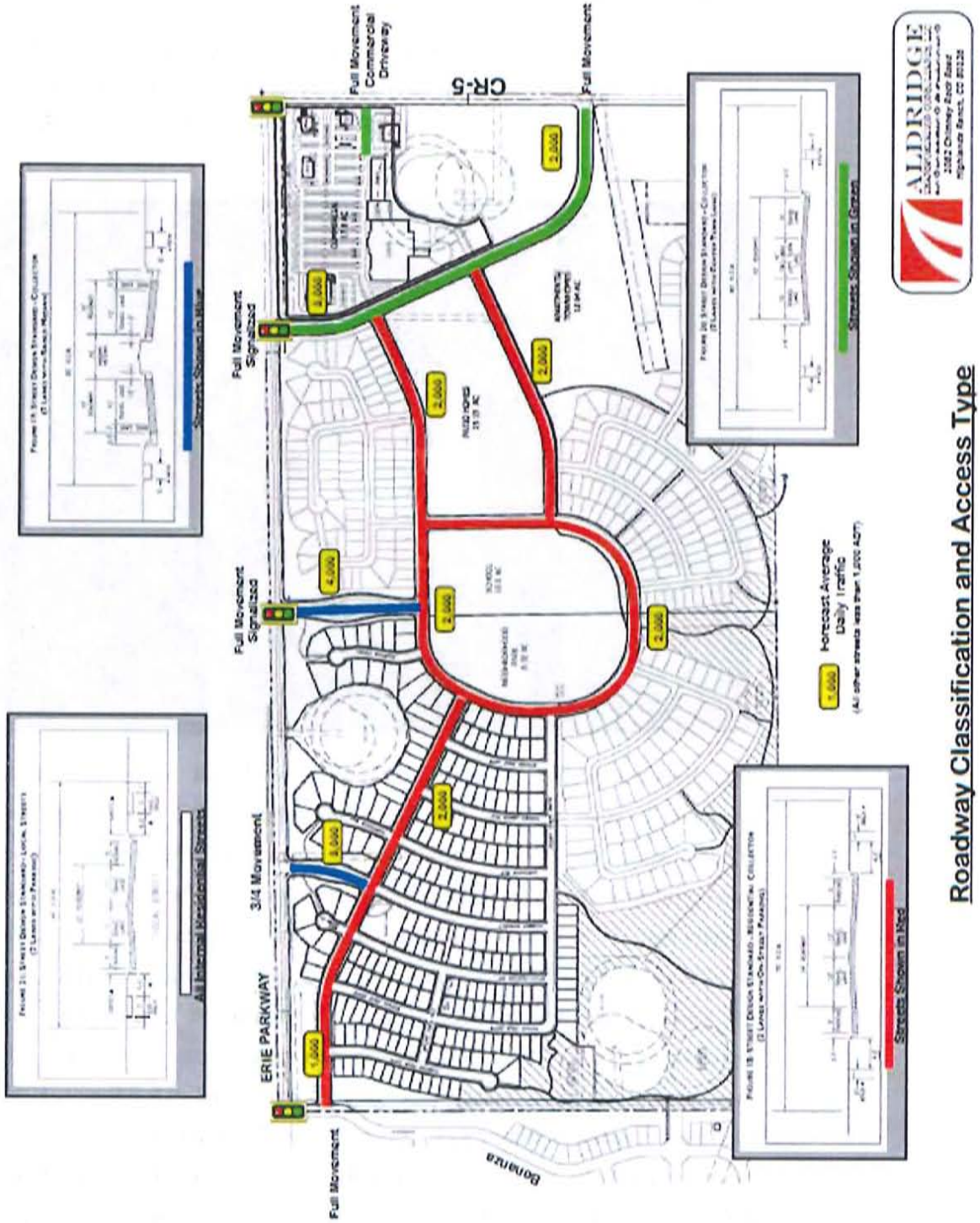
1082 CHIMNEY ROCK ROAD
HIGHLANDS RANCH, COLORADO 80120
303-703-9112

August 22, 2013

1. INTRODUCTION

This report examines the traffic impact associated with the construction of Erie Highlands in Erie, Colorado. The project is located on the south side of Erie Parkway between CR-3/Bonanza and CR-5. An aerial photo below shows the location and general vicinity of the project.

The proposed project is a new mixed-use residential and neighborhood commercial center featuring 791 single-family homes, 203 townhomes, and 100,000 square feet of commercial/shopping center uses. The project proposes three primary accesses from the one-mile stretch of Erie Parkway. The access directly east of CR-3 (Summit Blvd.) will be a 3/4 movement, the center access (Highlands Blvd.) will be a full-movement and signalized when warranted, and the access to the west of CR-5 (Glacier Drive) will be full-movement and signalized when the commercial area is developed. There will be one full-movement access from Bonanza (Longs Peak Drive) and two full-movements (yet named) accesses from CR-5. One will serve the commercial area and the other the southeast section of the property. The following graphic shows the access locations and type, forecast average daily traffic, and cross-sections.



Roadway Classification and Access Type

Erie Parkway is a two-lane roadway that carries approximately 7,500 ADT in this section of the roadway. It is designated as a Principal Arterial (NR-A per CDOT Access Code) in the Town's 2008 transportation plan. The intersection of CR-3/Bonanza and Erie Parkway is two-way stop sign controlled. At CR-5 and Erie Parkway, the intersection is all-way stop sign controlled.

The traffic operations analysis herein examined a Filing 1 2016 scenario with the proposed initial development, and a 20-year horizon 2035 scenario with full build out of the property. Filing 1 contains 251 single-family homes in Planning Areas 1, 2, 3, and 4. The assumptions made on background traffic volumes are from the 2015 and 2030 growth forecasts in the **Town of Erie Transportation Master Plan (2008)** and the **Traffic Impact Analysis for Bridgewater Phase 1** prepared by LSC in October 2011. In addition data was gleaned, particularly trip distribution and assignment factors, from a traffic impact study prepared by Delich Associates in August 2007. The property was then known as the Emerson Development.

Note that the master plan growth projections assumed development of this property according to the **Town of Erie Comprehensive Plan** and the Town's **Land Use and Zoning Map**. The background volumes in the Bridgewater report, which have been approved by the Town, included projections from this project as well as from Erie Commons, Sunset, Tallgrass North, and Morgan Hill. For consistency, the forecast 2035 traffic volumes in the Bridgewater report were incorporated into this report.

In summary, this analysis demonstrates that the recommended access control and the proposed roadway improvements provide safe and convenient access and will function harmoniously with traffic flow on the adjacent streets and intersections.

2. PROJECT TRIP GENERATION AND DESIGN HOUR VOLUMES

The project's trip generation calculates from rates and values found in the ***ITE Trip Generation Manual, 9th Edition.*** The PUD plan has 994 residences, 100,000 square feet of commercial/shopping center use, and a 750-student elementary school. The chart below shows the trip generation for average weekday (ADT) and AM and PM peak hours for each of the planning areas, school, and the total of them.

Trip Generation Worksheet for Erie Highlands

					AVERAGE WEEKDAY			
					AM		PM	
ITE CODE	LAND USE	UNIT	QUANTITY	ADT	IN	OUT	IN	OUT
210	PA 1	DU	7	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SFD			**67**	**1**	**4**	**4**	**3**
210	PA-2	DU	112	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SFD			**1,066**	**21**	**63**	**71**	**41**
210	PA-3	DU	37	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SFD			**352**	**7**	**21**	**23**	**14**
210	PA-4	DU	95	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SFD			**904**	**18**	**53**	**60**	**35**
210	PA-5	DU	95	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SDF			**904**	**18**	**53**	**60**	**35**
210	PA-6	DU	155	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SFD			**1,476**	**29**	**87**	**98**	**57**
210	PA-7			*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
	Amenity							
210	PA-8	DU	120	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SFD			**1,142**	**23**	**68**	**76**	**44**
230	PA-9	DU	170	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SFD			**1,618**	**32**	**95**	**107**	**63**
230	PA-10	DU	203	*5.81*	*0.07*	*0.37*	*0.35*	*0.17*
	TH/APT			**1,179**	**15**	**74**	**71**	**35**
210	PA-11	KSF	100	*equation*	*equation*	*equation*	*equation*	*equation*
	COMM			**6,791**	**96**	**59**	**287**	**311**
520	PA-12	Students	750	*1.29*	*0.25*	*0.20*	*0.07*	*0.08*
	Elementary			**968**	**186**	**152**	**55**	**57**
TOTAL TRIPS				16,468	446	730	911	696

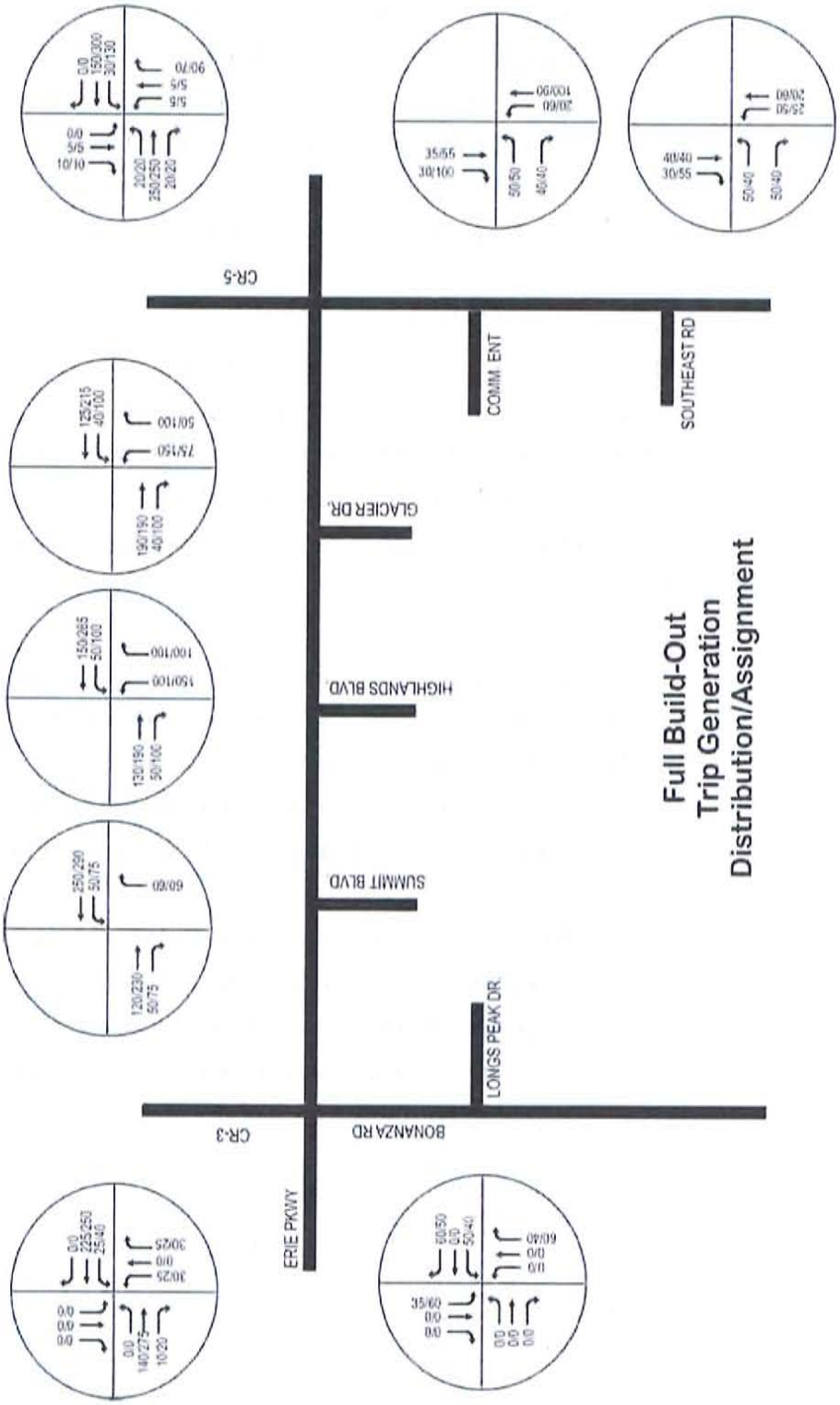
As the PM peak hour trips are considerably higher than the AM peak hour, the PM peak hour is the design hour volume (DHV). An analysis of the AM peak hour impacts was prepared to review and check the proposed intersection design and traffic control. Although there will be internal trips of approximately 10 percent and pass-by trips associated with the commercial area, to be conservative in the analysis these reductions were not taken.

3. TRIP DISTRIBUTION AND ASSIGNMENT

The trip distribution is based on the locations of streets and highways (including the easy access to I-25) and employment and shopping in the surrounding area. The assumption is that 50 percent will originate from the west, and 40 percent from the east. The remaining 10 percent will orient north and south on CR-5, which provides access south to SH-7 via Sheridan Parkway and to the north to SH-52.

The majority of the school traffic will be internal with the exception of the Grandview area on the west side of Bonanza. It is estimated, based on the number of homes in Grandview (approximately 340), that one-third of the school traffic will come from Grandview and will access the school via Bonanza and Longs Peak Drive. The park and amenity traffic will be primarily internal trips.

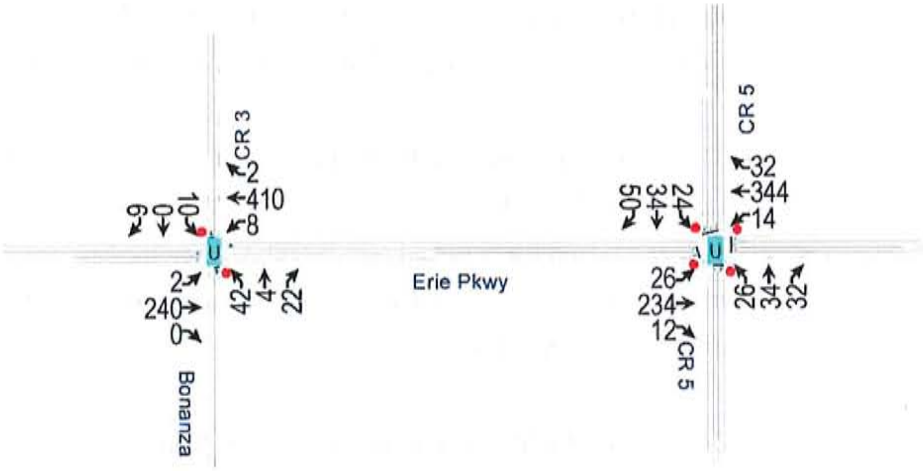
The distribution and assignment of site-generated trips for the AM and PM peak hours are shown on graphics provided on the following pages for the Full Build-Out in the AM/PM peak hours. Chapter 6 contains an analysis of the initial 2016 development Filing 1 including a graphic of the trip distribution and assignment.



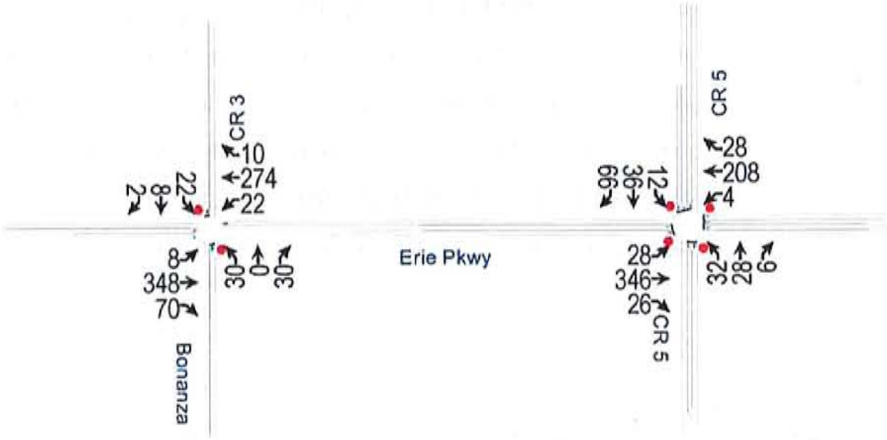
Full Build-Out
Trip Generation
Distribution/Assignment

4. EXISTING AND PROJECTED TRAFFIC VOLUMES

Traffic counts at the intersections of CR-3/Erie Parkway and CR-5/Erie Parkway by ATC on January 17, 2013. The counts for the existing AM and PM peak hours are provided below and on the Synchro graphics in the appendix. Operations models were prepared using Synchro v8. The existing LOS at each intersection is C in both the AM and PM peak hours.



AM Peak Hour



PM Peak Hour

Two scenarios were prepared for the future conditions. The first is the 20-year or the 2035 design horizon. The second scenario is Filings 1 development expected by 2016. This scenario examines the impact of the development of 251 homes in the northwest portion of the property. Chapter 6 contains a separate analysis of Filing 1.

The **Town of Erie Transportation Master Plan (2008)** provides forecasts for 2015, 2030, and 2060 (highly speculative full build-out of the Town and not used in this analysis). The forecast volumes in the master plan provided control points for this analysis. The current volume is approximately 7,500 ADT.

The 2015 forecast daily volume in the master plan is 10,000 ADT on a 2-lane roadway with a LOS D capacity of 14,400 ADT. The 2030 forecast volume is 17,000 ADT on the west end and 23,000 ADT on the east end. In that time, the master plan anticipates a 4-lane with center median roadway that has an LOS D capacity of 36,000 ADT.

The projected daily volume of the Erie Highlands in 2016 is 11,500 ADT inclusive of the Bridgewater Phase 1 development. In 2035, the projected daily volume is 35,000 ADT. These numbers are consistent with the Bridgewater TIA, but are far more than the master plan, which shows 21,000 by 2030[1]. Even though we find reason to disagree with the Bridgewater projections per the footnote, both indicate that a four-lane facility will be necessary in future. In the 2016 short-term scenario the existing two-lane facility is sufficient to handle the additional traffic at LOS C according to the master plan.[2]

[1] Upon review of the Bridgewater TIA it is apparent that the projected traffic from other area developments was double counted. The TIA increases the traffic volume from 2011 with a DRCOG factor of 2.46, which is inclusive of traffic generated by the TAZs, and then layers on traffic generated by the other area developments.

[2] Town of Erie Transportation Master Plan, Table 2: Roadway LOS Thresholds by Functional Classification, Page 15.

5. CAPACITY AND LEVEL OF SERVICE (LOS) ANALYSIS

A series of Synchro v8 traffic operations and SimTraffic simulation models were prepared to analyze the traffic operations of each scenario. The operations analysis is used to determine the veracity of access locations, type of traffic control, and intersection geometry. It also provides several key indicators on arterial traffic flow, level of service, signal coordination, and queuing data.

Synchro v8 is based on procedures and methodologies referenced from the **Highway Capacity Manual 2010 (HCM).** It rates intersection operations using a determination of level of service (LOS). LOS is letter rating from A to F. LOS A indicates free-flow traffic conditions and no delay at intersections. LOS F is heavy traffic congestion with significant delay. LOS is provided for the overall operations at signalized intersections. LOS D is generally the benchmark for acceptable signalized intersection operations during the weekday AM/PM peak hours. The LOS rating for unsignalized intersections is provided by the critical movement - not the overall -, which is generally a left turn out from the minor street. Caution must be used when evaluating the LOS at unsignalized intersections particularly when LOS F is shown. In case of an LOS F, the HCM[3] suggests that other evaluation measures should be considered such as the control delay, volume over capacity ratio, and the 95th percentile queue length to make the most effective traffic control decision. LOS F at unsignalized intersections is often normal for the weekday peak hour. The operations analysis data are presented on Synchro graphics in the appendix along with the Synchro worksheet reports.

The table on the next page provides a Level of Service summary of the unsignalized and signalized intersections. Where an LOS F appears, the control delay in seconds per vehicle and the 95th percentile queue length is shown as well.

[3] Highway Capacity Manual 2010 page 19-40

Unsignalized Intersection Level of Service Summary						
	Existing		2016		2035	
Intersection	AM	PM	AM	PM	AM	PM
Erie Parkway/CR-3	C	C	SIG	SIG	SIG	SIG
Erie Pkwy/Summit Blvd.	N/A	N/A	C	D	C	D
Erie Pkwy/Highlands Blvd.	N/A	N/A	N/A	N/A	SIG	SIG
Erie Pkwy/Glacier Dr.	N/A	N/A	N/A	N/A	SIG	SIG
Erie Parkway/CR-5	C	C	SIG	SIG	SIG	SIG
Bonanza/Longs Peak Dr.	N/A	N/A	A	A	B	A
CR-5/Commerical Ent.	N/A	N/A	N/A	N/A	C	D
CR-5/Southeast Rd.	N/A	N/A	N/A	N/A	D	D

Signalized Intersection Level of Service Summary						
	Existing		2016		2035	
Intersection	AM	PM	AM	PM	AM	PM
Erie Parkway/CR-3	UNSIG	UNSIG	B	C	B	D
Erie Pkwy/Highlands Blvd.	N/A	N/A	A	A	A	A
Erie Pkwy/Glacier Dr.	N/A	N/A	B	A	A	B
Erie Parkway/CR-5	UNSIG	UNSIG	D	E	C	E

The summary chart shows that all the signalized intersections will operate acceptably. The unsignalized intersections also will operate acceptably. An animation of the traffic movement throughout the project and on the adjacent streets and intersections is available via the SimTraffic software.

SIGNAL PROGRESSION

The signal progression efficiency was examined in 2035 AM and PM peak hours considering signals at CR-3, Glacier Drive, and CR-5. Signal progression efficiency is determined by adding the EB and WB bandwidths and dividing the product by 2 times the cycle length. 30 percent efficiency is considered good and 35 percent is considered excellent. The following table provides the signal progression efficiency.

Signal Progession Efficiency Analysis						
Period	EB Band	WB Band	Total	Cycle	Efficiency	Rating
2035 AM	42	24	66	100	33%	Good
2035 PM	30	50	80	120	33%	Good

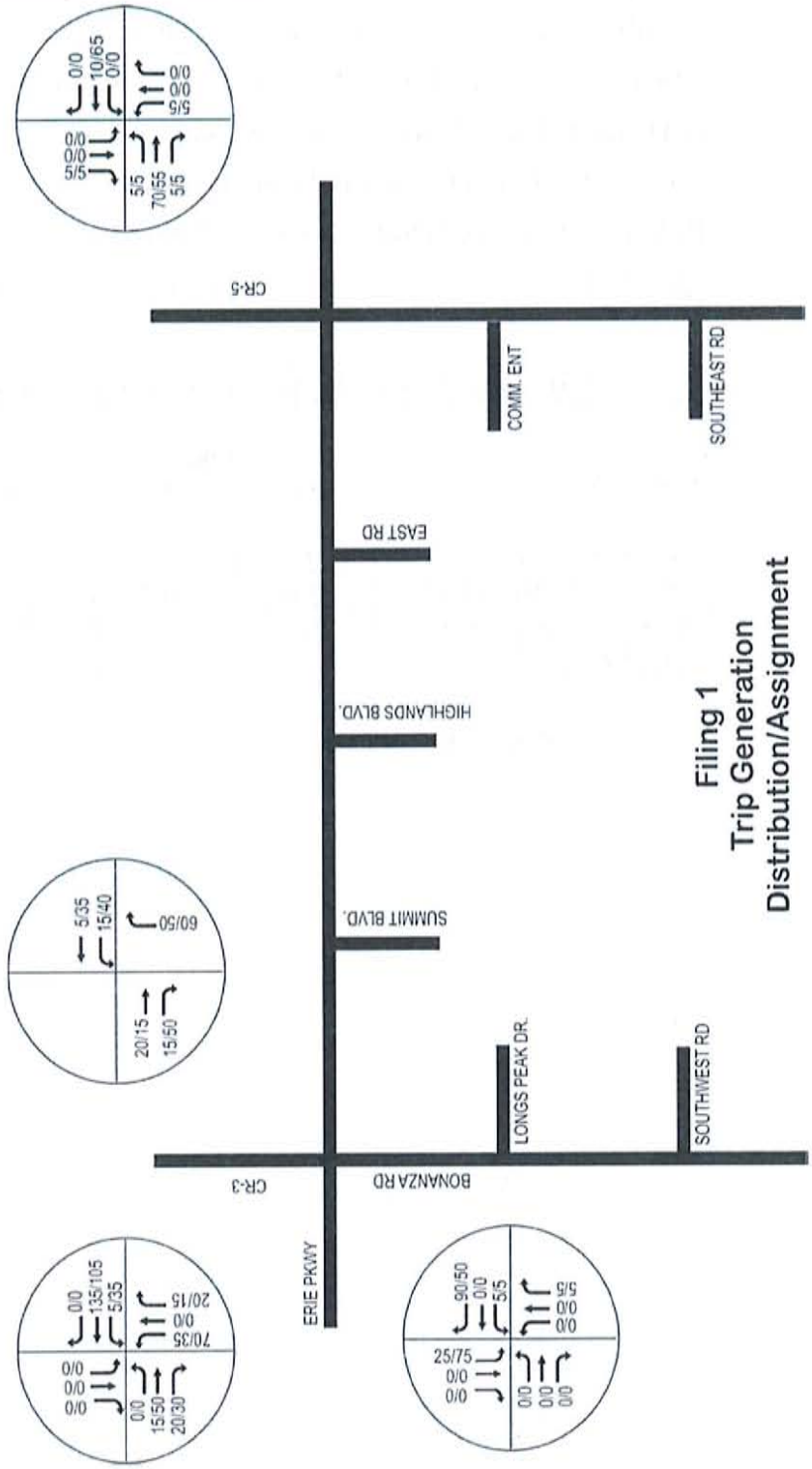
The analysis shows that the proposed signal array in 2035 will function with good to excellent progression efficiency. The time/space diagrams are appended for reference.

6. ANALYSIS OF FILING 1 DEVELOPMENT

The initial phase of the Erie Highlands development program plans to construct the northwest portion of the property in Planning Areas 1, 2, 3, and 4. The number of homes in these areas is 251. Street connection to Erie Parkway will be at Summit Blvd. initially. In addition, there will be a connection to Bonanza in the northwest corner of the property near Erie Parkway. The chart below shows the daily (ADT), and AM/PM peak-hour trip generation for Filing 1.

Trip Generation Worksheet for Dearmin Property - Filing 1								
					AVERAGE WEEKDAY			
					AM		PM	
ITE CODE	LAND USE	UNIT	QUANTITY	ADT	IN	OUT	IN	OUT
210	PA 1	DU	7	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SFD			**67**	**1**	**4**	**4**	**3**
210	PA-2	DU	112	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SDF			**1,066**	**21**	**63**	**71**	**41**
210	PA-3	DU	37	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SDF			**352**	**7**	**21**	**23**	**14**
210	PA-4	DU	95	*9.52*	*0.19*	*0.56*	*0.63*	*0.37*
	SDF			**904**	**18**	**53**	**60**	**35**
	TOTAL TRIPS		251	2,390	47	141	158	93

The following graphic shows the trip distribution and assignment. For Filing 1 the directional split is 55/45 west into Erie and east to I-25, respectively.



Filing 1
Trip Generation
Distribution/Assignment

A traffic operations analysis of Filing 1 indicates that the traffic impact is relatively minor. The LOS at Erie/CR-5 will drop from C to D with the additional traffic. Additionally, it is not necessary at this time to widen Erie Parkway to a fully developed four-lane facility. Improvements to Erie Parkway will be coordinated with the Bridgewater development. The appendix contains the Synchro graphics and worksheets for this scenario.

Unsignalized Intersection Level of Service Summary Filing 1				
	Existing		2016	
Intersection	AM	PM	AM	PM
Erie Parkway/CR-3	C	C	D	E
Erie Parkway/Summit Blvd.	N/A	N/A	C	C
Bonanza/Longs Peak Dr.	N/A	N/A	A	A
Erie Parkway/CR-5	C	C	E	F/.9/12.7*

*signalization of intersection is eminent.

7. ROADWAY DESIGN AND TRAFFIC CONTROL

The **Town of Erie Transportation Master Plan** provides recommended cross-sections for Erie Parkway and internal streets within the Erie Highlands. It also provides a generalized schedule for installation of traffic signal control at intersections throughout the Town. This analysis and recommendations are consistent with the master plan roadway design requirements and schedule for traffic signal installation.

The following cross-sections from the master plan, Figures 15 and 16 are recommended for this section of Erie Parkway. Figure 15 is for a six-lane Principal Arterial with 140 feet of right-of-way. However, this cross-section may not be required until past 2035. Figure 16 is consistent with the existing four-lane median divided roadway that currently terminates and reduces to a two-lane roadway at approximately one-half mile west of CR-3.

FIGURE 15: STREET DESIGN STANDARD - PRINCIPAL ARTERIAL (6 LANES WITH MEDIAN)

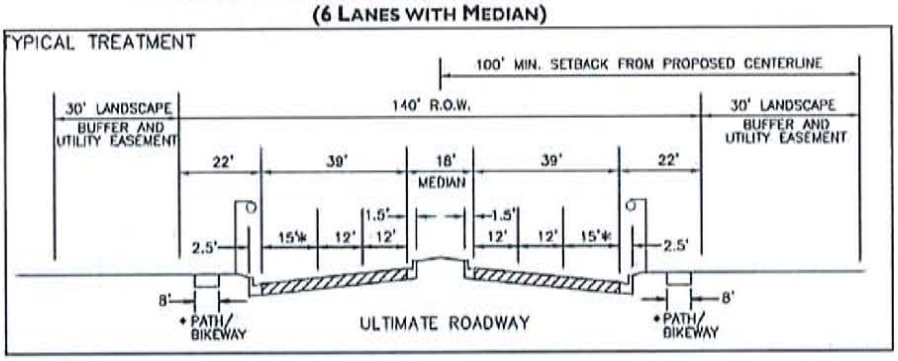
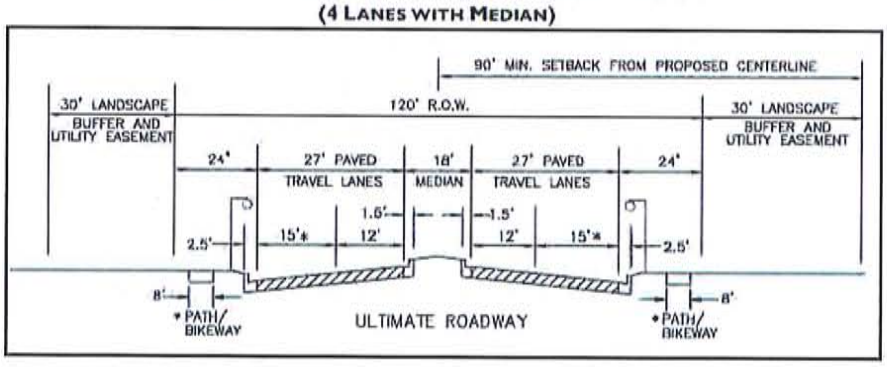


FIGURE 16: STREET DESIGN STANDARD - MINOR ARTERIAL (4 LANES WITH MEDIAN)



For the internal streets, four of the cross-sections in the master plan are appropriate. A local street cross-section as illustrated in the master plan's Figure 21 would serve the streets internal to the planning areas that have residential driveways fronting the street. This section is specifically designed to provide access to properties.

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FIGURE 21: STREET DESIGN STANDARD - LOCAL STREETS (2 LANES WITH PARKING)

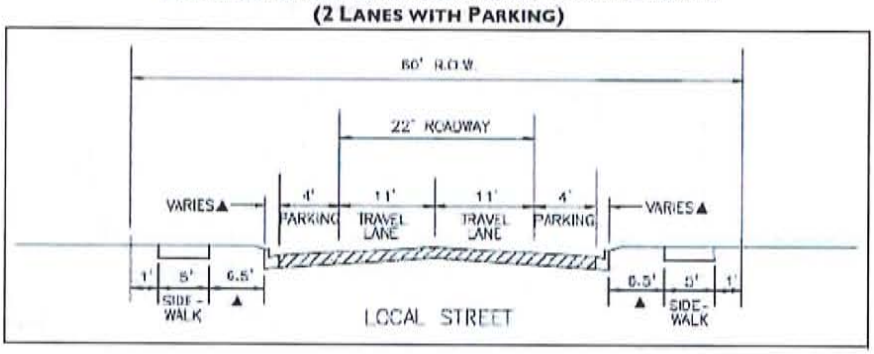
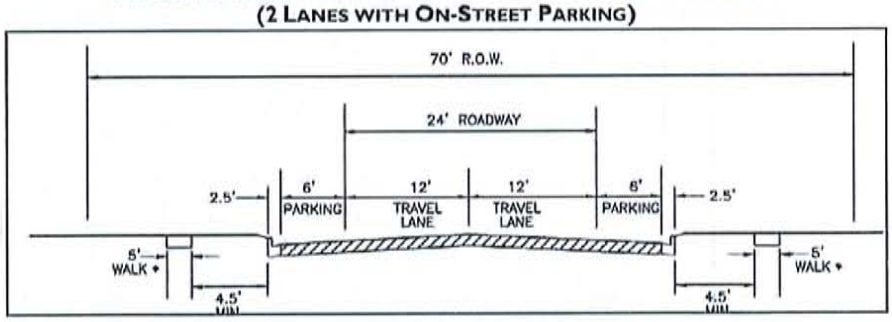


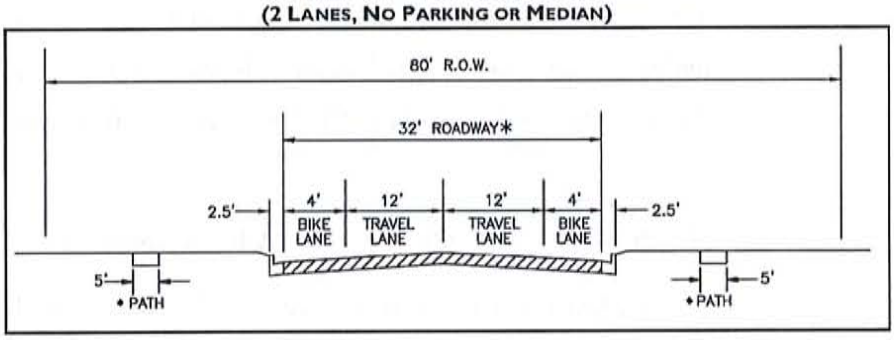
Figure 18 shows a residential collector type street that is appropriate for connectivity of the local streets to the entry streets and the streets serving the commercial area. The cross-section features 12-foot travel lanes and on-street parking on both sides.

FIGURE 18: STREET DESIGN STANDARD - RESIDENTIAL COLLECTOR (2 LANES WITH ON-STREET PARKING)



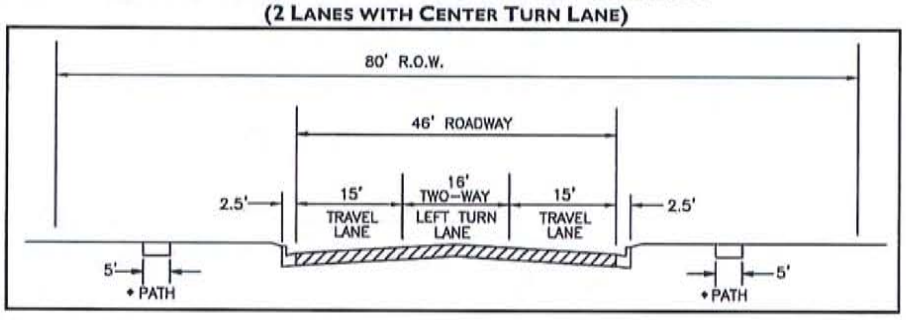
For the collector type streets, the cross-section in the master plan shown in Figure 17 below would serve as the connector between the arterial and local streets. This type of street is without parking and does not provide direct access to property.

FIGURE 17: STREET DESIGN STANDARD - COLLECTOR (2 LANES, NO PARKING OR MEDIAN)



For the collector type streets in the commercial area and the commercial entrance from CR-5, the cross-section in the master plan shown in Figure 20 on the next page includes a center turn lane for direct access to commercial property. Adjustments to this cross-section can be made to add on street parking where desired.

FIGURE 20: STREET DESIGN STANDARD - COLLECTOR (2 LANES WITH CENTER TURN LANE)



With regard to traffic control and intersection geometrics, the intersections serving the Erie Highlands will a 3/4 movement at Summit Blvd. full-movement and signalized when warranted at Highlands Blvd., and an interim full-movement at Glacier Drive until the commercial area is developed. At that time, it will be signalized.

The analysis of the CR-3 and CR-5 intersections with Erie Parkway indicates that traffic signal control is warranted at CR-5 in the 2016 scenario. The master plan has CR-5 warrants in 2030 and CR-3 in 2060.

AUXILIARY LANE DESIGN REQUIREMENTS

Erie Parkway is categorized as an NR-A and the auxiliary lane design requirements are specified in the State Highway Access Code. Posted at 40 mph the deceleration lane length is 370 feet including a 12:1 taper. The left turn lanes require additional length for storage.

CR-5 is a categorized as a NR-B highway. It is posted at 45 mph. The required lane length is 435 feet and there is no additional storage

requirement. The following table summarizes the required lane lengths on Erie Parkway and CR-5.

Auxiliary Lane Lengths		
Intersection	Movement	
	EBR	WBL
Erie Parkway/Summit Blvd.	370	420
Erie Parkway/Highlands Blvd	370	470
Erie Parkway/Glacier Peak	370	470
	SBR	NBL
CR-5/Comm. Ent.	435	435
CR-5/Comm. Ent.	435	435

No auxiliary lanes are necessary at the intersection on Bonanza Dr. On the internal road approaches, the auxiliary lanes should be designed to fit with a recommended minimum of 100 feet.

8. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This traffic analysis demonstrates that the traffic generated by Erie Highlands can be accommodated within acceptable operating parameters provided the recommended improvements below are made.

1) No improvements to Erie Parkway as an NR-A type roadway are necessary until approximately 60 homes in Filing 1 are constructed. When that occurs then a left in at the Summit Blvd. intersection should be installed. The lane should be 420 feet long inclusive of a 12:1 taper and 50 feet of additional storage. The lane can tie into the improvements at CR-3 soon to be constructed by the Bridgewater development. A transition taper of 360 feet from the PC of the left turn taper to the existing roadway would be required per the Code. A right turn lane of 370 feet including taper into the property at the Summit Blvd. would be warranted with construction of approximately 125 homes in Filing 1. This lane would be converted to the second eastbound through lane when Erie Parkway is fully built out.

2) Coordinate the widening of Erie Parkway with the Bridgewater property owner to the north and plans to extend the four-lane roadway from its current terminus (1/2 mile west of CR-3) and reconstruction of the CR-3/Erie Parkway intersection including auxiliary turn lanes. The Town has indicated that the Erie Highlands would be responsible for 25 percent of the signal costs at CR-3 when warranted.

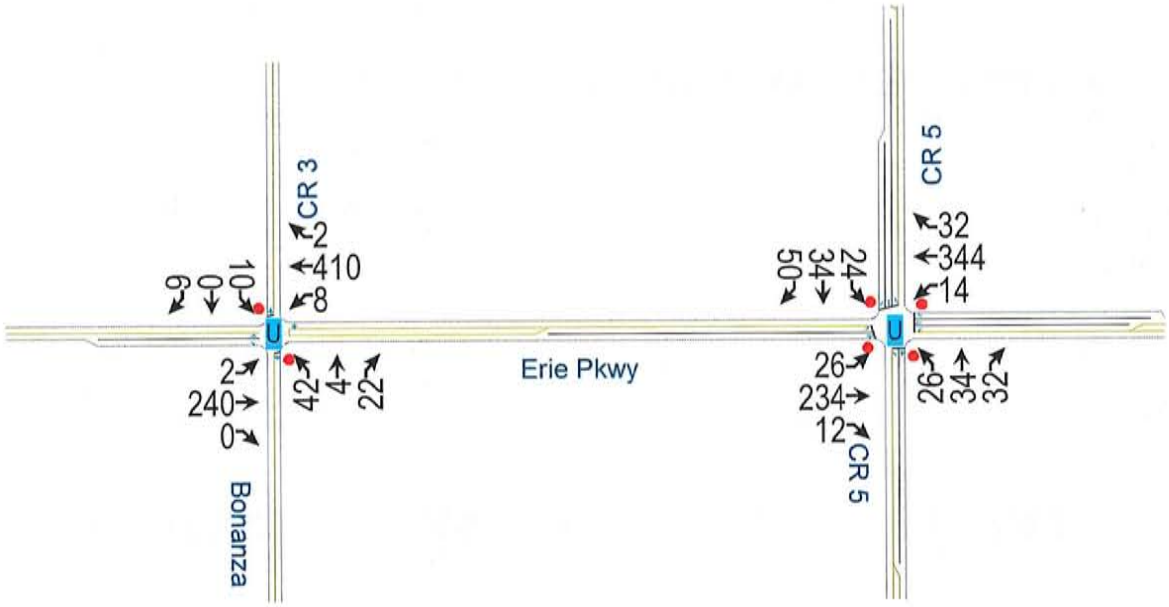
3) Construct the intersections with Erie Parkway when needed for each subsequent filing. The intersections should include right and left turn lanes with tapers of 12:1. The intersections will be two-way stop sign controlled in the initial Filing 1 2016 scenario. Convert the stop signs to traffic signal control at Highlands Blvd. when warranted. The Town has indicated that the signal costs would be fully absorbed by Erie Highlands.

4) If traffic signal control at CR-5/Erie Parkway meets warrants prior to the completion and extension of improvements to Erie Parkway, then coordinate with the Town to insure a proper fit with development plans for Erie Highlands. The Town has indicated that the Erie Highlands would be responsible for 25 percent of the signal costs at this locations

5) Construct the internal roads consistent with the Town's cross-sections in the master plan. Local roads within the planning areas are recommended for direct access to properties. Collector type roads are recommended for the road connecting to Erie Parkway and CR-5. Within the commercial area, a collector type roadway with center turn lane and optional parking is recommended.

In conclusion, this report finds that the roadway layout in the site plan and the recommended accesses will operate at an acceptable level of service and that overall traffic flow on the adjacent streets and intersections would be efficiently served by the proposed improvements.

APPENDIX


CR 3
2
410
8
9
0
10
2
240
0
42
4
22
Bonanza
Erie Pkwy
24
34
50
26
234
12
CR 5
32
344
14
26
34
32
CR 5

Intersection	
Intersection Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	240	0	8	410	2	42	4	22	10	0	6
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	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	261	0	9	446	2	46	4	24	11	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	448	0	0	261	0	0	732	730	261	743	729	447
Stage 1	-	-	-	-	-	-	265	265	-	464	464	-
Stage 2	-	-	-	-	-	-	467	465	-	279	265	-
Follow-up Headway	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Capacity-1 Maneuver	1112	-	-	1303	-	-	337	349	778	331	350	612
Stage 1	-	-	-	-	-	-	740	689	-	578	564	-
Stage 2	-	-	-	-	-	-	576	563	-	728	689	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1112	-	-	1303	-	-	331	345	778	315	346	612
Mov Capacity-2 Maneuver	-	-	-	-	-	-	331	345	-	315	346	-
Stage 1	-	-	-	-	-	-	739	688	-	577	559	-
Stage 2	-	-	-	-	-	-	565	558	-	700	688	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	15.8	14.8
HCM LOS			C	B

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	408	1112	-	-	1303	-	-	385
HCM Lane V/C Ratio	0.181	0.002	-	-	0.007	-	-	0.045
HCM Control Delay (s)	15.8	8.244	0	-	7.781	0	-	14.8
HCM Lane LOS	C	A	A		A	A		B
HCM 95th %tile Q(veh)	0.653	0.006	-	-	0.02	-	-	0.141

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	14.8
Intersection LOS	B

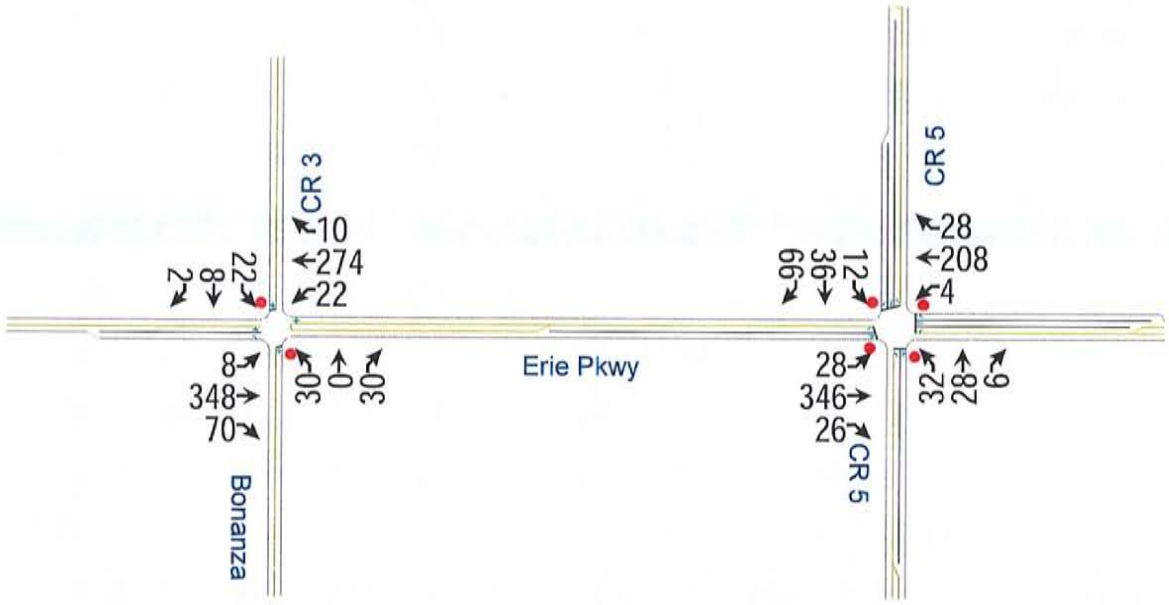
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	26	234	12	14	344	32	26	34	32	24	34	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	254	13	15	374	35	28	37	35	26	37	54
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	3	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	2	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	3	3	2
HCM Control Delay	14.1	17.6	10.7	10.2
HCM LOS	B	C	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	0%	100%	0%	0%
Vol Thru, %	0%	52%	0%	95%	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	48%	0%	5%	0%	0%	100%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	26	66	26	246	14	344	32	24	34	50
LT Vol	0	34	0	234	0	344	0	0	34	0
Through Vol	0	32	0	12	0	0	32	0	0	50
RT Vol	26	0	26	0	14	0	0	24	0	0
Lane Flow Rate	28	72	28	267	15	374	35	26	37	54
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.06	0.134	0.054	0.467	0.028	0.632	0.052	0.055	0.073	0.096
Departure Headway (Hd)	7.597	6.746	6.827	6.289	6.591	6.087	5.382	7.579	7.073	6.364
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	469	529	523	572	542	591	663	471	504	560
Service Time	5.374	4.523	4.586	4.048	4.343	3.839	3.134	5.354	4.847	4.138
HCM Lane V/C Ratio	0.06	0.136	0.054	0.467	0.028	0.633	0.053	0.055	0.073	0.096
HCM Control Delay	10.9	10.6	10	14.5	9.5	18.8	8.4	10.8	10.4	9.8
HCM Lane LOS	B	B	A	B	A	C	A	B	B	A
HCM 95th-tile Q	0.2	0.5	0.2	2.5	0.1	4.4	0.2	0.2	0.2	0.3

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined


CR 5
28
208
4
99
36
12
CR 5
28
346
26
32
28
6
Erie Pkwy
CR 3
10
274
22
2
8
22
8
348
70
30
0
30
Bonanza

Intersection	
Intersection Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	8	348	70	22	274	10	30	0	30	22	8	2
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	-	-	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	9	378	76	24	298	11	33	0	33	24	9	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	309	0	0	378	0	0	753	753	378	763	747	303
Stage 1	-	-	-	-	-	-	396	396	-	351	351	-
Stage 2	-	-	-	-	-	-	357	357	-	412	396	-
Follow-up Headway	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Capacity-1 Maneuver	1252	-	-	1180	-	-	326	339	669	321	341	737
Stage 1	-	-	-	-	-	-	629	604	-	666	632	-
Stage 2	-	-	-	-	-	-	661	628	-	617	604	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1252	-	-	1180	-	-	310	327	669	297	329	737
Mov Capacity-2 Maneuver	-	-	-	-	-	-	310	327	-	297	329	-
Stage 1	-	-	-	-	-	-	623	598	-	659	616	-
Stage 2	-	-	-	-	-	-	634	612	-	581	598	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	15	17.8
HCM LOS			C	C

Minor Lane / Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	424	1252	-	-	1180	-	-	317
HCM Lane V/C Ratio	0.154	0.007	-	-	0.02	-	-	0.11
HCM Control Delay (s)	15	7.896	0	-	8.114	0	-	17.8
HCM Lane LOS	C	A	A		A	A		C
HCM 95th %tile Q(veh)	0.539	0.021	-	-	0.062	-	-	0.366

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	14.8
Intersection LOS	B

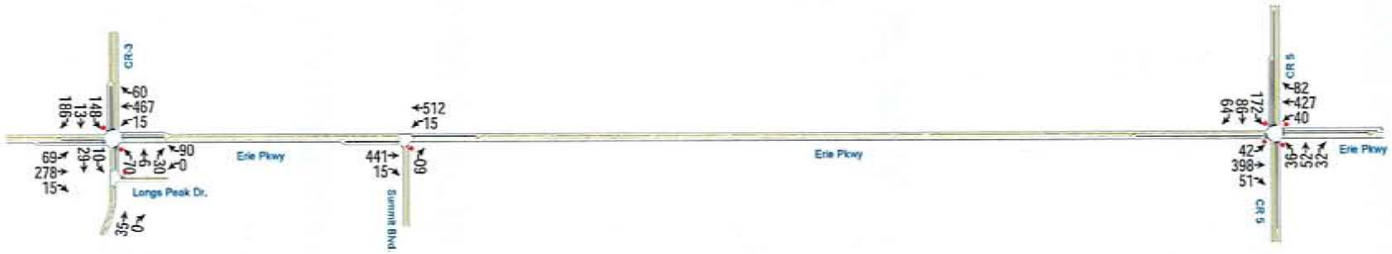
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	28	346	26	4	208	28	32	28	6	12	36	66
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	30	376	28	4	226	30	35	30	7	13	39	72
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	3	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	2	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	3	3	2
HCM Control Delay	18.3	12.5	10.5	10
HCM LOS	C	B	B	A

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	0%	100%	0%	0%
Vol Thru, %	0%	82%	0%	93%	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	18%	0%	7%	0%	0%	100%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	32	34	28	372	4	208	28	12	36	66
LT Vol	0	28	0	346	0	208	0	0	36	0
Through Vol	0	6	0	26	0	0	28	0	0	66
RT Vol	32	0	28	0	4	0	0	12	0	0
Lane Flow Rate	35	37	30	404	4	226	30	13	39	72
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.072	0.071	0.054	0.654	0.008	0.394	0.047	0.027	0.075	0.123
Departure Headway (Hd)	7.503	6.872	6.378	5.827	6.781	6.277	5.571	7.394	6.888	6.181
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	477	520	562	619	527	572	641	483	519	578
Service Time	5.264	4.633	4.118	3.567	4.53	4.025	3.319	5.153	4.647	3.939
HCM Lane V/C Ratio	0.073	0.071	0.053	0.653	0.008	0.395	0.047	0.027	0.075	0.125
HCM Control Delay	10.9	10.2	9.5	19	9.6	13.1	8.6	10.4	10.2	9.8
HCM Lane LOS	B	B	A	C	A	B	A	B	B	A
HCM 95th-tile Q	0.2	0.2	0.2	4.8	0	1.9	0.1	0.1	0.2	0.4

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined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Erie Pkwy
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441
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09
Summit Blvd
Erie Pkwy
CR 5
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427
40
172
86
64
42
398
51
36
52
32
CR 5
Erie Pkwy

Intersection	
Intersection Delay, s/veh	14.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	69	278	15	15	467	60	70	6	30	148	13	186
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	200	-	300	200	-	200	0	-	-	200	-	200
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	0	0	0	0	0	0
Mvmt Flow	75	302	16	16	508	65	76	7	33	161	14	202

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	508	0	0	302	0	0	999	992	302	1012	992	508
Stage 1	-	-	-	-	-	-	452	452	-	540	540	-
Stage 2	-	-	-	-	-	-	547	540	-	472	452	-
Follow-up Headway	2.218	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1057	-	-	1259	-	-	224	248	742	220	248	569
Stage 1	-	-	-	-	-	-	591	574	-	530	524	-
Stage 2	-	-	-	-	-	-	525	524	-	576	574	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1057	-	-	1259	-	-	129	227	742	193	227	569
Mov Capacity-2 Maneuver	-	-	-	-	-	-	129	227	-	193	227	-
Stage 1	-	-	-	-	-	-	549	533	-	492	517	-
Stage 2	-	-	-	-	-	-	325	517	-	505	533	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	0.2	36.2	41.9
HCM LOS			E	E

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	129	239	1057	-	-	1259	-	-	193	227	569
HCM Lane V/C Ratio	0.393	0.27	0.071	-	-	0.013	-	-	0.834	0.062	0.355
HCM Control Delay (s)	49.9	25.5	8.666	-	-	7.897	-	-	77.8	21.9	14.8
HCM Lane LOS	E	D	A			A			F	C	B
HCM 95th %tile Q(veh)	1.662	1.057	0.229	-	-	0.039	-	-	6.014	0.198	1.598

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	49.1
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	42	398	51	40	427	82	36	52	32	172	86	64
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	433	55	43	464	89	39	57	35	187	93	70
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	3	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	2	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	3	3	2
HCM Control Delay	67.2	58.9	15	17.7
HCM LOS	F	F	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	0%	100%	0%	0%
Vol Thru, %	0%	62%	0%	89%	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	38%	0%	11%	0%	0%	100%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	84	42	449	40	427	82	172	86	64
LT Vol	0	52	0	398	0	427	0	0	86	0
Through Vol	0	32	0	51	0	0	82	0	0	64
RT Vol	36	0	42	0	40	0	0	172	0	0
Lane Flow Rate	39	91	46	488	43	464	89	187	93	70
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.112	0.242	0.111	1	0.106	1	0.188	0.494	0.234	0.161
Departure Headway (Hd)	10.297	9.539	8.922	8.305	8.787	8.288	7.59	9.52	9.022	8.325
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	349	378	404	439	409	441	473	380	399	433
Service Time	8.02	7.263	6.622	6.045	6.522	6.023	5.325	7.241	6.743	6.046
HCM Lane V/C Ratio	0.112	0.241	0.114	1.112	0.105	1.052	0.188	0.492	0.233	0.162
HCM Control Delay	14.3	15.3	12.7	72.3	12.6	72.2	12.1	21.2	14.5	12.6
HCM Lane LOS	B	C	B	F	B	F	B	C	B	B
HCM 95th-tile Q	0.4	0.9	0.4	12.7	0.4	12.7	0.7	2.6	0.9	0.6

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	441	15	15	512	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	250	300	-	-	0
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	479	16	16	557	0	65

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	479	0	1068	479
Stage 1	-	-	-	-	479	-
Stage 2	-	-	-	-	589	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	1083	-	245	587
Stage 1	-	-	-	-	623	-
Stage 2	-	-	-	-	554	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	1083	-	241	587
Mov Capacity-2 Maneuver	-	-	-	-	241	-
Stage 1	-	-	-	-	623	-
Stage 2	-	-	-	-	546	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11.9
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	587	-	-	1083	-
HCM Lane V/C Ratio	0.111	-	-	0.015	-
HCM Control Delay (s)	11.9	-	-	8.375	-
HCM Lane LOS	B			A	
HCM 95th %tile Q(veh)	0.373	-	-	0.046	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	5.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	90	35	0	10	29
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	98	38	0	11	32

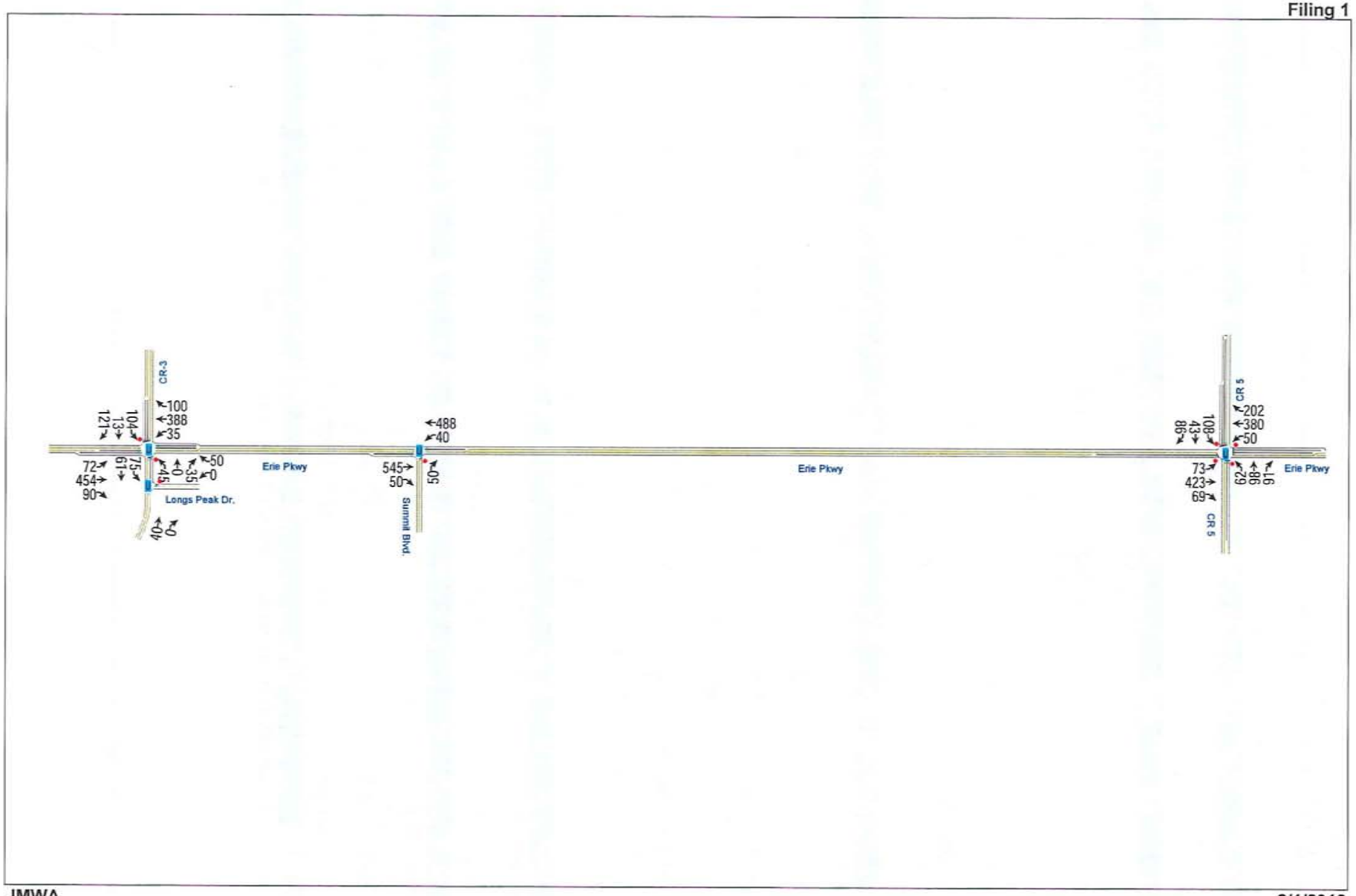
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	91	38	0	0	38	0
Stage 1	38	-	-	-	-	-
Stage 2	53	-	-	-	-	-
Follow-up Headway	3.5	3.3	-	-	2.2	-
Pot Capacity-1 Maneuver	914	1040	-	-	1585	-
Stage 1	990	-	-	-	-	-
Stage 2	975	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	908	1040	-	-	1585	-
Mov Capacity-2 Maneuver	908	-	-	-	-	-
Stage 1	990	-	-	-	-	-
Stage 2	968	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	1.9
HCM LOS	A		

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1040	1585	-
HCM Lane V/C Ratio	-	-	0.094	0.007	-
HCM Control Delay (s)	-	-	8.8	7.287	0
HCM Lane LOS			A	A	A
HCM 95th %tile Q(veh)	-	-	0.311	0.021	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined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Erie Pkwy
488
40
545
50
50
Summit Blvd.
Erie Pkwy
CR 5
202
380
50
86
43
108
73
423
69
62
98
91
CR 5
Erie Pkwy

Intersection	
Intersection Delay, s/veh	9.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	72	454	90	35	388	100	45	0	35	104	13	121
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	200	-	300	200	-	200	0	-	-	200	-	200
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	0	0	0	0	0	0
Mvmt Flow	78	493	98	38	422	109	49	0	38	113	14	132

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	422	0	0	493	0	0	1155	1148	493	1167	1148	422
Stage 1	-	-	-	-	-	-	650	650	-	498	498	-
Stage 2	-	-	-	-	-	-	505	498	-	669	650	-
Follow-up Headway	2.218	-	-	2.218	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1137	-	-	1071	-	-	175	200	580	172	200	636
Stage 1	-	-	-	-	-	-	461	468	-	558	548	-
Stage 2	-	-	-	-	-	-	553	548	-	450	468	-
Time blocked-Platoon, %		-	-		-	-						
Mov Capacity-1 Maneuver	1137	-	-	1071	-	-	120	180	580	148	180	636
Mov Capacity-2 Maneuver	-	-	-	-	-	-	120	180	-	148	180	-
Stage 1	-	-	-	-	-	-	429	436	-	520	529	-
Stage 2	-	-	-	-	-	-	412	529	-	392	436	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1	0.6	30.7	43.4
HCM LOS			D	E

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	SBLn3
Capacity (veh/h)	120	270	1137	-	-	1071	-	-	148	180	636
HCM Lane V/C Ratio	0.272	0.201	0.069	-	-	0.036	-	-	0.764	0.079	0.207
HCM Control Delay (s)	45.8	21.7	8.4	-	-	8.485	-	-	81.9	26.7	12.1
HCM Lane LOS	E	C	A			A			F	D	B
HCM 95th %tile Q(veh)	1.024	0.736	0.221	-	-	0.11	-	-	4.683	0.252	0.773

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	47.6
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	73	423	69	50	380	202	62	98	91	108	43	86
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	79	460	75	54	413	220	67	107	99	117	47	93
Number of Lanes	1	1	0	1	1	1	1	1	0	1	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	3	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	2	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	3	3	2
HCM Control Delay	67.6	51.7	21.4	16.6
HCM LOS	F	F	C	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	100%	0%	100%	0%	0%	100%	0%	0%
Vol Thru, %	0%	52%	0%	86%	0%	100%	0%	0%	100%	0%
Vol Right, %	0%	48%	0%	14%	0%	0%	100%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	62	189	73	492	50	380	202	108	43	86
LT Vol	0	98	0	423	0	380	0	0	43	0
Through Vol	0	91	0	69	0	0	202	0	0	86
RT Vol	62	0	73	0	50	0	0	108	0	0
Lane Flow Rate	67	205	79	535	54	413	220	117	47	93
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.195	0.547	0.212	1	0.14	1	0.491	0.342	0.13	0.241
Departure Headway (Hd)	10.414	9.585	9.61	8.997	9.242	8.743	8.045	10.59	10.092	9.396
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	346	378	376	406	387	413	446	342	358	384
Service Time	8.114	7.285	7.3	6.704	7.015	6.516	5.818	8.29	7.792	7.096
HCM Lane V/C Ratio	0.194	0.542	0.21	1.318	0.14	1	0.493	0.342	0.131	0.242
HCM Control Delay	15.6	23.3	14.9	75.4	13.5	74.5	18.4	18.7	14.3	15.1
HCM Lane LOS	C	C	B	F	B	F	C	C	B	C
HCM 95th-tile Q	0.7	3.2	0.8	12.2	0.5	12.4	2.6	1.5	0.4	0.9

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	545	50	40	488	0	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	200	-	-	0
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	592	54	43	530	0	54

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	592	0	1209	592
Stage 1	-	-	-	-	592	-
Stage 2	-	-	-	-	617	-
Follow-up Headway	-	-	2.218	-	3.518	3.318
Pot Capacity-1 Maneuver	-	-	984	-	202	506
Stage 1	-	-	-	-	553	-
Stage 2	-	-	-	-	538	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	984	-	193	506
Mov Capacity-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	553	-
Stage 2	-	-	-	-	514	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	13
HCM LOS			B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	506	-	-	984	-
HCM Lane V/C Ratio	0.107	-	-	0.044	-
HCM Control Delay (s)	13	-	-	8.828	-
HCM Lane LOS	B			A	
HCM 95th %tile Q(veh)	0.359	-	-	0.139	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	50	40	0	75	61
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	54	43	0	82	66

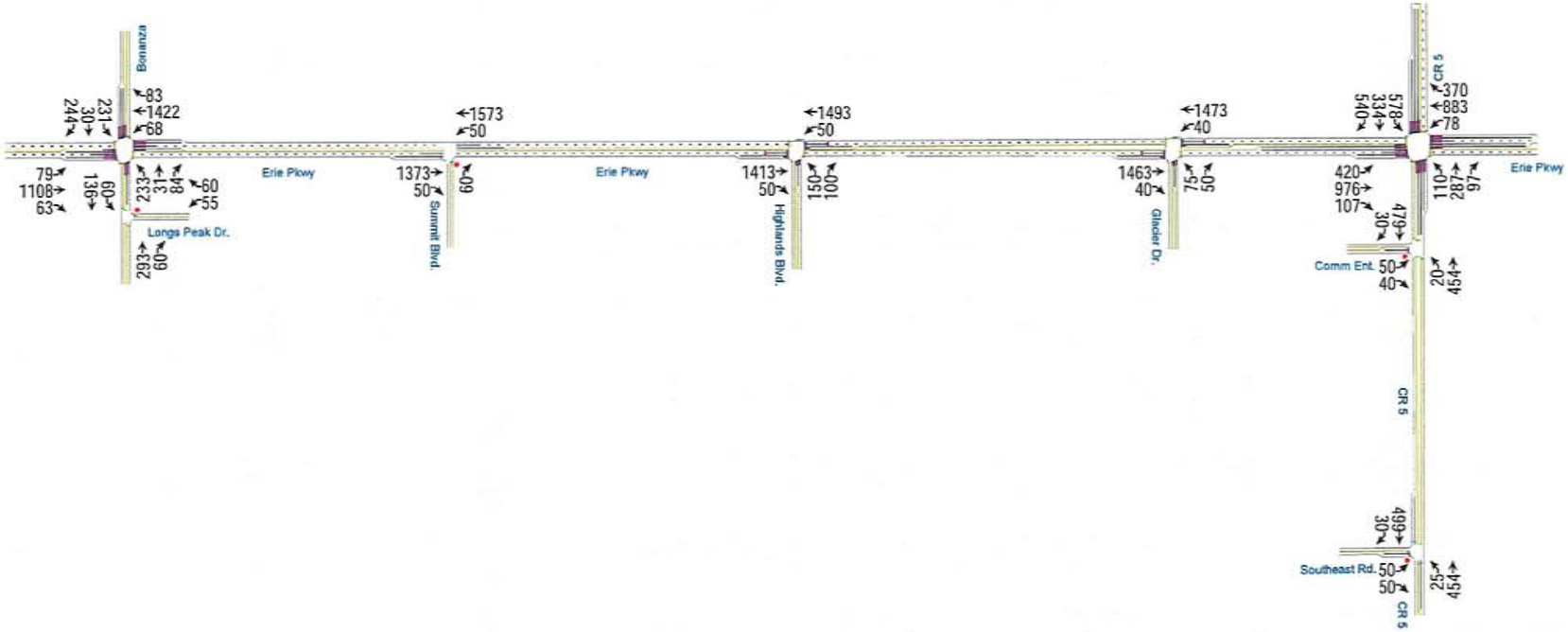
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	272	43	0	0	43	0
Stage 1	43	-	-	-	-	-
Stage 2	229	-	-	-	-	-
Follow-up Headway	3.5	3.3	-	-	2.2	-
Pot Capacity-1 Maneuver	722	1033	-	-	1579	-
Stage 1	985	-	-	-	-	-
Stage 2	814	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	683	1033	-	-	1579	-
Mov Capacity-2 Maneuver	683	-	-	-	-	-
Stage 1	985	-	-	-	-	-
Stage 2	770	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	4.1
HCM LOS	A		

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1033	1579	-
HCM Lane V/C Ratio	-	-	0.053	0.052	-
HCM Control Delay (s)	-	-	8.7	7.404	0
HCM Lane LOS			A	A	A
HCM 95th %tile Q(veh)	-	-	0.166	0.163	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined


Bonanza
83
1422
68
231
30
244
79
1108
63
136
60
233
31
84
60
55
Longs Peak Dr.
293
60
Erie Pkwy
1573
50
1373
50
60
Summit Blvd.
Erie Pkwy
1493
50
1413
50
150
100
Highlands Blvd.
1473
40
1463
40
75
50
Glacier Dr.
CR 5
370
883
78
578
334
540
420
976
107
479
30
110
287
97
Erie Pkwy
Comm Ent.
50
40
20
454
CR 5
499
30
Southeast Rd.
50
50
25
454
CR 5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	79	1108	63	68	1422	83	233	31	84	231	30	244
Number	7	4	14	3	8	18	5	2	12	1	6	16
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	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	190.0	186.3	186.3	186.3
Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Cap, veh/h	265	2212	940	257	2212	940	408	141	377	408	584	496
Arrive On Green	0.59	0.59	0.59	1.00	1.00	1.00	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	306	3725	1583	434	3725	1583	1077	449	1202	1261	1863	1583
Grp Volume(v), veh/h	86	1204	68	74	1546	90	253	0	125	251	33	265
Grp Sat Flow(s),veh/h/ln	306	1863	1583	434	1863	1583	1077	0	1651	1261	1863	1583
Q Serve(g_s), s	13.7	16.7	1.6	6.7	0.0	0.0	18.5	0.0	4.8	15.9	1.1	11.9
Cycle Q Clear(g_c), s	13.7	16.7	1.6	23.5	0.0	0.0	19.6	0.0	4.8	20.7	1.1	11.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.73	1.00		1.00
Lane Grp Cap(c), veh/h	265	2212	940	257	2212	940	408	0	517	408	584	496
V/C Ratio(X)	0.32	0.54	0.07	0.29	0.70	0.10	0.62	0.00	0.24	0.62	0.06	0.53
Avail Cap(c_a), veh/h	314	2812	1195	327	2812	1195	408	0	517	408	584	496
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.9	10.5	7.4	3.8	0.0	0.0	27.5	0.0	22.0	29.7	20.7	24.4
Incr Delay (d2), s/veh	0.7	0.2	0.0	0.6	0.6	0.0	6.9	0.0	1.1	6.8	0.2	4.1
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 Back of Q (50%), veh/ln	0.9	6.4	0.5	0.4	0.2	0.0	5.7	0.0	2.1	5.7	0.5	5.2
Lane Grp Delay (d), s/veh	10.6	10.7	7.5	4.4	0.6	0.0	34.4	0.0	23.1	36.5	20.8	28.4
Lane Grp LOS	B	B	A	A	A	A	C		C	D	C	C
Approach Vol, veh/h		1358			1710			378			549	
Approach Delay, s/veh		10.5			0.7			30.7			31.7	
Approach LOS		B			A			C			C	

Timer								
Assigned Phs		4			8		2		6
Phs Duration (G+Y+Rc), s		55.1			55.1		31.0		31.0
Change Period (Y+Rc), s		4.0			4.0		4.0		4.0
Max Green Setting (Gmax), s		65.0			65.0		27.0		27.0
Max Q Clear Time (g_c+I1), s		18.7			25.5		21.6		22.7
Green Ext Time (p_c), s		28.3			25.7		2.1		1.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.1
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	420	976	107	78	883	370	110	287	97	578	334	540
Number	7	4	14	3	8	18	5	2	12	1	6	16
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	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	2	2	1	2	2	1	2	1	1	2	1	1
Cap, veh/h	524	1173	499	471	1109	471	555	895	761	855	895	761
Arrive On Green	0.19	0.63	0.63	0.08	0.30	0.30	0.48	0.48	0.48	0.48	0.48	0.48
Sat Flow, veh/h	3442	3725	1583	3442	3725	1583	1141	1863	1583	1873	1863	1583
Grp Volume(v), veh/h	457	1061	116	85	960	402	120	312	105	628	363	587
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1721	1863	1583	570	1863	1583	937	1863	1583
Q Serve(g_s), s	6.7	23.4	3.0	0.0	23.3	22.9	7.3	10.0	3.5	30.1	12.0	29.3
Cycle Q Clear(g_c), s	6.7	23.4	3.0	0.0	23.3	22.9	19.3	10.0	3.5	40.1	12.0	29.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	524	1173	499	471	1109	471	555	895	761	855	895	761
V/C Ratio(X)	0.87	0.90	0.23	0.18	0.87	0.85	0.22	0.35	0.14	0.73	0.41	0.77
Avail Cap(c_a), veh/h	588	1479	629	471	1207	513	555	895	761	855	895	761
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.60	0.60	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.0	16.5	12.7	39.1	31.8	31.6	22.3	15.5	13.8	28.0	16.0	20.5
Incr Delay (d2), s/veh	8.1	4.4	0.1	0.2	6.4	12.3	0.9	1.1	0.4	5.6	1.4	7.4
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 Back of Q (50%), veh/ln	5.5	6.6	1.0	1.0	11.5	10.4	1.1	4.7	1.3	7.6	5.7	12.0
Lane Grp Delay (d), s/veh	44.1	20.9	12.8	39.3	38.2	44.0	23.1	16.6	14.2	33.6	17.4	28.0
Lane Grp LOS	D	C	B	D	D	D	C	B	B	C	B	C
Approach Vol, veh/h		1634			1447			537			1578	
Approach Delay, s/veh		26.8			39.9			17.6			27.8	
Approach LOS		C			D			B			C	
Timer												
Assigned Phs	7	4		3	8			2			6	
Phs Duration (G+Y+Rc), s	13.2	34.1		11.6	32.5			50.0			50.0	
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0			4.0			4.0	
Max Green Setting (Gmax), s	11.0	38.0		4.0	31.0			46.0			46.0	
Max Q Clear Time (g_c+I1), s	8.7	25.4		2.0	25.3			21.3			42.1	
Green Ext Time (p_c), s	0.5	4.7		0.5	3.2			12.2			3.1	
Intersection Summary												
HCM 2010 Ctrl Delay			29.8									
HCM 2010 LOS			C									
Notes												

Intersection	
Intersection Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1373	50	50	1573	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	200	-	-	0
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	1492	54	54	1710	0	65

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1492	0	2456	746
Stage 1	-	-	-	-	1492	-
Stage 2	-	-	-	-	964	-
Follow-up Headway	-	-	2.22	-	3.52	3.32
Pot Capacity-1 Maneuver	-	-	446	-	25	356
Stage 1	-	-	-	-	173	-
Stage 2	-	-	-	-	331	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	446	-	22	356
Mov Capacity-2 Maneuver	-	-	-	-	22	-
Stage 1	-	-	-	-	173	-
Stage 2	-	-	-	-	291	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	17.4
HCM LOS			C

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	356	-	-	446	-
HCM Lane V/C Ratio	0.183	-	-	0.122	-
HCM Control Delay (s)	17.4	-	-	14.189	-
HCM Lane LOS	C			B	
HCM 95th %tile Q(veh)	0.661	-	-	0.413	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1413	50	50	1493	150	100
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	2	1	1	2	1	1
Cap, veh/h	2519	1070	267	2519	416	371
Arrive On Green	0.90	0.90	0.90	0.90	0.23	0.23
Sat Flow, veh/h	3725	1583	320	3725	1774	1583
Grp Volume(v), veh/h	1536	54	54	1623	163	109
Grp Sat Flow(s),veh/h/ln	1863	1583	320	1863	1774	1583
Q Serve(g_s), s	8.2	0.3	4.4	9.3	6.9	5.1
Cycle Q Clear(g_c), s	8.2	0.3	12.6	9.3	6.9	5.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2519	1070	267	2519	416	371
V/C Ratio(X)	0.61	0.05	0.20	0.64	0.39	0.29
Avail Cap(c_a), veh/h	2954	1256	304	2954	416	371
HCM Platoon Ratio	1.33	1.33	1.33	1.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.69	0.69	1.00	1.00
Uniform Delay (d), s/veh	1.9	1.5	3.3	1.9	28.9	28.2
Incr Delay (d2), s/veh	0.3	0.0	0.3	0.3	2.8	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	1.6	0.1	0.2	1.7	3.4	2.2
Lane Grp Delay (d), s/veh	2.2	1.5	3.5	2.2	31.6	30.2
Lane Grp LOS	A	A	A	A	C	C
Approach Vol, veh/h	1590			1677	272	
Approach Delay, s/veh	2.1			2.2	31.1	
Approach LOS	A			A	C	

Timer						
Assigned Phs	4			8		
Phs Duration (G+Y+Rc), s	64.5			64.5		
Change Period (Y+Rc), s	4.0			4.0		
Max Green Setting (Gmax), s	71.0			71.0		
Max Q Clear Time (g_c+I1), s	10.2			14.6		
Green Ext Time (p_c), s	48.8			45.9		

Intersection Summary						
HCM 2010 Ctrl Delay			4.4			
HCM 2010 LOS			A			

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↱	↰	↑↑	↰	↱
Volume (veh/h)	1463	40	40	1473	75	50
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	2	1	1	2	1	1
Cap, veh/h	1767	751	270	2141	531	474
Arrive On Green	0.95	0.95	0.07	1.00	0.30	0.30
Sat Flow, veh/h	3725	1583	1774	3725	1774	1583
Grp Volume(v), veh/h	1590	43	43	1601	82	54
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583
Q Serve(g_s), s	9.5	0.1	0.0	0.0	2.2	1.6
Cycle Q Clear(g_c), s	9.5	0.1	0.0	0.0	2.2	1.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1767	751	270	2141	531	474
V/C Ratio(X)	0.90	0.06	0.16	0.75	0.15	0.11
Avail Cap(c_a), veh/h	3755	1596	343	4283	531	474
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	0.72	0.72	0.55	0.55	1.00	1.00
Uniform Delay (d), s/veh	1.1	0.9	15.8	0.0	16.3	16.1
Incr Delay (d2), s/veh	1.4	0.0	0.1	0.3	0.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	0.9	0.0	0.5	0.1	1.0	0.6
Lane Grp Delay (d), s/veh	2.5	0.9	16.0	0.3	17.0	16.6
Lane Grp LOS	A	A	B	A	B	B
Approach Vol, veh/h	1633			1644	136	
Approach Delay, s/veh	2.4			0.7	16.8	
Approach LOS	A			A	B	

Timer				
Assigned Phs	4		3	8
Phs Duration (G+Y+Rc), s	34.1		6.4	40.5
Change Period (Y+Rc), s	4.0		4.0	4.0
Max Green Setting (Gmax), s	64.0		5.0	73.0
Max Q Clear Time (g_c+I1), s	11.5		2.0	2.0
Green Ext Time (p_c), s	18.6		2.5	20.1

Intersection Summary	
HCM 2010 Ctrl Delay	2.2
HCM 2010 LOS	A

Notes

Intersection	
Intersection Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	50	50	25	454	499	30
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	100	200	-	-	200
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	54	54	27	493	542	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1090	542	542	0	-	0
Stage 1	542	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Follow-up Headway	3.518	3.318	2.218	-	-	-
Pot Capacity-1 Maneuver	238	540	1027	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	579	-	-	-	-	-
Time blocked-Platoon, %				-	-	-
Mov Capacity-1 Maneuver	232	540	1027	-	-	-
Mov Capacity-2 Maneuver	232	-	-	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	564	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.8	0.4	0
HCM LOS	C		

Minor Lane / Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1027	-	232	540	-	-
HCM Lane V/C Ratio	0.026	-	0.234	0.101	-	-
HCM Control Delay (s)	8.601	-	25.2	12.4	-	-
HCM Lane LOS	A		D	B		
HCM 95th %tile Q(veh)	0.081	-	0.883	0.334	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	55	60	293	60	60	136
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	-	-	-	-	-
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	60	65	318	65	65	148

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	629	351	0	0	384	0
Stage 1	351	-	-	-	-	-
Stage 2	278	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	446	692	-	-	1174	-
Stage 1	713	-	-	-	-	-
Stage 2	769	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	419	692	-	-	1174	-
Mov Capacity-2 Maneuver	419	-	-	-	-	-
Stage 1	713	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.9	0	2.5
HCM LOS	B		

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	528	1174	-
HCM Lane V/C Ratio	-	-	0.237	0.056	-
HCM Control Delay (s)	-	-	13.9	8.247	0
HCM Lane LOS			B	A	A
HCM 95th %tile Q(veh)	-	-	0.914	0.176	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	50	40	20	454	479	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	-	-
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	54	43	22	493	521	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1074	537	553	0	-	0
Stage 1	537	-	-	-	-	-
Stage 2	537	-	-	-	-	-
Follow-up Headway	3.518	3.318	2.218	-	-	-
Pot Capacity-1 Maneuver	243	544	1017	-	-	-
Stage 1	586	-	-	-	-	-
Stage 2	586	-	-	-	-	-
Time blocked-Platoon, %				-	-	-
Mov Capacity-1 Maneuver	236	544	1017	-	-	-
Mov Capacity-2 Maneuver	236	-	-	-	-	-
Stage 1	586	-	-	-	-	-
Stage 2	568	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.2	0.4	0
HCM LOS	C		

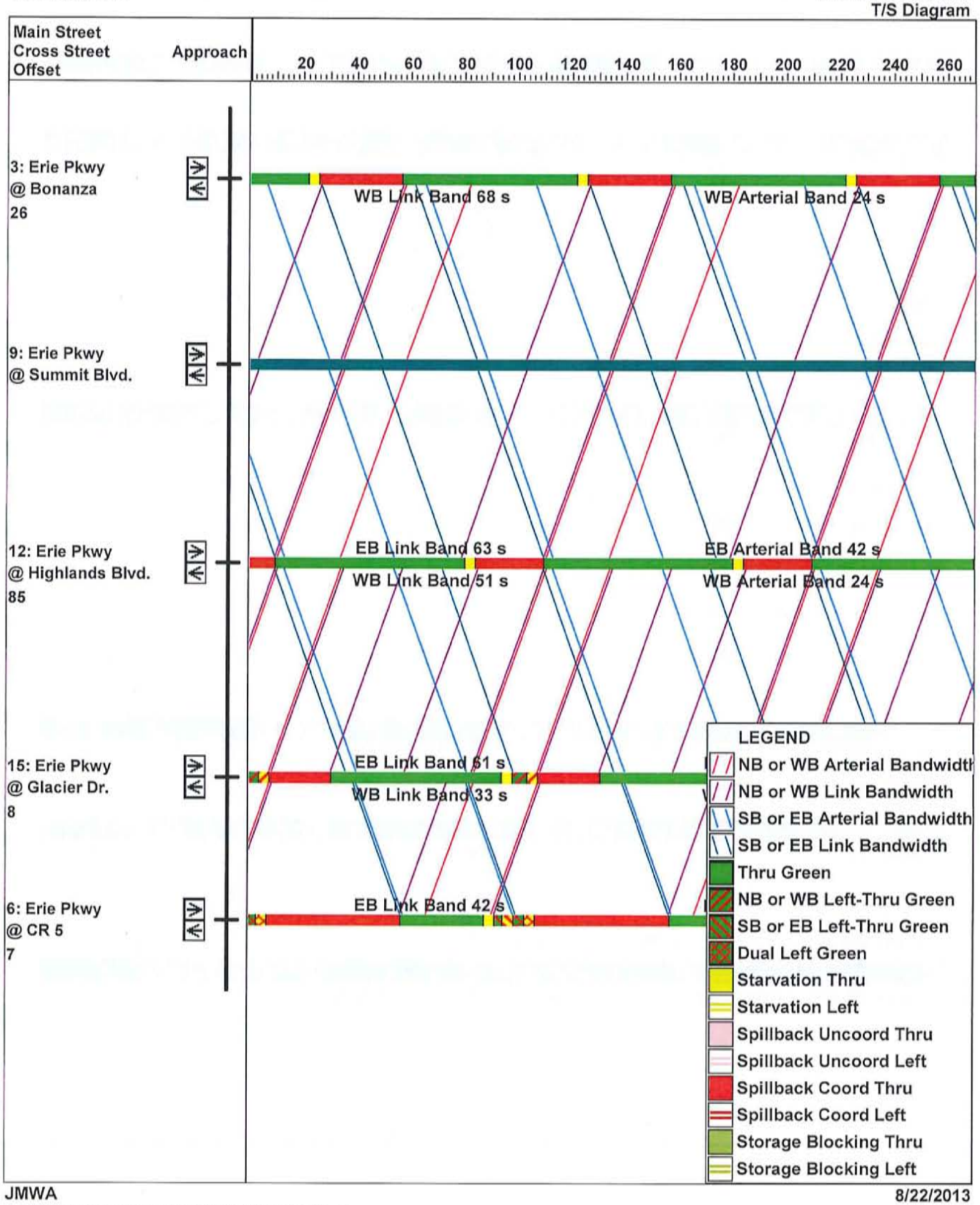
Minor Lane / Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1017	-	236	544	-	-
HCM Lane V/C Ratio	0.021	-	0.23	0.08	-	-
HCM Control Delay (s)	8.617	0	24.8	12.2	-	-
HCM Lane LOS	A	A	C	B		
HCM 95th %tile Q(veh)	0.065	-	0.865	0.26	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

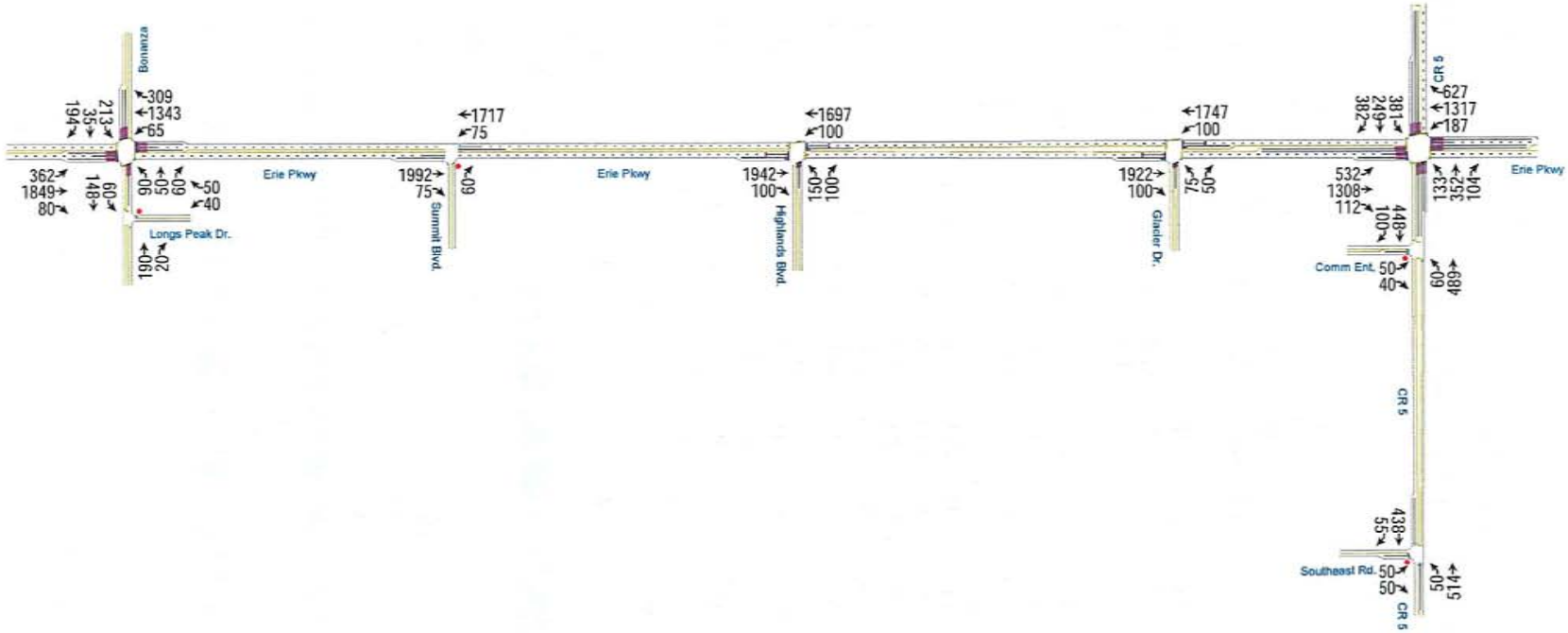
Erie Highlands

2035 AM Peak Hour
T/S Diagram



JMWA
Aldridge Transportation Consultants, LLC

8/22/2013


Bonanza
Longs Peak Dr.
Erie Pkwy
Summit Blvd.
Erie Pkwy
Highlands Blvd.
Glacier Dr.
Erie Pkwy
Comm Ent.
CR 5
Southeast Rd.
CR 5
CR 5
309
1343
65
213
35
194
362
1849
80
148
60
90
50
60
50
40
190
20
1717
75
1992
75
60
1697
100
1942
100
150
100
1747
100
1922
100
75
50
627
1317
187
381
246
382
532
1308
112
448
100
133
352
104
438
55
50
50
50
514
60
489

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	362	1849	80	65	1343	309	90	50	60	213	35	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
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	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	190.0	186.3	186.3	186.3
Lanes	1	2	1	1	2	1	1	1	0	1	1	1
Cap, veh/h	214	2794	1188	149	2794	1188	247	141	170	214	342	290
Arrive On Green	0.75	0.75	0.75	0.75	0.75	0.75	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	262	3725	1583	195	3725	1583	1126	771	928	1268	1863	1583
Grp Volume(v), veh/h	393	2010	87	71	1460	336	98	0	119	232	38	211
Grp Sat Flow(s),veh/h/ln	262	1863	1583	195	1863	1583	1126	0	1699	1268	1863	1583
Q Serve(g_s), s	70.7	35.2	1.7	37.3	19.3	8.1	9.5	0.0	7.4	14.6	2.0	15.1
Cycle Q Clear(g_c), s	90.0	35.2	1.7	72.5	19.3	8.1	11.6	0.0	7.4	22.0	2.0	15.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.55	1.00		1.00
Lane Grp Cap(c), veh/h	214	2794	1188	149	2794	1188	247	0	311	214	342	290
V/C Ratio(X)	1.84	0.72	0.07	0.48	0.52	0.28	0.40	0.00	0.38	1.08	0.11	0.73
Avail Cap(c_a), veh/h	214	2794	1188	149	2794	1188	247	0	311	214	342	290
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	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.6	8.1	4.0	27.8	6.2	4.8	45.7	0.0	43.0	54.7	40.9	46.2
Incr Delay (d2), s/veh	393.6	0.9	0.0	2.3	0.2	0.1	4.7	0.0	3.5	85.0	0.7	14.7
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 Back of Q (50%), veh/ln	30.0	12.9	0.5	1.9	7.0	2.5	3.1	0.0	3.5	11.7	1.0	7.3
Lane Grp Delay (d), s/veh	428.2	9.1	4.0	30.2	6.3	4.9	50.4	0.0	46.6	139.7	41.5	60.9
Lane Grp LOS	F	A	A	C	A	A	D		D	F	D	E
Approach Vol, veh/h		2490			1867			217			481	
Approach Delay, s/veh		75.0			7.0			48.3			97.4	
Approach LOS		E			A			D			F	

Timer				
Assigned Phs	4	8	2	6
Phs Duration (G+Y+Rc), s	94.0	94.0	26.0	26.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	90.0	90.0	22.0	22.0
Max Q Clear Time (g_c+I1), s	92.0	74.5	13.6	24.0
Green Ext Time (p_c), s	0.0	14.8	2.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	50.9
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	532	1308	112	187	1317	627	133	352	104	381	249	382
Number	7	4	14	3	8	18	5	2	12	1	6	16
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	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	2	2	1	2	2	1	2	1	1	2	1	1
Cap, veh/h	545	1740	740	257	1428	607	201	388	330	402	497	422
Arrive On Green	0.32	0.93	0.93	0.07	0.38	0.38	0.06	0.21	0.21	0.12	0.27	0.27
Sat Flow, veh/h	3442	3725	1583	3442	3725	1583	3442	1863	1583	3442	1863	1583
Grp Volume(v), veh/h	578	1422	122	203	1432	682	145	383	113	414	271	415
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1721	1863	1583	1721	1863	1583	1721	1863	1583
Q Serve(g_s), s	19.0	12.8	0.6	7.0	46.0	32.3	5.0	24.6	7.3	14.0	15.0	31.3
Cycle Q Clear(g_c), s	19.0	12.8	0.6	7.0	46.0	32.3	5.0	24.6	7.3	14.0	15.0	31.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	545	1740	740	257	1428	607	201	388	330	402	497	422
V/C Ratio(X)	1.06	0.82	0.16	0.79	1.00	1.12	0.72	0.99	0.34	1.03	0.55	0.98
Avail Cap(c_a), veh/h	545	1740	740	258	1428	607	201	388	330	402	497	422
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.43	0.43	0.43	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.0	2.5	1.2	54.6	37.0	18.3	55.5	47.3	40.5	53.0	37.8	43.7
Incr Delay (d2), s/veh	43.2	1.4	0.0	15.2	24.5	75.5	12.0	42.5	2.8	53.1	4.3	39.7
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 Back of Q (50%), veh/ln	10.2	1.7	0.2	3.6	25.7	24.4	2.6	16.3	3.1	9.2	7.7	17.0
Lane Grp Delay (d), s/veh	84.2	3.9	1.3	69.8	61.5	93.8	67.6	89.9	43.3	106.1	42.0	83.5
Lane Grp LOS	F	A	A	E	F	F	E	F	D	F	D	F
Approach Vol, veh/h		2122			2317			641			1100	
Approach Delay, s/veh		25.6			71.7			76.6			81.8	
Approach LOS		C			E			E			F	

Timer												
Assigned Phs	7	4		3	8		5	2		1	6	
Phs Duration (G+Y+Rc), s	23.0	60.0		13.0	50.0		11.0	29.0		18.0	36.0	
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Max Green Setting (Gmax), s	19.0	56.0		9.0	46.0		7.0	25.0		14.0	32.0	
Max Q Clear Time (g_c+I1), s	21.0	14.8		9.0	48.0		7.0	26.6		16.0	33.3	
Green Ext Time (p_c), s	0.0	15.6		0.0	0.0		0.0	0.0		0.0	0.0	

Intersection Summary	
HCM 2010 Ctrl Delay	58.2
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1992	75	75	1717	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	200	-	-	0
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	2165	82	82	1866	0	65

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	2165	0	3261	1083
Stage 1	-	-	-	-	2165	-
Stage 2	-	-	-	-	1096	-
Follow-up Headway	-	-	2.22	-	3.52	3.32
Pot Capacity-1 Maneuver	-	-	244	-	7	213
Stage 1	-	-	-	-	73	-
Stage 2	-	-	-	-	282	-
Time blocked-Platoon, %	-	-		-		
Mov Capacity-1 Maneuver	-	-	244	-	5	213
Mov Capacity-2 Maneuver	-	-	-	-	5	-
Stage 1	-	-	-	-	73	-
Stage 2	-	-	-	-	187	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	29.2
HCM LOS			D

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	213	-	-	244	-
HCM Lane V/C Ratio	0.306	-	-	0.334	-
HCM Control Delay (s)	29.2	-	-	26.982	-
HCM Lane LOS	D			D	
HCM 95th %tile Q(veh)	1.241	-	-	1.408	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1942	100	100	1697	150	100
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	2	1	1	2	1	1
Cap, veh/h	2927	1244	200	2927	253	226
Arrive On Green	1.00	1.00	1.00	1.00	0.14	0.14
Sat Flow, veh/h	3725	1583	173	3725	1774	1583
Grp Volume(v), veh/h	2111	109	109	1845	163	109
Grp Sat Flow(s),veh/h/ln	1863	1583	173	1863	1774	1583
Q Serve(g_s), s	0.0	0.0	0.0	0.0	9.7	7.1
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	9.7	7.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2927	1244	200	2927	253	226
V/C Ratio(X)	0.72	0.09	0.55	0.63	0.64	0.48
Avail Cap(c_a), veh/h	3193	1357	212	3193	253	226
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.69	0.69	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	45.3	44.2
Incr Delay (d2), s/veh	0.7	0.0	1.8	0.2	11.9	7.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	0.3	0.0	0.1	0.1	5.3	3.3
Lane Grp Delay (d), s/veh	0.7	0.0	1.8	0.2	57.2	51.4
Lane Grp LOS	A	A	A	A	E	D
Approach Vol, veh/h	2220			1954	272	
Approach Delay, s/veh	0.7			0.3	54.9	
Approach LOS	A			A	D	

Timer						
Assigned Phs	4			8		
Phs Duration (G+Y+Rc), s	92.0			92.0		
Change Period (Y+Rc), s	4.0			4.0		
Max Green Setting (Gmax), s	96.0			96.0		
Max Q Clear Time (g_c+I1), s	2.0			2.0		
Green Ext Time (p_c), s	86.0			86.0		

Intersection Summary						
HCM 2010 Ctrl Delay			3.9			
HCM 2010 LOS			A			

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1922	100	100	1747	75	50
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3
Lanes	2	1	1	2	1	1
Cap, veh/h	2156	916	300	2625	356	318
Arrive On Green	1.00	1.00	0.16	1.00	0.20	0.20
Sat Flow, veh/h	3725	1583	1774	3725	1774	1583
Grp Volume(v), veh/h	2089	109	109	1899	82	54
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583
Q Serve(g_s), s	0.0	0.0	0.0	0.0	3.3	2.4
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	3.3	2.4
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2156	916	300	2625	356	318
V/C Ratio(X)	0.97	0.12	0.36	0.72	0.23	0.17
Avail Cap(c_a), veh/h	3655	1553	328	4183	356	318
HCM Platoon Ratio	2.00	2.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	0.61	0.61	0.22	0.22	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	20.4	0.0	28.3	28.0
Incr Delay (d2), s/veh	4.0	0.0	0.2	0.1	1.5	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	1.2	0.0	1.9	0.0	1.6	1.0
Lane Grp Delay (d), s/veh	4.0	0.0	20.5	0.1	29.8	29.1
Lane Grp LOS	A	A	C	A	C	C
Approach Vol, veh/h	2198			2008	136	
Approach Delay, s/veh	3.8			1.2	29.5	
Approach LOS	A			A	C	

Timer				
Assigned Phs	4		3	8
Phs Duration (G+Y+Rc), s	48.5		10.6	59.2
Change Period (Y+Rc), s	4.0		4.0	4.0
Max Green Setting (Gmax), s	83.0		8.0	95.0
Max Q Clear Time (g_c+I1), s	2.0		2.0	2.0
Green Ext Time (p_c), s	38.1		5.2	31.7

Intersection Summary	
HCM 2010 Ctrl Delay	3.4
HCM 2010 LOS	A

Notes

Intersection	
Intersection Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	50	50	50	514	438	55
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	100	200	-	-	200
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	54	54	54	559	476	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1143	476	476	0	-	0
Stage 1	476	-	-	-	-	-
Stage 2	667	-	-	-	-	-
Follow-up Headway	3.518	3.318	2.218	-	-	-
Pot Capacity-1 Maneuver	221	589	1086	-	-	-
Stage 1	625	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Time blocked-Platoon, %				-	-	-
Mov Capacity-1 Maneuver	210	589	1086	-	-	-
Mov Capacity-2 Maneuver	210	-	-	-	-	-
Stage 1	625	-	-	-	-	-
Stage 2	485	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.9	0.8	0
HCM LOS	C		

Minor Lane / Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1086	-	210	589	-	-
HCM Lane V/C Ratio	0.05	-	0.259	0.092	-	-
HCM Control Delay (s)	8.489	-	28	11.7	-	-
HCM Lane LOS	A		D	B		
HCM 95th %tile Q(veh)	0.158	-	0.996	0.304	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	40	50	190	20	60	148
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	-	-	-	-	-
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	43	54	207	22	65	161

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	508	217	0	0	228	0
Stage 1	217	-	-	-	-	-
Stage 2	291	-	-	-	-	-
Follow-up Headway	3.518	3.318	-	-	2.218	-
Pot Capacity-1 Maneuver	525	823	-	-	1340	-
Stage 1	819	-	-	-	-	-
Stage 2	759	-	-	-	-	-
Time blocked-Platoon, %			-	-		-
Mov Capacity-1 Maneuver	497	823	-	-	1340	-
Mov Capacity-2 Maneuver	497	-	-	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	719	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	2.3
HCM LOS	B		

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	637	1340	-
HCM Lane V/C Ratio	-	-	0.154	0.049	-
HCM Control Delay (s)	-	-	11.7	7.824	0
HCM Lane LOS			B	A	A
HCM 95th %tile Q(veh)	-	-	0.54	0.153	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	50	40	60	489	448	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	-	-
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	54	43	65	532	487	109

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1203	541	596	0	-	0
Stage 1	541	-	-	-	-	-
Stage 2	662	-	-	-	-	-
Follow-up Headway	3.518	3.318	2.218	-	-	-
Pot Capacity-1 Maneuver	204	541	980	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	513	-	-	-	-	-
Time blocked-Platoon, %				-	-	-
Mov Capacity-1 Maneuver	185	541	980	-	-	-
Mov Capacity-2 Maneuver	185	-	-	-	-	-
Stage 1	583	-	-	-	-	-
Stage 2	465	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	23.4	1	0
HCM LOS	C		

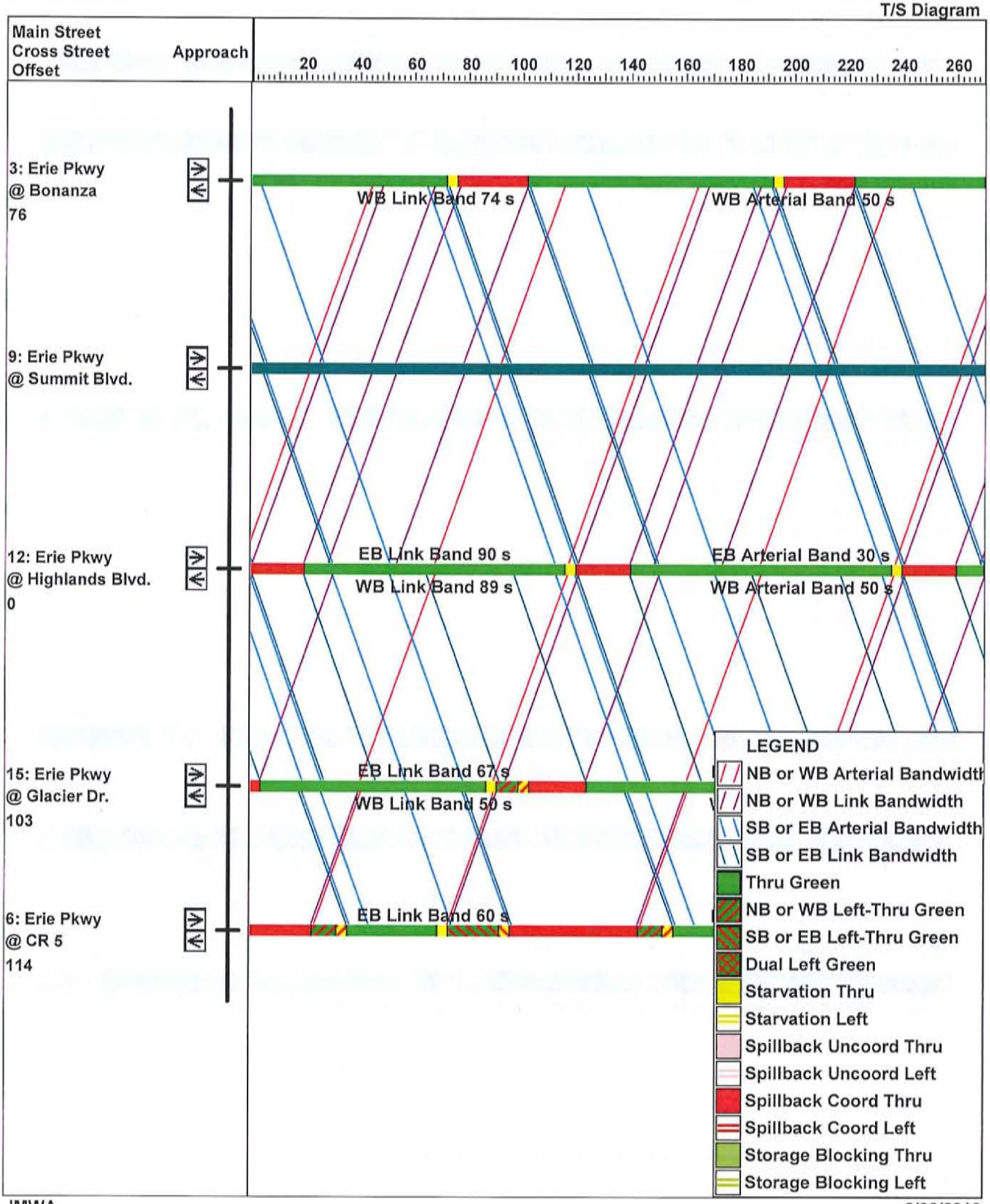
Minor Lane / Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	980	-	185	541	-	-
HCM Lane V/C Ratio	0.067	-	0.294	0.08	-	-
HCM Control Delay (s)	8.935	0	32.4	12.2	-	-
HCM Lane LOS	A	A	D	B		
HCM 95th %tile Q(veh)	0.213	-	1.165	0.261	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Erie Highlands

2035 PM Peak Hour
T/S Diagram



JMWA
Aldridge Transportation Consultants, LLC

8/22/2013

TOWN OF ERIE
1874

Department of Community Development
Planning and Building

The Town of Erie
645 Holbrook St.
P.O. Box 750
Erie, CO 80516
(303) 926-2775
FAX (303) 926-2706

Memo

To: John Cheney

From: Deborah Bachelder

Date: September 3, 2015

Re: SK-000676-2015: Erie Highlands Planning Area 5, 6 & 14 – Sketch Plan Application

cc: Layla Rosales, Marty Ostholthoff, Russell Pennington, Matt Wiederspahn, Farrell Buller

Comments:

The Erie Highlands Planning Area 5, 6 & 14 – Sketch Plan application was reviewed at the September 3, 2015 Development Review Team meeting. Below are the Community Development Department comments. Additional comments from the Public Works Department and the Open Space and Trails Advisory Board are being forwarded to you as well. We did not receive comments from the Parks & Recreation Department; if they submit comments after this memo is sent to you we will follow up and forward the comments to you at that time.

The Sketch Plan application process allows staff, Planning Commission and the Board of Trustees the opportunity to make comments that the applicant should then address with the Preliminary Plat application. All of the comments will be forwarded, as an attachment to the staff memos, to the Planning Commission and Board of Trustees for their review of the application.

Staff has scheduled your review with the Planning Commission on September 16th and with the Board of Trustees on October 13th. No further application materials are required from you at this time to proceed to those reviews. Staff will not be making a presentation at Sketch Plan, but will introduce the item to the Planning Commission and Board of Trustees. The Sketch Plan process is really for the applicant to present their concept and receive comments only.

<u>Community Development Department comments:</u>

1. Section 7 – ALTA:
   a. Tract L: At Preliminary Plat, you will need to identify what is being done with the two 55 gallon barrels identified on the property and on the edge of the property.

2. Section 8 - Sketch Plan:
   a. General Issues:
      i. Town of Erie Natural Areas Inventory:
         1. Two sites are identified in this Town document as being fully or partially located on the Dearmin property; they are:
            a. Inventory Site #75: Only the northeast portion of this site is on the property. Access to the site was not provided so the report was done from the road. Utility lines provide excellent perches for raptors.
            b. Inventory Site #76: This site is fully on the west end of the property. A prairie dog colony was noted which would make it a potential site for burrowing owls. The prairie dog colony is considered a raptor hunting ground.

2. The applicant will be required to provide an endangered species report with the Preliminary Plat application that will be reviewed by outside agencies.

ii. Natural and Scenic Resource Protection:
   1. MC 10.6.2 A.3.b.vi.: The Town lists "slopes of greater than 20 percent" as a priority for protection. The Sketch Plan identifies "8% or greater slopes" that do not correlate to Town standards. Only those areas with slopes greater than 20% are addressed by this section of the Code.

iii. Parks and Open Space:
   1. The Erie Highlands PUD contains a "Parks & Open Space" dedication table that identifies the overall park and open space dedication requirements. The table includes:
      a. Community Park: The full development of Erie Highlands requires a dedication of 13.87 acres of community park land. The Board of Trustees approved a fee in lieu of land dedication for the Community Park dedication requirement. A fee in lieu will be calculated with each final plat and included in the associated development agreement.
      b. Neighborhood Park: The applicant is required to dedicate an 8.32 acre neighborhood park within Planning Area 13 of the Erie Highlands PUD.
      c. Pocket Park: A 1 acre pocket park is required in the PUD for Planning Area 6. The applicant has met this requirement in the Sketch Plan submittal.
      d. Open Space:
         i. The open space dedication requirement for the full development of Erie Highlands is 47.15 acres. The Board of Trustees approved a minimum dedication of 32.65 acres of open space to the Town and the remainder of the dedication requirement is to be paid as a fee in lieu.
         ii. MC 10.6.3 C.4.: The open space dedication on the current PUD was approved by the Board of Trustees with the approval of the PUD. There are some areas of the open space that are narrower than 300 feet; however, they contain trails in which the Town approved these narrower areas.
         iii. The applicant is proposing to modify the open space dedication areas that are defined on the approved Erie Highlands PUD Zoning Map. This will require a PUD rezoning amendment application. Staff believes that in general the minor changes proposed are still within the intent of the open space on the approved PUD.

iv. Pedestrian Facilities and Trails:
   1. MC 10.6.5 F.3. Trails:
      a. MC 10.6.5 F.3.a. and b.: The east-west trail is a spine trail in the Town's Parks, Recreation, Open Space and Trails (PROST) Master Plan. Construction of this trail will need to meet our Town standards for a spine trail.
      b. MC 10.6.5 F.3.c.: A trail connection will be required for access to the Sunset property to the south. Please add the trail connection based on the approved Sunset Preliminary Plat location.
      c. MC 10.6.5 F.3.d.: The minimum trail width of 30 feet has not been met in all areas of the Sketch Plan submittal.
      d. MC 10.6.5 F.3.e.: Trails proposed on private HOA/Metro District property will be required to grant a public access easement.
   2. Erie Highlands PUD Zoning Map:

a. The trail configurations are not as complete as those illustrated in the PUD Zoning Map; revision is needed to meet the requirements.
b. PUD Sheet 3 Note 6 states that the trail along Indian Peaks Drive within PA-6 and PA-10 shall be located within a landscape tract and meander. Please add this trail. Additionally, MC 10.6.5 F.3.d. requires a minimum trail width of 30 feet in the tract.

v. Mineral Rights:
1. There is an existing oil/gas well on the west side of the site, in the open space, that will need to be accommodated in the development of the site. Setbacks and well facility requirements that are identified in the UDC and the SUA will need to be met at the time of Preliminary Plat. The mineral right holders will be sent referrals at Preliminary Plat.

vi. Utilities:
1. Stormwater Facilities:
   a. The proposed detention ponds in the proposed open space dedication area will need to meet the requirements in MC 10.6.3 C. and 10.6.4 E.9 to qualify as Town dedicated open space.
2. WAPA (Western Area Power Association) Transmission Lines:
   a. Any proposed grading and improvements within the easement will need to be reviewed and permitted by WAPA. WAPA will be sent a referral at Preliminary Plat for review and comment.

vii. Streets:
1. Highlands Circle:
   a. Highlands Circle has not yet been platted adjacent to these Planning Areas. This road will need to be platted before many of these lots can be platted.
2. Cul-de-sacs
   a. MC 10.5.G 6: Maximum length of a cul-de-sac is 750 feet. The western cul-de-sac comes close to that length.
   b. MC 10.6.5 F.2.d. Cul-de-sacs are required to provide a pedestrian path connection from the end of the cul-de-sac. The Sketch Plan proposes two cul-de-sacs and one has a pedestrian path and one does not.
   c. MC 10.6.5 D.2.e.:
      i. The cul-de-sac heads are required to have a minimum of a 35 foot view and pedestrian access. Neither cul-de-sac meets this requirement.
      ii. The trail needs to be shown in each tract connecting to the main trail corridor. The Sketch Plan proposes two cul-de-sacs and one has a pedestrian path and one does not.
3. Residential Streets:
   a. MC 10.6.5 D.3.c. Maximum Block Lengths:
      i. There is a requirement that the average block face be a maximum of 600 feet. Staff's calculation of the block faces proposed in this Sketch Plan exceeds that 600 foot maximum. At Preliminary Plat, the applicant needs to submit an illustration showing how the overall development of Preliminary Plat 1 and 2 meets this requirement.
   b. MC 10.6.5 F.2.c. Through-Block Connections:
      i. Blocks 900 feet or longer are required to have a through-block pedestrian connection, in a tract that is 30 feet in width with a trail at least 5 feet in width.

1. There are several blocks proposed that appear to be 900 feet or more in length that have not provided the through-block connection.
2. The through-block connection provided does not meet the 30 foot minimum tract width.

viii. Residential Lots:

1. PUD Sheet 3 Notes 4: This note requires double frontage lots abutting collector or local roads to be an additional 10 feet in depth and have a 20 foot landscape buffer. There a not very many double frontage lots in the Sketch Plan; however, the lots that back to Indian Peaks Drive appear to be some of the shallowest lots that do not provide the additional 10 feet in depth and do not have the minimum 20 foot landscape buffer in some areas.
2. There are a couple of lots just north and east of the pocket park that are clipped off in the back. Staff questions if they meet the minimum lot size.

b. Sheet 2:

i. Dwelling Unit Summary Chart:

1. Filing/PA Area" column: When I add the numbers in this column it comes to a total that is less than the legal description on Sheet 1.
2. The note below the table is not correct. The note references the Comprehensive Plan Map LDR-Low Density Residential density of 2-5 dwelling units per acre when it should be referencing the Unified Development Code LR-Low Density Residential zone district density. MC 10.2.2 E.1. allows residential development in LR at a gross density not to exceed 5 dwelling units per acre.

3. Section 10 – Ecological Site Assessment:

a. At the time of Preliminary Plat the Ecological Site Assessment will need to be updated. Areas within the report that contain Prairie Dogs and Remnant Native Grassland will need further evaluation by staff at the time of Preliminary Plat.

Department of Public Works

TOWN OF ERIE
1874

Memo

To: Deb Bachelder
From: Matt Wiederspahn, P.E., CFM, Development Engineer
Date: September 8, 2015
Subject: **Erie Highlands Planning Areas 5, 6, and 14 Sketch Plan Comments**
CC: Russell Pennington
Wendi Palmer

Comments for Phase I Drainage Report:

1. Basin OS includes numerous walkout lots that are shown draining un-detained with no water quality off site. All developed lots must provide detention and water quality for runoff.
2. Several detention ponds are shown in open space and will need to meet the UDC design criteria for storm water facilities in open space. Section 10.6.3.C.4.g.ix of the UDC requires that they cannot be deeper than five feet nor have slopes greater than 5:1.
3. Outfall locations and downstream facilities of the ponds will need to be identified in a future Phase II Drainage Report.

Comments for Sketch Plan:

1. A Preliminary Utility Study and Utility Plan were not included in the submittal. Therefore, Public Works cannot provide any comments on the feasibility of the utilities required for this development.
2. Roadway curve radii were not provided so Public Works cannot determine if the proposed road layout meets Town standards.

Town of Erie
Open Space and Trails Advisory Board

From: Town of Erie Open Space and Trails Advisory Board (OSTAB)
To: Deborah Bachelder, Senior Planner, Community Development
Date: September 1, 2015

Subject: Erie Highlands Planning Areas 5, 6 & 14: Sketch Plan
Location: South of Erie Parkway, between WCR 5 and WCR 3

OSTAB has reviewed the package materials, compared them to Town planning documents, and has prepared the following comments, questions, and recommendations for consideration in evaluating this project.

The Natural Areas Inventory (NAI):

Discussion: In 2008, the Town engaged Walsh Environmental Scientists and Engineers of Boulder, Colorado, to identify and evaluate the natural areas within the Town's planning area. Over 125 areas were evaluated. Based upon a variety of characteristics, a numerical "summary rating" was calculated, and the habitat quality of each site was categorized as high, medium, or low. There are no NAI sites located within this application.

Recommendations: None

Open Space:

Discussion:. Paragraph C of Section 10.6.3 of the Unified Development Code (UDC) defines the open space requirements for residential development, including not less than 17 acres of open space land shall be dedicated for each 1,000 ultimate residents. The UDC also defines standard criteria for open space, and areas not eligible. Standard criteria include:

1. "A minimum of 10 contiguous acres";
2. "A parcel that is no less than 300 feet wide at the narrowest width, unless the Town approves a lesser amount for a trail";
3. "Typically, open space shall be owned and maintained by the Town. The Town may consider a conservation easement as an alternative".

Areas not eligible include:

1. "Oil and gas well sites and required buffers";
2. "Storm water channels, detention and water quality ponds greater than 5 feet deep with slopes greater than 5:1."

Sheet 2 of the PUD indicates that the required open space is 47.15 acres, and the acres to be provided is 32.65 plus fee-in-lieu. It appears that some of the proposed open space in both PA 5 and PA 6 does not meet the 300 foot width requirement. There are also 4 proposed detention basins: PA 2/14, PA 5/14, PA 5 and PA 6. We do not know if these proposed deletion basins meet the slope requirements stated above.

Sheet 3 of the Sketch Plan has both an overlay and a chart comparing the open space areas in the PUD and this Sketch Plan. There are both inconsistencies and confusing issues in these comparisons:

1. The chart indicates that PA 14-B is public open space in the PUD, but the Sketch Plan overlay shows that this will NOT be public open space. Which is correct?

2. The overlay shows that the SW corner of PA 2 is public open space in the PUD, but the Sketch Plan overlay shows that this will NOT be public open space. Which is correct?
3. The Sketch Plan does not show if there is a detention basin in PA 2/14, and eliminates the detention basin in PA 6. Is this correct?
4. The Sketch Plan changes the configuration of the open space in PA 6, which appears to increase the amount of open space that does not meet the 300 minimum width defined in the UDC. We are against any reduction in qualified open space.

Recommendations:

1. Resolve all inconsistencies between the PUD and the Sketch Plan as described above in the Discussion section;
2. Do not reduced the amount of public open space that meets all the requirements in the UDC.

Trails:

Discussion: The Narrative (section h) states that "Trails connecting to regional connections and throughout the community will be included in the open space areas being dedicated to the town". Both Sheet 2 of the PUD Plan and the Concept Plan have a connector trail at the west end of PA 14 to Grandview, and a connector trail at the southern end of PA 6 to Sunset. However, neither Sheets 2 (Land Use Plan) nor Sheet 3 (Open Space Plan) in this Sketch Plan have any connecting trails to adjacent properties. That must be corrected.

Both Sheet 2 of the PUD Plan and the Concept Plan have a trail on the south side of Indian Peaks Drive in PA 6 that will be a primary walkway to the school-park site. However, neither Sheets 2 nor Sheet 3 in this Sketch Plan have this trail. For reasons of safety and usability, that trail should be paved, 8 feet wide, and separated from the street by a landscaped strip.

The Narrative (section a) states that "The neighborhood is organized around the south side of the school-park site with trail connectors through the open space corridor. The PUD plan has more connectors from the trail in the open space areas to various streets than Sheets 2 and 3 of the Sketch Plan. The following connectors in the PUD Plan are omitted from this Sketch Plan:

1. PA 5, NW portion, connector to Indian Peaks Drive;
2. PA 5, south central portion, connector in the middle of an unnamed street with roughly a dozen lots;
3. PA 6, SW portion, connector at the intersection of 2 unnamed streets.

The Sketch Plan should not eliminate any trails that are in the PUD.

Recommendations:

1. Add trail connections to adjacent properties to the west of PA 14 and the south of PA 6, to match the PUD;
2. Add a trail along the south side of Indian Peaks Drive as described above in the Discussion;
3. Add trail connections from the trail in the open space to adjacent streets to match the PUD, as described above in the Discussion.

Please pass this referral letter to the Applicant, and appropriate town departments, boards, and commissions. Thank you for your attention to these matters. OSTAB is available to discuss any of the above in more detail as needed.

Sincerely,

Open Space and Trails Advisory Board

Denise Brady
Kevin Chard
Dawn Fraser
Monica Kash

Nicole Littman
Ken Martin (Chair)
Joe Martinez

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-04, **Version:** 1

SUBJECT: April 5, 2016 Municipal Election Update
DEPARTMENT: Town Clerk-Administration

PRESENTER: Nancy Parker

FISCAL INFORMATION: None
Cost as Recommended:
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: None

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

The Town of Erie holds its Elections on even numbered years on the first Tuesday in April. Recent changes to the Municipal Election statutes have resulted in some new timelines for certain events occurring during the Election Season. There are two significant changes for the upcoming 2016 Election that should be noted:

1. The first date to circulate Candidate Petitions has changed from 50 days prior to the election to 92 days prior to the election and the petitions are to be filed with the Town Clerk within 71 days of the Election. This makes the date that the 2016 Petitions available for circulation January 5, 2016 and the date they need to be filed is January 25, 2016 (Last election dates were February 10th to circulate and February 28th to file).

2. Due to changes in requirements for mailing ballots to active military overseas voters, ballots must be mailed no later than 45 days prior to the election. This moves the date that ballots must be printed and ready 30 days earlier than the last election. This decreases the time by 30 days that the Board can add a ballot question to the ballot prior to the election. Instead of the first meeting in February, it would now be the first meeting in January.

We will be notifying voters of these changes in the newsletter and on the Town website.

ATTACHMENTS: Election Calendar
Draft Newsletter

TOWN OF ERIE
MUNICIPAL MAIL BALLOT ELECTION CALENDAR
APRIL 5, 2016
Title 31, Article 10; CRS 31-10-101

Exclude Election Day and count backwards; The day before the election will be day number one.

If the last day of any period is a Saturday, Sunday or legal Holiday, the period is extended to the next day which is not a Saturday, Sunday or legal Holiday

EXCEPT for petition circulation and filing a petition; if the last day of any period is a Saturday, Sunday or legal Holiday, the period shall be the day preceding the Saturday, Sunday or a legal Holiday.

CRS 31-10-204: Municipal Clerk as Deputy County Clerk and Recorder (allows Clerk to register voters)

RED = CLERK
BLUE = DEADLINES FOR CLERK
GREEN = CANDIDATE
BLACK = SOS

Date	Number of Days	**Action**
		2015
November 13, 2015 *Friday*	N/A	☐ **Reserve "Election Candidates Advertisement"** with Colorado Hometown ☐ **Reserve "Judges Ad"** with Colorado Hometown ☐ **Verify PO Box** is open/valid and paid for.
December 14, 2015 *Monday*	N/A	☐ **RESOLUTION** Approving Conduct of Election CRS 31-10-401
		2016
January 4, 2016 *Monday*	92 Days	☐ **LAST DAY** for clerk to prepare the petition forms for nomination. CRS 31-10-302 (1)(2) (always the day prior to 1st day nomination petitions can be circulated; accounting for weekends)
January 5, 2016 *Tuesday*	91 Days	☐ **FIRST DAY** that **nomination petitions may be circulated.** CRS. 31-10-909(a)
Within 10 Days after petition received	VARIES	☐ **Candidates must file Candidate Affidavit / Fair Campaign Practices Act Paperwork with Town Clerk; Title 1, Article 45 (we have them sign and leave when checking out petition)**
January 6, 2014 *Wednesday*	90 Days	☐ **FIRST DAY** absentee ballots may be filed in writing with the municipal clerk. (CRS. 31-10-1002) * Absentee ballots must be mailed w/in 72 hours of receipt by the clerk ☐ **LAST DAY** for any changes in the boundaries of election precincts. CRS 31-10-502

January 25, 2016 *Monday*	71 Days	☐ **LAST DAY** that **nomination petitions may be circulated** and signed prior to the regular election. CRS. 31-10-909 (a) ☐ **LAST DAY** for **nomination petitions to be filed** with the municipal clerk. CRS. 31-10-909 (a) ☐ All petitions and nominations that are in apparent conformity with the Municipal Election Code, as determined by the municipal clerk, are valid unless there is a written objection within three days after the filing of the nomination petition. Notice of the objection must be mailed "forthwith" to the affected candidate. The municipal clerk must determine the validity of the objection within at least 48 hours after it is filed. Any sustained objection may be remedied or any defect cured by an amendment to the original petition, or by filing a new petition within three days after the objection is sustained and no later than the 18th day before the election.**All nominations valid unless objection filed w/in 3 days CRS 31-10-305 ☐ **REQUEST** temporary access to SCORE from SOS to validate petitions (if required and available) ☐ **MAIL** sufficient / insufficient letters to candidates ☐ **EMAIL** all candidates FCPA reminder (in candidates folder)
January 29, 2016 *Monday*	66 Days	☐ **LAST DAY** that nomination petitions that do not contain the requisite number of names of electors qualified to sign the petition can be amended in this respect prior to the election. CRS 31-10-909 (a) ☐ If any candidate should die or withdraw from the nomination prior to 63 days before the election, the vacancy may be filled by the vacancy committee; if no committee has been assigned, petition may be used in the same manner as original petition. CRS 31-10-304 (1) ☐ **Email** candidates FCPA dates and reminders
January 25, 2016 *Monday*	71 Days	☐ **BOT LOT DRAWING** for names on ballot; candidates **MUST** be **sign their letter of acceptance/withdraw for candidacy**
February 1, 2016 *Monday*	64 Days	☐ **WRITE IN CANDIDATE:** If the governing body has so approved by ordinance, no write-in vote for any municipal office shall be counted unless an affidavit of intent has been filed with the clerk prior to 64 days before the day of the election by the person whose name is to be written in indicating that such person desires the office and is qualified to assume the duties of that office if elected. CRS 31-10-912
February 2, 2016 *Tuesday*	63 Days	☐ ****LAST DAY** to **withdraw nomination petition**. See requirements in Elections Book or CRS 31-10-909 (b)

February 5, 2016 *Friday*	60 Days	☐ Notice of Election and request for Voter Registration Lists given to the County Clerk and Recorder voters marked as active military or overseas voters. ☐ **ORDER** Ballots **5:00 pm (last day to mail ballots is for Active Military or Overseas Voters is Thursday February 25, 2016)**
March 23, 2015 *Wednesday*	N/A	☐ **Reserve "Election Advertisement"** ** Publication must be no later than _10 days prior to election CRS 31-10-501 (1)(2) Publish March 23,2016 Colorado Hometown)
February 19, 2016 *Friday*	46 Days	☐ **LAST DAY** to file written comments concerning **TABOR** issues to be included in the issue mailing. ** **TABOR = Taxpayer Bill of Rights; debt or a tax increase** (CO Constitution Article 10-20(3)(b)(v). Must be filed 45 days prior to election which is always a Saturday, therefore must be filed on the Friday preceding the 45th day. Title 1-7-901(4) and CRS. 31-10-501.5.) *****If no comments = must indicate "NO COMMENTS WERE FILED BY THE CONSTITUTIONAL DEADLINE" (Title 1-7-903(4)**
February 25, 2016 *Thursday*	45 Days	☐ **LAST DAY** to mail ballot and ballot materials to any person designated as an active military or overseas voter. CRS 31-10-102.8(2)a
February 22, 2016 *Monday*	43 Days	☐ **LAST DAY** for petition representatives for **TABOR** initiated measures, to submit a summary of comments in FAVOR of the measure to the DEO. (Title 1-7-903(3) **must submit all written comments, not just their own. **Typewritten comments must be submitted no later than 3:00 pm CRS. 31-10-501.5 **The DEO summarizes comments filed in opposition to the initiated measure. If no comments are filed must indicate, "NO COMMENTS FILED BY THE STATUTORY DEALINE" (Title 1-7-904)
March 7, 2016 *Monday*	30 Days	☐ **LAST DAY to mail TABOR Ballot Issue Notice to all "Registered households"** (CO. Constitution Art. 10, 20(3)(b) CRS 1-7-901 ☐ **LAST DAY** County Clerk can submit to the DEO a preliminary list of registered electors. CRS 31-10-910 (1)(a)
March 14, 2016 *Monday*	22 Days	☐ **LAST DAY** a person can establish residency in the State of Colorado. CRS 31-10-201(1)(b) ☐ **FROM THIS DAY** registered voter can change their address. Can be done any day up to election day. CAN ONLY BE DONE AT COUNTY CLERKS OFFICE CRS. 31-10-208 ☐ **LAST DAY** County Clerk can submit to the DEO a supplemental list of registered electors. CRS 31-10-910 (1)(b) **FIRST DAY** ballots can be made available in clerks office for pick-up / replacement. CRS 31-10-910(d)

March 14, 2016 *Monday* *No sooner than 22 Days and no later Than 15 Days	22 Days	☐ ***FIRST DAY** DEO can mail out ballots CRS 31-10-910(2)(a) ☐ **FIRST DAY** ballots can be made available at the DEO Office CRS 31-10-910(2)(d) ☐ Secure Judges
March 15, 2016 *Tuesday*	21 Days	☐ **Contribution reports** required by the Fair Campaign Practices Act to be filed with the municipal clerk must be filed on the twenty-first day and on the **Friday before (March 28th) and thirty days (April 30th)** after the election. Send a $50 per day fine to candidate who does not turn them in on time. Title 1-45-108 (1)(a)(I) and 1-45-108 (1)(II) and 1-45-108 (2)(II) and 1-45-109(II)(b)
March 16, 2016 *Wednesday*	20 Days	☐ **LAST DAY** to file any petition or certificate of nomination to fill a vacancy with the municipal clerk. CRS 31-10-304 (2) ☐ **LAST DAY** a ballot issue concerning the creation of debt or other financial obligation must post a notice, as described in CRS 1-7-908. This notice is in addition to any required **TABOR BALLOT** issue notice. CRS 31-10-501.5 ☐ **LAST DAY** for County Clerk to submit supplemental list of names of eligible electors whose names were NOT on the preliminary list. CRS 31-10-910 (1)(b)
March 17, 2016 *Thursday*	19 Days	☐ **FIRST DAY** If an ordinance has been adopted by the governing body pursuant to Section 31-10-507; the clerk may **CANCEL THE ELECTION** and declare the candidates elected upon a <u>resolution</u> by the governing body if the election of persons to office is the only matter before the voters, and if, at the close of business on the **19th day (March 17th)** before election, there are not more candidates than offices to be filled at such election, including write-in candidates filing affidavits of intent. In the event of such cancellation, **<u>notice of cancellation</u>**: ✓ shall be published ✓ shall be posted at each polling place ✓ shall be posted in at least one other public place. ☐ **MAIL** Judges packets and acceptance/standby letters
March 21, 2016 *Monday*	15 Days	☐ **LAST DAY** for the BOT to appoint election judges or to delegate to the Clerk the authority and responsibility to appoint election judges. (MINIMUM OF THREE JUDGES ARE NEEDED FOR ELECTION) CRS 31-10-401 ☐ **FIRST DAY** Mail Ballots may be counted. CRS 31-10-911 ☐ **LAST DAY** mail ballots may be mailed to registered elector CRS 31-10-910(2)(a)

March 25, 2016 *Friday*	10 Days	☐ **LAST DAY TO POST: CRS 31-10-501 (3)** ✓ "POLLING PLACE FOR THE TOWN OF ERIE REGULAR MUNICPAL ELECTION" ✓ Election date ✓ Election Hours
March 28, 2016 *Monday*	1 Week	☐ **Email** judges the manual to study ☐ **Email** candidates election day information ☐ **PICK UP** supplies from EPC
March 31, 2016 *Thursday*	5 Days	☐ **LAST DAY** for the County Clerk to submit to the DEO a complete list of registered electors. CRS 31-10-205
April 1, 2016 *Friday*	Friday before the election	☐ **LAST DAY** to file absentee ballot with DEO. CRS. 31-10-1002 ☐ **LAST DAY** to file with the Clerk, contribution reports required by the Fair Campaign Practices Act. CRS 1-45-108 (2)(a) ☐ **CONDUCT** Judges Training ☐ **ISSUANCE** of certificate of appointment to judge ☐ **ISSUANCE** of certificate of judges training
April 4, 2016 *Monday*	1Day before the election	☐ **LAST DAY** election judge may ask the DEO for the registration list and supplies CRS 31-10-206 (2)
April 5, 2016 ***Tuesday***	**Election Day**	☐ **Polling Location must be open from 7 am to 7 pm** CRS 31-10-601 ☐ **LAST DAY** judges may take the oath or affirmation. CRS 31-10-407 ☐ **LAST DAY** for registered electors to file an affidavit of change of address with the county clerk.CRS 31-10-208 ☐ **LAST DAY** for Emergency Ballot to be requested CRS 31-10-1010(1)(a) ☐ **LAST DAY** to request replacement ballot **CRS 31-10-910 (e)(I)** ☐ **LAST DAY** to vote via absentee ballot. CRS. 31-10-1004 ☐ **EMAIL unofficial results to:** lawclerk@cml.org Election Contacts 2016 dlovato@cml.org (Name of new candidates elected, address, phone and who they replaced) ☐ PUBLISH unofficial certified statement of election CRS 31-10-1205 (2) **CLERK must sign unofficial results

April 6, 2016 *Wednesday*	Day after election	☐ Thank you letters to all candidates ☐ Thank you letters to Judges ☐ Order ipad for newly elected candidates ☐ Order name plaques for newly elected candidates ☐ Order name badges for newly elected candidates ☐ Request bio from new candidates ☐ Request picture from new candidates ☐ Set up email for newly elected candidates ☐ Add newly elected candidates to TOM Trustees list ☐ Update spreadsheet of candidates
April 12, 2016 *Tuesday*	7 Days After	☐ **LAST DAY** for municipal clerk to open the returns and make all abstracts of votes for each office in the presence of the Mayor or other assistant. CRS 31-10-1201 ☐ **LAST DAY** an interested party may request a recount, at their expense. CRS 31-10-1207 ☐ **CANVASS** must be completed and election results certified; copy of the Official Abstract of Votes Cast must be sent to SOS; newspaper; website. CRS. 31-10-1201 **** Results are official only after canvass** ☐ Clerk shall notify the SOS of election results CRS 31-10-1205(2) steven.ward@sos.state.co.us
April 15, 2016 *Friday*	10 Days After	☐ **LAST DAY** for mandatory and optional recounts. CRS 31-10-1207(2) Highest number – lowest number = X If X less than or = to ½ of 1%
April 12, 2016 *Tuesday*	1st BOT Meeting After Election	☐ BOT Memo; Summary of Election ☐ **Issue** certificates of candidacy to newly elected candidates ☐ **SWEAR IN NEW BOARD/APPOINT MAYOR-PRO-TEM**
April 22, 2016 *Friday*	17 Days After	☐ **LAST DAY** for a person to contest the election of any person to a municipal office by filing such contest with the municipal clerk's office. CRS 31-10-1303 (pursuant to 31-10-1301)
April 25, 2016 *Monday*	20 Days After	☐ **LAST DAY** to contest if recount is conducted. CRS 31-10-1303
May 5, 2016 *Thursday*	30 Days	☐ **LAST DAY** for Contribution reports required by the Fair Campaign Practices Act (**FCPA**) to be filed with the municipal clerk. Title 1-45-108(1)(a)(I) and 1-45-108(1)(II) and 1-45-108 (2)(II)
May 20, 2016 *Friday*	45 Days After	If no challenges made, the **signature forms** filled out by the individuals voting at the election may be **destroyed**. CRS 31-10-606(3)
October 5, 2016	6 Months 1 Day After	☐ If no challenges made, ballots and absentee voter identification envelopes may be destroyed. CRS 31-10-616
	2018	
April 6, 2018	2 Years 1 Day After	☐ All nomination petitions may be destroyed. CRS 31-10-302 (7)

APRIL 5, 2016: MUNICIPAL ELECTION

WHAT'S ON THE BALLOT

The Town of Erie will conduct its Regular Municipal Election on Tuesday, April 5, 2016. **During this election, registered voters in Erie will be electing a Mayor and three (3) Trustees.** The Mayor will be elected to serve a two-year term; three Trustees will be elected to serve four-year terms.

Background: The Town of Erie holds a Regular Municipal Election the first Tuesday of April in even-numbered years. Trustees serve four-year staggered terms; at every Regular Election there are three out of the six seats up for election.

CANDIDATE INFORMATION & DEADLINES

- Erie residents interested in running for the Board of Trustees may pick up a Candidate's Packet from the Town Clerk's Office beginning on **Tuesday, January 5, 2016.**

- Each petition requires a minimum of ten signatures from registered electors within the boundaries of the Town of Erie. Registered electors may only sign one petition for the Mayoral candidacy and up to three petitions for the Board of Trustees candidates (only one signature per candidate. Completed petitions must be filed no later than **5:00 p.m. on Monday, January 25, 2016** with the Town Clerk's Office.

- The Town Clerk's Office has scheduled an informational meeting on **Monday, January 4, 2014 at 6:00 p.m.** This meeting is not mandatory, however, information will be provided from the Secretary of State's Office regarding the Colorado Campaign and Financial Practices Act as well as other important candidate information.

- The last day for candidates to submit petitions to be included on the April 1st ballot is **5:00 p.m. on Monday, January 25, 2016**.

MAIL BALLOT INFORMATION

The Town Clerk's Office will mail the ballots by the **week of Monday, March 14, 2016**. Erie voters may mail their ballot or drop off their ballot at Town Hall any time during normal business hours (8:00 a.m. to 5:00 p.m.) and on Election Day from 7:00 a.m. to 7:00 p.m. Ballots must be received by 7:00 p.m. on Election Day. Registered voters who do not receive a ballot in the mail may request one from the Erie Town Clerk's Office.

For more information, please contact Erie Town Clerk, Nancy Parker at 303-926-2731 or nparker@erieco.gov or visit www.erieco.gov/vote

VOTER REGISTRATION

HAVE YOU REGISTERED TO VOTE OR DO YOU NEED TO UPDATE YOUR REGISTRATION?

TO REGISTER TO VOTE YOU MUST BE:

- A United States Citizen
- Be 18 years old on or before the date of the election
- Reside in Colorado and in the municipal election precinct for at least 22 days before the election
- Registration is permitted on any day up to and including the day of the election

DEADLINE INFORMATION:

You may register either online, by mail or in person. Registration options are:

- Up to 8 days prior to the election voter registration is available via the Secretary of State's online voter registration system www.govotecolorado.com
- Prior to and including the day of the election voter registration can be conducted by your County Clerk and Recorder or Town Clerk

IN ADDITION TO REGISTERING TO VOTE YOU MAY:

- Change your address on your current voter registration record
- Change your party affiliation on your current voter registration record

TOWN OF ERIE
1874

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-070, **Version:** 1

SUBJECT: Monthly Communications Report - August 2015

DEPARTMENT: Administration

PRESENTER: Fred Diehl, Assistant to the Town Administrator

FISCAL INFORMATION: N/A
Cost as Recommended:
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: N/A

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

COMMUNICATIONS CALENDAR: Attached is the monthly Communications Calendar for August which provides statistical information on the release and reach of Town of Erie News & Announcements, including the following details:

- 39 Unique Announcements Released via "Notify Me"
- 5,744 "Notify Me" Subscriptions

FACEBOOK INSIGHTS:

- 22 Unique posts
- Reach of Facebook posts ranged from 344 on the low end (ECC Power Restored) to over 7,300 on the high end (MONEY Magazine Ranks Erie #13).

WEBSITE: The attached monthly Website Overview Report includes visitor statistics for www.erieco.gov <http://www.erieco.gov> including the following information:

- Total Page Visits: 149,224
- Total Unique Visits: 50,273
- Erie Government Television Streaming Video:
  - Total Page Views: 1695
  - Total Visits: 992

ERIE STUFF:

- 863 Downloads YTD
  - 620 - iOS
  - 243 - Android
- 22 Requests Submitted this Month
- 78 Requests Submitted YTD

ATTACHMENTS:

1. Communications Calendar
2. Facebook Insights
3. Twitter Analytics
4. Erie Stuff Requests
5. Website Overview Report

Communication Calendar - August 2015

NEWS & ANNOUNCEMENTS	Notify Me Message	Newsflash Posted on Website	Facebook Post	Twitter Post
Reach via Subscribers & Visitors:	1,310		2,063	1,054
8/4: Mosquito Control Update - Issued: August 4, 2015			X	
8/6: Happy Farmers Market Week!			X	
8/7: Erie Air Fair – Tomorrow!	X	X	X	X
8/7: Encana Neighborhood Meeting Notification	X	X	X	X
8/7: Updated: Encana Neighborhood Meeting Notification	X	X		X
8/7: Congratulations to 24 Carrot Bistro on Ribbon Cutting			X	
8/7: Jogger Attacked by Dog on Coal Creek Trail - Erie Police Ask for Public's Assistance in Locating Owner	X	X	X	X
8/8: Recycled Household Products Available to Erie Residents	X	X	X	X
8/10: More Website Tips with Gottfried Gorilla	X	X	X	X
8/11: Suspect in Dog Attack Identified Thanks to Anonymous Tip	X	X	X	X
8/12: Erie Board of Trustees Action Items – August 11, 2015	X	X	X	X
8/14: Erie Proud!	X	X	X	X
8/14: Message from the Mayor: 2015 Citizen Survey Results	X	X	X	X
8/15: Concert in the Park on Saturday!			X	
8/17: Back to School Safety Reminders!	X	X	X	X
8/17: MONEY Magazine Names Erie as One of the Best Places to Live in America!	X	X	X	X
8/26: Erie Board of Trustees Action Items - August 25, 2015	X	X	X	X
8/27: New! "Notify Me" now includes Oil & Gas Operations	X	X	X	X
8/28: Town of Erie Police Department & Municipal Court are Moving!	X	X	X	X
8/31: ECC Maintenance Week Closure Pictures			X	

ECONOMIC DEVELOPMENT ANNOUNCEMENT	Notify Me Message	Newsflash Posted on Website	Facebook Post	Twitter Post
Reach via Subscribers & Visitors:	819		2,063	1,054
8/14: Free Business Start-Up Seminar – Thursday, August 27	X	X		X

PUBLIC WORKS ANNOUNCEMENT	Notify Me Message	Newsflash Posted on Website	Facebook Post	Twitter Post
Reach via Subscribers & Visitors:	738		2,063	1,054
8/17: Concrete Repairs Begin This Week	X	X		X
8/25: Geotechnical Drilling at Erie Lake Reservoir to Begin August 31st	X	X		X
8/26: Erie Parkway Construction between Meadow View Pkwy. & 111th	X	X		X

POLICE ANNOUNCEMENT	Notify Me Message	Newsflash Posted on Website	Facebook Post	Twitter Post
Reach via Subscribers & Visitors:	1,047		2,063	1,054
8/27: Erie Police Seek Additional Information of Reported Incident on Highway 52	X	X		X
8/28: Town of Erie Police Department & Municipal Court are Moving!	X	X	X	X

PARKS & RECREATION ANNOUNCEMENT	Notify Me Message	Newsflash Posted on Website	Facebook Post	Twitter Post
Reach via Subscribers & Visitors:	1,186		2,063	1,054
8/19: Erie Community Garden Work Day	X	X	X	X
8/26: Erie Community Center Closed Until Further Notice	X	X	X	X
8/16: Erie Community Center Power Restored	X	X	X	X

OIL & GAS OPERATIONS ANNOUNCEMENT	Notify Me Message	Newsflash Posted on Website	Facebook Post	Twitter Post
Reach via Subscribers & Visitors:	57		2,063	1,054

TOWN OF ERIE CALENDAR NOTIFICATION	Notify Me Message	Event Posted on Website	Twitter Post
Reach via Subscribers & Visitors:	587		1054
8/1: Joint Board of Trustees/Planning Commission Meeting (8/4)	X	X	X
8/2: Planning Commission Meeting (8/5)	X	X	X
8/4: Joint Board of Trustees/Planning Commission Meeting (8/4)	X	X	X
8/7: Open Space and Trails Advisory Board (8/10)	X	X	X
8/9: Board of Trustees Meeting (8/11)	X	X	X
8/9: Tree Board Meeting (8/12)	X	X	X
8/10: Concert in the Park - Phat Daddy (8/15)	X	X	X
8/14: The Great Erie Outdoor Adventure (8/29-8/30)	X	X	X
8/15: Board of Trustees Study Session (8/18)	X	X	X
8/16: Planning Commission Meeting (8/16)	X	X	X
8/19: Movie in the Park (8/29)	X	X	X
8/21: Historic Preservation Advisory Board Meeting (8/24)	X	X	X
8/22: Board of Trustees Meeting (8/25)	X	X	X
8/30: Planning Commission Meting (9/2)	X	X	X
	X	X	X

ENGAGE ERIE TOPICS	Engage Erie Message	Newsflash Posted on Website	Facebook Post	Twitter Post
Reach via Participants & Visitors:			2063	1054

YOUTUBE CHANNEL	Views Via YouTube	Newsflash Posted on Website	Facebook Views	Twitter Post
Reach via Subscribers & Visitors:				1054
8/6: Town of Erie | Website Tips #3: Search Engine	29	X		
8/6: Town of Erie | Website Tips #4: News, Calendar & Connect	24	X		
8/6: Town of Erie | 2015 Erie Farmers Market	8	X	944	

UTILITY BILL INSERTS	Mailed Bills	Emailed Bills		
Total:				
Letter from the Mayor - RE: Citizen Survey Results	X	X		

NEW RESIDENT PACKETS	Packets Mailed This Month	Total Mailed YTD		
Total:				
	107	653		

ERIE STUFF - TOWN OF ERIE OFFICIAL MOBILE APPLICATION	iOS Downloads	Google Play Downloads	TOTAL	
Total:				
	620	243	863	

updated: 9/25/2015

August 2015 – Facebook Insights

Town of Erie, Colorado – Government Page

Reach: Organic / Paid | Post Clicks | Likes, Comments & Shares

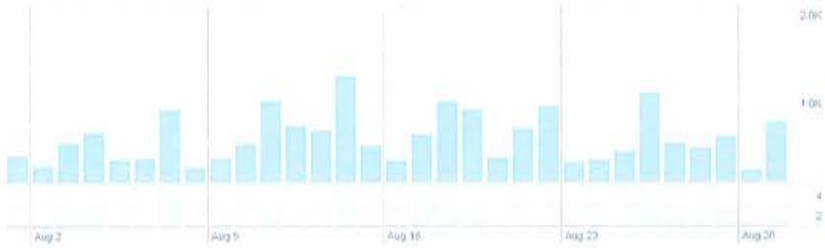
Published	Post	Type	Targeting	Reach	Engagement	Promote
08/31/2015 3:02 pm	While the Erie Community Center may be closed f or Maintenance Week, it is busy inside! Lots of de			1.3K	317 19	Boost Post
08/28/2015 4:42 pm	Town of Erie Police Department & Municipal Court are Moving! Effective Monday, August 31, 2015, th			1K	119 42	Boost Post
08/27/2015 1:16 pm	New! "Notify Me" now includes Oil & Gas Operatio ns The Town of Erie has added "Oil & Gas Operati			829	40 27	Boost Post
08/26/2015 12:00 pm	As of 11:45 a.m. the Erie Community Center's pow er has been restored and the facility has re-opene			344	5 5	Boost Post
08/26/2015 10:17 am	Erie Board of Trustees Action Items – August 25, 2 015 In This Issue: Board Approves New Oil & Gas			828	78 4	Boost Post
08/26/2015 9:47 am	Due to a power outage in the area, the Erie Comm unity Center is closed until further notice. All group			365	9 3	Boost Post
08/19/2015 12:04 pm	Erie Community Garden Work Day! The Erie Resi dents who are spearheading the first Community			996	86 29	Boost Post
08/17/2015 4:27 pm	This year Money Magazine ranks Erie #13 on the l ist of the 50 best small cities in the country—place			7.3K	523 229	Boost Post
08/17/2015 3:02 pm	Back to School Safety Reminders! The Erie Police Department wants to take a minute and remind kid			2K	110 87	Boost Post
08/15/2015 8:30 am	Don't miss the last Concert in the Park this summe r hosted by the Erie Chamber tonight featuring Ph			850	25 17	Boost Post
08/14/2015 12:01 pm	Message from the Mayor: 2015 Citizen Survey Re sults I am pleased to share the Citizen Survey rep			713	49 8	Boost Post
08/14/2015 8:50 am	Erie Proud! We have new 2015 Limited Edition Eri e, Colorado t-shirts and tank tops available for sal			692	60 17	Boost Post
08/12/2015 11:04 am	Erie Board of Trustees Action Items – August 11, 2 015 In This Issue: Board Considers Canyon Creek			744	83 3	Boost Post
08/11/2015 9:19 am	Suspect in Dog Attack Identified Thanks to Anony mous Tip Last night Erie Police followed up on an			2.1K	535 21	Boost Post
08/10/2015 9:32 am	More Website Tips with Gottfried Gorilla! Join Gottf ried Gorilla as he takes you on a guided tour of the			387	2 5	Boost Post
08/08/2015 9:10 am	Recycled Household Products Available to Erie R esidents! The Boulder County Hazardous Material			653	51 15	Boost Post
08/07/2015 1:40 pm	Jogger Attacked by Dog on Coal Creek Trail - Erie Police Ask for Public's Assistance in Locating Own			1.6K	536 9	Boost Post
08/07/2015 11:32 am	Congratulations 24 Carrot Bistro on your ribbon cu tting today!			1.8K	272 104	Boost Post
08/07/2015 9:50 am	Encana has posted notice that they have schedule d a Neighborhood Meeting on August 26, 2015 to			634	25 1	Boost Post
08/07/2015 9:00 am	All are invited to come down to the Erie Municipal Airport for the annual Erie Air Fair tomorrow Satur			1.1K	54 32	Boost Post
08/06/2015 8:29 am	Happy Farmers Market Week! We hope you come to celebrate tonight at the Erie Farmers' Market in			2K	160 105	Boost Post
08/04/2015 2:21 pm	Mosquito Control Update – Issued: August 4, 2015 In response to high mosquito activity in some area			499	43 3	Boost Post

Printed: 9-25-2015

August 2015 – Twitter Analytics

@eriecolorado

Your Tweets earned **15.8K impressions** over this **31 day** period

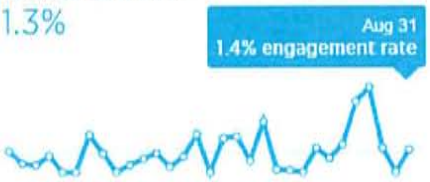


YOUR TWEETS
During this 31 day period, you earned **510 impressions** per day.

Engagements

Showing 31 days with daily frequency

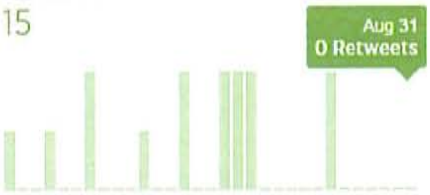
ENGAGEMENT RATE
1.3%



LINK CLICKS
141

On average, you earned **5 link clicks** per day

RETWEETS
15

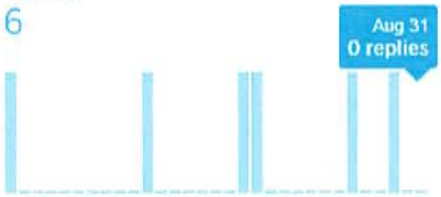


On average, you earned **0 Retweets** per day

FAVORITES
7

On average, you earned **0 favorites** per day

REPLIES
6



On average, you earned **0 replies** per day

Erie Stuff Requests | August 1 - August 31, 2015

Date Created	ID	Request Type	Status	Date Completed	Days Open	Source
Thu Aug 13 2015	1096952	Damaged Concrete	Completed	Fri Aug 14 2015	0.9	Iframe
Thu Aug 06 2015	1086997	Damaged Concrete	Completed	Fri Aug 14 2015	8.2	iOS
Fri Aug 14 2015	1098171	Irrigation Issue	Completed	Mon Aug 17 2015	2.9	iOS
Wed Aug 19 2015	1103387	Non-Emergency Police Issue	Submitted	N/A	37.1	Iframe
Thu Aug 27 2015	1115267	Park Maintenance Issue	Completed	Mon Aug 31 2015	4.1	Android
Sun Aug 16 2015	1099269	Park Maintenance Issue	Completed	Fri Aug 21 2015	4.9	Android
Sun Aug 16 2015	1099268	Park Maintenance Issue	Completed	Mon Aug 17 2015	1	Android
Sun Aug 16 2015	1099265	Park Maintenance Issue	Completed	Tue Aug 18 2015	1.9	Android
Mon Aug 17 2015	1101216	Playground Issue	Completed	Wed Aug 19 2015	1.9	Android
Mon Aug 17 2015	1099841	Pothole	Completed	Wed Aug 19 2015	2	Android
Fri Aug 14 2015	1097845	Pothole	Completed	Fri Aug 21 2015	7	Android
Mon Aug 31 2015	1120548	Questions/Comments	Completed	Thu Sep 03 2015	2.5	Android
Fri Aug 28 2015	1117376	Questions/Comments	Completed	Mon Aug 31 2015	2.7	Android
Fri Aug 21 2015	1107560	Questions/Comments	Completed	Mon Aug 24 2015	2.7	Iframe
Fri Aug 21 2015	1106975	Questions/Comments	Completed	Mon Aug 24 2015	3.1	iOS
Mon Aug 17 2015	1100285	Questions/Comments	Completed	Mon Aug 17 2015	0.3	Iframe
Mon Aug 17 2015	1100250	Questions/Comments	Completed	Mon Aug 24 2015	7.2	Iframe
Thu Aug 06 2015	1086552	Questions/Comments	Completed	Thu Aug 06 2015	0.7	iOS
Mon Aug 03 2015	1082092	Questions/Comments	Completed	Thu Aug 06 2015	3.1	Iframe
Tue Aug 18 2015	1101352	Street Sign Issue	Completed	Wed Aug 19 2015	1.5	Iframe
Tue Aug 11 2015	1093962	Traffic Signal Issue	Completed	Wed Aug 12 2015	0.4	iOS
Tue Aug 11 2015	1093500	Traffic Signal Issue	Completed	Wed Aug 12 2015	0.9	Iframe

Website Overview Report for www.erieco.gov - August 2015

Total Unique Visits	For the Month:	50,273	Year to Date:	328,896
Total Page Visits	For the Month:	149,224	Year to Date:	697,034

Top 25 Web Pages Visited	# of Visits	Rank
Home Page	41,706	#1
Erie Community Center	3,349	#2
Paying Your Bill	2,378	#3
2015 Town of Erie Special Events	1,444	#4
Board of Trustees	1,316	#5
Parks and Recreation	1,181	#6
Construction Projects	1,085	#7
Police Department	1,060	#8
Recreation Activities	1,058	#9
Building Division	911	#10
Service Requests	766	#11
Oil & Gas Operations	752	#12
New Resident Information	732	#13
Boards & Commissions	709	#14
Erie Municaipal Airport	708	#15
Residential & Commercial Construction Map	704	#16
Building Information & Applications	683	#17
Fees & Membership	680	#18
Parks, Trails, & Open Space	665	#19
Department	617	#20
Trail Maps	616	#21
About Erie	614	#22
Emergency Preparedness	613	#23
Aquatics	610	#24
Licenses & Permits	599	#25

Erie Government Television Streaming Video via Website - OVERVIEW

OVERVIEW

1,695	992	895	92%	8%
Total Page Views	Total Visits	Total Unique Visitors	Desktop	Mobile

WHAT MEDIA YOUR CITIZENS ARE VIEWING

All Media | Live Events | Encoder Streams | On Demand Media

Filter by title

Media Title	Type	Total Views
Erie Channel 8 Live Feed	Encoder	326
Board of Trustees Regular Meeting - Aug 11th, 2015	Archive	35
Board of Trustees/Planning Commission Joint Study Session - Aug 4th, 2015	Archive	24
Board of Trustees - Aug 25th, 2015	Live event	24
Board of Trustees Study Session - Aug 18th, 2015	Archive	17
Board of Trustees - Aug 25th, 2015	Archive	15
Planning Commission Meeting - Jul 15th, 2015	Archive	15
Board of Trustees Regular Meeting - Aug 11th, 2015	Live event	13
Planning Commission Meeting - Aug 19th, 2015	Archive	11
Comprehensive Plan Stakeholders Meeting - Jul 21st, 2015	Archive	6

ALL MEDIA

508

Total Media Stream Views

508 External Views | 0 Internal Views

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-071, **Version:** 1

SUBJECT: Staff Report

DEPARTMENT: Community Development

PRESENTER: R. Martin Ostholthoff, Director

FISCAL INFORMATION: n/a
Cost as Recommended:
Balance Available:
Budget Line Item Number:
New Appropriation Required:

STAFF RECOMMENDATION: n/a

SUMMARY AND BACKGROUND OF SUBJECT MATTER:
Building Permit Monthly Report

The Building Permit Report, Attachment A, indicates the number of new residential building permits issued to date (through September 2015) versus the building permit projections utilized in determining the 2015 budget. The Town issued 28 new residential building permits in September 2015.

For 2015 the Town has issued 340 building permits or 85 percent of the yearly projected total of 400 building permits.

The Building Permit Reports for 2014 and 2013 are attached hereto for comparison.

Attachment B indicates building permits issued in 2015 by development.

Historic Erie Neighborhood Building Permit Fee Waiver

The effective date of the Historic Erie Neighborhood waiver was October 6, 2012.

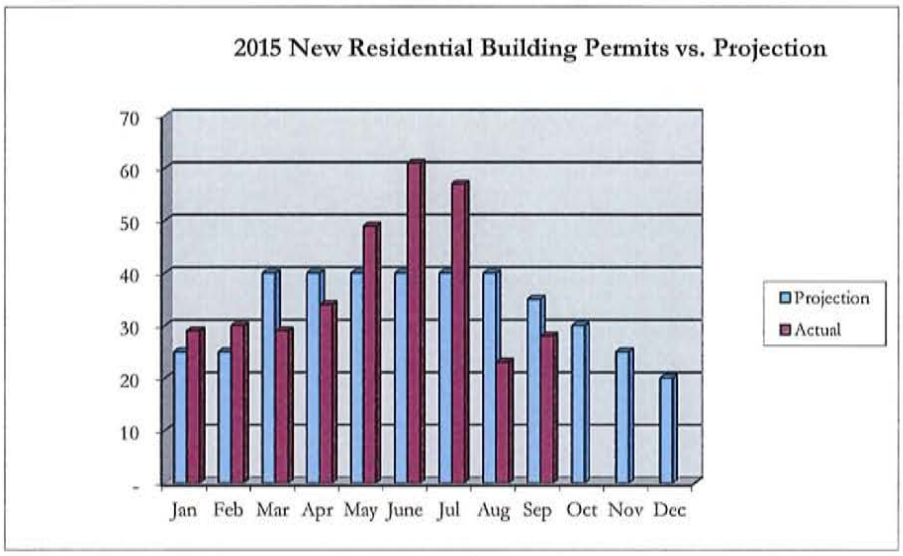
A total of 10 permits valued at $944.50 in fees were waived for the month of September 2015. The cumulative value of fees waived since the inception of the program is $29,510.15. A breakdown of the fees waived is attached hereto as Attachment C.

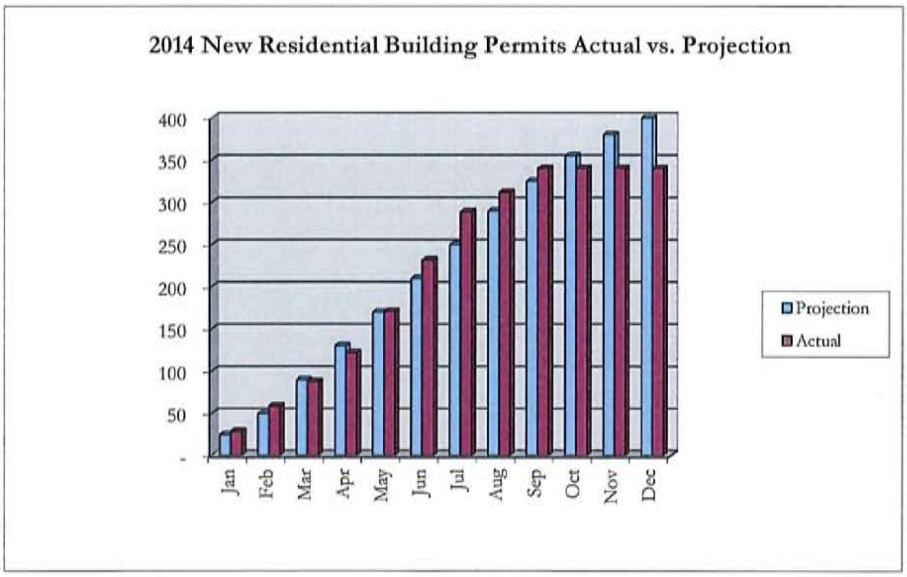
ATTACHMENTS:

2015 Building Permits to Projection Comparison

2015	Month by Month Projection	Month by Month Actual	*Seasonal Projection*
Jan	25	29	*8%*
Feb	25	30	*7%*
Mar	40	29	*11%*
Apr	40	34	*12%*
May	40	49	*10%*
June	40	61	*11%*
Jul	40	57	*10%*
Aug	40	23	*8%*
Sep	35	28	*7%*
Oct	30		*6%*
Nov	25		*7%*
Dec	20		*5%*
Total	400		

	Accumulation Projection	Accumulation Actual
Jan	25	29
Feb	50	59
Mar	90	88
Apr	130	122
May	170	171
Jun	210	232
Jul	250	289
Aug	290	312
Sep	325	340
Oct	355	340
Nov	380	340
Dec	400	340





2015 Building Permits by Development

Name of Development	Single Family Building Permits Issued	
	September	Year to Date
Candlelight	1	6
Canyon Creek	-	-
Colliers Hill	7	97
Compass	-	8
Creekside	-	-
Erie Highlands	5	64
Erie Village	-	6
Flatiron Meadows	8	93
Old Town	-	-
Sunwest North	4	31
Vista Pointe	1	3
Vista Ridge	1	26
All Others	1	6
Total	28	340

Sep-15

Permit No.	Permit Type	Contractor Name	Home Owner	Property Address	Building Fee	Electrical Fee	Mechanical Fee	Plumbing Fee	Misc. Fee	Total Fees Waived	Use Tax Collected
BPR-1351-15	Residential Misc	Homeowner	Linda Koenig	505 Holbrook St	$ 83.25					$ 83.25	$ 17.50
BPR-1368-15	AC/Furnace	AAARK Plmbg,Htg, AC	Nate Edlund	415 Pierce St		$ 36.00	$ 170.00			$ 206.00	$ 161.00
BPR-1388-15	AC/Furnace	Lionheart & Co	Brandy & Shane Stendel	165 Holbrook St			$ 85.00			$ 85.00	$ 77.00
BPR-1481-15	Re-Roof	Lifetime Const	Reta Woodruff	750 Pierce St	$ 47.00					$ 47.00	$ 63.00
BPC-1483-15	Plumbing	Kerwin Plmbg	Mexican Express Grille	656 Kattell St				$ 50.00		$ 50.00	$ 13.12
BPR-1226-15	Plumbing	Master Excavating	Jack Seloover	684 Moffat St				$ 50.00		$ 50.00	$ 35.00
BPR-1341-15	Fence	Bonnell Fencing Svcs	Anne & Randall Reeman	660 Briggs St	$ 47.00					$ 47.00	$ 66.08
BPR-1354-15	Siding	K & H Windows & Exteriors	Robert Wagener	130 Lawley Dr	$ 279.25					$ 279.25	$ 228.49
BPR-1486-15	Plumbing	Mr. Rooter Plmbg	Darren Champion	484 Main St				$ 50.00		$ 50.00	$ 17.50
BPR-1487-15	Re-Roof	Ramos Roofing CO	Cynthia Olmstead	204 Holbrook St	$ 47.00					$ 47.00	$ 52.50
										$ 944.50	$ 731.19

TOWN OF ERIE

645 Holbrook Street
Erie, CO 80516

BOARD OF TRUSTEE AGENDA ITEM

Board Meeting Date: 10/13/2015

File #: 15-074, **Version:** 1

SUBJECT: STAFF REPORT

County Line Road and Austin Avenue Signal Update

DEPARTMENT: **Public Works**

PRESENTER/PREPARER: **Gary Behlen, Director of Public Works**
Russell Pennington, Deputy Director of Public Works
Wendi Palmer, Civil Engineer

FISCAL INFORMATION:

Cost as Recommended:	$0
Balance Available:	$0
Budget Line Item Number:	000.00.000.000000.000000
New Appropriation Required:	No

STAFF RECOMMENDATION: NA

SUMMARY AND BACKGROUND OF SUBJECT MATTER:

The 2015 Capital Budget includes funds to design improvements to County Line Road. Included in this project is the design and construction of a traffic signal at the intersection of County Line Road and Austin Avenue. A traffic signal warrant evaluation was performed in 2011 and 2013 which determined that a signal was not warranted at those times. In 2014, it was anticipated by Staff that the signal would be warranted in the very near future.

At the March 24, 2015 Board of Trustees meeting, a design contract was awarded by the Board of Trustees to JVA for County Line Road Improvements. The design contract includes a new traffic signal warrant evaluation and design for a traffic signal at the County Line Road and Austin Avenue intersection since it was anticipated that the signal would now be warranted.

As you may recall, this intersection was also discussed during the School Traffic Safety Problem Solving Project presentation at the Board of Trustee meeting on July 28, 2015. As part of this project, blinking crosswalk signs were installed to bring attention to the crosswalk until a traffic signal was warranted and constructed. It was discussed that a traffic signal warrant evaluation would be performed in the next couple of months when school was back in session.

Traffic counts and a signal warrant evaluation were completed in September, 2015. Based on the traffic

counts, the traffic signal warrant evaluation identified that a traffic signal is now warranted. The design survey and the geometric layout at the intersection of County Line Road and Austin Avenue have been completed. The design for the traffic signal is now underway. Bid documents are anticipated to be complete for the traffic signal by the end of October. Award the bid for the traffic signal improvements is anticipated by the end of the year.

With the long lead time involved in ordering traffic signal poles, mast arms, and equipment, Staff anticipates that this signal will be complete by May or June 2016.