Print Form

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: SH7 Marketplace, LLC

PROJECT ADDRESS: NE Corner of Mountain View Boulevard & State Highway 7

PROJECT DESCRIPTION: Minor Subdivision Replat of Lot 10 - 7.311 Acres

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

Subdivision Name: Lot 10, Vista Ridge Filing No. 14 2nd Amendment (see attached recorded plat)

Filing #: Lot #: Block #: Section: Township: Range:

OWNER *(attach separate sheets if multiple)*

Name/Company: SH7 Marketplace, LLC
Contact Person: Andy Chaikovsky
Address: 4915 S. Gaylord St.
City/State/Zip: Englewood, CO 80113
Phone: 303-525-9700 Fax:
E-mail: achaikovsky@comcast.net

AUTHORIZED REPRESENTATIVE

Company/Firm: Marathon Land Company
Contact Person: James Spehalski
Address: 9750 W. Cambridge Place
City/State/Zip: Littleton, CO 80127
Phone: 303-920-9400 Fax:
E-mail: jspehalski@marathonlc.com

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

Name/Company: (See attached sheet)
Address:
City/State/Zip:

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

Name/Company: (See attached sheet)
Address:
City/State/Zip:

LAND-USE & SUMMARY INFORMATION

Present Zoning: Commercial
Proposed Zoning: Commercial
Gross Acreage: 7.311 Acres
Gross Site Density (du/ac): N/A
Lots/Units Proposed: 2 Lots
Gross Floor Area: N/A

SERVICE PROVIDERS

Electric: United Power
Metro District: Vista Ridge Metropolitan Districe
Water *(if other than Town)*: Town
Gas: Xcel
Fire District: Mountain View Fire Protection District
Sewer *(if other than Town)*: 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: 05-23-18

Applicant: Date:

STATE OF COLORADO)
) ss.
County of ARAPAHOE)

The foregoing instrument was acknowledged before me this 23rd day of MAY, 2018, by ANDY CHIRKOVSKY.

My commission expires: 5/22/20.
Witness my hand and official seal.

JAMES R SPEHALSKI
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20084013853
MY COMMISSION EXPIRES MAY 22, 2020

Notary Public

TOWN OF ERIE
AFFIDAVIT OF NOTICE POSTING

MW-000990-2018, VISTA RIDGE FILING NO. 14, 5TH AMENDMENT – BOARD OF TRUSTEE

I, **JAMES SPEHALSKI**, ATTEST THAT NOTICE WAS POSTED IN ACCORDANCE WITH THE ERIE MUNICIPAL CODE, TITLE 10, – "UNIFIED DEVELOPMENT CODE AND DESIGN GUIDELINES," AT LEAST 15 DAYS BEFORE THE SCHEDULED HEARING TO BE HELD ON THE 23RD DAY OF JULY, 2019 A.D. THE PHOTO, ABOVE, IS A TRUE AND CORRECT PHOTO OF THE NOTICE SO POSTED.

____

(SIGNATURE OF PERSON LISTED ABOVE)

STATE OF COLORADO)
) ss.
COUNTY OF Arapahoe)

ACKNOWLEDGED BEFORE ME THIS 28th DAY OF Jun, 2019 BY James Spehalski
AS ________________________.

WITNESS MY HAND AND OFFICIAL SEAL

____
NOTARY PUBLIC

MY COMMISSION EXPIRES: 08/01/2021

ERICK BALDERRAMA
Notary Public
State of Colorado
Notary ID: 20174023797
My Commission Expires 08/01/2021

TOWN OF ERIE
AFFIDAVIT OF NOTICE POSTING

MW-000990-2018, VISTA RIDGE FILING NO. 14, 5TH AMENDMENT – PLANNING COMMISSION

I, **JAMES SPEHALSKI**, ATTEST THAT NOTICE WAS POSTED IN ACCORDANCE WITH THE ERIE MUNICIPAL CODE, TITLE 10, – "UNIFIED DEVELOPMENT CODE AND DESIGN GUIDELINES," AT LEAST 15 DAYS BEFORE THE SCHEDULED HEARING TO BE HELD ON THE 17TH DAY OF JULY, 2019 A.D. THE PHOTO, ABOVE, IS A TRUE AND CORRECT PHOTO OF THE NOTICE SO POSTED.

____

(SIGNATURE OF PERSON LISTED ABOVE)

STATE OF COLORADO)
) ss.
COUNTY OF Arapahoe)

ACKNOWLEDGED BEFORE ME THIS 28th DAY OF June, 2019 BY James Spehalski
AS ______________________.

WITNESS MY HAND AND OFFICIAL SEAL

____
NOTARY PUBLIC

MY COMMISSION EXPIRES: 08/01/2021

ERICK BALDERRAMA
Notary Public
State of Colorado
Notary ID: 20174023797
My Commission Expires 08/01/2021

Chris LaRue

From: Chris LaRue
Sent: Monday, June 17, 2019 9:01 AM
To: Chris LaRue
Subject: FW: Neighborhood meeting waiver for VR F14, 5th Amend & Blue Credit Union

Chris LaRue | Senior Planner
Town of Erie | Planning & Development
Phone: 303-926-2776 | Fax: 303-926-2706
www.erieco.gov | Facebook | Twitter | LinkedIn

From: Chris LaRue <clarue@erieco.gov>
Sent: Friday, February 22, 2019 8:24 AM
To: jspehalski@marathonlc.com; Philip Cangilla <Philip.Cangilla@bluefcu.com>
Subject: FW: Neighborhood meeting waiver for VR F14, 5th Amend & Blue Credit Union

Good morning James & Phil:

You both have been waived of the requirement for a neighborhood meeting for VR F14, 5th Amendment – Lot 10 & the Blue Credit Union site plan.

Thank you,

Chris LaRue | Senior Planner
Town of Erie | Planning & Development
645 Holbrook Street | P.O. BOX 750 | Erie, CO 80516
Phone: 303-926-2776 | Fax: 303-926-2706
www.erieco.gov/department | Facebook | Twitter | LinkedIn

Erie, Colorado - the BEST place to raise a family!

From: Fred Starr
Sent: Friday, February 22, 2019 8:03 AM
To: Chris LaRue
Cc: Deborah Bachelder
Subject: RE: Neighborhood meeting waiver for VR F14, 5th Amend & Blue Credit Union

Chris,

I support of Waiver of the requirement for Neighborhood meeting for this particular application based upon the information we discussed and the factors you have identified in section 10.7.2.D2 of the Uniform Development Code.

Thanks,

Fred

Fred Starr - AICP
Planning & Development Director | Town of Erie
645 Holbrook Street | P.O. Box 750 | Erie, CO 80516
Phone: 303-926-2773 | E-mail: fstarr@erieco.gov
www.erieco.gov | Facebook | Twitter | LinkedIn

Erie, Colorado - the BEST place to raise a family!

From: Chris LaRue <clarue@erieco.gov>
Sent: Thursday, February 21, 2019 4:30 PM
To: Fred Starr <fstarr@erieco.gov>
Cc: Deborah Bachelder <dbach@erieco.gov>
Subject: Neighborhood meeting waiver for VR F14, 5th Amend & Blue Credit Union

Fred:

During our staff meeting this morning we talked about waiving the neighborhood meeting requirement (at the applicant's request) for the following:

- Vista Ridge Minor sub for Filing 14, 5th Amendment – Lot 10 creating 3 total lots
- Blue Credit Union – Referring the site plan to the PC for the "butterfly" roof.

Per the UDC (10.7.2.D2) the Community Development Director may waive the neighborhood meeting requirement if it is determined that the development proposal would not have significant impacts in any of the areas listed below. The waiver shall be in writing and shall be included as part of the case record.

a. Traffic;
b. Natural resources protected under this UDC;
c. Provision of public services such as safety, schools, or parks;
d. Compatibility of building design or scale; or
e. Operational compatibility, such as lighting, hours of operation, odors, noise, litter, or glare.

Please let me know whether or not you approve of waiving the neighborhood meeting.

Thank you,

Chris LaRue | Senior Planner
Town of Erie | Planning & Development
645 Holbrook Street | P.O. BOX 750 | Erie, CO 80516
Phone: 303-926-2776 | Fax: 303-926-2706
www.erieco.gov/department | Facebook | Twitter | LinkedIn

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PROJECT NARRATIVE
June 4, 2018

VISTA RIDGE COMMERCIAL WEST – LOT 10
VISTA RIDGE FILING NO. 14, 2ND AMENDMENT
ERIE, COLORADO

A. General Project Concept

State Highway Marketplace, Inc., is proposing to develop a portion of the 7.311 acre lot of vacant land located at the NEC of Mountain View Boulevard and Hwy 7, in Erie, CO. Galloway and Company, Inc. is the authorized representative and design consultant for SH7 Marketplace, LLC, for the purpose of obtaining Town of Erie Construction Plan and Final Plat approval and permits for construction of the proposed commercial/retail development.

An overall property boundary of approximately 7.311 acres encompasses portions of the existing Lot 10 of the Vista Ridge Final Plat. The scope of this project is to construct utility and access infrastructure for the proposed site layout for Lot 10A and future development of Lot 10B.

The development will be served by one major access point along Marketplace Drive. A Traffic Impact Study prepared by Kimley-Horn & Associates for the entire Vista Ridge Commercial development has been included with the submittal packet.

Pedestrian access has not been accounted for in these plans and shall be evaluated as pad sites within the Lot are submitted.

Town of Erie public works will serve the proposed lot for water and sewer. United Power is the service provider for electric and Xcel Energy is the service provider for natural gas. All utilities are available and are currently serving the site. Mountain View Fire Protection District will also serve this proposed development.

A drainage conformance letter has been included in this submittal package for Town review. The plan proposes a 36" storm sewer main to be constructed at the northwest corner of the site with stubs provided and sized for future development of Lots 10A and 10B. A roadside ditch and drainage swale are proposed to facilitate surface drainage to north to the existing detention pond in the interim condition prior to Lot development.

B. Compliance with Five Approval Criteria of MC Title 10-UDC

1. *Meets land use designation for commercial use. The project will also be integrated into the existing and proposed roadway network outlined in the comp. plan.*
2. *The final plat is consistent with the boundaries outlined for this general commercial portion of the Vista Ridge master plan. The proposed site plan has*

been designed to coordinate an access point that will work with the existing portions of this commercial area along Marketplace Drive. Thus creating the ability to establish an overall cohesive commercial center from Mountain View Blvd. to Sheridan Parkway.

3. *The site plan has been prepared in general conformance with the Town of Erie Zoning regulations and design standards. Setbacks, landscape %'s, parking layouts, etc. will be evaluated as pad sites within the development are submitted.*
4. *No adverse impacts from the proposed development are anticipated.*
5. *The proposed development will be compatible with the surrounding land uses. The site is bound to the north, south, and east by commercial/retail development, and by the Montex South site (single family attached) to the west.*

C. Architecture

The proposed site architecture will adhere to the Town of Erie and the Vista Ridge architectural design standards. As pad sites develop, the building architecture will be submitted and approved for each site.

D. Project Schedule/Phasing

Construction of the proposed development is anticipated to begin in the Fall of 2018 with construction completing in the by the end of 2018. Pad sites will begin construction in early 2019. The full 7.311 acres of on-site improvements are intended to be constructed as pad users come online.

E. Residential Units

No residential units are proposed with this development.

F. Ownership/Maintenance of public/common areas

Currently, SH7 Marketplace, LLC, owns all of Lot 10. When approved, SH7 Marketplace, LLC will own Lot 10B, and the end user of Lot 10A will own their parcel. All necessary easements are shown on the proposed plat and will be granted by plat or separate documents for utilities, signs, drainage tracts, etc.

Covenants and Restrictions – SH7 Marketplace, LLC, will be developing a Real Estate Covenants and Restrictions agreement that will cover the proposed entire subdivided property.

Galloway
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
303.770.8884 • GallowayUS.com

June 4, 2018 (*Revised November 9, 2018)*
(Revised January 30, 2019)
(Revised May 1, 2019)
(Revised June 25, 2019)

Mr. Chris LaRue
Senior Planner
Town of Erie – Planning and Development
645 Holbrook Street
Erie, CO 80516

Re: Drainage Compliance Letter for Vista Ridge Filing No. 14, 5th Amendment

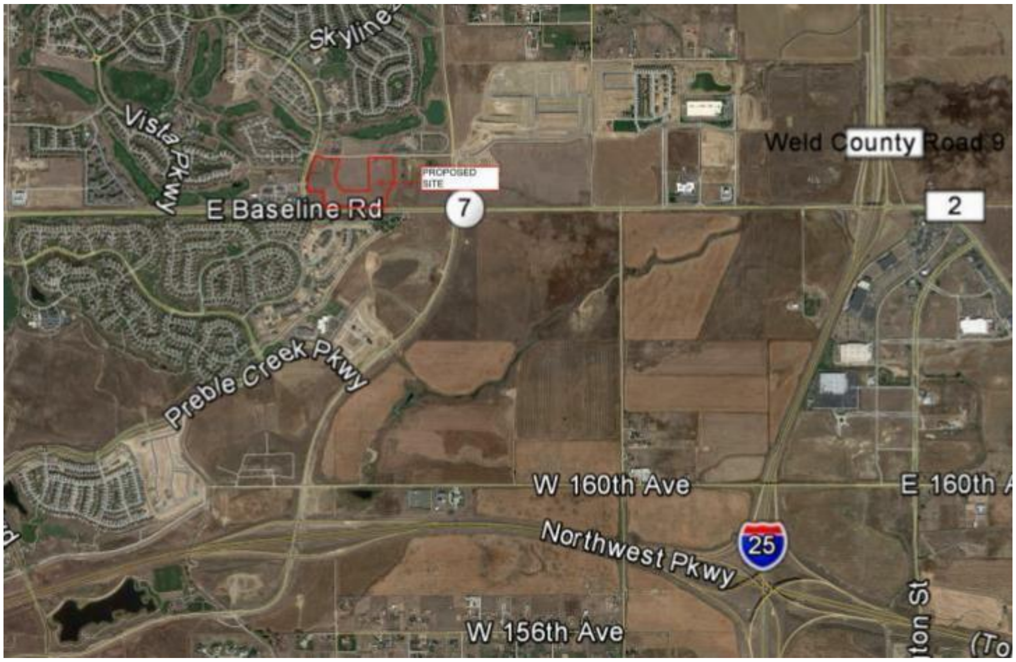
Dear Mr. LaRue,

This drainage conformance letter has been prepared for Vista Ridge Filing No. 14 5th Amendment located in the South West 1/4 of section 33, T. 1 N., R. 68 W., of the 6th P.M. Town of Erie, County of Weld, State of Colorado. The purpose of this letter is to demonstrate that the proposed drainage for the site conforms to the current Town of Erie *Standards and Specifications for Design and Construction of Public Improvements* and the approved *Phase III Drainage Study for Vista Ridge Commercial* prepared by Galloway and Company Inc. dated 10/14/16 (*known as Phase III Drainage Study*). Runoff coefficient calculations have been performed for the subject site and these calculations are attached herein.

Project Location and Description

Utility and infrastructure improvements are proposed on the site for the overall development, a 7.31-acre site. The project site is located within Basin A-1 of the *Phase III Drainage Study*. The site is located within the Vista Ridge Marketplace at the NEC of Mountain View Boulevard & Hwy 7 located in the SW ¼ of Section 33, Township 1 North, Range 68 West, of the 6th Principal Meridian, Town of Erie, County of Weld, State of Colorado. The site is bounded by Ridge View Drive to the north, a future residential development to the west, Marketplace Drive to the south, and a private roadway and King Soopers to the east.

Project Location Map



NOT TO SCALE

Description of Property

The existing property is currently vacant and mainly vegetated with natural grasses and weeds. The ultimate proposed development will include roof and paved areas, along with pockets of landscaping, including mulch, sod, shrubs and trees consistent with commercial development.

The site will include multiple pad sites and a 24' private access drive into the site. The total site area is approximately 7.31 Acres. The development will be served by one major access point, along Marketplace Drive, with potential for additional future access points as pad lots develop.

Natural soils on site consist of Ulm clay loam, Midway-Shingle complex, and Renohill clay loam, with average slopes of 1-10%. The soil type for this area is classified as Hydrologic Type C and D soils, as defined by the USDA SCS Soil Survey of Weld County, Colorado. A copy of the Soils Map has been included in the original Drainage Report.

Based on the geotechnical report for the overall Vista Ridge Filing No. 14, 2nd Amendment site, prepared by Kumar and Associates, dated October 12, 2015, the subsurface conditions consist of, "variable thickness of topsoil overlying man-placed fills and natural overburden soils underlain by claystone and sandstone bedrock," (Kumar and Associates, 2015). The underlying bedrock consisted generally of claystone with frequent zones of interbedded claystone and sandstone ranging from a few inches to about 18 feet below ground surface. The imported soils encountered on the site ranged from 5 to 8 feet in depth. The degree of compaction of the existing fill material was not determined at this time. Groundwater was encountered in two borings at depths ranging from 8 to 18 feet. Follow up groundwater measurements were taken 14 days after drilling and no groundwater was encountered. As part of the overall Vista Ridge Commercial development, construction activities occurred in 2017, and material was imported into the site. An updated soils report has not been performed for this site since.

A review of the Flood Insurance Rate Map (FIRM) by the Federal Emergency Management Agency (FEMA) shows the entire proposed development in Zone C. By definition of Zone C, all lots within the

Vista Ridge Commercial West development are designated as areas of minimal flooding and are outside of the 500-year flood plain according to FIRM Map 080266 0970D (See Attachment).

Historic and Overall Basin Characteristics

The subject property of 7.31 acres primarily resides in Vista Ridge Parcel 33. This parcel primarily consists of native grasses and the site slopes from southeast to northwest towards the existing detention pond A1A. This detention pond was designed to handle storm water from this portion of the site. A drainage study was prepared for Parcels 32 and 33 by Hurst & Associates which outlines the historic runoff patterns from this site as well as contemplates this site as commercial use with the requirement to detail and treat flows in the developed condition. A second drainage report has been prepared for the Montex South property adjacent to the proposed site.

Peak flow calculations were considered for the pre-developed historic conditions of the site assuming an overall imperviousness of 2% across the site. For this condition, a peak discharge of 5.7 cfs was estimated to have been generated by the overall site during the 5-year event and a peak discharge of 33.9 cfs was estimated to have been generated during the 100-year event. Refer to attached hydrologic calculations for historic condition peak flow calculations

There are no floodplains encumbering the site. (Refer to Attachments for FIRM Map)

Utility and infrastructure improvements are proposed on the site for the overall development, a 7.31-acre site. The project site is located within Basin A-1 of the *Phase III Drainage Study*. The runoff from this lot was designed to overland flow to and be captured by detention pond A1A. The planned 5-year and 100-year runoff coefficients for Basin A-1 of the *Phase III Drainage Study* are 0.60 and 0.72, respectively. These coefficients were based on an assumed 95% imperviousness for the future commercial development on the site, and 1.36 acres of the site were assumed landscape area with an imperviousness of 0%, making the overall total for the site 77% impervious. The proposed 5-year and 100-year runoff coefficients for the entire site are 0.55 and 0.69, respectively. These coefficients were based on an assumed 80% imperviousness for the future commercial development, with the intention to account for landscaping as well, with the only area designated as strictly landscaped being the detention pond area. This assumption results in a slightly higher percentage impervious and coefficients over the lot areas, a conservative estimate, but due to the landscape area of the detention pond, the overall imperviousness is slightly less than planned at 72% impervious.

Overall Project Scope

The proposed drainage design for the site consists of seven on-site drainage basins, A-1A - A-1F, totaling 7.311 acres. The site currently consists of native seeded areas graded to facilitate drainage northwest to the existing detention pond. The proposed infrastructure improvements include some proposed curb and gutter and an asphalt access drive which will drain north to basin A-1Cii where a proposed drainage swale will carry runoff to the detention pond in the interim state, prior to parcel development.

Curb and gutter and cross-pan capacities were evaluated using Bentley Flowmaster V8i, see attachments. In the 5-year event, approximately 0.30 cfs of discharge will be carried by the curb and gutter along each side of the proposed access drive, producing a maximum spread of 2.47 ft at a depth of 1.44 inches within the gutter and 1.2 inches within the cross pans. In the 100-year event, approximately 0.60 cfs of discharge will be carried by the curb and gutter along each side of the proposed private drive, producing a maximum spread of 3.59 ft at a depth of 1.8 inches within the gutter and 1.56 inches within the cross pans. A roadside ditch directly east of the access drive will collect and facilitate drainage from basin A-1B north to the proposed drainage swale, and ultimately the detention pond. Underground storm sewer will also be constructed as part of this project to ultimately service the tenants of Lot 10. Rip rap has been designed for both the storm sewer outfall and swale outfall into the existing detention pond, see sizing calculations provided in attachments. A forebay and small trickle channel have also been designed as part of this project's improvements to facilitate small flows from the storm sewer outfall to the existing pond's trickle channel. See attachments for design calculations for the forebay and trickle channel capacity.

The proposed site slopes from southeast to northwest toward the detention pond, ensuring the site is consistent with the intended grading and drainage pattern proposed in the original overall design. In the interim state of construction for the proposed improvements, discharge from basin A-1A will be collected in the existing drainage swale along the west side of the lot and conveyed north to the existing detention pond (ultimate condition will be to connect to proposed storm sewer stub A1A). Discharge from basin A-1B will overland flow west toward the access drive and be collected and conveyed north by the proposed roadside ditch in this interim condition (ultimate condition will be to connect to proposed storm sewer stub A1B). Discharge from Basin A-1Ci will overland flow north into the existing detention pond in both the interim and ultimate condition. In the interim state of construction, discharge from basin A-1Cii will be collected in the existing drainage swale along the west side of the lot and conveyed north to the existing detention pond (ultimate condition will be to connect to proposed storm sewer stub A1Cii). Discharge from basins A-1D and A-1E will be similarly collected in the proposed drainage swale B-B and conveyed north to the existing detention pond, during the interim state. Upon completion of the proposed improvements, these swales will remain intact to convey onsite drainage to the detention pond until the parcels are in their final developed state. In the final developed condition, discharge from basins A-1D and A-1E will be collected onsite and connect to the proposed storm stubs for each respective Basin.

Swales were assumed to be grass-lined upon completion to increase roughness and reduce erosion and velocity of flows as they are conveyed to the detention pond. Once parcels have been fully developed, onsite drainage from each parcel will be collected in inlets and piped into the 36" storm sewer main. Swale sizing calculations for both the roadside ditch (Swale A-A) and the drainage swale as it continues north through the proposed basins (Swale B-B) are provided in the attachments herein.

On-Site Flows and Concept

On-Site flows will ultimately be collected in a series of basins and storm sewer network throughout the development which will convey storm flows to the existing detention pond located at the northwest corner of the lot. The on-site basins will account for the entire proposed 7.311-acre development, including future commercial development. The drainage basins shown herein were developed to reflect the finished condition for the lot, with basins delineated by parcel boundaries. This assumes each parcel will collect drainage internally, either by storm sewer inlets which will connect to the storm sewer stubs provided for each delineated parcel, or overland flow directly into the detention pond, consistent with the Phase III Drainage Report. The proposed storm sewer stubs were sized to accommodate the fully developed runoff from contributing parcels; the stub A1A was sized to collect drainage from basin A-1A, the stub A1B was sized to collect drainage from basin A-1B, stub A1Cii was sized to collect drainage from basin A-1Cii, stub A1D was sized to collect drainage from basin A-1D, and stub A1E was sized to collect drainage from basin and A-1E. See attachments for pipe sizing calculations. Tailwater conditions for the HGL analysis at the pond outfall were assumed to be at the pond bottom in the 5-year storm and at the EURV water surface elevation (5263.15) in the 100-year storm.

Off-Site Flows

The curb and gutter and proposed cross pan at the site access point keep offsite flows within the existing roadways along the North, East, and South sides of the property. The property to the west is lower than the proposed site, and no offsite drainage enters the site from this adjacent property. Thus, no off-site flows were considered to impact the project site.

Project Summary

The runoff coefficients for the entire project site were estimated to be 0.55 and 0.69 in the 5 and 100-year storms, respectively. These runoff coefficients are slightly less than the planned values of basin A-1 (0.60 and 0.72, 77% Impervious) and thus the runoff will be approximately equal to what was originally planned. The overall imperviousness for the entire proposed project site after final stabilization has been estimated to be 72%, dependent on the end use of each parcel. These findings indicate that this project will have no negative impacts on the existing drainage infrastructure.
I affirm that the proposed drainage design of Vista Ridge Filing No. 14 5th Amendment is in substantial conformance with the approved *Phase III Drainage Study for Vista Ridge Commercial* prepared by Galloway and Company Inc. dated 10/14/16.

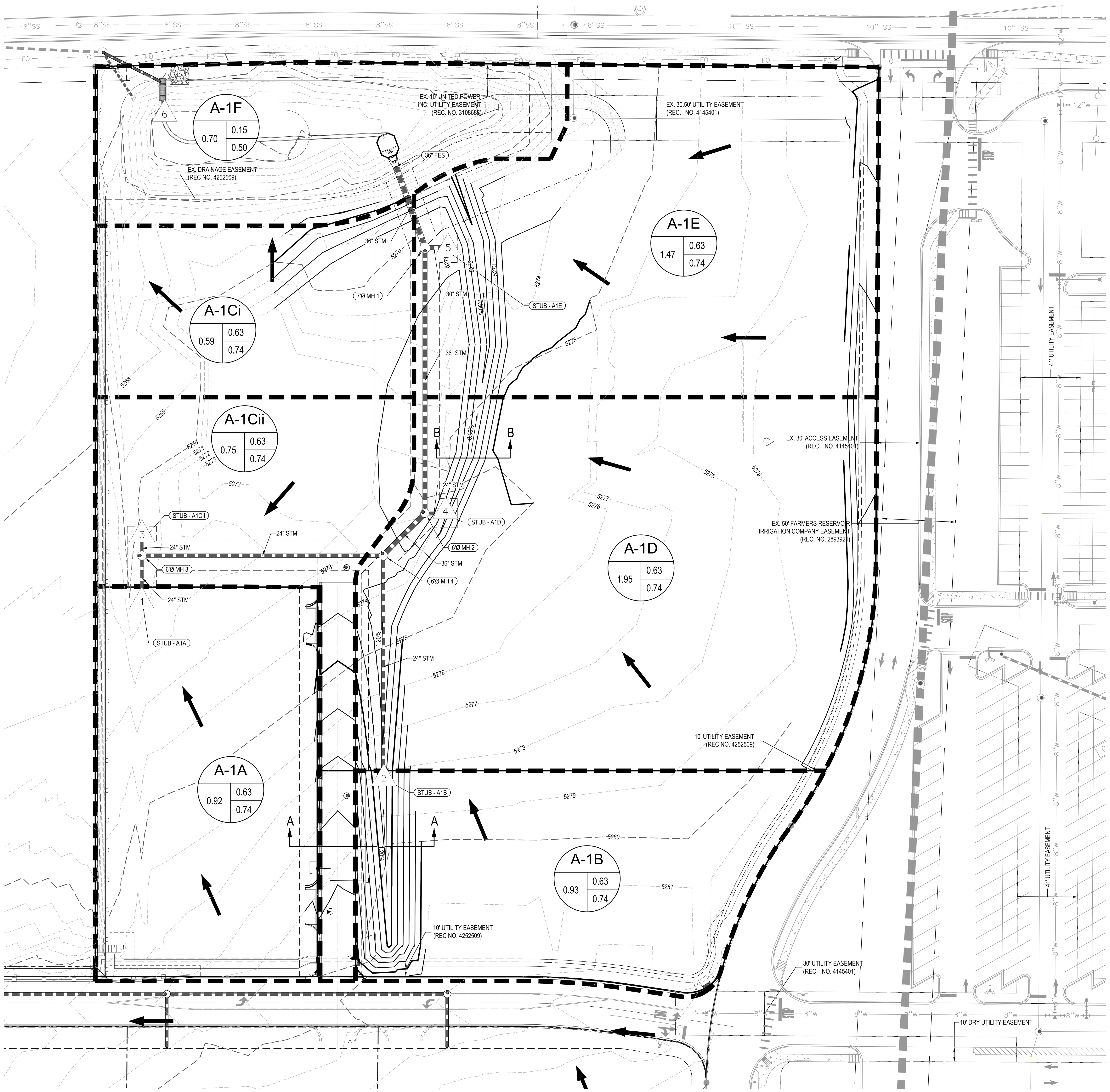
Philip Dalrymple, PE
Civil Engineering Project Manager
Galloway & Company, Inc.
Licensed Professional Engineer, State of Colorado No. 41171

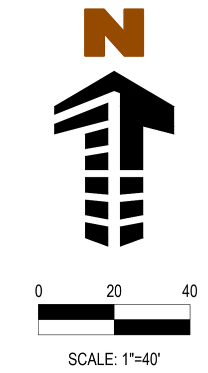
References:
1. Town of Erie*, Standards and Specifications for Design and Construction of Public Improvements,* latest version.
2. Galloway & Company, Inc., *Phase III Drainage Study for Vista Ridge Commercial,* October 2016.
3. USDA, *SCS Soil Survey of Weld County, Colorado*, latest version.
4. Kumar & Associates, Inc., *Geotechnical Engineering Study – Proposed Commercial Development, Northeast Corner of State Highway 7 and Mountain Vista Drive, Erie, Colorado,* October 2015.
5. Federal Emergency Management Agency, *Flood Insurance Rate Map, Weld County, Colorado (Unincorporated Areas), 080266 0970D,* latest version.
6. Hurst and Associates, Inc., *Drainage Report – Vista Ridge Parcels 32 & 33, Erie, Colorado,* September 2008.
7. Enertia Consulting Group, LLC, *Phase III Drainage Report, Montex South at Vista Ridge, Erie, Colorado,* February 2016.

Attachments:
Vista Ridge Commercial Lot 10 – Drainage Plan
Vista Ridge Commercial Lot 10 - Hydrologic Computations & Historic Peak Discharge Computations
Vista Ridge Commercial Lot 10 – Swale Sizing Computations
Vista Ridge Commercial Lot 10 – Pipe Sizing Computations
Vista Ridge Commercial Lot 10 – Rip Rap Sizing Computations
Vista Ridge Commercial Lot 10 – Forebay Design Computations
Vista Ridge Commercial Lot 10 – Curb & Gutter/ Cross Pan Capacity Computations
Vista Ridge Commercial Lot 10 – Trickle Channel Capacity Computations
Vista Ridge Filing No. 14 2nd Amendment - Hydrologic Computations
Vista Ridge Filing No. 14 2nd Amendment – Drainage Plan
Vista Ridge Filing No. 14 2nd Amendment – FEMA FIRM Map
Vista Ridge Filing No. 14 2nd Amendment – Pond A1A – Pond Volume Calculation

Attachments:

Vista Ridge Commercial Lot 10 – Drainage Plan





SITE LEGEND

- PROPERTY BOUNDARY LINE
- ADJACENT PROPERTY BOUNDARY LINE
- EASEMENT BOUNDARY LINE
- EXISTING CURB & GUTTER TO REMAIN
- EXISTING TO BE REMOVED
- PROPOSED CURB & GUTTER
- STREET LIGHT
- PROPOSED INLET

GRADING LEGEND

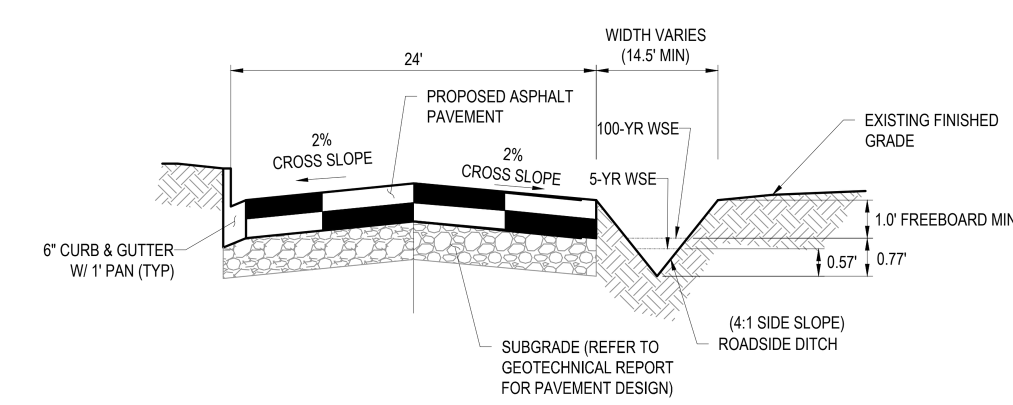
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- PROPOSED STORM SEWER (LESS THAN 12")

DRAINAGE LEGEND

- PROPOSED BASIN BOUNDARY LINE
- FLOW ARROW
- DESIGN POINT
- BASIN DESIGNATION
- 5-YEAR RUNOFF COEFFICIENT
- 100-YEAR RUNOFF COEFFICIENT
- BASIN AREA IN ACRES

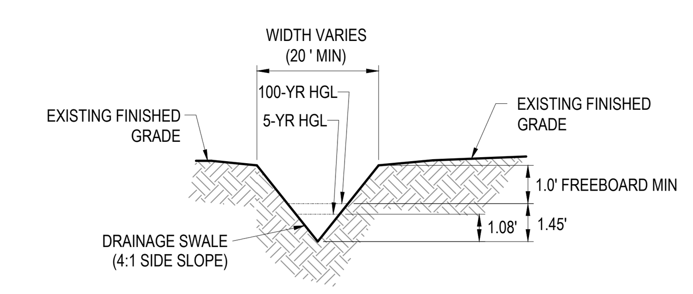
RUNOFF SUMMARY TABLE

DESIGN POINT	BASIN	AREA (AC)	5-YEAR RUNOFF (CFS)	100-YEAR RUNOFF (CFS)
1	A-1A	0.92	2.8	6.2
2	A-1B	0.93	2.8	6.3
-	A-1Ci	0.59	1.8	4.0
3	A-1Cii	0.75	2.3	5.1
4	A-1D	1.95	6.0	13.2
5	A-1E	1.47	4.5	10.0
6	A-1F	0.70	0.5	3.2
	TOTAL:	7.31	20.7	48.0



TYPICAL ACCESS ROAD SECTION A-A

SCALE: NOT TO SCALE



TYPICAL DRAINAGE SWALE SECTION B-B

SCALE: NOT TO SCALE

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6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
303.770.8884 O
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VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BLVD & STATE HWY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
CIVIL CONSTRUCTION DRAWINGS

ERIE, COLORADO

#	Date	Issue / Description	Init.
1	06/04/2018	1ST CITY SUBMITTAL	PJD
2	11/09/2018	2ND CITY SUBMITTAL	PJD
3	01/30/2019	3RD CITY SUBMITTAL	PJD
4	05/01/2019	4TH CITY SUBMITTAL	PJD
5	06/25/2019	5TH CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	CAC
Checked By:	PJD
Date:	06/21/19

DRAINAGE PLAN

Attachments:

Vista Ridge Commercial Lot 10 - Hydrologic Computations & Historic Peak Discharge Computations

PROJECT: Vista Ridge Commercial - Lot 10
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000001.01
Date: June 14, 2019
Designed By: CAC
Checked By: PJD

PERCENT IMPERVIOUS VALUES	
LANDSCAPE	0
PAVING	100
ROOFING	90
WALKS/DRIVES	90
FUTURE COMMERCIAL	80

***Refer to Table RO-5, Urban Drainage, Storm Drainage Criteria Manual for Runoff Coefficients used**

***Group C Soils**

Composite Runoff Coefficients and Percent Imperviousness for Developed Drainage Basins

BASIN DESIG.	OVERALL AREA (AC)	LANDSCAPE AREA (AC)	PAVED AREA (AC)	ROOF AREA (AC)	WALKS/ DRIVES (AC)	FUTURE COMMERCIAL (AC)	2-YEAR COEFF.	5-YEAR COEFF.	10-YEAR COEFF.	100-YEAR COEFF.	PERCENT IMPERVIOUS
A-1A	0.92	0.00	0.00	0.00	0.00	0.92	-	0.63	0.66	0.74	0.80
A-1B	0.93	0.00	0.00	0.00	0.00	0.93	-	0.63	0.66	0.74	0.80
A-1Ci	0.59	0.00	0.00	0.00	0.00	0.59	-	0.63	0.66	0.74	0.80
A-1Cii	0.75	0.00	0.00	0.00	0.00	0.75	-	0.63	0.66	0.74	0.80
A-1D	1.95	0.00	0.00	0.00	0.00	1.95	-	0.63	0.66	0.74	0.80
A-1E	1.47	0.00	0.00	0.00	0.00	1.47	-	0.63	0.66	0.74	0.80
A-1F	0.70	0.70	0.00	0.00	0.00	0.00	-	0.15	0.25	0.50	0.00
Total	7.31	0.70	0.00	0.00	0.00	6.61	-	0.55	0.59	0.69	0.72

PROJECT: Vista Ridge Commercial - Lot 10
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000001.01
Date: June 14, 2019
Engineer: CAC
Checked By: PJD

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Developed Conditions - Time of Concentration Runoff Calculations

Basin Data			Iintial/Overland Time (T_i)			Travel Time (T_t)					T_c CheckK Urbanized Basins			Final T_c		
Basin	Area (acre)	C_5	Length (ft)	Slope (%)	T_i (min)	Length (ft)	Slope (%)	Conv. Coeff.	Vel. (fps)	T_t (min)	Total Length	Comp. Tc	T_c=(L/180)+10	Final Tc	C_5	C_{100}
A-1A	**0.92**	0.63	50	2.0%	4.8	310	2.0%	20	2.8	1.8	360	6.7	12.0	**6.7**	0.63	0.74
A-1B	**0.93**	0.63	50	2.0%	4.8	290	2.0%	20	2.8	1.7	340	6.5	11.9	**6.5**	0.63	0.74
A-1Ci	**0.59**	0.63	50	2.0%	4.8	220	3.0%	20	3.5	1.1	270	5.9	11.5	**5.9**	0.63	0.74
A-1Cii	**0.75**	0.63	50	2.0%	4.8	220	3.0%	20	3.5	1.1	270	5.9	11.5	**5.9**	0.63	0.74
A-1D	**1.95**	0.63	50	2.0%	4.8	200	1.2%	20	2.2	1.5	250	6.4	11.4	**6.4**	0.63	0.74
A-1E	**1.47**	0.63	50	2.0%	4.8	150	2.5%	20	3.2	0.8	200	5.6	11.1	**5.6**	0.63	0.74
A-1F	**0.70**	0.15	50	18.0%	4.7	0	0.1%	20	0.6	0.0	50	5.0	10.3	**5.0**	0.15	0.50

PROJECT: Vista Ridge Commercial - Lot 10
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000001.01
Date: June 25, 2019
Engineer: CAC
Checked By: PJD

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Developed Condition: Rational Method Routing - 5 Year Storm Event

5	-YR EVENT ROUTING CALCULATIONS
1.43	INCHES/ HOUR POINT RAINFALL (PER TABLE 8700-2, ERIE CRITERIA)

Basin/Sub-Basin	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME				
	Design Point	Basin	Area (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Conv. Coef.	Velocity (fps)	TT (min)	Description
A-1A	1	A-1A	0.92	0.63	5.0	0.58	4.85	**2.8**														
A-1B	2	A-1B	0.93	0.63	5.0	0.58	4.85	**2.8**														
A-1Ci	-	A-1Ci	0.59	0.63	5.0	0.37	4.85	**1.8**														
A-1Cii	3	A-1Cii	0.75	0.63	5.0	0.48	4.85	**2.3**														
A-1D	4	A-1D	1.95	0.63	5.0	1.23	4.85	**6.0**														
A-1E	5	A-1E	1.47	0.63	5.0	0.93	4.85	**4.5**														
A-1F	6	A-1F	0.70	0.15	5.0	0.10	4.85	**0.5**														

PROJECT: Vista Ridge Commercial - Lot 10
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000001.01
Date: June 25, 2019
Engineer: CAC
Checked By: PJD

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Developed Condition: Rational Method Routing - 100 Year Storm Event

100	-YR EVENT ROUTING CALCULATIONS
2.7	INCHES/ HOUR POINT RAINFALL (PER TABLE 8700-2, ERIE CRITERIA)

Basin/Sub-Basin	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME				
	Design Point	Basin	Area (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Conv. Coef.	Velocity (fps)	TT (min)	Description
A-1A	1	A-1A	0.92	0.74	5.0	0.68	9.16	**6.2**														
A-1B	2	A-1B	0.93	0.74	5.0	0.69	9.16	**6.3**														
A-1Ci	-	A-1Ci	0.59	0.74	5.0	0.44	9.16	**4.0**														
A-1Cii	3	A-1Cii	0.75	0.74	5.0	0.56	9.16	**5.1**														
A-1D	4	A-1D	1.95	0.74	5.0	1.44	9.16	**13.2**														
A-1E	5	A-1E	1.47	0.74	5.0	1.09	9.16	**10.0**														
A-1F	6	A-1F	0.70	0.50	5.0	0.35	9.16	**3.2**														

PROJECT: **Vista Ridge Commercial - Lot 10**
LOCATION: **Mountain View Blvd and Highway 7**
Erie, CO

Project No.: **SH7000001.01**
Date: **November 9, 2018**
Designed By: **Phil Dalrymple**
Checked By: **Brandon McCrary, PE**

PERCENT IMPERVIOUS VALUES	
LANDSCAPE	2
PAVING	100
ROOFING	90
WALKS/DRIVES	90
FUTURE COMMERCIAL	80

***Refer to Table RO-5, Urban Drainage, Storm Drainage Criteria Manual for Runoff Coefficients used**

***Group C Soils**

Composite Runoff Coefficients and Percent Imperviousness for Undeveloped Basin (Historic Condition)

BASIN DESIG.	OVERALL AREA (AC)	LANDSCAPE AREA (AC)	PAVED AREA (AC)	ROOF AREA (AC)	WALKS/ DRIVES (AC)	FUTURE COMMERCIAL (AC)	2-YEAR COEFF.	5-YEAR COEFF.	10-YEAR COEFF.	100-YEAR COEFF.	PERCENT IMPERVIOUS
Historic Lot 10	7.31	7.31	0.00	0.00	0.00	0.00	-	0.16	0.26	0.51	0.02

PROJECT: Vista Ridge Commercial - Lot 10
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000003.01
Date: November 9, 2018
Engineer: Cayla Cappello
Checked By: Phil Dalrymple, PE

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Historic Conditions - Time of Concentration Runoff Calculations

Basin Data			Iintial/Overland Time (T_i)			Travel Time (T_t)					T_c CheckK Urbanized Basins			Final T_c		
Basin	Area (acre)	C_5	Length (ft)	Slope (%)	T_i (min)	Length (ft)	Slope (%)	Conv. Coeff.	Vel. (fps)	T_t (min)	Total Length	Comp. Tc	T_c=(L/180)+10	Final Tc	C_5	C_{100}
Historic Lot 10	7.31	0.16	585	3.0%	28.9	0	2.0%	20	2.8	0.0	585	28.9	13.3	**13.3**	0.16	0.51

PROJECT: Vista Ridge Commercial - Lot 10
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000003.01
Date: November 9, 2018
Engineer: Cayla Cappello
Checked By: Phil Dalrymple, PE

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Historic Condition: Rational Method Routing - 5 Year Storm Event

5	-YR EVENT ROUTING CALCULATIONS
1.43	INCHES/ HOUR POINT RAINFALL (PER TABLE 8700-2, ERIE CRITERIA)

Basin/Sub-Basin	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME				
	Design Point	Basin	Area (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Conv. Coef.	Velocity (fps)	TT (min)	Description
Historic Lot 10	1	Historic Lot 10	7.31	0.16	5.0	1.17	4.85	5.7														

PROJECT: Vista Ridge Commercial - Lot 10
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000003.01
Date: November 9, 2018
Engineer: Cayla Cappello
Checked By: Phil Dalrymple, PE

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Historic Condition: Rational Method Routing - 100 Year Storm Event

100	-YR EVENT ROUTING CALCULATIONS
2.7	INCHES/ HOUR POINT RAINFALL (PER TABLE 8700-2, ERIE CRITERIA)

Basin/Sub-Basin	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME				
	Design Point	Basin	Area (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Conv. Coef.	Velocity (fps)	TT (min)	Description
Historic Lot 10	1	Historic Lot 10	7.310	0.51	5.0	3.70	9.16	33.9														

Attachments:

Vista Ridge Commercial Lot 10 – Swale Sizing Computations

Drainage Swale - AA - 5 yr Report

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.032	
Channel Slope	0.01200	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	2.80	ft³/s

Results

Normal Depth	0.57	ft
Flow Area	1.30	ft²
Wetted Perimeter	4.70	ft
Hydraulic Radius	0.28	ft
Top Width	4.56	ft
Critical Depth	0.50	ft
Critical Slope	0.02470	ft/ft
Velocity	2.16	ft/s
Velocity Head	0.07	ft
Specific Energy	0.64	ft
Froude Number	0.71	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.57	ft
Critical Depth	0.50	ft
Channel Slope	0.01200	ft/ft
Critical Slope	0.02470	ft/ft

Drainage Swale - AA - 5 yr Cross Section

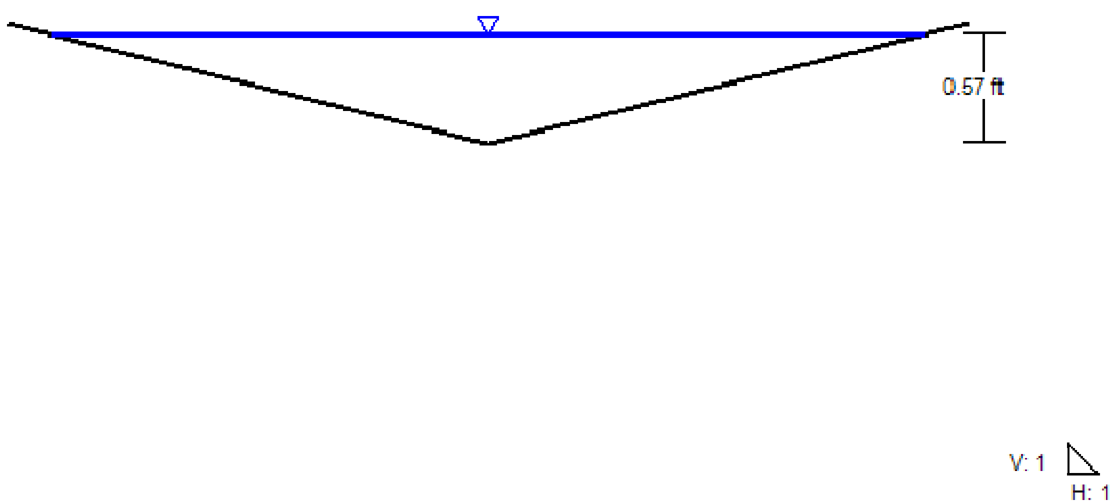
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.032	
Channel Slope	0.01200	ft/ft
Normal Depth	0.57	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	2.80	ft³/s

Cross Section Image



Drainage Swale - AA - 100 yr Report

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.032	
Channel Slope	0.01200	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	6.30	ft³/s

Results

Normal Depth	0.77	ft
Flow Area	2.38	ft²
Wetted Perimeter	6.37	ft
Hydraulic Radius	0.37	ft
Top Width	6.18	ft
Critical Depth	0.69	ft
Critical Slope	0.02217	ft/ft
Velocity	2.64	ft/s
Velocity Head	0.11	ft
Specific Energy	0.88	ft
Froude Number	0.75	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.77	ft
Critical Depth	0.69	ft
Channel Slope	0.01200	ft/ft
Critical Slope	0.02217	ft/ft

Drainage Swale - AA - 100 yr Cross Section

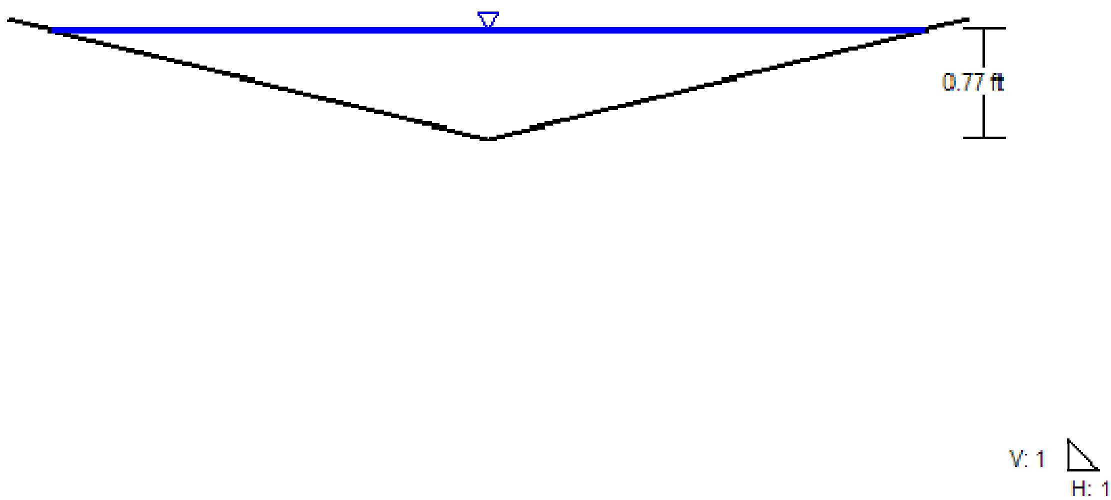
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.032	
Channel Slope	0.01200	ft/ft
Normal Depth	0.77	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	6.30	ft³/s

Cross Section Image



Drainage Swale - BB - 5 yr Report

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.032	
Channel Slope	0.00900	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	13.30	ft³/s

Results

Normal Depth	1.08	ft
Flow Area	4.65	ft²
Wetted Perimeter	8.89	ft
Hydraulic Radius	0.52	ft
Top Width	8.63	ft
Critical Depth	0.93	ft
Critical Slope	0.02007	ft/ft
Velocity	2.86	ft/s
Velocity Head	0.13	ft
Specific Energy	1.21	ft
Froude Number	0.69	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.08	ft
Critical Depth	0.93	ft
Channel Slope	0.00900	ft/ft
Critical Slope	0.02007	ft/ft

Drainage Swale - BB - 5 yr Cross Section

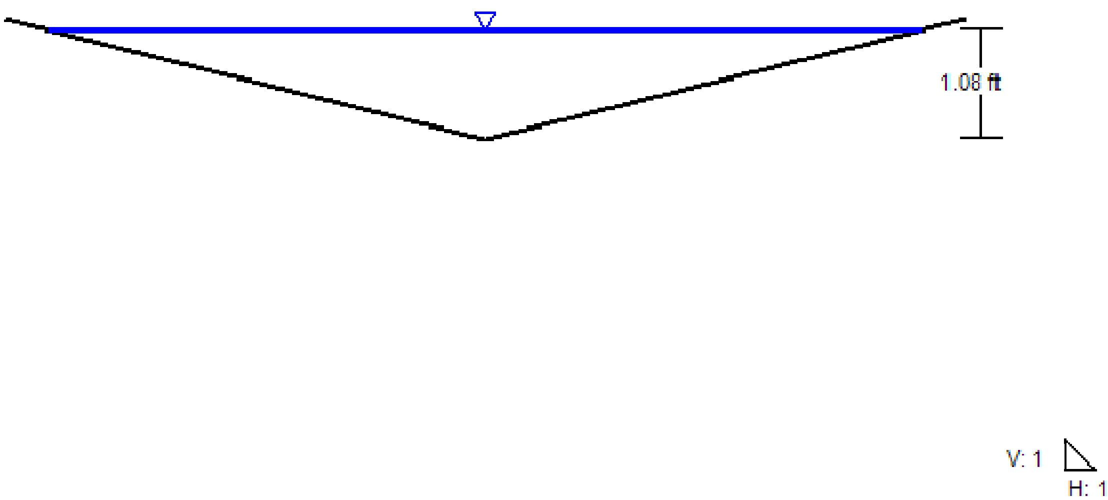
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.032	
Channel Slope	0.00900	ft/ft
Normal Depth	1.08	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	13.30	ft^3/s

Cross Section Image



Drainage Swale - BB - 100 yr Report

Project Description

Friction Method	Manning Formula		
Solve For	Normal Depth		

Input Data

Roughness Coefficient	0.032	
Channel Slope	0.00900	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	29.50	ft^3/s

Results

Normal Depth	1.45	ft
Flow Area	8.45	ft^2
Wetted Perimeter	11.99	ft
Hydraulic Radius	0.71	ft
Top Width	11.63	ft
Critical Depth	1.28	ft
Critical Slope	0.01805	ft/ft
Velocity	3.49	ft/s
Velocity Head	0.19	ft
Specific Energy	1.64	ft
Froude Number	0.72	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.45	ft
Critical Depth	1.28	ft
Channel Slope	0.00900	ft/ft
Critical Slope	0.01805	ft/ft

Drainage Swale - BB - 100 yr Cross Section

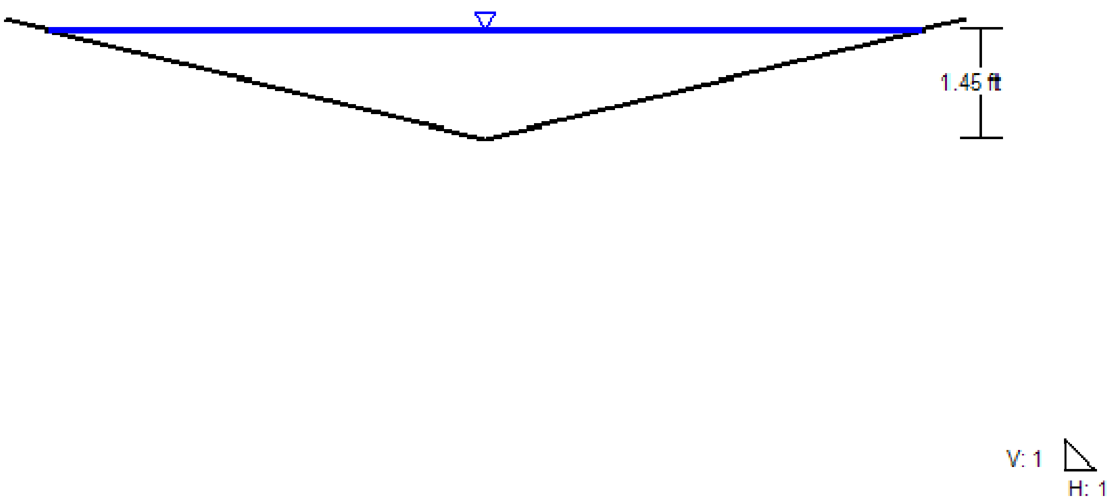
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

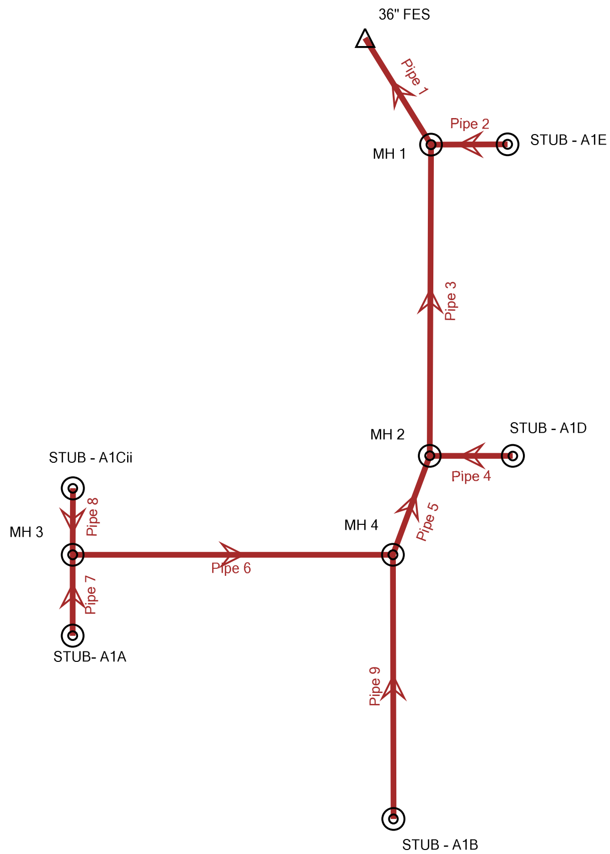
Roughness Coefficient	0.032	
Channel Slope	0.00900	ft/ft
Normal Depth	1.45	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	29.50	ft³/s

Cross Section Image



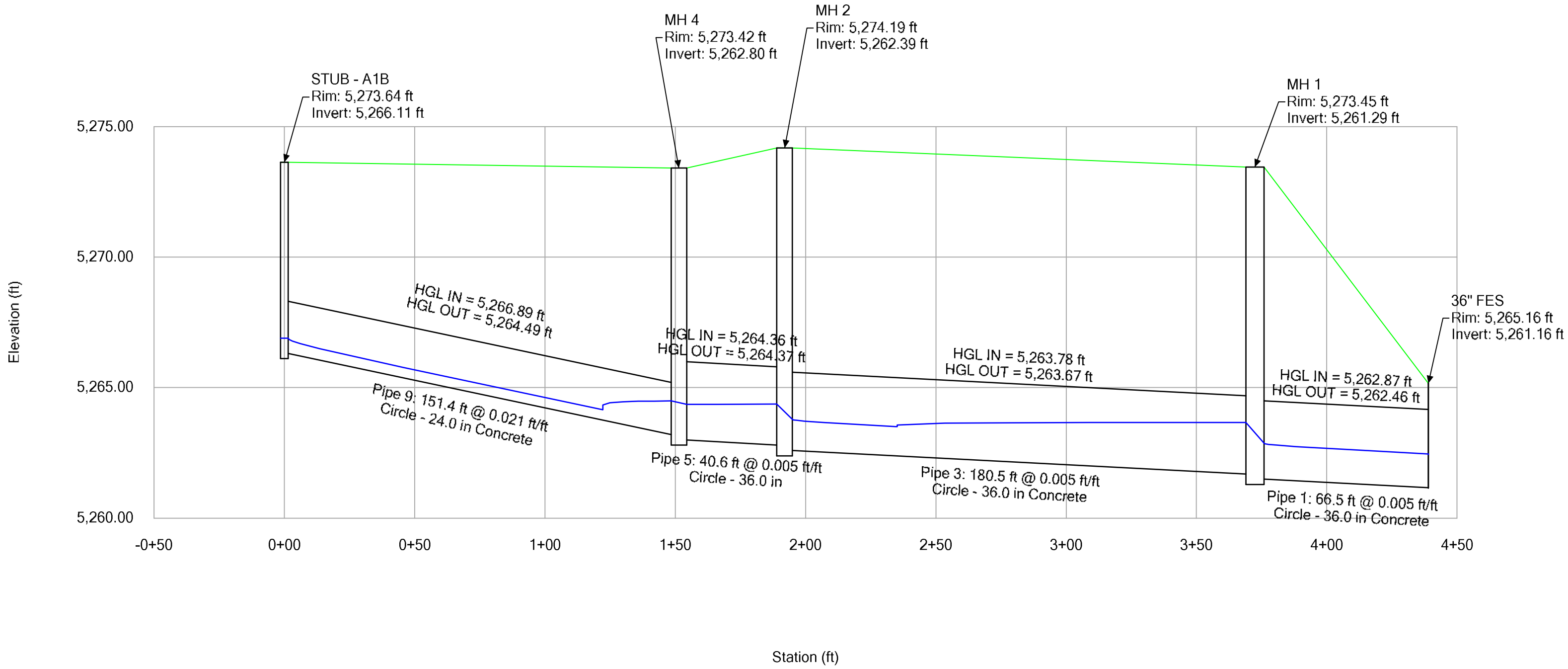
Attachments:
Vista Ridge Commercial Lot 10 – Pipe Sizing Computations

Scenario: 100 Year

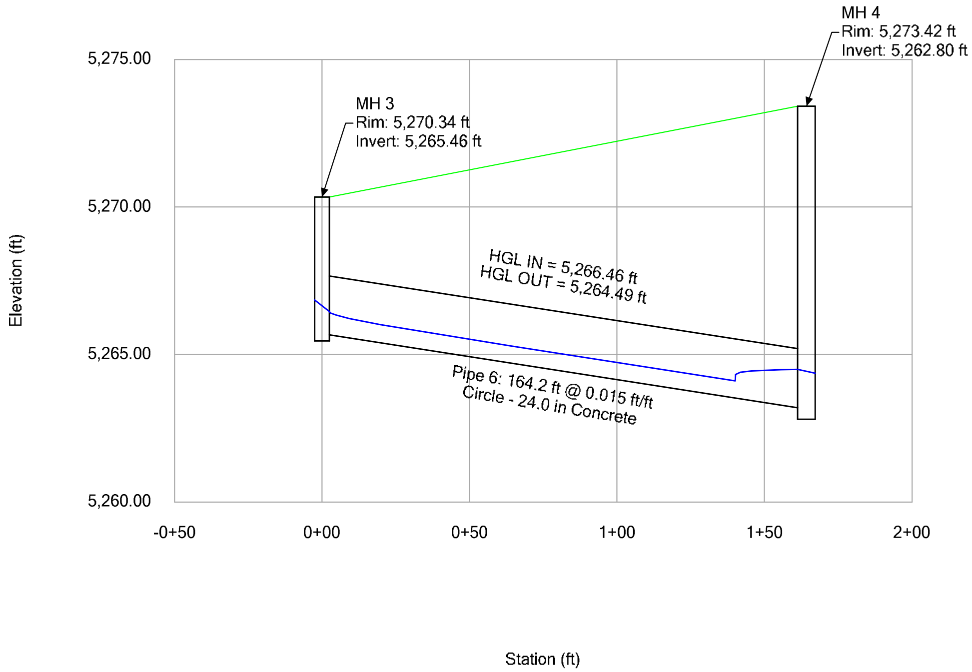


Profile Report

Engineering Profile - Storm Line I Profile - 5 Year



Profile Report
Engineering Profile - Storm Line J Profile - 5 Year



Scenario: 5 Year
Current Time Step: 0.000Hr
FlexTable: Conduit Table

ID	Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Has User Defined Length?	Length (User Defined) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Depth (Normal) / Rise (%)	Notes	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
31	Pipe 2	STUB - A1E	5,261.93	MH 1	5,261.69	True	12.0	20.9	0.020	Circle	30.0	0.013	4.50	7.02	1.98	58.00	7.8	18.8	-	5,263.66	5,263.67
36	Pipe 7	STUB- A1A	5,266.46	MH 3	5,265.86	True	30.0	22.1	0.020	Circle	24.0	0.013	2.80	6.26	0.99	31.99	8.8	20.0	-	5,267.04	5,266.85
38	Pipe 6	MH 3	5,265.66	MH 4	5,263.20	True	164.2	87.6	0.015	Circle	24.0	0.013	5.10	6.73	1.30	27.70	18.4	29.1	-	5,266.46	5,264.49
39	Pipe 3	MH 2	5,262.59	MH 1	5,261.69	True	180.5	85.1	0.005	Circle	36.0	0.013	13.90	5.80	1.98	47.15	29.5	37.2	-	5,263.78	5,263.67
40	Pipe 1	MH 1	5,261.49	36" FES	5,261.16	True	66.5	34.3	0.005	Circle	36.0	0.013	18.40	6.25	1.30	47.12	39.1	43.4	-	5,262.87	5,262.46
51	Pipe 9	STUB - A1B	5,266.31	MH 4	5,263.20	True	151.4	72.3	0.021	Circle	24.0	0.013	2.80	6.32	1.30	32.44	8.6	19.9	-	5,266.89	5,264.49
56	Pipe 8	STUB - A1Cii	5,266.06	MH 3	5,265.86	True	10.0	18.2	0.020	Circle	24.0	0.013	2.30	5.91	0.99	31.99	7.2	18.1	-	5,266.82	5,266.85
59	Pipe 4	STUB - A1D	5,263.03	MH 2	5,262.79	True	12.0	22.7	0.020	Circle	24.0	0.013	6.00	7.81	1.57	31.99	18.8	29.3	-	5,264.34	5,264.37
60	Pipe 5	MH 4	5,263.00	MH 2	5,262.79	True	40.6	28.9	0.005	Circle	36.0	0.013	7.90	4.96	1.57	47.19	16.7	27.7	-	5,264.36	5,264.37

H:\Marathon Land Company\CO, Erie - SH7000001.01 - Vista Ridge Commercial West\3. Permit Const Docs\3.04 Grading-Drainage Studies\3.04.2 Proposed Drainage Reports-Info\Lot 10\SH7003 Stormcad new.stsw

Scenario: 5 Year
Current Time Step: 0.000Hr
FlexTable: Manhole Table

ID	Label	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Bolted Cover?	Elevation (Invert in 1) (ft)	Flow (Total In)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Hydraulic Grade Line (In) (ft)	Notes
29	MH 1	5,273.45	True	5,273.45	False	5,261.69	18.3999996185303	18.40	1.58	5,262.87	Standard	5,263.67	-
30	STUB - A1E	5,273.45	True	5,273.45	False	(N/A)	4.5	4.50	1.93	5,263.66	Absolute	5,263.66	-
32	MH 2	5,274.19	True	5,274.19	False	5,262.79	13.8999996185303	13.90	1.39	5,263.78	Standard	5,264.37	-
33	MH 3	5,270.34	True	5,270.34	False	5,265.86	5.09999990463257	5.10	1.00	5,266.46	Standard	5,266.85	-
35	STUB- A1A	5,270.34	True	5,270.34	False	(N/A)	2.79999995231628	2.80	2.39	5,267.04	Absolute	5,267.04	-
37	MH 4	5,273.42	True	5,273.42	False	5,263.20	7.90000009536743	7.90	1.56	5,264.36	Standard	5,264.49	-
50	STUB - A1B	5,273.64	True	5,273.64	False	(N/A)	2.79999995231628	2.80	0.78	5,266.89	Absolute	5,266.89	-
55	STUB - A1Cii	5,270.34	True	5,270.34	False	(N/A)	2.29999995231628	2.30	2.27	5,266.82	Absolute	5,266.82	-
58	STUB - A1D	5,274.19	True	5,274.19	False	(N/A)	6	6.00	1.51	5,264.34	Absolute	5,264.34	-

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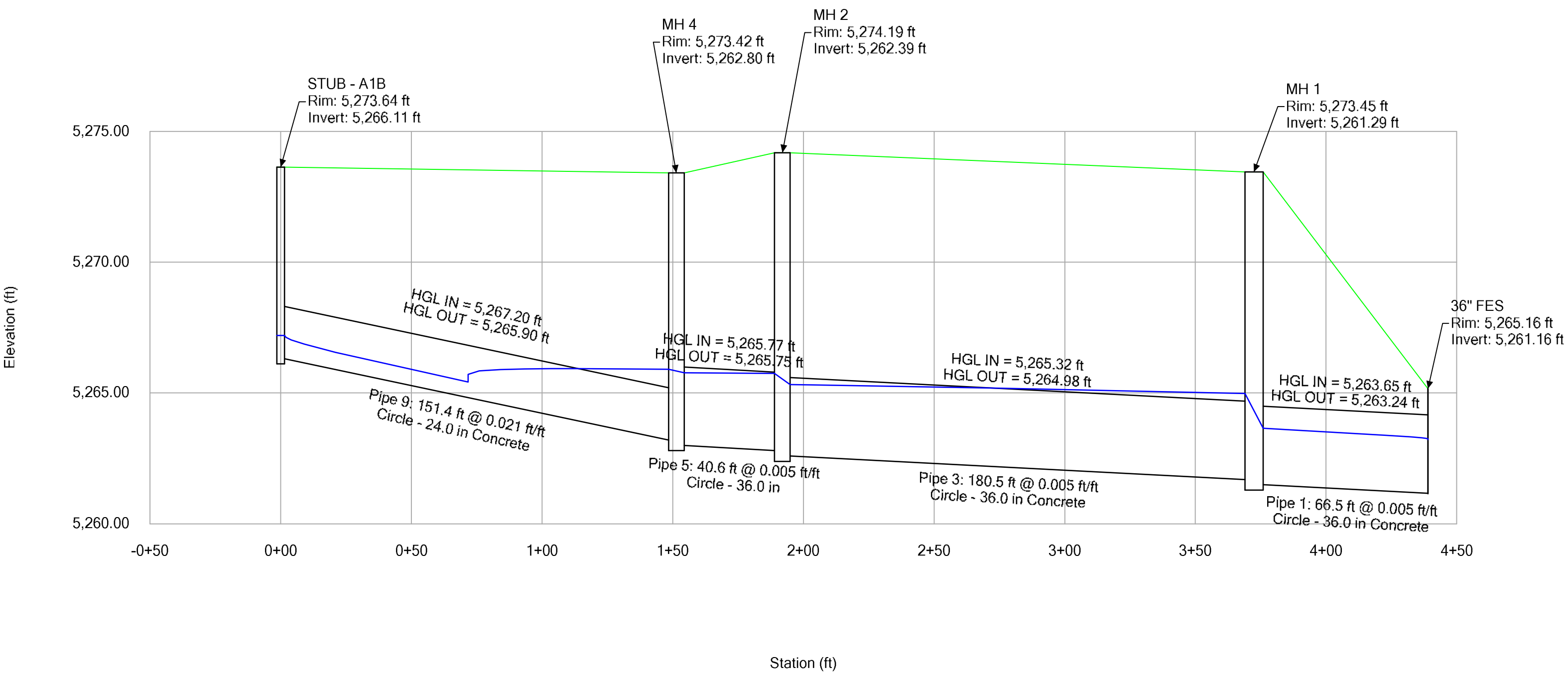
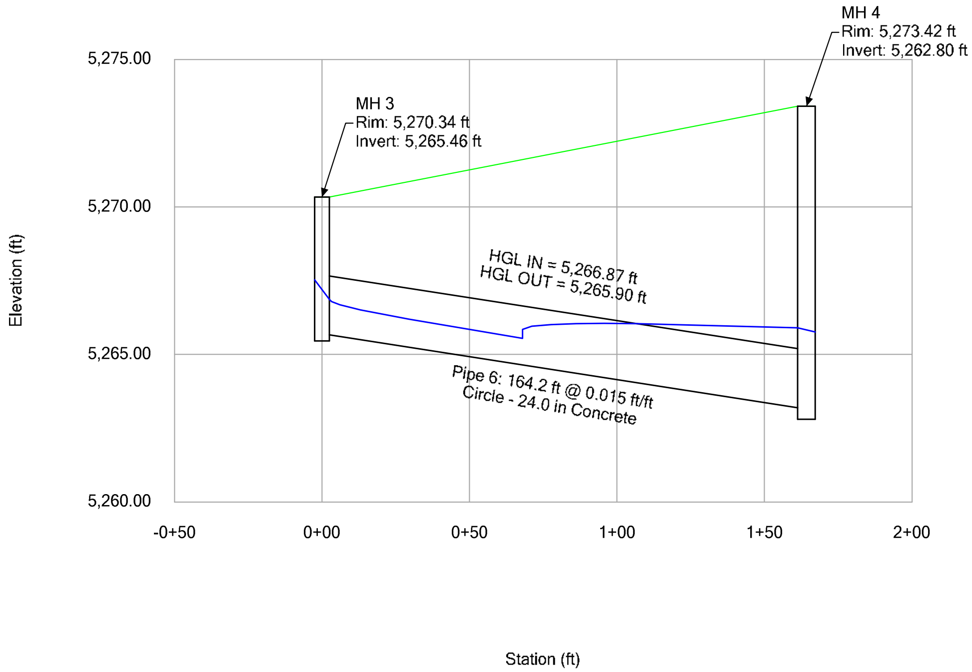
Profile Report

Engineering Profile - Storm Line I Profile - 100 Year



Profile Report
Engineering Profile - Storm Line J Profile - 100 Year



Scenario: 100 Year
Current Time Step: 0.000Hr
FlexTable: Conduit Table

ID	Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Has User Defined Length?	Length (User Defined) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Depth (Normal) / Rise (%)	Notes	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
31	Pipe 2	STUB - A1E	5,261.93	MH 1	5,261.69	True	12.0	20.9	0.020	Circle	30.0	0.013	10.00	2.04	3.29	58.00	17.2	28.1	-	5,264.98	5,264.98
36	Pipe 7	STUB- A1A	5,266.46	MH 3	5,265.86	True	30.0	22.1	0.020	Circle	24.0	0.013	6.20	7.88	1.67	31.99	19.4	29.8	-	5,267.34	5,267.53
38	Pipe 6	MH 3	5,265.66	MH 4	5,263.20	True	164.2	87.6	0.015	Circle	24.0	0.013	11.30	8.37	2.71	27.70	40.8	44.5	-	5,266.87	5,265.90
39	Pipe 3	MH 2	5,262.59	MH 1	5,261.69	True	180.5	85.1	0.005	Circle	36.0	0.013	30.80	7.11	3.29	47.15	65.3	58.9	-	5,265.32	5,264.98
40	Pipe 1	MH 1	5,261.49	36" FES	5,261.16	True	66.5	34.3	0.005	Circle	36.0	0.013	40.80	7.50	2.08	47.12	86.6	71.9	-	5,263.65	5,263.24
51	Pipe 9	STUB - A1B	5,266.31	MH 4	5,263.20	True	151.4	72.3	0.021	Circle	24.0	0.013	6.30	7.99	2.71	32.44	19.4	29.9	-	5,267.20	5,265.90
56	Pipe 8	STUB - A1Cii	5,266.06	MH 3	5,265.86	True	10.0	18.2	0.020	Circle	24.0	0.013	5.10	7.45	1.67	31.99	15.9	27.0	-	5,267.52	5,267.53
59	Pipe 4	STUB - A1D	5,263.03	MH 2	5,262.79	True	12.0	22.7	0.020	Circle	24.0	0.013	13.20	4.20	2.95	31.99	41.3	44.8	-	5,265.79	5,265.75
60	Pipe 5	MH 4	5,263.00	MH 2	5,262.79	True	40.6	28.9	0.005	Circle	36.0	0.013	17.60	6.19	2.95	47.19	37.3	42.3	-	5,265.77	5,265.75

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Scenario: 100 Year
Current Time Step: 0.000Hr
FlexTable: Manhole Table

ID	Label	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Bolted Cover?	Elevation (Invert in 1) (ft)	Flow (Total In)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Hydraulic Grade Line (In) (ft)	Notes
29	MH 1	5,273.45	True	5,273.45	False	5,261.69	40.7999992370605	40.80	2.36	5,263.65	Standard	5,264.98	-
30	STUB - A1E	5,273.45	True	5,273.45	False	(N/A)	10	10.00	3.26	5,264.98	Absolute	5,264.98	-
32	MH 2	5,274.19	True	5,274.19	False	5,262.79	30.7999992370605	30.80	2.93	5,265.32	Standard	5,265.75	-
33	MH 3	5,270.34	True	5,270.34	False	5,265.86	11.3000001907349	11.30	1.41	5,266.87	Standard	5,267.53	-
35	STUB- A1A	5,270.34	True	5,270.34	False	(N/A)	6.19999980926514	6.20	2.69	5,267.34	Absolute	5,267.34	-
37	MH 4	5,273.42	True	5,273.42	False	5,263.20	17.6000003814697	17.60	2.97	5,265.77	Standard	5,265.90	-
50	STUB - A1B	5,273.64	True	5,273.64	False	(N/A)	6.30000019073486	6.30	1.09	5,267.20	Absolute	5,267.20	-
55	STUB - A1Cii	5,270.34	True	5,270.34	False	(N/A)	5.09999990463257	5.10	2.97	5,267.52	Absolute	5,267.52	-
58	STUB - A1D	5,274.19	True	5,274.19	False	(N/A)	13.1999998092651	13.20	2.96	5,265.79	Absolute	5,265.79	-

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<u>Attachments:</u>

Vista Ridge Commercial Lot 10 – Rip Rap Sizing Computations

PIPE OUTFALL RIPRAP SIZING CALCULATIONS

Location: CO, Erie

Project Name: Vista Ridge Commercial - Lot 10
Project No.: SH7000003.01
Calculated By: CAC
Checked By: PJD
Date: 6/20/19

	STORM DRAIN SYSTEM	
	LOT 10 STORM SEWER OUTFALL	
Inputs		
Q_{100} (cfs)	44.8	
V (ft/s)	7.8	
W (ft) (D for circular)	3	Width of conduit (ft, diameter for circular conduits)
Slope (%)	0.50	
Y_t (ft)	1.40	Tailwater depth, If "unknown" Yt/D=0.4
Y_n (ft)	2.08	Normal depth of flow
Supercritical	No	Check this value
1/(2 tan θ)	5.80	Fig. 9-35 or 9-36 (Expansion factor)
Yt/D	0.47	Tailwater depth/conduit height
$Q/D^{2.5}$	2.87	Discharge/conduit depth
$Q/D^{1.5}$	8.62	Discharge/conduit depth
Use Riprap Size	**Type L**	
d_{50} (in)	9.0	
Erosive Soils	No	
A_t	5.74	A_t=Q/V
L	6.4	L=(1/(2 tan θ))(A_t/Yt - D)
Min L	9.0	Min L=3D or 3H
Max L	30.0	Max L=10D or 10H
T Min (ft)	1.5	Minimum thickness of of riprap layer
Length (ft)	9.0	
θ (rad)	0.1	
T, Bottom Width (ft)	9.0	Width=3D (Minimum)
Riprap Depth (in)	1.5	Depth=2(d_{50})

Note: No Type II Base to be used if Soil Riprap is specified within the plans

Rock Chute Design Data

(Version 4.02 - 11/04/09, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project:	Vista Ridge Lot 10	County:	Boulder
Designer:	CAC	Checked by:	PJD
Date:	06/20/19	Date:	06/20/19

Input Channel Geometry

Inlet Channel	Chute	Outlet Channel
Bw = 0.0 ft.	Bw = 28.0 ft.	Bw = 40.0 ft.
Side slopes = 4.0 (m:1)	Factor of safety = 1.00 (F_s)	Side slopes = 4.0 (m:1)
n-value = 0.050	Side slopes = 4.0 (m:1) → 2.0:1 max.	n-value = 0.050
Bed slope = 0.0090 ft./ft.	Bed slope (4:1) = 0.250 ft./ft. → 2.5:1 max.	Bed slope = 0.0050 ft./ft.
Freeboard = 1.0 ft.	Outlet apron depth, d = 0.0 ft.	Base flow = 0.0 cfs

Design Storm Data (Table 2, NHCP, NRCS Grade Stabilization Structure No. 410)

Drainage area = 7.3 acres Rainfall = ○ 0 - 3 in. ○ 3 - 5 in. ● 5+ in.

Apron elev. --- Inlet = 69.6 ft. --- Outlet = 61.0 ft. --- (H_{drop} = 8.6 ft.)

Chute capacity = Q10-year

Total capacity = Q25-year

Minimum capacity (based on a 5-year, 24-hour storm with a 5+ inch rainfall)

Note: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.

Input tailwater (Tw):

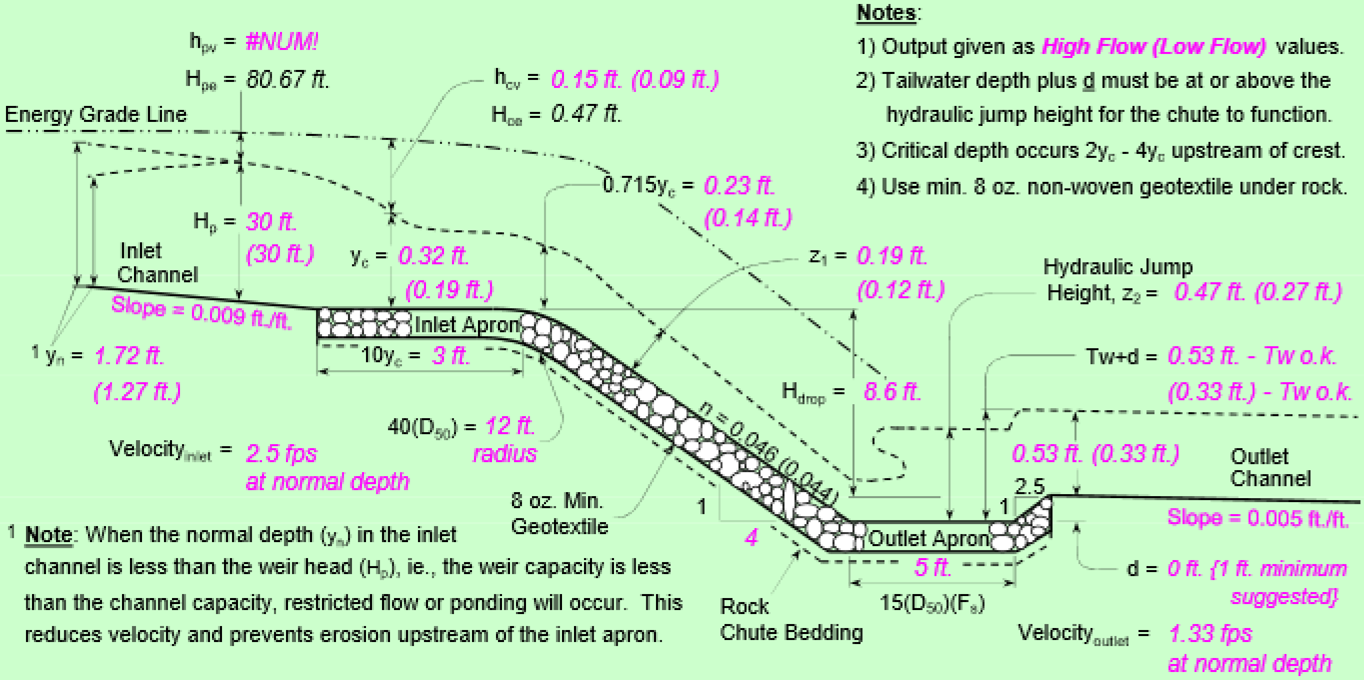
Q_{high} = 29.5 cfs High flow storm through chute → Tw (ft.) = Program 0.25

Q_{low} = 13.3 cfs Low flow storm through chute → Tw (ft.) = Program

Profile and Cross Section (Output)

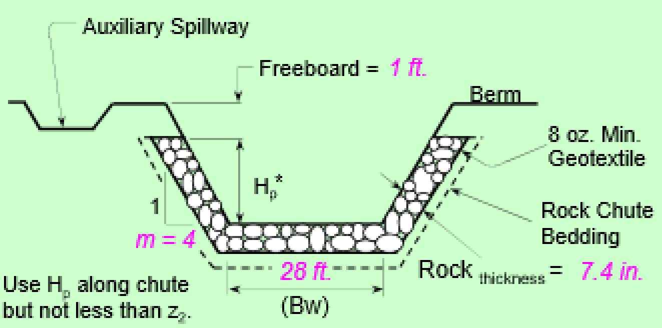
Notes:

1) Output given as ***High Flow (Low Flow)*** values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs $2y_c$ - $4y_c$ upstream of crest.
4) Use min. 8 oz. non-woven geotextile under rock.



[1] **Note**: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute



* Use H_p along chute but not less than z_2.

Typical Cross Section

q_t =	1.03 cfs/ft.	Equivalent unit discharge
F_S =	1.00	Factor of safety (multiplier)
z_1 =	0.19 ft.	Normal depth in chute
n-value =	0.046	Manning's roughness coefficient
$D_{50}(F_s)$ =	3.7 in. (4 lbs. - 50% round / 50% angular)	
$2(D_{50})(F_s)$ =	7.4 in.	Rock chute thickness
Tw + d =	0.53 ft.	Tailwater above outlet apron
z_2 =	0.47 ft.	Hydraulic jump height
*** The outlet	will	function adequately

High Flow Storm Information

Rock Chute Design Calculations

(Version 4.02 - 11/04/09, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project:	Vista Ridge Lot 10	**County:**	Boulder
Designer:	CAC	**Checked by:**	PJD
Date:	6/20/2019	**Date:**	06/20/19

I. Calculate the normal depth in the inlet channel.

High Flow			***Low Flow***			
y_n =	**1.72**	**ft.**	**y_n =**	**1.27**	**ft.**	(Normal depth)
Area =	11.8	ft^2	Area =	6.5	ft^2	(Flow area in channel)
Q_{high} =	29.5	cfs	Q_{low} =	13.3	cfs	(Capacity in channel)

II. Calculate the critical depth in the chute.

High Flow			***Low Flow***			
y_c =	**0.32**	**ft.**	**y_c =**	**0.19**	**ft.**	(Critical depth in chute)
Area =	9.4	ft^2	Area =	5.5	ft^2	(Flow area in channel)
Q_{high} =	29.5	cfs	Q_{low} =	13.3	cfs	(Capacity in channel)
H_{ce} =	0.47	ft.	H_{ce} =	0.28	ft.	(Total minimum specific energy head)
h_{cv} =	0.15	ft.	h_{cv} =	0.09	ft.	(Velocity head corresponding to y_c)
$10y_c$ =	**3.20**	**ft.**	---	---		(Required inlet apron length)
$0.715y_c$ =	**0.23**	**ft.**	**$0.715y_c$ =**	**0.14**	**ft.**	(Depth of flow over the weir crest or brink)

III. Calculate the tailwater depth in the outlet channel.

High Flow			***Low Flow***				
Tw =	**0.53**	**ft.**	**Tw =**	**0.33**	**ft.**	(Tailwater depth)	
Area =	22.2	ft^2	Area =	13.6	ft^2	(Flow area in channel)	
Q_{high} =	29.5	cfs	Q_{low} =	13.3	cfs	(Capacity in channel)	8.60 = H_{drop}
H_2 =	0.00	ft.	H_2 =	0.00	ft.	(Downstream head above weir crest, H_2 = 0, if H_2 < 0.715*y_c, neglect velocity head)	

IV. Calculate the head for a trapezoidal shaped broad-crested weir.

C_d = 1.00 C_{vn} = 0.581 (Discharge coefficient for rectangular & v-notch broad-crested weirs, respectively)

High Flow					
H_p =	0.47	ft.	**0.04**	**ft.**	(Weir head)
Area =	0.9	ft^2	0.0	ft^2	(Flow area in channel)
V_I =	0.00	fps	**41.08**	**fps**	(Approach velocity)
h_{pv} =	0.00	ft.	26.20	ft.	(Velocity head corresponding to H_p)
Q_{high} =	29.5	cfs	29.5	cfs	(Capacity in channel)

Trial and error procedure solving simultaneously for velocity and head

Low Flow					
H_p =	0.28	ft.	**30.00**	**ft.**	(Weir head)
Area =	0.3	ft^2	3600.0	ft^2	(Flow area in channel)
V_I =	0.00	fps	**#NUM!**	**fps**	(Approach velocity)
h_{pv} =	0.00	ft.	#NUM!	ft.	(Velocity head corresponding to H_p)
Q_{low} =	13.3	cfs	#NUM!	cfs	(Capacity in channel)

Trial and error procedure solving simultaneously for velocity and head

Rock Chute Design Calculations

(Version 4.02 - 11/04/09, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: Vista Ridge Lot 10 **County:** Boulder
Designer: CAC **Checked by:** PJD
Date: 6/20/2019 **Date:** 06/20/19

V. Calculate the rock chute parameters (w/o a factor of safety applied).

High Flow			***Low Flow***			
q_t =	0.10	cms/m	q_t =	0.04	cms/m	(Equivalent unit discharge)
D_{50} (mm) =	93.46	→ *(3.68 in.)*	D_{50} =	61.63	mm	(Median ***angular*** rock size)
n =	0.046		n =	0.044		(Manning's roughness coefficient)
z_1 =	0.19	ft.	z_1 =	0.12	ft.	(Normal depth in the chute)
A_1 =	5.5	ft^2	A_1 =	3.3	ft^2	(Area associated with normal depth)
Velocity =	5.32	fps	Velocity =	4.03	fps	(Velocity in chute slope)
z_{mean} =	0.19	ft.	z_{mean} =	0.11	ft.	(Mean depth)
F_1 =	2.16		F_1 =	2.11		(Froude number)
$L_{rock\ apron}$ =	4.60	ft.	----	----		(Length of rock outlet apron = 15*D_{50})

VI. Calculate the height of hydraulic jump height (conjugate depth).

High Flow			***Low Flow***			
z_2 =	**0.47**	**ft.**	**z_2 =**	**0.27**	**ft.**	(Hydraulic jump height)
Q_{high} =	28.1	cfs	Q_{low} =	12.6	cfs	(Capacity in channel)
A_2 =	14.0	ft^2	A_2 =	7.9	ft^2	(Flow area in channel)

VII. Calculate the energy lost through the jump (absorbed by the rock).

High Flow			***Low Flow***			
E_1 =	0.63	ft.	E_1 =	0.37	ft.	(Total energy before the jump)
E_2 =	0.53	ft.	E_2 =	0.31	ft.	(Total energy after the jump)
R_E =	16.10	%	R_E =	15.35	%	(Relative loss of energy)

Calculate Quantities for Rock Chute

-------Rock Riprap Volume-------

Area Calculations	Length @ Rock CL
h = 0.98	Inlet = 2.96
x_1 = 2.54	Outlet = 5.10
L = 4.04	Slope = 35.46
A_s = 2.49	2.5:1 Lip = -0.06
x_2 = 2.47	**Total = 43.45 ft.**
A_b = 18.88	**Rock Volume**
A_b+2*A_s = 23.86 ft^2	**38.41 yd^3**

-------Bedding Volume-------

Area Calculations	
h = 1.60	**Bedding Thickness**
x_1 = 2.06	t_1, t_2 = ***6.00*** in.
L = 6.60	
A_s = 3.30	**Length @ Bed CL**
x_2 = 2.00	**Total = 43.45 ft.**
A_b = 15.14	**Bedding Volume**
A_b+2*A_s = 21.73 ft^2	**34.97 yd^3**

-------Geotextile Quantity-------

Width	Length @ Bot. Rock
2*Slope = 13.19	**Total = 43.45 ft.**
Bottom = 28.15	**Geotextile Area**
Total = 41.35 ft.	**199.61 yd^2**

Note: 1) The radius is not considered when calculating quantities of riprap, bedding, or geotextile.
2) The geotextile quantity does not include over-overlapping (18-in. min.) or anchoring material (18-in. min. along sides, 24-in. min. on ends).

Attachments:

Vista Ridge Commercial Lot 10 -Forebay Design Computations

POND A - Southern Storm Drain - FOREBAY CALCULATIONS

1) WQCV (inches) = $a(.91I^3 - 1.19I^2 + .78I)$

I = impervious percentage = 72%

a = Coefficient corresponding to WQCV drain time = 1 (40 hours)

WQCV (inches) = 0.28 inches

2) WQCV (ac-ft) = (WQCV (inches))/12 x A

Area = tributary area = 7.31 acres

WQCV (ac-ft) = 0.17

WQCV (cubic feet) = 7,546

3) Forebay Volume

Per Table EDB-4, Section T-5 of USDCM Volume 3 - Forebay Volume = 3% of WQCV and be max 18" depth since watershed over 5 impervious acres

Forebay Volume = 3% of WQCV = 226 cubic feet

4) Forebay Discharge

Per Table EDB-4, Section T-5 of USDCM Volume 3 - Forebay Discharge = 2% of 100-yr Flow into pond

Q100 = 40.8 cfs

Forebay discharge = 0.82 cfs

5) Notch Sizing

For rectangular contracted weir: $Q = \frac{3.247 \cdot L \cdot H^{1.48} - 0.566 \cdot L^{1.9}}{1 + 2L^{1.87}} \cdot H^{1.9}$

where: H = Height of water above weir crest (ft)

L = Bottom Width of weir (ft)

Q = Flow rate (cfs)

$Q_{forebay}$ = 0.82 cfs

H = 1.4 ft

L = 0.16 ft

6) Volume check

H = 1.4 ft

Area (required, min) = 161.69 sq ft

Area (provided) = 162.00 sq ft

Volume (provide)= 226.80 cubic feet

Attachments:

Vista Ridge Commercial Lot 10 – Curb & Gutter/ Cross Pan Capacity Computations

Gutter - 5 yr Report

Project Description

Solve For	Spread

Input Data

Channel Slope	0.02300	ft/ft
Discharge	0.30	ft³/s
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	

Results

Spread	3.16	ft
Flow Area	0.13	ft²
Depth	0.13	ft
Gutter Depression	0.06	ft
Velocity	2.29	ft/s

Gutter - 5 yr Cross Section

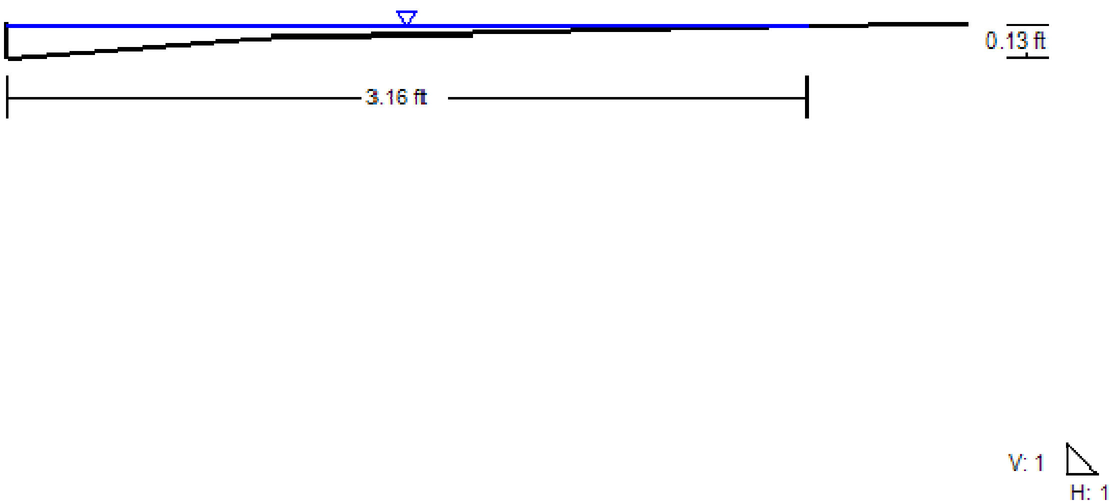
Project Description

Solve For	Spread

Input Data

Channel Slope	0.02300	ft/ft
Discharge	0.30	ft³/s
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Spread	3.16	ft
Roughness Coefficient	0.016	

Cross Section Image



Curb & Gutter - 100 yr Report

Project Description

Solve For	Spread

Input Data

Channel Slope	0.02300	ft/ft
Discharge	0.60	ft^3/s
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.016	

Results

Spread	4.53	ft
Flow Area	0.24	ft^2
Depth	0.15	ft
Gutter Depression	0.06	ft
Velocity	2.54	ft/s

Gutter - 100 yr Cross Section

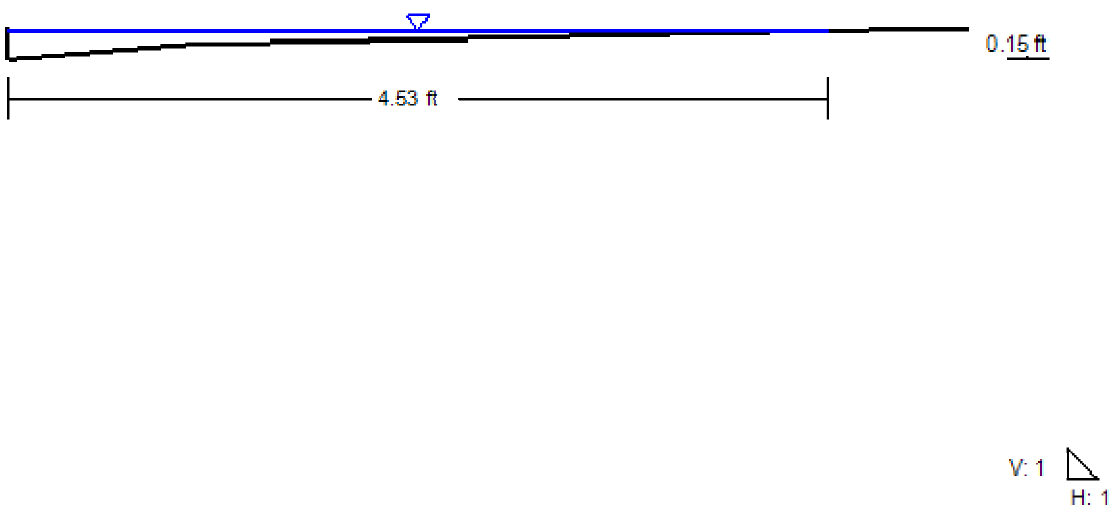
Project Description

Solve For	Spread

Input Data

Channel Slope	0.02300	ft/ft
Discharge	0.60	ft³/s
Gutter Width	1.00	ft
Gutter Cross Slope	0.08	ft/ft
Road Cross Slope	0.02	ft/ft
Spread	4.53	ft
Roughness Coefficient	0.016	

Cross Section Image



Crosspan - 5 yr Report

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.02300	ft/ft
Left Side Slope	12.00	ft/ft (H:V)
Right Side Slope	12.00	ft/ft (H:V)
Discharge	0.30	ft^3/s

Results

Normal Depth	0.11	ft
Flow Area	0.15	ft^2
Wetted Perimeter	2.67	ft
Hydraulic Radius	0.06	ft
Top Width	2.66	ft
Critical Depth	0.13	ft
Critical Slope	0.00929	ft/ft
Velocity	2.04	ft/s
Velocity Head	0.06	ft
Specific Energy	0.18	ft
Froude Number	1.53	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.11	ft
Critical Depth	0.13	ft
Channel Slope	0.02300	ft/ft
Critical Slope	0.00929	ft/ft

Crosspan - 5 yr Cross Section

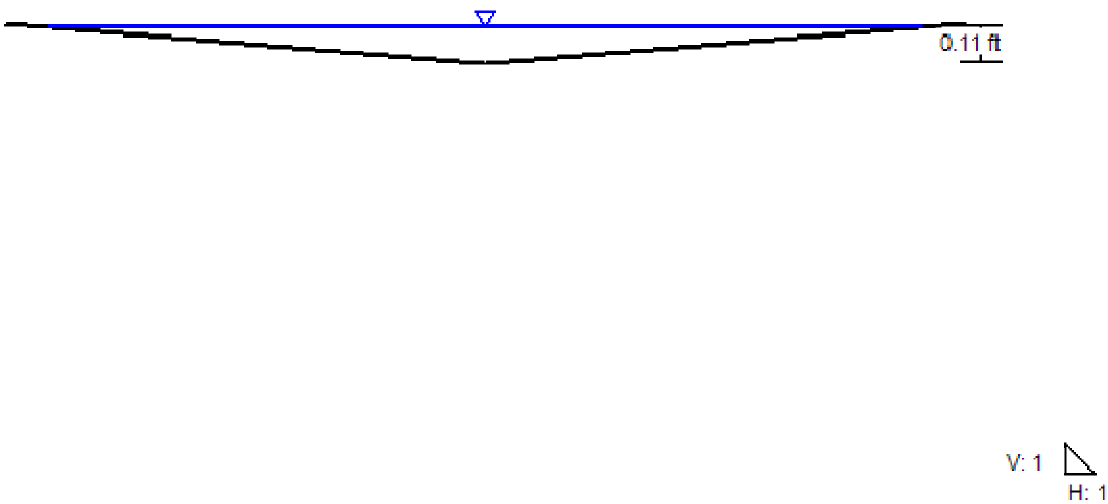
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.02300	ft/ft
Normal Depth	0.11	ft
Left Side Slope	12.00	ft/ft (H:V)
Right Side Slope	12.00	ft/ft (H:V)
Discharge	0.30	ft³/s

Cross Section Image



Crosspan - 100 yr Report

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.02300	ft/ft
Left Side Slope	12.00	ft/ft (H:V)
Right Side Slope	12.00	ft/ft (H:V)
Discharge	0.60	ft³/s

Results

Normal Depth	0.14	ft
Flow Area	0.25	ft²
Wetted Perimeter	3.46	ft
Hydraulic Radius	0.07	ft
Top Width	3.44	ft
Critical Depth	0.17	ft
Critical Slope	0.00847	ft/ft
Velocity	2.43	ft/s
Velocity Head	0.09	ft
Specific Energy	0.24	ft
Froude Number	1.60	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.14	ft
Critical Depth	0.17	ft
Channel Slope	0.02300	ft/ft
Critical Slope	0.00847	ft/ft

Crosspan - 100 yr Cross Section

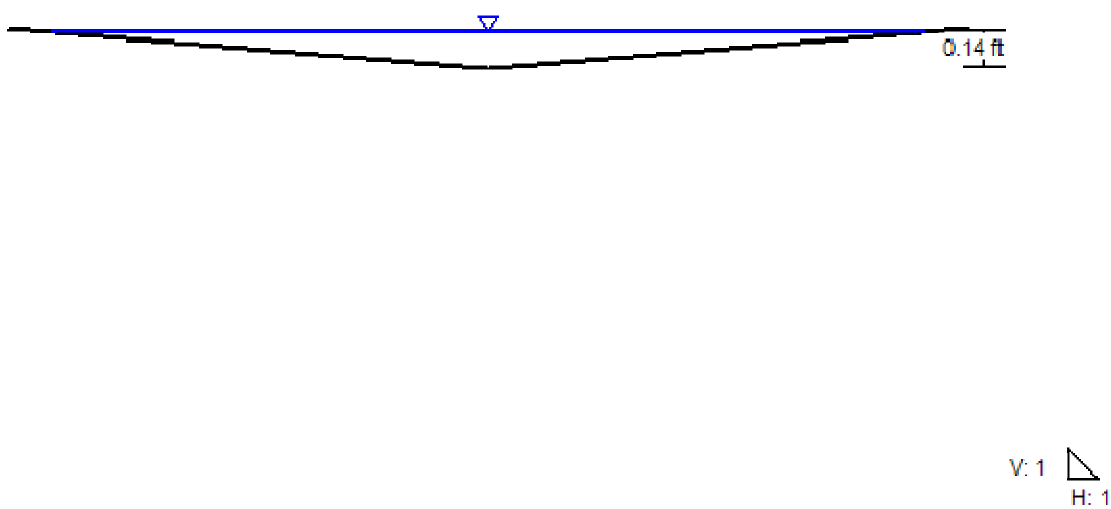
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.016	
Channel Slope	0.02300	ft/ft
Normal Depth	0.14	ft
Left Side Slope	12.00	ft/ft (H:V)
Right Side Slope	12.00	ft/ft (H:V)
Discharge	0.60	ft³/s

Cross Section Image



Attachments:

Vista Ridge Commercial Lot 10 – Trickle Channel Capacity Computations

Trickle Channel Capacity Calculations

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Normal Depth	0.50	ft
Bottom Width	2.00	ft

Results

Discharge	5.50	ft^3/s
Flow Area	1.00	ft^2
Wetted Perimeter	3.00	ft
Hydraulic Radius	0.33	ft
Top Width	2.00	ft
Critical Depth	0.62	ft
Critical Slope	0.00549	ft/ft
Velocity	5.50	ft/s
Velocity Head	0.47	ft
Specific Energy	0.97	ft
Froude Number	1.37	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.62	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00549	ft/ft

Trickle channel at Forebay Design Discharge

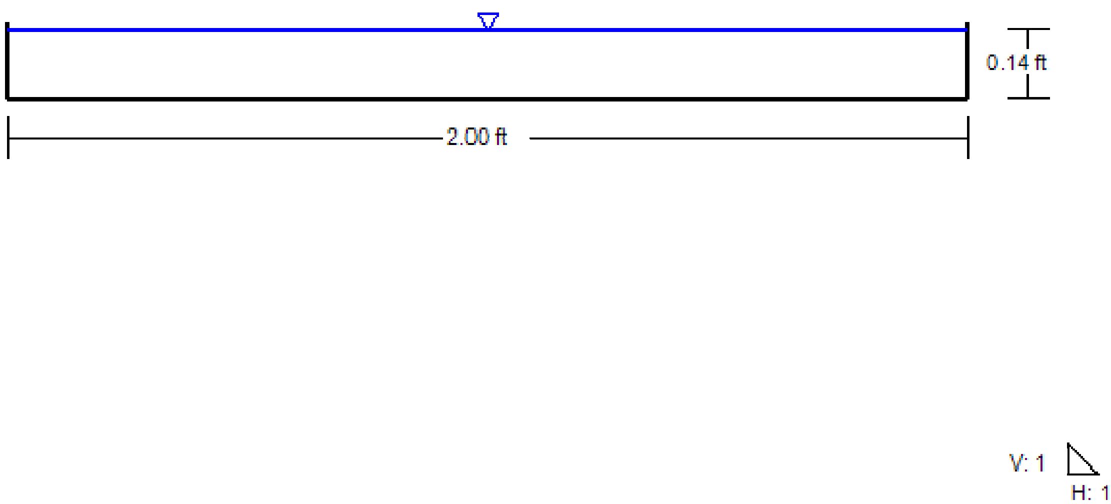
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Normal Depth	0.14	ft
Bottom Width	2.00	ft
Discharge	0.82	ft³/s

Cross Section Image



Trickle channel at Forebay Design Discharge

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Bottom Width	2.00	ft
Discharge	0.82	ft³/s

Results

Normal Depth	0.14	ft
Flow Area	0.29	ft²
Wetted Perimeter	2.29	ft
Hydraulic Radius	0.13	ft
Top Width	2.00	ft
Critical Depth	0.17	ft
Critical Slope	0.00547	ft/ft
Velocity	2.86	ft/s
Velocity Head	0.13	ft
Specific Energy	0.27	ft
Froude Number	1.33	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.14	ft
Critical Depth	0.17	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00547	ft/ft

Attachments:

Vista Ridge Filing No. 14 2nd Amendment - Hydrologic Computations

PROJECT: Vista Ridge Commercial
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000001.01
Date: May 19, 2017
Designed By: Phil Dalrymple
Checked By: Brandon McCrary, PE

PERCENT IMPERVIOUS VALUES	
LANDSCAPE	0
PAVING	100
ROOFING	90
WALKS/DRIVES	90
FUTURE COMMERCIAL	95

***Refer to Table RO-5, Urban Drainage, Storm Drainage Criteria Manual for Runoff Coefficients used**

***Group C Soils**

Composite Runoff Coefficients and Percent Imperviousness for Developed Drainage Basins

BASIN DESIG.	OVERALL AREA (AC)	LANDSCAPE AREA (AC)	PAVED AREA (AC)	ROOF AREA (AC)	WALKS/ DRIVES (AC)	FUTURE COMMERCIAL (AC)	2-YEAR COEFF.	5-YEAR COEFF.	10-YEAR COEFF.	100-YEAR COEFF.	PERCENT IMPERVIOUS
A-1	7.34	1.36	0.00	0.00	0.00	5.98	-	0.60	0.63	0.72	0.77
Total to Pond	7.34	1.36	0.00	0.00	0.00	5.98	-	0.60	0.63	0.72	0.77
B-1	0.98	0.18	0.00	0.00	0.03	0.77	-	0.60	0.63	0.72	0.77
B-2	0.96	0.20	0.00	0.00	0.05	0.71	-	0.58	0.62	0.71	0.75
B-3	0.92	0.17	0.00	0.00	0.04	0.71	-	0.60	0.63	0.72	0.77
B-4	0.79	0.14	0.00	0.00	0.03	0.62	-	0.61	0.65	0.73	0.78
B-5	1.00	0.21	0.00	0.00	0.06	0.73	-	0.58	0.62	0.71	0.75
B-6	1.03	0.22	0.00	0.00	0.06	0.75	-	0.57	0.61	0.71	0.74
B-7	1.11	0.19	0.00	0.00	0.03	0.89	-	0.62	0.65	0.74	0.79
B-8	0.28	0.00	0.00	0.00	0.00	0.28	-	0.82	0.84	0.89	0.95
B-9	1.40	0.00	0.60	0.00	0.30	0.50	-	0.83	0.85	0.90	0.96
B-10	0.50	0.00	0.50	0.00	0.00	0.00	-	0.90	0.92	0.96	1.00
B-11	0.47	0.00	0.00	0.00	0.00	0.47	-	0.82	0.84	0.89	0.95
B-12	0.98	0.46	0.00	0.00	0.00	0.52	-	0.40	0.46	0.60	0.50
B-13	0.22	0.22	0.00	0.00	0.00	0.00	-	0.15	0.25	0.50	0.00
Total to Pond	10.64	1.99	1.10	0.00	0.60	6.95	-	0.60	0.63	0.72	0.77
OS-1	1.52	0.36	0.91	0.27	0.00	0.00	-	0.63	0.68	0.80	0.76

Composite Runoff Coefficients and Percent Imperviousness for Historic Drainage Basins

H-1	7.34	7.34	0.00	0.00	0.00		0.00	0.15	0.25	0.50	0.00
H-2	10.64	10.64	0.00	0.00	0.00		0.00	0.15	0.25	0.50	0.00

PROJECT: Vista Ridge Commercial
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000001.01
Date: May 19, 2017
Engineer: Phil Dalrymple
Checked By: Brandon McCrary, PE

Galloway
Planning. Architecture. Engineering.

Developed Conditions - Time of Concentration Runoff Calculations

Basin Data			Intial/Overland Time (T_i)			Travel Time (T_t)					T_c Check Urbanized Basins			Final T_c		
Basin	Area (acre)	C_5	Length (ft)	Slope (%)	T_i (min)	Length (ft)	Slope (%)	Conv. Coeff.	Vel. (fps)	T_t (min)	Total Length	Comp. Tc	T_c=(L/180)+10	Final Tc	C_5	C_{100}
A-1	7.34	0.60	50	2.0%	5.2	745	3.1%	20	3.5	3.5	795	8.7	14.4	8.7	0.60	0.72
B-1	0.98	0.60	75	10.7%	3.6	266	1.5%	20	2.4	1.8	341	5.4	11.9	5.4	0.60	0.72
B-2	0.96	0.58	73	9.6%	3.8	225	2.6%	20	3.2	1.2	298	5.0	11.7	5.0	0.58	0.71
B-3	0.92	0.60	70	10.7%	3.5	225	2.8%	20	3.3	1.1	295	5.0	11.6	5.0	0.60	0.72
B-4	0.79	0.61	70	10.7%	3.4	225	3.1%	20	3.5	1.1	295	5.0	11.6	5.0	0.61	0.73
B-5	1.00	0.58	63	14.0%	3.1	195	3.1%	20	3.5	0.9	258	5.0	11.4	5.0	0.58	0.71
B-6	1.03	0.57	83	14.4%	3.6	420	1.7%	20	2.6	2.7	503	6.3	12.8	6.3	0.57	0.71
B-7	1.11	0.62	107	13.0%	3.9	225	1.0%	20	2.0	1.9	332	5.7	11.8	5.7	0.62	0.74
B-8	0.28	0.82	15	1.00%	2.0	185	1.1%	20	2.1	1.5	200	5.0	11.1	5.0	0.82	0.89
B-9	1.40	0.83	20	2.0%	1.7	1575	2.8%	20	3.3	7.8	1595	9.6	18.9	9.6	0.83	0.90
B-10	0.50	0.90	10	2.0%	0.9	1330	2.6%	20	3.2	6.8	1340	7.8	17.4	7.8	0.90	0.96
B-11	0.47	0.82	20	2.0%	1.8	145	4.2%	20	4.1	0.6	165	5.0	10.9	5.0	0.82	0.89
B-12	0.98	0.40	75	3.0%	7.7	230	1.3%	20	2.3	1.7	305	9.4	11.7	9.4	0.40	0.60
B-13	0.22	0.15	5	2.0%	3.1	5	20.0%	7	8.9	0.0	10	5.0	10.1	5.0	0.15	0.50
OS-1	1.52	0.63												6.1	0.63	0.80

Historic Conditions - Time of Concentration Runoff Calculations

Basin Data			Intial/Overland Time (T_i)			Travel Time (T_t)					T_c Check Urbanized Basins			Final T_c		
Basin	Area (acre)	C_5	Length (ft)	Slope (%)	T_i (min)	Length (ft)	Slope (%)	Conv. Coeff.	Vel. (fps)	T_t (min)	Total Length	Comp. Tc	T_c=(L/180)+10	Final Tc	C_5	C_{100}
H-1	7.34	0.15	50	2.0%	9.8	640	3.0%	7	1.2	8.8	690	18.6	13.8	13.8	0.15	0.50
H-2	10.64	0.15	50	4.0%	7.8	1610	3.9%	7	3.9	6.8	1660	14.5	19.2	14.5	0.15	0.50

PROJECT: Vista Ridge Commercial
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000001.01
Date: May 19, 2017
Engineer: Phil Dalrymple
Checked By: Brandon McCrary, PE

Galloway
Planning. Architecture. Engineering.

Developed Condition: Rational Method Routing - 5 Year Storm Event

5	-YR EVENT ROUTING CALCULATIONS
1.43	INCHES/ HOUR POINT RAINFALL (PER TABLE 8700-2, ERIE CRITERIA)

Basin/Sub-Basin	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME				
	Design Point	Basin	Area (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Conv. Coef.	Velocity (fps)	TT (min)	Description
A-1	1	A-1	7.340	0.60	8.7	4.38	4.08	17.9														
B-1	2	B-1	0.980	0.60	5.4	0.58	4.74	2.8														
B-2	3	B-2	0.960	0.58	5.0	0.56	4.85	2.7														
B-3	4	B-3	0.920	0.60	5.0	0.55	4.85	2.7														
B-4	5	B-4	0.790	0.61	5.0	0.48	4.85	2.4														
B-5	6	B-5	1.000	0.58	5.0	0.58	4.85	2.8														
B-6	7	B-6	1.030	0.57	6.3	0.59	4.54	2.7														
B-7	8	B-7	1.110	0.62	5.7	0.69	4.67	3.2														
B-8	9	B-8	0.280	0.82	5.0	0.23	4.85	1.1														
B-9	10	B-9	1.400	0.83	9.6	1.17	3.93	4.6														
B-10	11	B-10	0.500	0.90	7.8	0.45	4.25	1.9														
B-11	12	B-11	0.470	0.82	5.0	0.39	4.85	1.9														
B-12	13	B-12	0.980	0.40	9.4	0.39	3.97	1.6														
B-13	14	B-13	0.220	0.15	5.0	0.03	4.85	0.2														
OS-1	7	OS-1	1.520	0.63	6.1	0.96	4.59	4.4														

Historic Condition: Rational Method Routing - 5 Year Storm Event

5	-YR EVENT ROUTING CALCULATIONS
1.43	INCHES/ HOUR POINT RAINFALL (PER TABLE 8700-2, ERIE CRITERIA)

Basin/Sub-Basin	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME				
	Design Point	Basin	Area (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Conv. Coef.	Velocity (fps)	TT (min)	Description
H-1	1	H-1	7.340	0.15	13.8	1.10	3.37	3.7														
H-2	2	H-2	10.640	0.15	14.5	1.60	3.29	5.3														

PROJECT: Vista Ridge Commercial
LOCATION: Mountain View Blvd and Highway 7
Erie, CO

Project No.: SH7000001.01
Date: May 19, 2017
Engineer: Phil Dalrymple
Checked By: Brandon McCrary, PE

Galloway
Planning. Architecture. Engineering.

Developed Condition: Rational Method Routing - 100 Year Storm Event

100	-YR EVENT ROUTING CALCULATIONS
2.7	INCHES/ HOUR POINT RAINFALL (PER TABLE 8700-2, ERIE CRITERIA)

Basin/Sub-Basin	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME				
	Design Point	Basin	Area (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Conv. Coef.	Velocity (fps)	TT (min)	Description
A-1	1	A-1	7.340	0.72	8.7	5.28	7.70	40.7														
B-1	2	B-1	0.980	0.72	5.4	0.71	8.95	6.3														
B-2	3	B-2	0.960	0.71	5.0	0.68	9.16	6.2														
B-3	4	B-3	0.920	0.72	5.0	0.66	9.16	6.1														
B-4	5	B-4	0.790	0.71	5.0	0.56	9.16	5.1														
B-5	6	B-5	1.000	0.73	5.0	0.73	9.16	6.7														
B-6	7	B-6	1.030	0.71	6.3	0.73	8.57	6.2														
B-7	8	B-7	1.110	0.74	5.7	0.82	8.82	7.2														
B-8	9	B-8	0.280	0.89	5.0	0.25	9.16	2.3														
B-9	10	B-9	1.400	0.90	9.6	1.26	7.43	9.4														
B-10	11	B-10	0.500	0.96	7.8	0.48	8.02	3.9														
B-11	12	B-11	0.470	0.89	5.0	0.42	9.16	3.8														
B-12	13	B-12	0.980	0.60	9.4	0.59	7.49	4.4														
B-13	14	B-13	0.220	0.50	5.0	0.11	9.16	1.0														
OS-1	7	OS-1	1.520	0.80	6.1	1.22	8.93	10.9														

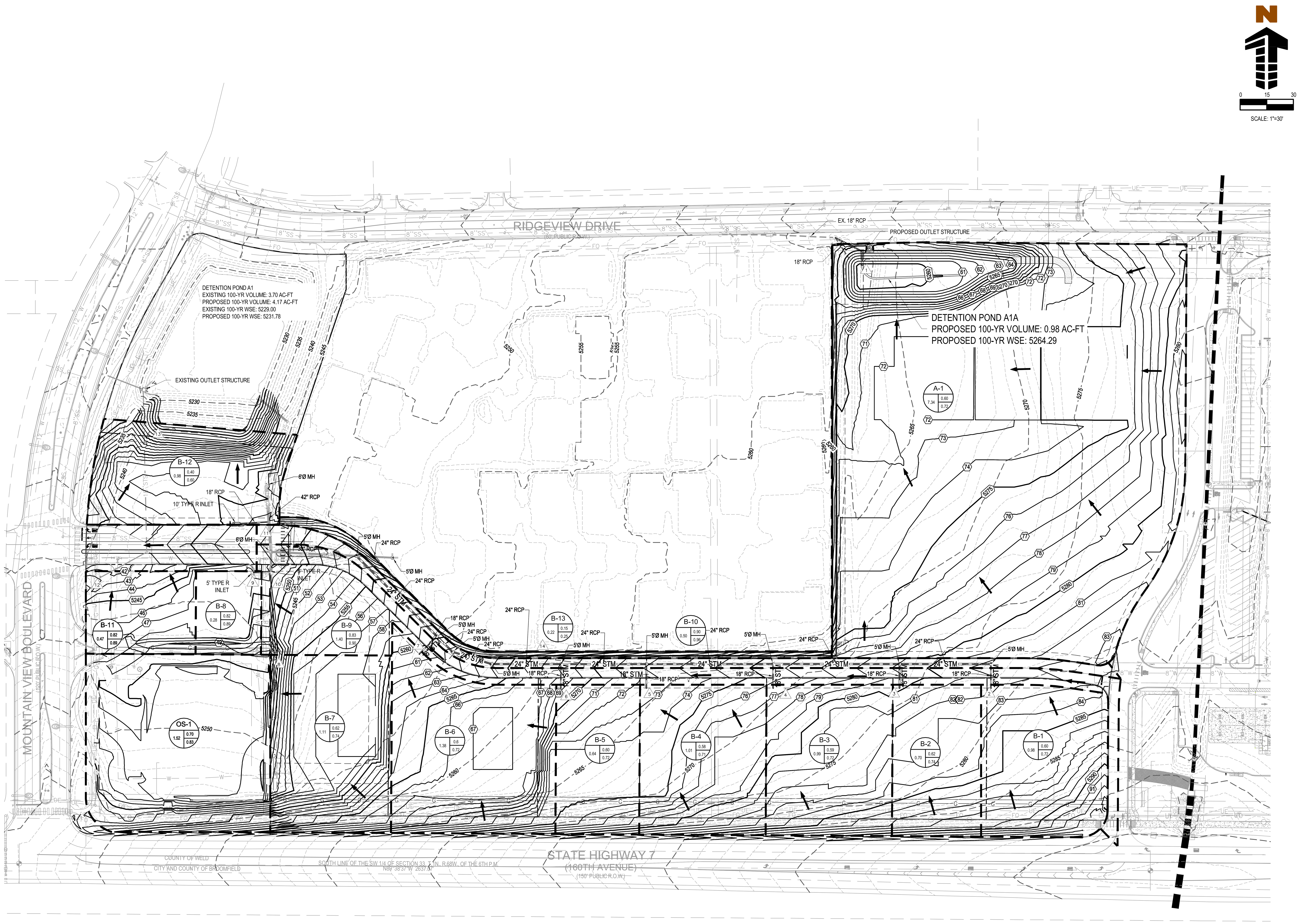
Historic Condition: Rational Method Routing - 100 Year Storm Event

100	-YR EVENT ROUTING CALCULATIONS
2.7	INCHES/ HOUR POINT RAINFALL (PER TABLE 8700-2, ERIE CRITERIA)

Basin/Sub-Basin	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME				
	Design Point	Basin	Area (ac)	Runoff Coeff.	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Tc (min)	CA (ac)	I (in/hr)	Q (cfs)	Slope (%)	Flow (cfs)	Flow (cfs)	Slope (%)	Size (in)	Length (ft)	Conv. Coef.	Velocity (fps)	TT (min)	Description
H-1	1	H-1	7.340	0.50	13.8	3.67	6.36	23.4														
H-2	2	H-2	10.640	0.50	14.5	5.32	6.22	33.1														

Attachments:

Vista Ridge Filing No. 14 2nd Amendment – Drainage Plan



SITE LEGEND

- PROPERTY BOUNDARY LINE
- ADJACENT PROPERTY BOUNDARY LINE
- EASEMENT BOUNDARY LINE
- EXISTING CURB & GUTTER TO REMAIN
- EXISTING TO BE REMOVED
- PROPOSED CURB & GUTTER
- STREET LIGHT
- PROPOSED INLET

GRADING LEGEND

- 5245 EXISTING CONTOUR
- 45 PROPOSED CONTOUR
- STS EXISTING STORM SEWER
- STS PROPOSED STORM SEWER
- STS PROPOSED STORM SEWER (LESS THAN 12")

DRAINAGE LEGEND

- PROPOSED BASIN BOUNDARY LINE
- FLOW ARROW
- 1 DESIGN POINT
- A BASIN DESIGNATION
- 0.00 5-YEAR RUNOFF COEFFICIENT
- 0.00 100-YEAR RUNOFF COEFFICIENT
- 0.00 BASIN AREA IN ACRES

Runoff Summary Table				
Design Poin	Basin	Area (Ac)	5-Year Runoff (cfs)	100-Year Runoff (cfs)
1	A-1	7.34	17.90	40.70
2	B-1	0.98	2.80	6.30
3	B-2	0.70	2.10	4.70
4	B-3	0.99	2.80	6.50
5	B-4	1.01	2.80	6.70
6	B-5	0.64	1.90	4.20
7	B-6	1.38	3.80	8.60
8	B-7	1.11	3.20	7.20
8	OS-1	1.52	4.40	10.90
9	B-8	0.28	1.10	2.30
10	B-9	1.40	4.60	9.40
11	B-10	0.50	1.90	3.90
12	B-11	0.47	1.90	3.80
13	B-12	0.98	1.60	4.40
14	B-13	0.22	0.20	1.00
Total:		19.52	53.00	120.6

Galloway
Planning. Architecture. Engineering.
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
303.770.8884 O
www.gallowayUS.com

VISTA RIDGE COMMERCIAL WEST CIVIL CONSTRUCTION DRAWINGS

ERIE, COLORADO

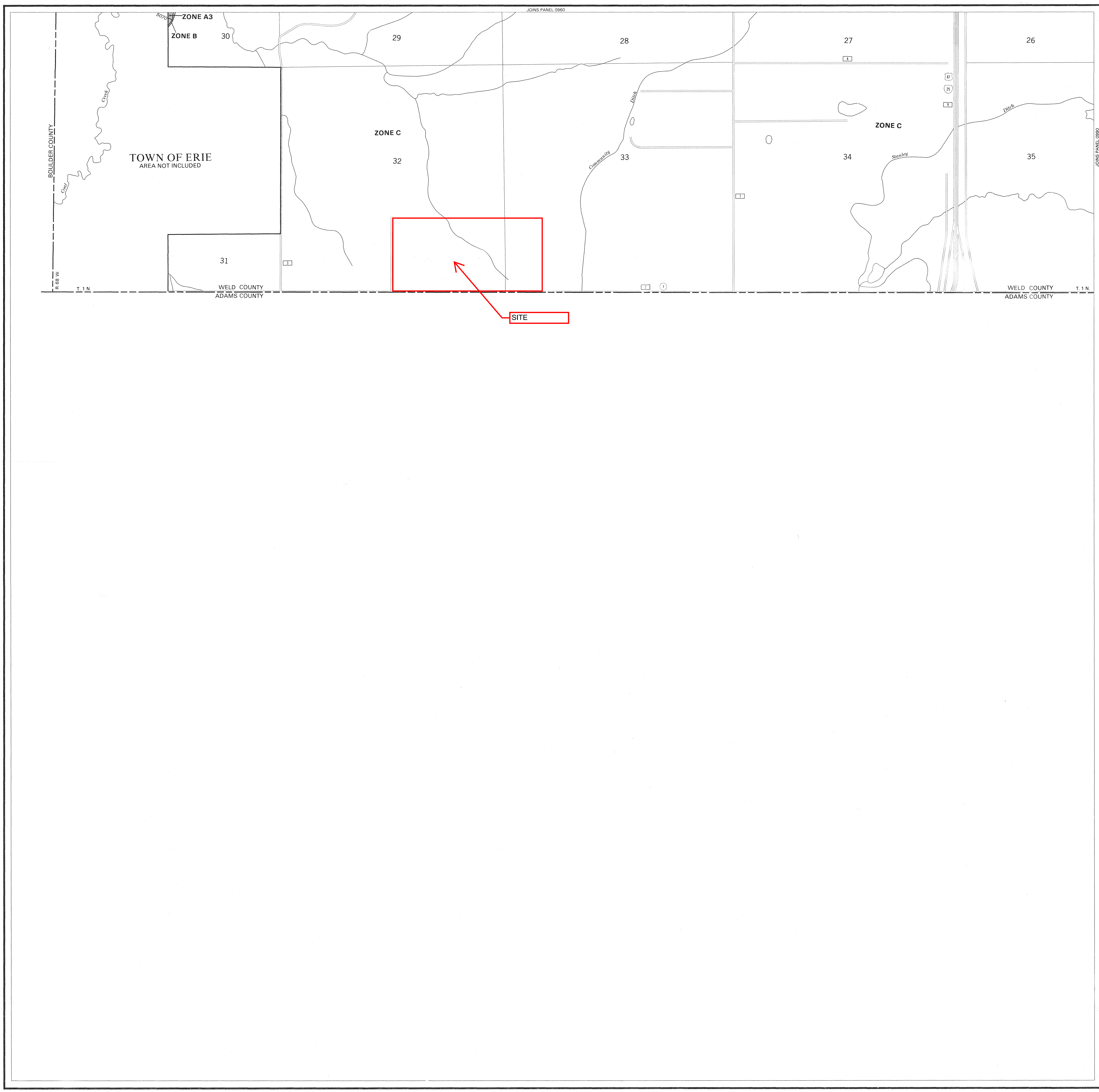
#	Date	Issue / Description	Init.
1	6/29/16	BID ADDENDUM #1	PJD
2	7/28/16	TOWN SUBMITTAL #2	PJD

Project No:	SH7000001.01
Drawn By:	DMP
Checked By:	PJD
Date:	5/26/16

DRAINAGE PLAN

Attachments:

Vista Ridge Filing No. 14 2nd Amendment – FEMA FIRM Map



KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	ZONE A1
Zone Designations	ZONE A5
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AO, A99, V, V1-30 AND VE.

Certain areas not in the Special Flood Hazard Areas (zones A and V) may be protected by flood control structures.

Coastal base flood elevations apply only landward of the shoreline shown on this map.

For adjoining map panels, see separately printed Index to Map Panels.

INITIAL IDENTIFICATION:
MARCH 21, 1978

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:
MARCH 18, 1980

FLOOD INSURANCE RATE MAP REVISIONS:

SEPTEMBER 28, 1982 to change corporate limits, to add new Special Flood Hazard Areas, to reduce Special Flood Hazard Areas, to add Zone Designations, to add Base Flood Elevations, to add Street Names, and to add Streets.

Map revised September 28, 1990 to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to change special flood hazard areas, to change zone designations, and to add roads and road names.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

N

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

WELD COUNTY,
COLORADO
(UNINCORPORATED AREAS)

PANEL 970 OF 1075

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
080266 0970 D

MAP REVISED:
SEPTEMBER 28, 1990

Federal Emergency Management Agency

Attachments:

Vista Ridge Filing No. 14 2nd Amendment – Pond A1A – Pond Volume Calculations

POND VOLUME CALCULATIONS

Subdivision	Lot 10 Pond - As-Built Condition		**Project Name:**	Vista Ridge Commercial
Location	CO, Erie		**Project No.**	SH7000001.01
			By:	PJD
			Checked By:	BSM
			Date:	10/30/18

Volume=1/3 x Depth x (A+B+(A*B)^0.5)
A - Upper Surface
B - Lower Surface

As-Built Pond Volume

Stage	Stage Elevation	Stage Surface Area (square feet)	Stage Volume (cubic feet)	Cumulative Volume (cubic feet)	Cumulative Volume (acre feet)
0.00	5259.00	13	0	0	0.00
1.00	5260.00	2,485	893	893	0.02
2.00	5261.00	6,609	4,382	5,275	0.12
3.00	5262.00	8,907	7,729	13,004	0.30
4.00	5263.00	11,191	10,027	23,031	0.53
5.00	5264.00	13,729	12,438	35,469	0.81
6.00	5265.00	16,419	15,054	50,523	1.16
6.50	5265.50	17,629	8,510	59,033	1.36

	As-Built Condition		Design Condition	
Volume (cubic feet)	**Volume**	**Water Surface Elevation**	**Design Volume**	**Water Surface Elevation**
WQCV*1.2	10,018.00	5261.62	10018.00	5261.41
EURV	24,829.00	5263.15	24829.00	5262.95
100-Year Detention	42,689.00	5264.41	42689.00	5264.29

Land Title Guarantee Company
CUSTOMER DISTRIBUTION

Date: May 01, 2019

Our Order Number: ABN25158978

Property Address:VISTA RIDGE FILING NO. 14, FIFTH AMENDMENT MINOR SUBDIVISION, ERIE, CO 80107

MARATHON LAND
Attn: JAMES SPEHALSKI
9750 CAMBRIDGE ST
LITTLETON, CO 80127
jspehalski@marathonlc.com

If you have any inquiries or require further assistance, please contact Final Policy Team

Phone: 303-850-4158

Email Address: finals@ltgc.com

Property Information Binder

CONDITIONS AND STIPULATIONS

1. Definition of Terms

The following terms when used in this Binder mean:
(a) "Land": The land described, specifically or by reference, in this Binder and improvements affixed thereto which by law constitute real property;
(b) "Public Records"; those records which impart constructive notice of matters relating to said land;
(c) "Date": the effective date;
(d) "the Assured": the party or parties named as the Assured in this Binder, or in a supplemental writing executed by the Company;
(e) "the Company" means Old Republic National Title Insurance Company, a Minnesota stock company.

2. Exclusions from Coverage of this Binder

The company assumes no liability including cost of defense by reason of the following:
(a) Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; taxes and assessments not yet due or payable and special assessments not yet certified to the Treasurer's office.
(b) Unpatented mining claims; reservations or exceptions in patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.
(c) Title to any property beyond the lines of the Land, or title to streets, roads, avenues, lanes, ways or waterways on which such land abuts, or the right to maintain therein vaults, tunnels, ramps, or any other structure or improvement; or any rights or easements therein unless such property, rights or easements are expressly and specifically set forth in said description.
(d) Mechanic's lien(s), judgment(s) or other lien(s).
(e) Defects, liens, encumbrances, adverse claims or other matters: (a) created, suffered or agreed to by the Assured; (b) not known to the Company, not recorded in the Public Records as of the Date, but known to the Assured as of the Date; or (c) attaching or creating subsequent to the Date.

3. Prosecution of Actions

(a) The Company shall have the right at its own costs to institute and prosecute any action or proceeding or do any other act which in its opinion may be necessary or desirable to establish or confirm the matters herein assured; and the Company may take any appropriate action under the terms of this Binder, whether or not it shall be liable thereunder and shall not thereby concede liability or waive any provision hereof.
(b) In all cases where the Company does not institute and prosecute any action or proceeding, the Assured shall permit the Company to use, at its option, the name of the Assured for this purpose. Whenever requested by the Company, the Assured shall give the Company all reasonable aid in prosecuting such action or proceeding, and the Company shall reimburse the Assured for any expense so incurred.

4. Notice of Loss - Limitation of Action

A statement in writing of any loss or damage for which it is claimed the Company is liable under this Binder shall be furnished to the Company within sixty days after such loss or damage shall have been determined, and no right of action shall accrue to the Assured under this Binder until thirty days after such statement shall have been furnished, and no recovery shall be had by the Assured under this Binder unless action shall be commenced thereon with two years after expiration of the thirty day period. Failure to furnish the statement of loss or damage or to commence the action within the time herinbefore specified, shall be conclusive bar against maintenance by the Assured of any action under this Binder.

5. Option to Pay, Settle or Compromise Claims

The Company shall have the option to pay, settle or compromise for or in the name of the Assured any claim which could result in loss to the Assured within the coverage of this Binder, or to pay the full amount of this Binder. Such payment or tender of payment of the full amount of the Binder shall terminate all liability of the Company hereunder.

6. Limitation of Liability - Payment of Loss

(a) The liability of the Company under this Binder shall be limited to the amount of actual loss sustained by the Assured because of reliance upon the assurances herein set forth, but in no event shall the liability exceed the amount of the liability stated on the face page hereof.
(b) The Company will pay all costs imposed upon the Assured in litigation carried on by the Company for the Assured, and all costs and attorneys' fees in litigation carried on by the Assured with the written authorization of the Company.
(c) No claim for loss or damages shall arise or be maintainable under this Binder (1) if the Company after having received notice of any alleged defect, lien or encumbrance not shown as an Exception or excluded herein removes such defect, lien or encumbrance within a reasonable time after receipt of such notice, or (2) for liability voluntarily assumed by the Assured in settling any claim or suit without written consent of the Company.
(d) All payments under this Binder, except for attorney's fees as provided for in paragraph 6(b) thereof, shall reduce the amount of the liability hereunder pro tanto, and no payment shall be made without producing this Binder or an acceptable copy thereof for endorsement of the payment unless the Binder be lost or destroyed, in which case proof of the loss or destruction shall be furnished to the satisfaction of the Company.
(e) When liability has been definitely fixed in accordance with the conditions of this Binder, the loss or damage shall be payable within thirty days thereafter.

7. Subrogation Upon Payment or Settlement

Whenever the Company shall have settled a claim under this Binder, all right of subrogation shall vest in the Company unaffected by any act of the Assured, and it shall be subrogated to and be entitled to all rights and remedies which the Assured would have had against any person or property in respect to the claim had this Binder not been issued. If the payment does not cover the loss of the Assured, the Company shall be subrogated to the rights and remedies in the proportion which the payment bears to the amount of said loss. The Assured, if requested by the Company, shall transfer to the Company all rights and remedies against any person or property necessary in order to perfect the right of subrogation, and shall permit the Company to use the name of the Assured in any transaction or litigation involving the rights or remedies.

8. Binder Entire Contract

Any action or actions or rights of action that the Assured may have or may bring against the Company arising out of the subject matter hereof must be based on the provisions of this Binder. No provision or condition of this Binder can be waived or changed except by a writing endorsed or attached hereto signed by the President, a Vice President, the Secretary, an Assistant Secretary or other validating officer of the Company.

9. Notices. Where Sent

All notices required to be given the Company and any statement in writing required to be furnished the Company shall be addressed to it at 400 Second Avenue South, Minneapolis, Minnesota 55401, (612) 371-1111.

10. Arbitration

Unless prohibited by applicable law, either the Company or the insured may demand arbitration pursuant to the Title Insurance Arbitration Rules of the American Arbitration Association.

ANTI-FRAUD STATEMENT: Pursuant to CRS 10-1-128(6)(a), it is unlawful to knowingly provide false, incomplete or misleading facts or information to an insurance company for the purpose of defrauding or attempting to defraud the company. Penalties may include imprisonment, fines, denial of insurance and civil damages. Any insurance company or agent of an insurance company who knowingly provides false, incomplete, or misleading facts or information to a policyholder or claimant for the purpose of defrauding or attempting to defraud the policyholder or claimant with regard to a settlement or award payable from insurance proceeds shall be reported to the Colorado division of insurance within the department of regulatory agencies.

This anti-fraud statement is affixed and made a part of this policy.

Issued through the Office of:
LAND TITLE GUARANTEE COMPANY
3033 E 1ST AVE #600
DENVER, CO 80206
303-850-4165

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
a Stock Company
400 Second Avenue South
Minneapolis, Minnesota 55401
612) 371-1111

John E. Freyer, Jr., President

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
OR

Mark Bilbrey, President

Rande Yeager, Secretary

Land Title Guarantee Company Representing

PROPERTY INFORMATION BINDER

Order Number: ABN 25158978

Policy Number: PIB25158978.2585146

Liability: $50,000.00

Fee: $500.00

Subject to the exclusions from coverage, the limits of liability and other provisions of the Conditions and Stipulations hereto annexed and made a part of this Binder,

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
a Corporation, herein called the Company,

GUARANTEES

MARATHON LAND

Herein called the Assured, against loss, not exceeding the liability amount stated above, which the assured shall sustain by reason of any incorrectness in the assurance which the Company hereby gives that, according to the public records as of April 24, 2019 at 5:00 P.M.

1. **Title to said estate or interest at the date hereof is vested in:**

   SH7 MARKETPLACE, INC., A COLORADO CORPORATION

2. **The estate or interest in the land hereinafter described or referred to covered by this Binder is:**

   A FEE SIMPLE

3. **The land referred to in this Binder is situated in the State of Colorado, County of Weld, described as follows:**

   LOT 10, VISTA RIDGE FILING NO. 14, SECOND AMENDMENT MINOR SUBDIVISION, COUNTY OF WELD, STATE OF COLORADO

4. **The following documents affect the land:**

1) EXISTING LEASES AND TENANCIES, IF ANY.

2) RESERVATIONS BY THE UNION PACIFIC RAILROAD COMPANY OF:
(1) ALL OIL, COAL AND OTHER MINERALS UNDERLYING SUBJECT PROPERTY,
(2) THE EXCLUSIVE RIGHT TO PROSPECT FOR, MINE AND REMOVE OIL, COAL AND OTHER MINERALS, AND
(3) THE RIGHT OF INGRESS AND EGRESS AND REGRESS TO PROSPECT FOR, MINE AND REMOVE OIL, COAL AND OTHER MINERALS, ALL AS CONTAINED IN DEED RECORDED JUNE 04, 1902, IN BOOK 201 AT PAGE 16.

MINERAL DEED RECORDED NOVEMBER 3, 1972 AT RECEPTION NO. 1602712 IN BOOK 681;
AND
RELINQUISHMENT AND QUIT CLAIM RECORDED AUGUST 21, 2000 AT RECEPTION NO. 2788395;
AND
SURFACE USE AGREEMENT RECORDED AUGUST 21, 2000 AT RECEPTION NO. 2788394 AND AMENDED NOVEMBER 15, 2004 AT RECEPTION NO. 3235488;
AND
REQUEST FOR NOTIFICATION RECORDED MAY 28, 2002 AT RECEPTION NO. 2954455.

3) OIL AND GAS LEASE RECORDED NOVEMBER 30, 1972 UNDER RECEPTION NO. 1602713 IN BOOK 681 AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

NOTE: EXTENSION OF THE ABOVE LEASE AS CLAIMED BY AFFIDAVIT OF PRODUCTION WAS RECORDED DECEMBER 07, 2000 UNDER RECEPTION NO. 2811882.

4) TERMS, CONDITIONS AND PROVISIONS OF CERTIFICATE OF ORGANIZATION FOR THE NORTHWEST PARKWAY PUBLIC HIGHWAY AUTHORITY RECORDED JUNE 30, 1999 AT RECEPTION NO. 2703636 AND RE-RECORDED NOVEMBER 19, 1999 AT RECEPTION NO. 2733705.

5) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN AND IMPOSED BY ORDINANCE NO. 696 RECORDED AUGUST 30, 2000 AT RECEPTION NO. 2790549.

6) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN ORDINANCE NO. 704 RECORDED AUGUST 30, 2000 AT RECEPTION NO. 2790550.

7) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN ANNEXATION AGREEMENT RECORDED SEPTEMBER 15, 2000 AT RECEPTION NO. 2793930 AND RE-RECORDED DECEMBER 8, 2000 AT RECEPTION NO. 2812291.

8) ANY TAX, LIEN, FEE, OR ASSESSMENT BY REASON OF INCLUSION OF SUBJECT PROPERTY IN THE VISTA RIDGE METROPOLITAN DISTRICT, AS EVIDENCED BY INSTRUMENT RECORDED JANUARY 08, 2001, UNDER RECEPTION NO. 2817763.

NOTICE OF RESOLUTION REGARDING THE IMPOSITION OF SYSTEM DEVELOPMENT FEES AND UNPAID FEES IN CONNECTION THEREWITH RECORDED JUNE 14, 2006 UNDER RECEPTION NO. 3396125.

NOTICES IN CONNECTION THEREWITH RECORDED MARCH 16, 2012 UNDER RECEPTION NO. 3832301; MAY 12, 2013 UNDER RECEPTION NO. 3933756; MARCH 18, 2014 UNDER RECEPTION NO. 4002991; AUGUST 20, 2014 UNDER RECEPTION NO. 4039682; AND NOVEMBER 14, 2014 UNDER RECEPTION NO. 4061805.

RESOLUTION OF THE BOARD OF DIRECTORS OF THE VISTA RIDGE METROPOLITAN DISTRICT REGARDING THE INCREASE OF SYSTEM DEVELOPMENT FEES RECORDED OCTOBER 31, 2018 UNDER RECEPTION NO. 4442712.

9) TERMS, CONDITIONS, PROVISIONS, BURDENS, OBLIGATIONS AND EASEMENTS AS SET FORTH AND GRANTED IN DEED OF AVIGATION EASEMENT RECORDED NOVEMBER 28, 2001 UNDER RECEPTION NO. 2903864.

10) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN DEVELOPMENT AGREEMENT RECORDED DECEMBER 04, 2001 AT RECEPTION NO. 2905896.

11) EASEMENTS, CONDITIONS, COVENANTS, RESTRICTIONS, RESERVATIONS AND NOTES ON THE RECORDED PLAT OF VISTA RIDGE MASTER FINAL PLAT RECORDED SEPTEMBER 6, 2001 AT RECEPTION NO. 2903870.

12) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN DEVELOPMENT PLAN RECORDED SEPTEMBER 15, 2000 AT RECEPTION NO. 2793940 AND AMENDMENT RECORDED FEBRUARY 27, 2002 AT RECEPTION NO. 2928673 AND AMENDMENT RECORDED MARCH 3, 2011 UNDER RECEPTION NO. 3753956 AND AMENDMENT RECORDED NOVEMBER 25, 2013 UNDER RECEPTION NO. 3980214.

13) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN DECLARATION OF GOLF PLAY COVENANTS RECORDED JULY 07, 2003 AT RECEPTION NO. 3080606.

14) RIGHT OF WAY EASEMENT AS GRANTED TO UNITED POWER INC. IN INSTRUMENT RECORDED APRIL 17, 2002, UNDER RECEPTION NO. 2943714.

15) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN SUBDIVISION DEVELOPMENT AGREEMENT RECORDED NOVEMBER 19, 2008 UNDER RECEPTION NO. 3590555.

16) ANNEXATION MAP RECORDED SEPTEMBER 15, 2000 UNDER RECEPTION NO. 2793937.

17) ANY TAX, LIEN, FEE, OR ASSESSMENT BY REASON OF INCLUSION OF SUBJECT PROPERTY IN THE NORTHERN COLORADO WATER CONSERVANCY DISTRICT, AS EVIDENCED BY INSTRUMENT RECORDED DECEMBER 14, 2001, UNDER RECEPTION NOS. 2908969 AND 2908971.

18) EASEMENTS, CONDITIONS, COVENANTS, RESTRICTIONS, RESERVATIONS AND NOTES ON THE PLAT OF VISTA RIDGE FILING NO 12 RECORDED NOVEMBER 19, 2008 AT RECEPTION NO. 3590554.

19) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN ORDINANCE NO. 29-2013 RECORDED NOVEMBER 25, 2013 AT RECEPTION NO. 3980215.

20) EASEMENTS, CONDITIONS, COVENANTS, RESTRICTIONS, RESERVATIONS AND NOTES ON THE PLAT OF VISTA RIDGE FLORIDA 14 RECORDED SEPTEMBER 25, 2015 UNDER RECEPTION NO. 4145401

AFFIDAVIT OF CORRECTION RECORDED MAY 02, 2017 UNDER RECEPTION NO. 4298783.

21) EASEMENTS, CONDITIONS, COVENANTS, RESTRICTIONS, RESERVATIONS AND NOTES ON THE PLAT OF VISTA RIDGE FILING NO. 12, 1ST AMENDMENT FINAL PLAT RECORDED DECEMBER 04, 2015 UNDER RECEPTION NO. 4162948.

22) REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT AS EVIDENCED BY INSTRUMENT RECORDED JULY 12, 2016 UNDER RECEPTION NO. 4218393.

23) THE EFFECT OF NOTICE, RECORDED JULY 21, 2016, UNDER RECEPTION NO. 4221172.

24) EASEMENTS, CONDITIONS, COVENANTS, RESTRICTIONS, RESERVATIONS AND NOTES ON THE PLAT OF VISTA RIDGE FILING NO. 14, SECOND AMENDMENT MINOR SUBDIVISION RECORDED NOVEMBER 10, 2016 UNDER RECEPTION NO. 4252509.

25) TERMS, CONDITIONS AND PROVISIONS OF DEVELOPMENT AGREEMENT RECORDED NOVEMBER 10, 2016 AT RECEPTION NO. 4252510.

26) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESTRICTIONS USE DECLARATION RECORDED APRIL 13, 2017 UNDER RECEPTION NO. 4293621.

27) RESTRICTIVE COVENANTS, WHICH DO NOT CONTAIN A FORFEITURE OR REVERTER CLAUSE, BUT OMITTING ANY COVENANTS OR RESTRICTIONS, IF ANY, BASED UPON RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, FAMILIAL STATUS, MARITAL STATUS, DISABILITY, HANDICAP, NATIONAL ORIGIN, ANCESTRY, OR SOURCE OF INCOME, AS SET FORTH IN APPLICABLE STATE OR FEDERAL LAWS, EXCEPT TO THE EXTENT THAT SAID COVENANT OR RESTRICTION IS PERMITTED BY APPLICABLE LAW, AS CONTAINED IN INSTRUMENT RECORDED NOVEMBER 09, 2017, UNDER RECEPTION NO. 4351357.
DECLARATION OF ADDRESS FOR FORECLOSURE NOTIFICATION IN CONNECTION THEREWITH RECORDED JANUARY 8, 2018 UNDER RECEPTION NO. 4365833.

28) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESTRICTIVE USE DECLARATION RECORDED NOVEMBER 09, 2017 UNDER RECEPTION NO. 4351358.

29) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESTRICTIVE USE DECLARATION RECORDED DECEMBER 15, 2017 UNDER RECEPTION NO. 4360708.

30) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESTRICTIVE USE DECLARATION RECORDED APRIL 04, 2018 UNDER RECEPTION NO. 4388175.

NOTE: THIS BINDER DOES NOT REFLECT THE STATUS OF TITLE TO WATER RIGHTS OR REPRESENTATION OF SAID RIGHTS, RECORDED OR NOT.

Land Title Guarantee Company Representing

PROPERTY INFORMATION BINDER

Order Number: ABN 25158978

Policy Number: PIB25158978.2585146

NOTE: THIS BINDER IS NOT A REPORT OR REPRESENTATION AS TO MINERAL INTERESTS, AND SHOULD NOT BE USED, OR RELIED UPON, IN CONNECTION WITH THE NOTICE REQUIREMENTS THAT ARE SET FORTH IN CRS 24-65.5-103.

NOTE: ADDITIONAL UPDATES TO THE EFFECTIVE DATE OF THE BINDER MAY BE REQUESTED BY THE PROPOSED INSURED AT THE COST OF $125 PER UPDATE. FOR EACH UPDATE PROVIDED, A REVISED BINDER WILL BE ISSUED SHOWING A NEW EFFECTIVE DATE AND ANY MATTERS RECORDED SINCE THE EFFECTIVE DATE OF THE PREVIOUS BINDER.

ALTA/NSPS LAND TITLE SURVEY

LOT 10A OF VISTA RIDGE FILING NO. 14, SECOND AMENDMENT MINOR SUBDIVISION
BEING A PART OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6th P.M.,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO

LEGAL DESCRIPTION:

PARCEL A

LOT 10A, VISTA RIDGE FILING NO. 14, FIFTH AMENDMENT MINOR SUBDIVISION, COUNTY OF WELD, STATE OF COLORADO.

PARCEL B

NON–EXCLUSIVE EASEMENTS FOR VEHICULAR AND PEDESTRIAN ACCESS ACROSS ROADS AND SIDEWALKS FOR USE OF COMMON UTILITY FACILITIES AND FOR USE OF THE COMMON AREAS FOR THE PURPOSES DESIGNATED, ALL AS MORE FULLY DEFINED AND DESCRIBED IN AMENDED AND RESTATED DECLARATION OF COVENANTS, CONDITIONS, RESTRICTIONS AND EASEMENTS RECORDED NOVEMBER 9, 2017 UNDER RECEPTION NO. 4351357, COUNTY OF WELD, STATE OF COLORADO.

PARCEL C

NON–EXCLUSIVE EASEMENTS FOR ACCESS MORE FULLY DEFINED AND DESCRIBED IN RECIPROCAL EASEMENT AND RESTRICTION AGREEMENT RECORDED SEPTEMBER 25, 2015 UNDER RECEPTION NO. 4145406, COUNTY OF WELD, STATE OF COLORADO. (SEE SURVEYOR NOTE 16 HEREON).

SCHEDULE B–2 TITLE EXCEPTION NOTES:

BASED ON A REVIEW OF THE TITLE COMMITMENT AS NOTED HEREON, THE FOLLOWING SCHEDULE B–2 EXCEPTIONS ARE NOTED WITH SURVEYOR COMMENTS IN AN *ITALIC TEXT STYLE*:

EXCEPTIONS NUMBERED 1 THROUGH 8 WERE NOT ADDRESSED BY CVL CONSULTANTS OF COLORADO, INC.

9. RESERVATIONS BY THE UNION PACIFIC RAILROAD COMPANY OF:
(1)ALL OIL, COAL AND OTHER MINERALS UNDERLYING SUBJECT PROPERTY,
(2)THE EXCLUSIVE RIGHT TO PROSPECT FOR, MINE AND REMOVE OIL, COAL AND OTHER MINERALS, AND
(3)THE RIGHT OF INGRESS AND EGRESS AND REGRESS TO PROSPECT FOR, MINE AND REMOVE OIL, COAL AND OTHER MINERALS, ALL AS CONTAINED IN DEED RECORDED JUNE 04, 1902, IN BOOK 201 AT PAGE 16.
MINERAL DEED RECORDED NOVEMBER 3, 1972 AT RECEPTION NO. 1602712 IN BOOK 681;
AND RELINQUISHMENT AND QUIT CLAIM RECORDED AUGUST 21, 2000 AT RECEPTION NO. 2788395;
AND SURFACE USE AGREEMENT RECORDED AUGUST 21, 2000 AT RECEPTION NO. 2788394 AND AMENDED NOVEMBER 15, 2004 AT RECEPTION NO. 3235488;
AND
REQUEST FOR NOTIFICATION RECORDED MAY 28, 2002 AT RECEPTION NO. 2954455.
NOTE: ALL DOCUMENTS AFFECT SUBJECTS PROPERTY - NOT PLOTTABLE

10. OIL AND GAS LEASE RECORDED NOVEMBER 30, 1972 UNDER RECEPTION NO. 1602713 IN BOOK 681 AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: EXTENSION OF THE ABOVE LEASE AS CLAIMED BY AFFIDAVIT OF PRODUCTION WAS RECORDED DECEMBER 07, 2000 UNDER RECEPTION NO. 2811882.
    NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

11. TERMS, CONDITIONS AND PROVISIONS OF CERTIFICATE OF ORGANIZATION FOR THE NORTHWEST. PARKWAY PUBLIC HIGHWAY AUTHORITY RECORDED JUNE 30, 1999 AT RECEPTION NO. 2703636 AND RE–RECORDED NOVEMBER 19, 1999 AT RECEPTION NO. 2733705.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

12. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN AND IMPOSED BY ORDINANCE NO. 696 RECORDED AUGUST 30, 2000 AT RECEPTION NO. 2790549 AND NOT IN CONFLICT WITH ORDINANCE NO. 29–2013 RECORDED NOVEMBER 25, 2013 AT RECEPTION NO. 3980215.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

13. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN ORDINANCE NO. 704 RECORDED AUGUST 30, 2000 AT RECEPTION NO. 2790550 AND NOT IN CONFLICT WITH ORDINANCE NO. 29–2013 RECORDED NOVEMBER 25, 2013 AT RECEPTION NO. 3980215.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

14. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN ANNEXATION AGREEMENT RECORDED SEPTEMBER 15, 2000 AT RECEPTION NO. 2793930 AND RE–RECORDED DECEMBER 8, 2000 AT RECEPTION NO. 2812291.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

15. ANY TAX, LIEN, FEE, OR ASSESSMENT BY REASON OF INCLUSION OF SUBJECT PROPERTY IN THE VISTA RIDGE METROPOLITAN DISTRICT, AS EVIDENCED BY INSTRUMENT RECORDED JANUARY 08, 2001, UNDER RECEPTION NO. 2817763.

    NOTICE OF RESOLUTION REGARDING THE IMPOSITION OF SYSTEM DEVELOPMENT FEES AND UNPAID FEES IN CONNECTION THEREWITH RECORDED JUNE 14, 2006 UNDER RECEPTION NO. 3396125.

    NOTICES IN CONNECTION THEREWITH RECORDED MARCH 16, 2012 UNDER RECEPTION NO. 3832301; MAY 12, 2013 UNDER RECEPTION NO. 3933756; MARCH 18, 2014 UNDER RECEPTION NO. 4002991; AUGUST 20, 2014 UNDER RECEPTION NO. 4039682; AND NOVEMBER 14, 2014 UNDER RECEPTION NO. 4061805, AND JULY 21, 2016 UNDER RECEPTION NO. 4221172.
    NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

16. TERMS, CONDITIONS, PROVISIONS, BURDENS, OBLIGATIONS AND EASEMENTS AS SET FORTH AND GRANTED IN DEED OF AVIGATION EASEMENT RECORDED NOVEMBER 28, 2001 UNDER RECEPTION NO. 2903864.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

17. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN DEVELOPMENT AGREEMENT RECORDED DECEMBER 04, 2001 AT RECEPTION NO. 2905896.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

18. EASEMENTS, CONDITIONS, COVENANTS, RESTRICTIONS, RESERVATIONS AND NOTES ON THE RECORDED PLAT OF VISTA RIDGE MASTER FINAL PLAT RECORDED SEPTEMBER 6, 2001 AT RECEPTION NO. 2903870.
NOTE: AFFECTS SUBJECTS PROPERTY - EASEMENTS FROM MASTER FINAL PLAT DO NOT LIE WITHIN SUBJECT PROPERTY

19. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN DEVELOPMENT PLAN RECORDED SEPTEMBER 15, 2000 AT RECEPTION NO. 2793940 AND AMENDMENT RECORDED FEBRUARY 27, 2002 AT RECEPTION NO. 2928673 AND AMENDMENT RECORDED MARCH 3, 2011 UNDER RECEPTION NO. 3753956 AND AMENDMENT RECORDED NOVEMBER 25, 2013 UNDER RECEPTION NO. 3980214.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

20. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN DECLARATION OF GOLF PLAY COVENANTS RECORDED JULY 07, 2003 AT RECEPTION NO. 3080606.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

21. RIGHT OF WAY EASEMENT AS GRANTED TO UNITED POWER INC. IN INSTRUMENT RECORDED APRIL 17, 2002, UNDER RECEPTION NO. 2943714.
NOTE: AFFECTS SUBJECTS PROPERTY - EASEMENT GRANTED IS FOR OTHER PROPERTY ADJACENT TO VISTA PARKWAY ON MOUNTAIN VIEW BLVD

22. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN SUBDIVISION DEVELOPMENT AGREEMENT RECORDED NOVEMBER 19, 2008 UNDER RECEPTION NO. 3590555.
NOTE:AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

23. ANNEXATION MAP RECORDED SEPTEMBER 15, 2000 UNDER RECEPTION NO. 2793937.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

24. ANY TAX, LIEN, FEE, OR ASSESSMENT BY REASON OF INCLUSION OF SUBJECT PROPERTY IN THE NORTHERN COLORADO WATER CONSERVANCY DISTRICT, AS EVIDENCED BY INSTRUMENT RECORDED DECEMBER 14, 2001, UNDER RECEPTION NOS. 2908969 AND 2908971.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

25. (THIS ITEM WAS INTENTIONALLY DELETED)

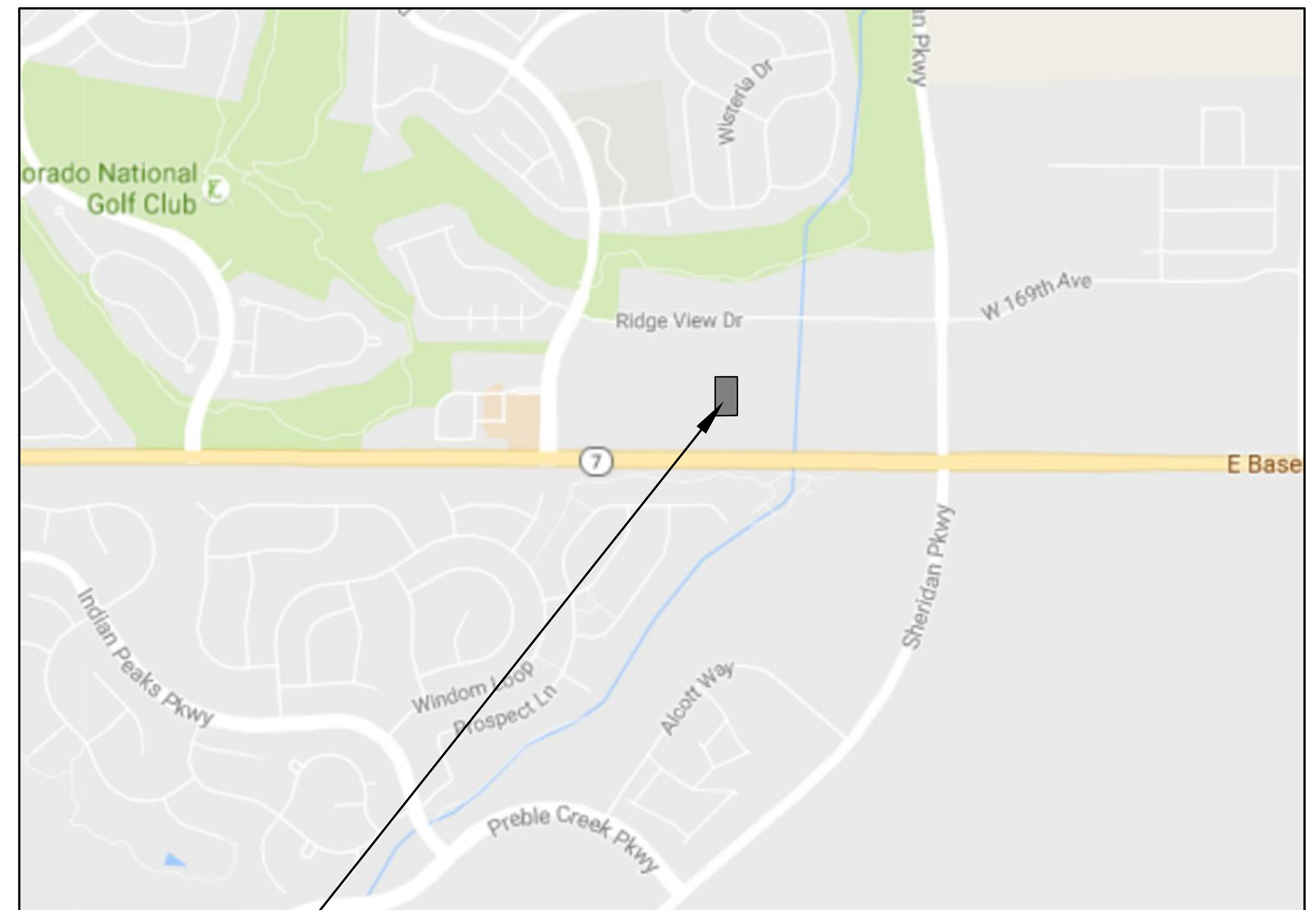
26. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN ORDINANCE NO. 29–2013 RECORDED NOVEMBER 25, 2013 AT RECEPTION NO. 3980215.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

27. (THIS ITEM WAS INTENTIONALLY DELETED)

28. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT AS EVIDENCED BY INSTRUMENT RECORDED JULY 12, 2016 UNDER RECEPTION NO. 4218393.
NOTE:AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

29. (THIS ITEM WAS INTENTIONALLY DELETED)

30. EASEMENTS, CONDITIONS, COVENANTS, RESTRICTIONS, RESERVATIONS AND NOTES ON THE PLAT OF VISTA RIDGE FILING NO. 14, SECOND AMENDMENT MINOR SUBDIVISION RECORDED NOVEMBER 10, 2016 UNDER RECEPTION NO. 4252509.
NOTE: AFFECTS SUBJECTS PROPERTY - AS SHOWN



PROPERTY LOCATION

VICINITY MAP
SCALE: 1" = 1000'

SCHEDULE B–2 TITLE EXCEPTION NOTES: (CONTINUED)

31. TERMS, CONDITIONS AND PROVISIONS OF DEVELOPMENT AGREEMENT RECORDED NOVEMBER 10, 2016 AT RECEPTION NO. 4252510.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

32. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESTRICTIONS USE DECLARATION RECORDED APRIL 13, 2017 UNDER RECEPTION NO. 4293621.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

33. RESTRICTIVE COVENANTS, WHICH DO NOT CONTAIN A FORFEITURE OR REVERTER CLAUSE, BUT OMITTING ANY COVENANTS OR RESTRICTIONS, IF ANY, BASED UPON RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, FAMILIAL STATUS, MARITAL STATUS, DISABILITY, HANDICAP, NATIONAL ORIGIN, ANCESTRY, OR SOURCE OF INCOME, AS SET FORTH IN APPLICABLE STATE OR FEDERAL LAWS, EXCEPT TO THE EXTENT THAT SAID COVENANT OR RESTRICTION IS PERMITTED BY APPLICABLE LAW, AS CONTAINED IN INSTRUMENT RECORDED NOVEMBER 09, 2017, UNDER RECEPTION NO. 4351357.
NOTE: AFFECTS SUBJECTS PROPERTY - AS SHOWN

34. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESTRICTIVE USE DECLARATION RECORDED NOVEMBER 09, 2017 UNDER RECEPTION NO. 4351358.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

35. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESTRICTIVE USE DECLARATION RECORDED DECEMBER 15, 2017 UNDER RECEPTION NO. 4360708.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

36. TERMS, CONDITIONS AND PROVISIONS CONTAINED IN RECIPROCAL EASEMENT AND RESTRICTION AGREEMENT RECORDED SEPTEMBER 25, 2015 UNDER RECEPTION NO. 4145406.
NOTE: AFFECTS SUBJECTS PROPERTY - AS SHOWN (SEE SURVEYOR NOTE 16 HEREON)

37. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESTRICTIVE USE DECLARATION RECORDED APRIL 04, 2018 UNDER RECEPTION NO. 4388175.
NOTE: AFFECTS SUBJECTS PROPERTY - NOT PLOTTABLE

38. ANY FACTS, RIGHTS, INTERESTS OR CLAIMS WHICH MAY EXIST OR ARISE BY REASON OF THE FOLLOWING FACTS SHOWN ON ALTA/NSPS LAND TITLE SURVEY CERTIFIED APRIL 02, 2018 PREPARED BY CVL CONSULTANTS OF COLORADO, INC., JOB #8130287201

    SAID DOCUMENT STORED AS OUR IMAGE 8394734

A. SOUTHWEST CORNER RETAINING WALL FOR THE STAIRS EXTENDS OUTSIDE OF THE WALL EASEMENT
B. WOODEN GUARD RAIL ENCROACHES ONTO SUBJECT PROPERTY
C. FENCE LINE IS NOT COINCIDENT WITH PROPERTY LINE
NOTE: AFFECTS SUBJECTS PROPERTY - THIS SURVEY IS AN UPDATE TO SAID ALTA SURVEY

SURVEYOR NOTES:

1. THE ADDRESS OF THE SUBJECT PROPERTY IS NOT DISCLOSED IN PUBLIC DOCUMENTS AND WAS NOT OBSERVED WHILE CONDUCTING THIS SURVEY. (ALTA/NSPS TABLE–A #2)

2. THE PROPERTY HAS DIRECT ACCESS TO THE SOUTH WITHIN TRACT A OF VISTA RIDGE FILING NO. 14, SECOND AMENDMENT MINOR SUBDIVISION. TRACT A IS A DEDICATED ACCESS & UTILITY TRACT. THE PROPERTY DOES NOT HAVE DIRECT ACCESS TO STATE HIGHWAY 7 (E. BASELINE ROAD).

3. THE PROPERTY IS LOCATED WITHIN FLOOD HAZARD AREAS HAVING ZONE DESIGNATION "X" BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA), ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 08013C0444J, EFFECTIVE DECEMBER 18, 2012.
ZONE "X" IS DEFINED AS BEING "AREAS OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN" (ALTA/NSPS TABLE–A #3)

4. THE GROSS LAND AREA OF THE SUBJECT PROPERTY IS 40,017 SQUARE FEET (0.919 ACRES), MORE OR LESS.
(ALTA/NSPS TABLE–A #4)

5. TOPOGRAPHY IS BASED ON FIELD SURVEY CONDUCTED ON THE GROUND AND PERFORMED MARCH 15, 16 AND 17, 2018. CONTOURS ARE BASED UPON BROOMFIELD CONTROL POINT "LUCY", WHICH IS A BROOMFIELD DISK ON A #5 REBAR. CONTROL POINT "LUCY" IS IDENTIFIED BY AN ORANGE WITNESS POST AND LOCATED ON THE SOUTH SIDE OF STATE HIGHWAY 7, APPROXIMATELY 1.8 MILES WEST OF INTERSTATE 25, HAVING A PUBLISHED ELEVATION OF 5297.00 FEET, NAVD 88 DATUM.
(ALTA/NSPS TABLE–A #5)

6. IN ACCORDANCE WITH A MEMO FROM THE TOWN OF ERIE DATED APRIL 13, 2018, THE SUBJECT PROPERTY IS ZONED PLANNED DEVELOPMENT (PD) AND IS LOCATED WITHIN THE VISTA RIDGE PLANNED DEVELOPMENT, PLANNING AREA 7–3, COMMERCIAL. THE DEVELOPMENT PLAN WAS LAST REVISED WITH AMENDMENT No. 6, APPROVED NOVEMBER 12, 2013. (ALTA/NSPS TABLE–A #6A)

7. SUBSTANTIAL FEATURES OBSERVED IN THE PROCESS OF CONDUCTING THIS SURVEY ARE SHOWN ON SHEET 2.
(ALTA/NSPS TABLE–A #8)

8. ONLY IMPROVEMENTS AND UTILITIES WHICH WERE VISIBLE ABOVE GROUND AT THE TIME OF THE SURVEY AND THROUGH A NORMAL SEARCH OF THE PROPERTY ARE SHOWN ON THIS SURVEY. (ALTA/NSPS TABLE–A #11)

9. ADJACENT PROPERTY OWNERSHIPS ARE AS SHOWN.
(ALTA/NSPS TABLE–A #13)

10. RECENT EARTH MOVING WORK WAS OBSERVED DURING JULY, 2016 AND MAY 24, 2017, NO BUILDING CONSTRUCTION, OR BUILDING ADDITIONS WERE OBSERVED IN THE PROCESS OF CONDUCTING THIS SURVEY.
(ALTA/NSPS TABLE–A #16)

11. THERE ARE NO ENCROACHMENTS ONTO ADJOINING PREMISES, STREETS OR ALLEYS BY ANY BUILDINGS, STRUCTURES OR OTHER IMPROVEMENTS LOCATED ON THE PROPERTY, AND NO ENCROACHMENTS ONTO THE PROPERTY BY BUILDINGS, STRUCTURES OR OTHER IMPROVEMENTS SITUATED ON ADJOINING PREMISES EXCEPT AS SHOWN HEREON.

12. 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.

13. ANY PERSON WHO KNOWINGLY REMOVES, ALTERS OR DEFACES ANY PUBLIC LAND SURVEY MONUMENT OR LAND BOUNDARY MONUMENT OR ACCESSORY, COMMITS A CLASS TWO (2) MISDEMEANOR PURSUANT TO STATE STATUTE 18–4–508, C.R.S.

14. TRACT A IS DEDICATED BY VISTA RIDGE NO. 14, SECOND AMENDMENT MINOR SUBDIVISION FOR ACCESS AND UTILITY EASEMENT.

    THE AMENDED AND RESTATED DECLARATION OF COVENANTS, CONDITIONS, RESTRICTIONS AND EASEMENTS FOR VISTA RIDGE FILING NO. 14 RECORDED AT RECEPTION NO. 4351357 (PARCEL B HEREON) GRANTS ACCESS, UTILITY, COMMON DRIVEWAY, DRAINAGE, AND ASSOCIATION EASEMENTS ACROSS TRACT A.

15. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY CVL CONSULTANTS OF COLORADO, INC. TO DETERMINE OWNERSHIP OR EASEMENTS OF RECORD. FOR ALL INFORMATION REGARDING EASEMENTS, RIGHTS–OF–WAY, AND TITLE OF RECORD, CVL CONSULTANTS OF COLORADO, INC. RELIED UPON LAND TITLE GUARANTEE COMPANY ORDER NO. ABN25156126–8 WITH AN EFFECTIVE DATE OF OCTOBER 04, 2018 AT 5:00:00 P.M.

16. THE ADJOINER ACCESS DESCRIBED IN THE RECIPROCAL EASEMENT AND RESTRICTION AGREEMENT RECORDED AT RECEPTION NO. 4145406 (PARCEL C AND B–2 EXCEPTION ITEM #36 OF THIS SURVEY) IS SHOWN GRAPHICALLY ONLY. SAID DOCUMENT CONTAINS A GRAPHIC DEPICTION OF THE ACCESS ON A REDUCED SCALE DRAWING AND DOES NOT GIVE SPECIFIC LOCATION OR DIMENSIONS OF THE ACCESS.

17. THIS PLAT WAS PREPARED FOR THE EXCLUSIVE USE OF THE PERSON(S) OR ENTITY(S) NAMED IN THE CERTIFICATE HEREON. SAID CERTIFICATE DOES NOT EXTEND TO ANY UNNAMED PERSON(S) OR ENTITY(S) WITHOUT AN EXPRESS RECERTIFICATION BY THE SURVEYOR NAMING SAID PERSON(S) OR ENTITY(S).

18. THE LINEAL UNIT USED IN THE PREPARATION OF THIS PLAT IS THE U.S. SURVEY FOOT AS DEFINED BY THE UNITED STATES DEPARTMENT OF COMMERCE, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.

19. BASIS OF BEARINGS: BEARINGS ARE BASED ON THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST. BEING MONUMENTED ON THE SOUTH BY A #6 REBAR AND CAP IN A RANGE BOX AND ON THE NORTH BY A 2.5" ALUMINUM CAP STAMPED PLS # 24302 AND IS CONSIDERED TO BEAR N00° 12'01"W.

20. PROPOSED SITE FEATURES AND UTILITIES ARE BASED UPON THE CIVIL CONSTRUCTION DRAWINGS PREPARED BY GALLOWAY AND REVISED ON OCTOBER 19, 2016.

21. DATE OF FIELD WORK: MARCH 15, 16 AND 17, 2018.

AREAS OF CONCERN:

THE FOLLOWING MATTERS, WHICH MAY AFFECT THE STATUS OF TITLE TO THE SURVEYED PROPERTY, ARE NOTED BY CVL CONSULTANTS OF COLORADO, INC. FOR THE BENEFIT OF THE PARTY REQUESTING THE SURVEY. CVL CONSULTANTS OF COLORADO, INC. AND THE SURVEYOR OF RECORD DO NOT WARRANT OR REPRESENT THAT ALL MATTERS THAT MAY AFFECT TITLE ARE NOTED BELOW. THE NUMBERS IN THE FOLLOWING COMMENTS CORRESPOND TO THE NUMBERS SHOWN ON OUR LAND SURVEY PLAT.

1. THE RETAINING WALL FOR THE STAIRS EXTENDED OUTSIDE OF THE 10' WALL EASEMENT.

2. THE 1–RAIL WOODEN GUARD RAIL EXTENDS OUT OF TRACT A AND INTO SUBJECTS PROPERTY AS SHOWN.

SURVEYOR'S CERTIFICATE

TO BPCO PROPERTIES, LLC, A COLORADO LIMITED LIABILITY COMPANY; **TO** SH7 MARKETPLACE, INC., A COLORADO CORPORATION; **TO** BRAKES PLUS, LLC, A DELAWARE LIMITED LIABILITY COMAPANY; **AND TO** LAND TITLE GUARANTEE COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 6A, 8, 11, 13, 14, 16, AND 20, OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON MARCH 17, 2018.

DATE OF PLAT OR MAP: OCTOBER 10, 2018

____

WILLIAM F. HESSELBACH, JR., P.L.S. NO. 25369
FOR AND ON BEHALF OF
CVL CONSULTANTS OF COLORADO, INC.

No.	Revisions	Date	Init.	Appr.	Date
4	Revised title	10/10/18	MJP	WFH	10/10/18
3	Revised title	4/24/18	MJP	WFH	4/24/18
2	New Title	4/24/18	MJP	WFH	4/24/18
1	Title	3/21/18	MJP	WFH	3/21/18

CVL CONSULTANTS
10333 E. Dry Creek Rd.
Suite 240
Englewood, CO 80112
Tel: (720) 482-9526
Fax: (720) 482-9546

SCALE: AS SHOWN	DRAWN BY: MJP	SHEET NO: 1
FILE NO: 8130287201	CHECKED BY: WFH	
	DATE: 10/10/2018	

ALTA/NSPS LAND TITLE SURVEY

LOT 10A OF VISTA RIDGE FILING NO. 14, SECOND AMENDMENT MINOR SUBDIVISION
BEING A PART OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6th P.M.,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO

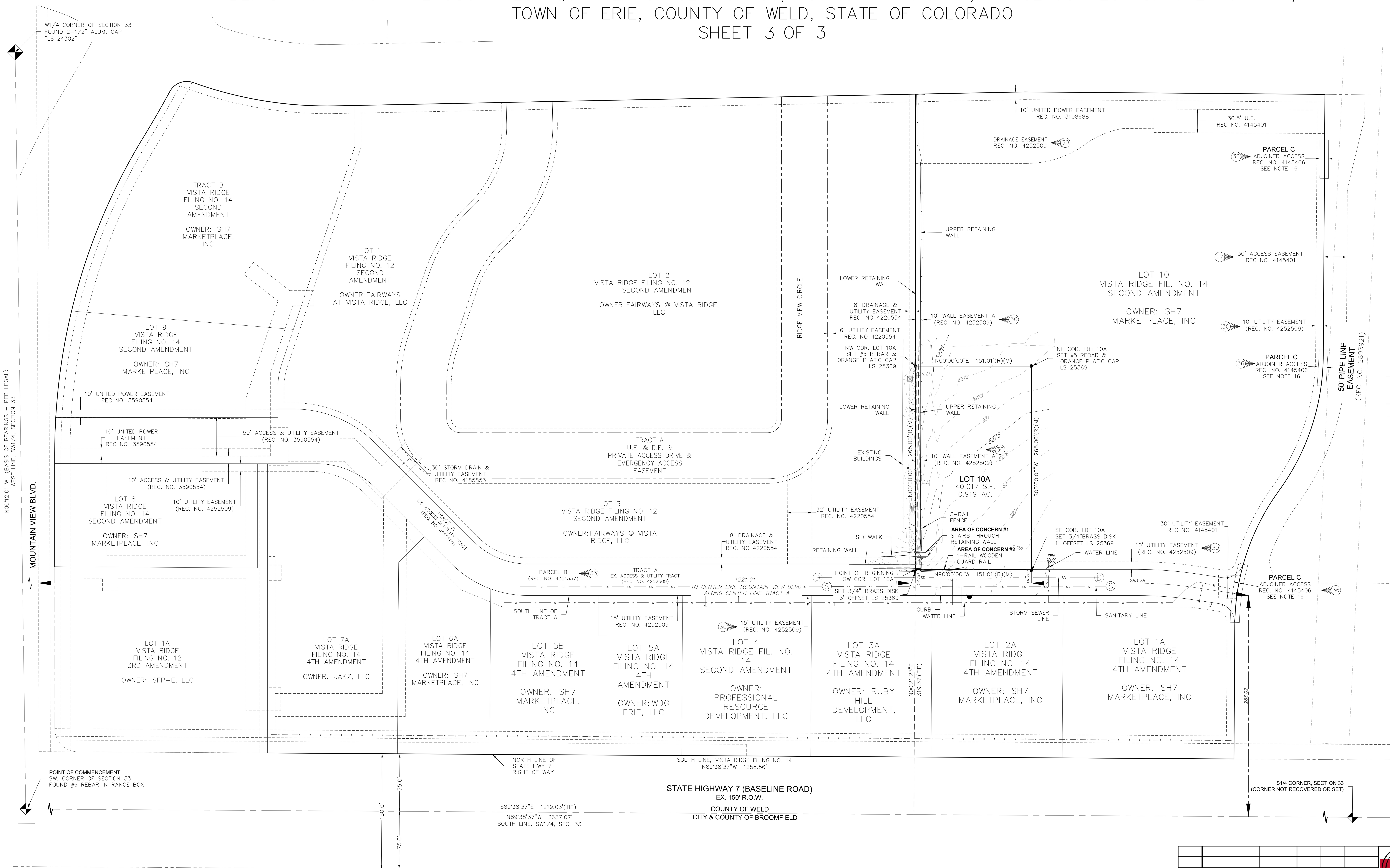
CVL CONSULTANTS
10333 E. Dry Creek Rd.
Suite 240
Englewood, CO 80112
Tel: (720) 482-9526
Fax: (720) 482-9546

No.	Revisions	Date	Init.	Appr.	Date
4	Revised title	10/10/18	MJP	WFH	10/10/18
3	Revised title	4/24/18	MJP	WFH	4/24/18
2	New Title	4/24/18	MJP	WFH	4/24/18
1	Title	3/21/18	MJP	WFH	3/21/18

SCALE: AS SHOWN
FILE NO: 8130287201
DRAWN BY: MJP
CHECKED BY: WFH
DATE: 10/10/2018
SHEET NO: 2

ALTA/NSPS LAND TITLE SURVEY

LOT 10A OF VISTA RIDGE FILING NO. 14, SECOND AMENDMENT MINOR SUBDIVISION
BEING A PART OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6th P.M.,
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
SHEET 3 OF 3



LEGEND

- FOUND SECTION CORNER (AS NOTED)
- FOUND PROPERTY MONUMENT (AS NOTED)
- SET PROPERTY MONUMENT (AS NOTED)
- EX. EXISTING
- R.O.W. RIGHT OF WAY
- (M) MEASURED
- (R) RECORDED
- (X) TITLE B-2 EXCEPTION IDENTIFIER
- —W— WATER LINE
- —SD— STORM SEWER LINE
- —SS— SANITARY LINE
- —X— EXISTING FENCE
- WATER VALVE
- WATER METER
- IRRIGATION
- ELECTRIC PEDESTAL
- FIBER PEDESTAL
- STORM MANHOLE
- FIRE HYDRANT
- SIGN

60 30 0 60 120

SCALE: 1" = 60'

CVL CONSULTANTS

10333 E. Dry Creek Rd.
Suite 240
Englewood, CO 80112
Tel: (720) 482-9526
Fax: (720) 482-9546

No.	Revisions	Date	Init.	Appr.	Date
4	Revised title	10/10/18	MJP	WFH	10/10/18
3	Revised title	4/24/18	MJP	WFH	4/24/18
2	New Title	4/24/18	MJP	WFH	4/24/18
1	Title	3/21/18	MJP	WFH	3/21/18

SCALE: AS SHOWN
FILE NO: 8130287201
DRAWN BY: MJP
CHECKED BY: WFH
DATE: 10/10/2018
SHEET NO: 3

Galloway

UTILITY COMPLIANCE LETTER

VISTA RIDGE FILING NO. 14, 5TH AMENDMENT

Erie, Colorado

PREPARED FOR:
State Highway 7 Marketplace
9750 W. Cambridge Place
Littleton, CO 80127
Attn: James Spehalski

PREPARED BY:
Galloway & Company, Inc.
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80126

DATE:
November 9, 2018

TABLE OF CONTENTS

Engineer's statement

The enclosed Utility Compliance Letter and exhibits were prepared by me, or under my direct supervision, and are correct to the best of my knowledge and belief. Said Utility Compliance Letter has been prepared in accordance with applicable Town of Erie criteria. I accept responsibility for any liability caused by negligent acts, errors or omissions on my part in preparing this report.

Philip Dalrymple, PE
Colorado Registered Professional Engineer

I. Introduction

This final utility report has been prepared by Galloway & Company, Inc. for the Vista Ridge Commercial West development which is located at the NEC of Mountain View Boulevard & Hwy 7 located in the SW ¼ of Section 33, Township 1 North, Range 68 West, of the 6th Principal Meridian, Town of Erie, County of Weld, State of Colorado. The site is bounded by Ridge View Drive to the north, an existing multi-family residential development to the west, Marketplace Drive to the south, and a private roadway and King Soopers to the east.

The site will include multiple pad sites within site. The total site area is approximately 7.31 acres. The development will be served by two major access points, one along Marketplace Drive to the south, and future connections along the private roadway between the site and the proposed King Soopers. The project includes associated infrastructure improvements, water, sanitary sewer, and storm sewer improvements.

Project location map

NOT TO SCALE

II. Existing Utility Infrastructure

Water

The site will utilize existing water line stubs to serve the site. There is an existing 8" public water main which runs along Marketplace Drive, with an 8" stub into the southern edge of the site. There is an existing 12" public water main in Ridgeview Drive which this site will connect to for a water line loop for the site.

Sanitary Sewer

The proposed sanitary sewer will utilize the existing 8" sanitary sewer main which crosses the northeast corner of the site and outfalls into Ridgeview Drive and heads west towards Mountain View Blvd. Capacity calculations for the existing main have been provided and can be found in Appendix C.

III. Proposed Utility Infrastructure

Proposed Water

The proposed water infrastructure will be designed to accommodate the proposed lots within the project. Service sizes for the future buildings are currently unknown, as the end users for the pad sites have not been determined. Table 1 below identifies the proposed lot area for each pad site, and the proposed use.

One water line loop with two connection points is planned to serve the project's water demands. The Town of Erie Specifications (Ref. 1) states that the jurisdiction prefers PVC pipe for all water mains 12" or less.

The proposed loop is to be an 8" PVC. The proposed loop will connect to the existing 8" stub connected to the 8" water main which runs along Marketplace Drive to the south and will also connect to the existing 12" water main in Ridgeview Drive to the north. The water loop is designed to convey anticipated flows from all the pad sites, as well as anticipated fire flows.

Proposed Sanitary

The proposed sanitary infrastructure will be designed to accommodate all the pad sites within the project. Service sizes for the future buildings are currently unknown, as the end users for the pad sites have not been determined. Table 1 below identifies the proposed lot area for each pad site, and the proposed use.

The site will utilize the existing 8" sanitary sewer main which crosses the northeast corner of the site and outfalls into Ridgeview Drive and heads west towards Mountain View Blvd. The original utility report for Vista Ridge Filing No. 14 2nd Amendment contemplated sanitary flows from Lot 10 heading west in the sanitary main in Marketplace Drive. However, since that report, and due to the proposed site layout and grading design, sanitary flows from the site will drain north towards the existing sanitary sewer main at the northeast corner of the site. Capacity calculations for the existing main in Ridgeview Drive have been provided and can be found in Appendix C.

Table 1: Proposed Lot Size

Lot	Lot Size	Use
10	0.92 Ac	Commercial/Retail
11	0.99 Ac	Commercial/Retail
12*	4.84 Ac.	Commercial/Retail

*Lot 12 assumes a developable area of 4.84 acres instead of 5.40 acres (total area minus the existing detention pond).

IV. Utility System Design Criteria

Water

The water system was designed and analyzed using the Town of Erie Design Specifications (Ref. 1). Demands for the project were obtained using criteria stated below. The calculations for the site can be found in Appendix A.

- Average Daily Demand (AD) = (6.75 acre) x (1651 GPD/acre for commercial development)
  = 12,069 GPD
  = 7.74 gpm
- Max Day Demand =AD x Max Day Factor
  =7.74 gpm x 2.0
  = 15.48 gpm
- Max Hour Demand =AD x Max Hour Factor
  =AD x 3.00
  = 23.22 gpm

*Lot 12 assumes a developable area of 4.84 acres instead of 5.40 acres (total area minus the existing detention pond).

The proposed water main was designed using the following constraints:

- Average Daily – 43 psi Minimum Static Pressure, 125 psi Maximum
- Max Day Demand – 43 psi Minimum Static Pressure
- Max Hour Demand – 20 psi Residual Pressure during fire flow
- Maximum pipe velocity 10 fps, Maximum head loss for 8-12" pipe = 2 ft / 1000 ft

Fire flow requirements were obtained using the Town of Erie Design Specifications. Using these criteria, the required fire flow for the site will be 2,500 gpm. Fire Hydrants will be placed on the pad sites as they develop in the future.

Existing static pressures were obtained for a couple of locations adjacent to the site. The following pressures were obtained:

- 98.6 psi – at the intersection of Mountain View Blvd. and Ridge View Dr.
- 86.6 psi – at the intersection of Ridge View Dr. and Sheridan Pkwy.

Sanitary Sewer

The sanitary sewer system was designed and analyzed using the Town of Erie Design Specifications (Ref. 1). Demands for the project were obtained using criteria outlined in the specifications which show that for a commercial property the average day demand is 1,000 gal/acre/day. The calculations for the site can be found in Appendix A. The calculation for Lot 10C considers the developable area which is the total site area minus the existing detention facility at the NW corner of the site.

- Average Daily Demand (AD) = (6.75 acres*) x (1,000 gal/acre/day) = 7,311 GPD
  = 0.011 cfs
- Peaking Factor (PF) $=3.8/(ADF)^{0.17}$ where ADF= annual average daily flow in MGD
  PF will not be less than 2.5 or greater than 5.0
  $=3.8/(7311 \text{ GPD} \times 4.0E10^{-4})^{0.17}$
  = 3.17

- Peak Flow Demand =AD x PF
  =(0.011 cfs) x 3.17
  =0.036 cfs

*Lot 12 assumes a developable area of 4.84 acres instead of 5.40 acres (total area minus the existing detention pond).

Sewers 10” in diameter and smaller are to be designed to carry the peak design flow at a maximum flow depth of 80% of the pipe diameter. The minimum velocity at the peak design flow shall be 2 feet per second.

V. Utility Analysis and Results

WaterCAD Analysis

Bentley WaterCAD Version V8i was used to model the proposed water system. The anticipated demands used in the model can be found in Table 2. Three scenarios were modeled for analysis of the loop. Descriptions of each scenario are as follows:

Average Daily Demand – Includes average daily demands at each building/lot.

Max Day Demand – includes max day demands at each building/lot.

Max-Hour Demand + Fire Flow– includes max-hour demands at each building/lot plus the required fire flow of 2,500 gpm. The proposed system satisfies the fire flow and sprinkler requirement with a 20 psi residual pressure.

Flows from the adjacent Vista Ridge commercial site, King Soopers site, and Les Schwab site have been included in the WaterCAD model for the site. Excerpts of the King Soopers utility report, and the original utility study for the site have been included and can be found in Appendix D.

Table 2: Anticipated Water Demands by Lot

Phase	Average Daily Demand (GPM)	Max Daily Demand (GPM)	Max-Hour Demand (GPM)
Lot 10	1.06	2.11	3.17
Lot 11	1.14	2.27	3.41
Lot 12	5.55	11.10	16.65

*Lot 12 assumes a developable area of 4.84 acres instead of 5.40 acres (total area minus the existing detention pond)

WaterCAD Results

The results are summarized in this section. Refer to Appendix B for detailed results and figures. Table 6 shows that the proposed water main loop is sufficiently sized with respect to the criteria described in Table 3 with exception to the head loss requirement during Max Hour and Fire Flow. The head loss during this event does not adversely affect the operating pressure.

Table 3: Water Loop Results

Scenario	Minimum Pressure (psi)	Maximum Pressure (psi)	Maximum Velocity (fps)	Maximum Head Loss (ft/1000 ft)
Average Daily Demand	77.0 @ J-40	80.9 @ J-43	0.87 @ P-60	0
Max Day Demand	77.0 @ J-40	80.8 @ J-43	0.85 @ P-60	1 @ P-60
Max Hour Demand	76.9 @ J-40	80.8 @ J-43	0.82 @ P-60	1 @ P-60
Max Hour + Fire Flow*	72.8 @ J-40	78.6 @ J-43	9.58 @ P-64	63 @ P-64

*Fire Flow – 1250 gpm at J-41, J-42 Nodes

Sanitary Sewer Analysis

Bentley Flowmaster Version V8i was used to model the proposed sanitary system. The anticipated demands used in the model can be found in Table 4.

Table 4: Anticipated Sanitary Sewer Demands by Building/Lot

Phase	Average Day Demand (cfs)	Peak Factor	Peak Flow (cfs)
Lot 10	0.0014	4.57	0.007
Lot 11	0.0015	4.52	0.007
Lot 12*	0.0075	3.45	0.026

*Lot 12 assumes a developable area of 4.84 acres instead of 5.40 acres (total area minus the existing detention pond)

Flowmaster Results

The sanitary sewer results are summarized in this section. Refer to Appendix C for detailed results and figures. Due to constraints associated with the existing sanitary invert elevations and the site grading, the proposed sanitary sewer system is anticipated to slope at a minimum 1.0%. This is to provide the maximum depth possible to best serve the buildings and avoid utility conflicts. Theses constraints result in sanitary sewer velocities below the required 2 feet per second during peak flows leaving the site.

Calculations are included in the Appendix C that calculates the minimum and maximum peak flow through the proposed sanitary sewer system. The proposed system does not reach the maximum 80% capacity, as required by the City standards. The calculations show that the system flows at a maximum of 13.3% full.

In addition, Flowmaster calculations have been provided to show the capacity of the existing sanitary sewer main in Ridgeview Drive when the flows from the project site are added to the existing flows. The Flowmaster evaluation was calculated at the intersection of Ridgeview Drive and Mountain View Blvd., where all contributions to the existing main have been made for the contributing parcels and at the location of the flattest slope (0.41%) of the existing main. When this new flow is added to the existing pipe, the capacity at this point is 46.0%, which is less than the 80% maximum per Town of Erie Criteria. Please refer to the calculations in Appendix C.

VI. Conclusion

The proposed water infrastructure to be constructed with the Vista Ridge Commercial West project includes one water main loop. The water loop is planned to be 8” PVC connecting to existing stubs on the east and west sides of the site. The results of this study show that, according to the criteria set forth by the Town of Erie, the proposed water infrastructure is adequately sized.

The proposed sanitary sewer infrastructure is 8” PVC and sufficiently serves the project. The proposed sanitary sewer will drain to Ridgeview Drive, which has the capacity to accept these flows. The onsite sanitary sewer system is anticipated to slope at a minimum 1.0%. The minimum slopes result in the sanitary sewer system not meeting the Town’s minimum velocity requirement during peak flow.

VII. **References**

1. Standards and Specifications for Design and Construction of Public Improvements; Town of Erie, 2015 Edition.
2. International Fire Code; International Code Council, 2015
3. Final Utility Study – Vista Ridge Commercial West, Galloway & Company, Inc., July 28, 2016.

APPENDIX A

Vista Ridge Filing No. 14, 5th Amendment
Erie, CO
SH7000003.20

Potable Water Distribution System Design Criteria

Hazen Williams	100		8"-12" PIPE
Operating Pressures			
Minimum Static Pressure	43	psi	(per 612.00)
Maximum Static Pressure	125	psi	(per 612.00)
Minimum Dynamic Pressure			
Max Hr Demand + fire flow	20	psi	(per jurisdiction)
Maximum Velocities			
Maximum Pipe Velocity	10	fps	(per 619.01)
Headloss	2	ft per 1000'	(per 619.01)
Fire			
Fire Hydrant Demand	2500	gpm	
Fire Pressure Residual	20	psi	(per 611.00)
Fire Duration	2	Hr	(per IFC / Fire Dept)

Domestic Water Demand per Land Classification (per 611.00)

Land Use	Average Day	Max Day Ratio	Max Hour Ratio
Residential Multi family	140 GPCD*	2.60	3.90
Commercial	1651 GPD/Acre	2.00	3.00
Indust.	1651 GPD/Acre	1.13	3.00

*Gallons Per Capita/Day

Demand

Land Use/Building	Area (Acre)	Average Day (GPM)	Max Day (GPM)	Max Hour (GPM)
Lot 10	0.92	1.06	2.11	3.17
Lot 11	0.99	1.14	2.27	3.41
Lot 12 (5.40 Ac. Gross Incl. Pond)	4.84	5.55	11.10	16.65
Total	6.75	7.74	15.48	23.22

Vista Ridge Filing No. 14, 5th Amendment
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Sanitary Sewer Design Criteria

Manning's n	0.015	(per 714.01)
Minimum Pipe Velocity (Peak Flow)	2 fps	(per 713.00)
Maximum Pipe Velocity (Peak Flow)	10 fps	(per 713.00)
Max Flow Depth of Pipe Dia.	80 %	(per 713.00)

Sanitary Sewer Demand per Land Classification (per 712.00)

Land Use	Average Day
Residential Multi family	90 gal/capita/day
Industrial	1,500 gal/acre/day
Commercial	1,000 gal/acre/day
Park/Recreation	50 gal/acre/day
Elementary Schools	13 gal/student/day
Jr. & Sr. High School	20 gal/student/day

Demand

Land Use/Building	Area (Acre)	Average Day (GPD)	Average Day (cfs)	Peak Factor**	Peak Flow (cfs)
Lot 10A	0.92	920	0.0014	4.57	0.007
Lot 10B	0.99	990	0.0015	4.52	0.007
Lot 10C (5.40 Ac. Gross Incl. Pond)	4.84	4840	0.0075	3.45	0.026
Total	6.75	6750.00	0.0104		0.039

**PF=3.8/(ADF)^0.17 where ADF = annual average daily flow in MGD (PF will not be less than 2.5 or greater than 5.0)

Vista Ridge Filing No. 14, 5th Amendment
Erie, CO
SH7000003.20

Sanitary Sewer Design Criteria

Manning's n	0.011		(per 714.01)
Minimum Pipe Velocity (Peak Flow)	2	fps	(per 713.00)
Maximum Pipe Velocity (Peak Flow)	10	fps	(per 713.00)
Max Flow Depth of Pipe Dia.	80	%	(per 713.00)

Sanitary Sewer Demand per Land Classification (per 712.00)

Land Use	Average Day
Residential	90 gal/capita/day
Industrial	1,500 gal/acre/day
Commercial	1,000 gal/acre/day
Park/Recreation	50 gal/acre/day
Elementary Schools	13 gal/student/day
Jr. & Sr. High School	20 gal/student/day

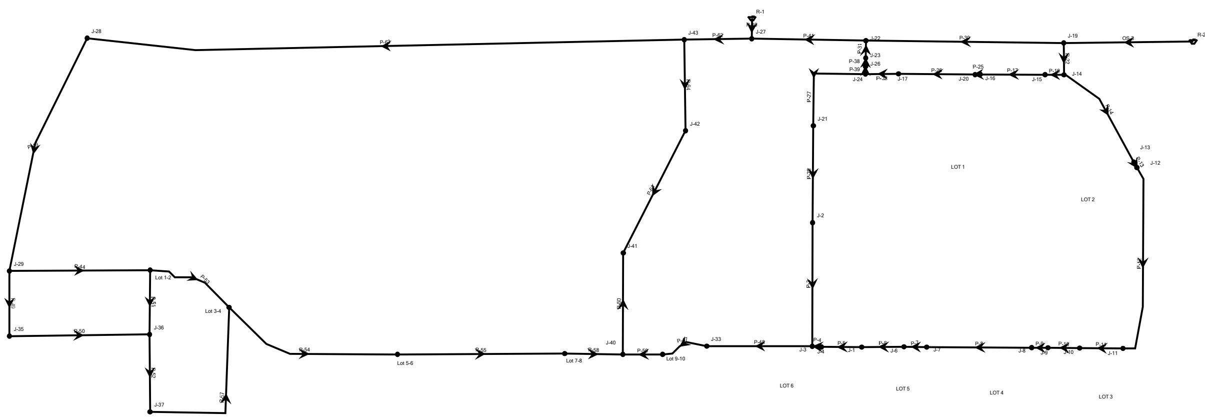
Demand

Land Use/Building	Area (Acre)	Average Day (GPD)	Average Day (cfs)	Peak Factor**	Peak Flow (cfs)
Lot 10	6.75	6750	0.0104		0.039
King Soopers	20.25	8467	0.0131	4.29	0.057
Vista Ridge Academy	400 Students	3900	0.0060	3.58	0.022
Montex South	148 Units @ 2.5/Capita/Unit	33300	0.0515	2.49	0.128
Montex North	24 Units @ 2.5/Capita/Unit	5400	0.0084	3.39	0.028
Day Care	225 Students	2925	0.0045	3.76	0.017
Total		60742.00	0.0940		0.291

**PF=3.8/(ADF)^0.17 where ADF = annual average daily flow in MGD (PF will not be less than 2.5 or greater than 5.0)

APPENDIX B

Scenario: Max Hr+FF



Scenario: Average Day
Current Time Step: 0.000Hr
FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
29	J-2	5,277.00	<None>	<Collection: 0 items>	0.00	5,460.48	79.4
31	J-3	5,280.21	<None>	<Collection: 0 items>	0.00	5,460.31	77.9
33	J-4	5,280.09	<None>	<Collection: 0 items>	0.00	5,460.32	78.0
35	J-1	5,279.30	<None>	<Collection: 1 item>	1.71	5,460.38	78.3
37	J-6	5,279.56	<None>	<Collection: 0 items>	0.00	5,460.44	78.3
39	J-7	5,279.82	<None>	<Collection: 1 item>	1.26	5,460.47	78.2
41	J-8	5,279.23	<None>	<Collection: 1 item>	1.26	5,460.63	78.5
43	J-9	5,279.04	<None>	<Collection: 0 items>	0.00	5,460.65	78.6
45	J-10	5,277.60	<None>	<Collection: 0 items>	0.00	5,460.70	79.2
47	J-11	5,275.57	<None>	<Collection: 1 item>	1.35	5,460.76	80.1
49	J-12	5,272.09	<None>	<Collection: 0 items>	0.00	5,461.06	81.8
51	J-13	5,271.89	<None>	<Collection: 1 item>	1.28	5,461.07	81.9
53	J-14	5,270.25	<None>	<Collection: 0 items>	0.00	5,461.25	82.6
56	J-15	5,271.19	<None>	<Collection: 0 items>	0.00	5,461.20	82.2
58	J-16	5,273.15	<None>	<Collection: 1 item>	1.74	5,461.01	81.3
60	J-17	5,275.55	<None>	<Collection: 0 items>	0.00	5,460.77	80.1
64	J-19	5,268.85	<None>	<Collection: 0 items>	0.00	5,461.39	83.3
75	J-20	5,273.15	<None>	<Collection: 0 items>	0.00	5,460.99	81.3
78	J-21	5,277.50	<None>	<Collection: 0 items>	0.00	5,460.61	79.2
90	J-22	5,280.41	<None>	<Collection: 0 items>	0.00	5,460.25	77.8
93	J-23	5,280.22	<None>	<Collection: 0 items>	0.00	5,460.47	78.0
95	J-24	5,276.41	<None>	<Collection: 0 items>	0.00	5,460.68	79.7
103	J-26	5,277.00	<None>	<Collection: 0 items>	0.00	5,460.61	79.4
106	J-27	5,279.30	<None>	<Collection: 0 items>	0.00	5,458.79	77.7
109	J-28	5,231.00	<None>	<Collection: 0 items>	0.00	5,458.90	98.6
111	J-29	5,240.00	<None>	<Collection: 0 items>	0.00	5,458.92	94.7
113	Lot 1-2	5,248.00	<None>	<Collection: 1 item>	1.95	5,458.93	91.3
115	Lot 5-6	5,271.98	<None>	<Collection: 1 item>	1.90	5,459.13	81.0
117	Lot 9-10	5,282.65	<None>	<Collection: 1 item>	9.43	5,459.53	76.5
119	J-33	5,283.00	<None>	<Collection: 0 items>	0.00	5,459.78	76.5
123	J-35	5,246.00	<None>	<Collection: 0 items>	0.00	5,458.93	92.1
125	J-36	5,248.00	<None>	<Collection: 0 items>	0.00	5,458.93	91.3
128	J-37	5,252.00	<None>	<Collection: 1 item>	1.74	5,458.94	89.5
130	Lot 3-4	5,257.07	<None>	<Collection: 1 item>	3.08	5,458.97	87.4
133	Lot 7-8	5,279.48	<None>	<Collection: 1 item>	1.85	5,459.29	77.8
137	J-40	5,281.36	<None>	<Collection: 0 items>	0.00	5,459.34	77.0
140	J-41	5,273.10	<None>	<Collection: 1 item>	7.74	5,459.17	80.5
142	J-42	5,272.08	<None>	<Collection: 0 items>	0.00	5,458.97	80.9
144	J-43	5,274.40	<None>	<Collection: 0 items>	0.00	5,458.83	79.8

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Scenario: Average Day
Current Time Step: 0.000Hr
FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Length (User Defined) (ft)	Zone
32	P-3	280.54	J-2	J-3	8.0	PVC	100.0	False	0.000	122.03	0.78	0.001	False	0.00	<None>
34	P-4	20.92	J-3	J-4	8.0	PVC	100.0	False	0.000	-124.08	0.79	0.001	False	0.00	<None>
36	P-5	91.65	J-4	J-1	8.0	PVC	100.0	False	0.000	-124.08	0.79	0.001	False	0.00	<None>
38	P-6	96.13	J-1	J-6	8.0	PVC	100.0	False	0.000	-125.79	0.80	0.001	False	0.00	<None>
40	P-7	51.54	J-6	J-7	8.0	PVC	100.0	False	0.000	-125.79	0.80	0.001	False	0.00	<None>
42	P-8	238.78	J-7	J-8	8.0	PVC	100.0	False	0.000	-127.05	0.81	0.001	False	0.00	<None>
44	P-9	37.20	J-8	J-9	8.0	PVC	100.0	False	0.000	-128.31	0.82	0.001	False	0.00	<None>
46	P-10	72.01	J-9	J-10	8.0	PVC	100.0	False	0.000	-128.31	0.82	0.001	False	0.00	<None>
48	P-11	98.48	J-10	J-11	8.0	PVC	100.0	False	0.000	-128.31	0.82	0.001	False	0.00	<None>
50	P-12	444.04	J-11	J-12	8.0	PVC	100.0	False	0.000	-129.66	0.83	0.001	False	0.00	<None>
52	P-13	14.27	J-12	J-13	8.0	PVC	100.0	False	0.000	-129.66	0.83	0.001	False	0.00	<None>
54	P-14	261.41	J-13	J-14	8.0	PVC	100.0	False	0.000	-130.94	0.84	0.001	False	0.00	<None>
57	P-16	42.85	J-14	J-15	12.0	PVC	100.0	False	0.000	532.57	1.51	0.001	False	0.00	<None>
59	P-17	147.54	J-15	J-16	12.0	PVC	100.0	False	0.000	532.57	1.51	0.001	False	0.00	<None>
66	OS-3	294.44	J-19	R-2	12.0	PVC	100.0	False	0.000	-1,434.72	4.07	0.008	False	0.00	<None>
67	P-22	72.24	J-19	J-14	12.0	PVC	100.0	False	0.000	663.51	1.88	0.002	False	0.00	<None>
76	P-25	11.78	J-16	J-20	12.0	PVC	100.0	False	0.000	530.83	1.51	0.001	False	0.00	<None>
77	P-26	174.16	J-20	J-17	12.0	PVC	100.0	False	0.000	530.83	1.51	0.001	False	0.00	<None>
80	P-28	220.07	J-21	J-2	8.0	PVC	100.0	False	0.000	122.03	0.78	0.001	False	0.00	<None>
92	P-30	449.91	J-22	J-19	12.0	PVC	100.0	False	0.000	-771.20	2.19	0.003	False	0.00	<None>
94	P-31	39.47	J-22	J-23	8.0	PVC	100.0	False	0.000	-408.80	2.61	0.006	False	0.00	<None>
96	P-32	75.26	J-24	J-17	12.0	PVC	100.0	False	0.000	-530.83	1.51	0.001	False	0.00	<None>
102	P-27	235.87	J-21	J-24	8.0	PVC	150.0	False	0.000	-122.03	0.78	0.000	False	0.00	<None>
104	P-38	19.35	J-23	J-26	8.0	PVC	100.0	False	0.000	-408.80	2.61	0.006	True	24.00	<None>
105	P-39	17.16	J-26	J-24	8.0	PVC	100.0	False	0.000	-408.80	2.61	0.006	True	12.30	<None>
107	P-40	45.97	R-1	J-27	12.0	PVC	100.0	False	0.000	-1,398.43	3.97	0.008	False	0.00	<None>
108	P-41	259.78	J-27	J-22	12.0	PVC	100.0	False	0.000	-1,180.01	3.35	0.006	False	0.00	<None>
112	P-43	562.05	J-28	J-29	12.0	PVC	100.0	False	0.000	-90.19	0.26	0.000	False	0.00	<None>
114	P-44	320.01	J-29	Lot 1-2	12.0	PVC	100.0	False	0.000	-69.44	0.20	0.000	False	0.00	<None>
120	P-47	111.23	Lot 9-10	J-33	8.0	PVC	100.0	False	0.000	-246.11	1.57	0.002	False	0.00	<None>
121	P-48	239.91	J-33	J-3	8.0	PVC	100.0	False	0.000	-246.11	1.57	0.002	False	0.00	<None>
124	P-49	147.81	J-29	J-35	8.0	PVC	100.0	False	0.000	-20.75	0.13	0.000	False	0.00	<None>
126	P-50	318.74	J-35	J-36	8.0	PVC	100.0	False	0.000	-20.75	0.13	0.000	False	0.00	<None>
127	P-51	145.85	J-36	Lot 1-2	8.0	PVC	100.0	False	0.000	11.74	0.07	0.000	False	0.00	<None>
129	P-52	175.83	J-36	J-37	8.0	PVC	100.0	False	0.000	-32.50	0.21	0.000	False	0.00	<None>
131	P-53	211.38	Lot 1-2	Lot 3-4	8.0	PVC	100.0	False	0.000	-59.65	0.38	0.000	False	0.00	<None>
132	P-54	421.32	Lot 3-4	Lot 5-6	8.0	PVC	100.0	False	0.000	-96.96	0.62	0.000	False	0.00	<None>
134	P-55	380.39	Lot 5-6	Lot 7-8	8.0	PVC	100.0	False	0.000	-98.86	0.63	0.000	False	0.00	<None>
136	P-57	411.27	J-37	Lot 3-4	8.0	PVC	100.0	False	0.000	-34.24	0.22	0.000	False	0.00	<None>
138	P-58	132.19	Lot 7-8	J-40	8.0	PVC	100.0	False	0.000	-100.71	0.64	0.000	False	0.00	<None>
139	P-59	90.52	J-40	Lot 9-10	8.0	PVC	100.0	False	0.000	-236.68	1.51	0.002	False	0.00	<None>
141	P-60	230.40	J-40	J-41	8.0	PVC	100.0	False	0.000	135.97	0.87	0.001	False	0.00	<None>
143	P-61	311.57	J-41	J-42	8.0	PVC	100.0	False	0.000	128.23	0.82	0.001	False	0.00	<None>
145	P-62	153.45	J-27	J-43	12.0	PVC	100.0	False	0.000	-218.42	0.62	0.000	False	0.00	<None>
146	P-63	1,359.70	J-43	J-28	12.0	PVC	100.0	False	0.000	-90.19	0.26	0.000	False	0.00	<None>
147	P-64	206.61	J-42	J-43	8.0	PVC	100.0	False	0.000	128.23	0.82	0.001	False	0.00	<None>

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Scenario: Max Hour
Current Time Step: 0.000Hr
FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
29	J-2	5,277.00	<None>	<Collection: 0 items>	0.00	5,460.37	79.3
31	J-3	5,280.21	<None>	<Collection: 0 items>	0.00	5,460.17	77.9
33	J-4	5,280.09	<None>	<Collection: 0 items>	0.00	5,460.18	77.9
35	J-1	5,279.30	<None>	<Collection: 1 item>	5.13	5,460.23	78.3
37	J-6	5,279.56	<None>	<Collection: 1 item>	3.78	5,460.30	78.2
39	J-7	5,279.82	<None>	<Collection: 0 items>	0.00	5,460.33	78.1
41	J-8	5,279.23	<None>	<Collection: 1 item>	3.78	5,460.49	78.4
43	J-9	5,279.04	<None>	<Collection: 0 items>	0.00	5,460.52	78.5
45	J-10	5,277.60	<None>	<Collection: 0 items>	0.00	5,460.57	79.2
47	J-11	5,275.57	<None>	<Collection: 1 item>	4.06	5,460.64	80.1
49	J-12	5,272.09	<None>	<Collection: 0 items>	0.00	5,460.98	81.7
51	J-13	5,271.89	<None>	<Collection: 1 item>	3.85	5,460.99	81.8
53	J-14	5,270.25	<None>	<Collection: 0 items>	0.00	5,461.19	82.6
56	J-15	5,271.19	<None>	<Collection: 0 items>	0.00	5,461.14	82.2
58	J-16	5,273.15	<None>	<Collection: 1 item>	5.22	5,460.94	81.2
60	J-17	5,275.55	<None>	<Collection: 0 items>	0.00	5,460.70	80.1
64	J-19	5,268.85	<None>	<Collection: 0 items>	0.00	5,461.34	83.3
75	J-20	5,273.15	<None>	<Collection: 0 items>	0.00	5,460.93	81.2
78	J-21	5,277.50	<None>	<Collection: 0 items>	0.00	5,460.53	79.2
90	J-22	5,280.41	<None>	<Collection: 0 items>	0.00	5,460.19	77.8
93	J-23	5,280.22	<None>	<Collection: 0 items>	0.00	5,460.41	78.0
95	J-24	5,276.41	<None>	<Collection: 0 items>	0.00	5,460.61	79.7
103	J-26	5,277.00	<None>	<Collection: 0 items>	0.00	5,460.54	79.4
106	J-27	5,279.30	<None>	<Collection: 0 items>	0.00	5,458.76	77.6
109	J-28	5,231.00	<None>	<Collection: 0 items>	0.00	5,458.80	98.6
111	J-29	5,240.00	<None>	<Collection: 0 items>	0.00	5,458.81	94.7
113	Lot 1-2	5,248.00	<None>	<Collection: 1 item>	23.85	5,458.81	91.2
115	Lot 5-6	5,271.98	<None>	<Collection: 1 item>	5.68	5,458.97	80.9
117	Lot 9-10	5,282.65	<None>	<Collection: 1 item>	28.28	5,459.34	76.4
119	J-33	5,283.00	<None>	<Collection: 0 items>	0.00	5,459.60	76.4
123	J-35	5,246.00	<None>	<Collection: 0 items>	0.00	5,458.81	92.1
125	J-36	5,248.00	<None>	<Collection: 0 items>	0.00	5,458.81	91.2
128	J-37	5,252.00	<None>	<Collection: 1 item>	5.23	5,458.82	89.5
130	Lot 3-4	5,257.07	<None>	<Collection: 1 item>	9.22	5,458.84	87.3
133	Lot 7-8	5,279.48	<None>	<Collection: 1 item>	5.54	5,459.11	77.7
137	J-40	5,281.36	<None>	<Collection: 0 items>	0.00	5,459.17	76.9
140	J-41	5,273.10	<None>	<Collection: 1 item>	23.22	5,459.01	80.4
142	J-42	5,272.08	<None>	<Collection: 0 items>	0.00	5,458.87	80.8
144	J-43	5,274.40	<None>	<Collection: 0 items>	0.00	5,458.78	79.8

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Scenario: Max Hour
Current Time Step: 0.000Hr
FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Length (User Defined) (ft)	Zone
32	P-3	280.54	J-2	J-3	8.0	PVC	100.0	False	0.000	133.99	0.86	0.001	False	0.00	<None>
34	P-4	20.92	J-3	J-4	8.0	PVC	100.0	False	0.000	-120.88	0.77	0.001	False	0.00	<None>
36	P-5	91.65	J-4	J-1	8.0	PVC	100.0	False	0.000	-120.88	0.77	0.001	False	0.00	<None>
38	P-6	96.13	J-1	J-6	8.0	PVC	100.0	False	0.000	-126.01	0.80	0.001	False	0.00	<None>
40	P-7	51.54	J-6	J-7	8.0	PVC	100.0	False	0.000	-129.79	0.83	0.001	False	0.00	<None>
42	P-8	238.78	J-7	J-8	8.0	PVC	100.0	False	0.000	-129.79	0.83	0.001	False	0.00	<None>
44	P-9	37.20	J-8	J-9	8.0	PVC	100.0	False	0.000	-133.57	0.85	0.001	False	0.00	<None>
46	P-10	72.01	J-9	J-10	8.0	PVC	100.0	False	0.000	-133.57	0.85	0.001	False	0.00	<None>
48	P-11	98.48	J-10	J-11	8.0	PVC	100.0	False	0.000	-133.57	0.85	0.001	False	0.00	<None>
50	P-12	444.04	J-11	J-12	8.0	PVC	100.0	False	0.000	-137.63	0.88	0.001	False	0.00	<None>
52	P-13	14.27	J-12	J-13	8.0	PVC	100.0	False	0.000	-137.63	0.88	0.001	False	0.00	<None>
54	P-14	261.41	J-13	J-14	8.0	PVC	100.0	False	0.000	-141.48	0.90	0.001	False	0.00	<None>
57	P-16	42.85	J-14	J-15	12.0	PVC	100.0	False	0.000	539.39	1.53	0.001	False	0.00	<None>
59	P-17	147.54	J-15	J-16	12.0	PVC	100.0	False	0.000	539.39	1.53	0.001	False	0.00	<None>
66	OS-3	294.44	J-19	R-2	12.0	PVC	100.0	False	0.000	-1,452.04	4.12	0.008	False	0.00	<None>
67	P-22	72.24	J-19	J-14	12.0	PVC	100.0	False	0.000	680.87	1.93	0.002	False	0.00	<None>
76	P-25	11.78	J-16	J-20	12.0	PVC	100.0	False	0.000	534.17	1.52	0.001	False	0.00	<None>
77	P-26	174.16	J-20	J-17	12.0	PVC	100.0	False	0.000	534.17	1.52	0.001	False	0.00	<None>
80	P-28	220.07	J-21	J-2	8.0	PVC	100.0	False	0.000	133.99	0.86	0.001	False	0.00	<None>
92	P-30	449.91	J-22	J-19	12.0	PVC	100.0	False	0.000	-771.17	2.19	0.003	False	0.00	<None>
94	P-31	39.47	J-22	J-23	8.0	PVC	100.0	False	0.000	-400.17	2.55	0.005	False	0.00	<None>
96	P-32	75.26	J-24	J-17	12.0	PVC	100.0	False	0.000	-534.17	1.52	0.001	False	0.00	<None>
102	P-27	235.87	J-21	J-24	8.0	PVC	150.0	False	0.000	-133.99	0.86	0.000	False	0.00	<None>
104	P-38	19.35	J-23	J-26	8.0	PVC	100.0	False	0.000	-400.17	2.55	0.005	True	24.00	<None>
105	P-39	17.16	J-26	J-24	8.0	PVC	100.0	False	0.000	-400.17	2.55	0.005	True	12.30	<None>
107	P-40	45.97	R-1	J-27	12.0	PVC	100.0	False	0.000	-1,325.20	3.76	0.007	False	0.00	<None>
108	P-41	259.78	J-27	J-22	12.0	PVC	100.0	False	0.000	-1,171.35	3.32	0.006	False	0.00	<None>
112	P-43	562.05	J-28	J-29	12.0	PVC	100.0	False	0.000	-49.19	0.14	0.000	False	0.00	<None>
114	P-44	320.01	J-29	Lot 1-2	12.0	PVC	100.0	False	0.000	-36.86	0.10	0.000	False	0.00	<None>
120	P-47	111.23	Lot 9-10	J-33	8.0	PVC	100.0	False	0.000	-254.87	1.63	0.002	False	0.00	<None>
121	P-48	239.91	J-33	J-3	8.0	PVC	100.0	False	0.000	-254.87	1.63	0.002	False	0.00	<None>
124	P-49	147.81	J-29	J-35	8.0	PVC	100.0	False	0.000	-12.33	0.08	0.000	False	0.00	<None>
126	P-50	318.74	J-35	J-36	8.0	PVC	100.0	False	0.000	-12.33	0.08	0.000	False	0.00	<None>
127	P-51	145.85	J-36	Lot 1-2	8.0	PVC	100.0	False	0.000	11.53	0.07	0.000	False	0.00	<None>
129	P-52	175.83	J-36	J-37	8.0	PVC	100.0	False	0.000	-23.85	0.15	0.000	False	0.00	<None>
131	P-53	211.38	Lot 1-2	Lot 3-4	8.0	PVC	100.0	False	0.000	-49.19	0.31	0.000	False	0.00	<None>
132	P-54	421.32	Lot 3-4	Lot 5-6	8.0	PVC	100.0	False	0.000	-87.49	0.56	0.000	False	0.00	<None>
134	P-55	380.39	Lot 5-6	Lot 7-8	8.0	PVC	100.0	False	0.000	-93.17	0.59	0.000	False	0.00	<None>
136	P-57	411.27	J-37	Lot 3-4	8.0	PVC	100.0	False	0.000	-29.08	0.19	0.000	False	0.00	<None>
138	P-58	132.19	Lot 7-8	J-40	8.0	PVC	100.0	False	0.000	-98.71	0.63	0.000	False	0.00	<None>
139	P-59	90.52	J-40	Lot 9-10	8.0	PVC	100.0	False	0.000	-226.59	1.45	0.002	False	0.00	<None>
141	P-60	230.40	J-40	J-41	8.0	PVC	100.0	False	0.000	127.88	0.82	0.001	False	0.00	<None>
143	P-61	311.57	J-41	J-42	8.0	PVC	100.0	False	0.000	104.66	0.67	0.000	False	0.00	<None>
145	P-62	153.45	J-27	J-43	12.0	PVC	100.0	False	0.000	-153.85	0.44	0.000	False	0.00	<None>
146	P-63	1,359.70	J-43	J-28	12.0	PVC	100.0	False	0.000	-49.19	0.14	0.000	False	0.00	<None>
147	P-64	206.61	J-42	J-43	8.0	PVC	100.0	False	0.000	104.66	0.67	0.000	False	0.00	<None>

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Scenario: Max Day
Current Time Step: 0.000Hr
FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
29	J-2	5,277.00	<None>	<Collection: 0 items>	0.00	5,460.43	79.4
31	J-3	5,280.21	<None>	<Collection: 0 items>	0.00	5,460.24	77.9
33	J-4	5,280.09	<None>	<Collection: 0 items>	0.00	5,460.25	77.9
35	J-1	5,279.30	<None>	<Collection: 1 item>	3.48	5,460.31	78.3
37	J-6	5,279.56	<None>	<Collection: 0 items>	0.00	5,460.37	78.2
39	J-7	5,279.82	<None>	<Collection: 1 item>	2.52	5,460.40	78.1
41	J-8	5,279.23	<None>	<Collection: 1 item>	2.52	5,460.56	78.5
43	J-9	5,279.04	<None>	<Collection: 0 items>	0.00	5,460.59	78.5
45	J-10	5,277.60	<None>	<Collection: 0 items>	0.00	5,460.64	79.2
47	J-11	5,275.57	<None>	<Collection: 1 item>	2.71	5,460.71	80.1
49	J-12	5,272.09	<None>	<Collection: 0 items>	0.00	5,461.02	81.7
51	J-13	5,271.89	<None>	<Collection: 1 item>	2.57	5,461.03	81.8
53	J-14	5,270.25	<None>	<Collection: 0 items>	0.00	5,461.23	82.6
56	J-15	5,271.19	<None>	<Collection: 0 items>	0.00	5,461.17	82.2
58	J-16	5,273.15	<None>	<Collection: 1 item>	3.48	5,460.98	81.3
60	J-17	5,275.55	<None>	<Collection: 0 items>	0.00	5,460.74	80.1
64	J-19	5,268.85	<None>	<Collection: 0 items>	0.00	5,461.37	83.3
75	J-20	5,273.15	<None>	<Collection: 0 items>	0.00	5,460.96	81.3
78	J-21	5,277.50	<None>	<Collection: 0 items>	0.00	5,460.57	79.2
90	J-22	5,280.41	<None>	<Collection: 0 items>	0.00	5,460.22	77.8
93	J-23	5,280.22	<None>	<Collection: 0 items>	0.00	5,460.44	78.0
95	J-24	5,276.41	<None>	<Collection: 0 items>	0.00	5,460.64	79.7
103	J-26	5,277.00	<None>	<Collection: 0 items>	0.00	5,460.58	79.4
106	J-27	5,279.30	<None>	<Collection: 0 items>	0.00	5,458.78	77.7
109	J-28	5,231.00	<None>	<Collection: 0 items>	0.00	5,458.86	98.6
111	J-29	5,240.00	<None>	<Collection: 0 items>	0.00	5,458.88	94.7
113	Lot 1-2	5,248.00	<None>	<Collection: 1 item>	2.90	5,458.89	91.2
115	Lot 5-6	5,271.98	<None>	<Collection: 1 item>	3.78	5,459.06	80.9
117	Lot 9-10	5,282.65	<None>	<Collection: 1 item>	18.85	5,459.44	76.5
119	J-33	5,283.00	<None>	<Collection: 0 items>	0.00	5,459.69	76.4
123	J-35	5,246.00	<None>	<Collection: 0 items>	0.00	5,458.88	92.1
125	J-36	5,248.00	<None>	<Collection: 0 items>	0.00	5,458.89	91.2
128	J-37	5,252.00	<None>	<Collection: 1 item>	3.49	5,458.90	89.5
130	Lot 3-4	5,257.07	<None>	<Collection: 1 item>	6.14	5,458.92	87.3
133	Lot 7-8	5,279.48	<None>	<Collection: 1 item>	3.69	5,459.21	77.8
137	J-40	5,281.36	<None>	<Collection: 0 items>	0.00	5,459.26	77.0
140	J-41	5,273.10	<None>	<Collection: 1 item>	15.48	5,459.10	80.5
142	J-42	5,272.08	<None>	<Collection: 0 items>	0.00	5,458.93	80.8
144	J-43	5,274.40	<None>	<Collection: 0 items>	0.00	5,458.81	79.8

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Scenario: Max Day
Current Time Step: 0.000Hr
FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Length (User Defined) (ft)	Zone
32	P-3	280.54	J-2	J-3	8.0	PVC	100.0	False	0.000	127.75	0.82	0.001	False	0.00	<None>
34	P-4	20.92	J-3	J-4	8.0	PVC	100.0	False	0.000	-122.32	0.78	0.001	False	0.00	<None>
36	P-5	91.65	J-4	J-1	8.0	PVC	100.0	False	0.000	-122.32	0.78	0.001	False	0.00	<None>
38	P-6	96.13	J-1	J-6	8.0	PVC	100.0	False	0.000	-125.80	0.80	0.001	False	0.00	<None>
40	P-7	51.54	J-6	J-7	8.0	PVC	100.0	False	0.000	-125.80	0.80	0.001	False	0.00	<None>
42	P-8	238.78	J-7	J-8	8.0	PVC	100.0	False	0.000	-128.32	0.82	0.001	False	0.00	<None>
44	P-9	37.20	J-8	J-9	8.0	PVC	100.0	False	0.000	-130.84	0.84	0.001	False	0.00	<None>
46	P-10	72.01	J-9	J-10	8.0	PVC	100.0	False	0.000	-130.84	0.84	0.001	False	0.00	<None>
48	P-11	98.48	J-10	J-11	8.0	PVC	100.0	False	0.000	-130.84	0.84	0.001	False	0.00	<None>
50	P-12	444.04	J-11	J-12	8.0	PVC	100.0	False	0.000	-133.55	0.85	0.001	False	0.00	<None>
52	P-13	14.27	J-12	J-13	8.0	PVC	100.0	False	0.000	-133.55	0.85	0.001	False	0.00	<None>
54	P-14	261.41	J-13	J-14	8.0	PVC	100.0	False	0.000	-136.12	0.87	0.001	False	0.00	<None>
57	P-16	42.85	J-14	J-15	12.0	PVC	100.0	False	0.000	535.68	1.52	0.001	False	0.00	<None>
59	P-17	147.54	J-15	J-16	12.0	PVC	100.0	False	0.000	535.68	1.52	0.001	False	0.00	<None>
66	OS-3	294.44	J-19	R-2	12.0	PVC	100.0	False	0.000	-1,442.66	4.09	0.008	False	0.00	<None>
67	P-22	72.24	J-19	J-14	12.0	PVC	100.0	False	0.000	671.80	1.91	0.002	False	0.00	<None>
76	P-25	11.78	J-16	J-20	12.0	PVC	100.0	False	0.000	532.20	1.51	0.001	False	0.00	<None>
77	P-26	174.16	J-20	J-17	12.0	PVC	100.0	False	0.000	532.20	1.51	0.001	False	0.00	<None>
80	P-28	220.07	J-21	J-2	8.0	PVC	100.0	False	0.000	127.75	0.82	0.001	False	0.00	<None>
92	P-30	449.91	J-22	J-19	12.0	PVC	100.0	False	0.000	-770.86	2.19	0.003	False	0.00	<None>
94	P-31	39.47	J-22	J-23	8.0	PVC	100.0	False	0.000	-404.44	2.58	0.006	False	0.00	<None>
96	P-32	75.26	J-24	J-17	12.0	PVC	100.0	False	0.000	-532.20	1.51	0.001	False	0.00	<None>
102	P-27	235.87	J-21	J-24	8.0	PVC	150.0	False	0.000	-127.75	0.82	0.000	False	0.00	<None>
104	P-38	19.35	J-23	J-26	8.0	PVC	100.0	False	0.000	-404.44	2.58	0.006	True	24.00	<None>
105	P-39	17.16	J-26	J-24	8.0	PVC	100.0	False	0.000	-404.44	2.58	0.006	True	12.30	<None>
107	P-40	45.97	R-1	J-27	12.0	PVC	100.0	False	0.000	-1,371.05	3.89	0.007	False	0.00	<None>
108	P-41	259.78	J-27	J-22	12.0	PVC	100.0	False	0.000	-1,175.30	3.33	0.006	False	0.00	<None>
112	P-43	562.05	J-28	J-29	12.0	PVC	100.0	False	0.000	-78.59	0.22	0.000	False	0.00	<None>
114	P-44	320.01	J-29	Lot 1-2	12.0	PVC	100.0	False	0.000	-60.56	0.17	0.000	False	0.00	<None>
120	P-47	111.23	Lot 9-10	J-33	8.0	PVC	100.0	False	0.000	-250.08	1.60	0.002	False	0.00	<None>
121	P-48	239.91	J-33	J-3	8.0	PVC	100.0	False	0.000	-250.08	1.60	0.002	False	0.00	<None>
124	P-49	147.81	J-29	J-35	8.0	PVC	100.0	False	0.000	-18.03	0.12	0.000	False	0.00	<None>
126	P-50	318.74	J-35	J-36	8.0	PVC	100.0	False	0.000	-18.03	0.12	0.000	False	0.00	<None>
127	P-51	145.85	J-36	Lot 1-2	8.0	PVC	100.0	False	0.000	9.86	0.06	0.000	False	0.00	<None>
129	P-52	175.83	J-36	J-37	8.0	PVC	100.0	False	0.000	-27.89	0.18	0.000	False	0.00	<None>
131	P-53	211.38	Lot 1-2	Lot 3-4	8.0	PVC	100.0	False	0.000	-53.60	0.34	0.000	False	0.00	<None>
132	P-54	421.32	Lot 3-4	Lot 5-6	8.0	PVC	100.0	False	0.000	-91.12	0.58	0.000	False	0.00	<None>
134	P-55	380.39	Lot 5-6	Lot 7-8	8.0	PVC	100.0	False	0.000	-94.90	0.61	0.000	False	0.00	<None>
136	P-57	411.27	J-37	Lot 3-4	8.0	PVC	100.0	False	0.000	-31.38	0.20	0.000	False	0.00	<None>
138	P-58	132.19	Lot 7-8	J-40	8.0	PVC	100.0	False	0.000	-98.59	0.63	0.000	False	0.00	<None>
139	P-59	90.52	J-40	Lot 9-10	8.0	PVC	100.0	False	0.000	-231.23	1.48	0.002	False	0.00	<None>
141	P-60	230.40	J-40	J-41	8.0	PVC	100.0	False	0.000	132.64	0.85	0.001	False	0.00	<None>
143	P-61	311.57	J-41	J-42	8.0	PVC	100.0	False	0.000	117.16	0.75	0.001	False	0.00	<None>
145	P-62	153.45	J-27	J-43	12.0	PVC	100.0	False	0.000	-195.75	0.56	0.000	False	0.00	<None>
146	P-63	1,359.70	J-43	J-28	12.0	PVC	100.0	False	0.000	-78.59	0.22	0.000	False	0.00	<None>
147	P-64	206.61	J-42	J-43	8.0	PVC	100.0	False	0.000	117.16	0.75	0.001	False	0.00	<None>

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Scenario: Max Hr+FF
Current Time Step: 0.000Hr
FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
29	J-2	5,277.00	<None>	<Collection: 0 items>	0.00	5,457.58	78.1
31	J-3	5,280.21	<None>	<Collection: 0 items>	0.00	5,455.98	76.0
33	J-4	5,280.09	<None>	<Collection: 0 items>	0.00	5,456.04	76.1
35	J-1	5,279.30	<None>	<Collection: 1 item>	5.13	5,456.29	76.6
37	J-6	5,279.56	<None>	<Collection: 1 item>	3.78	5,456.56	76.6
39	J-7	5,279.82	<None>	<Collection: 0 items>	0.00	5,456.71	76.5
41	J-8	5,279.23	<None>	<Collection: 1 item>	3.78	5,457.41	77.1
43	J-9	5,279.04	<None>	<Collection: 0 items>	0.00	5,457.52	77.2
45	J-10	5,277.60	<None>	<Collection: 0 items>	0.00	5,457.73	77.9
47	J-11	5,275.57	<None>	<Collection: 1 item>	4.06	5,458.02	78.9
49	J-12	5,272.09	<None>	<Collection: 0 items>	0.00	5,459.38	81.0
51	J-13	5,271.89	<None>	<Collection: 1 item>	3.85	5,459.43	81.1
53	J-14	5,270.25	<None>	<Collection: 0 items>	0.00	5,460.24	82.2
56	J-15	5,271.19	<None>	<Collection: 0 items>	0.00	5,460.17	81.8
58	J-16	5,273.15	<None>	<Collection: 1 item>	5.22	5,459.91	80.8
60	J-17	5,275.55	<None>	<Collection: 0 items>	0.00	5,459.59	79.6
64	J-19	5,268.85	<None>	<Collection: 0 items>	0.00	5,460.50	82.9
75	J-20	5,273.15	<None>	<Collection: 0 items>	0.00	5,459.89	80.8
78	J-21	5,277.50	<None>	<Collection: 0 items>	0.00	5,458.83	78.5
90	J-22	5,280.41	<None>	<Collection: 0 items>	0.00	5,459.33	77.4
93	J-23	5,280.22	<None>	<Collection: 0 items>	0.00	5,459.40	77.5
95	J-24	5,276.41	<None>	<Collection: 0 items>	0.00	5,459.46	79.2
103	J-26	5,277.00	<None>	<Collection: 0 items>	0.00	5,459.44	78.9
106	J-27	5,279.30	<None>	<Collection: 0 items>	0.00	5,458.28	77.4
109	J-28	5,231.00	<None>	<Collection: 0 items>	0.00	5,455.08	96.9
111	J-29	5,240.00	<None>	<Collection: 0 items>	0.00	5,454.63	92.9
113	Lot 1-2	5,248.00	<None>	<Collection: 1 item>	23.85	5,454.47	89.3
115	Lot 5-6	5,271.98	<None>	<Collection: 1 item>	5.68	5,451.95	77.9
117	Lot 9-10	5,282.65	<None>	<Collection: 1 item>	28.28	5,450.80	72.7
119	J-33	5,283.00	<None>	<Collection: 0 items>	0.00	5,452.44	73.3
123	J-35	5,246.00	<None>	<Collection: 0 items>	0.00	5,454.57	90.2
125	J-36	5,248.00	<None>	<Collection: 0 items>	0.00	5,454.45	89.3
128	J-37	5,252.00	<None>	<Collection: 1 item>	5.23	5,454.31	87.5
130	Lot 3-4	5,257.07	<None>	<Collection: 1 item>	9.22	5,454.00	85.2
133	Lot 7-8	5,279.48	<None>	<Collection: 1 item>	5.54	5,450.16	73.8
137	J-40	5,281.36	<None>	<Collection: 0 items>	0.00	5,449.56	72.8
140	J-41	5,273.10	<None>	<Collection: 1 item>	1,273.22	5,442.44	73.3
142	J-42	5,272.08	<None>	<Collection: 1 item>	1,250.00	5,443.15	74.0
144	J-43	5,274.40	<None>	<Collection: 0 items>	0.00	5,456.17	78.6

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Scenario: Max Hr+FF
Current Time Step: 0.000Hr
FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Length (User Defined) (ft)	Zone
32	P-3	280.54	J-2	J-3	8.0	PVC	100.0	False	0.000	409.72	2.62	0.006	False	0.00	<None>
34	P-4	20.92	J-3	J-4	8.0	PVC	100.0	False	0.000	-276.17	1.76	0.003	False	0.00	<None>
36	P-5	91.65	J-4	J-1	8.0	PVC	100.0	False	0.000	-276.17	1.76	0.003	False	0.00	<None>
38	P-6	96.13	J-1	J-6	8.0	PVC	100.0	False	0.000	-281.30	1.80	0.003	False	0.00	<None>
40	P-7	51.54	J-6	J-7	8.0	PVC	100.0	False	0.000	-285.08	1.82	0.003	False	0.00	<None>
42	P-8	238.78	J-7	J-8	8.0	PVC	100.0	False	0.000	-285.08	1.82	0.003	False	0.00	<None>
44	P-9	37.20	J-8	J-9	8.0	PVC	100.0	False	0.000	-288.86	1.84	0.003	False	0.00	<None>
46	P-10	72.01	J-9	J-10	8.0	PVC	100.0	False	0.000	-288.86	1.84	0.003	False	0.00	<None>
48	P-11	98.48	J-10	J-11	8.0	PVC	100.0	False	0.000	-288.86	1.84	0.003	False	0.00	<None>
50	P-12	444.04	J-11	J-12	8.0	PVC	100.0	False	0.000	-292.92	1.87	0.003	False	0.00	<None>
52	P-13	14.27	J-12	J-13	8.0	PVC	100.0	False	0.000	-292.92	1.87	0.003	False	0.00	<None>
54	P-14	261.41	J-13	J-14	8.0	PVC	100.0	False	0.000	-296.77	1.89	0.003	False	0.00	<None>
57	P-16	42.85	J-14	J-15	12.0	PVC	100.0	False	0.000	628.74	1.78	0.002	False	0.00	<None>
59	P-17	147.54	J-15	J-16	12.0	PVC	100.0	False	0.000	628.74	1.78	0.002	False	0.00	<None>
66	OS-3	294.44	J-19	R-2	12.0	PVC	100.0	False	0.000	-1,704.77	4.84	0.011	False	0.00	<None>
67	P-22	72.24	J-19	J-14	12.0	PVC	100.0	False	0.000	925.52	2.63	0.004	False	0.00	<None>
76	P-25	11.78	J-16	J-20	12.0	PVC	100.0	False	0.000	623.52	1.77	0.002	False	0.00	<None>
77	P-26	174.16	J-20	J-17	12.0	PVC	100.0	False	0.000	623.52	1.77	0.002	False	0.00	<None>
80	P-28	220.07	J-21	J-2	8.0	PVC	100.0	False	0.000	409.72	2.62	0.006	False	0.00	<None>
92	P-30	449.91	J-22	J-19	12.0	PVC	100.0	False	0.000	-779.25	2.21	0.003	False	0.00	<None>
94	P-31	39.47	J-22	J-23	8.0	PVC	100.0	False	0.000	-213.81	1.36	0.002	False	0.00	<None>
96	P-32	75.26	J-24	J-17	12.0	PVC	100.0	False	0.000	-623.52	1.77	0.002	False	0.00	<None>
102	P-27	235.87	J-21	J-24	8.0	PVC	150.0	False	0.000	-409.72	2.62	0.003	False	0.00	<None>
104	P-38	19.35	J-23	J-26	8.0	PVC	100.0	False	0.000	-213.81	1.36	0.002	True	24.00	<None>
105	P-39	17.16	J-26	J-24	8.0	PVC	100.0	False	0.000	-213.81	1.36	0.002	True	12.30	<None>
107	P-40	45.97	R-1	J-27	12.0	PVC	100.0	False	0.000	922.07	2.62	0.004	False	0.00	<None>
108	P-41	259.78	J-27	J-22	12.0	PVC	100.0	False	0.000	-993.06	2.82	0.004	False	0.00	<None>
112	P-43	562.05	J-28	J-29	12.0	PVC	100.0	False	0.000	413.93	1.17	0.001	False	0.00	<None>
114	P-44	320.01	J-29	Lot 1-2	12.0	PVC	100.0	False	0.000	319.44	0.91	0.000	False	0.00	<None>
120	P-47	111.23	Lot 9-10	J-33	8.0	PVC	100.0	False	0.000	-685.89	4.38	0.015	False	0.00	<None>
121	P-48	239.91	J-33	J-3	8.0	PVC	100.0	False	0.000	-685.89	4.38	0.015	False	0.00	<None>
124	P-49	147.81	J-29	J-35	8.0	PVC	100.0	False	0.000	94.49	0.60	0.000	False	0.00	<None>
126	P-50	318.74	J-35	J-36	8.0	PVC	100.0	False	0.000	94.49	0.60	0.000	False	0.00	<None>
127	P-51	145.85	J-36	Lot 1-2	8.0	PVC	100.0	False	0.000	-48.72	0.31	0.000	False	0.00	<None>
129	P-52	175.83	J-36	J-37	8.0	PVC	100.0	False	0.000	143.21	0.91	0.001	False	0.00	<None>
131	P-53	211.38	Lot 1-2	Lot 3-4	8.0	PVC	100.0	False	0.000	246.87	1.58	0.002	False	0.00	<None>
132	P-54	421.32	Lot 3-4	Lot 5-6	8.0	PVC	100.0	False	0.000	375.63	2.40	0.005	False	0.00	<None>
134	P-55	380.39	Lot 5-6	Lot 7-8	8.0	PVC	100.0	False	0.000	369.95	2.36	0.005	False	0.00	<None>
136	P-57	411.27	J-37	Lot 3-4	8.0	PVC	100.0	False	0.000	137.98	0.88	0.001	False	0.00	<None>
138	P-58	132.19	Lot 7-8	J-40	8.0	PVC	100.0	False	0.000	364.41	2.33	0.005	False	0.00	<None>
139	P-59	90.52	J-40	Lot 9-10	8.0	PVC	100.0	False	0.000	-657.61	4.20	0.014	False	0.00	<None>
141	P-60	230.40	J-40	J-41	8.0	PVC	100.0	False	0.000	1,022.02	6.52	0.031	False	0.00	<None>
143	P-61	311.57	J-41	J-42	8.0	PVC	100.0	False	0.000	-251.20	1.60	0.002	False	0.00	<None>
145	P-62	153.45	J-27	J-43	12.0	PVC	100.0	False	0.000	1,915.13	5.43	0.014	False	0.00	<None>
146	P-63	1,359.70	J-43	J-28	12.0	PVC	100.0	False	0.000	413.93	1.17	0.001	False	0.00	<None>
147	P-64	206.61	J-42	J-43	8.0	PVC	100.0	False	0.000	-1,501.20	9.58	0.063	False	0.00	<None>

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APPENDIX C

Worksheet for Top Of System - Lots 10-12

Project Description

Friction Method	Manning Formula		
Solve For	Normal Depth		

Input Data

Roughness Coefficient		0.015	
Channel Slope		0.01000	ft/ft
Diameter		8.00	in
Discharge		0.014	cfs

Results

Normal Depth		0.05	ft
Flow Area		0.01	ft²
Wetted Perimeter		0.38	ft
Hydraulic Radius		0.03	ft
Top Width		0.36	ft
Critical Depth		0.05	ft
Percent Full		8.1	%
Critical Slope		0.01070	ft/ft
Velocity		1.06	ft/s
Velocity Head		0.02	ft
Specific Energy		0.07	ft
Froude Number		0.98	
Maximum Discharge		1.13	ft³/s
Discharge Full		1.05	ft³/s
Slope Full		0.00000	ft/ft
Flow Type	SubCritical		

GVF Input Data

Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	

GVF Output Data

Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Average End Depth Over Rise		0.00	%
Normal Depth Over Rise		8.07	%
Downstream Velocity		Infinity	ft/s

Worksheet for Top Of System - Lots 10-12

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.05	ft
Critical Depth	0.05	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.01070	ft/ft

Cross Section for Top Of System - Lots 10-12

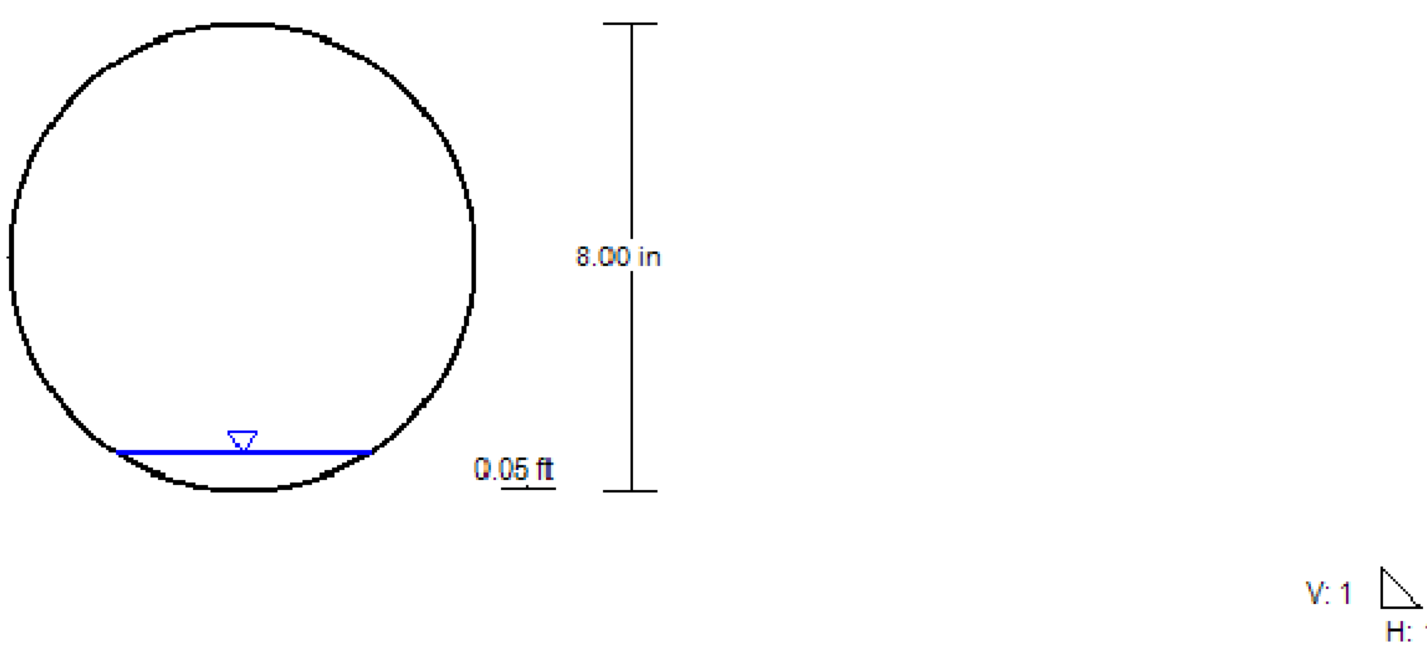
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.01000	ft/ft
Normal Depth	0.05	ft
Diameter	8.00	in
Discharge	0.014	cfs

Cross Section Image



Worksheet for Total Peak Flow - Lots 10-12

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.01000	ft/ft
Diameter	8.00	in
Discharge	0.040	cfs

Results

Normal Depth	0.09	ft
Flow Area	0.03	ft²
Wetted Perimeter	0.50	ft
Hydraulic Radius	0.06	ft
Top Width	0.45	ft
Critical Depth	0.09	ft
Percent Full	13.3	%
Critical Slope	0.00941	ft/ft
Velocity	1.44	ft/s
Velocity Head	0.03	ft
Specific Energy	0.12	ft
Froude Number	1.03	
Maximum Discharge	1.13	ft³/s
Discharge Full	1.05	ft³/s
Slope Full	0.00001	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	13.35	%
Downstream Velocity	Infinity	ft/s

Worksheet for Total Peak Flow - Lots 10-12

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.09	ft
Critical Depth	0.09	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00941	ft/ft

Cross Section for Total Peak Flow - Lots 10-12

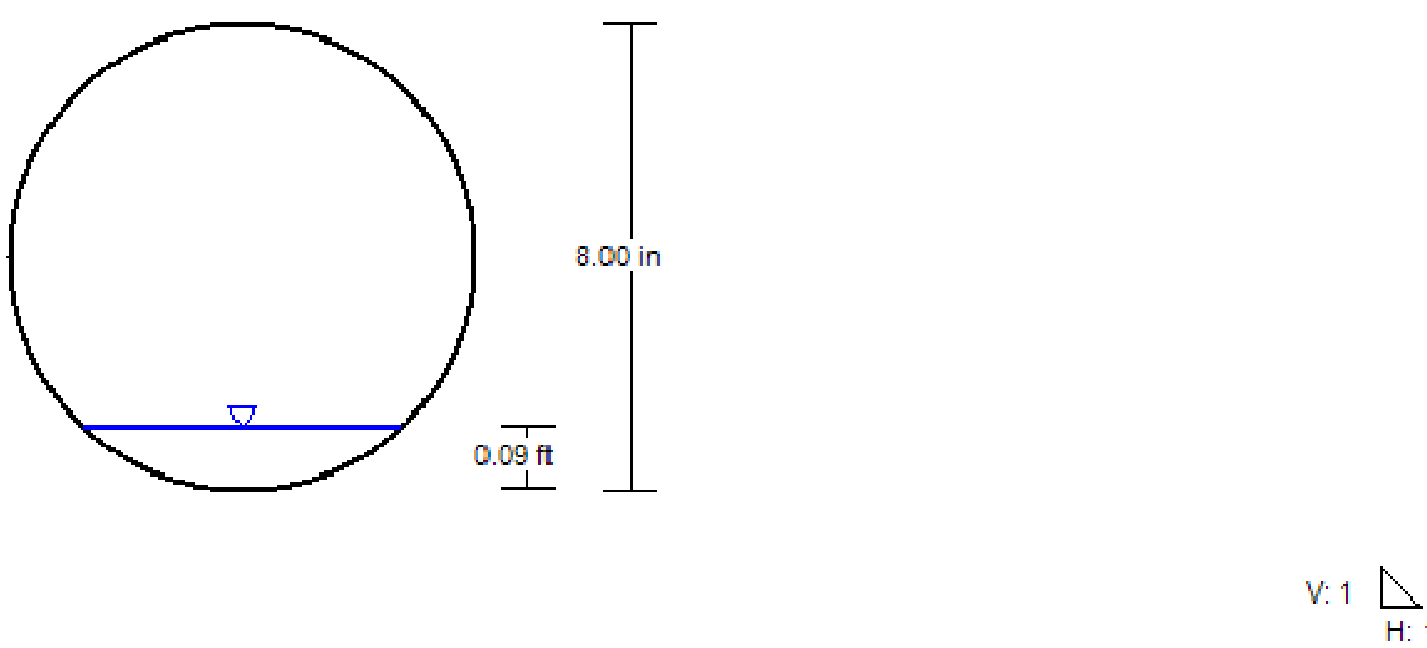
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.01000	ft/ft
Normal Depth	0.09	ft
Diameter	8.00	in
Discharge	0.040	cfs

Cross Section Image



Worksheet for Ridgeview-Mountain View Peak

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00410	ft/ft
Diameter	8.00	in
Discharge	0.291	cfs

Results

Normal Depth		0.31	ft
Flow Area		0.16	ft²
Wetted Perimeter		0.99	ft
Hydraulic Radius		0.16	ft
Top Width		0.66	ft
Critical Depth		0.25	ft
Percent Full		46.0	%
Critical Slope		0.00869	ft/ft
Velocity		1.85	ft/s
Velocity Head		0.05	ft
Specific Energy		0.36	ft
Froude Number		0.67	
Maximum Discharge		0.72	ft³/s
Discharge Full		0.67	ft³/s
Slope Full		0.00077	ft/ft
Flow Type	SubCritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	46.05	%
Downstream Velocity	Infinity	ft/s

Worksheet for Ridgeview-Mountain View Peak

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.31	ft
Critical Depth	0.25	ft
Channel Slope	0.00410	ft/ft
Critical Slope	0.00869	ft/ft

Cross Section for Ridgeview-Mountain View Peak

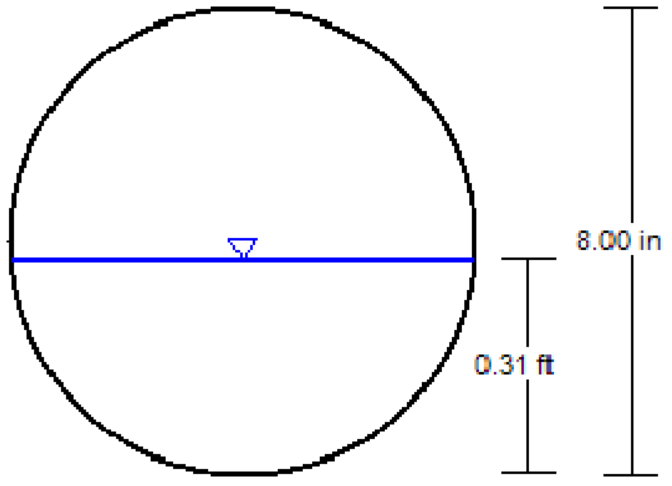
Project Description

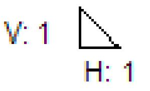
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00410	ft/ft
Normal Depth	0.31	ft
Diameter	8.00	in
Discharge	0.291	cfs

Cross Section Image





APPENDIX D

Galloway
Planning. Architecture. Engineering.

Final Utility Study
Vista Ridge Commercial West

NEC of Mountain View Boulevard & Hwy 7
Located in the S ½ of Section 33, Township 1 North, Range 68 West, of the 6th Principal Meridian, Town of Erie, County of Weld, State of Colorado

Date: May 26, 2015
Revised July 28, 2016

Prepared for:
State Highway 7 Marketplace
9750 W. Cambridge Place
Littleton, CO 80127
Phone (303) 920-9400
Attn: James Spehalski

Prepared by:
Galloway & Company, Inc.
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
Phone (303) 770-8884
Fax (303) 770-3636
Attn: Brandon S. McCrary, P.E.

Galloway
Planning. Architecture. Engineering.

ENGINEER'S STATEMENT

The enclosed Final Utility Report and exhibits were prepared by me, or under my direct supervision, and are correct to the best of my knowledge and belief. Said Utility Report has been prepared in accordance with applicable Town of Erie criteria. I accept responsibility for any liability caused by negligent acts, errors or omissions on my part in preparing this report.

Brandon S. McCrary, PE
Colorado Registered Professional Engineer

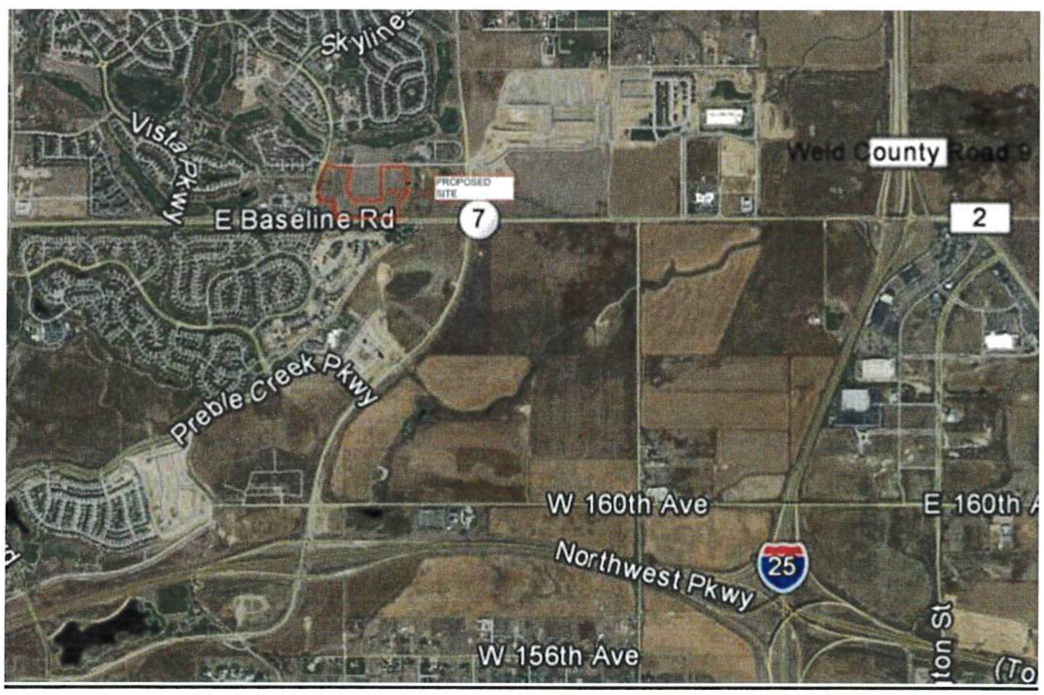
TABLE OF CONTENTS

I. INTRODUCTION

This final utility report has been prepared by Galloway & Company, Inc. for the Vista Ridge Commercial West development which is located at the NEC of Mountain View Boulevard & Hwy 7 located in the SW ¼ of Section 33, Township 1 North, Range 68 West, of the 6th Principal Meridian, Town of Erie, County of Weld, State of Colorado. The site is bounded by Ridge View Drive to the north, Mountain View Boulevard to the west, Highway 7 to the south, and a private roadway and King Soopers to the east.

The site will include multiple pad sites along with a junior anchor parcel on the northeastern portion of the site. The site will be bisected by a private roadway running east-west to provide access to all of the proposed pad sites. The total site area is approximately 17.8 acres. The development will be served by two major access points, one along Mountain View Boulevard, and one along the private roadway between the site and the proposed King Soopers (currently under construction). The project includes associated parking and infrastructure improvements, water, sanitary sewer, and storm sewer improvements.

PROJECT LOCATION MAP.



NOT TO SCALE

Based on the geotechnical report for the site, prepared by Kumar and Associates, dated October 12, 2015, the subsurface conditions consist of a variable thickness top soil overlying overburden man-placed fills and natural soils. The underlying bedrock consisted generally of claystone with frequent zones of interbedded claystone and sandstone ranging from a few inches to about 18 feet below ground surface.

The imported soils encountered on the site ranged from 5 to 8 feet in depth. The degree of compaction of the existing fill material was not determined at this time. Groundwater was encountered in two borings at depths ranging from 8 to 18 feet. Follow up groundwater measurements were taken 14 days after drilling and no groundwater was encountered.

This study is intended to analyze the proposed water and sanitary sewer infrastructure, and describe the process of sizing the public water and sanitary sewer mains associated with the project.

II. EXISTING UTILITY INFRASTRUCTURE

Water

The site will utilize existing water line stubs to serve the site. There is an existing 8" public water main which runs through the proposed King Soopers site to the east and into the site. In addition, there is another existing 8" public water main which has been stubbed into the site from the west off of Mountain View Boulevard. These water line stubs will be located within the future private drive for the site. There is an existing 12" public water main in Mountain View Boulevard as well. This water main runs east and west in Ridgeview Dr.

Sanitary Sewer

An existing 8" public sanitary sewer main has been stubbed into the site form the west off of Mountain View Drive. This stub connects into the existing Sanitary Sewer main within Mountain View Boulevard.

III. PROPOSED UTILITY INFRASTRUCTURE

Proposed Water

The proposed water infrastructure will be designed to accommodate the ten lots within the project. Service sizes for the future buildings are currently unknown, as the end users for the pad sites have not been determined. Table 1 below identifies the proposed lot area for each pad site, and the proposed use.

One water line loop with two connection points is planned to serve the project's water demands. The Town of Erie Specifications (Ref. 1) states that the jurisdiction prefers PVC pipe for all water mains 12" or less.

The proposed loop is to be an 8" PVC. The proposed loop will connect to the existing 8" existing 8" public water main which runs through the proposed King Soopers site to the east and into the site. In addition, there is another existing 8" public water main which has been stubbed into the site from the west off of Mountain View Boulevard. The water main will run just south of the proposed private drive through the site. The water loop is designed to convey anticipated flows from all of the pad sites, as well as anticipated fire flows.

Table 1: Proposed Lot Size

Lot	Lot Size	Use
1	0.84 ac	Retail
2	0.86 ac	Retail
3	1.48 ac	Retail
4	1.20 ac	Retail
5	0.73 ac	Retail
6	0.92 ac	Retail
7	0.92 ac	Retail
8	0.69 ac	Retail
9	0.88 ac	Retail
10	7.34 ac	Retail

<u>Proposed Sanitary</u>

The proposed sanitary infrastructure will be designed to accommodate all of the pad sites within the project. Service sizes for the future buildings are currently unknown, as the end users for the pad sites have not been determined. Table 1 below identifies the proposed lot area for each pad site, and the proposed use.

The proposed 8" sanitary sewer for the site will connect to an existing 8" public sanitary sewer main has been stubbed into the site form the west off of Mountain View Drive. This stub connects into the existing Sanitary Sewer main within Mountain View Boulevard. The sanitary sewer main will parallel portions of the proposed water line loop while maintaining a minimum of 10-feet of separation.

IV. UTILITY SYSTEM DESIGN CRITERIA

<u>Water</u>

The water system was designed and analyzed using the Town of Erie Design Specifications (Ref. 1). Demands for the project were obtained using criteria outlined in Table 2. A sample calculation is as follows for a 0.98-acre Retail/Commercial parcel. The rest of the calculations for the site can be found in Appendix A.

Average Daily Demand (AD) = (0.98-acre) x (1651 GPD/acre) = 1,613 GPD
=1.125 gpm

Max Day Demand =AD x Max Day Factor
=2.0 x 1.125
=2.25 gpm

Max Hour Demand =AD x Max Hr Factor
=(1.125 gpm) x 3.00
=3.37 gpm

Table 2: Estimated Water Loading Criteria

Future Phase	Average Day Demand	Max Day Factor*	Max Hour Factor
Residential	140 GPCD	2.6	3.9
Commercial	1651	2.0	3.0
Industrial	1651	1.32	3.0

The proposed water main was designed using the following constraints:

Table 3: Maximum and Minimum Water Design Constraints

Flow Scenario	Minimum Static Pressure	Maximum Static Pressure	Maximum Velocity	Maximum Headloss
Average Daily*	43 psi	125 psi	10 fps	2 ft/ 1000ft*
Max Day	43 psi	N/A	10 fps	2 ft/ 1000ft*
Max Hour	20 psi**	N/A	10 fps	2 ft/ 1000ft*

*Maximum Headloss for 8"-12" waterlines

**Minimum residual pressure during fire flow

Fire flow requirements were obtained using the Town of Erie Design Specifications. Using these criteria, the required fire flow for the site will be 2,500 gpm. Fire Hydrants will be placed on the pad sites as they develop in the future.

Existing static pressures were obtained for a couple of locations adjacent to the site. The following pressures were obtained:

1. 98.6 psi – at the intersection of Mountain View Blvd. and Ridge View Dr.
2. 86.6 psi – at the intersection of Ridge View Dr. and Sheridan Pkwy.

Sanitary Sewer

The sanitary sewer system was designed and analyzed using the Town of Erie Design Specifications (Ref. 1). Demands for the project were obtained using criteria outlined in Table 4. A sample calculation is as follows for a 0.98-acre Retail/Commercial parcel. The rest of the calculations for the site can be found in Appendix A.

Average Daily Demand (AD) = (98-acre) x (1,000 gal/acre/day) = 980 GPD
=0.0015 cfs

Peaking Factor (PF) $=3.8/(ADF)^{0.17}$ where ADF= annual average daily flow in MGD
PF will not be less than 2.5 or greater than 5.0
$=3.8/(980 \times 4.0E10^{-4})^{0.17}$
=4.53

Peak Flow Demand =AD x PF
=(.002 cfs) x 4.53
=0.007 cfs

Table 4: Estimated Sanitary Sewer Loading Criteria

Future Phase	Average Day Demand
Residential/Multi Family	90 gal/capita/day
Industrial	1,500 gal/acre/day
Commercial	1,000 gal/acre/day
Park/Recreation	50 gal/acre/day
Elementary Schools	13 gal/student/day
Jr. & Sr. High School	20 gal/student/day

Sewers 10" in diameter and smaller are to be designed to carry the peak design flow at a maximum flow depth of 80% of the pipe diameter. The minimum velocity at the peak design flow shall be 2 feet per second.

V. UTILITY ANALYSIS AND RESULTS

<u>WaterCAD Analysis</u>

Bentley WaterCAD Version V8i was used to model the proposed water system. The anticipated demands used in the model can be found in Table 5. Three scenarios were modeled for analysis of the loop. Descriptions of each scenario are as follows:

- Average Daily Demand – Includes average daily demands at each building/lot.
- Max Day Demand – includes max day demands at each building/lot.
- Max-Hour Demand + Fire Flow– includes max-hour demands at each building/lot plus the required fire flow of 2,500 gpm. The proposed system satisfies the fire flow and sprinkler requirement with a 20 psi residual pressure.
- Flows from the adjacent King Soopers Site and Les Schwab site have been included in

the WaterCAD model for the site. Excerpts of the King Soopers utility report has been included and can be found in Appendix C.

- An irrigation demand of a maximum 18 gpm for a 1" irrigation tap for the proposed landscaping north of the private road adjacent to the retaining walls only.

Table 5: Anticipated Water Demands by Building/Lot

Phase	Average Daily Demand (GPM)	Max Daily Demand (GPM)	Max-Hour Demand (GPM)
Lot 1	0.96	1.93	2.89
Lot 2	0.99	1.97	2.96
Lot 3	1.70	3.39	5.09
Lot 4	1.38	2.75	4.13
Lot 5	0.84	1.67	2.51
Lot 6	1.06	2.11	3.17
Lot 7	1.06	2.11	3.17
Lot 8	0.79	1.58	2.37
Lot 9	1.01	2.02	3.03
Lot 10	8.42	16.83	25.25

WaterCAD Results

The results are summarized in this section. Refer to Appendix B for detailed results and figures. Table 6 shows that the proposed water main loop is sufficiently sized with respect to the criteria described in Table 6 with exception to the head loss requirement during Max Hour and Fire Flow. The head loss during this event does not adversely affect the operating pressure.

Table 6: Water Loop Results

Scenario	Minimum Pressure (psi)	Maximum Pressure (psi)	Maximum Velocity (fps)	Maximum Head Loss (ft/1000 ft)
Average Daily Demand	76.8 @ J-33	94.8 @ J-29	1.10 @ P-47	0.41 @ P-54
Max Day Demand	76.7 @ J-33	94.8 @ J-29	1.15 @ P-47	0.38 @ P-54
Max Hour Demand	76.7 @ J-33	94.7 @ J-29	1.21 @ P-47	0.37 @ P-54
Max Hour + Fire Flow*	58.6 @ Lot 9/10	90.5 @ J-29	9.83 @ P-47	12.20 @ P-54

*Fire Flow – 1250 gpm at Lot 7/8, Lot 9/10 Nodes

Sanitary Sewer Analysis

Bentley Flowmaster Version V8i was used to model the proposed sanitary system. The anticipated demands used in the model can be found in Table 7.

Table 7: Anticipated Sanitary Sewer Demands by Building/Lot

Phase	Average Day Demand (cfs)	Peak Factor	Peak Flow (cfs)
Lot 1	0.0013	4.65	0.006
Lot 2	0.0013	4.63	0.006
Lot 3	0.0023	4.22	0.010
Lot 4	0.0019	4.37	0.008
Lot 5	0.0011	4.76	0.005
Lot 6	0.0014	4.57	0.007
Lot 7	0.0014	4.57	0.007
Lot 8	0.0011	4.80	0.005
Lot 9	0.0014	4.61	0.006
Lot 10	0.0114	3.21	0.037

Flowmaster Results

The sanitary sewer results are summarized in this section. Refer to Appendix B for detailed results and figures. Due to constraints associated with the existing sanitary invert elevations and the site grading, the proposed sanitary sewer system is anticipated to slope at a minimum 0.4%. This is to provide the maximum depth possible in order to best serve the buildings, and avoid utility conflicts. Theses constraints result in sanitary sewer velocities below the required 2 feet per second during peak flows.

Calculations are included in the Appendix that calculates the minimum and maximum peak flow through the proposed sanitary sewer system. The proposed system does not reached the maximum 80% capacity, as required by the City standards. The calculations show that the system flows at a maximum of 12.8% full. A summary of the velocities are found in the table below:

Table V-IV: Sanitary Sewer Results

Minimum Velocity	1.07 fps	Lot 9
Maximum Velocity	2.80 fps	Project Site

VI. CONCLUSION

The proposed water infrastructure to be constructed with the Vista Ridge Commercial West project includes one water main loop. The water loop is planned to be 8" PVC connecting to existing stubs on the east and west sides of the site. The results of this study show that, according to the criteria set forth by the Town of Erie, the proposed water infrastructure is adequately sized.

The proposed sanitary sewer infrastructure is 8" PVC and sufficiently serves the project. Due to site constraints, the sanitary sewer system is anticipated to slope at a minimum 0.4%. The minimum slopes result in the sanitary sewer system not meeting the Town's minimum velocity requirement during peak flow.

VII. REFERENCES

1. Standards and Specifications for Design and Construction of Public Improvements; Town of Erie, 2015 Edition.
2. Geotechnical Engineering Study Proposed Commercial Development Northeast Corner of State Highway 7 and Mountain View Drive, Erie, Colorado; Kumar & Associates, Inc., October 12, 2015.
3. International Fire Code; International Code Council, 2015

Appendix A
Demands

Vista Ridge Commercial
Erie, CO
SH7000001.01

Potable Water Distribution System Design Criteria

Hazen Williams	100	8"-12" PIPE

Operating Pressures

Minimum Static Pressure	43 psi	(per 612.00)
Maximum Static Pressure	125 psi	(per 612.00)
Minimum Dynamic Pressure		
Max Hr Demand + fire flow	20 psi	(per jurisdiction)

Maximum Velocities

Maximum Pipe Velocity	10 fps	(per 619.01)
Headloss	2 ft per 1000'	(per 619.01)

Fire

Fire Hydrant Demand	2500 gpm	
Fire Pressure Residual	20 psi	(per 611.00)
Fire Duration	2 Hr	(per IFC / Fire Dept)

Domestic Water Demand per Land Classification (per 611.00)

Land Use	Average Day	Max Day Ratio	Max Hour Ratio
Residential Multi family	140 GPCD*	2.60	3.90
Commercial	1651 GPD/Acre	2.00	3.00
Indust.	1651 GPD/Acre	1.13	3.00

*Gallons Per Capita/Day

Demand

Land Use/Building	Area (Acre)	Average Day (GPM)	Max Day (GPM)	Max Hour (GPM)
Lot 1	0.84	0.96	1.93	2.89
Lot 2	0.86	0.99	1.97	2.96
Lot 3	1.48	1.70	3.39	5.09
Lot 4	1.2	1.38	2.75	4.13
Lot 5	0.73	0.84	1.67	2.51
Lot 6	0.92	1.06	2.11	3.17
Lot 7	0.92	1.06	2.11	3.17
Lot 8	0.69	0.79	1.58	2.37
Lot 9	0.88	1.01	2.02	3.03
Lot 10	7.34	8.42	16.83	25.25

Les Schwab	1.52	1.74	3.49	5.23

Vista Ridge Commercial West
Erie, CO
SH7000001.01

Sanitary Sewer Design Criteria

Manning's n	0.015	(per 714.01)
Minimum Pipe Velocity (Peak Flow)	2 fps	(per 713.00)
Maximum Pipe Velocity (Peak Flow)	10 fps	(per 713.00)
Max Flow Depth of Pipe Dia.	80 %	(per 713.00)

Sanitary Sewer Demand per Land Classification (per 712.00)

Land Use	Average Day
Residential Multi family	90 gal/capita/day
Industrial	1,500 gal/acre/day
Commercial	1,000 gal/acre/day
Park/Recreation	50 gal/acre/day
Elementary Schools	13 gal/student/day
Jr. & Sr. High School	20 gal/student/day

Demand

Land Use/Building	Area (Acre)	Average Day (GPD)	Average Day (cfs)	Peak Factor**	Peak Flow (cfs)
Lot 1	0.84	840	0.0013	4.65	0.006
Lot 2	0.86	860	0.0013	4.63	0.006
Lot 3	1.48	1480	0.0023	4.22	0.010
Lot 4	1.2	1200	0.0019	4.37	0.008
Lot 5	0.73	730	0.0011	4.76	0.005
Lot 6	0.92	920	0.0014	4.57	0.007
Lot 7	0.92	920	0.0014	4.57	0.007
Lot 8	0.69	690	0.0011	4.80	0.005
Lot 9	0.88	880	0.0014	4.61	0.006
Lot 10	7.34	7340	0.0114	3.21	0.037
Total	15.86	15860.00	0.0245	2.82	0.069

*Building demand based upon Kroger requirment of 2,500 GPD
**PF=3.8/(ADF)^0.17 where ADF = annual average daily flow in MGD (PF will not be less than 2.5 or greater than 5.0)

Appendix B

WaterCAD & Flowmaster Results

Average Day Demand

FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
32	P-3	280.54	J-2	J-3	8.0	PVC	100.0	72.97	0.47	0.07
34	P-4	20.92	J-3	J-4	8.0	PVC	100.0	-103.60	0.66	0.01
36	P-5	91.65	J-4	J-1	8.0	PVC	100.0	-103.60	0.66	0.04
38	P-6	96.13	J-1	J-6	8.0	PVC	100.0	-105.31	0.67	0.04
40	P-7	51.54	J-6	J-7	8.0	PVC	100.0	-105.31	0.67	0.02
42	P-8	238.78	J-7	J-8	8.0	PVC	100.0	-106.57	0.68	0.11
44	P-9	37.20	J-8	J-9	8.0	PVC	100.0	-107.83	0.69	0.02
46	P-10	72.01	J-9	J-10	8.0	PVC	100.0	-107.83	0.69	0.03
48	P-11	98.48	J-10	J-11	8.0	PVC	100.0	-107.83	0.69	0.05
50	P-12	444.04	J-11	J-12	8.0	PVC	100.0	-109.18	0.70	0.22
52	P-13	14.27	J-12	J-13	8.0	PVC	100.0	-109.18	0.70	0.01
54	P-14	261.41	J-13	J-14	8.0	PVC	100.0	-110.46	0.71	0.13
57	P-16	42.85	J-14	J-15	12.0	PVC	100.0	515.67	1.46	0.05
59	P-17	147.54	J-15	J-16	12.0	PVC	100.0	515.67	1.46	0.18
66	OS-3	294.44	J-19	R-2	12.0	PVC	100.0	-1,403.46	3.98	2.27
67	P-22	72.24	J-19	J-14	12.0	PVC	100.0	626.13	1.78	0.13
76	P-25	11.78	J-16	J-20	12.0	PVC	100.0	513.93	1.46	0.01
77	P-26	174.16	J-20	J-17	12.0	PVC	100.0	513.93	1.46	0.21
80	P-28	220.07	J-21	J-2	8.0	PVC	100.0	72.97	0.47	0.05
92	P-30	449.91	J-22	J-19	12.0	PVC	100.0	-777.33	2.21	1.16
94	P-31	39.47	J-22	J-23	8.0	PVC	100.0	-440.96	2.81	0.26
96	P-32	75.26	J-24	J-17	12.0	PVC	100.0	-513.93	1.46	0.09
102	P-27	235.87	J-21	J-24	8.0	PVC	150.0	-72.97	0.47	0.03
104	P-38	19.35	J-23	J-26	8.0	PVC	100.0	-440.96	2.81	0.16
105	P-39	17.16	J-26	J-24	8.0	PVC	100.0	-440.96	2.81	0.08
107	P-40	45.97	R-1	J-27	12.0	PVC	100.0	-1,374.91	3.90	0.34
108	P-41	259.78	J-27	J-22	12.0	PVC	100.0	-1,218.29	3.46	1.54
110	P-42	1,513.14	J-27	J-28	12.0	PVC	100.0	-156.62	0.44	0.20
112	P-43	562.05	J-28	J-29	12.0	PVC	100.0	-156.62	0.44	0.07
114	P-44	320.01	J-29	Lot 1-2	12.0	PVC	100.0	-120.57	0.34	0.03
120	P-47	111.23	Lot 9-10	J-33	8.0	PVC	100.0	-176.57	1.13	0.13
121	P-48	239.91	J-33	J-3	8.0	PVC	100.0	-176.57	1.13	0.29
124	P-49	147.81	J-29	J-35	8.0	PVC	100.0	-36.04	0.23	0.01
126	P-50	318.74	J-35	J-36	8.0	PVC	100.0	-36.04	0.23	0.02
127	P-51	145.85	J-36	Lot 1-2	8.0	PVC	100.0	20.42	0.13	0.00
129	P-52	175.83	J-36	J-37	8.0	PVC	100.0	-56.47	0.36	0.03
131	P-53	211.38	Lot 1-2	Lot 3-4	8.0	PVC	100.0	-102.10	0.65	0.09
132	P-54	421.32	Lot 3-4	Lot 5-6	8.0	PVC	100.0	-163.39	1.04	0.44
134	P-55	380.39	Lot 5-6	Lot 7-8	8.0	PVC	100.0	-165.29	1.05	0.40
135	P-56	222.71	Lot 7-8	Lot 9-10	8.0	PVC	100.0	-167.14	1.07	0.24
136	P-57	411.27	J-37	Lot 3-4	8.0	PVC	100.0	-58.21	0.37	0.06

FlexTable: Junction Table

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
29	J-2	5,277.00	0.00	5,460.74	79.5
31	J-3	5,280.21	0.00	5,460.68	78.1
33	J-4	5,280.09	0.00	5,460.69	78.1
35	J-1	5,279.30	1.71	5,460.73	78.5
37	J-6	5,279.56	0.00	5,460.77	78.4
39	J-7	5,279.82	1.26	5,460.79	78.3
41	J-8	5,279.23	1.26	5,460.91	78.6
43	J-9	5,279.04	0.00	5,460.92	78.7
45	J-10	5,277.60	0.00	5,460.96	79.3
47	J-11	5,275.57	1.35	5,461.01	80.2
49	J-12	5,272.09	0.00	5,461.22	81.8
51	J-13	5,271.89	1.28	5,461.23	81.9
53	J-14	5,270.25	0.00	5,461.36	82.7
56	J-15	5,271.19	0.00	5,461.31	82.3
58	J-16	5,273.15	1.74	5,461.13	81.3
60	J-17	5,275.55	0.00	5,460.91	80.2
64	J-19	5,268.85	0.00	5,461.49	83.3
75	J-20	5,273.15	0.00	5,461.12	81.3
78	J-21	5,277.50	0.00	5,460.79	79.3
90	J-22	5,280.41	0.00	5,460.32	77.8
93	J-23	5,280.22	0.00	5,460.58	78.0
95	J-24	5,276.41	0.00	5,460.82	79.8
103	J-26	5,277.00	0.00	5,460.74	79.5
106	J-27	5,279.30	0.00	5,458.78	77.7
109	J-28	5,231.00	0.00	5,458.98	98.6
111	J-29	5,240.00	0.00	5,459.06	94.8
113	Lot 1-2	5,248.00	1.95	5,459.08	91.3
115	Lot 5-6	5,271.98	1.90	5,459.61	81.2
117	Lot 9-10	5,282.65	9.43	5,460.26	76.8
119	J-33	5,283.00	0.00	5,460.39	76.7
123	J-35	5,246.00	0.00	5,459.07	92.2
125	J-36	5,248.00	0.00	5,459.09	91.3
128	J-37	5,252.00	1.74	5,459.11	89.6
130	Lot 3-4	5,257.07	3.08	5,459.18	87.4
133	Lot 7-8	5,279.48	1.85	5,460.01	78.1

Max Day Demand

FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
32	P-3	280.54	J-2	J-3	8.0	PVC	100.0	81.70	0.52	0.08
34	P-4	20.92	J-3	J-4	8.0	PVC	100.0	-102.47	0.65	0.01
36	P-5	91.65	J-4	J-1	8.0	PVC	100.0	-102.47	0.65	0.04
38	P-6	96.13	J-1	J-6	8.0	PVC	100.0	-105.95	0.68	0.04
40	P-7	51.54	J-6	J-7	8.0	PVC	100.0	-105.95	0.68	0.02
42	P-8	238.78	J-7	J-8	8.0	PVC	100.0	-108.47	0.69	0.12
44	P-9	37.20	J-8	J-9	8.0	PVC	100.0	-110.99	0.71	0.02
46	P-10	72.01	J-9	J-10	8.0	PVC	100.0	-110.99	0.71	0.04
48	P-11	98.48	J-10	J-11	8.0	PVC	100.0	-110.99	0.71	0.05
50	P-12	444.04	J-11	J-12	8.0	PVC	100.0	-113.70	0.73	0.23
52	P-13	14.27	J-12	J-13	8.0	PVC	100.0	-113.70	0.73	0.01
54	P-14	261.41	J-13	J-14	8.0	PVC	100.0	-116.27	0.74	0.14
57	P-16	42.85	J-14	J-15	12.0	PVC	100.0	519.96	1.48	0.05
59	P-17	147.54	J-15	J-16	12.0	PVC	100.0	519.96	1.48	0.18
66	OS-3	294.44	J-19	R-2	12.0	PVC	100.0	-1,412.64	4.01	2.30
67	P-22	72.24	J-19	J-14	12.0	PVC	100.0	636.23	1.80	0.13
76	P-25	11.78	J-16	J-20	12.0	PVC	100.0	516.48	1.47	0.01
77	P-26	174.16	J-20	J-17	12.0	PVC	100.0	516.48	1.47	0.21
80	P-28	220.07	J-21	J-2	8.0	PVC	100.0	81.70	0.52	0.06
92	P-30	449.91	J-22	J-19	12.0	PVC	100.0	-776.41	2.20	1.16
94	P-31	39.47	J-22	J-23	8.0	PVC	100.0	-434.78	2.78	0.25
96	P-32	75.26	J-24	J-17	12.0	PVC	100.0	-516.48	1.47	0.09
102	P-27	235.87	J-21	J-24	8.0	PVC	150.0	-81.70	0.52	0.03
104	P-38	19.35	J-23	J-26	8.0	PVC	100.0	-434.78	2.78	0.15
105	P-39	17.16	J-26	J-24	8.0	PVC	100.0	-434.78	2.78	0.08
107	P-40	45.97	R-1	J-27	12.0	PVC	100.0	-1,356.51	3.85	0.33
108	P-41	259.78	J-27	J-22	12.0	PVC	100.0	-1,211.19	3.44	1.53
110	P-42	1,513.14	J-27	J-28	12.0	PVC	100.0	-145.33	0.41	0.18
112	P-43	562.05	J-28	J-29	12.0	PVC	100.0	-145.33	0.41	0.06
114	P-44	320.01	J-29	Lot 1-2	12.0	PVC	100.0	-111.94	0.32	0.02
120	P-47	111.23	Lot 9-10	J-33	8.0	PVC	100.0	-184.17	1.18	0.14
121	P-48	239.91	J-33	J-3	8.0	PVC	100.0	-184.17	1.18	0.31
124	P-49	147.81	J-29	J-35	8.0	PVC	100.0	-33.39	0.21	0.01
126	P-50	318.74	J-35	J-36	8.0	PVC	100.0	-33.39	0.21	0.02
127	P-51	145.85	J-36	Lot 1-2	8.0	PVC	100.0	18.59	0.12	0.00
129	P-52	175.83	J-36	J-37	8.0	PVC	100.0	-51.98	0.33	0.02
131	P-53	211.38	Lot 1-2	Lot 3-4	8.0	PVC	100.0	-96.24	0.61	0.08
132	P-54	421.32	Lot 3-4	Lot 5-6	8.0	PVC	100.0	-157.86	1.01	0.41
134	P-55	380.39	Lot 5-6	Lot 7-8	8.0	PVC	100.0	-161.63	1.03	0.39
135	P-56	222.71	Lot 7-8	Lot 9-10	8.0	PVC	100.0	-165.32	1.06	0.24
136	P-57	411.27	J-37	Lot 3-4	8.0	PVC	100.0	-55.47	0.35	0.06

FlexTable: Junction Table

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
29	J-2	5,277.00	0.00	5,460.69	79.5
31	J-3	5,280.21	0.00	5,460.60	78.0
33	J-4	5,280.09	0.00	5,460.61	78.1
35	J-1	5,279.30	3.48	5,460.65	78.5
37	J-6	5,279.56	0.00	5,460.70	78.4
39	J-7	5,279.82	2.52	5,460.72	78.3
41	J-8	5,279.23	2.52	5,460.84	78.6
43	J-9	5,279.04	0.00	5,460.86	78.7
45	J-10	5,277.60	0.00	5,460.89	79.3
47	J-11	5,275.57	2.71	5,460.94	80.2
49	J-12	5,272.09	0.00	5,461.18	81.8
51	J-13	5,271.89	2.57	5,461.19	81.9
53	J-14	5,270.25	0.00	5,461.33	82.7
56	J-15	5,271.19	0.00	5,461.28	82.2
58	J-16	5,273.15	3.48	5,461.10	81.3
60	J-17	5,275.55	0.00	5,460.87	80.2
64	J-19	5,268.85	0.00	5,461.46	83.3
75	J-20	5,273.15	0.00	5,461.08	81.3
78	J-21	5,277.50	0.00	5,460.75	79.3
90	J-22	5,280.41	0.00	5,460.30	77.8
93	J-23	5,280.22	0.00	5,460.55	78.0
95	J-24	5,276.41	0.00	5,460.78	79.8
103	J-26	5,277.00	0.00	5,460.70	79.5
106	J-27	5,279.30	0.00	5,458.77	77.6
109	J-28	5,231.00	0.00	5,458.95	98.6
111	J-29	5,240.00	0.00	5,459.01	94.8
113	Lot 1-2	5,248.00	2.90	5,459.04	91.3
115	Lot 5-6	5,271.98	3.78	5,459.53	81.1
117	Lot 9-10	5,282.65	18.85	5,460.15	76.8
119	J-33	5,283.00	0.00	5,460.29	76.7
123	J-35	5,246.00	0.00	5,459.02	92.2
125	J-36	5,248.00	0.00	5,459.04	91.3
128	J-37	5,252.00	3.49	5,459.06	89.6
130	Lot 3-4	5,257.07	6.14	5,459.12	87.4
133	Lot 7-8	5,279.48	3.69	5,459.91	78.1

Max Hour Demand

FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
32	P-3	280.54	J-2	J-3	8.0	PVC	100.0	91.83	0.59	0.10
34	P-4	20.92	J-3	J-4	8.0	PVC	100.0	-102.11	0.65	0.01
36	P-5	91.65	J-4	J-1	8.0	PVC	100.0	-102.11	0.65	0.04
38	P-6	96.13	J-1	J-6	8.0	PVC	100.0	-107.24	0.68	0.05
40	P-7	51.54	J-6	J-7	8.0	PVC	100.0	-111.02	0.71	0.03
42	P-8	238.78	J-7	J-8	8.0	PVC	100.0	-111.02	0.71	0.12
44	P-9	37.20	J-8	J-9	8.0	PVC	100.0	-114.80	0.73	0.02
46	P-10	72.01	J-9	J-10	8.0	PVC	100.0	-114.80	0.73	0.04
48	P-11	98.48	J-10	J-11	8.0	PVC	100.0	-114.80	0.73	0.05
50	P-12	444.04	J-11	J-12	8.0	PVC	100.0	-118.86	0.76	0.26
52	P-13	14.27	J-12	J-13	8.0	PVC	100.0	-118.86	0.76	0.01
54	P-14	261.41	J-13	J-14	8.0	PVC	100.0	-122.71	0.78	0.16
57	P-16	42.85	J-14	J-15	12.0	PVC	100.0	525.12	1.49	0.05
59	P-17	147.54	J-15	J-16	12.0	PVC	100.0	525.12	1.49	0.18
66	OS-3	294.44	J-19	R-2	12.0	PVC	100.0	-1,423.85	4.04	2.33
67	P-22	72.24	J-19	J-14	12.0	PVC	100.0	647.83	1.84	0.13
76	P-25	11.78	J-16	J-20	12.0	PVC	100.0	519.90	1.47	0.01
77	P-26	174.16	J-20	J-17	12.0	PVC	100.0	519.90	1.47	0.21
80	P-28	220.07	J-21	J-2	8.0	PVC	100.0	91.83	0.59	0.08
92	P-30	449.91	J-22	J-19	12.0	PVC	100.0	-776.02	2.20	1.16
94	P-31	39.47	J-22	J-23	8.0	PVC	100.0	-428.06	2.73	0.24
96	P-32	75.26	J-24	J-17	12.0	PVC	100.0	-519.90	1.47	0.09
102	P-27	235.87	J-21	J-24	8.0	PVC	150.0	-91.83	0.59	0.04
104	P-38	19.35	J-23	J-26	8.0	PVC	100.0	-428.06	2.73	0.15
105	P-39	17.16	J-26	J-24	8.0	PVC	100.0	-428.06	2.73	0.08
107	P-40	45.97	R-1	J-27	12.0	PVC	100.0	-1,320.23	3.75	0.32
108	P-41	259.78	J-27	J-22	12.0	PVC	100.0	-1,204.08	3.42	1.51
110	P-42	1,513.14	J-27	J-28	12.0	PVC	100.0	-116.14	0.33	0.12
112	P-43	562.05	J-28	J-29	12.0	PVC	100.0	-116.14	0.33	0.04
114	P-44	320.01	J-29	Lot 1-2	12.0	PVC	100.0	-88.51	0.25	0.01
120	P-47	111.23	Lot 9-10	J-33	8.0	PVC	100.0	-193.94	1.24	0.16
121	P-48	239.91	J-33	J-3	8.0	PVC	100.0	-193.94	1.24	0.34
124	P-49	147.81	J-29	J-35	8.0	PVC	100.0	-27.64	0.18	0.01
126	P-50	318.74	J-35	J-36	8.0	PVC	100.0	-27.64	0.18	0.01
127	P-51	145.85	J-36	Lot 1-2	8.0	PVC	100.0	20.40	0.13	0.00
129	P-52	175.83	J-36	J-37	8.0	PVC	100.0	-48.04	0.31	0.02
131	P-53	211.38	Lot 1-2	Lot 3-4	8.0	PVC	100.0	-91.96	0.59	0.08
132	P-54	421.32	Lot 3-4	Lot 5-6	8.0	PVC	100.0	-154.44	0.99	0.39
134	P-55	380.39	Lot 5-6	Lot 7-8	8.0	PVC	100.0	-160.12	1.02	0.38
135	P-56	222.71	Lot 7-8	Lot 9-10	8.0	PVC	100.0	-165.66	1.06	0.24
136	P-57	411.27	J-37	Lot 3-4	8.0	PVC	100.0	-53.27	0.34	0.05

FlexTable: Junction Table

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
29	J-2	5,277.00	0.00	5,460.62	79.4
31	J-3	5,280.21	0.00	5,460.52	78.0
33	J-4	5,280.09	0.00	5,460.52	78.1
35	J-1	5,279.30	5.13	5,460.56	78.4
37	J-6	5,279.56	3.78	5,460.61	78.3
39	J-7	5,279.82	0.00	5,460.64	78.2
41	J-8	5,279.23	3.78	5,460.76	78.5
43	J-9	5,279.04	0.00	5,460.78	78.6
45	J-10	5,277.60	0.00	5,460.82	79.3
47	J-11	5,275.57	4.06	5,460.87	80.2
49	J-12	5,272.09	0.00	5,461.12	81.8
51	J-13	5,271.89	3.85	5,461.13	81.9
53	J-14	5,270.25	0.00	5,461.29	82.7
56	J-15	5,271.19	0.00	5,461.24	82.2
58	J-16	5,273.15	5.22	5,461.05	81.3
60	J-17	5,275.55	0.00	5,460.83	80.2
64	J-19	5,268.85	0.00	5,461.43	83.3
75	J-20	5,273.15	0.00	5,461.04	81.3
78	J-21	5,277.50	0.00	5,460.69	79.3
90	J-22	5,280.41	0.00	5,460.27	77.8
93	J-23	5,280.22	0.00	5,460.51	78.0
95	J-24	5,276.41	0.00	5,460.73	79.7
103	J-26	5,277.00	0.00	5,460.66	79.5
106	J-27	5,279.30	0.00	5,458.76	77.6
109	J-28	5,231.00	0.00	5,458.87	98.6
111	J-29	5,240.00	0.00	5,458.92	94.7
113	Lot 1-2	5,248.00	23.85	5,458.93	91.3
115	Lot 5-6	5,271.98	5.68	5,459.40	81.1
117	Lot 9-10	5,282.65	28.28	5,460.02	76.7
119	J-33	5,283.00	0.00	5,460.17	76.7
123	J-35	5,246.00	0.00	5,458.92	92.1
125	J-36	5,248.00	0.00	5,458.93	91.3
128	J-37	5,252.00	5.23	5,458.95	89.5
130	Lot 3-4	5,257.07	9.22	5,459.01	87.4
133	Lot 7-8	5,279.48	5.54	5,459.78	78.0

Max Hour Plus Fire Flow Demand

FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
32	P-3	280.54	J-2	J-3	8.0	PVC	100.0	923.15	5.89	7.18
34	P-4	20.92	J-3	J-4	8.0	PVC	100.0	-587.05	3.75	0.23
36	P-5	91.65	J-4	J-1	8.0	PVC	100.0	-587.05	3.75	1.01
38	P-6	96.13	J-1	J-6	8.0	PVC	100.0	-592.18	3.78	1.08
40	P-7	51.54	J-6	J-7	8.0	PVC	100.0	-595.96	3.80	0.59
42	P-8	238.78	J-7	J-8	8.0	PVC	100.0	-595.96	3.80	2.72
44	P-9	37.20	J-8	J-9	8.0	PVC	100.0	-599.74	3.83	0.43
46	P-10	72.01	J-9	J-10	8.0	PVC	100.0	-599.74	3.83	0.83
48	P-11	98.48	J-10	J-11	8.0	PVC	100.0	-599.74	3.83	1.13
50	P-12	444.04	J-11	J-12	8.0	PVC	100.0	-603.80	3.85	5.18
52	P-13	14.27	J-12	J-13	8.0	PVC	100.0	-603.80	3.85	0.17
54	P-14	261.41	J-13	J-14	8.0	PVC	100.0	-607.65	3.88	3.09
57	P-16	42.85	J-14	J-15	12.0	PVC	100.0	632.06	1.79	0.08
59	P-17	147.54	J-15	J-16	12.0	PVC	100.0	632.06	1.79	0.26
66	OS-3	294.44	J-19	R-2	12.0	PVC	100.0	-1,954.43	5.54	4.20
67	P-22	72.24	J-19	J-14	12.0	PVC	100.0	1,239.71	3.52	0.44
76	P-25	11.78	J-16	J-20	12.0	PVC	100.0	626.84	1.78	0.02
77	P-26	174.16	J-20	J-17	12.0	PVC	100.0	626.84	1.78	0.30
80	P-28	220.07	J-21	J-2	8.0	PVC	100.0	923.15	5.89	5.64
92	P-30	449.91	J-22	J-19	12.0	PVC	100.0	-714.72	2.03	1.00
94	P-31	39.47	J-22	J-23	8.0	PVC	100.0	296.31	1.89	0.12
96	P-32	75.26	J-24	J-17	12.0	PVC	100.0	-626.84	1.78	0.13
102	P-27	235.87	J-21	J-24	8.0	PVC	150.0	-923.15	5.89	2.85
104	P-38	19.35	J-23	J-26	8.0	PVC	100.0	296.31	1.89	0.07
105	P-39	17.16	J-26	J-24	8.0	PVC	100.0	296.31	1.89	0.04
107	P-40	45.97	R-1	J-27	12.0	PVC	100.0	649.19	1.84	0.08
108	P-41	259.78	J-27	J-22	12.0	PVC	100.0	-418.40	1.19	0.21
110	P-42	1,513.14	J-27	J-28	12.0	PVC	100.0	1,067.59	3.03	7.04
112	P-43	562.05	J-28	J-29	12.0	PVC	100.0	1,067.59	3.03	2.61
114	P-44	320.01	J-29	Lot 1-2	12.0	PVC	100.0	822.66	2.33	0.92
120	P-47	111.23	Lot 9-10	J-33	8.0	PVC	100.0	-1,510.21	9.64	7.09
121	P-48	239.91	J-33	J-3	8.0	PVC	100.0	-1,510.21	9.64	15.29
124	P-49	147.81	J-29	J-35	8.0	PVC	100.0	244.93	1.56	0.32
126	P-50	318.74	J-35	J-36	8.0	PVC	100.0	244.93	1.56	0.70
127	P-51	145.85	J-36	Lot 1-2	8.0	PVC	100.0	-134.17	0.86	0.10
129	P-52	175.83	J-36	J-37	8.0	PVC	100.0	379.09	2.42	0.87
131	P-53	211.38	Lot 1-2	Lot 3-4	8.0	PVC	100.0	664.65	4.24	2.95
132	P-54	421.32	Lot 3-4	Lot 5-6	8.0	PVC	100.0	1,029.29	6.57	13.20
134	P-55	380.39	Lot 5-6	Lot 7-8	8.0	PVC	100.0	1,023.61	6.53	11.79
135	P-56	222.71	Lot 7-8	Lot 9-10	8.0	PVC	100.0	-231.93	1.48	0.44
136	P-57	411.27	J-37	Lot 3-4	8.0	PVC	100.0	373.86	2.39	1.97

FlexTable: Junction Table

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
29	J-2	5,277.00	0.00	5,449.85	74.8
31	J-3	5,280.21	0.00	5,442.66	70.3
33	J-4	5,280.09	0.00	5,442.89	70.4
35	J-1	5,279.30	5.13	5,443.91	71.2
37	J-6	5,279.56	3.78	5,444.99	71.6
39	J-7	5,279.82	0.00	5,445.58	71.7
41	J-8	5,279.23	3.78	5,448.30	73.1
43	J-9	5,279.04	0.00	5,448.72	73.4
45	J-10	5,277.60	0.00	5,449.55	74.4
47	J-11	5,275.57	4.06	5,450.69	75.8
49	J-12	5,272.09	0.00	5,455.87	79.5
51	J-13	5,271.89	3.85	5,456.03	79.7
53	J-14	5,270.25	0.00	5,459.12	81.7
56	J-15	5,271.19	0.00	5,459.04	81.3
58	J-16	5,273.15	5.22	5,458.78	80.3
60	J-17	5,275.55	0.00	5,458.46	79.1
64	J-19	5,268.85	0.00	5,459.56	82.5
75	J-20	5,273.15	0.00	5,458.76	80.3
78	J-21	5,277.50	0.00	5,455.48	77.0
90	J-22	5,280.41	0.00	5,458.57	77.1
93	J-23	5,280.22	0.00	5,458.44	77.1
95	J-24	5,276.41	0.00	5,458.33	78.7
103	J-26	5,277.00	0.00	5,458.37	78.5
106	J-27	5,279.30	0.00	5,458.35	77.5
109	J-28	5,231.00	0.00	5,451.32	95.3
111	J-29	5,240.00	0.00	5,448.70	90.3
113	Lot 1-2	5,248.00	23.85	5,447.78	86.4
115	Lot 5-6	5,271.98	5.68	5,431.64	69.1
117	Lot 9-10	5,282.65	1,278.28	5,420.29	59.5
119	J-33	5,283.00	0.00	5,427.38	62.5
123	J-35	5,246.00	0.00	5,448.38	87.6
125	J-36	5,248.00	0.00	5,447.68	86.4
128	J-37	5,252.00	5.23	5,446.81	84.3
130	Lot 3-4	5,257.07	9.22	5,444.84	81.2
133	Lot 7-8	5,279.48	1,255.54	5,419.85	60.7

Flowmaster Results

Worksheet for Top Of System

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.01920	ft/ft
Diameter	8.00	in
Discharge	0.006	cfs

Results

Normal Depth	0.03	ft
Flow Area	0.01	ft²
Wetted Perimeter	0.29	ft
Hydraulic Radius	0.02	ft
Top Width	0.28	ft
Critical Depth	0.03	ft
Percent Full	4.7	%
Critical Slope	0.01217	ft/ft
Velocity	1.01	ft/s
Velocity Head	0.02	ft
Specific Energy	0.05	ft
Froude Number	1.23	
Maximum Discharge	1.56	ft³/s
Discharge Full	1.45	ft³/s
Slope Full	0.00000	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	4.69	%
Downstream Velocity	Infinity	ft/s

Worksheet for Top Of System

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.03	ft
Critical Depth	0.03	ft
Channel Slope	0.01920	ft/ft
Critical Slope	0.01217	ft/ft

Worksheet for Total Peak Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.03970	ft/ft
Diameter	8.00	in
Discharge	0.069	cfs

Results

Normal Depth	0.08	ft
Flow Area	0.03	ft²
Wetted Perimeter	0.48	ft
Hydraulic Radius	0.05	ft
Top Width	0.44	ft
Critical Depth	0.12	ft
Percent Full	12.4	%
Critical Slope	0.00888	ft/ft
Velocity	2.76	ft/s
Velocity Head	0.12	ft
Specific Energy	0.20	ft
Froude Number	2.04	
Maximum Discharge	2.24	ft³/s
Discharge Full	2.09	ft³/s
Slope Full	0.00004	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	12.44	%
Downstream Velocity	Infinity	ft/s

Worksheet for Total Peak Flow

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.08	ft
Critical Depth	0.12	ft
Channel Slope	0.03970	ft/ft
Critical Slope	0.00888	ft/ft

Appendix C

Excerpts from King Soopers Utility Report

Galloway
Planning. Architecture. Engineering.

Final Utility Study
King Soopers Store #129
at
Vista Ridge Marketplace

NWC of East Sheridan Pkwy & Hwy 7
Located in the S ½ of Section 33, Township 1 North, Range 68 West, of the 6th Principal Meridian, Town of Erie, County of Weld, State of Colorado

Date: June 4, 2015

Prepared for:
King Soopers Inc.
65 Tejon Street
Denver, Colorado 80223

Prepared by:
Galloway & Company, Inc.
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
Phone (303) 770-8884
Fax (303) 770-3636
Attn: Gary Iwata, P.E.

Table V-I: Anticipated Water Demands by Building/Lot

Phase	Average Daily Demand (GPM)	Max Daily Demand (GPM)	Max-Hour Demand (GPM)
Lot 1/King Soopers	1.74	3.48	5.22
Lot 2	1.28	2.57	3.85
Lot 3	1.35	2.71	4.06
Lot 4	1.26	2.52	3.78
Lot 5	1.26	2.52	3.78
Lot 6	1.71	3.42	5.13

WaterCAD Results

The results are summarized in this section. Refer to Appendix B for detailed results and figures. Table V-II shows that the proposed water main loop is sufficiently sized with respect to the criteria described in Table IV-II with exception to the head loss requirement during Max Hour and Fire Flow. The head loss during this event does not adversely affect the operating pressure.

Table V-II: Water Loop Results

Scenario	Minimum Pressure (psi)	Maximum Pressure (psi)	Maximum Velocity (fps)	Maximum Head Loss (ft/1000 ft)
Average Daily Demand	78.5 @ J-18	84.0 @ J-19	1.13 @ P-22	0.10 @ P-26
Max Day Demand	78.5 @ J-18	84.0 @ J-19	1.14 @ P-22	0.10 @ P-26
Max Hour Demand	78.4 @ J-18	84.0 @ J-19	1.16 @ P-22	0.10 @ P-26
Max Hour + Fire Flow*	65.4 @ J-3, Lot 5	78.6 @ J-19	7.94 @ P-22	9.28 @ P-28

*Fire Flow – 1000 gpm at J-2, J-12, J-15 & J-17; 850 gpm sprinkler at J-20

Sanitary Sewer Analysis

Bentley Flowmaster Version V8i was used to model the proposed sanitary system. The anticipated demands used in the model can be found in Table V-III.

King Soopers-City Market
Erie, CO
KSS129.01

Potable Water Distribution System Design Criteria

Hazen Williams	100	8"-12" PIPE

Operating Pressures

Minimum Static Pressure	43 psi	(per 612.00)
Maximum Static Pressure	125 psi	(per 612.00)
Minimum Dynamic Pressure		
Max Hr Demand + fire flow	20 psi	(per jurisdiction)

Maximum Velocities

Maximum Pipe Velocity	10 fps	(per 619.01)
Headloss	2 ft per 1000'	(per 619.01)

Fire

Fire Hydrant Demand	3750 gpm	(per IFC 2015, 123,000 sf Type II B)
Fire Pressure Residual	20 psi	(per 611.00)
Fire Duration	2 Hr	(per IFC / Fire Dept)
King Soopers Fire Sprinkler System	850 gpm	(per Kroger requirment)

Domestic Water Demand per Land Classification (per 611.00)

Land Use	Average Day	Max Day Ratio	Max Hour Ratio
Residential Multi family	140 GPCD*	2.60	3.90
Commercial	1651 GPD/Acre	2.00	3.00
Indust.	1651 GPD/Acre	1.13	3.00

*Gallons Per Capita/Day

Demand

Land Use/Building	Area (Acre)	Average Day (GPM)	Max Day (GPM)	Max Hour (GPM)
Kings Soopers*		1.74	3.48	5.22
Lot 2	1.12	1.28	2.57	3.85
Lot 3	1.18	1.35	2.71	4.06
Lot 4	1.1	1.26	2.52	3.78
Lot 5	1.1	1.26	2.52	3.78
Lot 6	1.49	1.71	3.42	5.13

*Building demand based upon Kroger requirment of 2,500 GPD

Appendix B

WaterCAD & Flowmaster Results

AVERAGE DAY

FlexTable: Junction Table (KSS129.wtg)

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
27	J-1	5,277.56	<Collection: 0 items>	0.00	5,462.62	80.1
29	J-2	5,277.00	<Collection: 0 items>	0.00	5,462.66	80.3
31	J-3	5,280.21	<Collection: 0 items>	0.00	5,462.70	79.0
33	J-4	5,280.09	<Collection: 0 items>	0.00	5,462.70	79.0
37	J-6	5,279.56	<Collection: 0 items>	0.00	5,462.73	79.2
43	J-9	5,279.04	<Collection: 0 items>	0.00	5,462.77	79.5
45	J-10	5,277.60	<Collection: 0 items>	0.00	5,462.78	80.1
49	J-12	5,272.09	<Collection: 0 items>	0.00	5,462.86	82.5
53	J-14	5,270.25	<Collection: 0 items>	0.00	5,462.91	83.4
56	J-15	5,271.19	<Collection: 0 items>	0.00	5,462.88	82.9
60	J-17	5,275.55	<Collection: 0 items>	0.00	5,462.70	81.0
63	J-18	5,281.21	<Collection: 0 items>	0.00	5,462.56	78.5
64	J-19	5,268.85	<Collection: 0 items>	0.00	5,462.96	84.0
75	J-20	5,273.15	<Collection: 0 items>	0.00	5,462.80	82.1
78	J-21	5,277.50	<Collection: 0 items>	0.00	5,462.64	80.1
58	KS	5,273.15	<Collection: 1 items>	1.74	5,462.80	82.1
51	Lot 2	5,271.89	<Collection: 1 items>	1.28	5,462.87	82.6
47	Lot 3	5,275.57	<Collection: 1 items>	1.35	5,462.80	81.0
41	Lot 4	5,279.23	<Collection: 1 items>	1.26	5,462.77	79.4
39	Lot 5	5,279.82	<Collection: 1 items>	1.26	5,462.73	79.1
35	Lot 6	5,279.30	<Collection: 1 items>	1.71	5,462.71	79.4

AVERAGE DAY

FlexTable: Pipe Table (KSS129.wtg)

Current Time: 0.000 hours

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Has User Defined Length?	Length (User Defined) (ft)
69	OS-1	210.32	J-18	R-1	12.0	100.0	788.61	2.24	4.12	True	1,553.00
65	OS-2	530.95	J-18	J-19	12.0	100.0	-399.87	1.13	0.40	False	0.00
66	OS-3	294.44	J-19	R-2	12.0	100.0	-797.21	2.26	0.80	False	0.00
70	P-1	76.02	J-18	J-1	12.0	100.0	-388.74	1.10	0.05	False	0.00
32	P-3	280.54	J-2	J-3	8.0	100.0	-52.50	0.34	0.04	False	0.00
34	P-4	20.92	J-3	J-4	8.0	100.0	-52.50	0.34	0.00	False	0.00
36	P-5	91.65	J-4	Lot 6	8.0	100.0	-52.50	0.34	0.01	False	0.00
38	P-6	96.13	Lot 6	J-6	8.0	100.0	-54.21	0.35	0.01	False	0.00
40	P-7	51.54	J-6	Lot 5	8.0	100.0	-54.21	0.35	0.01	False	0.00
42	P-8	238.78	Lot 5	Lot 4	8.0	100.0	-55.47	0.35	0.03	False	0.00
44	P-9	37.20	Lot 4	J-9	8.0	100.0	-56.73	0.36	0.01	False	0.00
46	P-10	72.01	J-9	J-10	8.0	100.0	-56.73	0.36	0.01	False	0.00
48	P-11	98.48	J-10	Lot 3	8.0	100.0	-56.73	0.36	0.01	False	0.00
50	P-12	444.04	Lot 3	J-12	8.0	100.0	-58.08	0.37	0.07	False	0.00
52	P-13	14.27	J-12	Lot 2	8.0	100.0	-58.08	0.37	0.00	False	0.00
54	P-14	261.41	Lot 2	J-14	8.0	100.0	-59.36	0.38	0.04	False	0.00
57	P-16	42.85	J-14	J-15	12.0	100.0	337.98	0.96	0.02	False	0.00
59	P-17	147.54	J-15	KS	12.0	100.0	337.98	0.96	0.08	False	0.00
62	P-19	155.89	J-17	J-1	12.0	100.0	336.24	0.95	0.09	False	0.00
67	P-22	72.24	J-19	J-14	12.0	100.0	397.34	1.13	0.05	False	0.00
76	P-25	11.78	KS	J-20	12.0	100.0	336.24	0.95	0.01	False	0.00
77	P-26	174.16	J-20	J-17	12.0	100.0	336.24	0.95	0.10	False	0.00
79	P-27	154.43	J-1	J-21	8.0	100.0	-52.50	0.34	0.02	False	0.00
80	P-28	220.07	J-21	J-2	8.0	100.0	-52.50	0.34	0.03	False	0.00

MAX DAY

FlexTable: Junction Table (KSS129.wtg)

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
27	J-1	5,277.56	<Collection: 0 items>	0.00	5,462.60	80.1
29	J-2	5,277.00	<Collection: 0 items>	0.00	5,462.64	80.3
31	J-3	5,280.21	<Collection: 0 items>	0.00	5,462.67	78.9
33	J-4	5,280.09	<Collection: 0 items>	0.00	5,462.68	79.0
37	J-6	5,279.56	<Collection: 0 items>	0.00	5,462.70	79.2
43	J-9	5,279.04	<Collection: 0 items>	0.00	5,462.75	79.5
45	J-10	5,277.60	<Collection: 0 items>	0.00	5,462.76	80.1
49	J-12	5,272.09	<Collection: 0 items>	0.00	5,462.84	82.5
53	J-14	5,270.25	<Collection: 0 items>	0.00	5,462.89	83.3
56	J-15	5,271.19	<Collection: 0 items>	0.00	5,462.87	82.9
60	J-17	5,275.55	<Collection: 0 items>	0.00	5,462.69	81.0
63	J-18	5,281.21	<Collection: 0 items>	0.00	5,462.55	78.5
64	J-19	5,268.85	<Collection: 0 items>	0.00	5,462.95	84.0
75	J-20	5,273.15	<Collection: 0 items>	0.00	5,462.78	82.0
78	J-21	5,277.50	<Collection: 0 items>	0.00	5,462.62	80.1
58	KS	5,273.15	<Collection: 1 items>	3.48	5,462.79	82.0
51	Lot 2	5,271.89	<Collection: 1 items>	2.57	5,462.85	82.6
47	Lot 3	5,275.57	<Collection: 1 items>	2.71	5,462.77	81.0
41	Lot 4	5,279.23	<Collection: 1 items>	2.52	5,462.74	79.4
39	Lot 5	5,279.82	<Collection: 1 items>	2.52	5,462.71	79.1
35	Lot 6	5,279.30	<Collection: 1 items>	3.42	5,462.69	79.3

MAX DAY

FlexTable: Pipe Table (KSS129.wtg)

Current Time: 0.000 hours

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Has User Defined Length?	Length (User Defined) (ft)
69	OS-1	210.32	J-18	R-1	12.0	100.0	787.04	2.23	4.11	True	1,553.00
65	OS-2	530.95	J-18	J-19	12.0	100.0	-401.04	1.14	0.40	False	0.00
66	OS-3	294.44	J-19	R-2	12.0	100.0	-804.26	2.28	0.81	False	0.00
70	P-1	76.02	J-18	J-1	12.0	100.0	-385.99	1.09	0.05	False	0.00
32	P-3	280.54	J-2	J-3	8.0	100.0	-49.50	0.32	0.03	False	0.00
34	P-4	20.92	J-3	J-4	8.0	100.0	-49.50	0.32	0.00	False	0.00
36	P-5	91.65	J-4	Lot 6	8.0	100.0	-49.50	0.32	0.01	False	0.00
38	P-6	96.13	Lot 6	J-6	8.0	100.0	-52.92	0.34	0.01	False	0.00
40	P-7	51.54	J-6	Lot 5	8.0	100.0	-52.92	0.34	0.01	False	0.00
42	P-8	238.78	Lot 5	Lot 4	8.0	100.0	-55.44	0.35	0.03	False	0.00
44	P-9	37.20	Lot 4	J-9	8.0	100.0	-57.96	0.37	0.01	False	0.00
46	P-10	72.01	J-9	J-10	8.0	100.0	-57.96	0.37	0.01	False	0.00
48	P-11	98.48	J-10	Lot 3	8.0	100.0	-57.96	0.37	0.02	False	0.00
50	P-12	444.04	Lot 3	J-12	8.0	100.0	-60.67	0.39	0.07	False	0.00
52	P-13	14.27	J-12	Lot 2	8.0	100.0	-60.67	0.39	0.00	False	0.00
54	P-14	261.41	Lot 2	J-14	8.0	100.0	-63.24	0.40	0.05	False	0.00
57	P-16	42.85	J-14	J-15	12.0	100.0	339.97	0.96	0.02	False	0.00
59	P-17	147.54	J-15	KS	12.0	100.0	339.97	0.96	0.08	False	0.00
62	P-19	155.89	J-17	J-1	12.0	100.0	336.49	0.95	0.09	False	0.00
67	P-22	72.24	J-19	J-14	12.0	100.0	403.21	1.14	0.06	False	0.00
76	P-25	11.78	KS	J-20	12.0	100.0	336.49	0.95	0.01	False	0.00
77	P-26	174.16	J-20	J-17	12.0	100.0	336.49	0.95	0.10	False	0.00
79	P-27	154.43	J-1	J-21	8.0	100.0	-49.50	0.32	0.02	False	0.00
80	P-28	220.07	J-21	J-2	8.0	100.0	-49.50	0.32	0.02	False	0.00

MAX HOUR

FlexTable: Junction Table (KSS129.wtg)

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
27	J-1	5,277.56	<Collection: 0 items>	0.00	5,462.58	80.1
29	J-2	5,277.00	<Collection: 1 items>	0.00	5,462.62	80.3
31	J-3	5,280.21	<Collection: 0 items>	0.00	5,462.65	78.9
33	J-4	5,280.09	<Collection: 0 items>	0.00	5,462.65	79.0
37	J-6	5,279.56	<Collection: 0 items>	0.00	5,462.67	79.2
43	J-9	5,279.04	<Collection: 0 items>	0.00	5,462.72	79.5
45	J-10	5,277.60	<Collection: 0 items>	0.00	5,462.73	80.1
49	J-12	5,272.09	<Collection: 0 items>	0.00	5,462.82	82.5
53	J-14	5,270.25	<Collection: 0 items>	0.00	5,462.88	83.3
56	J-15	5,271.19	<Collection: 1 items>	0.00	5,462.85	82.9
60	J-17	5,275.55	<Collection: 1 items>	0.00	5,462.67	81.0
63	J-18	5,281.21	<Collection: 0 items>	0.00	5,462.53	78.4
64	J-19	5,268.85	<Collection: 0 items>	0.00	5,462.94	84.0
75	J-20	5,273.15	<Collection: 1 items>	0.00	5,462.77	82.0
78	J-21	5,277.50	<Collection: 1 items>	0.00	5,462.60	80.1
58	KS	5,273.15	<Collection: 1 items>	5.22	5,462.77	82.0
51	Lot 2	5,271.89	<Collection: 1 items>	3.85	5,462.83	82.6
47	Lot 3	5,275.57	<Collection: 1 items>	4.06	5,462.75	81.0
41	Lot 4	5,279.23	<Collection: 1 items>	3.78	5,462.71	79.4
39	Lot 5	5,279.82	<Collection: 1 items>	3.78	5,462.68	79.1
35	Lot 6	5,279.30	<Collection: 1 items>	5.13	5,462.66	79.3

MAX HOUR

FlexTable: Pipe Table (KSS129.wtg)

Current Time: 0.000 hours

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Has User Defined Length?	Length (User Defined) (ft)
69	OS-1	210.32	J-18	R-1	12.0	100.0	785.44	2.23	4.09	True	1,553.00
65	OS-2	530.95	J-18	J-19	12.0	100.0	-402.25	1.14	0.40	False	0.00
66	OS-3	294.44	J-19	R-2	12.0	100.0	-811.26	2.30	0.82	False	0.00
70	P-1	76.02	J-18	J-1	12.0	100.0	-383.19	1.09	0.05	False	0.00
32	P-3	280.54	J-2	J-3	8.0	100.0	-46.42	0.30	0.03	False	0.00
34	P-4	20.92	J-3	J-4	8.0	100.0	-46.42	0.30	0.00	False	0.00
36	P-5	91.65	J-4	Lot 6	8.0	100.0	-46.42	0.30	0.01	False	0.00
38	P-6	96.13	Lot 6	J-6	8.0	100.0	-51.55	0.33	0.01	False	0.00
40	P-7	51.54	J-6	Lot 5	8.0	100.0	-51.55	0.33	0.01	False	0.00
42	P-8	238.78	Lot 5	Lot 4	8.0	100.0	-55.33	0.35	0.03	False	0.00
44	P-9	37.20	Lot 4	J-9	8.0	100.0	-59.11	0.38	0.01	False	0.00
46	P-10	72.01	J-9	J-10	8.0	100.0	-59.11	0.38	0.01	False	0.00
48	P-11	98.48	J-10	Lot 3	8.0	100.0	-59.11	0.38	0.02	False	0.00
50	P-12	444.04	Lot 3	J-12	8.0	100.0	-63.17	0.40	0.08	False	0.00
52	P-13	14.27	J-12	Lot 2	8.0	100.0	-63.17	0.40	0.00	False	0.00
54	P-14	261.41	Lot 2	J-14	8.0	100.0	-67.02	0.43	0.05	False	0.00
57	P-16	42.85	J-14	J-15	12.0	100.0	342.00	0.97	0.02	False	0.00
59	P-17	147.54	J-15	KS	12.0	100.0	342.00	0.97	0.08	False	0.00
62	P-19	155.89	J-17	J-1	12.0	100.0	336.78	0.96	0.09	False	0.00
67	P-22	72.24	J-19	J-14	12.0	100.0	409.01	1.16	0.06	False	0.00
76	P-25	11.78	KS	J-20	12.0	100.0	336.78	0.96	0.01	False	0.00
77	P-26	174.16	J-20	J-17	12.0	100.0	336.78	0.96	0.10	False	0.00
79	P-27	154.43	J-1	J-21	8.0	100.0	-46.42	0.30	0.02	False	0.00
80	P-28	220.07	J-21	J-2	8.0	100.0	-46.42	0.30	0.02	False	0.00

MAX HR + FIRE FLOW

FlexTable: Junction Table (KSS129.wtg)

Current Time: 0.000 hours

ID	Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
27	J-1	5,277.56	<Collection: 0 items>	0.00	5,447.71	73.6
29	J-2	5,277.00	<Collection: 1 items>	1,000.00	5,431.93	67.0
31	J-3	5,280.21	<Collection: 0 items>	0.00	5,431.47	65.4
33	J-4	5,280.09	<Collection: 1 items>	0.00	5,431.44	65.5
37	J-6	5,279.56	<Collection: 1 items>	0.00	5,431.14	65.6
43	J-9	5,279.04	<Collection: 1 items>	1,000.00	5,430.65	65.6
45	J-10	5,277.60	<Collection: 1 items>	0.00	5,432.08	66.8
49	J-12	5,272.09	<Collection: 1 items>	0.00	5,442.93	73.9
53	J-14	5,270.25	<Collection: 0 items>	0.00	5,448.50	77.1
56	J-15	5,271.19	<Collection: 1 items>	1,000.00	5,447.87	76.4
60	J-17	5,275.55	<Collection: 1 items>	1,000.00	5,447.22	74.3
63	J-18	5,281.21	<Collection: 0 items>	0.00	5,448.93	72.6
64	J-19	5,268.85	<Collection: 0 items>	0.00	5,450.50	78.6
75	J-20	5,273.15	<Collection: 1 items>	850.00	5,447.23	75.3
78	J-21	5,277.50	<Collection: 1 items>	0.00	5,441.20	70.8
58	KS	5,273.15	<Collection: 1 items>	5.22	5,447.28	75.3
51	Lot 2	5,271.89	<Collection: 1 items>	3.85	5,443.22	74.1
47	Lot 3	5,275.57	<Collection: 1 items>	4.06	5,434.04	68.6
41	Lot 4	5,279.23	<Collection: 1 items>	3.78	5,430.71	65.5
39	Lot 5	5,279.82	<Collection: 1 items>	3.78	5,431.06	65.4
35	Lot 6	5,279.30	<Collection: 1 items>	5.13	5,431.29	65.8

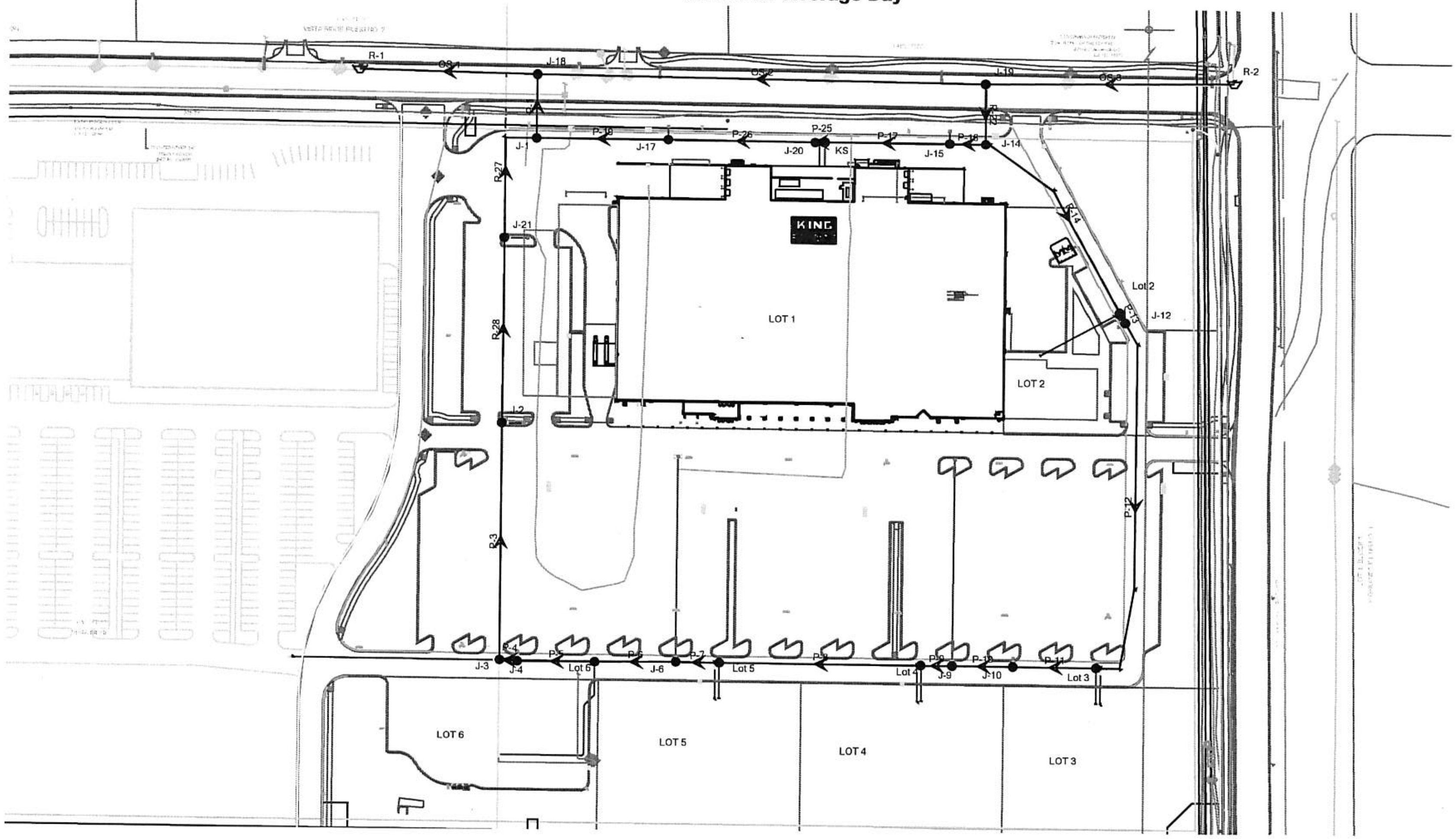
MAX HR + FIRE FLOW

FlexTable: Pipe Table (KSS129.wtg)

Current Time: 0.000 hours

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Has User Defined Length?	Length (User Defined) (ft)
69	OS-1	210.32	J-18	R-1	12.0	100.0	-1,238.88	3.51	9.51	True	1,553.00
65	OS-2	530.95	J-18	J-19	12.0	100.0	-838.41	2.38	1.58	False	0.00
66	OS-3	294.44	J-19	R-2	12.0	100.0	-3,636.94	10.32	13.26	False	0.00
70	P-1	76.02	J-18	J-1	12.0	100.0	2,077.29	5.89	1.21	False	0.00
32	P-3	280.54	J-2	J-3	8.0	100.0	208.13	1.33	0.46	False	0.00
34	P-4	20.92	J-3	J-4	8.0	100.0	208.13	1.33	0.03	False	0.00
36	P-5	91.65	J-4	Lot 6	8.0	100.0	208.13	1.33	0.15	False	0.00
38	P-6	96.13	Lot 6	J-6	8.0	100.0	203.00	1.30	0.15	False	0.00
40	P-7	51.54	J-6	Lot 5	8.0	100.0	203.00	1.30	0.08	False	0.00
42	P-8	238.78	Lot 5	Lot 4	8.0	100.0	199.22	1.27	0.36	False	0.00
44	P-9	37.20	Lot 4	J-9	8.0	100.0	195.44	1.25	0.05	False	0.00
46	P-10	72.01	J-9	J-10	8.0	100.0	-804.56	5.14	1.43	False	0.00
48	P-11	98.48	J-10	Lot 3	8.0	100.0	-804.56	5.14	1.96	False	0.00
50	P-12	444.04	Lot 3	J-12	8.0	100.0	-808.62	5.16	8.90	False	0.00
52	P-13	14.27	J-12	Lot 2	8.0	100.0	-808.62	5.16	0.29	False	0.00
54	P-14	261.41	Lot 2	J-14	8.0	100.0	-812.47	5.19	5.28	False	0.00
57	P-16	42.85	J-14	J-15	12.0	100.0	1,986.07	5.63	0.63	False	0.00
59	P-17	147.54	J-15	KS	12.0	100.0	986.07	2.80	0.59	False	0.00
62	P-19	155.89	J-17	J-1	12.0	100.0	-869.15	2.47	0.50	False	0.00
67	P-22	72.24	J-19	J-14	12.0	100.0	2,798.53	7.94	2.00	False	0.00
76	P-25	11.78	KS	J-20	12.0	100.0	980.85	2.78	0.05	False	0.00
77	P-26	174.16	J-20	J-17	12.0	100.0	130.85	0.37	0.02	False	0.00
79	P-27	154.43	J-1	J-21	8.0	100.0	1,208.13	7.71	6.51	False	0.00
80	P-28	220.07	J-21	J-2	8.0	100.0	1,208.13	7.71	9.28	False	0.00

Scenario: Average Day



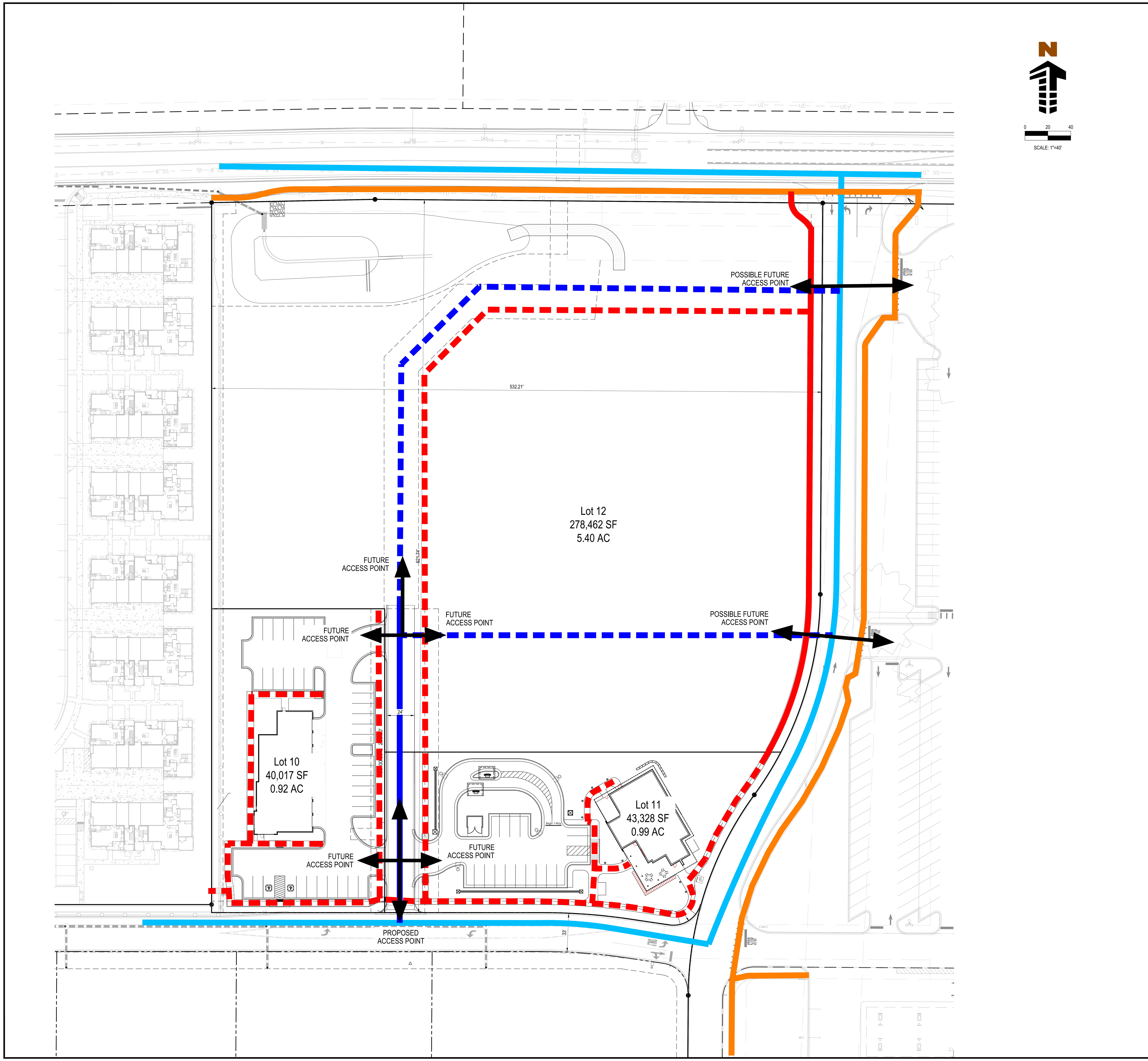
KSS129.wtg
5/19/2015

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666

Bentley WaterCAD V8i (SELECTseries 1)
[08.11.01.32]

Appendix D

Maps/Plans



SITE LEGEND

- PROPERTY BOUNDARY LINE
- R.O.W. LINE
- PROPOSED LOT LINE
- EASEMENT BOUNDARY LINE
- EXISTING TO REMAIN
- EXISTING CURB & GUTTER TO REMAIN
- PROPOSED CURB & GUTTER
- PROPOSED CONCRETE PAVING
- PROPOSED ASPHALT PAVING
- PROPOSED HEAVY DUTY ASPHALT PAVING
- PROPOSED RETAINING WALL
- EXISTING ASPHALT TO BE REMOVED
- PROPOSED SIDEWALK
- STREET LIGHT
- EXISTING FIRE HYDRANT
- PROPOSED MANHOLE COVER
- PROPOSED REGULATORY SIGN
- PROPOSED INLET
- EXISTING LANDSCAPE TREE
- PROPOSED VEHICULAR GUARDRAIL
- PROPOSED PEDESTRIAN FENCE
- EXISTING VEHICULAR ACCESS PATH
- PROPOSED VEHICULAR ACCESS PATH
- POSSIBLE FUTURE VEHICULAR ACCESS PATH
- EXISTING PEDESTRIAN PATH
- PROPOSED PEDESTRIAN PATH
- POSSIBLE FUTURE PEDESTRIAN PATH

BENCHMARK

CITY OF AND COUNTY OF BROOMFIELD BM "LUCY" ELEVATION: 5297.00 FEET (NAVD 1988 DATUM)

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH RIGHT-OF-WAY LINE OF STATE HIGHWAY NO. 7 BEARING N89°38'37"W AS REFERENCED AND BOUNDED BY THE MONUMENTS SHOWN HEREON.

LEGAL DESCRIPTION

A PARCEL OF LAND ACROSS PARCELS 33 AND 34 OF "VISTA RIDGE MASTER FINAL PLAT" AND LOT 2 AND TRACT A OF "VISTA RIDGE FILING NO. 12", LOCATED IN THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH P.M., TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO. SEE SURVEY FOR DETAILED DESCRIPTION.

CAUTION - NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.

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

2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

Galloway
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303.770.8884 O
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VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BLVD & STATE HWY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
CIVIL CONSTRUCTION DRAWINGS

ERIE, COLORADO

#	Date	Issue / Description	Init.
1	06/04/2018	1ST CITY SUBMITTAL	PJD
2	11/09/2018	2ND CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	5/07/18

CIRCULATION & ROUTING PLAN

Traffic Impact Study

Vista Ridge Commercial

Erie, Colorado

Prepared for:

State Highway 7 Marketplace, Inc.

Kimley»Horn

T R A F F I C   I M P A C T   S T U D Y

Vista Ridge Commercial

Erie, Colorado

Prepared for
State Highway 7 Marketplace, Inc.
9750 W. Cambridge Place
Littleton, Colorado 80127

Prepared by
Kimley-Horn and Associates, Inc.
4582 South Ulster Street
Suite 1500
Denver, Colorado 80237
(303) 228-2300

May 2016

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1.0 EXECUTIVE SUMMARY

Vista Ridge Commercial, a retail and service oriented project, is proposed to be located on the northeast corner of the State Highway 7 (SH-7) and Mountain View Boulevard intersection in Erie, Colorado. It is anticipated that this project will consist of several retail establishments, fast-food restaurants, a high turnover sit down restaurant, and a bank. The total square footage is approximately 110,000 square feet with approximately 76,000 square feet of retail shopping, 14,200 square feet of fast-food restaurants, a 7,000 square foot bank, a 5,600 square foot high turnover sit down restaurant, and a 7,000 square foot medical office anticipated. This project is immediately adjacent to another retail development (Erie King Soopers Retail Center) located to the east that includes a proposed 123,000 square foot King Soopers Marketplace, approximately 11,028 square feet of retail space, a gas station with 18 fueling positions, and outlots to include other various retail uses. Analysis was completed for build out of the development in 2018 as well as the 2035 long-term horizon to determine intersection and roadway configurations needed at both planning horizons.

The purpose of this study is to identify project traffic generation characteristics, to identify potential project traffic related impacts on the local street system, and to develop mitigation measures required for the identified impacts. The following five (5) key intersections were included for evaluation within this study:

- SH-7 and Mountain View Boulevard;
- SH-7 and Sheridan Parkway;
- Ridge View Drive and Sheridan Parkway;
- Ridge View Drive and Mountain View Boulevard; and
- Village Vista Drive and Mountain View Boulevard.

The proposed project access intersections along SH-7, Mountain View Boulevard, Sheridan Parkway, and Ridge View Drive were also studied.

Regional access to the project will be provided by Interstate 25 and Northwest Parkway. Primary access to the proposed commercial development will be provided by SH-7 and Mountain View Boulevard. Direct access is proposed at one driveway along SH-7 (to be shared with the Erie King Soopers Retail Center to the east), two driveways along Mountain View Boulevard (one located at the intersection of Village Vista Drive), and two driveways along

Ridge View Drive (with the eastern one shared with Erie King Soopers Retail Center). It is also anticipated that access to this retail development will occur through the Erie King Soopers Retail Center at another driveway along Ridge View Drive and at the full movement access proposed along Sheridan Parkway. The SH-7 access will be restricted to three-quarter movements with the southbound left turn exit restricted. The driveway along Mountain View Boulevard to align with Village Vista Drive will allow full turning movements; while the second access along Mountain View Boulevard, located to the south of the Village Vista Drive intersection, will be restricted to right-in and right-out movements only. All driveways along Ridge View Drive will allow full turning movements.

Full build out of the Vista Ridge Commercial development project is expected to generate approximately 8,808 daily weekday driveway trips. Of these, 660 driveway trips are expected to occur during the morning peak hour, while 825 driveway trips are expected during the afternoon peak hour. Since the project is a commercial development, pass-by trips are expected. These pass-by trips are vehicles already on the street network that will be attracted to the site. The expected pass-by trips to the development results in an anticipated 5,024 weekday daily trips, of which 359 and 489 trips would be new (non pass-by) during the weekday morning and afternoon peak hours, respectively.

Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, demographic information, anticipated surrounding development areas, and the proposed access system for the project. Assignment of project traffic was based upon the trip generation described previously and the distributions developed. The traffic assignment was added to the background traffic volumes to determine future traffic with the project.

Based on the analysis presented in this report, Kimley-Horn believes the proposed Vista Ridge Commercial project will be successfully incorporated into the existing and future roadway network. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following recommendations:

<u>2018 Year Improvement Recommendations</u>

- It is recommended that the southbound left-turn lane length at the SH-7/Sheridan Parkway intersection be reduced from 425 feet to 325 feet so that back-to-back left turn storage will be available along Sheridan Parkway between SH-7 and the proposed full movement project access. This length is anticipated to be sufficient to accommodate future left turning traffic volumes.

- It is recommended that a 100-foot northbound left-turn lane be designated along Sheridan Parkway for the proposed full movement access. Since there is approximately 450 feet of back-to-back available storage available between SH-7 and the project driveway, it is recommended that the taper between the left-turn lanes be 25 feet to allow for the recommended 325-foot southbound left-turn lane at SH-7.
- It is recommended that the full movement access on Sheridan Parkway be designated with stop control with a R1-1 “STOP” sign installed on the eastbound exiting approach. The eastbound exiting approach is recommended to be constructed with separate left and right turn lanes. The left-turn lane length recommended is the standard driveway throat depth of 75 feet.
- It is recommended that the northbound left-turn lane at the Ridge View Drive and Sheridan Parkway intersection also be reduced due to the proposed project access location along Sheridan Parkway. This left-turn lane is recommended to be reduced from 350 feet to 150 feet. This turn bay length is anticipated to be sufficient to accommodate future left turning traffic volumes.
- With construction of the project, the east leg of the Village Vista Drive and Mountain View Boulevard intersection will be improved. When the project is constructed, it is recommended that the existing striped full lane width median be redesignated with a 175-foot westbound left turn lane. If possible, it is encouraged that this westbound left turn lane be constructed so that the future 250-foot westbound left turn lane can be designated to accommodate 2035 traffic volumes.
- It is recommended that an eastbound left-turn lane be designated within the full width striped median along SH-7 at the proposed three-quarter movement access. It is recommended that this left-turn lane be designated with a length of 655 feet plus a 220-foot taper (875-foot total length).
- A continuous westbound auxiliary acceleration/deceleration lane exists along State Highway 7 between Sheridan Parkway and Mountain View Boulevard. This existing lane will serve as both an acceleration and deceleration lane for the proposed three-quarter SH-7 project access.
- At the proposed SH-7 three quarter movement access, it is recommended that a R3-2 No Left Turn sign be installed for the southbound approach for motorists exiting the

development. This sign can be installed under the R1-1 “STOP” or R1-2 “YIELD” sign if desired.

- Both access approaches to Ridge View Drive are recommended to be designated with R1-1 “STOP” signs installed on the northbound approach out of the development. The eastern access is anticipated to receive the most traffic and is therefore recommended to have separate left and right lanes. The western access on Ridge View Drive is believed to operate acceptably with shared northbound left turn/right turn lanes.
- It is recommended that the full lane width median along Ridge View Drive be restriped to include a two-way left-turn lane through the proposed project accesses. It is recommended that this be coordinated with Montex North and South developments to provide a coordinated plan for Ridge View Drive.
- The westbound approach exiting the project at the right-in/right-out access along Mountain View Boulevard is recommended to operate with stop control. Therefore it is recommended that a R1-1 “STOP” sign be installed for this approach. In addition, a R3-2 No Left Turn Sign should be installed underneath the STOP sign to identify the turn movement restriction at this access.

<u>2035 Long Term Twenty Year Planning Horizon Improvement Recommendations</u>

- SH-7 may need to be a six-lane roadway by 2035. It is recommended that the westbound right turn deceleration and acceleration lanes from the three-quarter movement project driveway along SH-7 be reconstructed in addition to the three westbound through lanes. Sheridan Parkway may need to be a four-lane (or six-lane) roadway by 2035 as identified within the Amendment to the SH 7 Access Control Plan.
- The intersection of State Highway 7 with Sheridan Parkway is recommended to have dual left-turn lanes on all approaches and right turn lanes for the northbound and southbound directions.
- Upon construction of the dual southbound left-turn lanes at the SH-7 and Sheridan Parkway intersection, it is believed that the turn lane storage bay length can be reduced to 200 feet. This will allow for a 150-foot northbound left-turn lane at the proposed Sheridan Parkway access with a standard 100-foot taper between the back-to-back left-turn lanes along Sheridan Parkway between the proposed full movement access and SH-7.
- If future traffic volumes are realized along Mountain View Boulevard, the intersection of Village Vista Drive and Mountain View Boulevard will warrant and require signalization.

Therefore, the Town of Erie should monitor traffic volumes in the future to determine if and when this improvement is needed.

General Recommendations

- All on-site and off-site roadway improvements should be incorporated into the Civil Drawings, and conform to standards of the Town of Erie, State of Colorado Department of Transportation (CDOT), American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets, Institute of Transportation Engineers (ITE), and/or the Manual on Traffic Control Devices (MUTCD) – 2009 Edition as appropriate.

2.0 INTRODUCTION

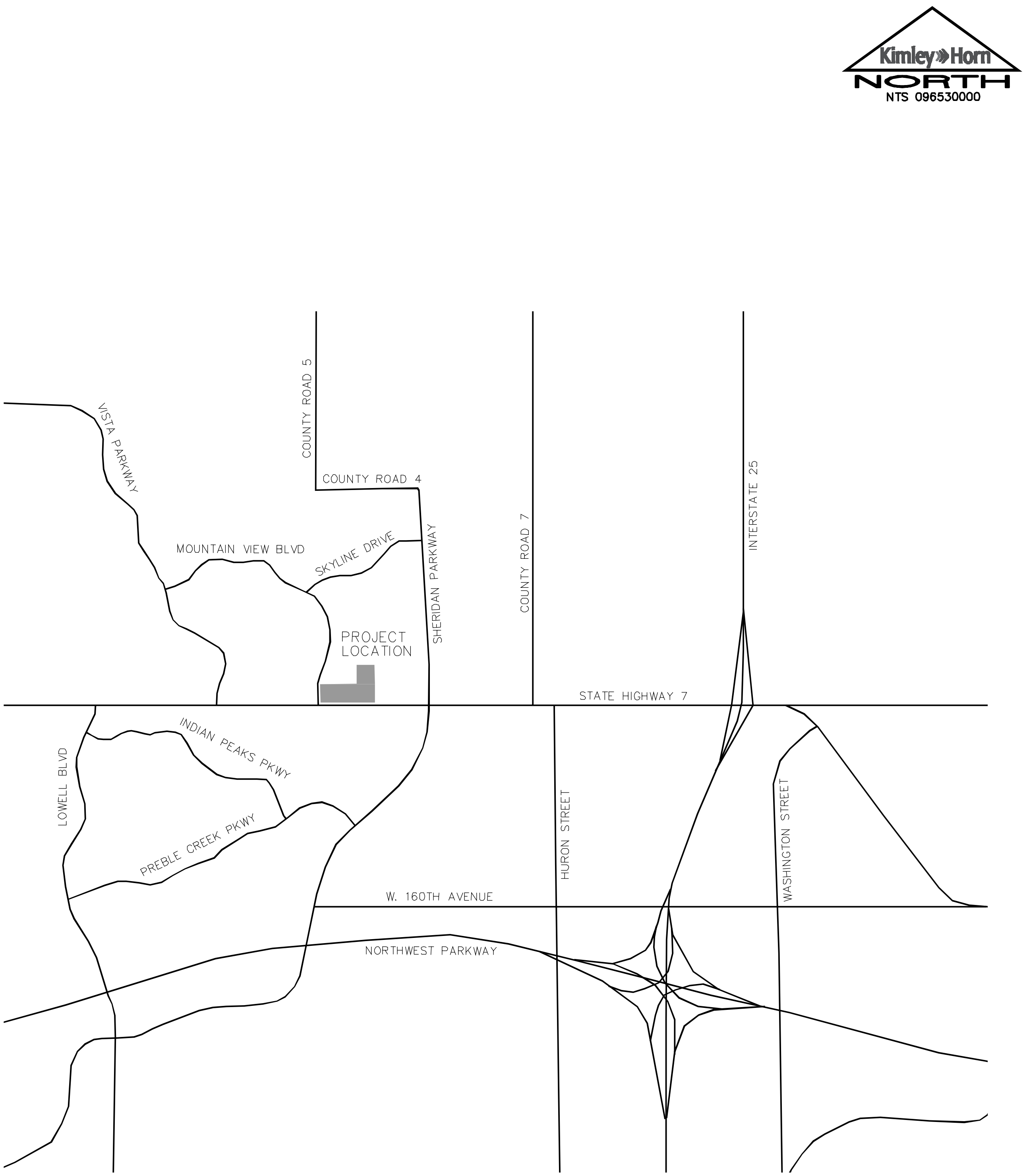
Kimley-Horn and Associates, Inc. (Kimley-Horn) has prepared this report to document the results of a Traffic Impact Study of future traffic conditions associated with the proposed Vista Ridge Commercial project to be located on the northeast corner of the State Highway 7 (SH-7) and Mountain View Boulevard intersection in Erie, Colorado. A vicinity map illustrating the project location with respect to the surrounding area is shown in **Figure 1**.

It is anticipated that this project will consist of several retail establishments, fast-food restaurants, a high turnover sit down restaurant, and a bank. The total square footage is approximately 110,000 square feet with approximately 76,000 square feet of retail shopping, 14,200 square feet of fast-food restaurants, a 7,000 square foot bank, a 5,600 square foot high turnover sit down restaurant, and a 7,000 square foot medical office anticipated. A site plan illustrating the proposed development is provided in **Appendix F**.

Analysis was completed for the anticipated build out of the development in 2018 as well as the 2035 long-term horizon to determine intersection and roadway configurations needed at both planning horizons. The purpose of this study is to identify project traffic generation characteristics, to identify potential project traffic related impacts on the local street system, and to develop mitigation measures required for the identified impacts. The following five (5) key intersections were included for evaluation within this study:

- SH-7 and Mountain View Boulevard;
- SH-7 and Sheridan Parkway;
- Ridge View Drive and Sheridan Parkway;
- Ridge View Drive and Mountain View Boulevard; and
- Village Vista Drive and Mountain View Boulevard.

The proposed project access intersections along SH-7, Mountain View Boulevard, Sheridan Parkway, and Ridge View Drive were also studied.



VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
VICINITY MAP

FIGURE 1

Kimley»Horn

3.0 EXISTING CONDITIONS

The following sections outline existing conditions in the vicinity of the Vista Ridge Commercial project.

3.1 Existing Study Area

The existing project site consists of vacant, undeveloped land. The land directly west of the project site includes retail, restaurants, and a gas station. South of the project site are single family homes, and directly north of the project site is an existing school, Vista Ridge Academy, and vacant land.

The future Erie King Soopers Retail Center development is located immediately east of the project site, and a proposed apartment complex will be located adjacent to the project within the northern area. The apartment complex will include two separate driveways along Ridge View Road, not shared with this project development. The land uses in the general surroundings of the site to the north and west are primarily residential and to the south are vacant/agricultural. Land uses to the east are currently mostly vacant, but residential and commercial uses exist as well.

3.2 Existing Roadway Network

Regional access to the project will be provided by Interstate 25 and Northwest Parkway. Primary access to the proposed commercial development will be provided by SH-7 and Mountain View Boulevard. The roadways adjacent to the proposed project are described within the following paragraphs.

<u>State Highway 7 (SH-7)</u>

State Highway 7 is a four-lane roadway with a striped median and a 55 mile per hour speed limit adjacent to the site. This segment of the roadway travels east-west. Separate left-turn and right-turn lanes have been constructed along SH-7 at both signalized intersections with Mountain View Boulevard and Sheridan Parkway.

<u>Sheridan Parkway</u>

Sheridan Parkway is a two-lane roadway with a double yellow centerline and a 45 mile per hour speed limit adjacent to the site. This segment of the roadway runs north-south. The intersection with SH-7 is signalized, and the intersection with Ridge View Drive operates with stop control on the eastbound Ridge View Drive approach.

Mountain View Boulevard

Mountain View Boulevard is a four-lane roadway with a landscaped median between SH-7 and Ridge View Drive. The roadway primarily provides residential access for areas to the north of the site. This segment of the roadway travels north-south and has a 35 mile per hour speed limit. The intersection of Mountain View Boulevard with SH-7 is a signalized “T”-intersection.

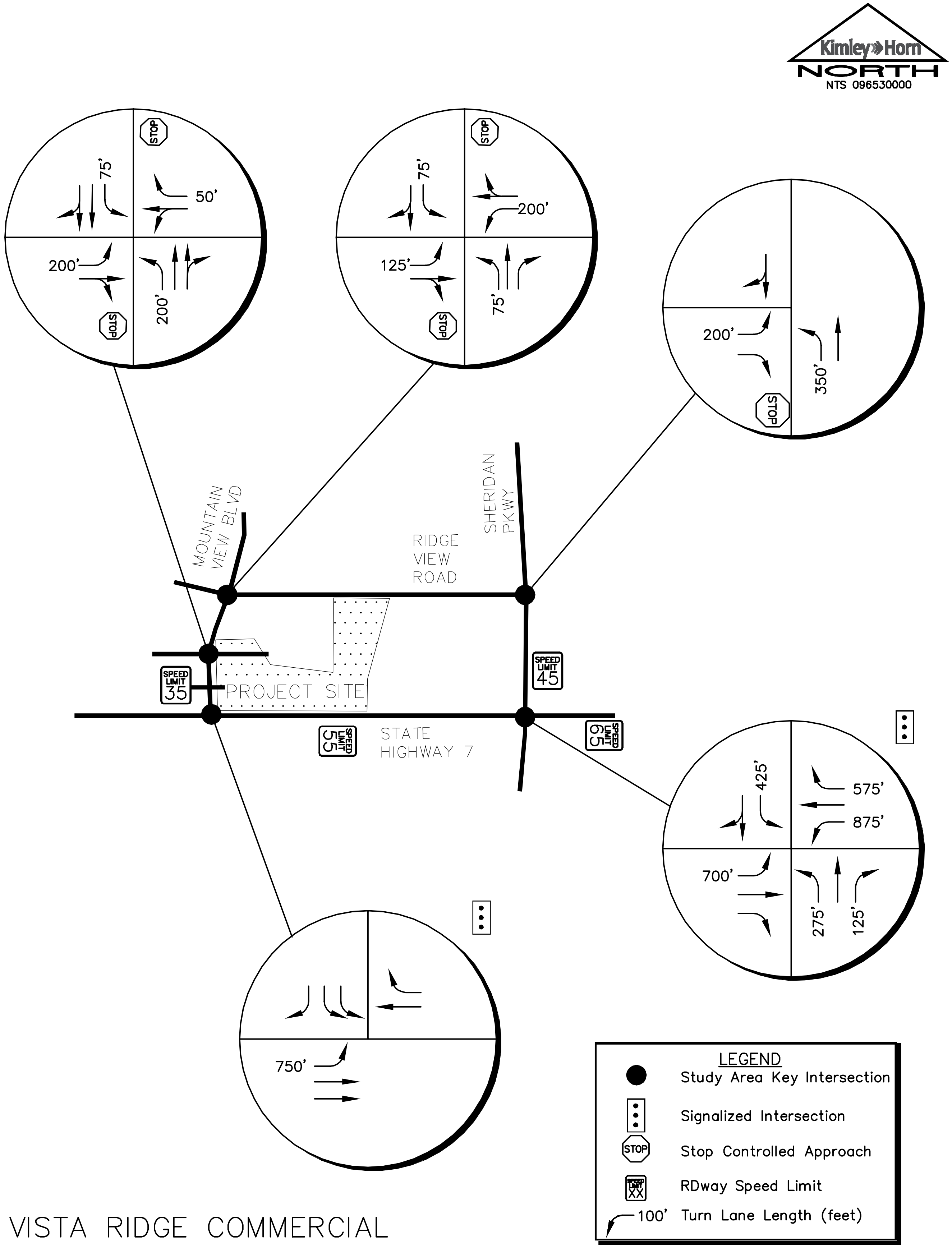
Ridge View Drive

Ridge View Drive is a two-lane, east-west, roadway with a full lane width striped median and a 35 mile per hour speed limit adjacent to the site. The intersection with Sheridan Parkway is a “T”-intersection and operates with stop control on the eastbound approach. Ridge View Drive’s intersection with Mountain View Boulevard is a four-legged intersection with stop control on both the eastbound and westbound approaches. The west leg of this intersection is named Fairway Pointe Drive. For purposes of this study, this intersection is referenced by the name Ridge View Drive and Mountain View Boulevard.

Existing intersection lane configurations and control for the study area are shown in **Figure 2**.

3.3 Existing Traffic Volumes

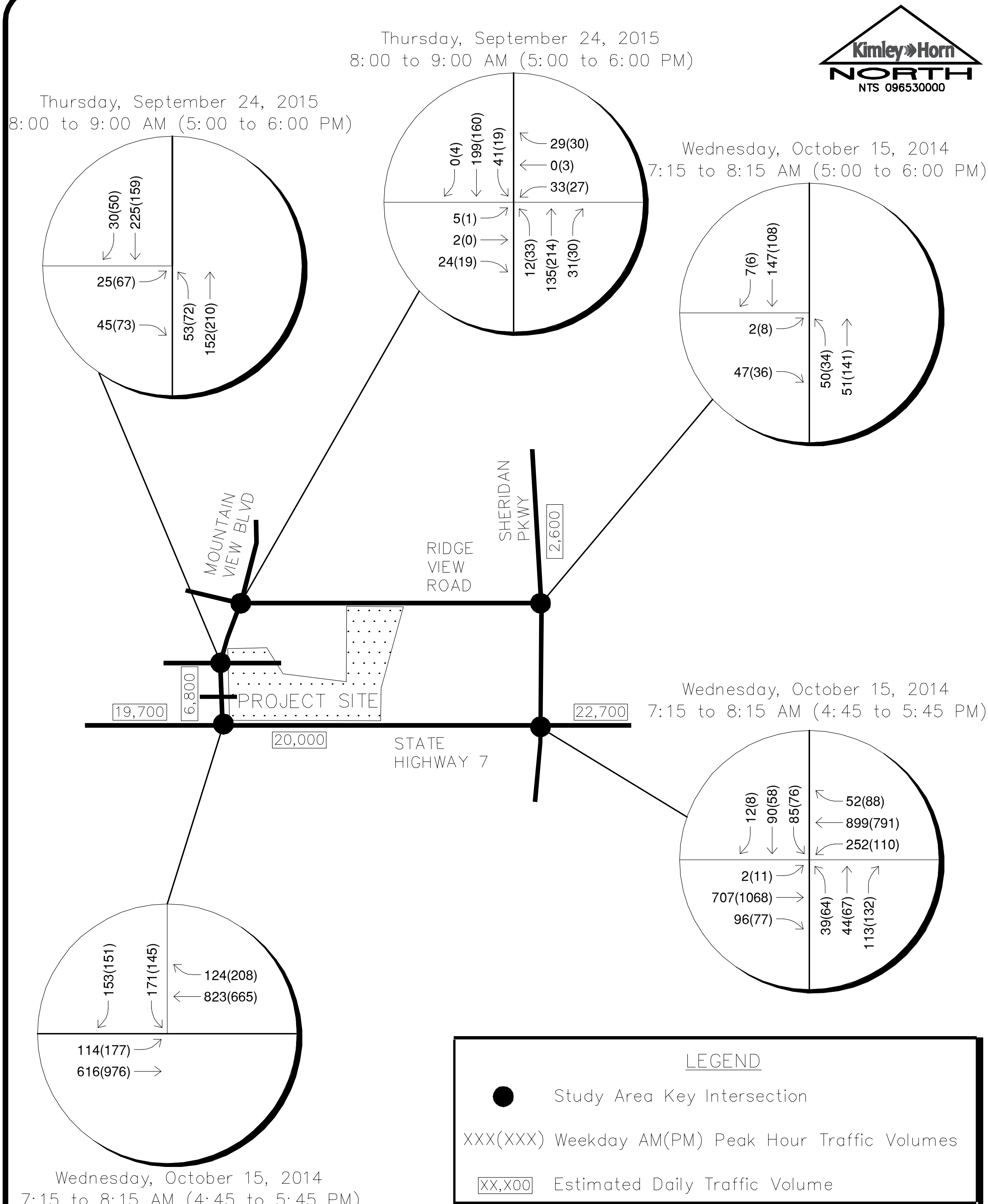
Existing peak hour turning movement counts were conducted at the study key intersections on Wednesday, October 15, 2014 and September 24, 2015 for the morning (AM) and afternoon (PM) peak hours. The October 2014 counts were obtained from the “Erie King Soopers #129 Retail Center Traffic Impact Study”, prepared by Kimley-Horn and Associates, Inc. in March 2015. All counts were conducted in 15-minute intervals during the AM peak hour and PM peak hour of adjacent street traffic from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM, respectively. The peak hour volumes from these counts are shown in **Figure 3**, and the raw data count sheets are provided in **Appendix A**.



VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
EXISTING LANE CONFIGURATIONS

FIGURE 2

Kimley»Horn



VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
EXISTING TRAFFIC VOLUMES

FIGURE 3

Kimley»Horn

4.0 FUTURE CONDITIONS

This section of the report details conditions that are expected with the development of the Vista Ridge Commercial project for both the build out (2018) and twenty-year (2035) horizon years.

4.1 Future Roadway Network

Both SH-7 and Sheridan Parkway are anticipated to be improved in the future. According to the Town of Erie's 2008 Transportation Master Plan, both roadways will need additional through lanes for increased capacity in the future. SH-7 was identified as a six-lane principal arterial with a raised median adjacent to the site on the Capacity Improvements Map (2030 to Build out) within the Transportation Master Plan. Sheridan Parkway was also identified as a six-lane principal arterial with a raised median.

4.2 Proposed Project Access

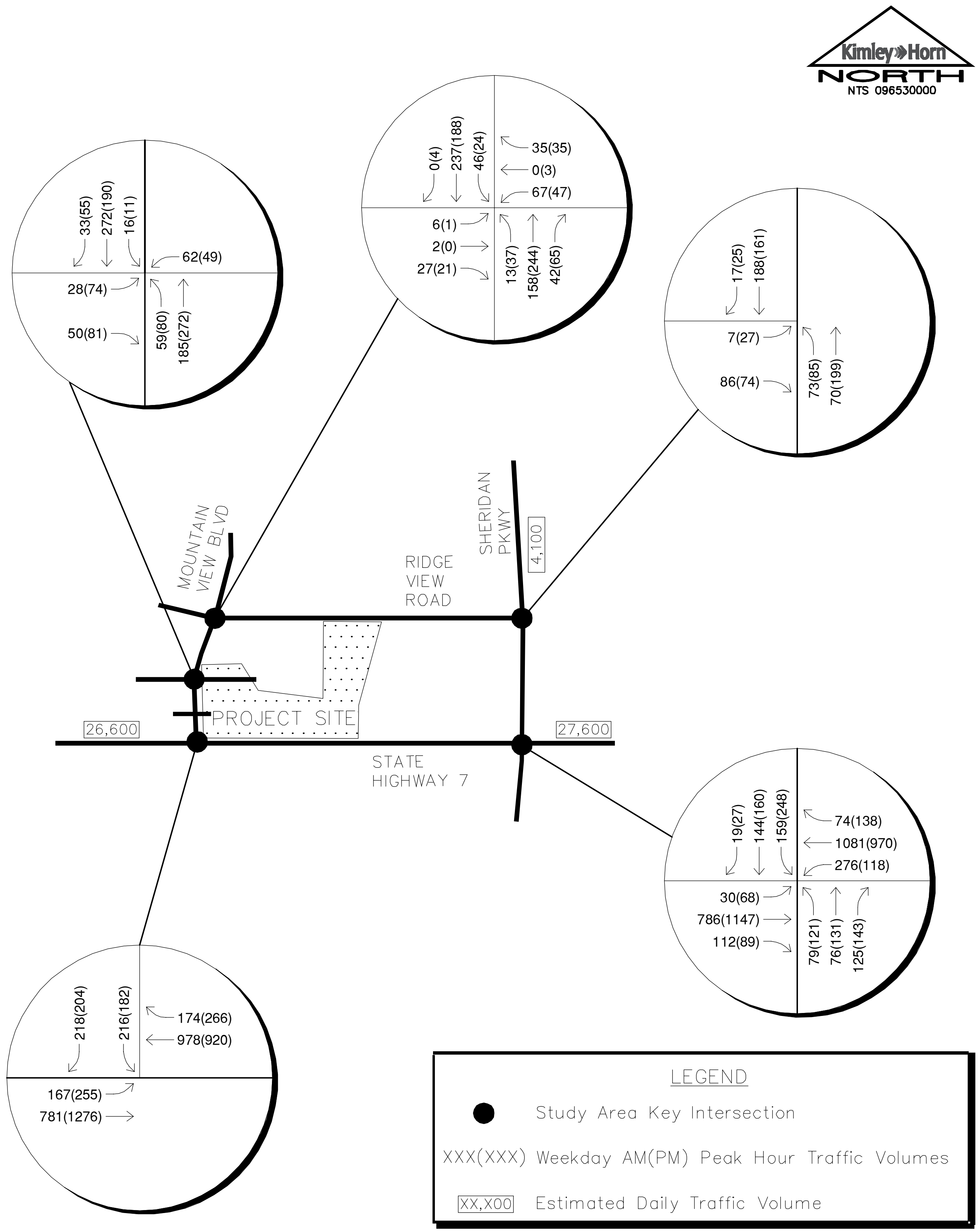
Direct access to Vista Ridge Commercial is proposed at one driveway along SH-7 (to be shared with the Erie King Soopers Retail Center to the east), two driveways along Mountain View Boulevard (one located at the intersection of Village Vista Drive), and two driveways along Ridge View Drive (with the eastern one shared with Erie King Soopers Retail Center). It is also anticipated that access to this retail development will occur through the Erie King Soopers Retail Center at another driveway along Ridge View Drive and at the full movement access proposed along Sheridan Parkway. The SH-7 access will be restricted to three-quarter movements with the southbound left turn exit restricted. The driveway along Mountain View Boulevard to align with Village Vista Drive will allow full turning movements; while the second access along Mountain View Boulevard, located to the south of the Village Vista Drive intersection, will be restricted to right-in and right-out movements only. All driveways along Ridge View Drive will allow full turning movements.

With completion of the project, it is proposed that the private east-west access roadway through the site be a two-lane roadway. Limitations exist to widen the roadway to provide a three-lane section due to setbacks from the apartment complex to the north and State Highway 7 to the south. It is anticipated that a two-lane roadway will operate acceptably, especially since the apartment complex along the north side of the roadway will not have access along this private street. Therefore, left turns will primarily occur from the westbound direction into the Vista Ridge Commercial project outparcels along the SH-7 frontage. The average left turn volume into the accesses along the private street to the north and south is anticipated to be approximately 30 vehicles per hour during the peak with an opposing through volume of approximately 125 vehicles per hour. Based on the “Transportation and Land Development”, 2nd edition, by the Institute of Transportation Engineers (ITE), Figure 5-21 - Suggested Warrants for Isolated Left-Turn Bays, left turn lanes are not warranted along this roadway with an anticipated posted speed limit of 35 miles per hour or less. The opposing through volume along the roadway would need to approximately 220 vehicles per hour to warrant a separate left turn lane based on the projected left turn volumes at the accesses. Therefore, the internal access roadway is believed to be sufficient providing a single through lane in each direction without a left turn lane.

4.3 Future Traffic Volumes

According to the information provided on the website for the Colorado Department of Transportation (CDOT), the 20-year growth factor along SH-7 adjacent to the site is 1.97. These values equate to an annual growth rate of approximately 3.4 percent. SH-7 traffic information from the CDOT Online Transportation Information System (OTIS) website is included in **Appendix B**. The annual growth rate was used to estimate near-term 2018 and long-term 2035 traffic volume projections at the study key intersections.

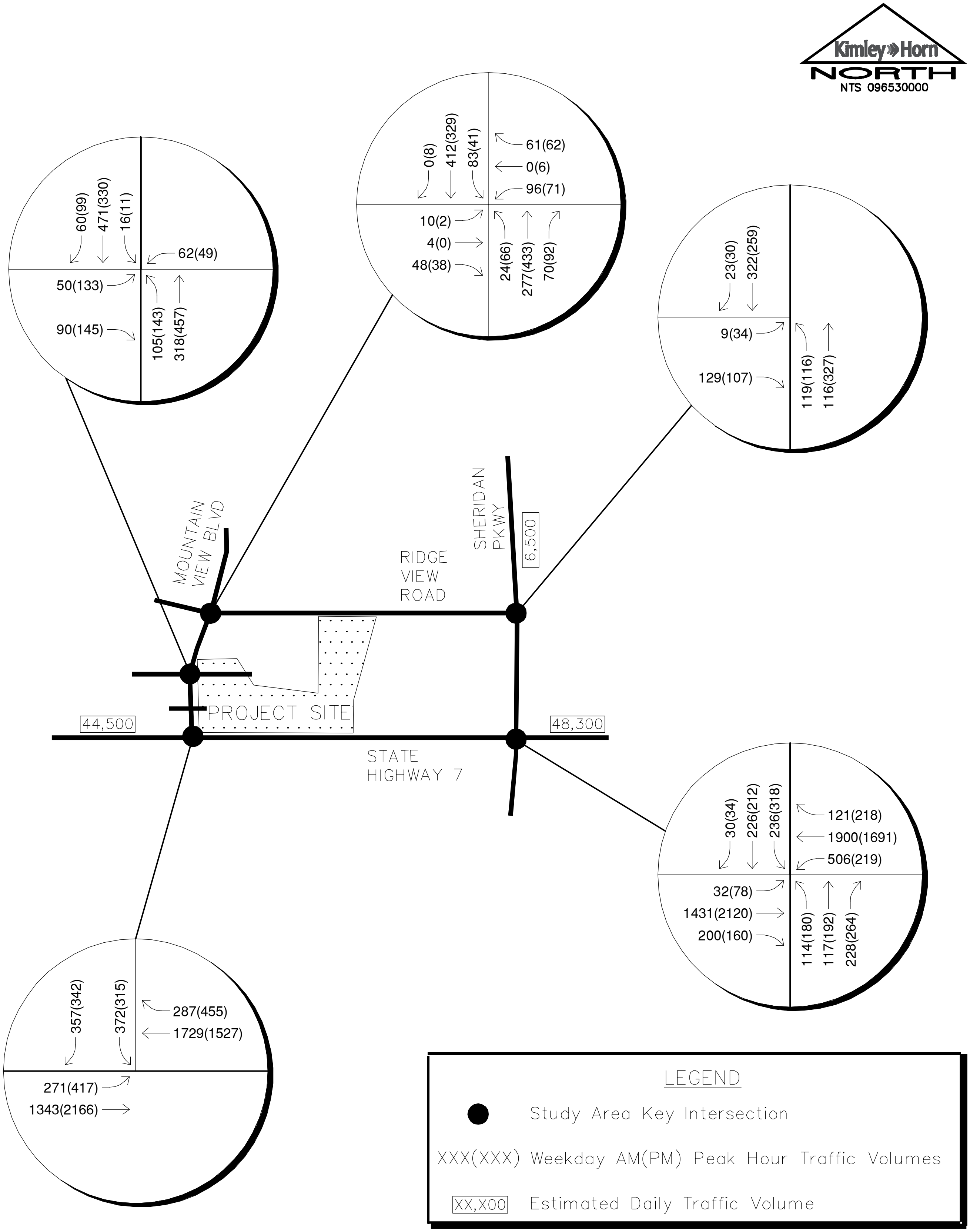
In addition to this growth rate application, project traffic volumes from the adjacent Erie King Soopers #129 Retail Center project to the east, the 144 apartment units within the northern project site area, and the 11,976 square foot Les Schwab tire and 3,000 square foot fast food restaurant project directly on the northeast corner of the SH-7 and Mountain View Boulevard were included. It should be noted that the Erie King Soopers #129 traffic study included some of this project development in that project. This traffic was removed from the background traffic calculations for these duplicate uses that are now part of this project so that it could be applied as project traffic with this Vista Ridge Commercial project. The calculated background traffic volumes for both 2018 and 2035 are shown in **Figures 4** and **5**, respectively.



VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
2018 BACKGROUND TRAFFIC VOLUMES

FIGURE 4

Kimley»Horn



VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
2035 BACKGROUND TRAFFIC VOLUMES

FIGURE 5

Kimley»Horn

5.0 PROJECT TRAFFIC CHARACTERISTICS

5.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation*[1] report published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. For this study, the ITE Trip Generation fitted curve and average trip rates that apply to Shopping Center (ITE Land Use Code 820), Drive-In Bank (912), Medical-Dental Office Building (720), High Turnover Sit-Down Restaurant, and Fast-Food Restaurant with Drive-Thru (934) were used to estimate traffic generated by the proposed development.

Since a mix of uses, shopping center (retail), bank, fast-food, and tire store, is proposed within the same development, it is anticipated that traffic will be shared between each use. This internal trip generation, or capture, is most specifically expected to occur between the bank, restaurants, and shopping center (retail) uses. Therefore, the ITE internal capture procedure was used to determine the amount of traffic that may be shared between uses, which thereby reduces the number of external trips.

Based on this, full build out of the Vista Ridge Commercial project is expected to generate approximately 8,808 daily weekday driveway trips. Of these, 660 driveway trips are expected to occur during the morning peak hour, while 825 driveway trips are expected during the afternoon peak hour. Since the project is a commercial development, pass-by trips are expected. These pass-by trips are vehicles already on the street network that will be attracted to the site. The expected pass-by trips to the development results in an anticipated 5,024 weekday daily trips, of which 359 and 489 trips would be new (non pass-by) during the weekday morning and afternoon peak hours, respectively. The internal capture methodology and procedure as well as the pass-by percentages for each use were obtained from the ITE "Trip Generation Manual, Ninth Edition Volume 1, Users Guide and Handbook" 2012. Of note, the afternoon peak hour internal capture and pass-by rates were applied to the morning peak hour and daily as needed

[1] Institute of Transportation Engineers, *Trip Generation: An Information Report*, Ninth Edition, Washington DC, 2012.

as these rates are anticipated to be similar throughout the day. **Table 1** summarizes the estimated traffic generation for proposed development. The trip generation worksheets are included in **Appendix C**. These calculations illustrate the equations used, directional distribution of trips, and number of daily trips based on the published ITE *Trip Generation Report*.

Table 1 – External Project Trip Generation

	Vehicles Trips						
	Daily	**Weekday AM Peak Hour**			**Weekday PM Peak Hour**		
		In	**Out**	**Total**	**In**	**Out**	**Total**
Non Pass-By Trips							
Shopping Center (820)	2,330	30	9	39	114	124	238
Fast-Food Restaurant with Drive-Thru Window (934)	2,446	151	138	289	86	77	163
High-Turnover Sit-Down Restaurant (932)	54	2	2	4	7	6	13
Drive-In Bank (912)	122	7	3	10	25	23	48
Medical Offices (720)	72	13	4	17	8	19	27
Total	**5,024**	**203**	**156**	**359**	**240**	**249**	**489**
Pass-By Trips							
Shopping Center (820)	1,198	10	3	13	59	64	123
Fast-Food Restaurant with Drive-Thru Window (934)	2,446	145	132	277	86	77	163
High-Turnover Sit-Down Restaurant (932)	32	1	1	2	4	3	7
Drive-In Bank (912)	108	7	2	9	22	21	43
Total	**3,784**	**163**	**138**	**301**	**171**	**165**	**336**
Total Trips	**8,808**	**366**	**294**	**660**	**411**	**414**	**825**

5.2 Trip Distribution

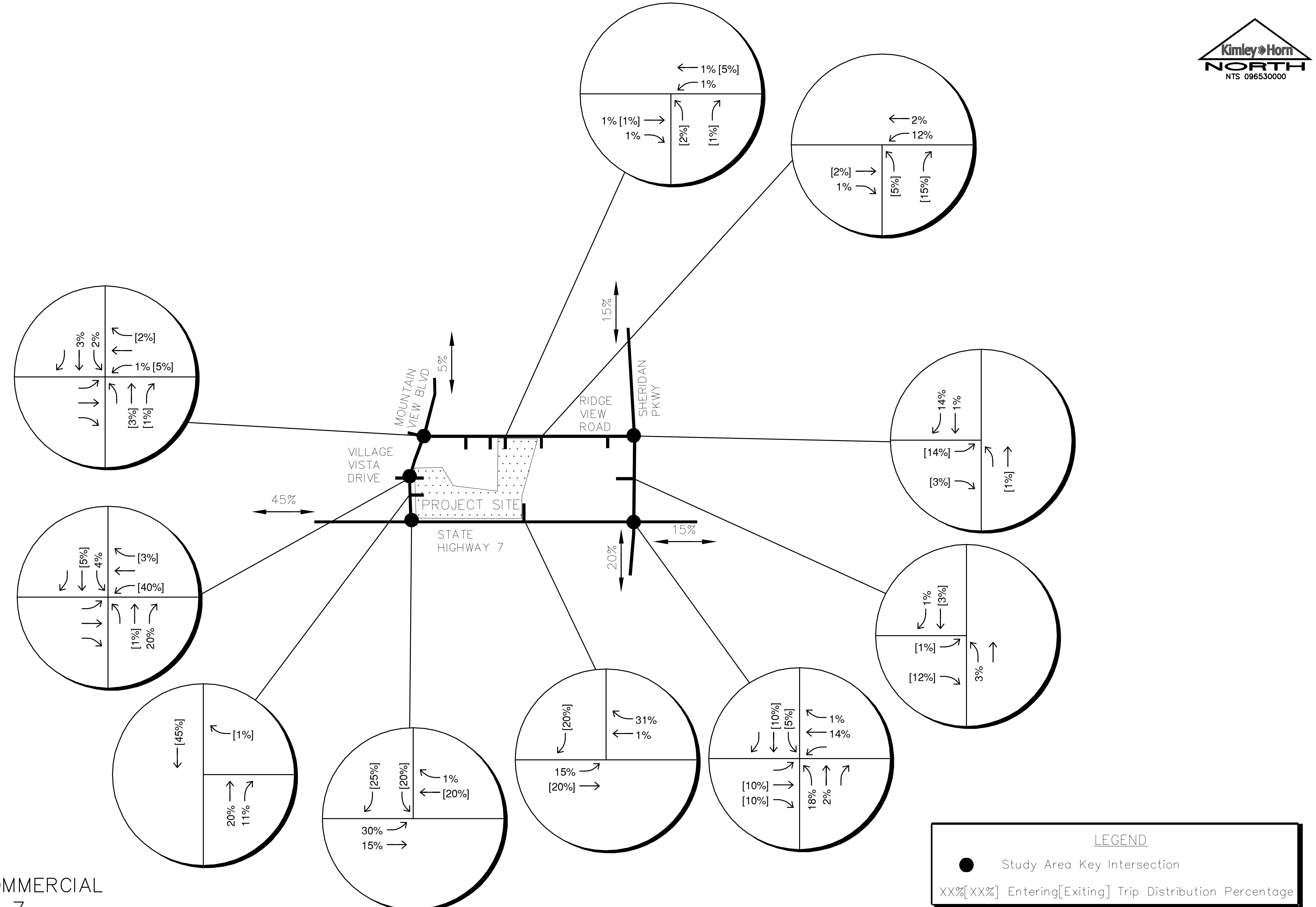
Distribution of site traffic was based on the area street system characteristics, existing traffic patterns and volumes, existing demographic information, and the proposed access system for the project. The non-pass-by directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source direction. **Figure 6** illustrates the expected non pass-by trip distribution for the site. Due to the nature of the proposed uses, both new (non-pass-by) and pass-by trips are anticipated to be generated by this project. Pass-by distributions capture the route of the vehicle, which is a percentage of traffic driving by the site, arriving from a direction and then continuing in that original direction when leaving. Pass-by distributions are prepared directly based on existing traffic volume counts along the adjacent streets. **Figures 7** and **8**, illustrate the pass-by traffic, calculated separately for the morning and afternoon peak hours, respectively, due to the directional differences of traffic during the peak hours.

5.3 Traffic Assignment

Traffic assignment was obtained by applying the distributions from **Figures 6** through **8** to the estimated traffic generation of the project shown in **Table 1**. The non-pass-by traffic assignment is shown in **Figure 9**. Pass-by traffic assignment is shown in **Figure 10**.

5.4 Total (Background Plus Project) Traffic

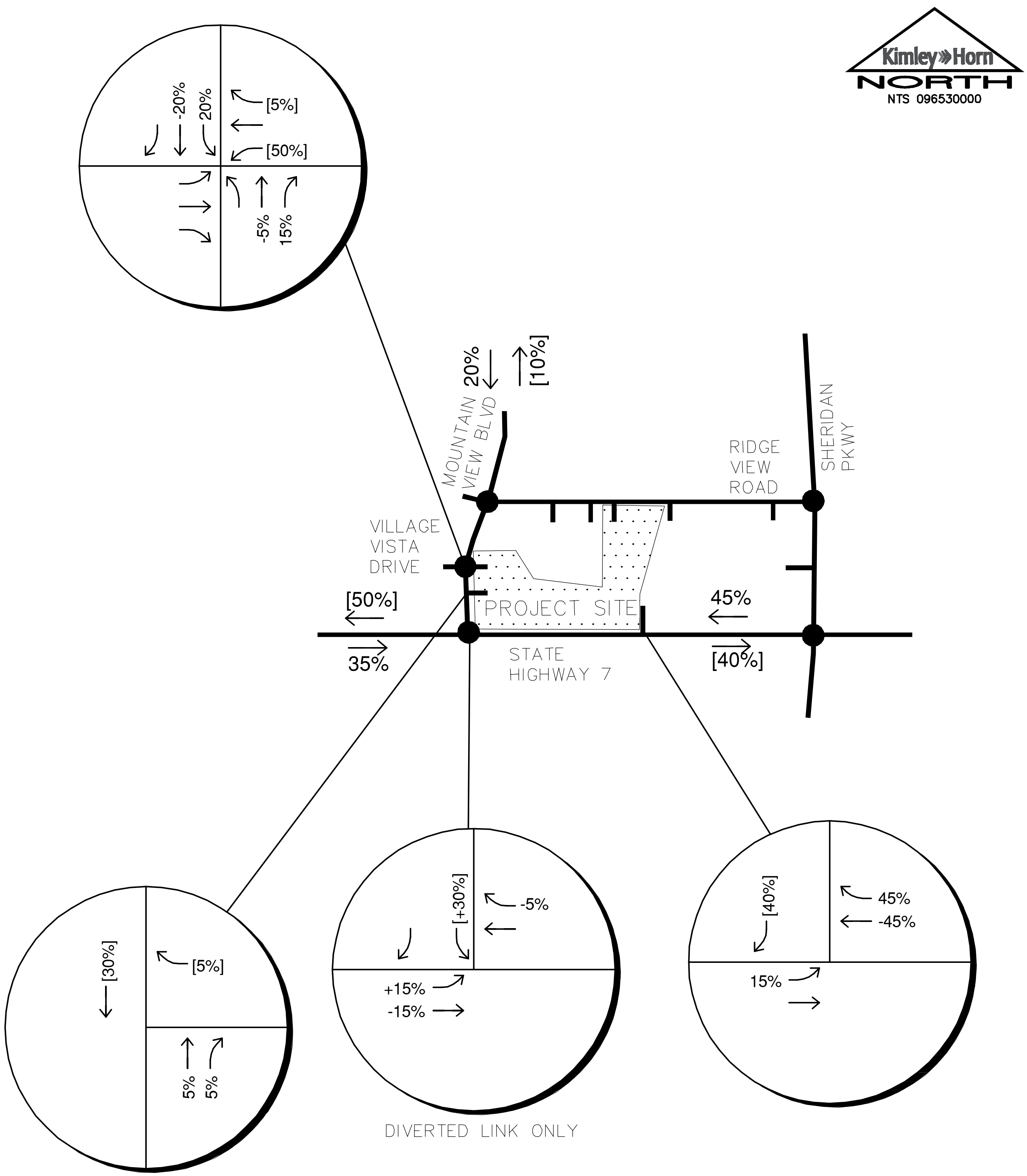
Project traffic volumes were added to the background volumes to represent estimated traffic conditions for the short-term 2018 project build out horizon and long-term 2035 horizon. **Figure 11** illustrates the background plus project traffic volumes for the 2018 horizon at the study key intersections and the access intersections proposed with the project. The 2035 background plus project traffic volumes are shown in **Figure 12**.



VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
NON PASS-BY TRIP DISTRIBUTION

FIGURE 6

Kimley»Horn



LEGEND

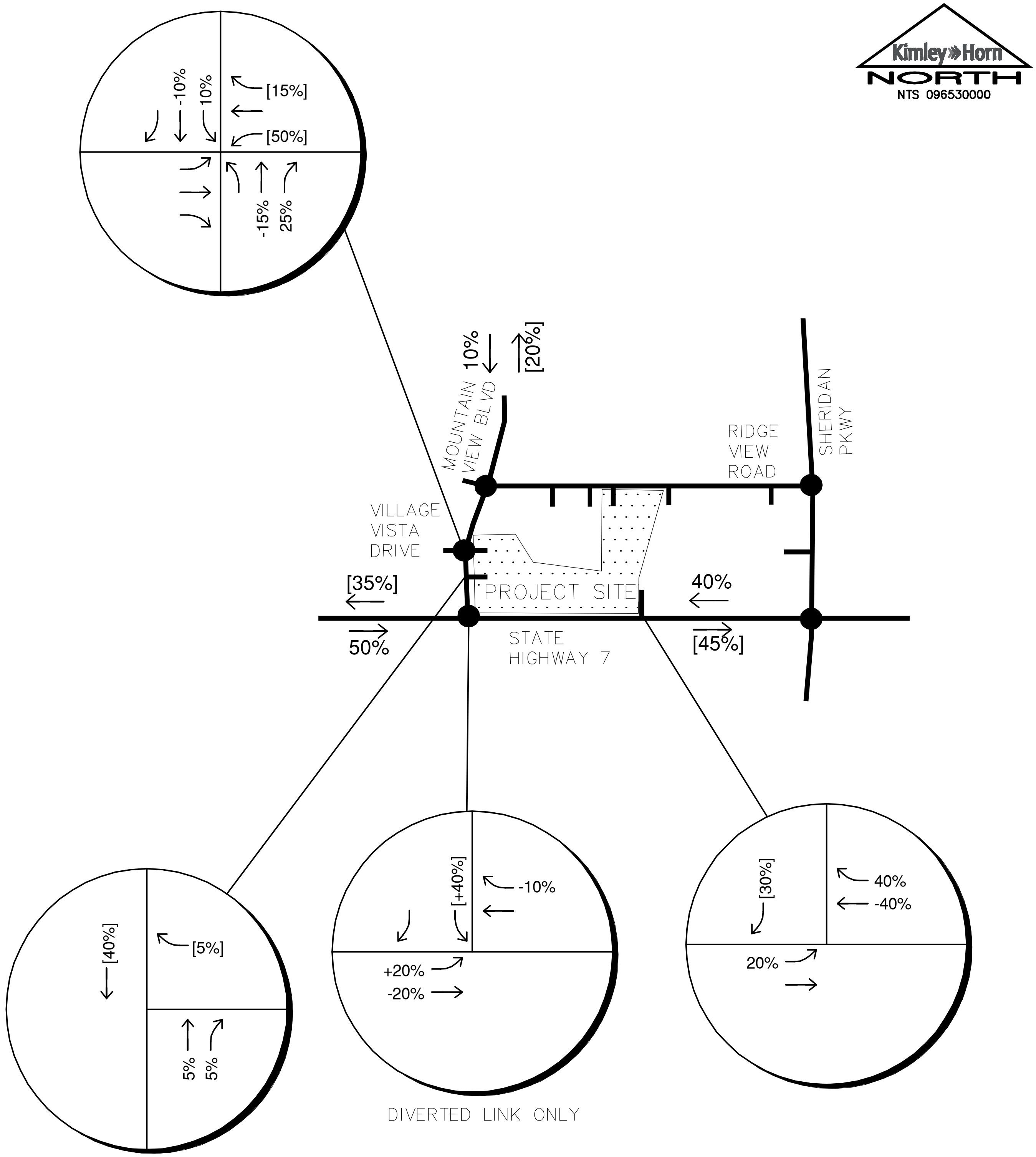
Study Area Key Intersection

XX%[XX%] Entering[Exiting] Trip Distribution Percentage

VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
AM PEAK PASS-BY TRIP DISTRIBUTION

FIGURE 7

Kimley»Horn



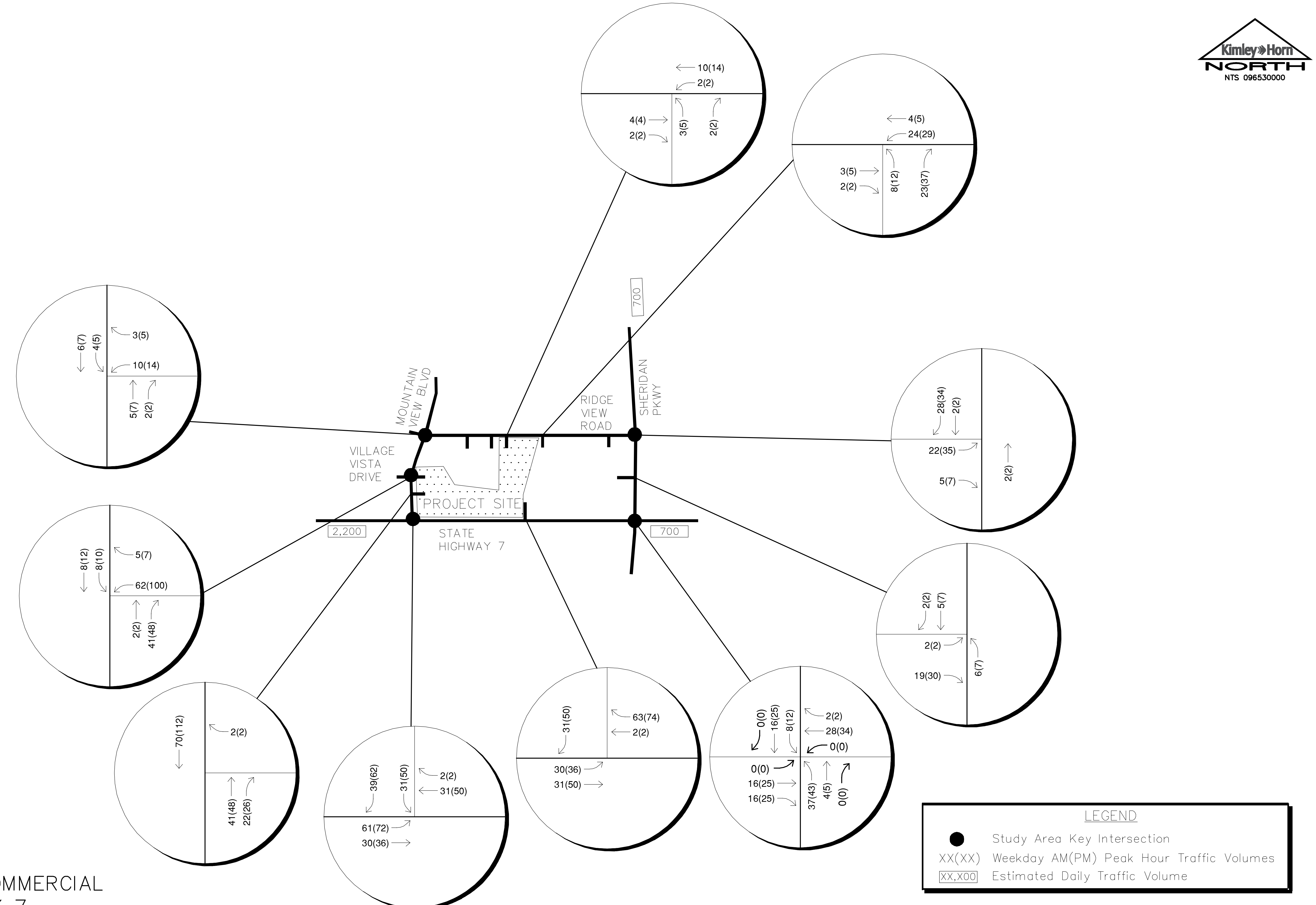
LEGEND

●	Study Area Key Intersection
XX%[XX%]	Entering[Exiting] Trip Distribution Percentage

VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
PM PEAK PASS-BY TRIP DISTRIBUTION

FIGURE 8

Kimley»Horn

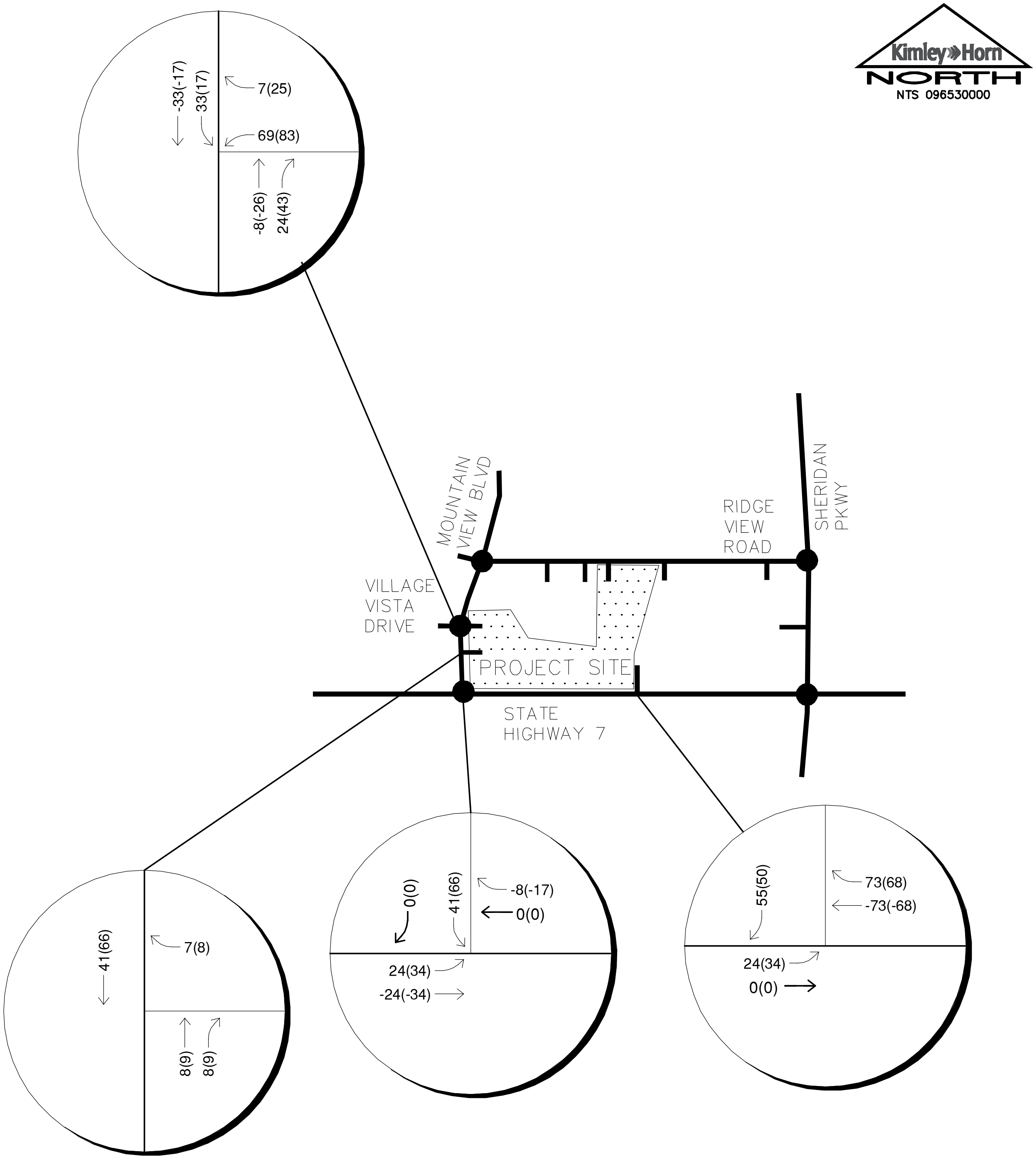


VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
PROJECT TRAFFIC ASSIGNMENT

FIGURE 9

Kimley»Horn

Date: May 23, 2016 – 10:54am / User: matt.farmen
Path: K:\DEN_TPTO\096530000 – Vista Ridge Commercial\Vista Ridge Commercial Figures.dwg / Xref:



LEGEND

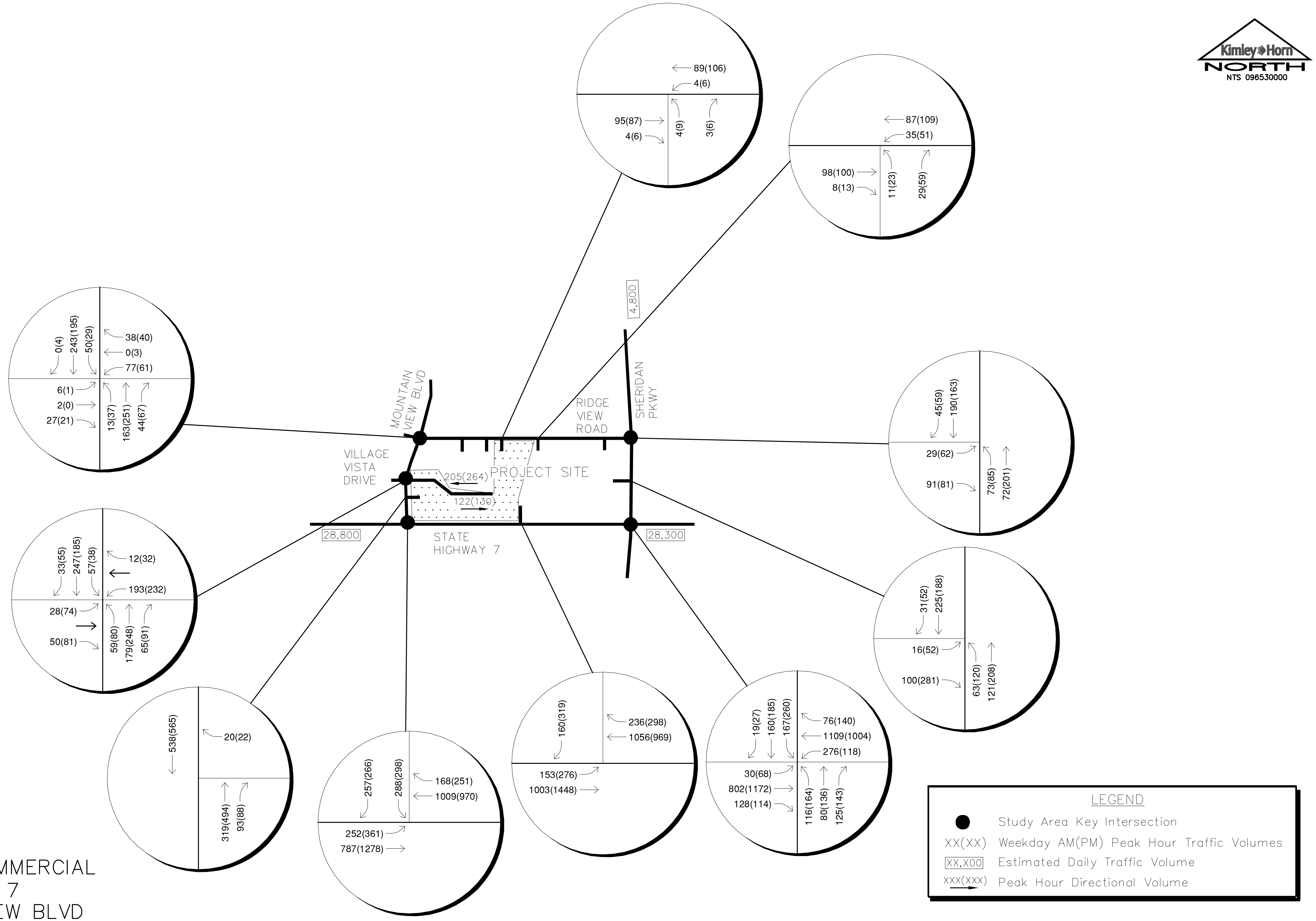
● Study Area Key Intersection

XX(XX) Weekday AM(PM) Peak Hour Traffic Volumes

VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
PASS-BY TRAFFIC ASSIGNMENT

FIGURE 10

Kimley»Horn



VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
2016 BACKGROUND
PLUS PROJECT TRAFFIC VOLUMES

FIGURE 11

Kimley»Horn

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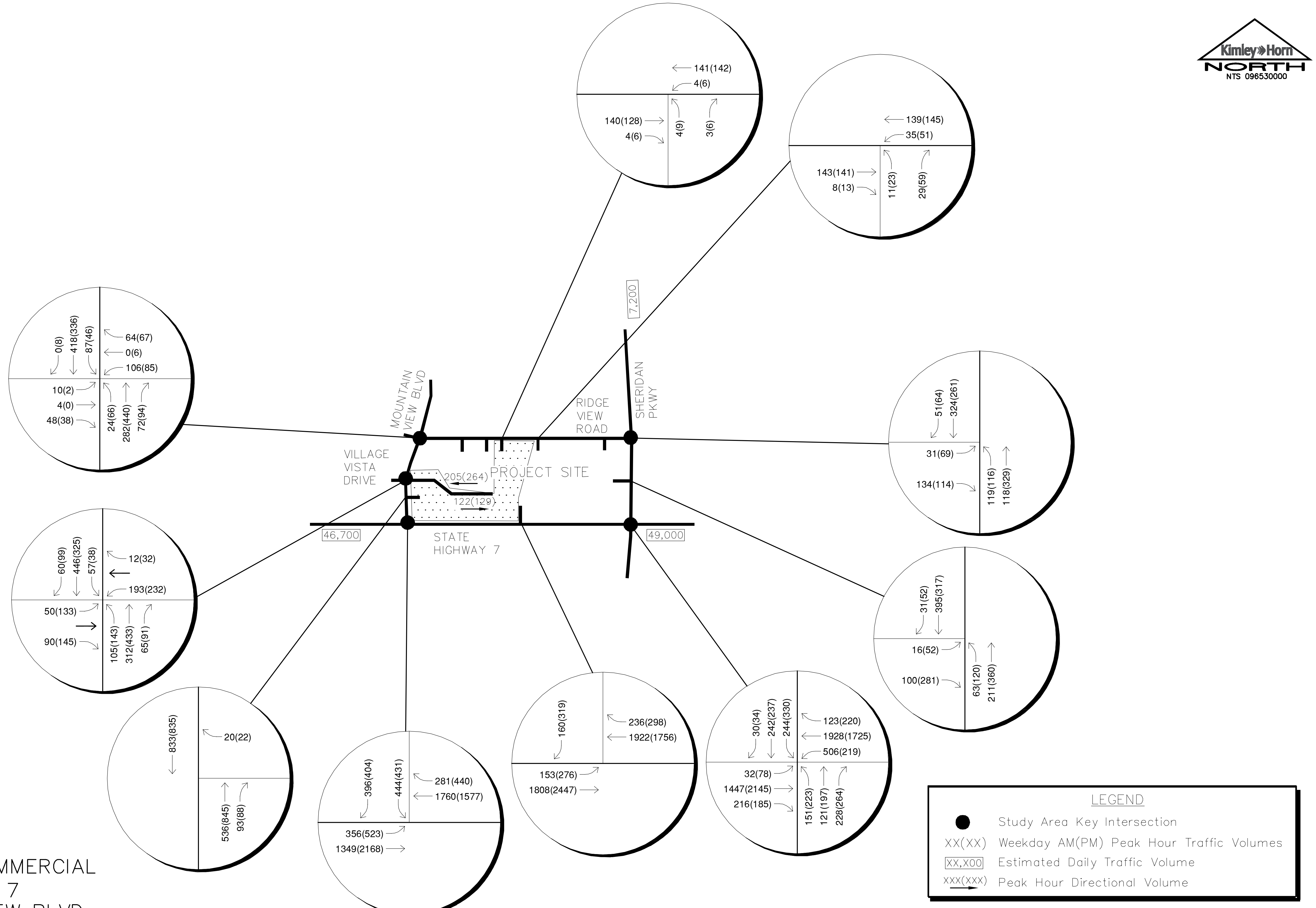


VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
2035 BACKGROUND
PLUS PROJECT TRAFFIC VOLUMES

FIGURE 12

Kimley»Horn

6.0 TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn's analysis of traffic operations in the vicinity of the site was conducted to determine potential capacity deficiencies in the 2018 and 2035 development horizons at the identified key intersections. The acknowledged source for determining overall capacity is the current edition of the *Highway Capacity Manual*[2].

6.1 Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). For intersections and roadways in this study area, common traffic engineering practice recommends intersection LOS D and movement LOS E as the minimum desirable threshold for acceptable operations. **Table 2** shows the definition of LOS for signalized and unsignalized intersections.

Table 2 – Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)	Unsignalized Intersection Average Total Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Definitions provided from the Highway Capacity Manual, Special Report 209, Transportation Research Board, 2010.

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. Under the unsignalized analysis, the LOS for a two-way stop controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS for a two-way stop-controlled intersection is not defined for the intersection as a whole. LOS for a signalized and four-way stop controlled intersection is defined for each approach and for the intersection. The intersection analysis was conducted using Synchro software with results reported using the Highway Capacity Manual (HCM) procedure.

[2] Transportation Research Board, *Highway Capacity Manual*, Special Report 209, Washington DC, 2010.

6.2 Intersection Operational Analysis

Calculations for the LOS at the study key intersections are provided in **Appendix D**. The analyses are based on the lane geometry and intersection control shown in **Figure 2**. The existing peak hour factors are also used in the existing and short term horizon (2018) analysis. The analysis determines what improvements may be needed at the intersections and accesses to accommodate background growth and project related traffic in the two study horizons.

<u>SH-7 and Mountain View Boulevard</u>

The existing “T”-intersection of SH-7 and Mountain View Boulevard operates with signal control and a 110-second cycle length. The southbound approach includes dual left-turn lanes and a single right turn lane. The westbound approach contains separate through and right turn lanes. The eastbound approach has one designated left-turn lane with protected permissive phasing and two through lanes. As such, the intersection operates acceptably for the morning and afternoon peak hours. In 2018, the intersection is anticipated to continue operating acceptably, with or without the addition of Vista Ridge Commercial project traffic. By 2035, it is believed that SH-7 through this Mountain View Boulevard intersection would be improved to accommodate future traffic. The SH-7 Access Control Plan identifies SH-7 to be improved to be a six-lane roadway. In addition, it is recommended that the southbound right turn operate with overlap phasing. With this configuration, the intersection is anticipated to continue operating acceptably through the 2035 horizon, with or without the addition of project traffic. **Table 3** provides the results of the level of service analysis conducted at this intersection.

Table 3 – SH-7 and Mountain View Boulevard LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	**LOS**	**Delay (sec/veh)**	**LOS**
2014 Existing	20.5	C	13.5	B
2018 Background	46.1	D	40.9	D
2018 Background Plus Project	54.9	D	53.7	D
2035 Background #	17.8	B	18.3	B
2035 Background Plus Project #	41.4	D	47.8	D

Three Through Lanes EB and WB and SB Right Turn Overlap Phasing

SH-7 and Sheridan Parkway

The existing signalized intersection at SH-7 and Sheridan Parkway operates with traffic signal control and a 110-second cycle length. The eastbound, westbound, and northbound approaches have designated left turn, through, and right turn lanes with protected/permissive phasing for left turn movements. The southbound approach has a shared through/right turn lane and a designated left-turn lane with protected/permissive phasing. With this configuration, the existing intersection operates acceptably at LOS C during the morning peak hour and LOS D during the afternoon peak hour. With the existing configuration, the intersection is anticipated to continue operating acceptably at LOS D during the morning peak hour and LOS E during the afternoon peak hour in 2018 prior to the addition of the proposed development traffic. With the addition of the proposed development traffic in 2018, the intersection is anticipated to operate at a LOS F for the morning and afternoon peak hours. The through volume of traffic utilizing SH-7 is currently nearing capacity with just a single through lane in each direction prior to the addition of project traffic. The roadway will likely need to be improved by CDOT in the near term future to accommodate future traffic with at least two through lanes in each direction. It is recommended that in the interim CDOT consider converting the eastbound and westbound approaches to include two through lanes. This could be accomplished by redesignating and restriping the eastbound and westbound separate right turn lanes to shared through/right turn lanes. With this modification and the addition of project traffic, the intersection is anticipated to operate at LOS C during the morning peak hour and LOS D during the afternoon peak hour. The improvement offered by converting the eastbound and westbound right turn lanes to through lanes demonstrates the capacity issues for traffic traveling along SH-7.

As previously described, it is anticipated that SH-7 will be improved to be six-lane roadway by the 2035 horizon. In addition, Sheridan Boulevard may be a four-lane roadway in the future. Dual left-turn lanes are anticipated to exist on all approaches to the intersection along with northbound and southbound right turn lanes. With this configuration, the intersection is anticipated to operate acceptably, with or without the addition of project traffic in 2035. **Table 4** provides the results of the LOS analysis conducted at this intersection.

Table 4 – State Highway 7 and Sheridan Parkway LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2014 Existing	21.9	C	36.2	D
2018 Background	38.5	D	78.1	E
2018 Background Plus Project	94.5	F	99.0	F
2018 Background Plus Project #	31.5	C	40.0	D
2035 Background ##	31.1	C	36.1	D
2035 Background Plus Project ##	35.3	D	52.3	D

Two Through Lanes Eastbound and Westbound

Three Through Lanes EB and WB, Dual Left Turn Lanes all Approaches, NB & SB Right Turn Lanes

<u>Sheridan Parkway and Ridge View Drive</u>

The existing intersection of Sheridan Parkway and Ridge View Drive operates with stop control on the eastbound approach. The intersection currently has all movements operating at a LOS B or better during the morning and afternoon peak hours. With the addition of project traffic through the build out 2018 horizon, this intersection is anticipated to continue to operate acceptably during the morning and afternoon peak hours with its existing configuration and control. By 2035, Sheridan Parkway is expected to have at least two through lanes of travel in each direction (possibly three through lanes in each direction as identified). With or without the addition of project traffic through the 2035 horizon, this intersection is anticipated to operate acceptably during the morning and afternoon peak hours with stop control on the eastbound approach. Therefore, no improvements are anticipated to be needed at this intersection specific to this project. **Table 5** provides the results of the LOS analysis conducted at this intersection.

Table 5 – Sheridan Parkway and Ridge View Drive LOS Results

Scenario	AM Peak Hour Delay (sec/veh)	AM Peak Hour LOS	PM Peak Hour Delay (sec/veh)	PM Peak Hour LOS
2014 Existing				
Northbound Left	7.7	A	7.5	A
Eastbound Left	11.2	B	11.3	B
Eastbound Right	9.5	A	9.1	A
2018 Background				
Northbound Left	8.0	A	7.9	A
Eastbound Left	13.0	B	16.1	C
Eastbound Right	10.2	B	9.8	A
2018 Background Plus Project				
Northbound Left	8.1	A	8.1	A
Eastbound Left	10.6	B	20.0	C
Eastbound Right	10.5	B	10.0	B
2035 Background #				
Northbound Left	8.7	A	8.3	A
Eastbound Left	19.0	C	23.0	C
Eastbound Right	10.7	B	10.0	B
2035 Background Plus Project #				
Northbound Left	8.9	A	8.5	A
Eastbound Left	23.6	C	49.5	E
Eastbound Right	12.8	B	11.4	B

Two Through Lanes NB and SB

<u>Mountain View Boulevard and Ridge View Drive</u>

The existing intersection of Mountain View Drive and Ridge View Drive operates with stop control on the eastbound and westbound approaches of Fairway Point Drive/Ridge View Drive. The westbound approach of Ridge View has a designated left turn lane and a shared through/ right-turn lane. Although not striped, the eastbound approach is wide enough to accommodate a left turn lane and a shared through and right turn lane. With this configuration, all movements operate with acceptable level of service today. In 2018 with or without the addition of project traffic, all movements are anticipated to continue operating acceptably. Therefore, no improvements are anticipated to be needed at this intersection to accommodate project traffic. By 2035, the westbound left turn movement may operate with long delays and a LOS F during the peak hours if the projected future traffic volumes are realized. Alternate control (traffic signal or roundabout) could be considered for the intersection if desired. It is recommended that the Town of Erie continue to monitor traffic volumes at this intersection in the future to determine if and when improvements are needed. Otherwise, it is believed that traffic will divert and reroute on the street network if these long delays are realized for the westbound left turn movement. **Table 6** provides the LOS analysis conducted at this intersection.

Table 6 – Mountain View Boulevard and Ridge View Drive LOS Results

	AM Peak Hour		PM Peak Hour	
Scenario	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**
2015 Existing				
Northbound Left	7.8	A	7.7	A
Southbound Left	7.6	A	7.7	A
Eastbound Left	14.9	B	14.6	B
Eastbound Thru/Right	10.4	B	9.3	A
Westbound Left	16.5	C	15.2	C
Westbound Thru/Right	9.2	A	10.2	B
2018 Background				
Northbound Left	8.0	A	7.8	A
Southbound Left	7.7	A	7.8	A
Eastbound Left	16.9	C	16.3	C
Eastbound Thru/Right	10.9	B	9.5	A
Westbound Left	22.7	C	18.5	C
Westbound Thru/Right	9.4	A	10.5	B
2018 Background Plus Project				
Northbound Left	8.0	A	7.8	A
Southbound Left	7.7	A	7.9	A
Eastbound Left	17.5	C	17.1	C
Eastbound Thru/Right	11.0	B	9.6	A
Westbound Left	25.5	D	20.9	C
Westbound Thru/Right	9.4	A	10.6	B
2035 Background				
Northbound Left	8.7	A	8.4	A
Southbound Left	8.2	A	8.5	A
Eastbound Left	39.9	E	37.4	E
Eastbound Thru/Right	15.3	C	10.9	B
Westbound Left	288.8	F	99.7	F
Westbound Thru/Right	10.5	B	14.1	B
2035 Background Plus Project				
Northbound Left	8.7	A	8.4	A
Southbound Left	8.3	A	8.5	A
Eastbound Left	42.5	E	39.6	E
Eastbound Thru/Right	15.5	C	11.0	B
Westbound Left	379.3	F	159.3	F
Westbound Thru/Right	10.6	B	14.4	B

Mountain View Boulevard and Village Vista Drive

The existing intersection of Mountain View Boulevard and Village Vista Drive operates with stop control on the eastbound approach**.** The eastbound approach of Village Vista Drive includes an exclusive left-turn lane and a shared through and right-turn lane. Although the westbound approach leads to vacant land, it has been partially constructed and includes a shared through and left-turn lane and a right-turn lane. With the intersection's existing configuration, all movements operate acceptably today. The intersection is anticipated to continue to operate acceptably in 2018 prior to the addition of Vista Ridge Commercial project traffic. With the addition of the project, the east leg of the intersection will provide access to the development. All movements are anticipated to operate acceptably with the exception of the westbound left turn during the afternoon peak hour. It isn't anticipated that the intersection will warrant signalization under this condition. Some traffic may reroute to the SH-7 three-quarter movement access if destined west on SH-7 or to Sheridan Boulevard if heading east on SH-7.

In 2035 the eastbound left turn movement is anticipated to operate with significantly long delays prior to the construction of the project due to the increased north-south through traffic volume growth along Mountain View Boulevard. Therefore, it is believed that this intersection will warrant and require signalization. Signalized and with the addition of project traffic, the intersection is anticipated to operate at LOS B during both peak hours. With signalization a westbound left turn lane is recommended to be designated. **Table 7** provides the LOS analysis conducted at this intersection.

Table 7 – Mountain View Boulevard and Village Vista Drive LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2015 Existing				
Northbound Left	8.2	A	8.1	A
Eastbound Left	15.7	C	18.0	C
Eastbound Thru/Right	9.7	A	9.5	A
2018 Background				
Northbound Left	8.5	A	8.2	A
Southbound Left	7.7	A	7.9	A
Eastbound Left	19.8	C	23.6	C
Eastbound Thru/Right	10.0	B	9.7	A
Westbound Thru/Left	19.6	C	21.7	C
Westbound Right	0.0	A	0.0	A
2018 Background Plus Project				
Northbound Left	8.3	A	8.2	A
Southbound Left	8.0	A	8.1	A
Eastbound Left	22.7	C	28.0	D
Eastbound Thru/Right	9.9	A	9.7	A
Westbound Thru/Left	63.2	F	134.6	F
Westbound Right	9.2	A	9.5	A
2035 Background				
Northbound Left	10.1	B	9.6	A
Southbound Left	8.2	A	8.4	A
Eastbound Left	94.1	F	386.5	F
Eastbound Thru/Right	12.2	B	11.5	B
Westbound Thru/Left	65.1	F	89.5	F
Westbound Right	0.0	A	0.0	A
2035 Background Plus Project #	17.8	B	21.5	C

Signalized, WB Left Turn Lane

6.3 Project Access Operational Analysis

An operational analysis was performed for the driveways proposed with this Vista Ridge Commercial project, as well as those that will be used by this project that are shared with Erie King Soopers #129 project to the east. The shared driveways that will allow direct access to the Vista Ridge Commercial project site include the three-quarter driveway along SH-7, the eastern full movement Ridge View Drive access, and the full movement access along Sheridan Parkway. The three-quarter movement driveway (southbound left turn egress restricted) is proposed to be located approximately 1,050 feet west of the SH-7/Sheridan Parkway intersection at the eastern edge of this project. New accesses proposed for Vista Ridge Commercial include a right-in/right-out driveway along Mountain View Boulevard, a full movement driveway to align with the Mountain View Boulevard and Village Vista Drive intersection, and an additional Ridge View Drive access. The right-in/right-out driveway is located approximately 315 feet north of the SH-7 and Mountain View Boulevard intersection.

The operational analysis at the proposed driveways determines the lane and control improvements needed at each access. Of note, the proposed three-quarter movement access along SH-7 will use the existing westbound auxiliary lane for deceleration and acceleration for movements to and from the driveway. **Table 8** provides a summary of the operational analysis at the proposed project accesses in 2018 and 2035. Detailed results of the operational analysis are also provided in **Appendix D**.

Table 8 – Project Access Driveway Intersection LOS Results

	2018 Total Traffic				2035 Total Traffic			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Access and Movement	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
SH-7 Three-Quarter								
EB Left	13.1	B	14.9	B	21.1	C	34.9	D
SB Right	0.0 *	A *	0.0 *	A *	0.0*	A *	0.0	A *
Sheridan Pkwy Full								
NB Left	8.0	A	8.1	A	8.5	A	8.5	A
EB Left	12.7	B	17.0	C	16.7	C	25.6	D
EB Right	10.4	B	12.2	B	12.1	B	14.7	B
Eastern Ridge View Dr.								
Northbound Left	10.2	B	10.6	B	10.7	B	11.1	B
Northbound Right	9.0	A	9.1	A	9.2	A	9.4	A
Westbound Left	7.5	A	7.6	A	7.6	A	7.7	A
Western Ridge View Dr.								
Northbound Approach	9.3	A	9.4	A	9.7	A	9.7	A
Westbound Left	7.4	A	7.4	A	7.5	A	7.5	A
Mountain View RIRO								
Westbound Right	9.8	A	10.5	B	10.7	B	12.4	B

* Free southbound right turn movement with acceleration lane

Recommendations from Access Operational Analysis

It is recommended that the proposed three-quarter movement access along SH-7 have an eastbound left-turn deceleration lane, a westbound right-turn deceleration lane and southbound free right-turn lane with a receiving acceleration lane along westbound SH-7 in 2018 and when the highway is improved to three through lanes in each direction in 2035. It is anticipated that the eastbound left turn movement at this intersection will operate acceptably during the 2018 horizon. In 2035, the eastbound left turn movement may operate with long delays as reported in the HCM 2010 analysis procedure; however it is anticipated to operate better than predicted by the effect of traffic metering from the upstream SH-7/Sheridan Boulevard signalized intersection. This was observed in the simulation and the HCM 2000 procedure shows acceptable level of service is attainable. The existing westbound auxiliary lane will be used for the deceleration and acceleration lane at this access. It is recommended that a R3-2 No Left Turn sign be installed for the southbound approach exiting the development at this access.

It is recommended that the proposed full movement access on Sheridan Parkway be designated with stop control with a R1-1 “STOP” sign installed on the eastbound approach out of the development. The northbound approach is recommended to have a designated left-turn lane. The southbound approach is recommended to have a shared through/right turn lane. With this configuration, the intersection is anticipated to have movements operate acceptably through the 2035 horizon.

The northbound approach at both Ridge View Drive accesses are recommended to be designated with stop control with R1-1 “STOP” signs installed. The eastern Ridge View Drive driveway shared with the Erie King Soopers #129 project is anticipated to receive the most traffic and is recommended to have separate northbound left turn and right turn lanes exiting the development. It is recommended that the driveway along Ridge View Drive be coordinated with Montex North and South developments as well as Vista Ridge Academy. It is also recommended that the existing striped median within Ridge View Drive be restriped as a two-way left-turn lane to accommodate left turn movements for the proposed access points and the existing access points on the north side of the street. With this proposed configuration, both proposed Ridge View Drive accesses are anticipated to operate acceptably throughout the 2035 horizon.

The proposed right-in/right-out access along Mountain View Boulevard is anticipated to operate with acceptable level of service. The westbound right turn movement exiting the development is recommended to operate with stop control with the installation of a R1-1 “STOP” sign. In addition, a R3-2 No Left Turn sign shall be installed underneath the STOP sign.

6.4 Turn Bay Length Analysis

It is recommended that auxiliary lanes along SH-7 adjacent to the project be constructed or designated in accordance with the current CDOT State Highway Access Code (SHAC). The State Highway Access Category Schedule categorizes the segment of State Highway 7 through the project study area as NR-A (Non-Rural Principal Highway). According to the SHAC, the following thresholds apply for category NR-A roadways:

- A left turn deceleration lane and taper with storage length is required for any access with a projected peak hour ingress turning volume greater than 10 vehicles per hour (vph). The taper length will be included within the required deceleration length.
- A right turn deceleration lane and taper is required for any access with a projected peak hour ingress turning volume greater than 25 vph. The taper length will be included within the required deceleration length.

- A right turn acceleration lane and taper is required for any access with a projected peak hour right turning volume greater than 50 vph when the posted speed on the highway is greater than 40 mph. The taper length will be included within the required deceleration length.

Based on traffic projections and the above thresholds, auxiliary turn lane requirements were calculated for the proposed three-quarter movement access along SH-7. Immediately adjacent to the site, SH-7 provides primarily a single through lane of travel in each direction with a 55 mile per hour posted speed limit. A continuous auxiliary lane exists along westbound SH-7 adjacent to the site which is used as an acceleration lane from Sheridan Parkway and a deceleration lane for Mountain View Boulevard. Eastbound there are two through lanes to receive the southbound dual lefts from Mountain View Boulevard, with the outside lane being a forced drop right turn lane at Sheridan Boulevard. As such, turn lane requirements at the proposed site access along SH-7 are as follows:

Proposed Three-quarter Movement Unsignalized Access

- A westbound right turn deceleration lane is warranted with the build out of the project. It is recommended that the existing westbound auxiliary lane be used for this right turn lane. Per SHAC standards, this right turn lane should include a length of 600 feet which includes a 222-foot taper (18.5 to 1), assuming a 12-foot wide turn lane. An acceleration/deceleration lane already exists today along State Highway 7 adjacent to the site. It is recommended that the existing combination acceleration/deceleration lane remain between this three-quarter movement access and Sheridan Parkway, which are separated by approximately 1,050 feet. The combination acceleration (960 feet) and deceleration (600 feet) would include an auxiliary combination lane length of approximately 1,120 feet without the tapers. Therefore, it is believed this distance will be adequate for acceleration, deceleration, and weaving maneuvers along westbound SH-7 between the proposed three-quarter movement access and Mountain View Boulevard. Further, it is recommended that this continuous auxiliary lane exists in 2035 after the highway is widened to be three lanes in each direction to allow for acceptable traffic operations.
- An eastbound left turn deceleration lane is warranted with the build out of the project. The length of the left turn deceleration lane will include deceleration length plus storage. The maximum projected peak hour ingress turning volume is 276 vehicles per hour

which equates to a storage length of 275 feet. It is recommended that the deceleration length be 380 feet plus a 220-foot taper (18.5 to 1), assuming a 12-foot wide lane. The overall left turn deceleration lane length is 655 feet plus a 220-foot taper.

- A westbound acceleration lane along State Highway 7 is warranted. The acceleration lane length needed is 960 feet which includes a 222-foot taper (18.5 to 1), assuming a 12-foot wide lane. It is recommended that the existing auxiliary lane be used as a combination acceleration/deceleration lane between the three-quarter movement access and Mountain View Boulevard. The combination acceleration (960 feet) and deceleration (600 feet) lane lengths would include an auxiliary combination lane length of approximately 1,120 feet without the two 220-foot tapers. There is approximately 1,550 feet between the proposed three-quarter movement access and Mountain View Boulevard which is greater than required. It is believed this distance will be adequate for acceleration, deceleration, and weaving maneuvers along westbound SH-7 between the proposed three-quarter movement access and Mountain View Boulevard. A continuous auxiliary lane for acceleration and deceleration movements should exist in 2035 when the highway is improved as well.

In addition to CDOT SHAC turn lane requirements along SH-7, a queuing analysis was conducted for the SH-7 and Ridge View Drive intersections with Mountain View Boulevard and Sheridan Parkway as well as the proposed accesses. Turn lanes are recommended to be constructed providing the recommended storage length based on the queuing analysis. Results were obtained from the 95th percentile queue lengths obtained from the Synchro analysis. Results are shown in the following **Table 9** with calculations provided within the level of service operational sheets of **Appendix D** for the unsignalized intersections and **Appendix E** for signalized intersections.

Table 9 – Left-turn lane Length Analysis Results

Intersection Turn Lane	Existing Turn Lane Length (feet)	2018 Total Queue Length (feet)	2018 Recommended Turn Lane Length (feet)	2035 Total Queue Length (feet)	2035 Recommended Turn Lane Length (feet)
SH-7 & Mountain View Blvd					
Eastbound Left	750’	436’	750’	570’	750’
Southbound Left	325’ DL	162’ DL	325’ DL	262’ DL	325’ DL
SH-7 & Sheridan Pkwy #					
Eastbound Left	700’	33’	700’	52’	**450’ DL**
Westbound Left	875’	230’	875’	193’	**650’ DL**
Northbound Left	275’	140’	275’	125’	**200’ DL**
Southbound Left	425’	230’	**325’**	228’	**200’ DL**
Ridge View & Sheridan					
Northbound Left	350’	25’	**150’**	25’	**150’**
Eastbound Left	200’	38’	200’	200’	200’
Ridge View & Mountain View					
Northbound Left	75’	25’	75’	25’	75’
Southbound Left	75’	25’	75’	25’	75’
Eastbound Left	125’	25’	125’	25’	125’
Westbound Left	200’	50’	200’	**320’**	**TWLTL**
Village Vista & Mountain View					
Northbound Left	200’	25’	200’	102’	200’
Southbound Left	75’	25’	75’	29’	75’
Eastbound Left	200’	25’	200’	117’	200’
Westbound Left	DNE	165’	**175’**	**240’**	**250’**
Sheridan Pkwy Access					
Northbound Left	DNE	25’	**100’**	25’	**150’**
Eastbound Left	DNE	50’	**50’**	60’	**75’**
Eastern Ridge View Access					
Westbound Left	DNE	25’	**TWLTL**	25’	**TWLTL**
Western Ridge View Access					
Westbound Left	DNE	25’	**TWLTL**	25’	**TWLTL**
Mountain View RIRO Access					
Westbound Right	DNE	25’	25’	25’	25’

DL = Dual Lefts
DNE = Does Not Exist
TWLTL = Two Way Left-turn lane
# Two Through Lanes EB and WB 2018, Three Through Lanes EB and WB 2035

SH-7 and Mountain View Boulevard Signalized Intersection

It is believed that the existing eastbound and southbound left-turn lanes will be sufficient to accommodate future traffic volumes throughout the 2035 horizon. Based on this, no improvements or modifications are anticipated to be needed.

SH-7 and Sheridan Parkway Signalized Intersection

In 2018 all existing left turn storage bays are believed to be adequate to accommodate project traffic. It is recommended that the existing southbound left turn bay be reduced from the existing 425 feet to 325 feet. This will allow for designation of a northbound left-turn lane at the proposed

Sheridan Parkway access. In 2035 it is anticipated that all left-turn lanes will be constructed as dual left-turn lanes. With two lanes for storage, left turn requirements will decrease further.

Ridge View Drive and Sheridan Parkway

The existing northbound and eastbound left-turn lanes are anticipated to be adequate to accommodate projected left turn queues. Based on planned access locations, both left turn bays are recommended to be reduced. The northbound left-turn lane is recommended to be reduced from the existing 350 feet to 150 feet to accommodate the proposed access intersection along Sheridan Parkway so that a southbound left-turn lane could be designated in the future for the development along the east side of Sheridan Parkway.

Ridge View Drive and Mountain View Boulevard

The existing left turn storage bays are sufficient to accommodate 2018 traffic with the addition of the Vista Ridge Commercial project. By 2035, the westbound left turn queue may extend as far as 320 feet if the future traffic volume projections are realized. As recommended, restriping Ridge View Drive with a Two Way Left Turn Lane will help with the queuing.

Village Vista Drive and Mountain View Boulevard

All existing left turn storage bays successfully accommodate existing traffic at the Village Vista Drive and Mountain View Boulevard intersection. With project development, the east leg of the intersection will be created. It is recommended that a westbound left turn lane be constructed and designated with a length of 175 feet for the 2018 horizon and 250 feet for the 2035 horizon. If possible, it would be desirable to construct this left turn lane with a length of 250 feet with project development.

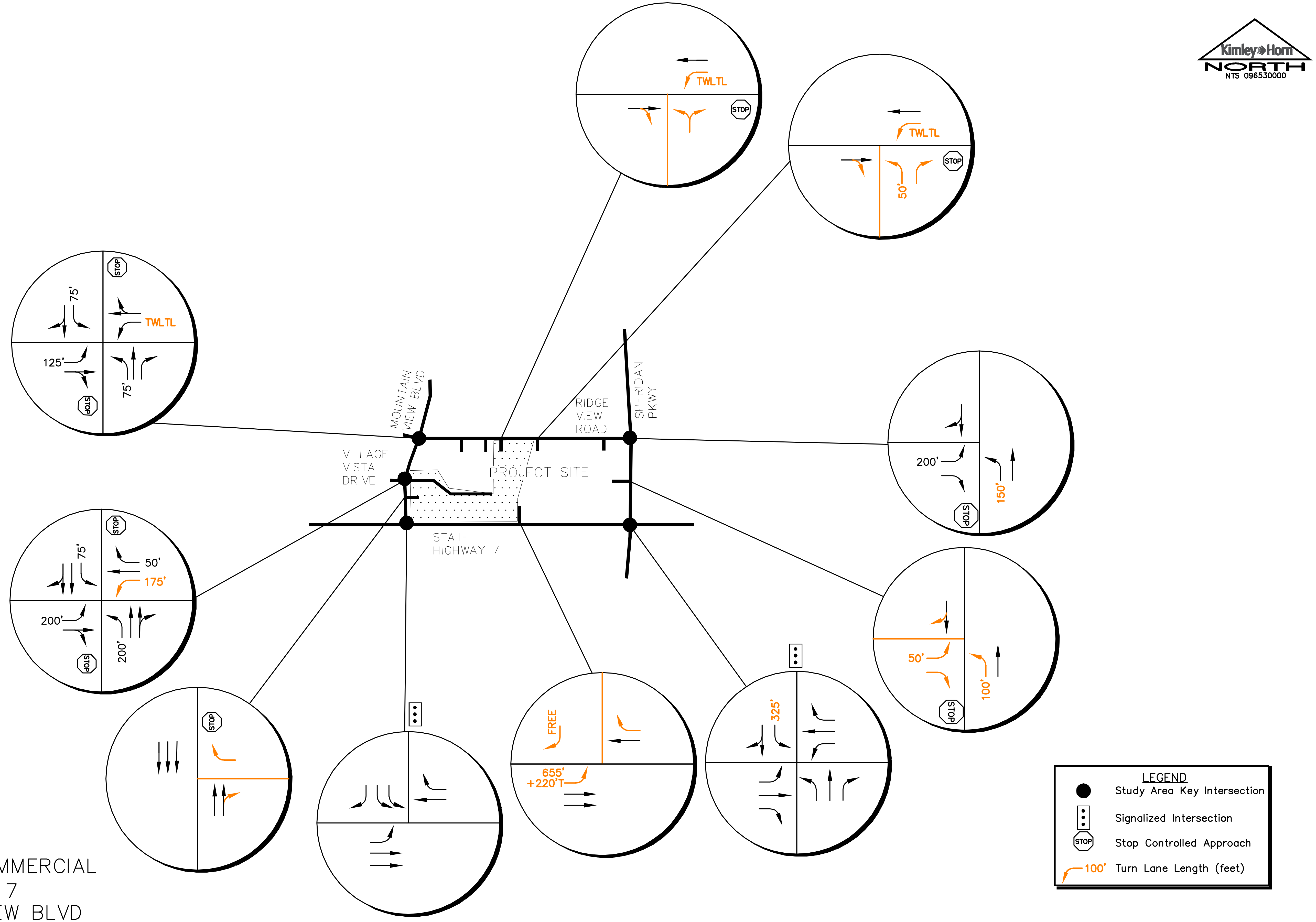
Sheridan Parkway Access

A full movement access is proposed along Sheridan Parkway, approximately halfway between SH-7 and Ridge View Drive. This full movement access will require a northbound left-turn lane. In addition, it is recommended that the eastbound approach exiting the property contain separate left turn and right turn lanes. Since there is approximately 450 feet of back-to-back storage available along Sheridan Parkway for the southbound left turn at SH-7 and northbound left turn at the access, it is recommended that a 100-foot northbound left-turn lane be designated. The southbound left-turn lane at SH-7 is recommended for a length of 325 feet. These lengths can be accommodate with a 25-foot taper between. When dual southbound left-turn lanes are constructed at the SH-7 and Sheridan Parkway intersection, it is recommended the back-to-back storage along Sheridan Parkway includes 200-foot southbound dual left-turn lanes, a 100-foot taper, and a 150-foot northbound left-turn lane at the access. The eastbound left turn out of the property was found to require three vehicles of storage. Therefore it is recommended that 75 feet of storage be provided within the throat of this driveway.

Ridge View Drive Access

It is recommended that a two-way left-turn lane be designated along Ridge View Drive to accommodate the two driveways proposed with the project, as well as the existing driveways for the school on the north side of the roadway. The eastern access is recommended to include separate northbound left turn and right turn lanes exiting the property. One vehicle of storage was found to be needed, so a driveway throat depth of 50 feet should be sufficient.

These improvements are illustrated in **Figure 13** for the 2018 horizon year and **Figure 14** for the 2035 horizon year.

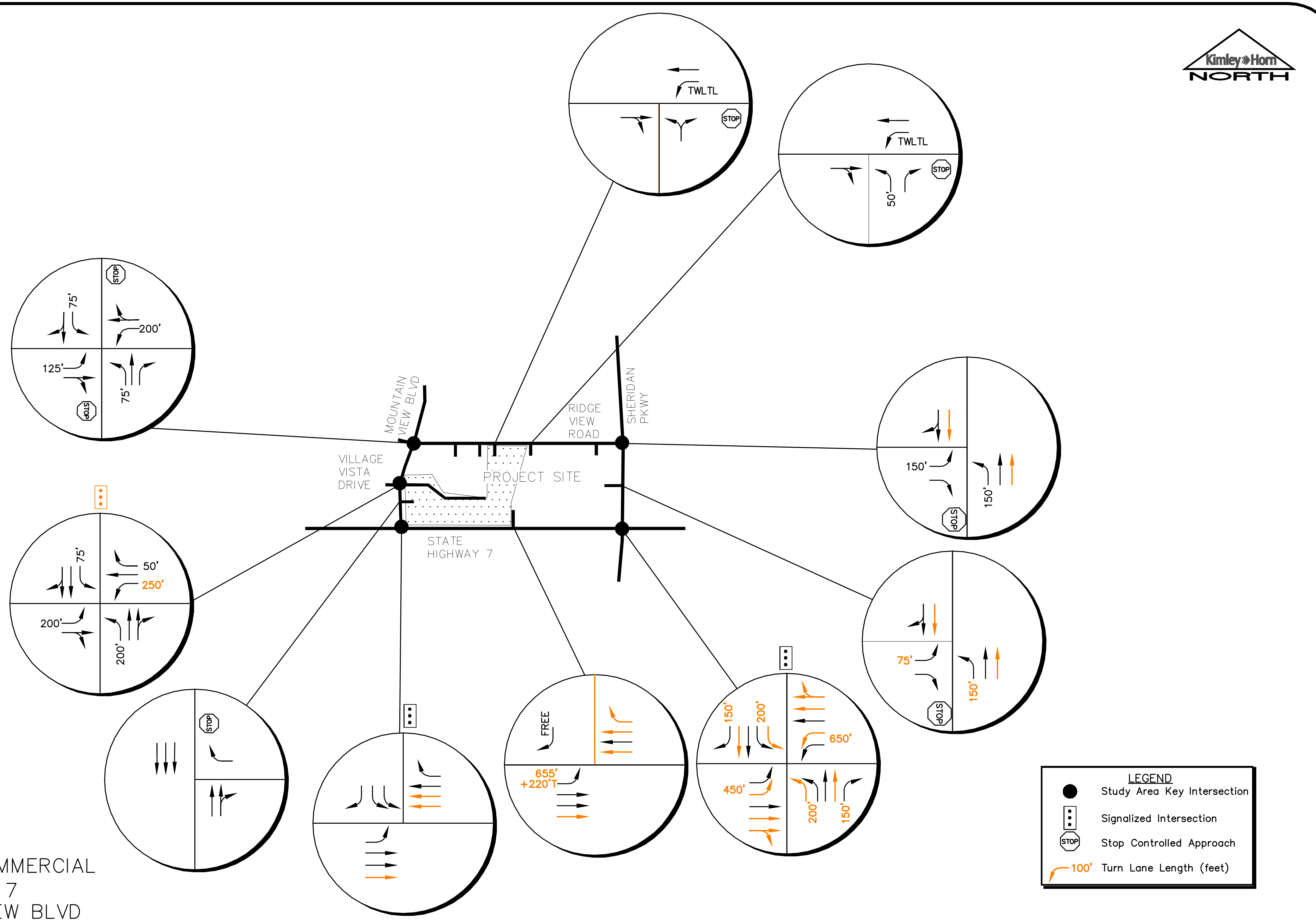


VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
2018 RECOMMENDED LANE
CONFIGURATIONS AND CONTROL

FIGURE 13

Kimley»Horn

Date: May 24, 2016 – 3:09pm / User: matt.farmen
Path: K:\DEN_TPTO\096530000 – Vista Ridge Commercial\Vista Ridge Commercial Figures.dwg / Xref:



VISTA RIDGE COMMERCIAL
STATE HIGHWAY 7
& MOUNTAIN VIEW BLVD
2035 RECOMMENDED LANE
CONFIGURATIONS AND CONTROL

FIGURE 14

Kimley»Horn

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes the proposed Vista Ridge Commercial project will be successfully incorporated into the existing and future roadway network. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following recommendations:

2018 Year Improvement Recommendations

- It is recommended that the southbound left-turn lane length at the SH-7/Sheridan Parkway intersection be reduced from 425 feet to 325 feet so that back-to-back left turn storage will be available along Sheridan Parkway between SH-7 and the proposed full movement project access. This length is anticipated to be sufficient to accommodate future left turning traffic volumes.
- It is recommended that a 100-foot northbound left-turn lane be designated along Sheridan Parkway for the proposed full movement access. Since there is approximately 450 feet of back-to-back available storage available between SH-7 and the project driveway, it is recommended that the taper between the left-turn lanes be 25 feet to allow for the recommended 325-foot southbound left-turn lane at SH-7.
- It is recommended that the full movement access on Sheridan Parkway be designated with stop control with a R1-1 “STOP” sign installed on the eastbound exiting approach. The eastbound exiting approach is recommended to be constructed with separate left and right turn lanes. The left-turn lane length recommended is the standard driveway throat depth of 75 feet.
- It is recommended that the northbound left-turn lane at the Ridge View Drive and Sheridan Parkway intersection also be reduced due to the proposed project access location along Sheridan Parkway. This left-turn lane is recommended to be reduced from 350 feet to 150 feet. This turn bay length is anticipated to be sufficient to accommodate future left turning traffic volumes.
- With construction of the project, the east leg of the Village Vista Drive and Mountain View Boulevard intersection will be improved. When the project is constructed, it is recommended that the existing striped full lane width median be redesignated with a 175-foot westbound left turn lane. If possible, it is encouraged that this westbound left turn lane be constructed so that the future 250-foot westbound left turn lane can be designated to accommodate 2035 traffic volumes.

- It is recommended that an eastbound left-turn lane be designated within the full width striped median along SH-7 at the proposed three-quarter movement access. It is recommended that this left-turn lane be designated with a length of 655 feet plus a 220-foot taper (875-foot total length).
- A continuous westbound auxiliary acceleration/deceleration lane exists along State Highway 7 between Sheridan Parkway and Mountain View Boulevard. This existing lane will serve as both an acceleration and deceleration lane for the proposed three-quarter SH-7 project access.
- At the proposed SH-7 three quarter movement access, it is recommended that a R3-2 No Left Turn sign be installed for the southbound approach for motorists exiting the development. This sign can be installed under the R1-1 “STOP” or R1-2 “YIELD” sign if desired.
- Both access approaches to Ridge View Drive are recommended to be designated with R1-1 “STOP” signs installed on the northbound approach out of the development. The eastern access is anticipated to receive the most traffic and is therefore recommended to have separate left and right lanes. The western access on Ridge View Drive is believed to operate acceptably with shared northbound left turn/right turn lanes.
- It is recommended that the full lane width median along Ridge View Drive be restriped to include a two-way left-turn lane through the proposed project accesses. It is recommended that this be coordinated with Montex North and South developments to provide a coordinated plan for Ridge View Drive.
- The westbound approach exiting the project at the right-in/right-out access along Mountain View Boulevard is recommended to operate with stop control. Therefore it is recommended that a R1-1 “STOP” sign be installed for this approach. In addition, a R3-2 No Left Turn Sign should be installed underneath the STOP sign to identify the turn movement restriction at this access.

2035 Long Term Twenty Year Planning Horizon Improvement Recommendations

- SH-7 may need to be a six-lane roadway by 2035. It is recommended that the westbound right turn deceleration and acceleration lanes from the three-quarter movement project driveway along SH-7 be reconstructed in addition to the three westbound through lanes. Sheridan Parkway may need to be a four-lane (or six-lane) roadway by 2035 as identified within the Amendment to the SH 7 Access Control Plan.

- The intersection of State Highway 7 with Sheridan Parkway is recommended to have dual left-turn lanes on all approaches and right turn lanes for the northbound and southbound directions.
- Upon construction of the dual southbound left-turn lanes at the SH-7 and Sheridan Parkway intersection, it is believed that the turn lane storage bay length can be reduced to 200 feet. This will allow for a 150-foot northbound left-turn lane at the proposed Sheridan Parkway access with a standard 100-foot taper between the back-to-back left-turn lanes along Sheridan Parkway between the proposed full movement access and SH-7.
- If future traffic volumes are realized along Mountain View Boulevard, the intersection of Village Vista Drive and Mountain View Boulevard will warrant and require signalization. Therefore, the Town of Erie should monitor traffic volumes in the future to determine if and when this improvement is needed.

General Recommendations

- All on-site and off-site roadway improvements should be incorporated into the Civil Drawings, and conform to standards of the Town of Erie, State of Colorado Department of Transportation (CDOT), American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets, Institute of Transportation Engineers (ITE), and/or the Manual on Traffic Control Devices (MUTCD) – 2009 Edition as appropriate.

APPENDICES

APPENDIX A

Intersection Count Sheets

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
AM Peak
Ridge View Dr and Mountian View Blvd

File Name : RidgeViewMountainViewAM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 1

Groups Printed- Unshifted

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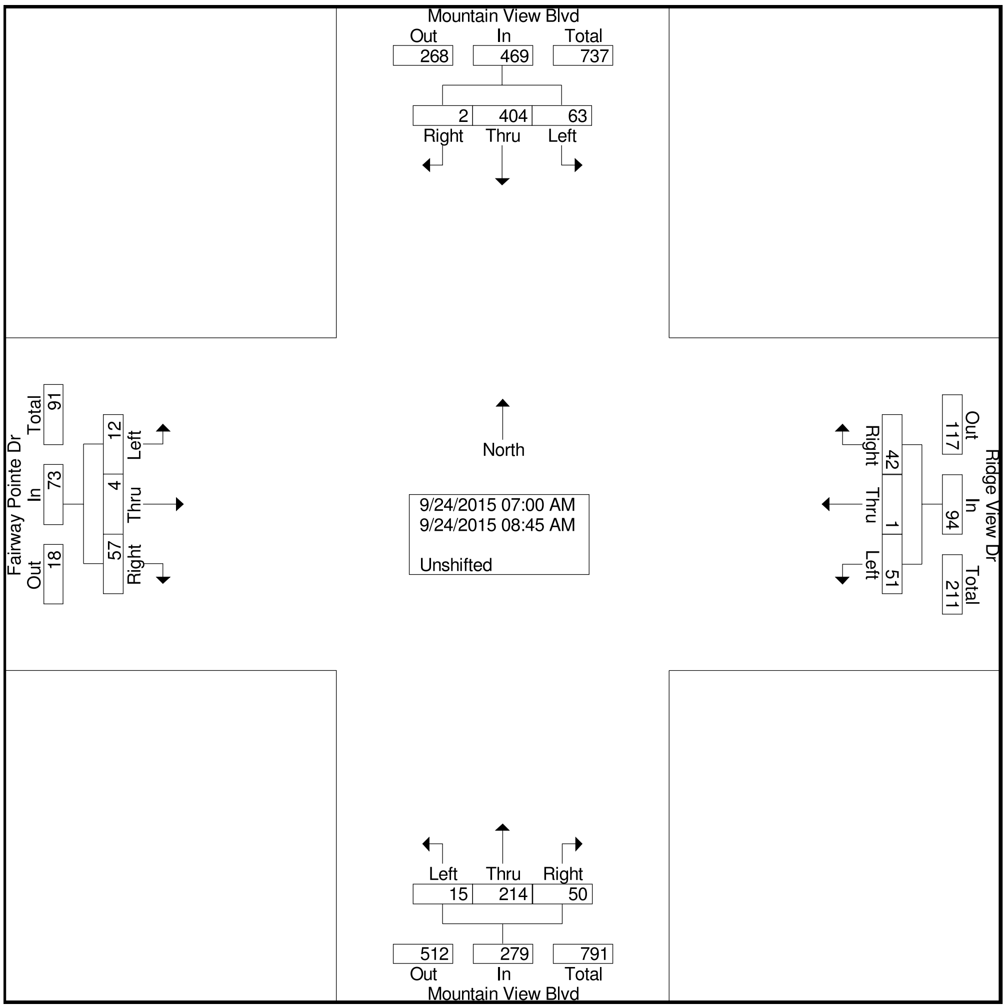
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	1	0	17	18	4	0	3	7	1	15	2	18	2	50	1	53	96
07:15 AM	2	0	10	12	3	0	1	4	0	23	3	26	6	49	1	56	98
07:30 AM	1	0	5	6	8	1	2	11	0	18	8	26	6	47	0	53	96
07:45 AM	3	2	1	6	3	0	7	10	2	23	6	31	8	59	0	67	114
Total	7	2	33	42	18	1	13	32	3	79	19	101	22	205	2	229	404
08:00 AM	1	1	7	9	13	0	5	18	1	35	15	51	9	57	0	66	144
08:15 AM	0	0	9	9	7	0	8	15	4	33	6	43	16	44	0	60	127
08:30 AM	2	1	7	10	6	0	9	15	1	29	5	35	7	32	0	39	99
08:45 AM	2	0	1	3	7	0	7	14	6	38	5	49	9	66	0	75	141
Total	5	2	24	31	33	0	29	62	12	135	31	178	41	199	0	240	511
Grand Total	12	4	57	73	51	1	42	94	15	214	50	279	63	404	2	469	915
Apprch %	16.4	5.5	78.1		54.3	1.1	44.7		5.4	76.7	17.9		13.4	86.1	0.4		
Total %	1.3	0.4	6.2	8	5.6	0.1	4.6	10.3	1.6	23.4	5.5	30.5	6.9	44.2	0.2	51.3	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
AM Peak
Ridge View Dr and Mountian View Blvd

File Name : RidgeViewMountainViewAM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 2



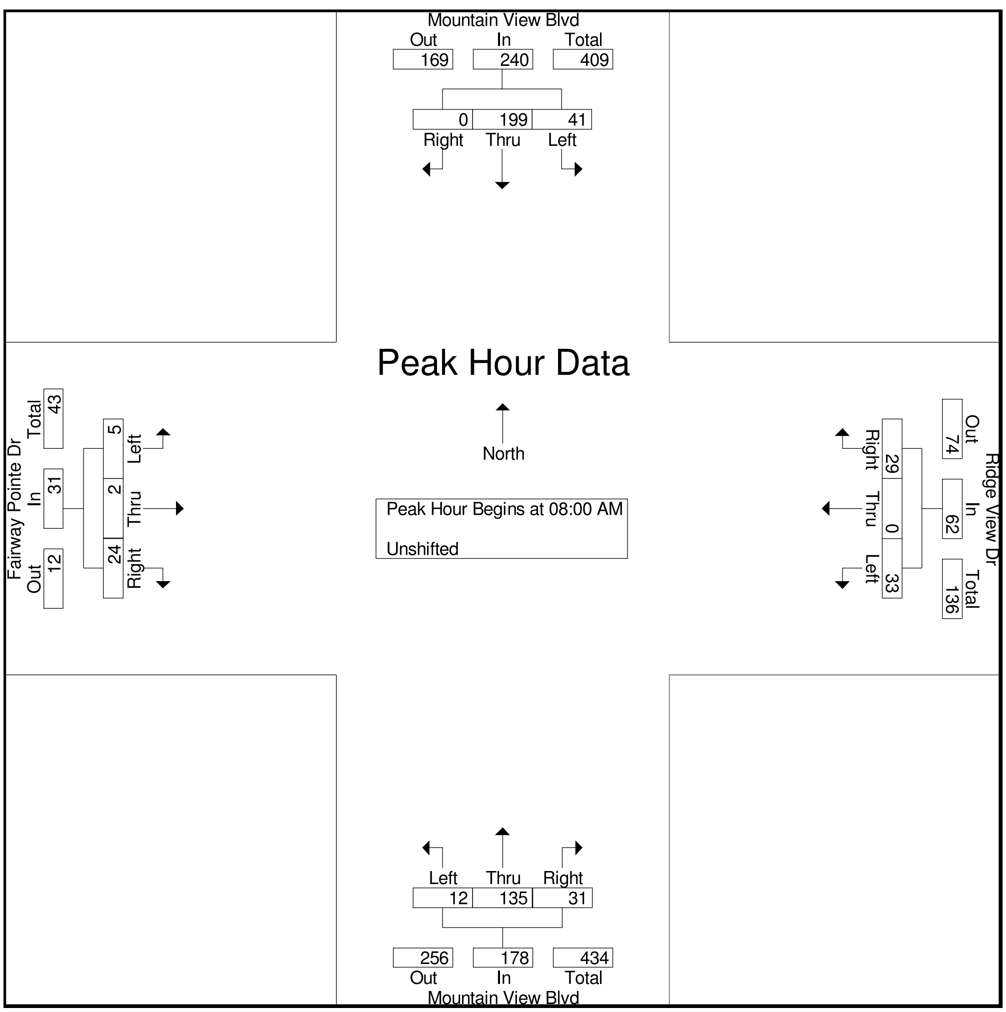
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
AM Peak
Ridge View Dr and Mountian View Blvd

File Name : RidgeViewMountainViewAM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 3

	Fairway Pointe Dr Eastbound				Ridge View Dr Westbound				Mountain View Blvd Northbound				Mountain View Blvd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	1	**1**	7	9	**13**	0	5	**18**	1	35	**15**	**51**	9	57	0	66	**144**
08:15 AM	0	0	**9**	9	7	0	8	15	4	33	6	43	**16**	44	0	60	127
08:30 AM	**2**	1	7	**10**	6	0	**9**	15	1	29	5	35	7	32	0	39	99
08:45 AM	2	0	1	3	7	0	7	14	**6**	**38**	5	49	9	**66**	0	**75**	141
Total Volume	5	2	24	31	33	0	29	62	12	135	31	178	41	199	0	240	511
% App. Total	16.1	6.5	77.4		53.2	0	46.8		6.7	75.8	17.4		17.1	82.9	0		
PHF	.625	.500	.667	.775	.635	.000	.806	.861	.500	.888	.517	.873	.641	.754	.000	.800	.887



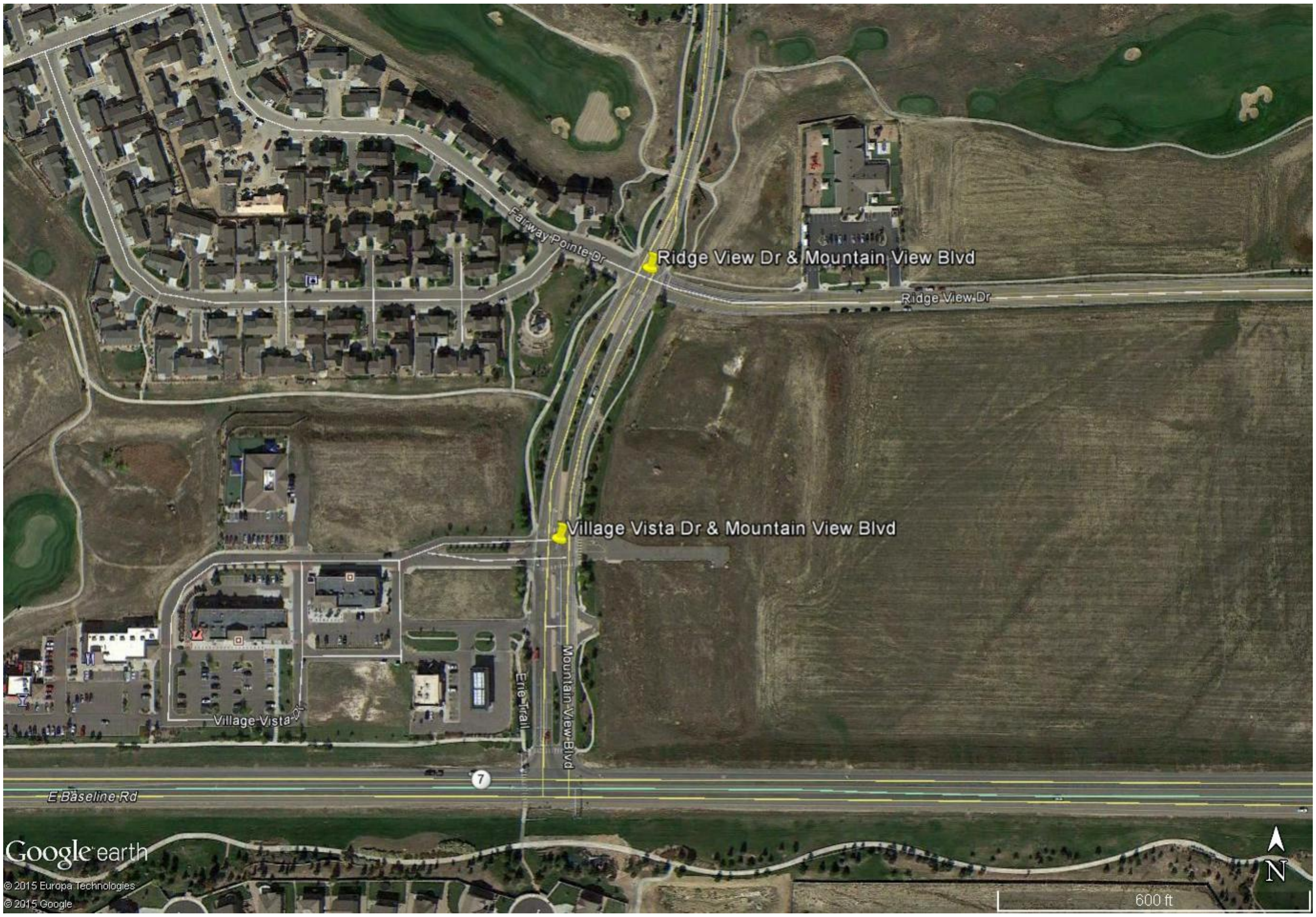
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
AM Peak
Ridge View Dr and Mountian View Blvd

File Name : RidgeViewMountainViewAM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 4

Image 1



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
PM Peak
Ridge View Dr and Mountain View Blvd

File Name : RidgeViewMountainViewPM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 1

Groups Printed- Unshifted

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04:15 PM	1	1	2	4	3	1	1	5	7	60	0	67	3	45	2	50	126
04:30 PM	0	0	3	3	2	2	4	8	7	37	0	44	3	48	2	53	108
04:45 PM	1	0	4	5	5	0	8	13	5	50	5	60	8	34	3	45	123
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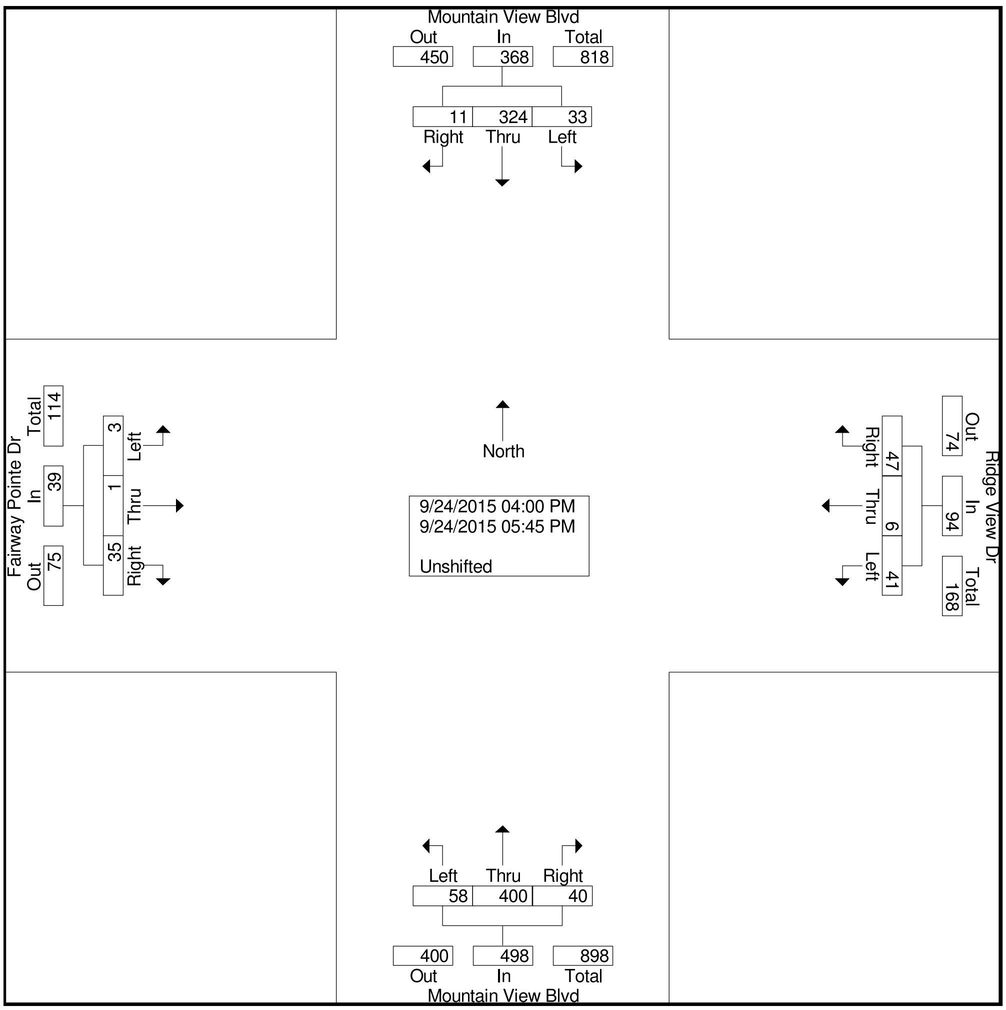
05:00 PM	0	0	4	4	10	0	9	19	8	49	14	71	6	42	3	51	145
05:15 PM	0	0	4	4	11	1	7	19	5	58	6	69	2	45	0	47	139
05:30 PM	0	0	7	7	3	1	3	7	12	52	7	71	6	38	0	44	129
05:45 PM	1	0	4	5	3	1	11	15	8	55	3	66	5	35	1	41	127
Total	1	0	19	20	27	3	30	60	33	214	30	277	19	160	4	183	540
Grand Total	3	1	35	39	41	6	47	94	58	400	40	498	33	324	11	368	999
Apprch %	7.7	2.6	89.7		43.6	6.4	50		11.6	80.3	8		9	88	3		
Total %	0.3	0.1	3.5	3.9	4.1	0.6	4.7	9.4	5.8	40	4	49.8	3.3	32.4	1.1	36.8	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
PM Peak
Ridge View Dr and Mountain View Blvd

File Name : RidgeViewMountainViewPM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 2



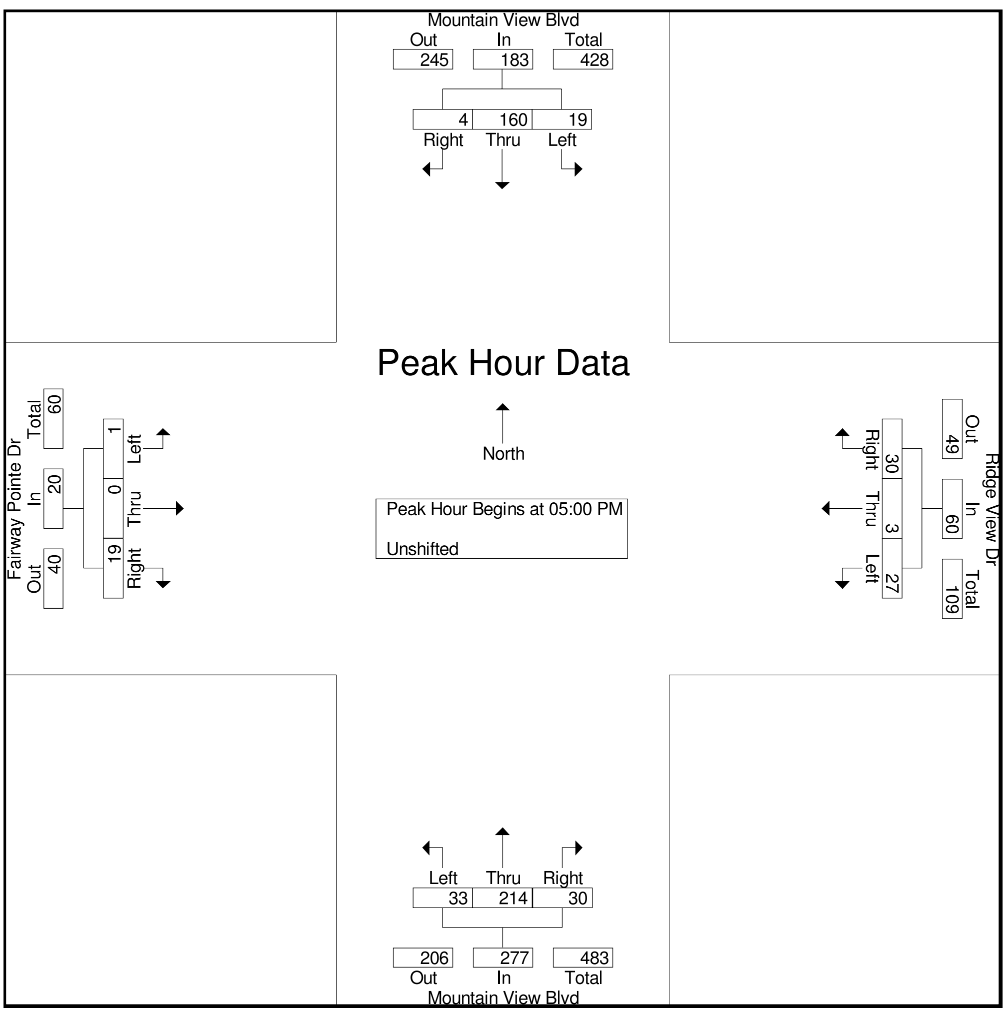
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
PM Peak
Ridge View Dr and Mountain View Blvd

File Name : RidgeViewMountainViewPM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 3

	Fairway Pointe Dr Eastbound				Ridge View Dr Westbound				Mountain View Blvd Northbound				Mountain View Blvd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	4	4	10	0	9	**19**	8	49	**14**	**71**	**6**	42	**3**	**51**	**145**
05:15 PM	0	0	4	4	**11**	**1**	7	19	5	**58**	6	69	2	**45**	0	47	139
05:30 PM	0	0	**7**	**7**	3	1	3	7	**12**	52	7	71	6	38	0	44	129
05:45 PM	**1**	0	4	5	3	1	**11**	15	8	55	3	66	5	35	1	41	127
Total Volume	1	0	19	20	27	3	30	60	33	214	30	277	19	160	4	183	540
% App. Total	5	0	95		45	5	50		11.9	77.3	10.8		10.4	87.4	2.2		
PHF	.250	.000	.679	.714	.614	.750	.682	.789	.688	.922	.536	.975	.792	.889	.333	.897	.931



RDC
Ridgeview Data Collection

Morrison, CO 80465

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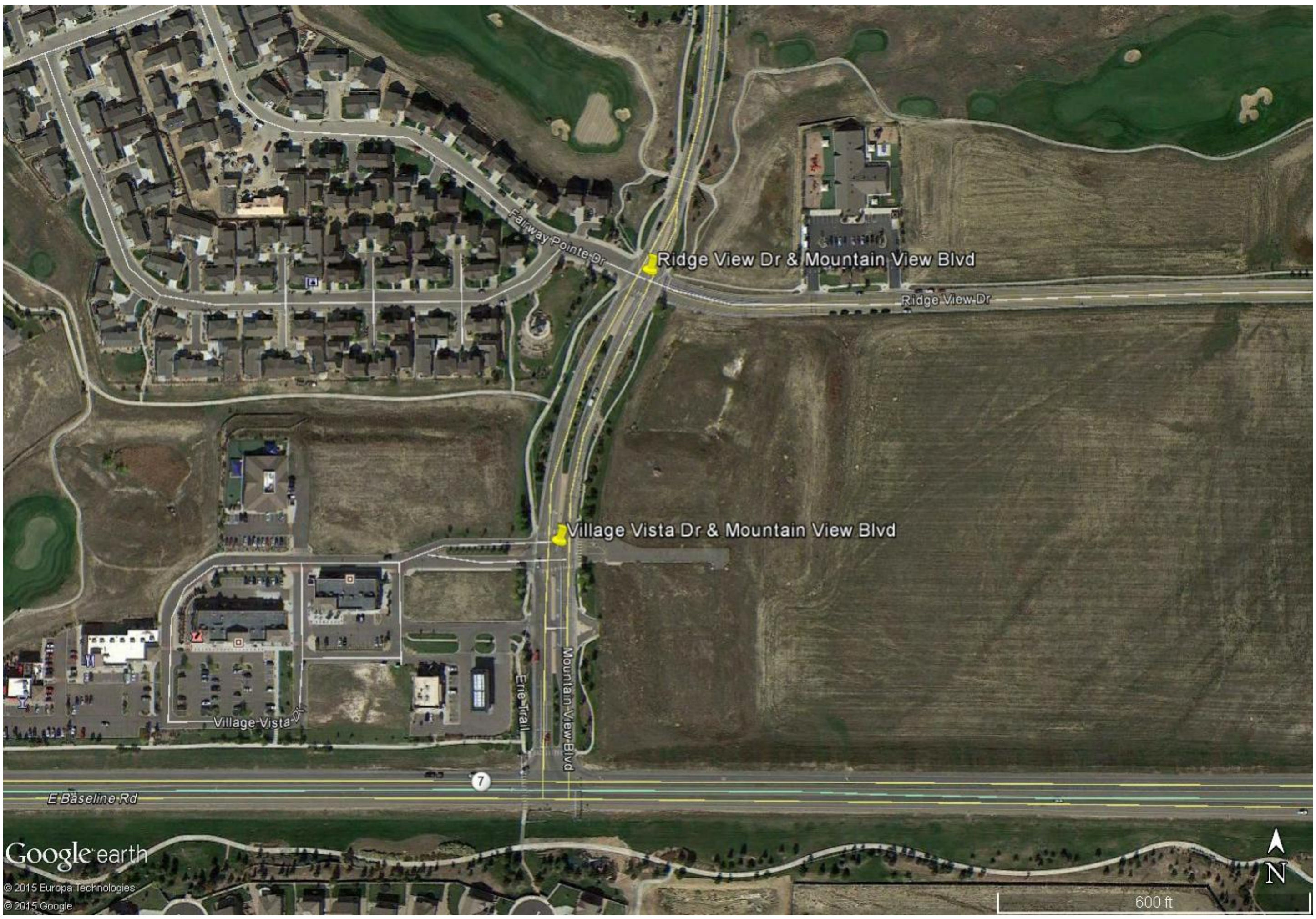
Erie Kentro	Site Code : IPO 129
PM Peak	Start Date : 9/24/2015
Ridge View Dr and Mountain View Blvd	Page No : 4

Image 1



Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
Ridge View Dr and Sheridan Pkwy

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Start Date : 10/15/2014
Page No : 1

Groups Printed- Unshifted

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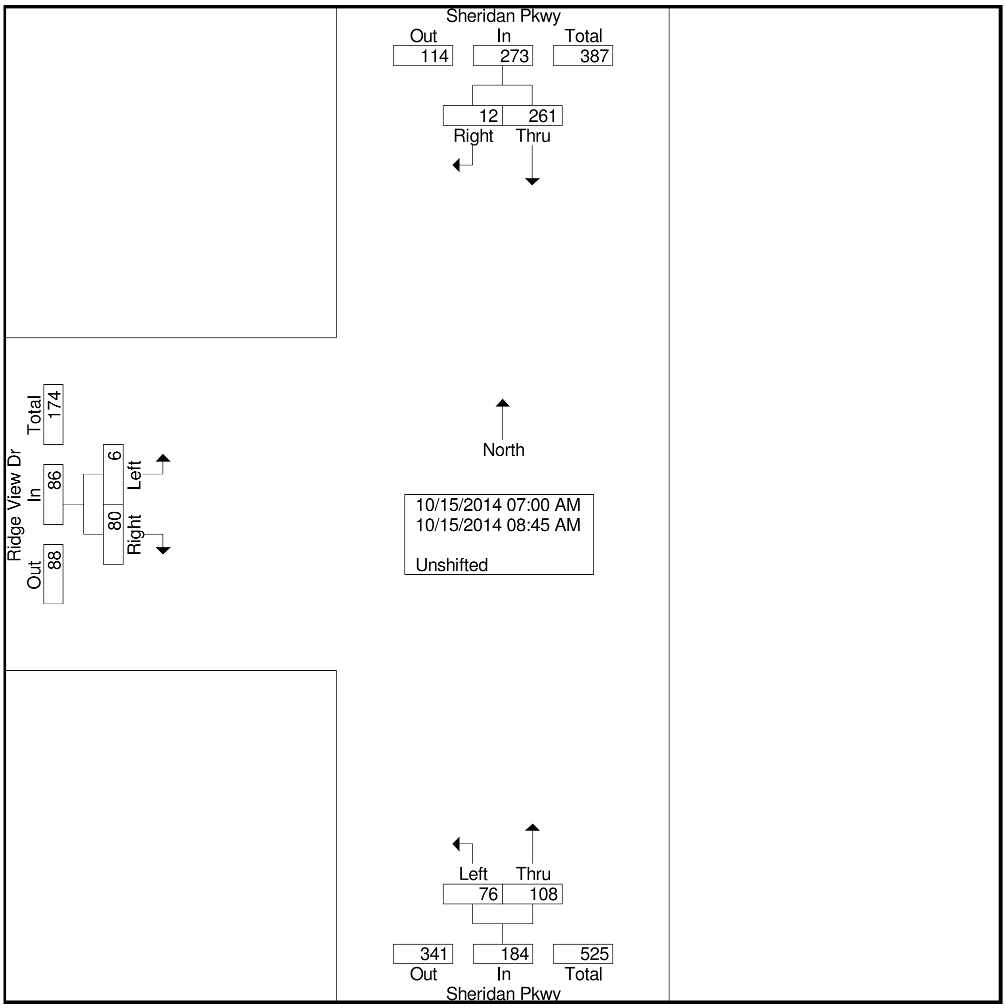
07:15 AM	0	8	8	10	12	22	45	3	48	78
07:30 AM	0	14	14	8	8	16	35	1	36	66
07:45 AM	1	13	14	16	20	36	38	1	39	89
Total	1	43	44	41	55	96	143	6	149	289
08:00 AM	1	12	13	16	11	27	29	2	31	71
08:15 AM	3	11	14	12	11	23	34	3	37	74
08:30 AM	1	11	12	5	16	21	27	1	28	61
08:45 AM	0	3	3	2	15	17	28	0	28	48
Total	5	37	42	35	53	88	118	6	124	254
Grand Total	6	80	86	76	108	184	261	12	273	543
Apprch %	7	93		41.3	58.7		95.6	4.4		
Total %	1.1	14.7	15.8	14	19.9	33.9	48.1	2.2	50.3	

Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
Ridge View Dr and Sheridan Pkwy

File Name : RidgeViewSheridanAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 2



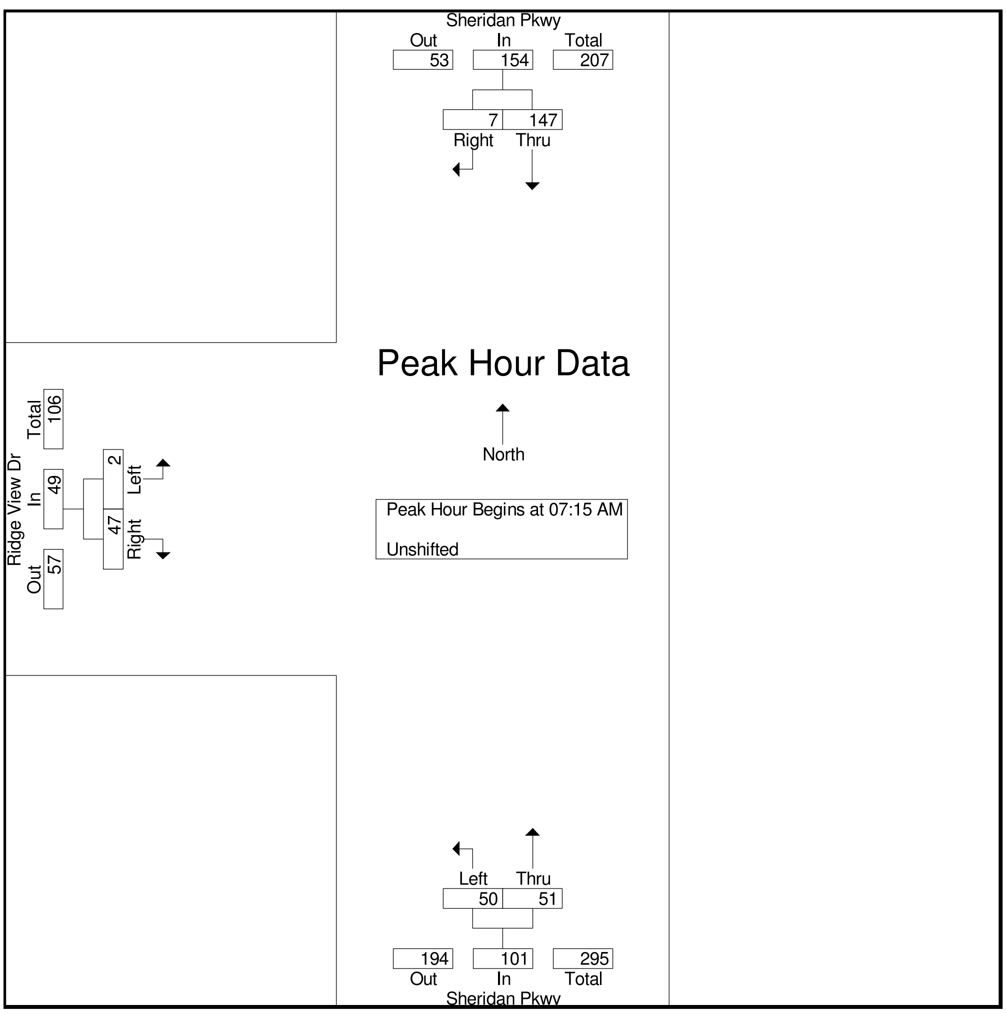
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
Ridge View Dr and Sheridan Pkwy

File Name : RidgeViewSheridanAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 3

	Ridge View Dr Eastbound			Sheridan Pkwy Northbound			Sheridan Pkwy Southbound			
Start Time	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	0	8	8	10	12	22	**45**	**3**	**48**	78
07:30 AM	0	**14**	**14**	8	8	16	35	1	36	66
07:45 AM	**1**	13	14	**16**	**20**	**36**	38	1	39	**89**
08:00 AM	1	12	13	16	11	27	29	2	31	71
Total Volume	2	47	49	50	51	101	147	7	154	304
% App. Total	4.1	95.9		49.5	50.5		95.5	4.5		
PHF	.500	.839	.875	.781	.638	.701	.817	.583	.802	.854



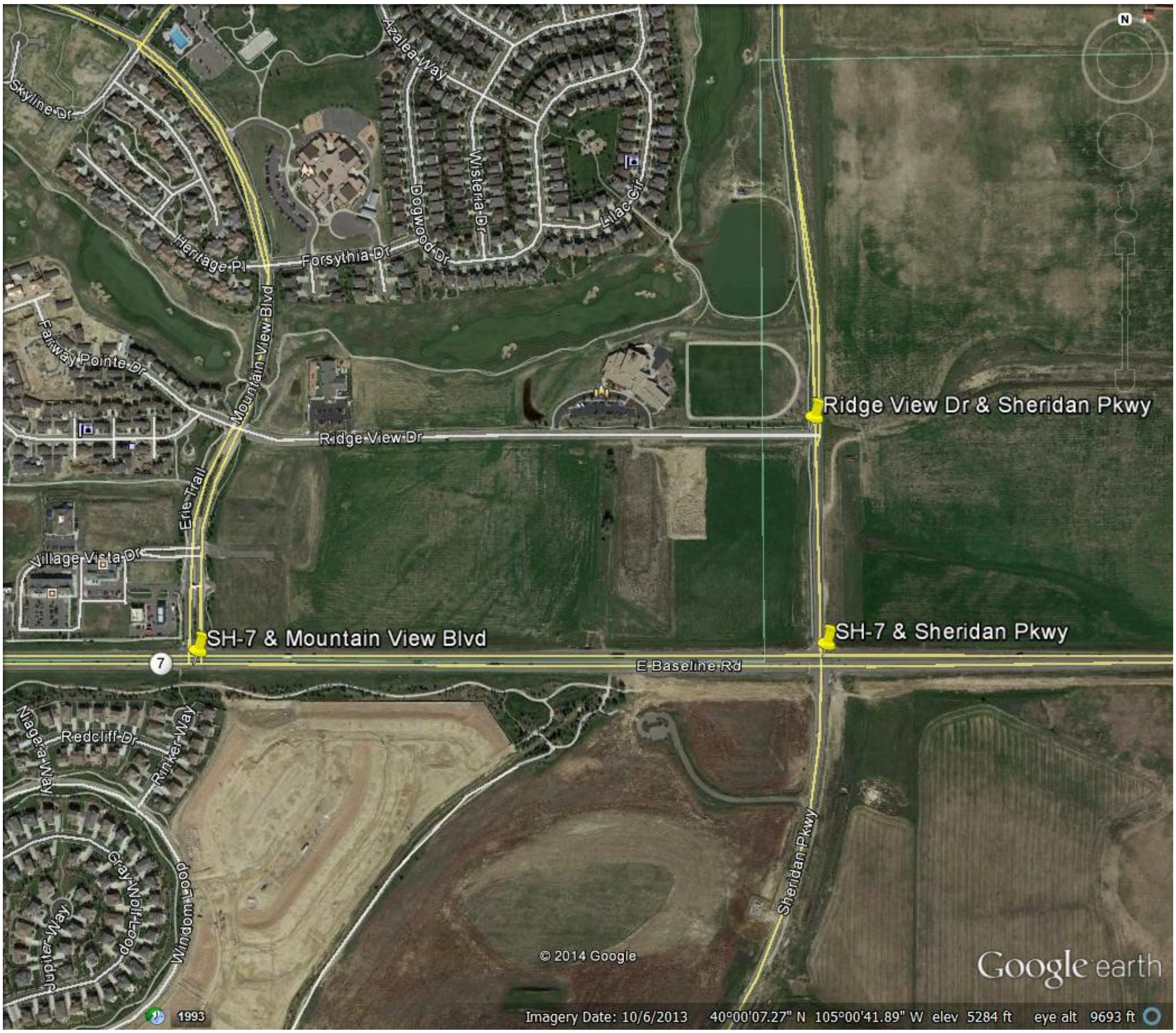
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
Ridge View Dr and Sheridan Pkwy

File Name : RidgeViewSheridanAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 4

Image 1



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
Ridge View Dr and Sheridan Pkwy

File Name : RidgeViewSheridanPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 1

Groups Printed- Unshifted

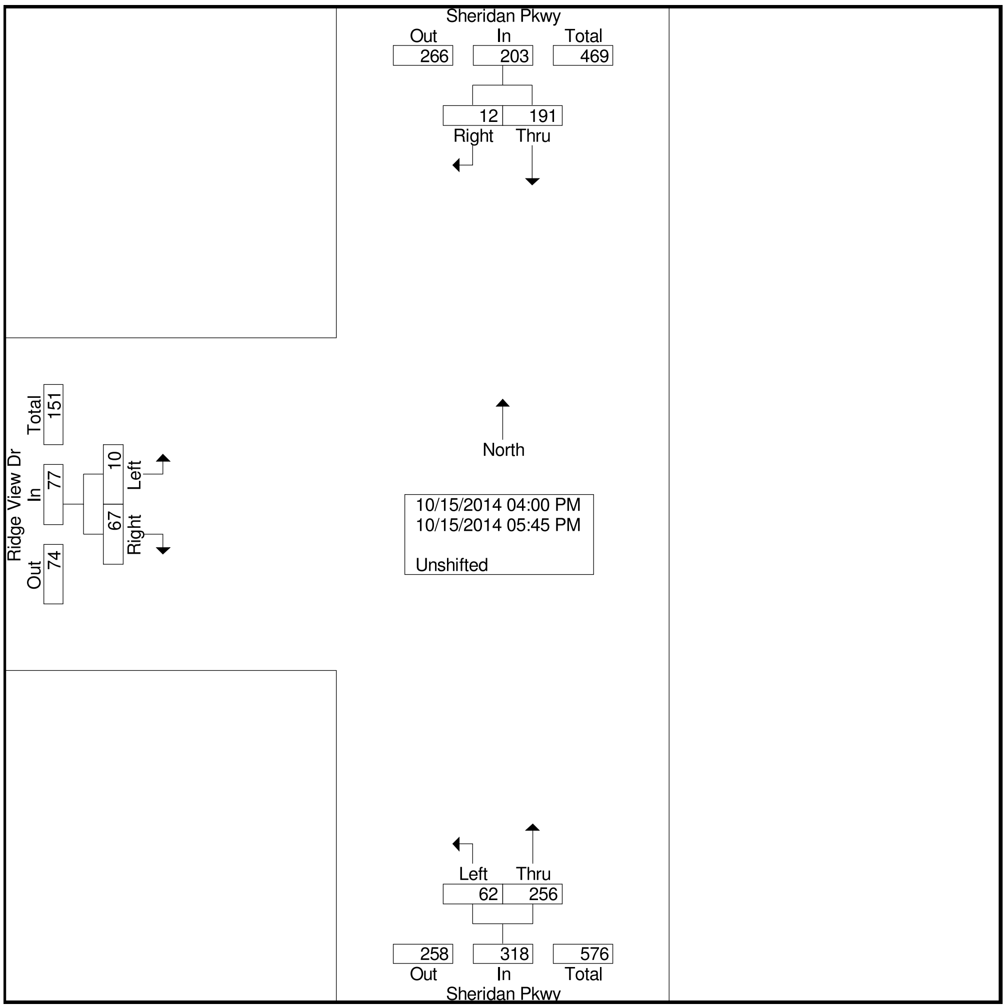
	Ridge View Dr Eastbound			Sheridan Pkwy Northbound			Sheridan Pkwy Southbound			
Start Time	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	0	8	8	6	26	32	16	2	18	58
04:15 PM	1	6	7	9	22	31	20	1	21	59
04:30 PM	0	9	9	5	41	46	29	2	31	86
04:45 PM	1	8	9	8	26	34	18	1	19	62
Total	2	31	33	28	115	143	83	6	89	265
05:00 PM	1	11	12	9	24	33	28	2	30	75
05:15 PM	4	6	10	12	40	52	29	1	30	92
05:30 PM	3	12	15	8	45	53	22	1	23	91
05:45 PM	0	7	7	5	32	37	29	2	31	75
Total	8	36	44	34	141	175	108	6	114	333
Grand Total	10	67	77	62	256	318	191	12	203	598
Apprch %	13	87		19.5	80.5		94.1	5.9		
Total %	1.7	11.2	12.9	10.4	42.8	53.2	31.9	2	33.9	

Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
Ridge View Dr and Sheridan Pkwy

File Name : RidgeViewSheridanPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 2

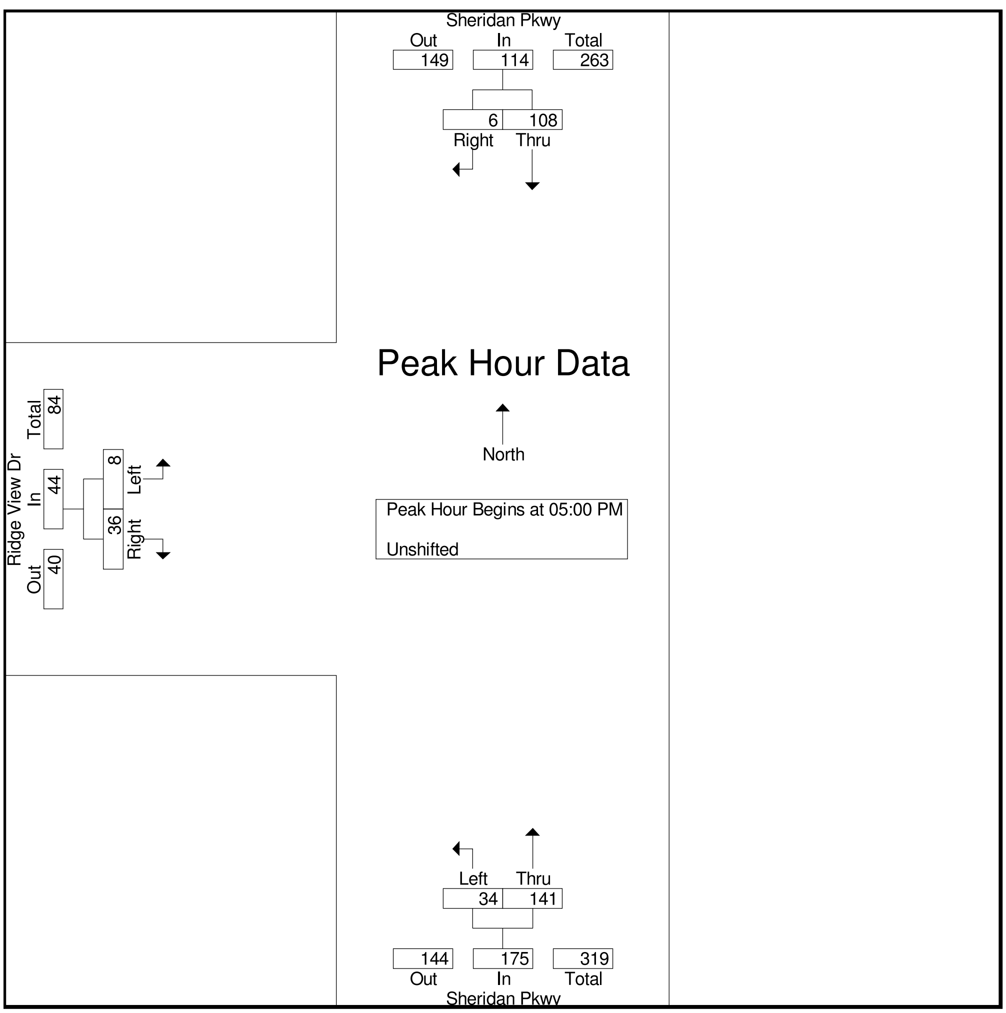


RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO	File Name : RidgeViewSheridanPM
Erie King Soopers #129	Site Code : IPO 60
PM Peak	Start Date : 10/15/2014
Ridge View Dr and Sheridan Pkwy	Page No : 3

	Ridge View Dr Eastbound			Sheridan Pkwy Northbound			Sheridan Pkwy Southbound			
Start Time	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	1	11	12	9	24	33	28	**2**	30	75
05:15 PM	**4**	6	10	**12**	40	52	**29**	1	30	**92**
05:30 PM	3	**12**	**15**	8	**45**	**53**	22	1	23	91
05:45 PM	0	7	7	5	32	37	29	2	**31**	75
Total Volume	8	36	44	34	141	175	108	6	114	333
% App. Total	18.2	81.8		19.4	80.6		94.7	5.3		
PHF	.500	.750	.733	.708	.783	.825	.931	.750	.919	.905



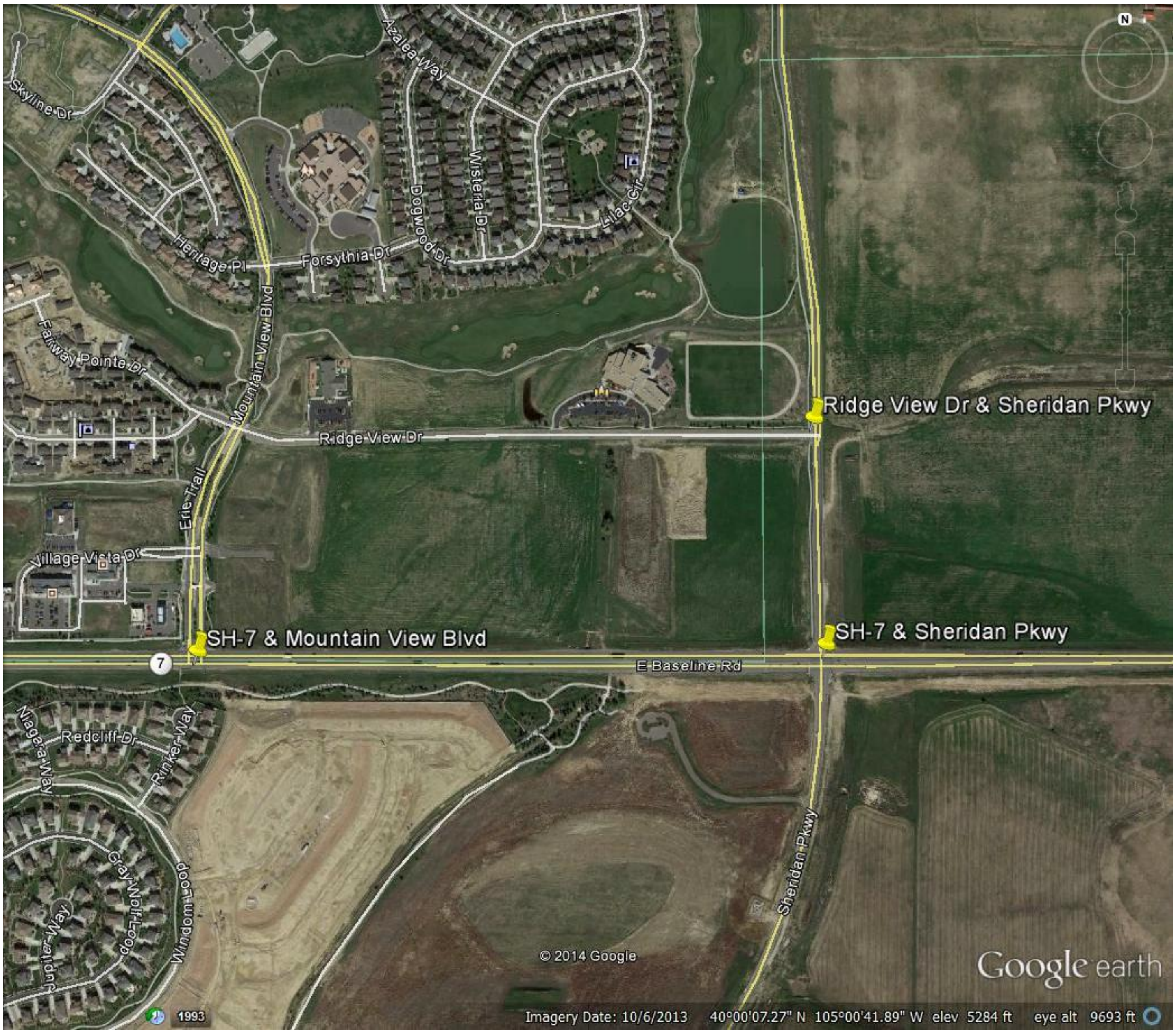
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
Ridge View Dr and Sheridan Pkwy

File Name : RidgeViewSheridanPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 4

Image 1



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
SH - 7 and Mountain View Blvd

File Name : SH7MountianViewAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 1

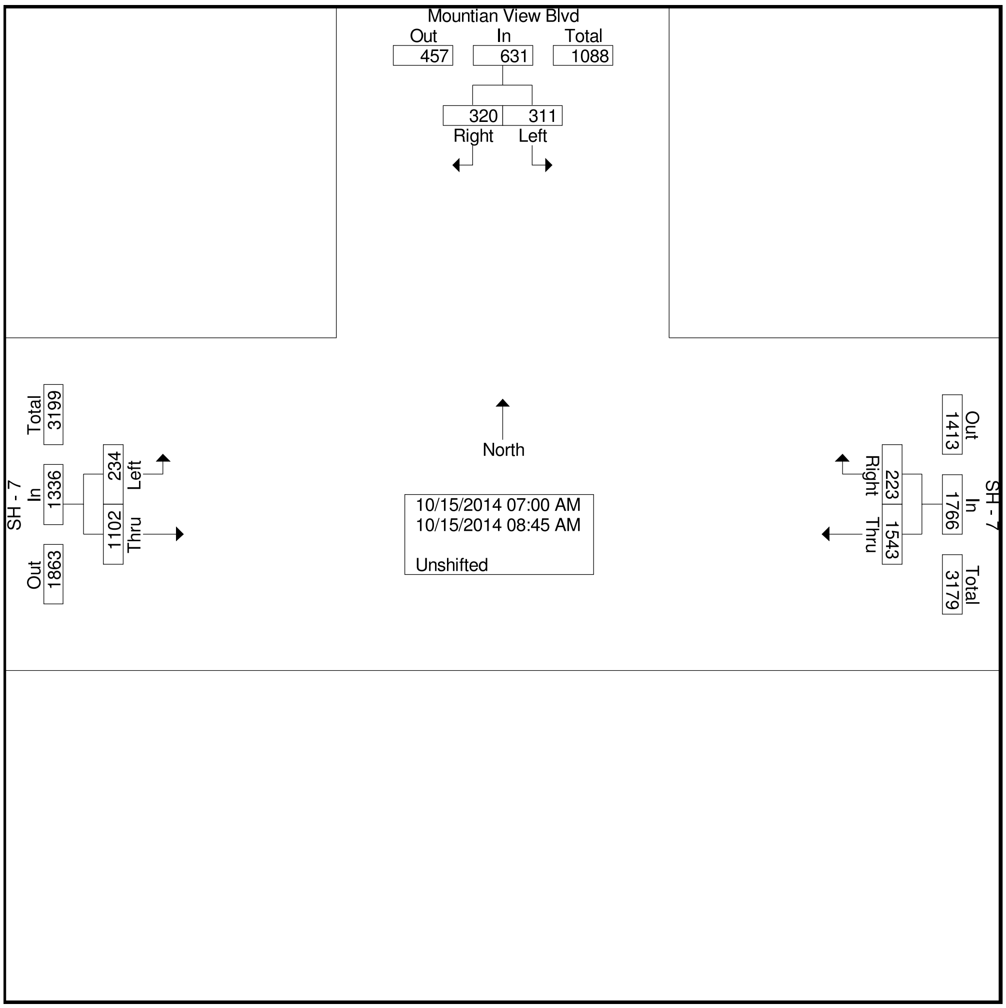
Groups Printed- Unshifted

	SH - 7 Eastbound			SH - 7 Westbound			Mountian View Blvd Southbound			
Start Time	Left	Thru	App. Total	Thru	Right	App. Total	Left	Right	App. Total	Int. Total
07:00 AM	22	129	151	209	21	230	27	47	74	455
07:15 AM	17	153	170	234	23	257	39	42	81	508
07:30 AM	20	149	169	202	28	230	52	46	98	497
07:45 AM	36	150	186	202	34	236	35	26	61	483
Total	95	581	676	847	106	953	153	161	314	1943
08:00 AM	41	164	205	185	39	224	45	39	84	513
08:15 AM	27	112	139	172	25	197	35	41	76	412
08:30 AM	27	137	164	200	17	217	39	33	72	453
08:45 AM	44	108	152	139	36	175	39	46	85	412
Total	139	521	660	696	117	813	158	159	317	1790
Grand Total	234	1102	1336	1543	223	1766	311	320	631	3733
Apprch %	17.5	82.5		87.4	12.6		49.3	50.7		
Total %	6.3	29.5	35.8	41.3	6	47.3	8.3	8.6	16.9	

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
SH - 7 and Mountain View Blvd

File Name : SH7MountianViewAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 2



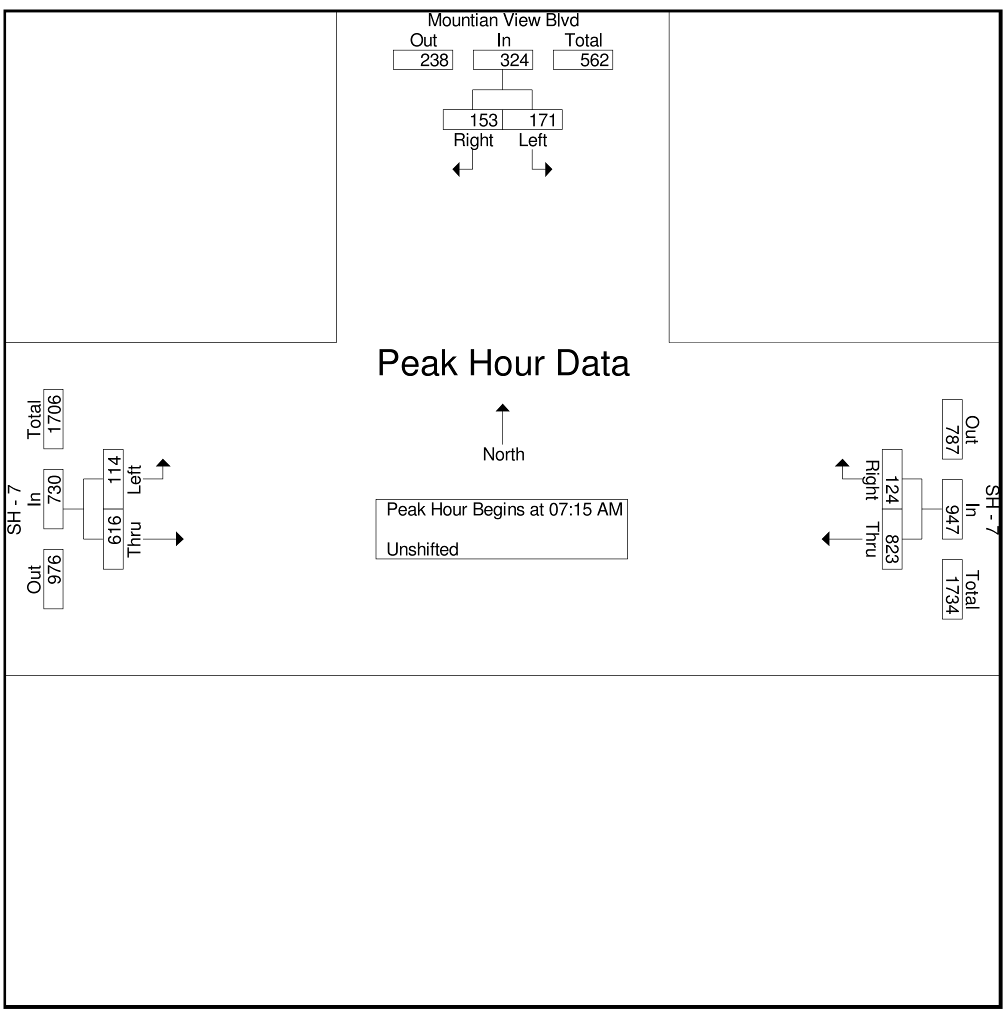
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
SH - 7 and Mountain View Blvd

File Name : SH7MountianViewAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 3

	SH - 7 Eastbound			SH - 7 Westbound			Mountian View Blvd Southbound			
Start Time	Left	Thru	App. Total	Thru	Right	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	17	153	170	**234**	23	**257**	39	42	81	508
07:30 AM	20	149	169	202	28	230	**52**	**46**	**98**	497
07:45 AM	36	150	186	202	34	236	35	26	61	483
08:00 AM	**41**	**164**	**205**	185	**39**	224	45	39	84	**513**
Total Volume	114	616	730	823	124	947	171	153	324	2001
% App. Total	15.6	84.4		86.9	13.1		52.8	47.2		
PHF	.695	.939	.890	.879	.795	.921	.822	.832	.827	.975



RDC

Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
SH - 7 and Mountain View Blvd

File Name : SH7MountianViewAM
Site Code : IPO 60
Start Date : 10/15/2014
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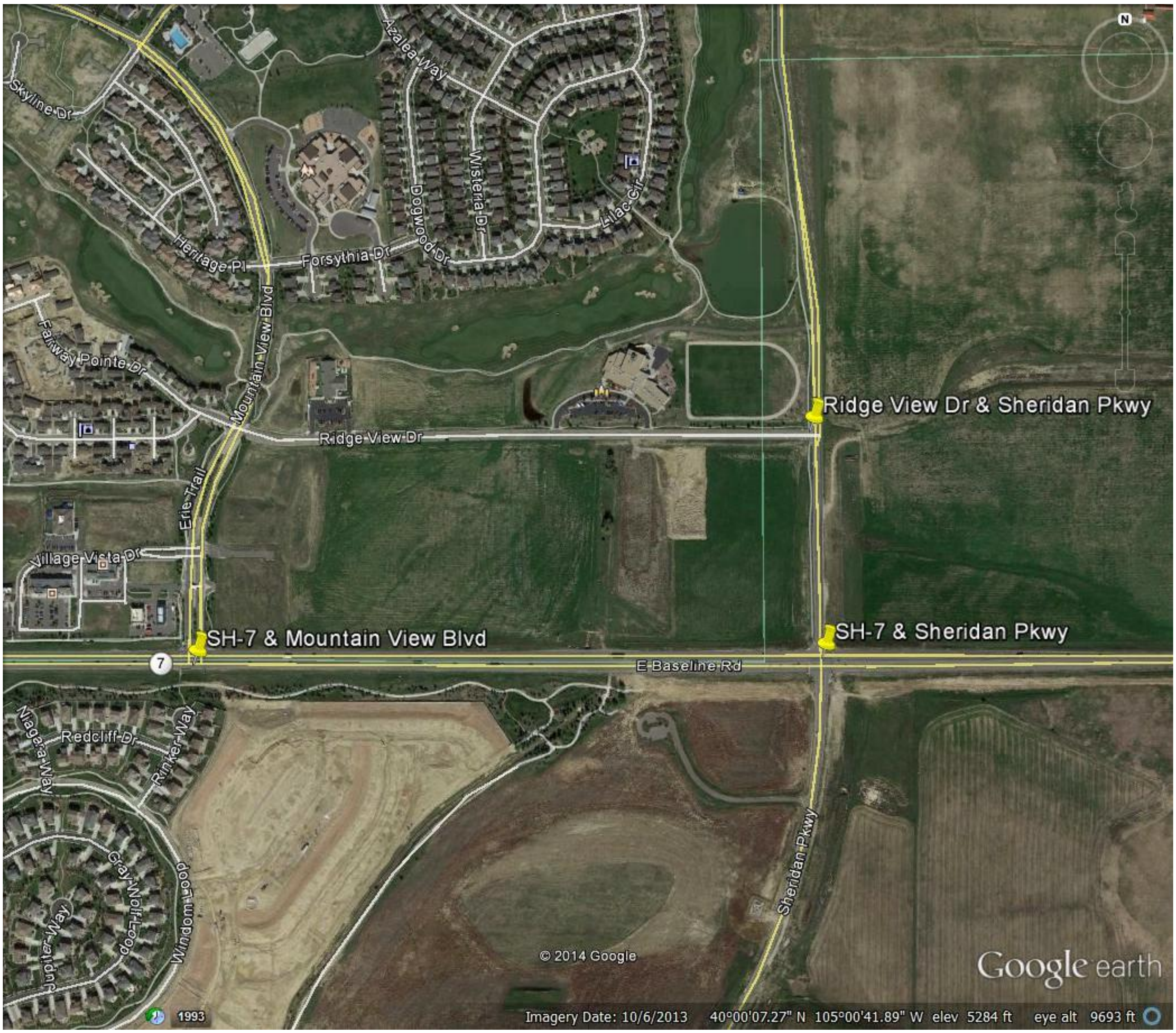
Image 1



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
SH - 7 and Mountain View Blvd

File Name : SH7MountianViewPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 1

Groups Printed- Unshifted

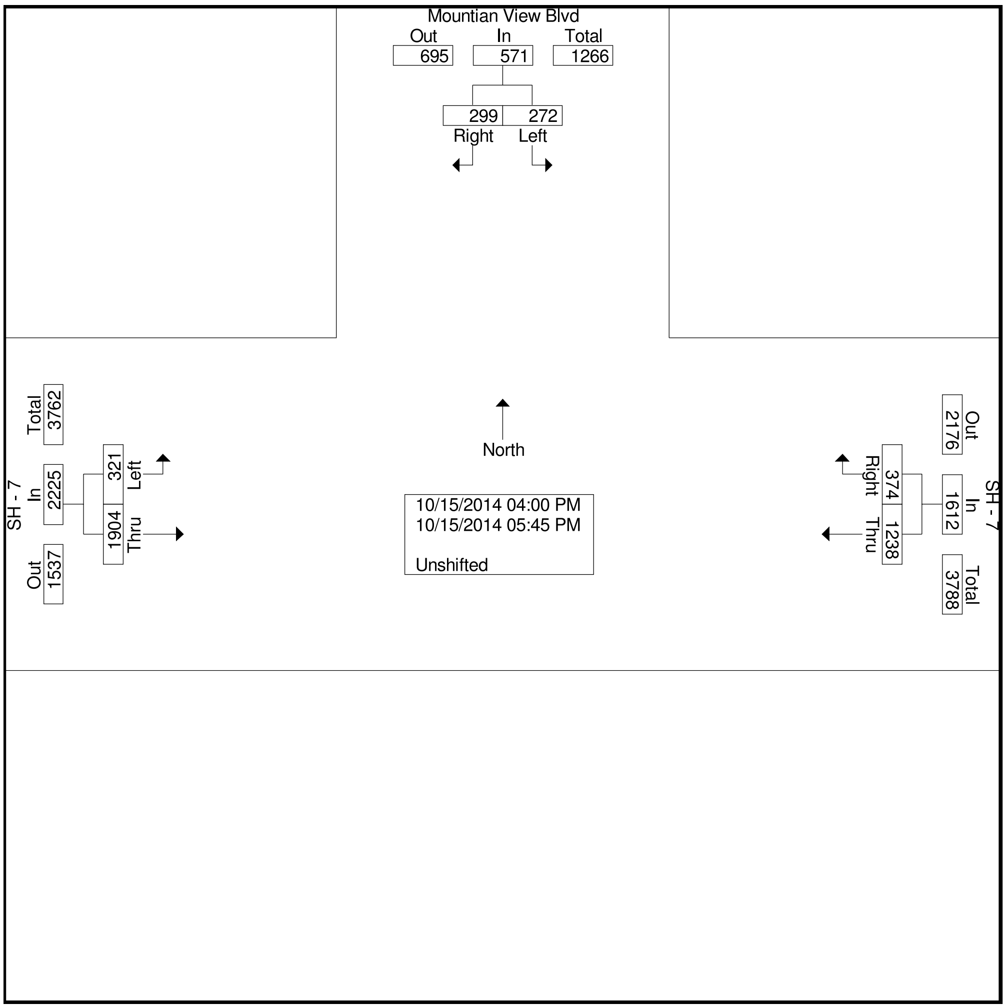
	SH - 7 Eastbound			SH - 7 Westbound			Mountian View Blvd Southbound			
Start Time	Left	Thru	App. Total	Thru	Right	App. Total	Left	Right	App. Total	Int. Total
04:00 PM	38	211	249	144	25	169	24	42	66	484
04:15 PM	34	251	285	150	44	194	24	41	65	544
04:30 PM	38	250	288	133	51	184	45	21	66	538
04:45 PM	30	259	289	154	41	195	24	41	65	549
Total	140	971	1111	581	161	742	117	145	262	2115
05:00 PM	48	250	298	180	53	233	41	27	68	599
05:15 PM	53	248	301	166	63	229	42	39	81	611
05:30 PM	46	219	265	165	51	216	38	44	82	563
05:45 PM	34	216	250	146	46	192	34	44	78	520
Total	181	933	1114	657	213	870	155	154	309	2293
Grand Total	321	1904	2225	1238	374	1612	272	299	571	4408
Apprch %	14.4	85.6		76.8	23.2		47.6	52.4		
Total %	7.3	43.2	50.5	28.1	8.5	36.6	6.2	6.8	13	

Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
SH - 7 and Mountain View Blvd

File Name : SH7MountianViewPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 2



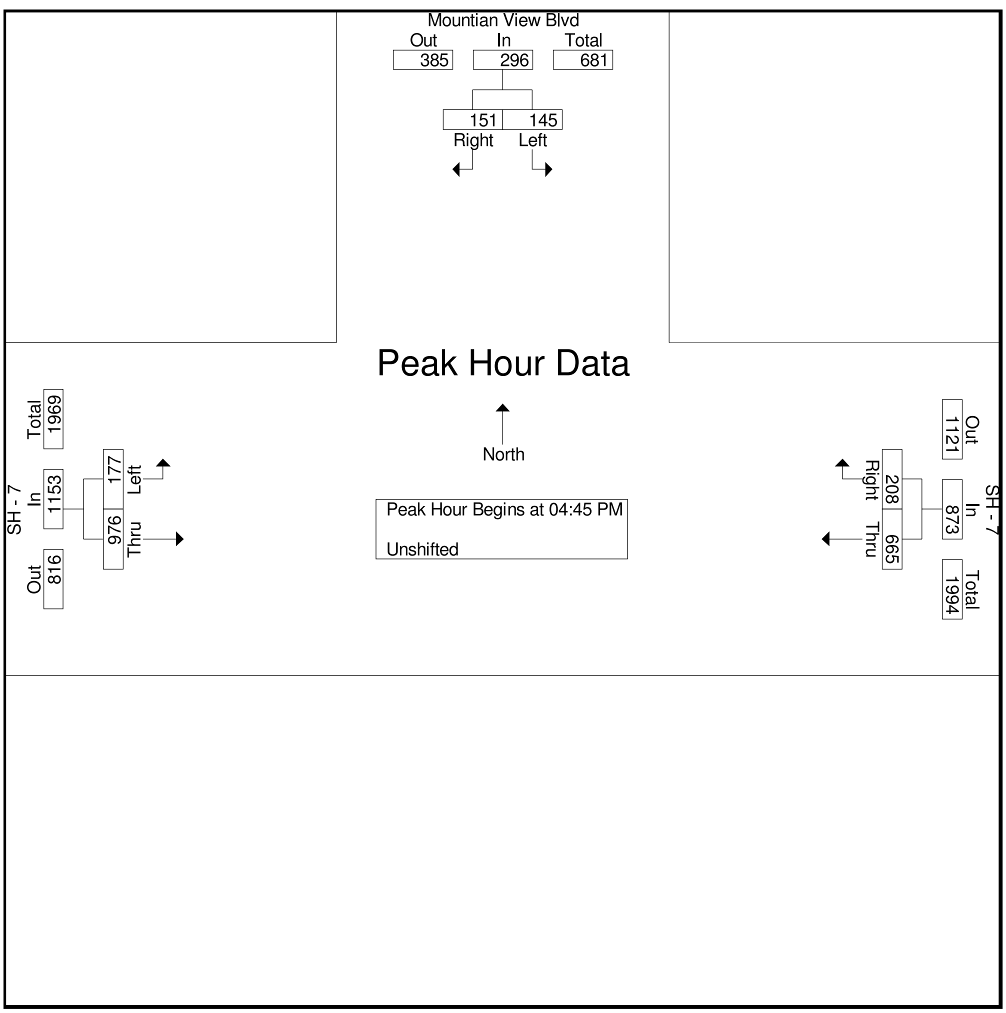
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
SH - 7 and Mountain View Blvd

File Name : SH7MountianViewPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 3

	SH - 7 Eastbound			SH - 7 Westbound			Mountian View Blvd Southbound			
Start Time	Left	Thru	App. Total	Thru	Right	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	30	**259**	289	154	41	195	24	41	65	549
05:00 PM	48	250	298	**180**	53	**233**	41	27	68	599
05:15 PM	**53**	248	**301**	166	**63**	229	**42**	39	81	**611**
05:30 PM	46	219	265	165	51	216	38	**44**	**82**	563
Total Volume	177	976	1153	665	208	873	145	151	296	2322
% App. Total	15.4	84.6		76.2	23.8		49	51		
PHF	.835	.942	.958	.924	.825	.937	.863	.858	.902	.950



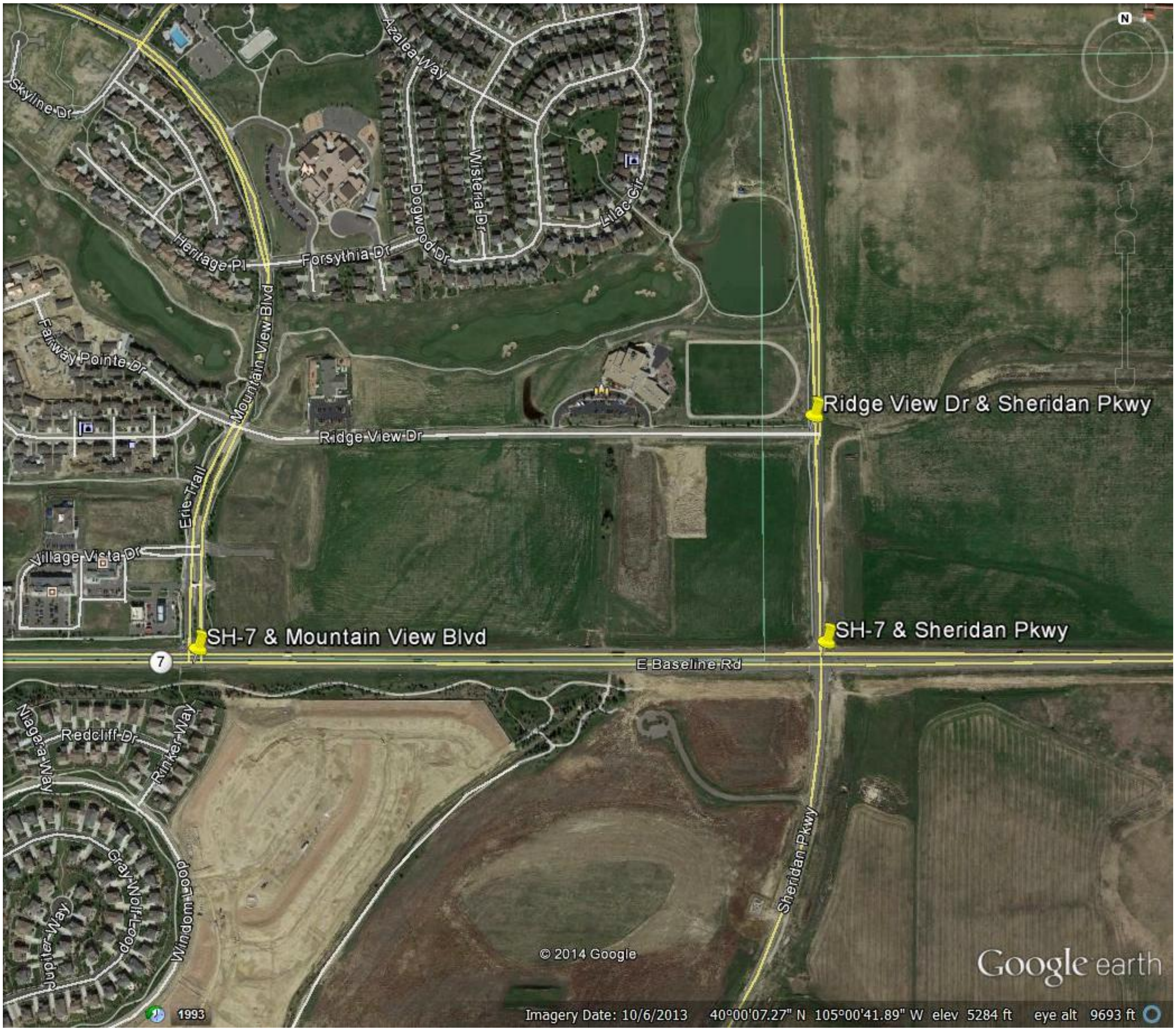
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
SH - 7 and Mountain View Blvd

File Name : SH7MountianViewPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 4

Image 1



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
SH - 7 and Sheridan Pkwy

File Name : SH7SheridanAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 1

Groups Printed- Unshifted

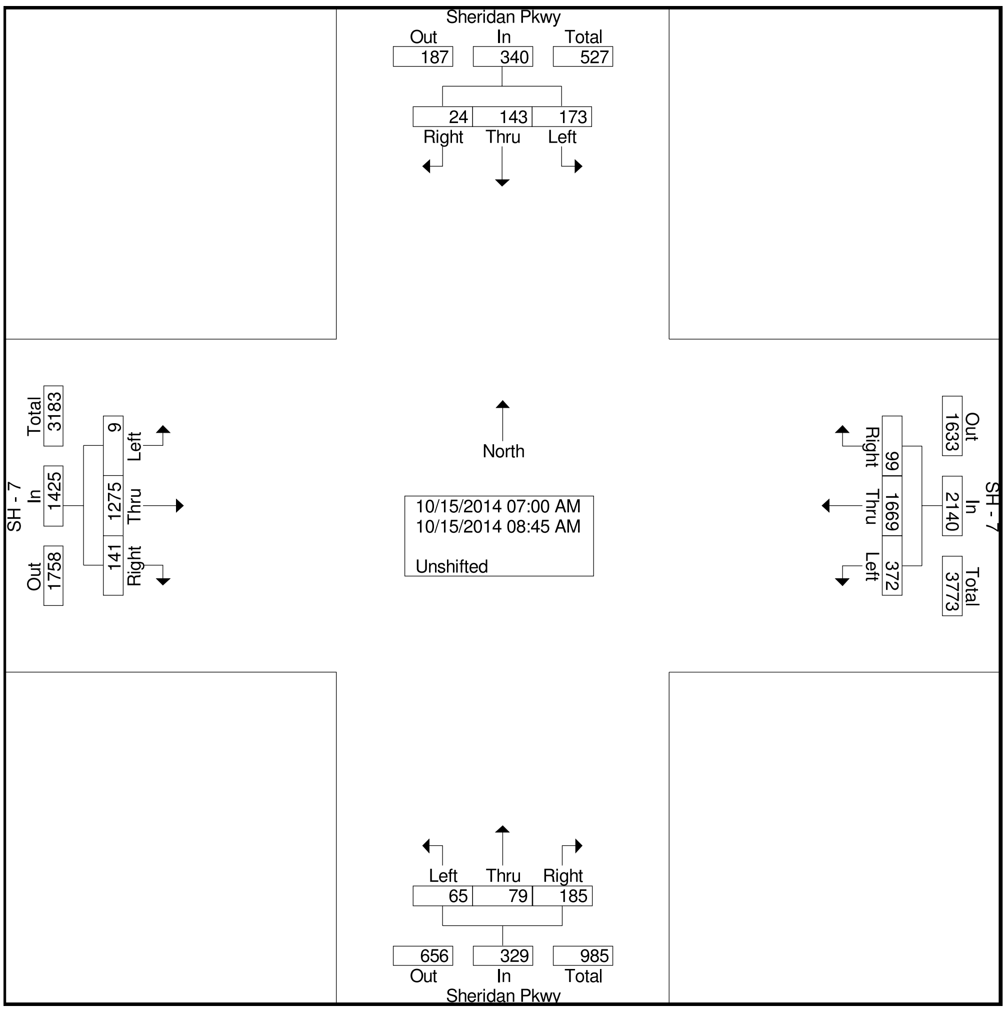
	SH - 7 Eastbound				SH - 7 Westbound				Sheridan Pkwy Northbound				Sheridan Pkwy Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	1	144	3	148	37	217	13	267	5	10	17	32	19	13	4	36	483
07:15 AM	1	174	10	185	50	257	15	322	4	10	22	36	28	18	3	49	592
07:30 AM	1	174	34	209	83	208	7	298	7	5	22	34	19	27	3	49	590
07:45 AM	0	174	34	208	73	211	19	303	20	17	42	79	17	24	4	45	635
Total	3	666	81	750	243	893	54	1190	36	42	103	181	83	82	14	179	2300
08:00 AM	0	185	18	203	46	223	11	280	8	12	27	47	21	21	2	44	574
08:15 AM	1	136	11	148	28	185	13	226	10	11	18	39	33	16	3	52	465
08:30 AM	1	142	18	161	31	205	10	246	3	12	19	34	18	16	2	36	477
08:45 AM	4	146	13	163	24	163	11	198	8	2	18	28	18	8	3	29	418
Total	6	609	60	675	129	776	45	950	29	37	82	148	90	61	10	161	1934
Grand Total	9	1275	141	1425	372	1669	99	2140	65	79	185	329	173	143	24	340	4234
Apprch %	0.6	89.5	9.9		17.4	78	4.6		19.8	24	56.2		50.9	42.1	7.1		
Total %	0.2	30.1	3.3	33.7	8.8	39.4	2.3	50.5	1.5	1.9	4.4	7.8	4.1	3.4	0.6	8	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
SH - 7 and Sheridan Pkwy

File Name : SH7SheridanAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 2



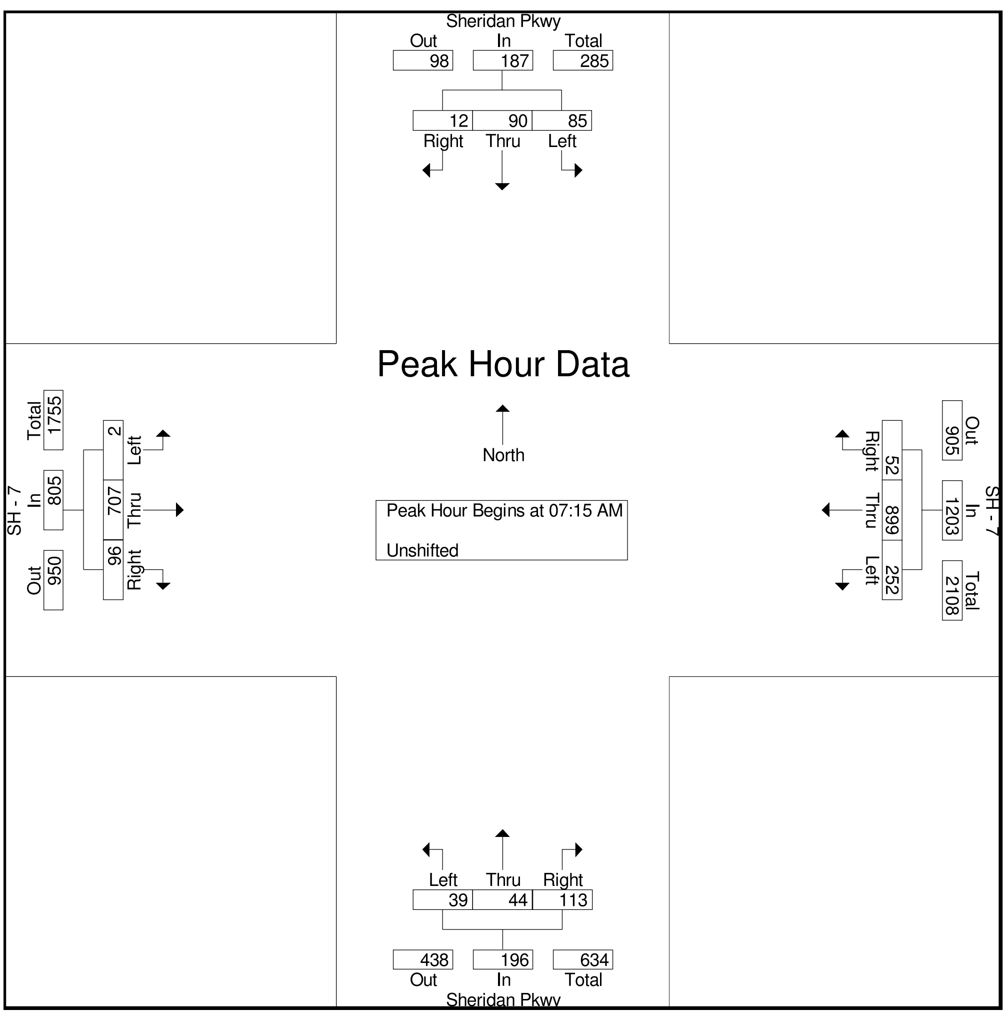
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
SH - 7 and Sheridan Pkwy

File Name : SH7SheridanAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 3

	SH - 7 Eastbound				SH - 7 Westbound				Sheridan Pkwy Northbound				Sheridan Pkwy Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	**1**	174	10	185	50	**257**	15	**322**	4	10	22	36	**28**	18	3	**49**	592
07:30 AM	1	174	**34**	**209**	**83**	208	7	298	7	5	22	34	19	**27**	3	49	590
07:45 AM	0	174	34	208	73	211	**19**	303	**20**	**17**	**42**	**79**	17	24	**4**	45	**635**
08:00 AM	0	**185**	18	203	46	223	11	280	8	12	27	47	21	21	2	44	574
Total Volume	2	707	96	805	252	899	52	1203	39	44	113	196	85	90	12	187	2391
% App. Total	0.2	87.8	11.9		20.9	74.7	4.3		19.9	22.4	57.7		45.5	48.1	6.4		
PHF	.500	.955	.706	.963	.759	.875	.684	.934	.488	.647	.673	.620	.759	.833	.750	.954	.941



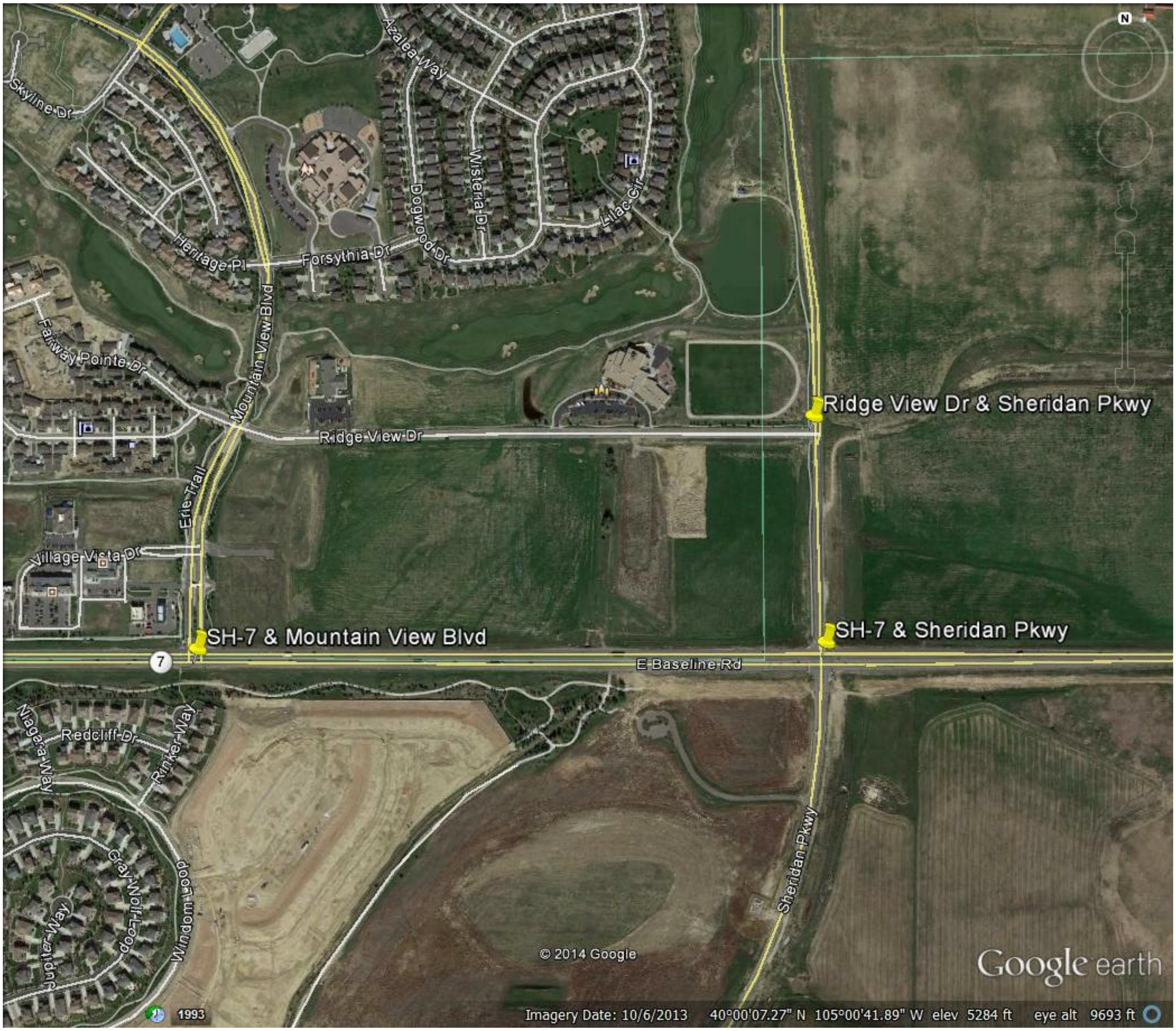
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
AM Peak
SH - 7 and Sheridan Pkwy

File Name : SH7SheridanAM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 4

Image 1



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
SH - 7 and Sheridan Pkwy

File Name : SH7SheridanPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 1

Groups Printed- Unshifted

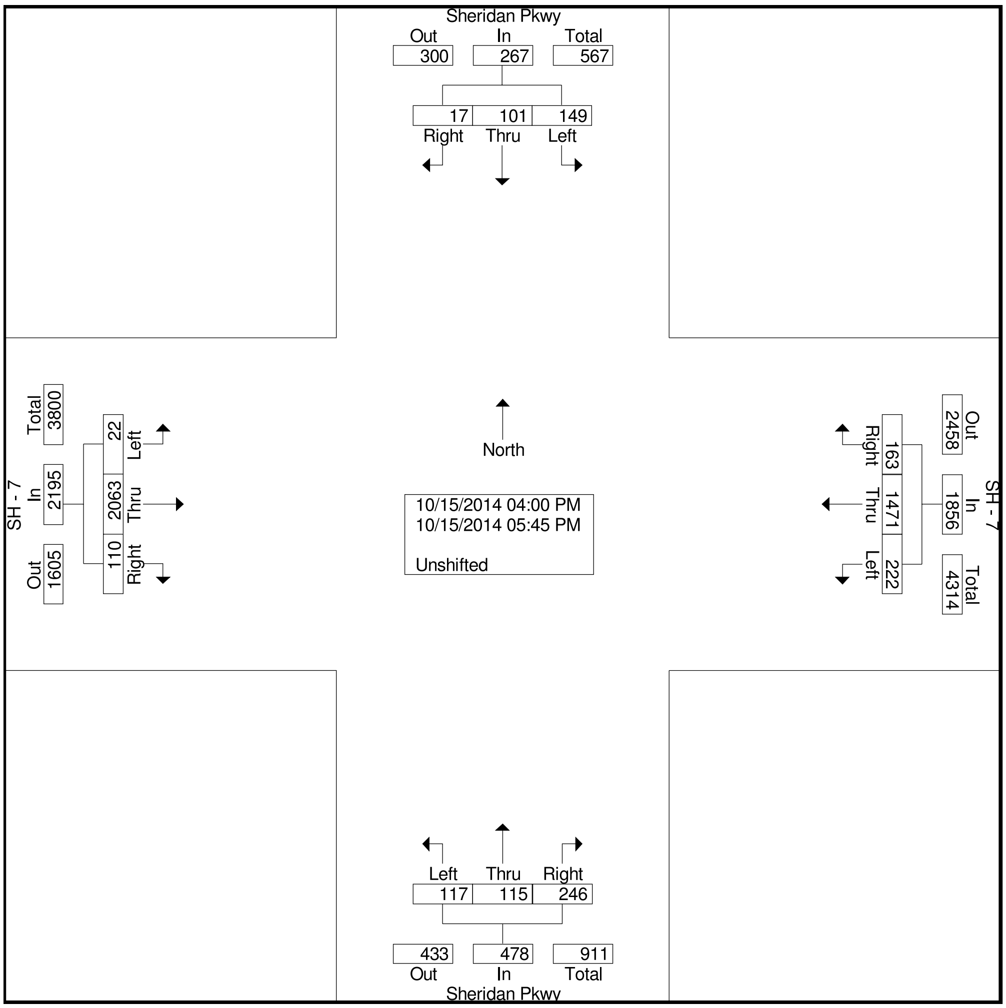
	SH - 7 Eastbound				SH - 7 Westbound				Sheridan Pkwy Northbound				Sheridan Pkwy Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	3	232	6	241	30	167	16	213	6	13	16	35	16	6	3	25	514
04:15 PM	2	255	8	265	28	178	18	224	17	7	37	61	17	9	3	29	579
04:30 PM	5	272	8	285	31	159	20	210	21	16	32	69	19	15	1	35	599
04:45 PM	2	279	16	297	26	178	16	220	13	16	28	57	13	14	0	27	601
Total	12	1038	38	1088	115	682	70	867	57	52	113	222	65	44	7	116	2293
05:00 PM	2	286	18	306	26	203	18	247	22	13	32	67	22	9	5	36	656
05:15 PM	2	259	30	291	30	212	26	268	14	21	42	77	22	18	3	43	679
05:30 PM	5	244	13	262	28	198	28	254	15	17	30	62	19	17	0	36	614
05:45 PM	1	236	11	248	23	176	21	220	9	12	29	50	21	13	2	36	554
Total	10	1025	72	1107	107	789	93	989	60	63	133	256	84	57	10	151	2503
Grand Total	22	2063	110	2195	222	1471	163	1856	117	115	246	478	149	101	17	267	4796
Apprch %	1	94	5		12	79.3	8.8		24.5	24.1	51.5		55.8	37.8	6.4		
Total %	0.5	43	2.3	45.8	4.6	30.7	3.4	38.7	2.4	2.4	5.1	10	3.1	2.1	0.4	5.6	

Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
SH - 7 and Sheridan Pkwy

File Name : SH7SheridanPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 2



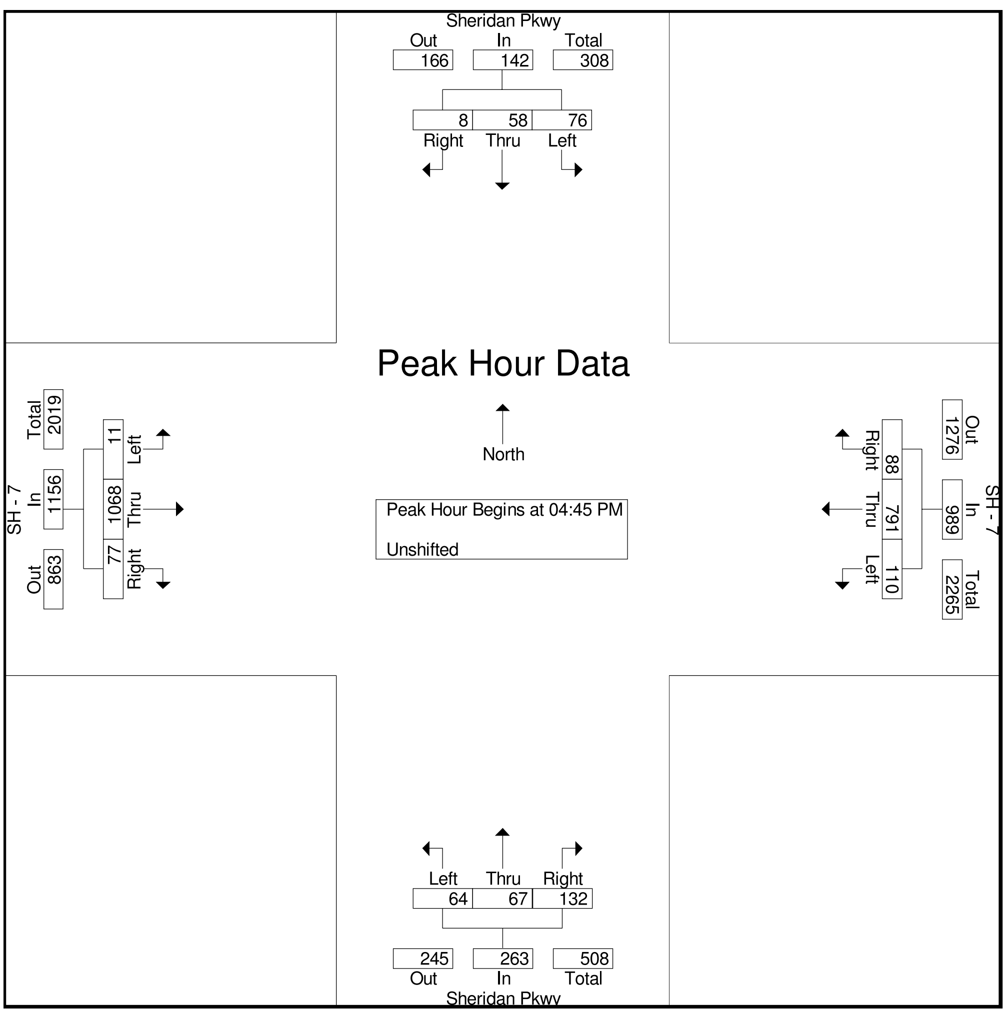
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie King Soopers #129
PM Peak
SH - 7 and Sheridan Pkwy

File Name : SH7SheridanPM
Site Code : IPO 60
Start Date : 10/15/2014
Page No : 3

	SH - 7 Eastbound				SH - 7 Westbound				Sheridan Pkwy Northbound				Sheridan Pkwy Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	2	279	16	297	26	178	16	220	13	16	28	57	13	14	0	27	601
05:00 PM	2	**286**	18	**306**	26	203	18	247	**22**	13	32	67	**22**	9	**5**	36	656
05:15 PM	2	259	**30**	291	**30**	**212**	26	**268**	14	**21**	**42**	**77**	22	**18**	3	**43**	**679**
05:30 PM	**5**	244	13	262	28	198	**28**	254	15	17	30	62	19	17	0	36	614
Total Volume	11	1068	77	1156	110	791	88	989	64	67	132	263	76	58	8	142	2550
% App. Total	1	92.4	6.7		11.1	80	8.9		24.3	25.5	50.2		53.5	40.8	5.6		
PHF	.550	.934	.642	.944	.917	.933	.786	.923	.727	.798	.786	.854	.864	.806	.400	.826	.939

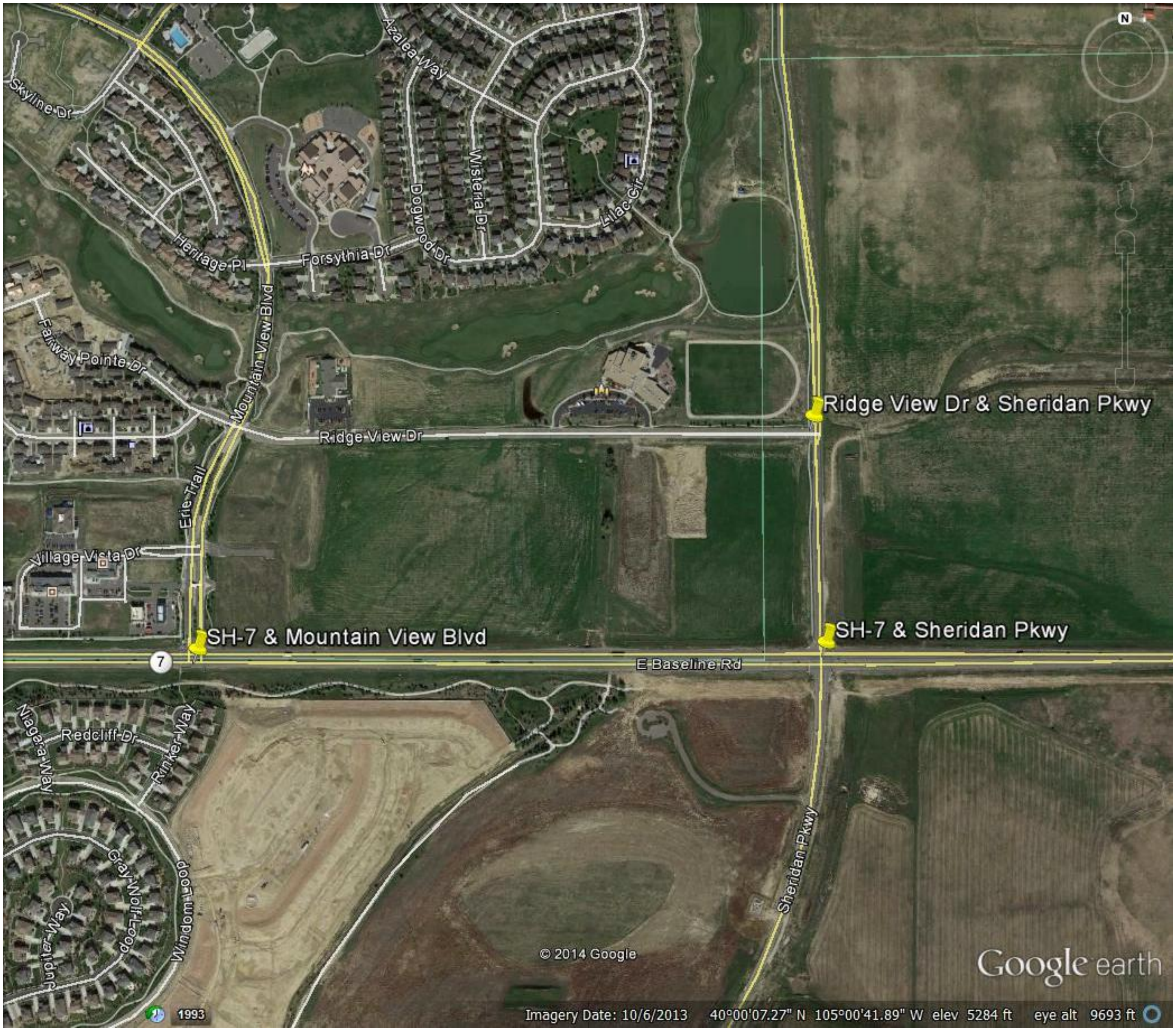


RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO	File Name : SH7SheridanPM
Erie King Soopers #129	Site Code : IPO 60
PM Peak	Start Date : 10/15/2014
SH - 7 and Sheridan Pkwy	Page No : 4

Image 1



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
AM Peak
Village Vista Dr and Mountian View Blvd

File Name : VillageVistaMountainViewAM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 1

Groups Printed- Unshifted

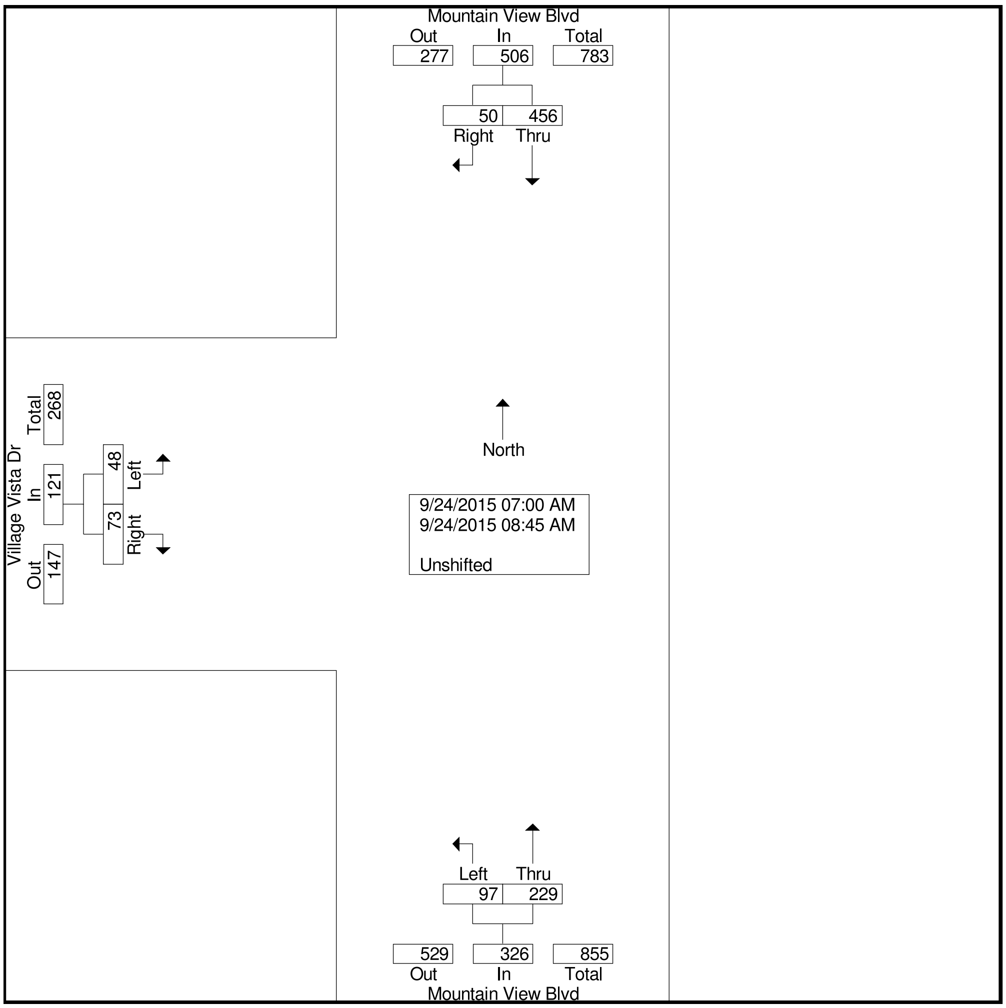
	Village Vista Dr Eastbound			Mountain View Blvd Northbound			Mountain View Blvd Southbound			
Start Time	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	2	4	6	10	17	27	61	8	69	102
07:15 AM	10	9	19	8	15	23	57	3	60	102
07:30 AM	4	8	12	13	22	35	55	5	60	107
07:45 AM	7	7	14	13	23	36	58	4	62	112
Total	23	28	51	44	77	121	231	20	251	423
08:00 AM	4	10	14	18	47	65	71	9	80	159
08:15 AM	10	12	22	14	33	47	49	11	60	129
08:30 AM	5	15	20	11	29	40	44	2	46	106
08:45 AM	6	8	14	10	43	53	61	8	69	136
Total	25	45	70	53	152	205	225	30	255	530
Grand Total	48	73	121	97	229	326	456	50	506	953
Apprch %	39.7	60.3		29.8	70.2		90.1	9.9		
Total %	5	7.7	12.7	10.2	24	34.2	47.8	5.2	53.1	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
AM Peak
Village Vista Dr and Mountian View Blvd

File Name : VillageVistaMountainViewAM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 2



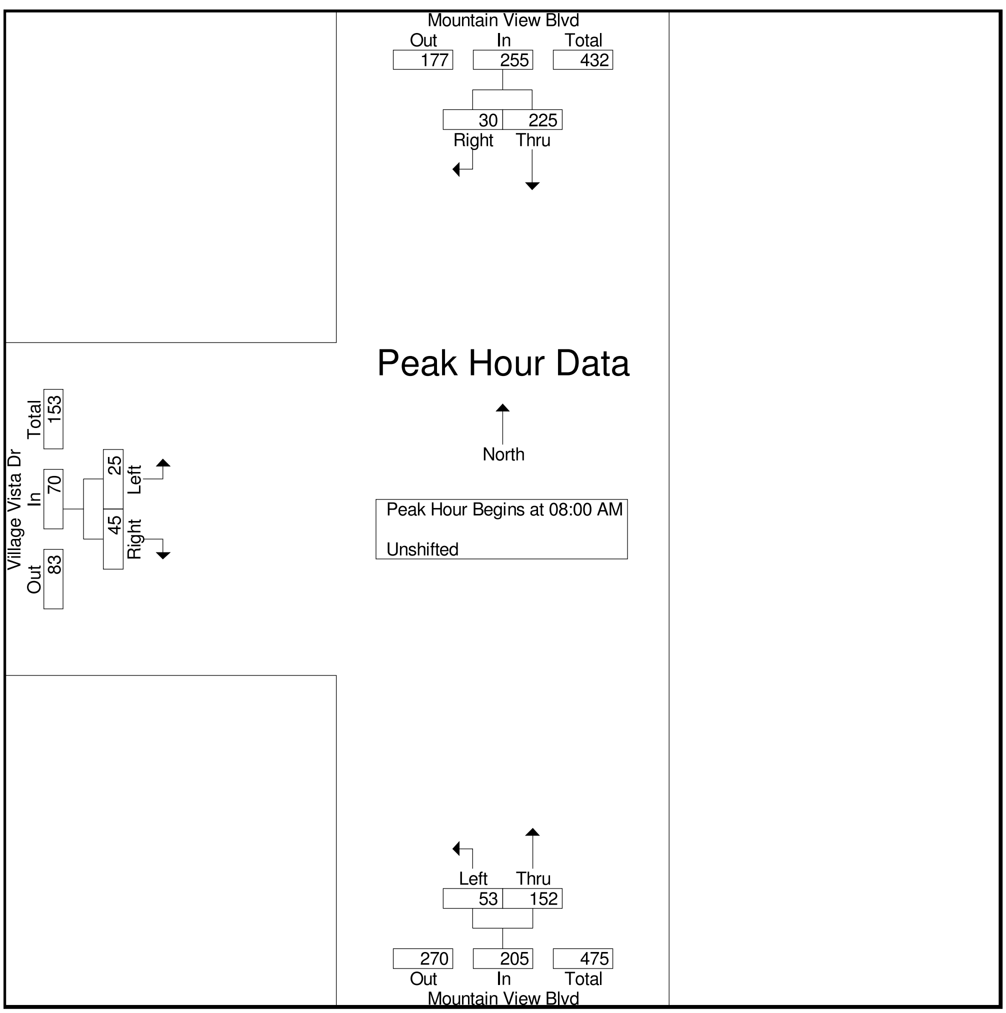
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
AM Peak
Village Vista Dr and Mountian View Blvd

File Name : VillageVistaMountainViewAM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 3

	Village Vista Dr Eastbound			Mountain View Blvd Northbound			Mountain View Blvd Southbound			
Start Time	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	4	10	14	**18**	**47**	**65**	**71**	9	**80**	**159**
08:15 AM	**10**	12	**22**	14	33	47	49	**11**	60	129
08:30 AM	5	**15**	20	11	29	40	44	2	46	106
08:45 AM	6	8	14	10	43	53	61	8	69	136
Total Volume	25	45	70	53	152	205	225	30	255	530
% App. Total	35.7	64.3		25.9	74.1		88.2	11.8		
PHF	.625	.750	.795	.736	.809	.788	.792	.682	.797	.833

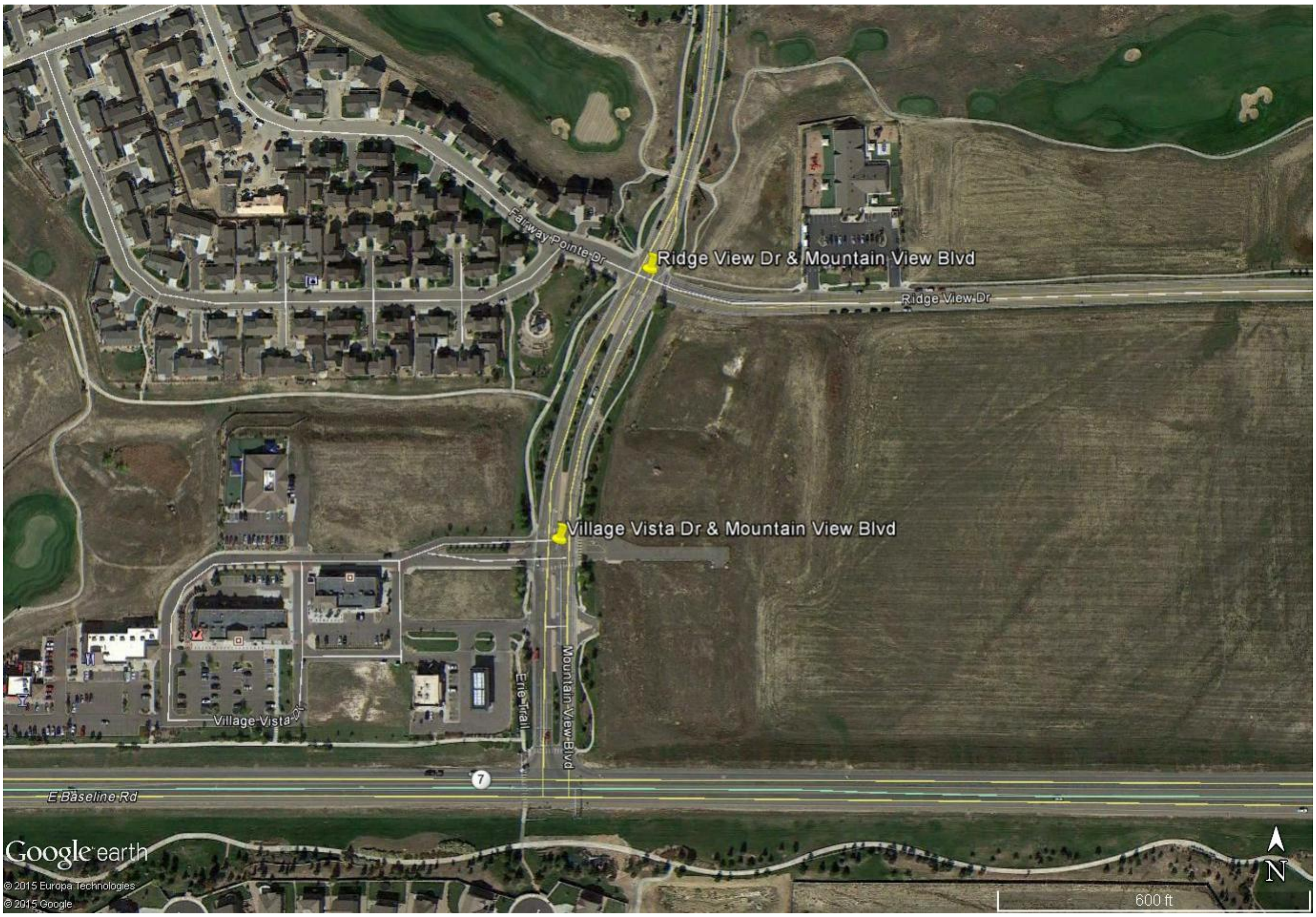


Ridgeview Data Collection

Morrison, CO 80465

Erie, CO	File Name : VillageVistaMountainViewAM
Erie Kentro	Site Code : IPO 129
AM Peak	Start Date : 9/24/2015
Village Vista Dr and Mountian View Blvd	Page No : 4

Image 1



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
PM Peak
Village Vista Dr and Mountain View Blvd

File Name : VillageVistaMountainViewPM
Site Code : IPO 129
Start Date : 9/24/2015

Groups Printed- Unshifted

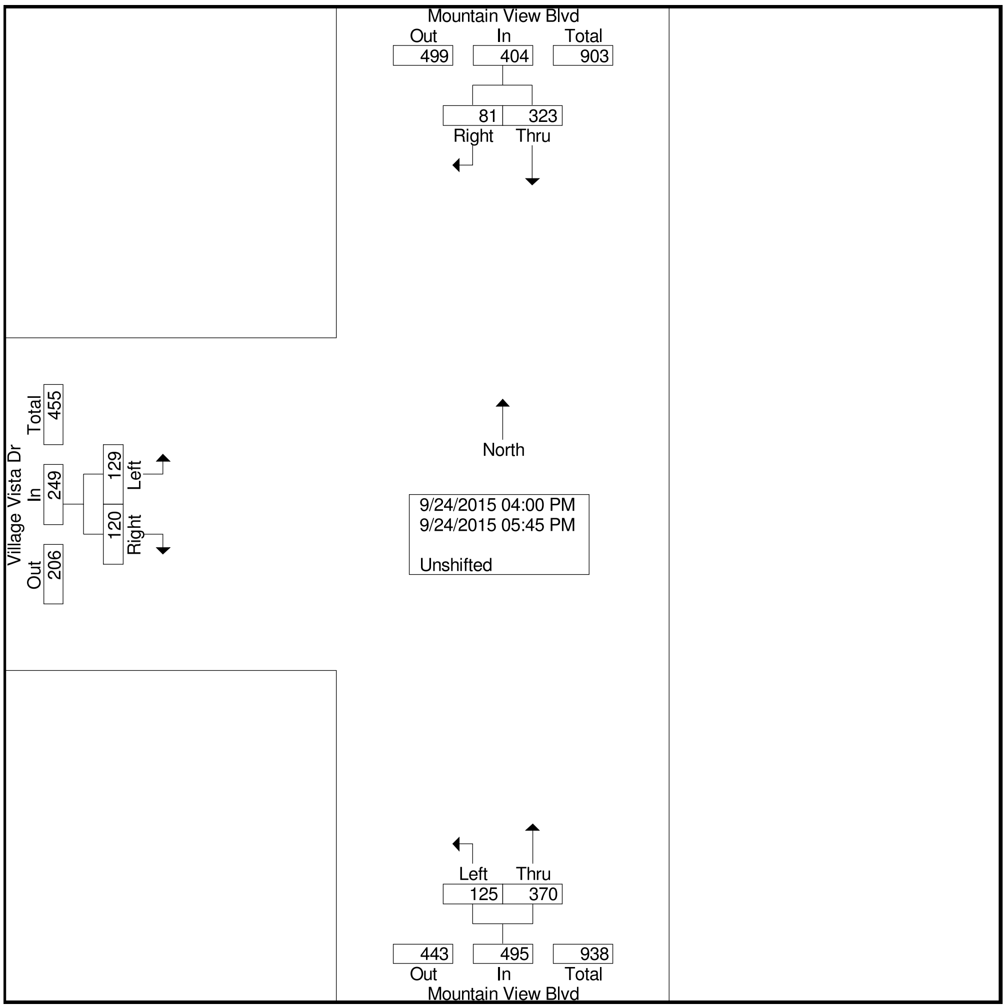
	Village Vista Dr Eastbound			Mountain View Blvd Northbound			Mountain View Blvd Southbound			
Start Time	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	14	12	26	12	36	48	40	9	49	123
04:15 PM	20	8	28	9	47	56	44	5	49	133
04:30 PM	11	11	22	15	33	48	45	8	53	123
04:45 PM	17	16	33	17	44	61	35	9	44	138
Total	62	47	109	53	160	213	164	31	195	517
05:00 PM	23	15	38	28	49	77	43	12	55	170
05:15 PM	19	19	38	22	50	72	47	17	64	174
05:30 PM	14	18	32	12	56	68	37	11	48	148
05:45 PM	11	21	32	10	55	65	32	10	42	139
Total	67	73	140	72	210	282	159	50	209	631
Grand Total	129	120	249	125	370	495	323	81	404	1148
Apprch %	51.8	48.2		25.3	74.7		80	20		
Total %	11.2	10.5	21.7	10.9	32.2	43.1	28.1	7.1	35.2	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
PM Peak
Village Vista Dr and Mountain View Blvd

File Name : VillageVistaMountainViewPM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 2



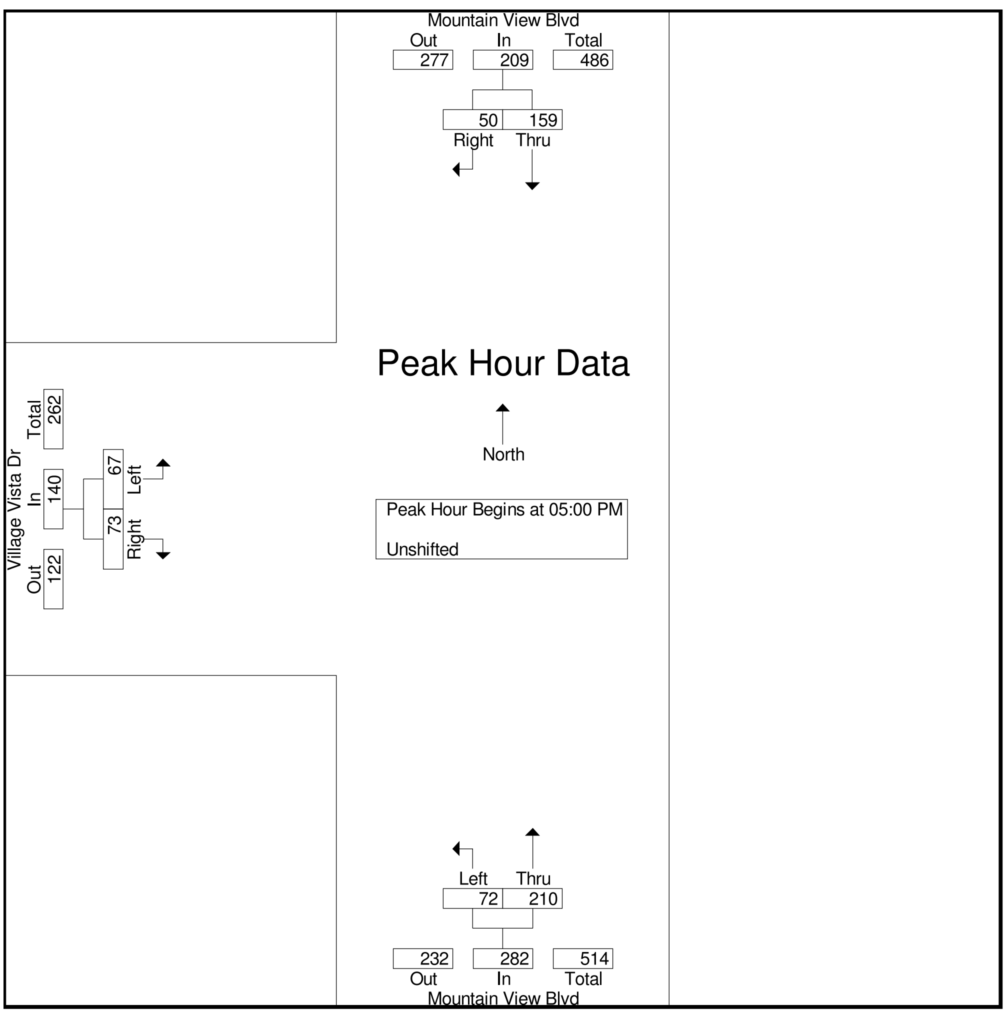
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Erie Kentro
PM Peak
Village Vista Dr and Mountain View Blvd

File Name : VillageVistaMountainViewPM
Site Code : IPO 129
Start Date : 9/24/2015
Page No : 3

	Village Vista Dr Eastbound			Mountain View Blvd Northbound			Mountain View Blvd Southbound			
Start Time	Left	Right	App. Total	Left	Thru	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	**23**	15	**38**	**28**	49	**77**	43	12	55	170
05:15 PM	19	19	38	22	50	72	**47**	**17**	**64**	**174**
05:30 PM	14	18	32	12	**56**	68	37	11	48	148
05:45 PM	11	**21**	32	10	55	65	32	10	42	139
Total Volume	67	73	140	72	210	282	159	50	209	631
% App. Total	47.9	52.1		25.5	74.5		76.1	23.9		
PHF	.728	.869	.921	.643	.938	.916	.846	.735	.816	.907

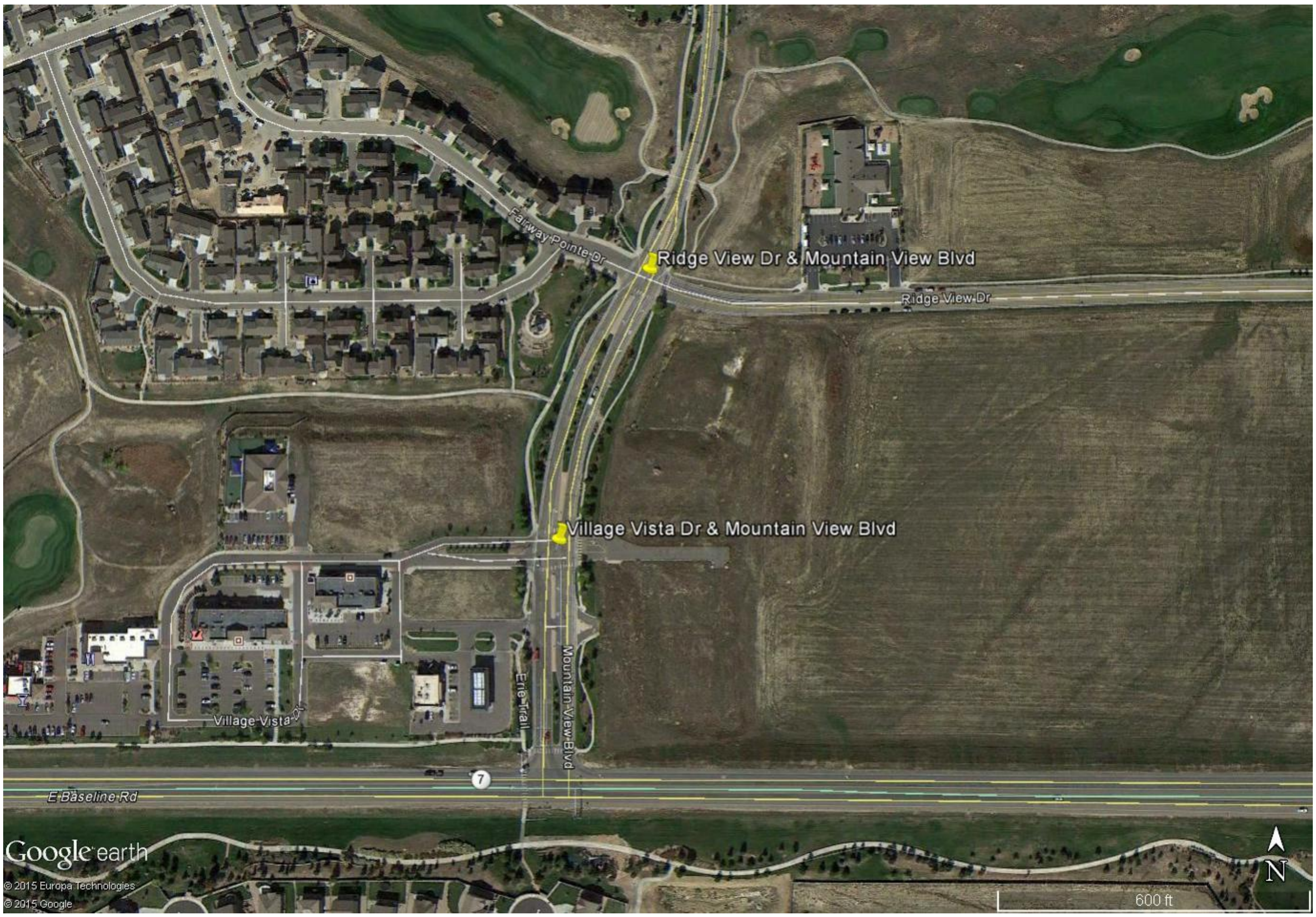


Ridgeview Data Collection

Morrison, CO 80465

Erie, CO	File Name : VillageVistaMountainViewPM
Erie Kentro	Site Code : IPO 129
PM Peak	Start Date : 9/24/2015
Village Vista Dr and Mountain View Blvd	Page No : 4

Image 1



APPENDIX B

CDOT SH-7 Traffic Information

ROUTE	REFPT	ENDREFPT	AADT	YR20FACTOR	LOCATION
007D	64.144	67.488	20000	1.97	ON SH 7 BASELINE RD E/O E COUNTY LINE RD CR 901 LAFAYETTE

APPENDIX C

Trip Generation Worksheets

Trip Generation Planner (ITE 9th Edition) - Summary Report

Kimley»Horn

Weekday Trip Generation
Trips Based on Average Rates/Equations

Project Name **Vista Ridge Commercial**
Project Number **096530000**

ITE Code	Internal Capture Land Use	Land Use Description	Independent Variable	No. of Units	Avg Rate or Eq	Rates: Daily Rate	Rates: AM Rate	Rates: PM Rate	Total Trips: Daily Trips	Total Trips: AM Trips	Total Trips: PM Trips	Total Trips: AM Trips In	Total Trips: AM Trips Out	Total Trips: PM Trips In	Total Trips: PM Trips Out	Net Trips after Internal Capture: Daily Trips	Net Trips after Internal Capture: AM Trips	Net Trips after Internal Capture: PM Trips	Net Trips after Internal Capture: AM Trips In	Net Trips after Internal Capture: AM Trips Out	Net Trips after Internal Capture: PM Trips In	Net Trips after Internal Capture: PM Trips Out	Net Trips after Internal Capture & Pass-By: Daily Trips	Net Trips after Internal Capture & Pass-By: AM Trips	Net Trips after Internal Capture & Pass-By: PM Trips	Net Trips after Internal Capture & Pass-By: AM Trips In	Net Trips after Internal Capture & Pass-By: AM Trips Out	Net Trips after Internal Capture & Pass-By: PM Trips In	Net Trips after Internal Capture & Pass-By: PM Trips Out
820	Retail	Shopping Center	1,000 Sq Ft GLA	76	Eq	N/A	N/A	N/A	5682	132	498	82	50	239	259	3528	52	360	40	12	173	187	2330	38	238	30	9	114	124
912	Retail	Drive-In Bank	1,000 Sq Ft	7	Avg	148.15	12.08	24.30	1038	85	170	48	37	85	85	230	19	91	14	5	47	44	122	10	48	7	3	25	23
934	Retail	Fast-Food Restaurant w/ D.T.	1,000 Sq Ft	14.2	Avg	496.12	45.42	32.65	7046	645	464	329	316	241	223	4892	565	326	295	270	172	154	2446	288	163	151	138	86	77
932	Retail	High-Turnover (Sit-Down) Restaurant	1,000 Sq Ft	5.6	Avg	127.15	10.81	9.85	714	61	55	34	27	33	22	94	7	22	4	3	12	10	54	4	13	2	2	7	6
								Totals	14480	923	1187	493	430	598	589	8744	643	799	353	290	404	395	4952	341	462	190	151	232	230

Notes:
(1) AM and/or PM rates correspond to peak hour of generator

A Trip Generation data from ITE *Trip Generation, 9th Edition*
B AM/PM rates correspond to peak of adjacent street traffic (if data available)
C Includes weekday rates only
D Total trips include pass-by trips w/ no internal capture
E Pass-by rates from ITE *Trip Generation Handbook, 2nd Edition*
F Internal capture rates from ITE *Trip Generation Handbook, 2nd Edition*
G Worksheet is intended as a planning tool. Verify results w/ ITE *Trip Generation 9th Edition*

Kimley»Horn

Project	Vista Ridge Commercial				
Subject	Trip Generation for Apartment				
Designed by	Matt Farmen	*Date*	May 23, 2016	*Job No.*	096530000
Checked by	Curtis Rowe	*Date*	May 24, 2016	*Sheet No.*	1 *of* 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Fitted Curve Equations

Land Use Code - Apartment, (220)

Independant Variable - Dwelling Units (X)

X = 144
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (page 334)

Daily Weekday
T = 0.49 (X) + 3.73
T = 0.49 * 144.0 + 3.79

Directional Distribution: 20% ent. 80% exit.
T = 74 Average Vehicle Trip Ends
15 entering 59 exiting

15 + 59 = 74

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 335)

Daily Weekday
T = 0.55 (X) + 17.65
T = 0.55 * 144.0 + 17.65

Directional Distribution: 65% ent. 35% exit.
T = 97 Average Vehicle Trip Ends
63 entering 34 exiting

63 + 34 = 97

Weekday (page 333)

Daily Weekday
T = 6.06 (X) + 123.56
T = 6.06 * 144.0 + 123.56

Directional Distribution: 50% entering, 50% exiting
T = 996 Average Vehicle Trip Ends
498 entering 498 exiting

498 + 498 = 996

Kimley»Horn

Project	Erie Kentro				
Subject	Trip Generation for Medical-Dental Office				
Designed by	Matt Farmen	*Date*	October 27, 2015	*Job No.*	096530000
Checked by	Curtis Rowe	*Date*	October 27, 2015	*Sheet No.*	1 *of* 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition - Fitted Curve and Average Rate Equations
Land Use Code - Medical-Dental Office Building (720)

Independent Variable - 1000 Sq Feet Gross Floor Area
SF = 7,000
X = 7.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1295)

Average Rate (R) = 2.39
T = R * X
T = 2.39 * 7.000

Directional Distribution: 79% ent. 21% exit.
T = 17 Average Vehicle Trip Ends
13 entering 4 exiting

13 + 4 = 17

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (Page 1296)

Ln(T) = 0.90 Ln(X) + 1.53
T = 0.900 Ln(7.000) + 1.53

Directional Distribution: 28% ent. 72% exit.
T = 27 Average Vehicle Trip Ends
8 entering 19 exiting

8 + 19 = 27

Weekday (page 1294)

Average Weekday

T = 40.89(X) - 214.97
T = 40.89 * 7.000 - 214.97

Directional Distribution: 50% entering, 50% exiting
T = 72 Average Vehicle Trip Ends
36 entering 36 exiting

36 + 36 = 72

Kimley»Horn

Project	Vista Ridge Commercial				
Subject	Trip Generation for Shopping Center				
Designed by	Matt Farmen	*Date*	May 23, 2016	*Job No.*	096530000
Checked by	Curtis Rowe	*Date*	May 24, 2016	*Sheet No.*	1 *of* 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Fitted Curve Equations
Land Use Code - Shopping Center (820)
Independant Variable - 1000 Square Feet Gross Leasable Area (X)
Gross Leasable Area = 76,000 Square Feet
X = 76.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1562)

Directional Distribution: 62% ent. 38% exit.
Ln(T) = 0.61 Ln(X) + 2.24 — T = 132 Average Vehicle Trip Ends
Ln(T) = 0.61 * Ln(76) + 2.24 — 82 entering 50 exiting

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1563)

Directional Distribution: 48% ent. 52% exit.
Ln(T) = 0.67 Ln(X) + 3.31 — T = 498 Average Vehicle Trip Ends
Ln(T) = 0.67 * Ln(76) + 3.31 — 239 entering 259 exiting

Weekday (page 1561)

Daily Weekday — Directional Distribution: 50% entering, 50% exiting
Ln(T) = 0.65 Ln(X) + 5.83 — T = 5682 Average Vehicle Trip Ends
Ln(T) = 0.65 * Ln(76) + 5.83 — 2841 entering 2841 exiting

Saturday Peak Hour of Generator

Average Saturday — Directional Distribution: 52% ent. 48% exit.
Ln(T) = 0.65 Ln(X) + 3.78 — T = 731 Average Vehicle Trip Ends
Ln(T) = 0.65 * Ln(76) + 3.78 — 380 entering 351 exiting

Non Pass-By Trip Volumes (Per ITE Trip Generation Handbook, June 2004)

PM Peak Hour = 34% Pass-by — Saturday Peak Hour = 26% Pass-by

	IN	Out	Total	
AM Peak	60	37	97	*uses lesser of PM and Saturday pass-by rates (26%)
PM Peak	158	171	329	
Daily	1875	1875	3750	*uses PM peak hour pass-by rate
Saturday Peak	281	260	541	

Kimley»Horn

Project	Vista Ridge Commercial					
Subject	Trip Generation for Drive-In Bank					
Designed by	Matt Farmen	*Date*	May 23, 2016	*Job No.*	096530000	
Checked by	Curtis Rowe	*Date*	May 24, 2016	*Sheet No.*	1	*of* 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Average Rate Equations

Land Use Code - Drive-in Bank (912)

Independant Variable - 1000 Square Feet Gross Floor Area (X)
Gross Floor Area = 7,000 Square Feet
X = 7.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1843)

Average Weekday
T = 12.08 (X)
T = 12.08 * 7.000

Directional Distribution: 57% ent. 43% exit.
T = 85 Average Vehicle Trip Ends
48 entering 37 exiting

48 + 37 (*) = 85

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1844)

Average Weekday
T =24.30 (X)
T = 24.30 * 7.000

Directional Distribution: 50% ent. 50% exit.
T = 170 Average Vehicle Trip Ends
85 entering 85 exiting

85 + 85 = 170

Weekday (page 1753)

Average Weekday
T = 148.15 (X)
T = 148.15 * 7.000

Directional Distribution: 50% entering, 50% exiting
T = 1038 Average Vehicle Trip Ends
519 entering 519 exiting

519 + 519 (*) = 1038

Saturday Peak Hour of Generator (page 1848)

Average Saturday
T = 26.31 (X)
T = 26.31 * 7.000

Directional Distribution: 51% ent. 49% exit.
T = 184 Average Vehicle Trip Ends
94 entering 90 exiting

94 + 90 = 184

Kimley»Horn

Project	Vista Ridge Commercial						
Subject	Trip Generation for High-Turnover (Sit-Down) Restaurant						
Designed by	Matt Farmen	*Date*	May 23, 2016	*Job No.*	096530000		
Checked by	Curtis Rowe	*Date*	May 24, 2016	*Sheet No.*	1	*of*	1

<u>TRIP GENERATION MANUAL TECHNIQUES</u>

ITE <u>Trip Generation Manual</u> 9th Edition, Average Rate Equations
Land Use Code - High Turnover Sit-Down Restaurant (932)
Independant Variable - 1000 Square Feet Gross Floor Area (X)

Gross Floor Area = 5,600 Square Feet
X = 5.600
T = Average Vehicle Trip Ends

<u>Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1886)</u>

Average Weekday	Directional Distribution:		55%	ent.	45%	exit.
T = 10.81 (X)	T =	61	Average Vehicle Trip Ends			
T = 10.81 * 5.600	34	entering	27	exiting		

<u>Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1887)</u>

Average Weekday	Directional Distribution:		60%	ent.	40%	exit.
T = 9.85 (X)	T =	55	Average Vehicle Trip Ends			
T = 9.85 * 5.600	33	entering	22	exiting		

<u>Weekday (page 1885)</u>

Average Weekday	Directional Distribution: 50% entering, 50% exiting			
T = 127.15 (X)	T =	714	Average Vehicle Trip Ends	
T = 127.15 * 5.600	357	entering	357	exiting

<u>P.M. Peak Hour of Generator (page 1889)</u>

Average Weekday	Directional Distribution:		54%	ent.	46%	exit.
T = 18.49 (X)	T =	104	Average Vehicle Trip Ends			
T = 18.49 * 5.600	56	entering	48	exiting		

<u>Saturday Peak Hour of Generator (page 1891)</u>

Average Saturday	Directional Distribution:		53%	ent.	47%	exit.
T = 14.07 (X)	T =	80	Average Vehicle Trip Ends			
T = 14.07 * 5.600	42	entering	38	exiting		

<u>Non-Pass-by Trip Volumes (page 48 Trip Generation Handbook, June 2004)</u>

PM Peak Hour = 57% Non-Pass By

	IN	Out	Total	
AM Peak	19	15	35	
PM Peak	19	13	31	
Daily	203	203	406	PM Peak Hour Rate Applied to All Other Time Periods

<u>Pass-by Trip Volumes (page 48 Trip Generation Handbook, June 2004</u>

PM Peak Hour = 43% Pass By

	IN	Out	Total	
AM Peak	15	12	26	
PM Peak	14	9	24	
Daily	154	154	308	PM Peak Hour Rate Applied to All Other Time Periods

Kimley»Horn

Project	Vista Ridge Commercial				
Subject	Trip Generation for Fast-Food Restaurant with Drive-Through Window				
Designed by	Matt Farmen	*Date*	May 23, 2016	*Job No.*	096530000
Checked by	Curtis Rowe	*Date*	May 24, 2016	*Sheet No.*	1 *of* 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Average Rate Equations

Land Use Code - Fast Food Restaurant With Drive-Through Window (934)

Independant Variable - 1000 Square Feet Gross Floor Area (X)
Gross Floor Area = 14,200 Square Feet
X = 14.200
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1913)

Average Weekday
T = 45.42 (X)
T = 45.42 * 14.200

Directional Distribution: 51% ent. 49% exit.
T = 645 Average Vehicle Trip Ends
329 entering 316 exiting

329 + 316 = 645

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1914)

Average Weekday
T = 32.65 (X)
T = 32.65 * 14.200

Directional Distribution: 52% ent. 48% exit.
T = 464 Average Vehicle Trip Ends
241 entering 223 exiting

241 + 223 = 464

Weekday (page 1912)

Average Weekday
T = 496.12 (X)
T = 496.12 * 14.200

Directional Distribution: 50% entering, 50% exiting
T = 7046 Average Vehicle Trip Ends
3523 entering 3523 exiting

3523 + 3523 = 7046

Saturday Peak Hour of Generator (Page 1918)

T = 59.00 (X)
T = 59.00 * 14.200

Directional Distribution: 51% ent. 49% exit.
T = 838 Average Vehicle Trip Ends
427 entering 411 exiting

427 + 411 = 838

Non-Pass-by Trip Volumes (pages 68 and 70, Trip Generation Handbook, June 2004)

AM Peak Hour = 51% Non-Pass By   PM Peak Hour = 50% Non-Pass By

	IN	Out	Total	
AM Peak	168	161	329	
PM Peak	121	112	232	
Daily	1762	1762	3524	PM Peak Hour Rate Applied to Daily

Pass-by Trip Volumes (pages 68 and 70, Trip Generation Handbook, June 2004

AM Peak Hour = 49% Pass By   PM Peak Hour = 50% Pass By

	IN	Out	Total	
AM Peak	161	155	316	
PM Peak	121	112	232	
Daily	1761	1761	3522	PM Peak Hour Rate Applied to Daily

ITE MULTI-USE PROJECT INTERNAL CAPTURE WORKSHEET
(Source: Chapter 7, ITE *Trip Generation Handbook*, June 2004)

Project Number: 096530000
Project Name: Vista Ridge Commercial
Scenario: AM
Analysis Period: AM Peak
Analyst: Kimley-Horn and Associates, Inc

Land Use A: Retail (Shopping Center)

ITE Land Use Code 820
Size: 76

	Total	Internal	External
Enter	82	42	40
Exit	50	38	12
Total	132	80	52
%	100%	**60.7%**	39.3%

Enter from External: 40
Exit to External: 12

Demand 30.0% 15
Balanced 13
Demand 28.0% 13

28.0% 23 Demand
11 Balanced
30.0% 11 Demand

Demand 30.0% 15
Balanced 15
Demand 28.0% 92

28.0% 23 Demand
8 Balanced
30.0% 8 Demand

Demand 30.0% 15
Balanced 10
Demand 28.0% 10

Land Use B: Retail (Drive-In Bank)

ITE Land Use Code 912
Size: 7

	Total	Internal	External
Enter	48	34	14
Exit	37	32	5
Total	85	66	19
%	100%	**77.6%**	22.4%

Enter from External: 14
Exit to External: 5

Demand 28.0% 10
10 Balanced
30.0% 11 Demand

Demand 28.0% 13
Balanced 8
Demand 30.0% 8

Land Use D: Retail (High-Turnover (Sit-Do

ITE Land Use Code 932
Size: 5.6

	Total	Internal	External
Enter	34	30	4
Exit	27	24	3
Total	61	54	7
%	100%	**88.5%**	11.5%

Enter from External: 4
Exit to External: 3

28.0% 13 Demand
13 Balanced
30.0% 95 Demand

Demand 28.0% 23
Balanced 23
Demand 30.0% 95

Demand 30.0% 8
Balanced 8
Demand 28.0% 92

Demand 30.0% 11
Balanced 11
Demand 28.0% 92

28.0% 10 Demand
10 Balanced
30.0% 95 Demand

Land Use C: Retail (Fast-Food Restaurant w/ D.T.)

ITE Land Use Code 934
Size: 14.2

	Total	Internal	External
Enter	329	34	295
Exit	316	46	270
Total	645	80	565
%	100%	**12.4%**	87.6%

Enter from External: 295
Exit to External: 270

NET EXTERNAL TRIPS FOR MULTI-USE DEVELOPMENT

	Land Use				
Category	A	B	C	D	Total
Enter	40	14	295	4	353
Exit	12	5	270	3	290
Total	52	19	565	7	**643**
Single Use Trip Gen Estimate	132	85	645	61	**923**

Overall Internal Capture = 30.34%

ITE MULTI-USE PROJECT INTERNAL CAPTURE WORKSHEET
(Source: Chapter 7, ITE *Trip Generation Handbook*, June 2004)

Project Number: 096530000
Project Name: Vista Ridge Commercial
Scenario: Daily
Analysis Period: Daily
Analyst: Kimley-Horn and Associates, Inc

Land Use A: Retail (Shopping Center)
ITE Land Use Code 820
Size: 76

	Total	Internal	External
Enter	2,841	1,058	1,783
Exit	2,841	1,097	1,744
Total	5,682	2,155	3,527
%	100%	**37.9%**	62.1%

Enter from External: 1,783
Exit to External: 1,744

Demand 30.0% 852
Balanced 145
Demand 28.0% 145

28.0% 795 Demand
156 Balanced
30.0% 156 Demand

Demand 30.0% 852
Balanced 852
Demand 28.0% 986

28.0% 795 Demand
107 Balanced
30.0% 107 Demand

Demand 30.0% 852
Balanced 100
Demand 28.0% 100

Land Use B: Retail (Drive-In Bank)
ITE Land Use Code 912
Size: 7

	Total	Internal	External
Enter	519	397	122
Exit	519	412	107
Total	1038	809	229
%	100%	**77.9%**	22.1%

Enter from External: 122
Exit to External: 107

Demand 28.0% 100
100 Balanced
30.0% 156 Demand

Land Use D: Retail (High-Turnover (Sit-Do
ITE Land Use Code 932
Size: 5.6

	Total	Internal	External
Enter	357	300	57
Exit	357	321	36
Total	714	621	93
%	100%	**87.0%**	13.0%

Enter from External: 57
Exit to External: 36

Demand 28.0% 145
Balanced 107
Demand 30.0% 107

28.0% 145 Demand
145 Balanced
30.0% 1057 Demand

Demand 28.0% 795
Balanced 795
Demand 30.0% 1057

Demand 30.0% 107
Balanced 107
Demand 28.0% 986

Demand 30.0% 156
Balanced 156
Demand 28.0% 986

28.0% 100 Demand
100 Balanced
30.0% 1057 Demand

Land Use C: Retail (Fast-Food Restaurant w/ D.T.)
ITE Land Use Code 934
Size: 14.2

	Total	Internal	External
Enter	3523	1115	2408
Exit	3523	1040	2483
Total	7046	2155	4891
%	100%	**30.6%**	69.4%

Enter from External: 2,408
Exit to External: 2,483

NET EXTERNAL TRIPS FOR MULTI-USE DEVELOPMENT

	Land Use				
Category	A	B	C	D	Total
Enter	1,783	122	2,408	57	4,370
Exit	1,744	107	2,483	36	4,370
Total	3,527	229	4,891	93	**8,740**
Single Use Trip Gen Estimate	5,682	1,038	7,046	714	**14,480**

Overall Internal Capture = 39.64%

ITE MULTI-USE PROJECT INTERNAL CAPTURE WORKSHEET
(Source: Chapter 7, ITE *Trip Generation Handbook*, June 2004)

Project Number: 096530000
Project Name: Vista Ridge Commercial
Scenario: PM
Analysis Period: PM Peak
Analyst: Kimley-Horn and Associates, Inc

Land Use A: Retail (Shopping Center)
ITE Land Use Code 820
Size: 76

	Total	Internal	External
Enter	239	66	173
Exit	259	72	187
Total	498	138	360
%	100%	**27.7%**	72.3%

Enter from External: 173
Exit to External: 187

Demand 20.0% 52
Balanced 17
Demand 20.0% 17

20.0% 48 Demand
4 Balanced
20.0% 4 Demand

Demand 20.0% 52
Balanced 48
Demand 20.0% 48

20.0% 48 Demand
17 Balanced
20.0% 17 Demand

Demand 20.0% 52
Balanced 7
Demand 20.0% 7

Land Use B: Retail (Drive-In Bank)
ITE Land Use Code 912
Size: 7

	Total	Internal	External
Enter	85	38	47
Exit	85	41	44
Total	170	79	91
%	100%	**46.5%**	53.5%

Enter from External: 47
Exit to External: 44

Demand 20.0% 7
7 Balanced
20.0% 17 Demand

Demand 20.0% 17
Balanced 4
Demand 20.0% 4

Land Use D: Retail (High-Turnover (Sit-Do
ITE Land Use Code 932
Size: 5.6

	Total	Internal	External
Enter	33	21	12
Exit	22	12	10
Total	55	33	22
%	100%	**60.0%**	40.0%

Enter from External: 12
Exit to External: 10

20.0% 17 Demand
17 Balanced
20.0% 45 Demand

Demand 20.0% 48
Balanced 45
Demand 20.0% 45

Demand 20.0% 4
Balanced 4
Demand 20.0% 48

Demand 20.0% 17
Balanced 17
Demand 20.0% 48

20.0% 7 Demand
7 Balanced
20.0% 45 Demand

Land Use C: Retail (Fast-Food Restaurant w/ D.T.)
ITE Land Use Code 934
Size: 14.2

	Total	Internal	External
Enter	241	69	172
Exit	223	69	154
Total	464	138	326
%	100%	**29.7%**	70.3%

Enter from External: 172
Exit to External: 154

NET EXTERNAL TRIPS FOR MULTI-USE DEVELOPMENT

	Land Use				
Category	A	B	C	D	Total
Enter	173	47	172	12	404
Exit	187	44	154	10	395
Total	360	91	326	22	**799**
Single Use Trip Gen Estimate	498	170	464	55	**1,187**

Overall Internal Capture = 32.67%

APPENDIX D

Intersection Analysis Worksheets

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	114	616	823	124	171	153
Future Volume (veh/h)	114	616	823	124	171	153
Number	7	4	8	18	1	16
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	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	165	655	935	155	209	184
Adj No. of Lanes	1	2	1	1	2	1
Peak Hour Factor	0.69	0.94	0.88	0.80	0.82	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	241	2096	907	771	1153	531
Arrive On Green	0.07	0.59	0.97	0.97	0.34	0.34
Sat Flow, veh/h	1774	3632	1863	1583	3442	1583
Grp Volume(v), veh/h	165	655	935	155	209	184
Grp Sat Flow(s),veh/h/ln	1774	1770	1863	1583	1721	1583
Q Serve(g_s), s	4.8	10.2	53.6	0.3	4.7	9.6
Cycle Q Clear(g_c), s	4.8	10.2	53.6	0.3	4.7	9.6
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	241	2096	907	771	1153	531
V/C Ratio(X)	0.69	0.31	1.03	0.20	0.18	0.35
Avail Cap(c_a), veh/h	280	2767	1219	1036	1153	531
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.44	0.44	1.00	1.00
Uniform Delay (d), s/veh	23.2	11.2	1.4	0.7	25.9	27.5
Incr Delay (d2), s/veh	5.6	0.1	24.3	0.1	0.3	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	4.9	14.7	0.1	2.3	9.6
LnGrp Delay(d),s/veh	28.8	11.3	25.7	0.8	26.2	29.3
LnGrp LOS	C	B	F	A	C	C
Approach Vol, veh/h		820	1090		393	
Approach Delay, s/veh		14.8	22.2		27.7	
Approach LOS		B	C		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				74.6		35.4	11.2	63.4
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				86.0		16.0	10.0	72.0
Max Q Clear Time (g_c+I1), s				12.2		11.6	6.8	55.6
Green Ext Time (p_c), s				16.6		0.6	0.1	9.6

Intersection Summary		
HCM 2010 Ctrl Delay		20.5
HCM 2010 LOS		C

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	177	976	665	208	145	151
Future Volume (veh/h)	177	976	665	208	145	151
Number	7	4	8	18	1	16
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	1863	1727	1727	1863	1863	1863
Adj Flow Rate, veh/h	213	1038	723	254	169	176
Adj No. of Lanes	1	2	1	1	2	1
Peak Hour Factor	0.83	0.94	0.92	0.82	0.86	0.86
Percent Heavy Veh, %	2	10	10	2	2	2
Cap, veh/h	282	1963	826	757	1133	521
Arrive On Green	0.08	0.60	0.96	0.96	0.33	0.33
Sat Flow, veh/h	1774	3368	1727	1583	3442	1583
Grp Volume(v), veh/h	213	1038	723	254	169	176
Grp Sat Flow(s),veh/h/ln	1774	1641	1727	1583	1721	1583
Q Serve(g_s), s	6.3	20.5	12.3	1.1	3.8	9.2
Cycle Q Clear(g_c), s	6.3	20.5	12.3	1.1	3.8	9.2
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	282	1963	826	757	1133	521
V/C Ratio(X)	0.75	0.53	0.88	0.34	0.15	0.34
Avail Cap(c_a), veh/h	328	2476	1052	964	1133	521
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.66	0.66	1.00	1.00
Uniform Delay (d), s/veh	22.5	13.0	1.5	1.3	26.0	27.8
Incr Delay (d2), s/veh	8.2	0.2	4.8	0.2	0.3	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	9.3	4.7	0.5	1.9	9.2
LnGrp Delay(d),s/veh	30.7	13.2	6.3	1.4	26.3	29.6
LnGrp LOS	C	B	A	A	C	C
Approach Vol, veh/h		1251	977		345	
Approach Delay, s/veh		16.2	5.0		28.0	
Approach LOS		B	A		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				59.6		50.4	12.8	46.8
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				83.0		19.0	12.0	67.0
Max Q Clear Time (g_c+I1), s				22.5		11.2	8.3	14.3
Green Ext Time (p_c), s				19.2		0.7	0.2	18.6

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	167	781	978	174	216	218		
Future Volume (veh/h)	167	781	978	174	216	218		
Number	7	4	8	18	1	16		
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	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	242	831	1111	218	263	263		
Adj No. of Lanes	1	2	1	1	2	1		
Peak Hour Factor	0.69	0.94	0.88	0.80	0.82	0.83		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	297	2221	927	788	1031	474		
Arrive On Green	0.09	0.63	1.00	1.00	0.30	0.30		
Sat Flow, veh/h	1774	3632	1863	1583	3442	1583		
Grp Volume(v), veh/h	242	831	1111	218	263	263		
Grp Sat Flow(s),veh/h/ln	1774	1770	1863	1583	1721	1583		
Q Serve(g_s), s	6.8	12.6	54.8	0.1	6.4	15.3		
Cycle Q Clear(g_c), s	6.8	12.6	54.8	0.1	6.4	15.3		
Prop In Lane	1.00			1.00	1.00	1.00		
Lane Grp Cap(c), veh/h	297	2221	927	788	1031	474		
V/C Ratio(X)	0.81	0.37	1.20	0.28	0.26	0.55		
Avail Cap(c_a), veh/h	309	2735	1185	1008	1031	474		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.09	0.09	1.00	1.00		
Uniform Delay (d), s/veh	21.9	10.0	0.2	0.1	29.2	32.3		
Incr Delay (d2), s/veh	14.9	0.1	90.0	0.0	0.6	4.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	5.0	6.1	23.3	0.0	3.1	14.2		
LnGrp Delay(d),s/veh	36.8	10.1	90.2	0.1	29.8	37.0		
LnGrp LOS	D	B	F	A	C	D		
Approach Vol, veh/h		1073	1329		526			
Approach Delay, s/veh		16.1	75.4		33.4			
Approach LOS		B	E		C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				78.4		31.6	13.6	64.8
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				85.0		17.0	11.0	70.0
Max Q Clear Time (g_c+I1), s				14.6		17.3	8.8	56.8
Green Ext Time (p_c), s				26.5		0.0	0.1	10.0
Intersection Summary								
HCM 2010 Ctrl Delay			46.1					
HCM 2010 LOS			D					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	255	1276	920	266	182	204
Future Volume (veh/h)	255	1276	920	266	182	204
Number	7	4	8	18	1	16
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	1863	1727	1727	1863	1863	1863
Adj Flow Rate, veh/h	307	1357	1000	324	212	237
Adj No. of Lanes	1	2	1	1	2	1
Peak Hour Factor	0.83	0.94	0.92	0.82	0.86	0.86
Percent Heavy Veh, %	2	10	10	2	2	2
Cap, veh/h	383	2071	826	757	1020	469
Arrive On Green	0.12	0.63	0.96	0.96	0.30	0.30
Sat Flow, veh/h	1774	3368	1727	1583	3442	1583
Grp Volume(v), veh/h	307	1357	1000	324	212	237
Grp Sat Flow(s),veh/h/ln	1774	1641	1727	1583	1721	1583
Q Serve(g_s), s	8.9	28.6	52.6	1.7	5.1	13.6
Cycle Q Clear(g_c), s	8.9	28.6	52.6	1.7	5.1	13.6
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	383	2071	826	757	1020	469
V/C Ratio(X)	0.80	0.66	1.21	0.43	0.21	0.51
Avail Cap(c_a), veh/h	386	2536	1068	979	1020	469
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.10	0.10	1.00	1.00
Uniform Delay (d), s/veh	18.1	12.8	2.4	1.3	29.0	32.0
Incr Delay (d2), s/veh	11.4	0.4	96.0	0.0	0.5	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	12.9	37.2	0.5	2.5	12.8
LnGrp Delay(d),s/veh	29.5	13.2	98.4	1.3	29.5	35.9
LnGrp LOS	C	B	F	A	C	D
Approach Vol, veh/h		1664	1324		449	
Approach Delay, s/veh		16.2	74.6		32.9	
Approach LOS		B	E		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				79.2		30.8	16.0	63.3
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				85.0		17.0	13.0	68.0
Max Q Clear Time (g_c+I1), s				30.6		15.6	10.9	54.6
Green Ext Time (p_c), s				32.3		0.3	0.2	11.3

Intersection Summary	
HCM 2010 Ctrl Delay	40.9
HCM 2010 LOS	D

Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	252	787	1009	168	288	257		
Future Volume (veh/h)	252	787	1009	168	288	257		
Number	7	4	8	18	1	16		
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	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	365	837	1147	210	351	310		
Adj No. of Lanes	1	2	1	1	2	1		
Peak Hour Factor	0.69	0.94	0.88	0.80	0.82	0.83		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	340	2767	1101	936	501	230		
Arrive On Green	0.15	0.78	1.00	1.00	0.15	0.15		
Sat Flow, veh/h	1774	3632	1863	1583	3442	1583		
Grp Volume(v), veh/h	365	837	1147	210	351	310		
Grp Sat Flow(s),veh/h/ln	1774	1770	1863	1583	1721	1583		
Q Serve(g_s), s	17.0	7.4	65.0	0.0	10.7	16.0		
Cycle Q Clear(g_c), s	17.0	7.4	65.0	0.0	10.7	16.0		
Prop In Lane	1.00			1.00	1.00	1.00		
Lane Grp Cap(c), veh/h	340	2767	1101	936	501	230		
V/C Ratio(X)	1.07	0.30	1.04	0.22	0.70	1.35		
Avail Cap(c_a), veh/h	340	2767	1101	936	501	230		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	39.9	3.4	0.0	0.0	44.7	47.0		
Incr Delay (d2), s/veh	70.2	0.1	38.7	0.1	8.0	181.8		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	16.9	3.6	11.8	0.0	5.6	24.6		
LnGrp Delay(d),s/veh	110.0	3.5	38.7	0.1	52.7	228.8		
LnGrp LOS	F	A	F	A	D	F		
Approach Vol, veh/h		1202	1357		661			
Approach Delay, s/veh		35.8	32.8		135.3			
Approach LOS		D	C		F			
Timer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				90.0		20.0	21.0	69.0
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				86.0		16.0	17.0	65.0
Max Q Clear Time (g_c+I1), s				9.4		18.0	19.0	67.0
Green Ext Time (p_c), s				28.7		0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay			54.9					
HCM 2010 LOS			D					

Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	361	1278	970	251	298	266		
Future Volume (veh/h)	361	1278	970	251	298	266		
Number	7	4	8	18	1	16		
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	1863	1727	1727	1863	1863	1863		
Adj Flow Rate, veh/h	435	1360	1054	306	347	309		
Adj No. of Lanes	1	2	1	1	2	1		
Peak Hour Factor	0.83	0.94	0.92	0.82	0.86	0.86		
Percent Heavy Veh, %	2	10	10	2	2	2		
Cap, veh/h	388	2566	974	892	501	230		
Arrive On Green	0.18	0.78	1.00	1.00	0.15	0.15		
Sat Flow, veh/h	1774	3368	1727	1583	3442	1583		
Grp Volume(v), veh/h	435	1360	1054	306	347	309		
Grp Sat Flow(s),veh/h/ln	1774	1641	1727	1583	1721	1583		
Q Serve(g_s), s	20.0	17.0	62.0	0.0	10.5	16.0		
Cycle Q Clear(g_c), s	20.0	17.0	62.0	0.0	10.5	16.0		
Prop In Lane	1.00			1.00	1.00	1.00		
Lane Grp Cap(c), veh/h	388	2566	974	892	501	230		
V/C Ratio(X)	1.12	0.53	1.08	0.34	0.69	1.34		
Avail Cap(c_a), veh/h	388	2566	974	892	501	230		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	38.9	4.5	0.0	0.0	44.7	47.0		
Incr Delay (d2), s/veh	82.8	0.2	53.9	0.2	7.7	180.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	20.7	7.6	14.6	0.1	5.5	24.5		
LnGrp Delay(d),s/veh	121.7	4.7	53.9	0.2	52.4	227.0		
LnGrp LOS	F	A	F	A	D	F		
Approach Vol, veh/h		1795	1360		656			
Approach Delay, s/veh		33.0	41.8		134.6			
Approach LOS		C	D		F			
Timer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				90.0		20.0	24.0	66.0
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				86.0		16.0	20.0	62.0
Max Q Clear Time (g_c+I1), s				19.0		18.0	22.0	64.0
Green Ext Time (p_c), s				37.7		0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay			53.7					
HCM 2010 LOS			D					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	271	1343	1729	287	372	357
Future Volume (veh/h)	271	1343	1729	287	372	357
Number	7	4	8	18	1	16
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	1863	1863	1863	1900	1863	1863
Adj Flow Rate, veh/h	393	1429	1965	359	454	430
Adj No. of Lanes	1	3	3	0	2	1
Peak Hour Factor	0.69	0.94	0.88	0.80	0.82	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	426	3557	2072	371	784	654
Arrive On Green	0.19	0.70	0.96	0.96	0.23	0.23
Sat Flow, veh/h	1774	5253	4507	777	3442	1583
Grp Volume(v), veh/h	393	1429	1526	798	454	430
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	1726	1721	1583
Q Serve(g_s), s	17.8	12.9	22.3	30.2	12.9	24.1
Cycle Q Clear(g_c), s	17.8	12.9	22.3	30.2	12.9	24.1
Prop In Lane	1.00			0.45	1.00	1.00
Lane Grp Cap(c), veh/h	426	3557	1619	824	784	654
V/C Ratio(X)	0.92	0.40	0.94	0.97	0.58	0.66
Avail Cap(c_a), veh/h	516	3883	1664	847	784	654
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.54	0.54	1.00	1.00
Uniform Delay (d), s/veh	32.0	6.9	1.8	2.0	37.8	26.0
Incr Delay (d2), s/veh	19.9	0.1	6.8	15.6	3.1	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.0	6.0	7.9	12.4	6.5	21.7
LnGrp Delay(d),s/veh	51.9	7.0	8.6	17.6	40.9	31.1
LnGrp LOS	D	A	A	B	D	C
Approach Vol, veh/h		1822	2324		884	
Approach Delay, s/veh		16.7	11.7		36.1	
Approach LOS		B	B		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				80.9		29.1	24.4	56.5
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				84.0		18.0	26.0	54.0
Max Q Clear Time (g_c+I1), s				14.9		26.1	19.8	32.2
Green Ext Time (p_c), s				56.7		0.0	0.6	20.4

Intersection Summary	
HCM 2010 Ctrl Delay	17.8
HCM 2010 LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	417	2166	1527	455	315	342
Future Volume (veh/h)	417	2166	1527	455	315	342
Number	7	4	8	18	1	16
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	1863	1727	1759	1900	1863	1863
Adj Flow Rate, veh/h	502	2304	1660	555	366	398
Adj No. of Lanes	1	3	3	0	2	1
Peak Hour Factor	0.83	0.94	0.92	0.82	0.86	0.86
Percent Heavy Veh, %	2	10	10	10	2	2
Cap, veh/h	529	3623	1726	561	547	649
Arrive On Green	0.25	0.77	0.96	0.96	0.16	0.16
Sat Flow, veh/h	1774	4871	3747	1166	3442	1583
Grp Volume(v), veh/h	502	2304	1476	739	366	398
Grp Sat Flow(s),veh/h/ln	1774	1572	1601	1553	1721	1583
Q Serve(g_s), s	25.3	24.4	24.8	41.5	11.0	17.5
Cycle Q Clear(g_c), s	25.3	24.4	24.8	41.5	11.0	17.5
Prop In Lane	1.00			0.75	1.00	1.00
Lane Grp Cap(c), veh/h	529	3623	1540	747	547	649
V/C Ratio(X)	0.95	0.64	0.96	0.99	0.67	0.61
Avail Cap(c_a), veh/h	551	3687	1543	749	547	649
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.50	0.50	1.00	1.00
Uniform Delay (d), s/veh	33.4	5.8	1.6	1.9	43.5	25.6
Incr Delay (d2), s/veh	25.7	0.4	8.6	20.7	6.4	4.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	18.7	10.4	8.0	14.1	5.7	20.0
LnGrp Delay(d),s/veh	59.2	6.1	10.2	22.6	49.9	29.9
LnGrp LOS	E	A	B	C	D	C
Approach Vol, veh/h		2806	2215		764	
Approach Delay, s/veh		15.6	14.3		39.5	
Approach LOS		B	B		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				88.5		21.5	31.6	56.9
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				86.0		16.0	29.0	53.0
Max Q Clear Time (g_c+I1), s				26.4		19.5	27.3	43.5
Green Ext Time (p_c), s				56.2		0.0	0.3	9.4

Intersection Summary	
HCM 2010 Ctrl Delay	18.3
HCM 2010 LOS	B

Movement	EBL	EBT	WBT	WBR	SBL	SBR		
Lane Configurations								
Traffic Volume (veh/h)	356	1349	1760	281	444	396		
Future Volume (veh/h)	356	1349	1760	281	444	396		
Number	7	4	8	18	1	16		
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	1863	1863	1863	1900	1863	1863		
Adj Flow Rate, veh/h	516	1435	2000	351	541	477		
Adj No. of Lanes	1	3	3	0	2	1		
Peak Hour Factor	0.69	0.94	0.88	0.80	0.82	0.83		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	533	3883	2026	348	563	677		
Arrive On Green	0.26	0.76	0.46	0.46	0.16	0.16		
Sat Flow, veh/h	1774	5253	4537	751	3442	1583		
Grp Volume(v), veh/h	516	1435	1542	809	541	477		
Grp Sat Flow(s),veh/h/ln	1774	1695	1695	1730	1721	1583		
Q Serve(g_s), s	27.5	10.2	49.2	51.0	17.2	18.0		
Cycle Q Clear(g_c), s	27.5	10.2	49.2	51.0	17.2	18.0		
Prop In Lane	1.00			0.43	1.00	1.00		
Lane Grp Cap(c), veh/h	533	3883	1572	802	563	677		
V/C Ratio(X)	0.97	0.37	0.98	1.01	0.96	0.71		
Avail Cap(c_a), veh/h	533	3883	1572	802	563	677		
HCM Platoon Ratio	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		
Uniform Delay (d), s/veh	34.7	4.3	29.0	29.5	45.6	25.8		
Incr Delay (d2), s/veh	30.8	0.1	18.3	33.8	29.4	6.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	20.0	4.7	26.9	31.8	10.4	23.9		
LnGrp Delay(d),s/veh	65.5	4.3	47.4	63.3	75.0	31.9		
LnGrp LOS	E	A	D	F	E	C		
Approach Vol, veh/h		1951	2351		1018			
Approach Delay, s/veh		20.5	52.8		54.8			
Approach LOS		C	D		D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				88.0		22.0	33.0	55.0
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				84.0		18.0	29.0	51.0
Max Q Clear Time (g_c+I1), s				12.2		20.0	29.5	53.0
Green Ext Time (p_c), s				59.0		0.0	0.0	0.0
Intersection Summary								
HCM 2010 Ctrl Delay			41.4					
HCM 2010 LOS			D					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	523	2168	1577	440	431	404
Future Volume (veh/h)	523	2168	1577	440	431	404
Number	7	4	8	18	1	16
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	1863	1727	1758	1900	1863	1863
Adj Flow Rate, veh/h	630	2306	1714	537	501	470
Adj No. of Lanes	1	3	3	0	2	1
Peak Hour Factor	0.83	0.94	0.92	0.82	0.86	0.86
Percent Heavy Veh, %	2	10	10	10	2	2
Cap, veh/h	598	3687	1626	495	501	705
Arrive On Green	0.30	0.78	0.45	0.45	0.15	0.15
Sat Flow, veh/h	1774	4871	3808	1111	3442	1583
Grp Volume(v), veh/h	630	2306	1496	755	501	470
Grp Sat Flow(s),veh/h/ln	1774	1572	1600	1562	1721	1583
Q Serve(g_s), s	33.0	23.0	49.0	49.0	16.0	16.0
Cycle Q Clear(g_c), s	33.0	23.0	49.0	49.0	16.0	16.0
Prop In Lane	1.00			0.71	1.00	1.00
Lane Grp Cap(c), veh/h	598	3687	1425	696	501	705
V/C Ratio(X)	1.05	0.63	1.05	1.09	1.00	0.67
Avail Cap(c_a), veh/h	598	3687	1425	696	501	705
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	33.8	5.1	30.5	30.5	47.0	24.1
Incr Delay (d2), s/veh	51.9	0.3	38.1	59.6	40.4	4.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	26.7	9.9	29.1	32.6	10.4	23.2
LnGrp Delay(d),s/veh	85.7	5.5	68.6	90.1	87.4	29.0
LnGrp LOS	F	A	F	F	F	C
Approach Vol, veh/h		2936	2251		971	
Approach Delay, s/veh		22.7	75.8		59.1	
Approach LOS		C	E		E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				90.0		20.0	37.0	53.0
Change Period (Y+Rc), s				4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s				86.0		16.0	33.0	49.0
Max Q Clear Time (g_c+I1), s				25.0		18.0	35.0	51.0
Green Ext Time (p_c), s				57.6		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	47.8
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	707	96	252	899	52	39	44	113	85	90	12
Future Volume (veh/h)	2	707	96	252	899	52	39	44	113	85	90	12
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	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	4	744	135	332	1022	76	80	68	169	112	108	16
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.50	0.95	0.71	0.76	0.88	0.68	0.49	0.65	0.67	0.76	0.83	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	124	908	772	537	1106	940	336	410	349	347	349	52
Arrive On Green	0.01	0.98	0.98	0.11	0.59	0.59	0.04	0.22	0.22	0.04	0.22	0.22
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	1586	235
Grp Volume(v), veh/h	4	744	135	332	1022	76	80	68	169	112	0	124
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	0	1821
Q Serve(g_s), s	0.1	5.4	0.3	9.7	54.3	2.3	3.9	3.2	10.2	4.0	0.0	6.3
Cycle Q Clear(g_c), s	0.1	5.4	0.3	9.7	54.3	2.3	3.9	3.2	10.2	4.0	0.0	6.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	124	908	772	537	1106	940	336	410	349	347	0	401
V/C Ratio(X)	0.03	0.82	0.17	0.62	0.92	0.08	0.24	0.17	0.48	0.32	0.00	0.31
Avail Cap(c_a), veh/h	181	965	820	599	1168	993	336	410	349	347	0	401
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)	0.97	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.5	0.8	0.7	10.5	20.1	9.5	32.0	34.7	37.4	33.3	0.0	35.9
Incr Delay (d2), s/veh	0.1	5.2	0.1	1.6	11.8	0.0	0.4	0.9	4.8	0.5	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	2.1	0.1	4.9	31.2	1.0	1.9	1.8	5.0	0.9	0.0	3.4
LnGrp Delay(d),s/veh	22.6	6.0	0.8	12.1	32.0	9.6	32.4	35.6	42.2	33.9	0.0	37.9
LnGrp LOS	C	A	A	B	C	A	C	D	D	C		D
Approach Vol, veh/h		883			1430			317			236	
Approach Delay, s/veh		5.3			26.2			38.3			36.0	
Approach LOS		A			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	28.2	16.1	57.6	8.0	28.2	4.5	69.3
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	4.0	17.0	16.0	57.0	4.0	17.0	4.0	69.0
Max Q Clear Time (g_c+I1), s	6.0	12.2	11.7	7.4	5.9	8.3	2.1	56.3
Green Ext Time (p_c), s	0.0	0.7	0.4	19.7	0.0	1.0	0.0	9.0

Intersection Summary	
HCM 2010 Ctrl Delay	21.9
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	1068	77	110	791	88	64	67	132	76	58	8
Future Volume (veh/h)	11	1068	77	110	791	88	64	67	132	76	58	8
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	1863	1727	1863	1863	1727	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	20	1148	120	120	851	111	88	84	167	88	72	20
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.55	0.93	0.64	0.92	0.93	0.79	0.73	0.80	0.79	0.86	0.81	0.40
Percent Heavy Veh, %	2	10	2	2	10	2	2	2	2	2	2	2
Cap, veh/h	282	1099	1008	130	1133	1039	259	271	230	248	204	57
Arrive On Green	0.02	0.85	0.85	0.04	0.66	0.66	0.04	0.15	0.15	0.04	0.15	0.15
Sat Flow, veh/h	1774	1727	1583	1774	1727	1583	1774	1863	1583	1774	1404	390
Grp Volume(v), veh/h	20	1148	120	120	851	111	88	84	167	88	0	92
Grp Sat Flow(s),veh/h/ln	1774	1727	1583	1774	1727	1583	1774	1863	1583	1774	0	1794
Q Serve(g_s), s	0.4	70.0	1.4	3.3	36.7	2.9	4.0	4.4	11.1	4.0	0.0	5.1
Cycle Q Clear(g_c), s	0.4	70.0	1.4	3.3	36.7	2.9	4.0	4.4	11.1	4.0	0.0	5.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	282	1099	1008	130	1133	1039	259	271	230	248	0	261
V/C Ratio(X)	0.07	1.04	0.12	0.92	0.75	0.11	0.34	0.31	0.73	0.35	0.00	0.35
Avail Cap(c_a), veh/h	317	1099	1008	130	1133	1039	259	271	230	248	0	261
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.90	0.90	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.3	8.4	3.2	32.2	12.8	7.0	39.5	42.1	44.9	39.4	0.0	42.3
Incr Delay (d2), s/veh	0.1	38.2	0.0	56.0	2.8	0.0	0.8	3.0	18.0	0.9	0.0	3.7
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 BackOfQ(50%),veh/ln	0.2	42.8	0.6	5.7	18.2	1.2	0.5	2.5	6.0	2.3	0.0	2.8
LnGrp Delay(d),s/veh	12.3	46.6	3.2	88.2	15.7	7.0	40.3	45.0	62.9	40.3	0.0	46.0
LnGrp LOS	B	F	A	F	B	A	D	D	E	D		D
Approach Vol, veh/h		1288			1082			339			180	
Approach Delay, s/veh		42.1			22.8			52.6			43.2	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.0	20.0	8.0	74.0	8.0	20.0	5.8	76.2
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	4.0	16.0	4.0	70.0	4.0	16.0	4.0	70.0
Max Q Clear Time (g_c+I1), s	6.0	13.1	5.3	72.0	6.0	7.1	2.4	38.7
Green Ext Time (p_c), s	0.0	0.4	0.0	0.0	0.0	0.9	0.0	19.9

Intersection Summary	
HCM 2010 Ctrl Delay	36.2
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	786	112	276	1081	74	79	76	125	159	144	19
Future Volume (veh/h)	30	786	112	276	1081	74	79	76	125	159	144	19
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	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	60	827	158	363	1228	109	161	117	187	209	173	25
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.50	0.95	0.71	0.76	0.88	0.68	0.49	0.65	0.67	0.76	0.83	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	120	1026	872	569	1168	993	202	282	240	247	241	35
Arrive On Green	0.06	1.00	1.00	0.11	0.63	0.63	0.05	0.15	0.15	0.05	0.15	0.15
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	1592	230
Grp Volume(v), veh/h	60	827	158	363	1228	109	161	117	187	209	0	198
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	0	1822
Q Serve(g_s), s	1.6	0.0	0.0	9.2	69.0	3.0	5.0	6.3	12.5	5.0	0.0	11.4
Cycle Q Clear(g_c), s	1.6	0.0	0.0	9.2	69.0	3.0	5.0	6.3	12.5	5.0	0.0	11.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.13
Lane Grp Cap(c), veh/h	120	1026	872	569	1168	993	202	282	240	247	0	276
V/C Ratio(X)	0.50	0.81	0.18	0.64	1.05	0.11	0.80	0.42	0.78	0.85	0.00	0.72
Avail Cap(c_a), veh/h	130	1026	872	669	1168	993	202	282	240	247	0	276
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)	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.8	0.0	0.0	7.3	20.5	8.2	44.5	42.3	44.9	45.1	0.0	44.4
Incr Delay (d2), s/veh	3.1	4.6	0.1	1.6	40.8	0.0	19.4	4.5	21.9	22.8	0.0	14.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	1.3	0.0	4.7	48.3	1.3	3.5	3.6	6.9	6.9	0.0	6.9
LnGrp Delay(d),s/veh	28.9	4.6	0.1	8.9	61.3	8.3	63.8	46.7	66.8	67.9	0.0	59.4
LnGrp LOS	C	A	A	A	F	A	E	D	E	E		E
Approach Vol, veh/h		1045			1700			465			407	
Approach Delay, s/veh		5.3			46.7			60.7			63.7	
Approach LOS		A			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	20.6	15.8	64.6	9.0	20.6	7.4	73.0
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	5.0	16.0	18.0	55.0	5.0	16.0	4.0	69.0
Max Q Clear Time (g_c+I1), s	7.0	14.5	11.2	2.0	7.0	13.4	3.6	71.0
Green Ext Time (p_c), s	0.0	0.4	0.6	28.9	0.0	0.6	0.0	0.0

Intersection Summary			
HCM 2010 Ctrl Delay			38.5
HCM 2010 LOS			D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	1147	89	118	970	138	121	131	143	248	160	27
Future Volume (veh/h)	68	1147	89	118	970	138	121	131	143	248	160	27
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	1863	1727	1863	1863	1727	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	124	1233	139	128	1043	175	166	164	181	288	198	68
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.55	0.93	0.64	0.92	0.93	0.79	0.73	0.80	0.79	0.86	0.81	0.40
Percent Heavy Veh, %	2	10	2	2	10	2	2	2	2	2	2	2
Cap, veh/h	136	1052	964	130	1052	964	169	288	245	237	205	70
Arrive On Green	0.05	0.81	0.81	0.04	0.61	0.61	0.05	0.15	0.15	0.05	0.15	0.15
Sat Flow, veh/h	1774	1727	1583	1774	1727	1583	1774	1863	1583	1774	1327	456
Grp Volume(v), veh/h	124	1233	139	128	1043	175	166	164	181	288	0	266
Grp Sat Flow(s),veh/h/ln	1774	1727	1583	1774	1727	1583	1774	1863	1583	1774	0	1782
Q Serve(g_s), s	3.2	67.0	2.1	3.9	65.5	5.3	6.0	9.0	12.0	6.0	0.0	16.3
Cycle Q Clear(g_c), s	3.2	67.0	2.1	3.9	65.5	5.3	6.0	9.0	12.0	6.0	0.0	16.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.26
Lane Grp Cap(c), veh/h	136	1052	964	130	1052	964	169	288	245	237	0	275
V/C Ratio(X)	0.91	1.17	0.14	0.98	0.99	0.18	0.98	0.57	0.74	1.21	0.00	0.97
Avail Cap(c_a), veh/h	136	1052	964	130	1052	964	169	288	245	237	0	275
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.84	0.84	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.5	10.4	4.3	32.0	21.2	9.4	43.3	43.1	44.4	45.6	0.0	46.2
Incr Delay (d2), s/veh	46.0	86.2	0.1	74.1	25.6	0.1	63.5	8.0	18.1	128.1	0.0	46.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	55.4	0.9	6.6	38.5	2.4	5.1	5.2	6.5	18.8	0.0	11.6
LnGrp Delay(d),s/veh	74.5	96.7	4.3	106.1	46.8	9.5	106.8	51.1	62.5	173.7	0.0	92.3
LnGrp LOS	E	F	A	F	D	A	F	D	E	F		F
Approach Vol, veh/h		1496			1346			511			554	
Approach Delay, s/veh		86.2			47.6			73.2			134.6	
Approach LOS		F			D			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	21.0	8.0	71.0	10.0	21.0	8.0	71.0
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	6.0	17.0	4.0	67.0	6.0	17.0	4.0	67.0
Max Q Clear Time (g_c+I1), s	8.0	14.0	5.9	69.0	8.0	18.3	5.2	67.5
Green Ext Time (p_c), s	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	78.1
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	802	128	276	1109	76	116	80	125	167	160	19
Future Volume (veh/h)	30	802	128	276	1109	76	116	80	125	167	160	19
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	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	60	844	180	363	1260	112	237	123	187	220	193	25
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.50	0.95	0.71	0.76	0.88	0.68	0.49	0.65	0.67	0.76	0.83	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	120	1022	869	226	1033	878	309	333	283	355	274	35
Arrive On Green	0.03	0.55	0.55	0.04	0.55	0.55	0.10	0.18	0.18	0.09	0.17	0.17
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	1616	209
Grp Volume(v), veh/h	60	844	180	363	1260	112	237	123	187	220	0	218
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1863	1583	1774	0	1826
Q Serve(g_s), s	1.6	41.1	6.4	4.0	61.0	3.7	11.0	6.4	12.1	10.0	0.0	12.4
Cycle Q Clear(g_c), s	1.6	41.1	6.4	4.0	61.0	3.7	11.0	6.4	12.1	10.0	0.0	12.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	120	1022	869	226	1033	878	309	333	283	355	0	309
V/C Ratio(X)	0.50	0.83	0.21	1.61	1.22	0.13	0.77	0.37	0.66	0.62	0.00	0.70
Avail Cap(c_a), veh/h	130	1033	878	226	1033	878	309	333	283	355	0	309
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	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.6	20.5	12.6	33.1	24.5	11.7	36.1	39.7	42.1	35.2	0.0	43.1
Incr Delay (d2), s/veh	3.2	5.6	0.1	292.9	107.8	0.1	11.1	3.1	11.6	3.3	0.0	12.7
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 BackOfQ(50%),veh/ln	1.1	22.7	2.8	23.3	61.9	1.6	2.7	3.6	6.2	5.8	0.0	7.3
LnGrp Delay(d),s/veh	29.9	26.0	12.8	326.0	132.3	11.8	47.2	42.9	53.6	38.5	0.0	55.8
LnGrp LOS	C	C	B	F	F	B	D	D	D	D		E
Approach Vol, veh/h		1084			1735			547			438	
Approach Delay, s/veh		24.0			165.0			48.4			47.1	
Approach LOS		C			F			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	23.6	8.0	64.4	15.0	22.6	7.4	65.0
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	10.0	19.0	4.0	61.0	11.0	18.0	4.0	61.0
Max Q Clear Time (g_c+I1), s	12.0	14.1	6.0	43.1	13.0	14.4	3.6	63.0
Green Ext Time (p_c), s	0.0	1.1	0.0	14.2	0.0	0.9	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	94.5
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	1172	114	118	1004	140	164	136	143	260	185	27
Future Volume (veh/h)	68	1172	114	118	1004	140	164	136	143	260	185	27
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	1863	1727	1863	1863	1727	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	124	1260	178	128	1080	177	225	170	181	302	228	68
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	0
Peak Hour Factor	0.55	0.93	0.64	0.92	0.93	0.79	0.73	0.80	0.79	0.86	0.81	0.40
Percent Heavy Veh, %	2	10	2	2	10	2	2	2	2	2	2	2
Cap, veh/h	130	1036	950	130	1036	950	178	288	245	250	213	64
Arrive On Green	0.04	0.60	0.60	0.04	0.60	0.60	0.06	0.15	0.15	0.06	0.15	0.15
Sat Flow, veh/h	1774	1727	1583	1774	1727	1583	1774	1863	1583	1774	1379	411
Grp Volume(v), veh/h	124	1260	178	128	1080	177	225	170	181	302	0	296
Grp Sat Flow(s),veh/h/ln	1774	1727	1583	1774	1727	1583	1774	1863	1583	1774	0	1790
Q Serve(g_s), s	3.6	66.0	5.6	3.9	66.0	5.5	7.0	9.3	12.0	7.0	0.0	17.0
Cycle Q Clear(g_c), s	3.6	66.0	5.6	3.9	66.0	5.5	7.0	9.3	12.0	7.0	0.0	17.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	130	1036	950	130	1036	950	178	288	245	250	0	277
V/C Ratio(X)	0.95	1.22	0.19	0.98	1.04	0.19	1.26	0.59	0.74	1.21	0.00	1.07
Avail Cap(c_a), veh/h	130	1036	950	130	1036	950	178	288	245	250	0	277
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	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.7	22.0	9.9	31.5	22.0	9.9	42.0	43.3	44.4	44.6	0.0	46.5
Incr Delay (d2), s/veh	64.7	106.1	0.1	74.1	39.5	0.1	154.7	8.6	18.1	125.3	0.0	73.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	61.6	2.4	6.6	42.5	2.4	9.7	5.5	6.5	8.7	0.0	14.1
LnGrp Delay(d),s/veh	95.4	128.1	10.0	105.6	61.5	10.0	196.8	51.9	62.5	170.0	0.0	120.4
LnGrp LOS	F	F	B	F	F	B	F	D	E	F		F
Approach Vol, veh/h		1562			1385			576			598	
Approach Delay, s/veh		112.0			59.0			111.8			145.4	
Approach LOS		F			E			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	21.0	8.0	70.0	11.0	21.0	8.0	70.0
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	7.0	17.0	4.0	66.0	7.0	17.0	4.0	66.0
Max Q Clear Time (g_c+I1), s	9.0	14.0	5.9	68.0	9.0	19.0	5.6	68.0
Green Ext Time (p_c), s	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	99.0
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	802	128	276	1109	76	116	80	125	167	160	19
Future Volume (veh/h)	30	802	128	276	1109	76	116	80	125	167	160	19
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	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	60	844	180	363	1260	112	237	123	187	220	193	25
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.50	0.95	0.71	0.76	0.88	0.68	0.49	0.65	0.67	0.76	0.83	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	173	993	212	399	1508	134	435	472	401	472	409	53
Arrive On Green	0.07	0.68	0.68	0.15	0.46	0.46	0.11	0.25	0.25	0.11	0.25	0.25
Sat Flow, veh/h	1774	2904	619	1774	3289	292	1774	1863	1583	1774	1616	209
Grp Volume(v), veh/h	60	514	510	363	676	696	237	123	187	220	0	218
Grp Sat Flow(s),veh/h/ln	1774	1770	1753	1774	1770	1811	1774	1863	1583	1774	0	1826
Q Serve(g_s), s	2.4	24.1	24.1	13.9	36.9	37.1	10.8	5.8	11.0	9.9	0.0	11.1
Cycle Q Clear(g_c), s	2.4	24.1	24.1	13.9	36.9	37.1	10.8	5.8	11.0	9.9	0.0	11.1
Prop In Lane	1.00		0.35	1.00		0.16	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	173	605	600	399	812	831	435	472	401	472	0	462
V/C Ratio(X)	0.35	0.85	0.85	0.91	0.83	0.84	0.54	0.26	0.47	0.47	0.00	0.47
Avail Cap(c_a), veh/h	210	605	600	520	885	906	435	472	401	489	0	462
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)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.4	15.2	15.2	22.5	26.1	26.2	26.5	32.8	34.8	25.7	0.0	34.8
Incr Delay (d2), s/veh	1.2	11.1	11.2	16.8	6.4	6.5	1.4	1.3	3.9	0.7	0.0	3.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	13.3	13.2	8.6	19.3	20.1	5.4	3.1	5.2	4.9	0.0	6.1
LnGrp Delay(d),s/veh	25.6	26.3	26.4	39.3	32.5	32.7	27.9	34.2	38.6	26.5	0.0	38.3
LnGrp LOS	C	C	C	D	C	C	C	C	D	C		D
Approach Vol, veh/h		1084			1735			547			438	
Approach Delay, s/veh		26.3			34.0			33.0			32.3	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	31.9	20.5	41.6	16.0	31.8	7.7	54.4
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	13.0	20.0	24.0	37.0	12.0	21.0	6.0	55.0
Max Q Clear Time (g_c+I1), s	11.9	13.0	15.9	26.1	12.8	13.1	4.4	39.1
Green Ext Time (p_c), s	0.1	1.4	0.7	8.6	0.0	1.5	0.0	11.3

Intersection Summary	
HCM 2010 Ctrl Delay	31.5
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	1172	114	118	1004	140	164	136	143	260	185	27
Future Volume (veh/h)	68	1172	114	118	1004	140	164	136	143	260	185	27
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	1863	1743	1900	1863	1745	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	124	1260	178	128	1080	177	225	170	181	302	228	68
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	0
Peak Hour Factor	0.55	0.93	0.64	0.92	0.93	0.79	0.73	0.80	0.79	0.86	0.81	0.40
Percent Heavy Veh, %	2	10	10	2	10	10	2	2	2	2	2	2
Cap, veh/h	220	1345	189	180	1320	216	342	359	306	438	316	94
Arrive On Green	0.05	0.46	0.46	0.05	0.46	0.46	0.11	0.19	0.19	0.15	0.23	0.23
Sat Flow, veh/h	1774	2917	410	1774	2854	467	1774	1863	1583	1774	1379	411
Grp Volume(v), veh/h	124	712	726	128	626	631	225	170	181	302	0	296
Grp Sat Flow(s),veh/h/ln	1774	1656	1671	1774	1658	1663	1774	1863	1583	1774	0	1790
Q Serve(g_s), s	4.0	44.8	45.5	4.1	35.9	36.1	11.2	8.9	11.5	14.5	0.0	16.8
Cycle Q Clear(g_c), s	4.0	44.8	45.5	4.1	35.9	36.1	11.2	8.9	11.5	14.5	0.0	16.8
Prop In Lane	1.00		0.25	1.00		0.28	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	220	764	771	180	767	769	342	359	306	438	0	411
V/C Ratio(X)	0.56	0.93	0.94	0.71	0.82	0.82	0.66	0.47	0.59	0.69	0.00	0.72
Avail Cap(c_a), veh/h	237	768	775	196	769	771	342	359	306	438	0	411
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	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.1	28.0	28.2	25.2	25.5	25.6	31.6	39.4	40.4	28.2	0.0	39.1
Incr Delay (d2), s/veh	2.6	18.1	19.5	10.3	6.9	7.0	4.6	4.4	8.2	4.5	0.0	10.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	24.2	25.1	2.5	17.8	18.0	5.8	5.0	5.7	7.6	0.0	9.5
LnGrp Delay(d),s/veh	24.8	46.2	47.7	35.5	32.4	32.6	36.2	43.8	48.6	32.7	0.0	49.6
LnGrp LOS	C	D	D	D	C	C	D	D	D	C		D
Approach Vol, veh/h		1562			1385			576			598	
Approach Delay, s/veh		45.2			32.8			42.4			41.1	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.0	25.2	10.0	54.7	16.0	29.2	9.9	54.9
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	16.0	20.0	7.0	51.0	12.0	24.0	7.0	51.0
Max Q Clear Time (g_c+I1), s	16.5	13.5	6.1	47.5	13.2	18.8	6.0	38.1
Green Ext Time (p_c), s	0.0	1.8	0.0	3.2	0.0	1.5	0.0	10.8

Intersection Summary	
HCM 2010 Ctrl Delay	40.0
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	1431	200	506	1900	121	114	117	228	236	226	30
Future Volume (veh/h)	32	1431	200	506	1900	121	114	117	228	236	226	30
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	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	64	1506	282	666	2159	178	233	180	340	311	272	40
Adj No. of Lanes	2	3	0	2	3	0	2	2	1	2	2	1
Peak Hour Factor	0.50	0.95	0.71	0.76	0.88	0.68	0.49	0.65	0.67	0.76	0.83	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	288	1790	334	749	2615	214	634	822	368	613	822	368
Arrive On Green	0.04	0.55	0.55	0.16	0.55	0.55	0.05	0.23	0.23	0.05	0.23	0.23
Sat Flow, veh/h	3442	4307	804	3442	4793	391	3442	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	64	1184	604	666	1521	816	233	180	340	311	272	40
Grp Sat Flow(s),veh/h/ln	1721	1695	1721	1721	1695	1794	1721	1770	1583	1721	1770	1583
Q Serve(g_s), s	1.1	32.1	32.3	14.5	40.7	41.7	5.0	4.5	23.1	5.0	7.0	2.2
Cycle Q Clear(g_c), s	1.1	32.1	32.3	14.5	40.7	41.7	5.0	4.5	23.1	5.0	7.0	2.2
Prop In Lane	1.00		0.47	1.00		0.22	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	288	1409	715	749	1850	979	634	822	368	613	822	368
V/C Ratio(X)	0.22	0.84	0.84	0.89	0.82	0.83	0.37	0.22	0.93	0.51	0.33	0.11
Avail Cap(c_a), veh/h	306	1409	715	881	1911	1011	634	822	368	613	822	368
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.88	0.88	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.2	21.6	21.6	29.1	20.6	20.8	31.8	34.2	41.3	33.6	35.1	33.3
Incr Delay (d2), s/veh	0.3	4.2	8.1	10.0	3.0	5.9	0.4	0.6	31.3	0.7	1.1	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	15.6	16.7	10.8	19.6	22.0	0.7	2.3	13.3	1.8	3.6	1.0
LnGrp Delay(d),s/veh	21.6	25.8	29.7	39.1	23.5	26.8	32.2	34.8	72.6	34.3	36.2	33.9
LnGrp LOS	C	C	C	D	C	C	C	C	E	C	D	C
Approach Vol, veh/h		1852			3003			753			623	
Approach Delay, s/veh		26.9			27.9			51.1			35.1	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	29.5	21.8	49.7	9.0	29.5	7.4	64.0
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	5.0	23.0	22.0	44.0	5.0	23.0	4.0	62.0
Max Q Clear Time (g_c+I1), s	7.0	25.1	16.5	34.3	7.0	9.0	3.1	43.7
Green Ext Time (p_c), s	0.0	0.0	1.3	9.4	0.0	3.4	0.0	16.3

Intersection Summary		
HCM 2010 Ctrl Delay		31.1
HCM 2010 LOS		C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	2120	160	219	1691	218	180	192	264	318	212	34
Future Volume (veh/h)	78	2120	160	219	1691	218	180	192	264	318	212	34
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	1863	1740	1900	1863	1744	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	142	2280	250	238	1818	276	247	240	334	370	262	85
Adj No. of Lanes	1	3	0	2	3	0	2	2	1	2	2	1
Peak Hour Factor	0.55	0.93	0.64	0.92	0.93	0.79	0.73	0.80	0.79	0.86	0.81	0.40
Percent Heavy Veh, %	2	10	10	2	10	10	2	2	2	2	2	2
Cap, veh/h	195	2366	255	293	2234	336	615	780	349	553	748	335
Arrive On Green	0.05	0.54	0.54	0.05	0.53	0.53	0.05	0.22	0.22	0.05	0.21	0.21
Sat Flow, veh/h	1774	4355	469	3442	4179	629	3442	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	142	1646	884	238	1377	717	247	240	334	370	262	85
Grp Sat Flow(s),veh/h/ln	1774	1583	1657	1721	1587	1633	1721	1770	1583	1721	1770	1583
Q Serve(g_s), s	3.9	54.4	57.5	3.4	39.2	40.1	6.0	6.2	22.9	5.0	6.9	4.9
Cycle Q Clear(g_c), s	3.9	54.4	57.5	3.4	39.2	40.1	6.0	6.2	22.9	5.0	6.9	4.9
Prop In Lane	1.00		0.28	1.00		0.38	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	195	1720	900	293	1697	873	615	780	349	553	748	335
V/C Ratio(X)	0.73	0.96	0.98	0.81	0.81	0.82	0.40	0.31	0.96	0.67	0.35	0.25
Avail Cap(c_a), veh/h	244	1727	904	293	1697	873	615	780	349	553	748	335
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)	0.72	0.72	0.72	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.6	23.9	24.6	26.1	21.0	21.2	32.4	35.9	42.4	38.0	36.9	36.2
Incr Delay (d2), s/veh	5.9	10.2	21.1	16.0	3.1	6.3	0.4	1.0	38.5	3.1	1.3	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	26.0	31.3	2.6	17.8	19.5	0.4	3.1	13.7	4.6	3.5	2.3
LnGrp Delay(d),s/veh	29.6	34.1	45.7	42.1	24.1	27.6	32.8	36.9	80.8	41.1	38.2	38.0
LnGrp LOS	C	C	D	D	C	C	C	D	F	D	D	D
Approach Vol, veh/h		2672			2332			821			717	
Approach Delay, s/veh		37.7			27.0			53.5			39.7	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	28.2	9.0	63.8	10.0	27.2	9.9	62.8
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	5.0	24.0	5.0	60.0	6.0	23.0	9.0	56.0
Max Q Clear Time (g_c+I1), s	7.0	24.9	5.4	59.5	8.0	8.9	5.9	42.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.3	0.0	3.8	0.1	13.7

Intersection Summary	
HCM 2010 Ctrl Delay	36.1
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	1447	216	506	1928	123	151	121	228	244	242	30
Future Volume (veh/h)	32	1447	216	506	1928	123	151	121	228	244	242	30
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	1863	1863	1900	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	64	1523	304	666	2191	181	308	186	340	321	292	40
Adj No. of Lanes	2	3	0	2	3	0	2	2	1	2	2	1
Peak Hour Factor	0.50	0.95	0.71	0.76	0.88	0.68	0.49	0.65	0.67	0.76	0.83	0.75
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	282	1740	346	740	2605	213	667	829	371	612	701	313
Arrive On Green	0.03	0.41	0.41	0.17	0.54	0.54	0.08	0.23	0.23	0.05	0.20	0.20
Sat Flow, veh/h	3442	4257	846	3442	4792	392	3442	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	64	1212	615	666	1543	829	308	186	340	321	292	40
Grp Sat Flow(s),veh/h/ln	1721	1695	1713	1721	1695	1794	1721	1770	1583	1721	1770	1583
Q Serve(g_s), s	1.2	36.2	36.5	15.3	42.0	43.1	7.6	4.7	23.0	5.0	7.9	2.3
Cycle Q Clear(g_c), s	1.2	36.2	36.5	15.3	42.0	43.1	7.6	4.7	23.0	5.0	7.9	2.3
Prop In Lane	1.00		0.49	1.00		0.22	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	282	1386	700	740	1843	975	667	829	371	612	701	313
V/C Ratio(X)	0.23	0.87	0.88	0.90	0.84	0.85	0.46	0.22	0.92	0.52	0.42	0.13
Avail Cap(c_a), veh/h	300	1386	700	826	1880	995	667	829	371	612	701	313
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.3	29.9	30.0	31.1	21.0	21.3	30.3	34.0	41.1	35.7	38.6	36.3
Incr Delay (d2), s/veh	0.4	6.5	12.3	12.0	3.5	7.0	0.5	0.6	29.7	0.8	1.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	18.1	19.7	11.0	20.4	23.1	3.6	2.3	13.1	2.0	4.1	1.1
LnGrp Delay(d),s/veh	22.7	36.4	42.3	43.1	24.5	28.3	30.8	34.7	70.8	36.5	40.4	37.1
LnGrp LOS	C	D	D	D	C	C	C	C	E	D	D	D
Approach Vol, veh/h		1891			3038			834			653	
Approach Delay, s/veh		37.9			29.6			48.0			38.3	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	29.8	22.3	49.0	13.0	25.8	7.4	63.8
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	5.0	24.0	21.0	44.0	9.0	20.0	4.0	61.0
Max Q Clear Time (g_c+I1), s	7.0	25.0	17.3	38.5	9.6	9.9	3.2	45.1
Green Ext Time (p_c), s	0.0	0.0	1.0	5.5	0.0	3.0	0.0	14.7

Intersection Summary	
HCM 2010 Ctrl Delay	35.3
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	2145	185	219	1725	220	223	197	264	330	237	34
Future Volume (veh/h)	78	2145	185	219	1725	220	223	197	264	330	237	34
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	1863	1741	1900	1863	1744	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	142	2306	289	238	1855	278	305	246	334	384	293	85
Adj No. of Lanes	2	3	0	2	3	0	2	2	1	2	2	1
Peak Hour Factor	0.55	0.93	0.64	0.92	0.93	0.79	0.73	0.80	0.79	0.86	0.81	0.40
Percent Heavy Veh, %	2	10	10	2	10	10	2	2	2	2	2	2
Cap, veh/h	188	2224	272	282	2284	339	363	515	360	375	527	236
Arrive On Green	0.05	0.52	0.52	0.08	0.55	0.55	0.11	0.15	0.15	0.11	0.15	0.15
Sat Flow, veh/h	3442	4293	525	3442	4187	621	3442	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	142	1688	907	238	1402	731	305	246	334	384	293	85
Grp Sat Flow(s),veh/h/ln	1721	1585	1649	1721	1587	1634	1721	1770	1583	1721	1770	1583
Q Serve(g_s), s	4.5	57.0	57.0	7.5	39.5	40.5	9.6	7.0	16.0	12.0	8.4	5.3
Cycle Q Clear(g_c), s	4.5	57.0	57.0	7.5	39.5	40.5	9.6	7.0	16.0	12.0	8.4	5.3
Prop In Lane	1.00		0.32	1.00		0.38	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	188	1642	854	282	1731	891	363	515	360	375	527	236
V/C Ratio(X)	0.76	1.03	1.06	0.85	0.81	0.82	0.84	0.48	0.93	1.02	0.56	0.36
Avail Cap(c_a), veh/h	188	1642	854	282	1731	891	375	515	360	375	527	236
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.3	26.5	26.5	49.8	20.4	20.6	48.3	43.2	41.6	49.0	43.4	42.1
Incr Delay (d2), s/veh	16.1	29.6	48.6	20.4	3.0	6.2	15.1	3.2	32.3	52.4	4.2	4.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	31.4	37.2	4.4	17.9	19.6	5.3	3.6	13.2	8.4	4.5	2.6
LnGrp Delay(d),s/veh	67.3	56.1	75.1	70.2	23.3	26.7	63.4	46.3	73.9	101.4	47.6	46.3
LnGrp LOS	E	F	F	E	C	C	E	D	E	F	D	D
Approach Vol, veh/h		2737			2371			885			762	
Approach Delay, s/veh		63.0			29.1			62.6			74.6	
Approach LOS		E			C			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	20.0	13.0	61.0	15.6	20.4	10.0	64.0
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	12.0	16.0	9.0	57.0	12.0	16.0	6.0	60.0
Max Q Clear Time (g_c+I1), s	14.0	18.0	9.5	59.0	11.6	10.4	6.5	42.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.1	2.3	0.0	17.2

Intersection Summary	
HCM 2010 Ctrl Delay	52.3
HCM 2010 LOS	D

Notes

Intersection						
Int Delay, s/veh	2.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	2	47	50	51	147	7
Future Vol, veh/h	2	47	50	51	147	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	84	78	64	82	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	56	64	80	179	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	393	185	191	0	-	0
Stage 1	185	-	-	-	-	-
Stage 2	208	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	611	857	1383	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	827	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	583	857	1383	-	-	-
Mov Cap-2 Maneuver	583	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	789	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	3.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1383	-	583	857	-	-
HCM Lane V/C Ratio	0.046	-	0.007	0.065	-	-
HCM Control Delay (s)	7.7	-	11.2	9.5	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0	0.2	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	8	36	34	141	108	6
Future Vol, veh/h	8	36	34	141	108	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	75	71	78	93	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	48	48	181	116	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	397	120	124	0	-	0
Stage 1	120	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	608	931	1463	-	-	-
Stage 1	905	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	588	931	1463	-	-	-
Mov Cap-2 Maneuver	588	-	-	-	-	-
Stage 1	905	-	-	-	-	-
Stage 2	745	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.7	1.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1463	-	588	931	-	-
HCM Lane V/C Ratio	0.033	-	0.027	0.052	-	-
HCM Control Delay (s)	7.5	-	11.3	9.1	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.2	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	7	86	73	70	188	17
Future Vol, veh/h	7	86	73	70	188	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	84	78	64	82	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	102	94	109	229	29

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	541	244	259	0	-	0
Stage 1	244	-	-	-	-	-
Stage 2	297	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	502	795	1306	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	754	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	466	795	1306	-	-	-
Mov Cap-2 Maneuver	466	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	3.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1306	-	466	795	-	-
HCM Lane V/C Ratio	0.072	-	0.03	0.129	-	-
HCM Control Delay (s)	8	-	13	10.2	-	-
HCM Lane LOS	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.4	-	-

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	27	74	85	199	161	25
Future Vol, veh/h	27	74	85	199	161	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	75	71	78	93	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	99	120	255	173	33

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	685	190	206	0	-	0
Stage 1	190	-	-	-	-	-
Stage 2	495	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	414	852	1365	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	613	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	378	852	1365	-	-	-
Mov Cap-2 Maneuver	378	-	-	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	559	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	2.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1365	-	378	852	-	-
HCM Lane V/C Ratio	0.088	-	0.143	0.116	-	-
HCM Control Delay (s)	7.9	-	16.1	9.8	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.5	0.4	-	-

Intersection							
Int Delay, s/veh	3.7						

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	29	91	73	72	190	45
Future Vol, veh/h	29	91	73	72	190	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	84	78	64	82	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	58	108	94	113	232	78

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	571	271	309	0	-	0
Stage 1	271	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	482	768	1252	-	-	-
Stage 1	775	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	446	768	1252	-	-	-
Mov Cap-2 Maneuver	696	-	-	-	-	-
Stage 1	775	-	-	-	-	-
Stage 2	696	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	3.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1252	-	696	768	-	-
HCM Lane V/C Ratio	0.075	-	0.083	0.141	-	-
HCM Control Delay (s)	8.1	-	10.6	10.5	-	-
HCM Lane LOS	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.3	0.5	-	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	62	81	85	201	163	59
Future Vol, veh/h	62	81	85	201	163	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	75	71	78	93	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	124	108	120	258	175	79

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	712	215	254	0	-	0
Stage 1	215	-	-	-	-	-
Stage 2	497	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	399	825	1311	-	-	-
Stage 1	821	-	-	-	-	-
Stage 2	611	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	362	825	1311	-	-	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	821	-	-	-	-	-
Stage 2	555	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.3	2.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1311	-	362	825	-	-
HCM Lane V/C Ratio	0.091	-	0.343	0.131	-	-
HCM Control Delay (s)	8	-	20	10	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	1.5	0.5	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	9	129	119	116	322	23
Future Vol, veh/h	9	129	119	116	322	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	84	78	64	82	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	154	153	181	393	40

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	809	216	432	0	-	0
Stage 1	413	-	-	-	-	-
Stage 2	396	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	318	789	1124	-	-	-
Stage 1	636	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	275	789	1124	-	-	-
Mov Cap-2 Maneuver	275	-	-	-	-	-
Stage 1	636	-	-	-	-	-
Stage 2	561	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.6	4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1124	-	275	789	-	-
HCM Lane V/C Ratio	0.136	-	0.065	0.195	-	-
HCM Control Delay (s)	8.7	-	19	10.7	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.2	0.7	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	34	107	116	327	259	30
Future Vol, veh/h	34	107	116	327	259	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	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	75	71	78	93	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	143	163	419	278	40

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	834	159	318	0	-	0
Stage 1	298	-	-	-	-	-
Stage 2	536	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	307	858	1239	-	-	-
Stage 1	727	-	-	-	-	-
Stage 2	551	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	267	858	1239	-	-	-
Mov Cap-2 Maneuver	267	-	-	-	-	-
Stage 1	727	-	-	-	-	-
Stage 2	479	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.2	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1239	-	267	858	-	-
HCM Lane V/C Ratio	0.132	-	0.255	0.166	-	-
HCM Control Delay (s)	8.3	-	23	10	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.5	-	1	0.6	-	-

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	31	134	119	118	324	51
Future Vol, veh/h	31	134	119	118	324	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	84	78	64	82	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	62	160	153	184	395	88

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	929	439	483	0	-	0
Stage 1	439	-	-	-	-	-
Stage 2	490	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	297	618	1080	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	255	618	1080	-	-	-
Mov Cap-2 Maneuver	255	-	-	-	-	-
Stage 1	650	-	-	-	-	-
Stage 2	529	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.8	4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1080	-	255	618	-	-
HCM Lane V/C Ratio	0.141	-	0.243	0.258	-	-
HCM Control Delay (s)	8.9	-	23.6	12.8	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.9	1	-	-

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	69	114	116	329	261	64
Future Vol, veh/h	69	114	116	329	261	64
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	200	0	350	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	75	71	78	93	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	138	152	163	422	281	85

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1072	323	366	0	-	0
Stage 1	323	-	-	-	-	-
Stage 2	749	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	244	718	1193	-	-	-
Stage 1	734	-	-	-	-	-
Stage 2	467	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	211	718	1193	-	-	-
Mov Cap-2 Maneuver	211	-	-	-	-	-
Stage 1	734	-	-	-	-	-
Stage 2	403	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29.5	2.4	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1193	-	211	718	-	-
HCM Lane V/C Ratio	0.137	-	0.654	0.212	-	-
HCM Control Delay (s)	8.5	-	49.5	11.4	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.5	-	4	0.8	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	5	2	24	33	0	29	12	135	31	41	199	0
Future Vol, veh/h	5	2	24	33	0	29	12	135	31	41	199	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	50	67	64	25	81	50	89	52	64	75	25
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	4	36	52	0	36	24	152	60	64	265	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	611	593	265	613	593	152	265	0	0	152	0	0
Stage 1	393	393	-	200	200	-	-	-	-	-	-	-
Stage 2	218	200	-	413	393	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	406	418	774	405	418	894	1299	-	-	1429	-	-
Stage 1	632	606	-	802	736	-	-	-	-	-	-	-
Stage 2	784	736	-	616	606	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	371	392	774	365	392	894	1299	-	-	1429	-	-
Mov Cap-2 Maneuver	371	392	-	365	392	-	-	-	-	-	-	-
Stage 1	620	579	-	787	722	-	-	-	-	-	-	-
Stage 2	739	722	-	557	579	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.2	13.5	0.8	1.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1299	-	-	371	705	365	894	1429	-	-
HCM Lane V/C Ratio	0.018	-	-	0.022	0.056	0.141	0.04	0.045	-	-
HCM Control Delay (s)	7.8	-	-	14.9	10.4	16.5	9.2	7.6	-	-
HCM Lane LOS	A	-	-	B	B	C	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.2	0.5	0.1	0.1	-	-

Intersection												
Int Delay, s/veh	3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	1	0	19	27	3	30	33	214	30	19	160	4
Future Vol, veh/h	1	0	19	27	3	30	33	214	30	19	160	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	25	68	61	75	68	69	92	54	79	89	33
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	28	44	4	44	48	233	56	24	180	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	586	562	186	576	568	233	192	0	0	233	0	0
Stage 1	234	234	-	328	328	-	-	-	-	-	-	-
Stage 2	352	328	-	248	240	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	422	436	856	428	432	806	1381	-	-	1335	-	-
Stage 1	769	711	-	685	647	-	-	-	-	-	-	-
Stage 2	665	647	-	756	707	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	380	413	856	398	409	806	1381	-	-	1335	-	-
Mov Cap-2 Maneuver	380	413	-	398	409	-	-	-	-	-	-	-
Stage 1	742	698	-	661	625	-	-	-	-	-	-	-
Stage 2	603	625	-	718	694	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10	12.6	1.1	0.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1381	-	-	380	856	398	746	1335	-	-
HCM Lane V/C Ratio	0.035	-	-	0.011	0.033	0.111	0.065	0.018	-	-
HCM Control Delay (s)	7.7	-	-	14.6	9.3	15.2	10.2	7.7	-	-
HCM Lane LOS	A	-	-	B	A	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0.1	0.4	0.2	0.1	-	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	6	2	27	67	0	35	13	158	42	46	237	0
Future Vol, veh/h	6	2	27	67	0	35	13	158	42	46	237	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	50	67	64	25	81	50	89	52	64	75	25
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	4	40	105	0	43	26	178	81	72	316	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	711	690	316	712	690	178	316	0	0	178	0	0
Stage 1	460	460	-	230	230	-	-	-	-	-	-	-
Stage 2	251	230	-	482	460	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	348	368	724	347	368	865	1244	-	-	1398	-	-
Stage 1	581	566	-	773	714	-	-	-	-	-	-	-
Stage 2	753	714	-	565	566	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	313	342	724	307	342	865	1244	-	-	1398	-	-
Mov Cap-2 Maneuver	313	342	-	307	342	-	-	-	-	-	-	-
Stage 1	569	537	-	757	699	-	-	-	-	-	-	-
Stage 2	700	699	-	502	537	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12	18.8	0.7	1.4
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1244	-	-	313	658	307	865	1398	-	-
HCM Lane V/C Ratio	0.021	-	-	0.031	0.067	0.341	0.05	0.051	-	-
HCM Control Delay (s)	8	-	-	16.9	10.9	22.7	9.4	7.7	-	-
HCM Lane LOS	A	-	-	C	B	C	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.2	1.5	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	1	0	21	47	3	35	37	244	65	24	188	4
Future Vol, veh/h	1	0	21	47	3	35	37	244	65	24	188	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	25	68	61	75	68	69	92	54	79	89	33
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	31	77	4	51	54	265	120	30	211	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	678	650	217	665	656	265	223	0	0	265	0	0
Stage 1	278	278	-	372	372	-	-	-	-	-	-	-
Stage 2	400	372	-	293	284	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	366	388	823	374	385	774	1346	-	-	1299	-	-
Stage 1	728	680	-	648	619	-	-	-	-	-	-	-
Stage 2	626	619	-	715	676	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	323	364	823	343	361	774	1346	-	-	1299	-	-
Mov Cap-2 Maneuver	323	364	-	343	361	-	-	-	-	-	-	-
Stage 1	699	664	-	622	594	-	-	-	-	-	-	-
Stage 2	557	594	-	672	660	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.3	15.2	1	0.9
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1346	-	-	323	823	343	715	1299	-	-
HCM Lane V/C Ratio	0.04	-	-	0.012	0.038	0.225	0.078	0.023	-	-
HCM Control Delay (s)	7.8	-	-	16.3	9.5	18.5	10.5	7.8	-	-
HCM Lane LOS	A	-	-	C	A	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0.1	0.8	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	6	2	27	77	0	38	13	163	44	50	243	0
Future Vol, veh/h	6	2	27	77	0	38	13	163	44	50	243	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	50	67	64	25	81	50	89	52	64	75	25
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	4	40	120	0	47	26	183	85	78	324	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	739	715	324	737	715	183	324	0	0	183	0	0
Stage 1	480	480	-	235	235	-	-	-	-	-	-	-
Stage 2	259	235	-	502	480	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	333	356	717	334	356	859	1236	-	-	1392	-	-
Stage 1	567	554	-	768	710	-	-	-	-	-	-	-
Stage 2	746	710	-	552	554	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	297	329	717	294	329	859	1236	-	-	1392	-	-
Mov Cap-2 Maneuver	297	329	-	294	329	-	-	-	-	-	-	-
Stage 1	555	523	-	752	695	-	-	-	-	-	-	-
Stage 2	690	695	-	488	523	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.2	21	0.7	1.5
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1236	-	-	297	648	294	859	1392	-	-
HCM Lane V/C Ratio	0.021	-	-	0.033	0.068	0.409	0.055	0.056	-	-
HCM Control Delay (s)	8	-	-	17.5	11	25.5	9.4	7.7	-	-
HCM Lane LOS	A	-	-	C	B	D	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.2	1.9	0.2	0.2	-	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	1	0	21	61	3	40	37	251	67	29	195	4
Future Vol, veh/h	1	0	21	61	3	40	37	251	67	29	195	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	25	68	61	75	68	69	92	54	79	89	33
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	0	31	100	4	59	54	273	124	37	219	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	710	679	225	694	685	273	231	0	0	273	0	0
Stage 1	299	299	-	380	380	-	-	-	-	-	-	-
Stage 2	411	380	-	314	305	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	348	374	814	357	371	766	1337	-	-	1290	-	-
Stage 1	710	666	-	642	614	-	-	-	-	-	-	-
Stage 2	618	614	-	697	662	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	302	349	814	326	346	766	1337	-	-	1290	-	-
Mov Cap-2 Maneuver	302	349	-	326	346	-	-	-	-	-	-	-
Stage 1	681	647	-	616	589	-	-	-	-	-	-	-
Stage 2	544	589	-	651	643	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	16.9	0.9	1.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1337	-	-	302	814	326	711	1290	-	-
HCM Lane V/C Ratio	0.04	-	-	0.013	0.038	0.307	0.088	0.028	-	-
HCM Control Delay (s)	7.8	-	-	17.1	9.6	20.9	10.6	7.9	-	-
HCM Lane LOS	A	-	-	C	A	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0.1	1.3	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	31.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	4	48	96	0	61	24	277	70	83	412	0
Future Vol, veh/h	10	4	48	96	0	61	24	277	70	83	412	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	50	67	64	25	81	50	89	52	64	75	25
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	8	72	150	0	75	48	311	135	130	549	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1254	1216	549	1256	1216	311	549	0	0	311	0	0
Stage 1	809	809	-	407	407	-	-	-	-	-	-	-
Stage 2	445	407	-	849	809	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	149	181	535	~ 148	181	729	1021	-	-	1249	-	-
Stage 1	374	394	-	621	597	-	-	-	-	-	-	-
Stage 2	592	597	-	356	394	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	119	155	535	~ 109	155	729	1021	-	-	1249	-	-
Mov Cap-2 Maneuver	119	155	-	~ 109	155	-	-	-	-	-	-	-
Stage 1	356	353	-	592	569	-	-	-	-	-	-	-
Stage 2	506	569	-	270	353	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.4	195.8	0.8	1.6
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1021	-	-	119	429	109	729	1249	-	-
HCM Lane V/C Ratio	0.047	-	-	0.136	0.186	1.376	0.103	0.104	-	-
HCM Control Delay (s)	8.7	-	-	39.9	15.3	288.8	10.5	8.2	-	-
HCM Lane LOS	A	-	-	E	C	F	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	0.7	10.5	0.3	0.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	10.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	2	0	38	71	6	62	66	433	92	41	329	8
Future Vol, veh/h	2	0	38	71	6	62	66	433	92	41	329	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	25	68	61	75	68	69	92	54	79	89	33
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	56	116	8	91	96	471	170	52	370	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1198	1148	382	1176	1160	471	394	0	0	471	0	0
Stage 1	486	486	-	662	662	-	-	-	-	-	-	-
Stage 2	712	662	-	514	498	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	162	199	665	168	195	593	1165	-	-	1091	-	-
Stage 1	563	551	-	451	459	-	-	-	-	-	-	-
Stage 2	423	459	-	543	544	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	119	174	665	139	170	593	1165	-	-	1091	-	-
Mov Cap-2 Maneuver	119	174	-	139	170	-	-	-	-	-	-	-
Stage 1	517	525	-	414	421	-	-	-	-	-	-	-
Stage 2	322	421	-	474	518	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.2	60.3	1.1	1
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1165	-	-	119	665	139	494	1091	-	-
HCM Lane V/C Ratio	0.082	-	-	0.067	0.084	0.837	0.201	0.048	-	-
HCM Control Delay (s)	8.4	-	-	37.4	10.9	99.7	14.1	8.5	-	-
HCM Lane LOS	A	-	-	E	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.2	0.3	5.3	0.7	0.1	-	-

Intersection	
Int Delay, s/veh	43.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	4	48	106	0	64	24	282	72	87	418	0
Future Vol, veh/h	10	4	48	106	0	64	24	282	72	87	418	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	50	67	64	25	81	50	89	52	64	75	25
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	8	72	166	0	79	48	317	138	136	557	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1281	1242	557	1282	1242	317	557	0	0	317	0	0
Stage 1	829	829	-	413	413	-	-	-	-	-	-	-
Stage 2	452	413	-	869	829	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	142	175	530	~ 142	175	724	1014	-	-	1243	-	-
Stage 1	365	385	-	616	594	-	-	-	-	-	-	-
Stage 2	587	594	-	347	385	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	112	148	530	~ 104	148	724	1014	-	-	1243	-	-
Mov Cap-2 Maneuver	112	148	-	~ 104	148	-	-	-	-	-	-	-
Stage 1	348	343	-	587	566	-	-	-	-	-	-	-
Stage 2	498	566	-	261	343	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20	260.2	0.8	1.6
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1014	-	-	112	421	104	724	1243	-	-
HCM Lane V/C Ratio	0.047	-	-	0.144	0.189	1.593	0.109	0.109	-	-
HCM Control Delay (s)	8.7	-	-	42.5	15.5	$ 379.3	10.6	8.3	-	-
HCM Lane LOS	A	-	-	E	C	F	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	0.7	12.6	0.4	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	17.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	2	0	38	85	6	67	66	440	94	46	336	8
Future Vol, veh/h	2	0	38	85	6	67	66	440	94	46	336	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	200	-	-	75	-	0	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	25	68	61	75	68	69	92	54	79	89	33
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	56	139	8	99	96	478	174	58	378	24

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1229	1176	390	1204	1188	478	402	0	0	478	0	0
Stage 1	506	506	-	670	670	-	-	-	-	-	-	-
Stage 2	723	670	-	534	518	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	155	191	658	161	188	587	1157	-	-	1084	-	-
Stage 1	549	540	-	446	455	-	-	-	-	-	-	-
Stage 2	417	455	-	530	533	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	112	166	658	~ 132	163	587	1157	-	-	1084	-	-
Mov Cap-2 Maneuver	112	166	-	~ 132	163	-	-	-	-	-	-	-
Stage 1	503	511	-	409	417	-	-	-	-	-	-	-
Stage 2	312	417	-	459	504	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.6	96.5	1.1	1.1
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1157	-	-	112	658	132	491	1084	-	-
HCM Lane V/C Ratio	0.083	-	-	0.071	0.085	1.056	0.217	0.054	-	-
HCM Control Delay (s)	8.4	-	-	39.6	11	159.3	14.4	8.5	-	-
HCM Lane LOS	A	-	-	E	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.2	0.3	7.7	0.8	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	25	0	45	0	0	0	53	152	0	0	225	30
Future Vol, veh/h	25	0	45	0	0	0	53	152	0	0	225	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	50	200	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	25	75	92	25	92	74	81	92	79	68	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	40	0	60	0	0	0	72	188	0	0	331	33

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	584	678	182	496	694	94	363	0	0	188	0	0
Stage 1	347	347	-	331	331	-	-	-	-	-	-	-
Stage 2	237	331	-	165	363	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	395	373	829	457	365	944	1192	-	-	1384	-	-
Stage 1	642	633	-	656	644	-	-	-	-	-	-	-
Stage 2	745	644	-	821	623	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	377	350	829	404	343	944	1192	-	-	1384	-	-
Mov Cap-2 Maneuver	377	350	-	404	343	-	-	-	-	-	-	-
Stage 1	603	633	-	616	605	-	-	-	-	-	-	-
Stage 2	700	605	-	762	623	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.1	0	2.3	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1192	-	-	377	829	-	-	1384	-	-
HCM Lane V/C Ratio	0.06	-	-	0.107	0.072	-	-	-	-	-
HCM Control Delay (s)	8.2	-	-	15.7	9.7	0	0	0	-	-
HCM Lane LOS	A	-	-	C	A	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.4	0.2	-	-	0	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	67	0	73	0	0	0	72	210	0	0	159	50
Future Vol, veh/h	67	0	73	0	0	0	72	210	0	0	159	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	50	200	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	73	25	87	92	25	92	64	94	92	85	73	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	92	0	84	0	0	0	113	223	0	0	218	54

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	582	693	136	557	720	112	272	0	0	223	0	0
Stage 1	245	245	-	448	448	-	-	-	-	-	-	-
Stage 2	337	448	-	109	272	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	396	365	888	413	352	920	1288	-	-	1343	-	-
Stage 1	737	702	-	560	571	-	-	-	-	-	-	-
Stage 2	651	571	-	885	683	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	369	333	888	349	321	920	1288	-	-	1343	-	-
Mov Cap-2 Maneuver	369	333	-	349	321	-	-	-	-	-	-	-
Stage 1	672	702	-	511	521	-	-	-	-	-	-	-
Stage 2	594	521	-	801	683	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.9	0	2.7	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1288	-	-	369	888	-	-	1343	-	-
HCM Lane V/C Ratio	0.087	-	-	0.249	0.094	-	-	-	-	-
HCM Control Delay (s)	8.1	-	-	18	9.5	0	0	0	-	-
HCM Lane LOS	A	-	-	C	A	A	A	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	1	0.3	-	-	0	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	28	0	50	62	0	0	59	185	0	16	272	33
Future Vol, veh/h	28	0	50	62	0	0	59	185	0	16	272	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	50	200	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	25	75	92	25	92	74	81	92	79	68	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	0	67	67	0	0	80	228	0	20	400	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	732	846	218	629	864	114	436	0	0	228	0	0
Stage 1	458	458	-	388	388	-	-	-	-	-	-	-
Stage 2	274	388	-	241	476	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	309	298	786	367	291	917	1120	-	-	1337	-	-
Stage 1	552	565	-	607	607	-	-	-	-	-	-	-
Stage 2	709	607	-	741	555	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	289	273	786	314	266	917	1120	-	-	1337	-	-
Mov Cap-2 Maneuver	289	273	-	314	266	-	-	-	-	-	-	-
Stage 1	513	557	-	564	564	-	-	-	-	-	-	-
Stage 2	658	564	-	668	547	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14	19.6	2.2	0.3
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1120	-	-	289	786	314	-	1337	-	-
HCM Lane V/C Ratio	0.071	-	-	0.156	0.085	0.215	-	0.015	-	-
HCM Control Delay (s)	8.5	-	-	19.8	10	19.6	0	7.7	-	-
HCM Lane LOS	A	-	-	C	B	C	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.5	0.3	0.8	-	0	-	-

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	74	0	81	49	0	0	80	272	0	11	190	55
Future Vol, veh/h	74	0	81	49	0	0	80	272	0	11	190	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	50	200	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	73	25	87	92	25	92	64	94	92	85	73	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	0	93	53	0	0	125	289	0	13	260	60

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	711	855	160	695	885	145	320	0	0	289	0	0
Stage 1	316	316	-	539	539	-	-	-	-	-	-	-
Stage 2	395	539	-	156	346	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	320	294	857	329	282	876	1237	-	-	1270	-	-
Stage 1	670	654	-	494	520	-	-	-	-	-	-	-
Stage 2	602	520	-	831	634	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	293	262	857	268	251	876	1237	-	-	1270	-	-
Mov Cap-2 Maneuver	293	262	-	268	251	-	-	-	-	-	-	-
Stage 1	602	647	-	444	467	-	-	-	-	-	-	-
Stage 2	541	467	-	733	628	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.9	21.7	2.5	0.3
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1237	-	-	293	857	268	-	1270	-	-
HCM Lane V/C Ratio	0.101	-	-	0.346	0.109	0.199	-	0.01	-	-
HCM Control Delay (s)	8.2	-	-	23.6	9.7	21.7	0	7.9	-	-
HCM Lane LOS	A	-	-	C	A	C	A	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	1.5	0.4	0.7	-	0	-	-

Intersection	
Int Delay, s/veh	13.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	28	0	50	193	0	12	59	179	65	57	247	33
Future Vol, veh/h	28	0	50	193	0	12	59	179	65	57	247	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	50	200	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	25	75	92	25	92	74	81	92	79	68	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	45	0	67	210	0	13	80	221	71	72	363	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	795	976	200	742	959	146	399	0	0	292	0	0
Stage 1	525	525	-	416	416	-	-	-	-	-	-	-
Stage 2	270	451	-	326	543	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	278	250	808	304	256	875	1156	-	-	1267	-	-
Stage 1	504	528	-	585	590	-	-	-	-	-	-	-
Stage 2	713	569	-	661	518	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	248	219	808	253	225	875	1156	-	-	1267	-	-
Mov Cap-2 Maneuver	248	219	-	253	225	-	-	-	-	-	-	-
Stage 1	469	498	-	545	549	-	-	-	-	-	-	-
Stage 2	654	530	-	572	489	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.1	60	1.8	1.2
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1156	-	-	248	808	253	875	1267	-	-
HCM Lane V/C Ratio	0.069	-	-	0.182	0.083	0.829	0.015	0.057	-	-
HCM Control Delay (s)	8.3	-	-	22.7	9.9	63.2	9.2	8	-	-
HCM Lane LOS	A	-	-	C	A	F	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.7	0.3	6.6	0	0.2	-	-

Intersection	
Int Delay, s/veh	29.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	74	0	81	232	0	32	80	248	91	38	185	55
Future Vol, veh/h	74	0	81	232	0	32	80	248	91	38	185	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	50	200	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	73	25	87	92	25	92	64	94	92	85	73	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	0	93	252	0	35	125	264	99	45	253	60

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	755	986	157	779	966	181	313	0	0	363	0	0
Stage 1	373	373	-	563	563	-	-	-	-	-	-	-
Stage 2	382	613	-	216	403	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	298	246	861	286	253	831	1244	-	-	1192	-	-
Stage 1	620	617	-	478	507	-	-	-	-	-	-	-
Stage 2	612	481	-	766	598	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	256	213	861	~ 229	219	831	1244	-	-	1192	-	-
Mov Cap-2 Maneuver	256	213	-	~ 229	219	-	-	-	-	-	-	-
Stage 1	558	594	-	430	456	-	-	-	-	-	-	-
Stage 2	527	433	-	657	575	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.2	119.4	2.1	1
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1244	-	-	256	861	229	831	1192	-	-
HCM Lane V/C Ratio	0.1	-	-	0.396	0.108	1.101	0.042	0.038	-	-
HCM Control Delay (s)	8.2	-	-	28	9.7	134.6	9.5	8.1	-	-
HCM Lane LOS	A	-	-	D	A	F	A	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	1.8	0.4	11.3	0.1	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	50	0	90	62	0	0	105	318	0	16	471	60
Future Vol, veh/h	50	0	90	62	0	0	105	318	0	16	471	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	50	200	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	62	25	75	92	25	92	74	81	92	79	68	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	81	0	120	67	0	0	142	393	0	20	693	65

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1246	1442	379	1063	1474	196	758	0	0	393	0	0
Stage 1	766	766	-	676	676	-	-	-	-	-	-	-
Stage 2	480	676	-	387	798	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	130	131	619	177	125	812	849	-	-	1162	-	-
Stage 1	361	410	-	409	451	-	-	-	-	-	-	-
Stage 2	536	451	-	608	396	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	112	107	619	123	102	812	849	-	-	1162	-	-
Mov Cap-2 Maneuver	112	107	-	123	102	-	-	-	-	-	-	-
Stage 1	301	403	-	341	376	-	-	-	-	-	-	-
Stage 2	446	376	-	482	389	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	45.1	65.1	2.7	0.2
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	849	-	-	112	619	123	-	1162	-	-
HCM Lane V/C Ratio	0.167	-	-	0.72	0.194	0.548	-	0.017	-	-
HCM Control Delay (s)	10.1	-	-	94.1	12.2	65.1	0	8.2	-	-
HCM Lane LOS	B	-	-	F	B	F	A	A	-	-
HCM 95th %tile Q(veh)	0.6	-	-	3.9	0.7	2.6	-	0.1	-	-

Intersection	
Int Delay, s/veh	47.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	133	0	145	49	0	0	143	457	0	11	330	99
Future Vol, veh/h	133	0	145	49	0	0	143	457	0	11	330	99
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	-	-	50	200	-	-	75	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	73	25	87	92	25	92	64	94	92	85	73	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	182	0	167	53	0	0	223	486	0	13	452	108

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1222	1465	280	1185	1519	243	560	0	0	486	0	0
Stage 1	532	532	-	933	933	-	-	-	-	-	-	-
Stage 2	690	933	-	252	586	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	~ 136	127	717	144	118	758	1007	-	-	1073	-	-
Stage 1	499	524	-	286	343	-	-	-	-	-	-	-
Stage 2	401	343	-	730	495	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 112	98	717	91	91	758	1007	-	-	1073	-	-
Mov Cap-2 Maneuver	~ 112	98	-	91	91	-	-	-	-	-	-	-
Stage 1	388	518	-	223	267	-	-	-	-	-	-	-
Stage 2	312	267	-	554	489	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	207.3	89.5	3	0.2
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1007	-	-	112	717	91	-	1073	-	-
HCM Lane V/C Ratio	0.222	-	-	1.627	0.232	0.585	-	0.012	-	-
HCM Control Delay (s)	9.6	-	$	386.5	11.5	89.5	0	8.4	-	-
HCM Lane LOS	A	-	-	F	B	F	A	A	-	-
HCM 95th %tile Q(veh)	0.8	-	-	13.7	0.9	2.7	-	0	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	0	90	193	0	12	105	312	65	57	446	60
Future Volume (veh/h)	50	0	90	193	0	12	105	312	65	57	446	60
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	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	81	0	120	210	0	13	142	385	71	72	656	65
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	0
Peak Hour Factor	0.62	0.25	0.75	0.92	0.25	0.92	0.74	0.81	0.92	0.79	0.68	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	419	0	401	309	472	401	507	1809	331	632	1908	189
Arrive On Green	0.25	0.00	0.25	0.25	0.00	0.25	0.05	0.61	0.61	0.03	0.59	0.59
Sat Flow, veh/h	1395	0	1583	1266	1863	1583	1774	2989	547	1774	3254	322
Grp Volume(v), veh/h	81	0	120	210	0	13	142	227	229	72	356	365
Grp Sat Flow(s),veh/h/ln	1395	0	1583	1266	1863	1583	1774	1770	1766	1774	1770	1806
Q Serve(g_s), s	5.1	0.0	6.7	17.7	0.0	0.7	3.5	6.4	6.5	1.8	11.5	11.5
Cycle Q Clear(g_c), s	5.1	0.0	6.7	24.4	0.0	0.7	3.5	6.4	6.5	1.8	11.5	11.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.31	1.00		0.18
Lane Grp Cap(c), veh/h	419	0	401	309	472	401	507	1071	1069	632	1038	1059
V/C Ratio(X)	0.19	0.00	0.30	0.68	0.00	0.03	0.28	0.21	0.21	0.11	0.34	0.34
Avail Cap(c_a), veh/h	573	0	576	448	677	576	659	1071	1069	687	1038	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.6	0.0	33.2	43.0	0.0	30.9	8.6	9.8	9.9	8.4	11.8	11.8
Incr Delay (d2), s/veh	0.2	0.0	0.4	2.6	0.0	0.0	0.3	0.5	0.5	0.1	0.9	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	3.0	6.4	0.0	0.3	1.7	3.2	3.3	0.9	5.8	5.9
LnGrp Delay(d),s/veh	32.8	0.0	33.6	45.7	0.0	30.9	8.9	10.3	10.3	8.5	12.7	12.7
LnGrp LOS	C		C	D		C	A	B	B	A	B	B
Approach Vol, veh/h		201			223			598			793	
Approach Delay, s/veh		33.3			44.8			10.0			12.3	
Approach LOS		C			D			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.6	70.6		31.9	9.6	68.5		31.9
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	7.0	51.0		40.0	15.0	43.0		40.0
Max Q Clear Time (g_c+I1), s	3.8	8.5		8.7	5.5	13.5		26.4
Green Ext Time (p_c), s	0.0	8.8		1.8	0.2	8.2		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	17.8
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	133	0	145	232	0	32	143	433	91	38	325	99
Future Volume (veh/h)	133	0	145	232	0	32	143	433	91	38	325	99
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	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	182	0	167	252	0	35	223	461	99	45	445	108
Adj No. of Lanes	1	1	0	1	1	1	1	2	0	1	2	0
Peak Hour Factor	0.73	0.25	0.87	0.92	0.25	0.92	0.64	0.94	0.92	0.85	0.73	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	502	0	505	355	594	505	546	1582	338	501	1388	334
Arrive On Green	0.32	0.00	0.32	0.32	0.00	0.32	0.08	0.54	0.54	0.03	0.49	0.49
Sat Flow, veh/h	1368	0	1583	1214	1863	1583	1774	2904	620	1774	2830	682
Grp Volume(v), veh/h	182	0	167	252	0	35	223	280	280	45	277	276
Grp Sat Flow(s),veh/h/ln	1368	0	1583	1214	1863	1583	1774	1770	1753	1774	1770	1742
Q Serve(g_s), s	11.5	0.0	8.8	22.0	0.0	1.7	6.5	9.4	9.5	1.4	10.4	10.5
Cycle Q Clear(g_c), s	11.5	0.0	8.8	30.8	0.0	1.7	6.5	9.4	9.5	1.4	10.4	10.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.35	1.00		0.39
Lane Grp Cap(c), veh/h	502	0	505	355	594	505	546	964	955	501	868	855
V/C Ratio(X)	0.36	0.00	0.33	0.71	0.00	0.07	0.41	0.29	0.29	0.09	0.32	0.32
Avail Cap(c_a), veh/h	637	0	662	475	779	662	740	964	955	518	868	855
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.4	0.0	28.5	40.2	0.0	26.1	11.5	13.5	13.6	13.2	16.9	17.0
Incr Delay (d2), s/veh	0.4	0.0	0.4	3.2	0.0	0.1	0.5	0.8	0.8	0.1	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	0.0	3.9	7.7	0.0	0.7	3.2	4.8	4.8	0.7	5.3	5.3
LnGrp Delay(d),s/veh	29.9	0.0	28.9	43.4	0.0	26.1	12.0	14.3	14.3	13.3	17.9	18.0
LnGrp LOS	C		C	D		C	B	B	B	B	B	B
Approach Vol, veh/h		349			287			783			598	
Approach Delay, s/veh		29.4			41.3			13.7			17.6	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.0	63.9		39.1	13.0	58.0		39.1
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	48.0		46.0	21.0	31.0		46.0
Max Q Clear Time (g_c+I1), s	3.4	11.5		13.5	8.5	12.5		32.8
Green Ext Time (p_c), s	0.0	8.0		2.8	0.5	6.5		2.3

Intersection Summary	
HCM 2010 Ctrl Delay	21.5
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	153	1003	1056	236	0	160
Future Vol, veh/h	153	1003	1056	236	0	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
Storage Length	100	-	-	0	-	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	166	1090	1148	257	0	174

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1148	0	-	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	609	-	-	-	0	0
Stage 1	-	-	-	-	0	0
Stage 2	-	-	-	-	0	0
Platoon blocked, %		-	-	-	-	
Mov Cap-1 Maneuver	609	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	609	-	-	-	-
HCM Lane V/C Ratio	0.273	-	-	-	-
HCM Control Delay (s)	13.1	-	-	-	0
HCM Lane LOS	B	-	-	-	A
HCM 95th %tile Q(veh)	1.1	-	-	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	276	1448	969	298	0	319
Future Vol, veh/h	276	1448	969	298	0	319
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Free
Storage Length	100	-	-	0	-	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	300	1574	1053	324	0	347

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1053	0	-	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.12	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	661	-	-	-	0	0
Stage 1	-	-	-	-	0	0
Stage 2	-	-	-	-	0	0
Platoon blocked, %		-	-	-	-	
Mov Cap-1 Maneuver	661	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	661	-	-	-	-
HCM Lane V/C Ratio	0.454	-	-	-	-
HCM Control Delay (s)	14.9	-	-	-	0
HCM Lane LOS	B	-	-	-	A
HCM 95th %tile Q(veh)	2.4	-	-	-	-

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	153	1808	1922	236	0	160
Future Volume (Veh/h)	153	1808	1922	236	0	160
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	166	1965	2089	257	0	174
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			1072			
pX, platoon unblocked	0.64				0.64	0.64
vC, conflicting volume	2346				3076	696
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1152				2287	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	57				100	75
cM capacity (veh/h)	387				12	698

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	166	655	655	655	696	696	696	257	174
Volume Left	166	0	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	0	257	174
cSH	387	1700	1700	1700	1700	1700	1700	1700	698
Volume to Capacity	0.43	0.39	0.39	0.39	0.41	0.41	0.41	0.15	0.25
Queue Length 95th (ft)	52	0	0	0	0	0	0	0	25
Control Delay (s)	21.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.9
Lane LOS	C								B
Approach Delay (s)	1.6				0.0				11.9
Approach LOS									B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	276	2447	1756	298	0	319
Future Volume (Veh/h)	276	2447	1756	298	0	319
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	300	2660	1909	324	0	347
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			1032			
pX, platoon unblocked	0.68				0.68	0.68
vC, conflicting volume	2233				3396	636
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1156				2871	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	26				100	53
cM capacity (veh/h)	407				2	735

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	SB 1
Volume Total	300	887	887	887	636	636	636	324	347
Volume Left	300	0	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	0	324	347
cSH	407	1700	1700	1700	1700	1700	1700	1700	735
Volume to Capacity	0.74	0.52	0.52	0.52	0.37	0.37	0.37	0.19	0.47
Queue Length 95th (ft)	146	0	0	0	0	0	0	0	64
Control Delay (s)	34.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2
Lane LOS	D								B
Approach Delay (s)	3.5				0.0				14.2
Approach LOS									B

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	98	8	35	87	11	29
Future Vol, veh/h	98	8	35	87	11	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	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	107	9	38	95	12	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	115	0	282	111
Stage 1	-	-	-	-	111	-
Stage 2	-	-	-	-	171	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1474	-	708	942
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	859	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1474	-	690	942
Mov Cap-2 Maneuver	-	-	-	-	711	-
Stage 1	-	-	-	-	914	-
Stage 2	-	-	-	-	837	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.2	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	711	942	-	-	1474	-
HCM Lane V/C Ratio	0.017	0.033	-	-	0.026	-
HCM Control Delay (s)	10.2	9	-	-	7.5	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	100	13	51	109	23	59
Future Vol, veh/h	100	13	51	109	23	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	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	109	14	55	118	25	64

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	123	0	345	116
Stage 1	-	-	-	-	116	-
Stage 2	-	-	-	-	229	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1464	-	652	936
Stage 1	-	-	-	-	909	-
Stage 2	-	-	-	-	809	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1464	-	628	936
Mov Cap-2 Maneuver	-	-	-	-	663	-
Stage 1	-	-	-	-	909	-
Stage 2	-	-	-	-	779	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	9.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	663	936	-	-	1464	-
HCM Lane V/C Ratio	0.038	0.069	-	-	0.038	-
HCM Control Delay (s)	10.6	9.1	-	-	7.6	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	143	8	35	139	11	29
Future Vol, veh/h	143	8	35	139	11	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	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	155	9	38	151	12	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	164	0	387	160
Stage 1	-	-	-	-	160	-
Stage 2	-	-	-	-	227	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1414	-	616	885
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	811	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1414	-	599	885
Mov Cap-2 Maneuver	-	-	-	-	649	-
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	789	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	649	885	-	-	1414	-
HCM Lane V/C Ratio	0.018	0.036	-	-	0.027	-
HCM Control Delay (s)	10.7	9.2	-	-	7.6	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	141	13	51	145	23	59
Future Vol, veh/h	141	13	51	145	23	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	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	153	14	55	158	25	64

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	167	0	428	160
Stage 1	-	-	-	-	160	-
Stage 2	-	-	-	-	268	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1411	-	584	885
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	777	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1411	-	561	885
Mov Cap-2 Maneuver	-	-	-	-	618	-
Stage 1	-	-	-	-	869	-
Stage 2	-	-	-	-	747	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	9.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	618	885	-	-	1411	-
HCM Lane V/C Ratio	0.04	0.072	-	-	0.039	-
HCM Control Delay (s)	11.1	9.4	-	-	7.7	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	95	4	4	89	4	3
Future Vol, veh/h	95	4	4	89	4	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	103	4	4	97	4	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	108	0	210	105
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	105	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1483	-	778	949
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	919	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1483	-	776	949
Mov Cap-2 Maneuver	-	-	-	-	773	-
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	917	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	840	-	-	1483	-
HCM Lane V/C Ratio	0.009	-	-	0.003	-
HCM Control Delay (s)	9.3	-	-	7.4	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	87	6	6	106	9	6
Future Vol, veh/h	87	6	6	106	9	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	95	7	7	115	10	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	101	0	226	98
Stage 1	-	-	-	-	98	-
Stage 2	-	-	-	-	128	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1491	-	762	958
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	898	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1491	-	758	958
Mov Cap-2 Maneuver	-	-	-	-	760	-
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	894	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	828	-	-	1491	-
HCM Lane V/C Ratio	0.02	-	-	0.004	-
HCM Control Delay (s)	9.4	-	-	7.4	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	140	4	4	141	4	3
Future Vol, veh/h	140	4	4	141	4	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	152	4	4	153	4	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	157	0	316	154
Stage 1	-	-	-	-	154	-
Stage 2	-	-	-	-	162	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1423	-	677	892
Stage 1	-	-	-	-	874	-
Stage 2	-	-	-	-	867	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1423	-	675	892
Mov Cap-2 Maneuver	-	-	-	-	705	-
Stage 1	-	-	-	-	874	-
Stage 2	-	-	-	-	865	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	775	-	-	1423	-
HCM Lane V/C Ratio	0.01	-	-	0.003	-
HCM Control Delay (s)	9.7	-	-	7.5	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection							
Int Delay, s/veh	0.6						

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	128	6	6	142	9	6
Future Vol, veh/h	128	6	6	142	9	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	139	7	7	154	10	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	146	0	309	142
Stage 1	-	-	-	-	142	-
Stage 2	-	-	-	-	167	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1436	-	683	906
Stage 1	-	-	-	-	885	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1436	-	680	906
Mov Cap-2 Maneuver	-	-	-	-	708	-
Stage 1	-	-	-	-	885	-
Stage 2	-	-	-	-	859	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	776	-	-	1436	-
HCM Lane V/C Ratio	0.021	-	-	0.005	-
HCM Control Delay (s)	9.7	-	-	7.5	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	20	319	93	0	538
Future Vol, veh/h	0	20	319	93	0	538
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	0	22	347	101	0	585

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	631	224	0	0	448	0
Stage 1	397	-	-	-	-	-
Stage 2	234	-	-	-	-	-
Critical Hdwy	6.29	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	6.04	-	-	-	-	-
Follow-up Hdwy	3.67	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	442	779	-	-	1109	-
Stage 1	626	-	-	-	-	-
Stage 2	745	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	442	779	-	-	1109	-
Mov Cap-2 Maneuver	442	-	-	-	-	-
Stage 1	626	-	-	-	-	-
Stage 2	745	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	779	1109	-
HCM Lane V/C Ratio	-	-	0.028	-	-
HCM Control Delay (s)	-	-	9.8	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	22	494	88	0	565
Future Vol, veh/h	0	22	494	88	0	565
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	0	24	537	96	0	614

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	831	316	0	0	633	0
Stage 1	585	-	-	-	-	-
Stage 2	246	-	-	-	-	-
Critical Hdwy	6.29	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	6.04	-	-	-	-	-
Follow-up Hdwy	3.67	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	340	680	-	-	946	-
Stage 1	504	-	-	-	-	-
Stage 2	734	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	340	680	-	-	946	-
Mov Cap-2 Maneuver	340	-	-	-	-	-
Stage 1	504	-	-	-	-	-
Stage 2	734	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	680	946	-
HCM Lane V/C Ratio	-	-	0.035	-	-
HCM Control Delay (s)	-	-	10.5	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	20	536	93	0	833
Future Vol, veh/h	0	20	536	93	0	833
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	0	22	583	101	0	905

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	995	342	0	0	684	0
Stage 1	633	-	-	-	-	-
Stage 2	362	-	-	-	-	-
Critical Hdwy	6.29	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	6.04	-	-	-	-	-
Follow-up Hdwy	3.67	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	274	654	-	-	905	-
Stage 1	477	-	-	-	-	-
Stage 2	639	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	274	654	-	-	905	-
Mov Cap-2 Maneuver	274	-	-	-	-	-
Stage 1	477	-	-	-	-	-
Stage 2	639	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.7	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	654	905	-
HCM Lane V/C Ratio	-	-	0.033	-	-
HCM Control Delay (s)	-	-	10.7	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection						
Int Delay, s/veh	0.2					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	0	22	845	88	0	835
Future Vol, veh/h	0	22	845	88	0	835
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	0	24	918	96	0	908

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1329	507	0	0	1014	0
Stage 1	966	-	-	-	-	-
Stage 2	363	-	-	-	-	-
Critical Hdwy	6.29	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	6.04	-	-	-	-	-
Follow-up Hdwy	3.67	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	176	511	-	-	680	-
Stage 1	322	-	-	-	-	-
Stage 2	638	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	176	511	-	-	680	-
Mov Cap-2 Maneuver	176	-	-	-	-	-
Stage 1	322	-	-	-	-	-
Stage 2	638	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	511	680	-
HCM Lane V/C Ratio	-	-	0.047	-	-
HCM Control Delay (s)	-	-	12.4	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	16	100	63	121	225	31
Future Vol, veh/h	16	100	63	121	225	31
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	0	100	-	-	-
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	17	109	68	132	245	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	529	261	278	0	-	0
Stage 1	261	-	-	-	-	-
Stage 2	268	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	510	778	1285	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	777	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	483	778	1285	-	-	-
Mov Cap-2 Maneuver	483	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	736	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	2.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1285	-	483	778	-	-
HCM Lane V/C Ratio	0.053	-	0.036	0.14	-	-
HCM Control Delay (s)	8	-	12.7	10.4	-	-
HCM Lane LOS	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.5	-	-

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	52	281	120	208	188	52
Future Vol, veh/h	52	281	120	208	188	52
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	0	100	-	-	-
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	57	305	130	226	204	57

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	720	233	261	0	-	0
Stage 1	233	-	-	-	-	-
Stage 2	487	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	395	806	1303	-	-	-
Stage 1	806	-	-	-	-	-
Stage 2	618	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	356	806	1303	-	-	-
Mov Cap-2 Maneuver	356	-	-	-	-	-
Stage 1	806	-	-	-	-	-
Stage 2	556	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1303	-	356	806	-	-
HCM Lane V/C Ratio	0.1	-	0.159	0.379	-	-
HCM Control Delay (s)	8.1	-	17	12.2	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.3	-	0.6	1.8	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	16	100	63	211	395	31
Future Vol, veh/h	16	100	63	211	395	31
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	0	100	-	-	-
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	17	109	68	229	429	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	812	446	463	0	-	0
Stage 1	446	-	-	-	-	-
Stage 2	366	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	348	612	1098	-	-	-
Stage 1	645	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	326	612	1098	-	-	-
Mov Cap-2 Maneuver	326	-	-	-	-	-
Stage 1	645	-	-	-	-	-
Stage 2	659	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.7	2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1098	-	326	612	-	-
HCM Lane V/C Ratio	0.062	-	0.053	0.178	-	-
HCM Control Delay (s)	8.5	-	16.7	12.1	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0.2	0.6	-	-

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	52	281	120	360	317	52
Future Vol, veh/h	52	281	120	360	317	52
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	0	100	-	-	-
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	57	305	130	391	345	57

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1025	373	401	0	-	0
Stage 1	373	-	-	-	-	-
Stage 2	652	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	260	673	1158	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	518	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	231	673	1158	-	-	-
Mov Cap-2 Maneuver	231	-	-	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	460	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.4	2.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1158	-	231	673	-	-
HCM Lane V/C Ratio	0.113	-	0.245	0.454	-	-
HCM Control Delay (s)	8.5	-	25.6	14.7	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.9	2.4	-	-

APPENDIX E

Queuing Analysis Worksheets

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	365	837	1147	210	351	310
v/c Ratio	1.07	0.30	1.04	0.21	0.70	0.65
Control Delay	102.0	3.7	47.8	4.4	53.2	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	102.0	3.7	47.8	4.4	53.2	13.5
Queue Length 50th (ft)	~235	72	~868	13	123	12
Queue Length 95th (ft)	#252	91	m369	m12	155	69
Internal Link Dist (ft)		289	1560		233	
Turn Bay Length (ft)	750					
Base Capacity (vph)	341	2766	1100	1001	499	478
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.07	0.30	1.04	0.21	0.70	0.65

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	435	1360	1054	306	347	309
v/c Ratio	1.12	0.53	1.08	0.31	0.70	0.63
Control Delay	113.4	5.4	71.1	4.5	52.9	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	113.4	5.4	71.1	4.5	52.9	11.0
Queue Length 50th (ft)	~302	152	~833	17	121	0
Queue Length 95th (ft)	#436	190	m#819	m18	162	65
Internal Link Dist (ft)		289	1600		223	
Turn Bay Length (ft)	750					
Base Capacity (vph)	390	2565	973	996	499	494
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.12	0.53	1.08	0.31	0.70	0.63

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	516	1435	2351	541	477
v/c Ratio	0.97	0.37	1.01	0.96	0.65
Control Delay	63.5	4.6	39.1	70.8	26.5
Queue Delay	0.0	0.0	0.0	0.0	0.5
Total Delay	63.5	4.6	39.1	70.8	27.0
Queue Length 50th (ft)	306	102	~358	201	279
Queue Length 95th (ft)	294	120	#686	#247	352
Internal Link Dist (ft)		289	799	233	
Turn Bay Length (ft)	750				
Base Capacity (vph)	534	3883	2328	561	735
Starvation Cap Reductn	0	0	0	0	57
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.97	0.37	1.01	0.96	0.70

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	630	2306	2251	501	470
v/c Ratio	1.05	0.63	1.07	1.00	0.61
Control Delay	83.0	6.0	59.2	85.2	26.2
Queue Delay	0.0	0.0	0.0	0.0	1.0
Total Delay	83.0	6.0	59.2	85.2	27.2
Queue Length 50th (ft)	~437	206	~620	~189	261
Queue Length 95th (ft)	#570	240	#716	#262	362
Internal Link Dist (ft)		289	740	223	
Turn Bay Length (ft)	750				
Base Capacity (vph)	598	3686	2112	499	765
Starvation Cap Reductn	0	0	0	0	115
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.05	0.63	1.07	1.00	0.72

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	60	1024	363	1372	237	123	187	220	218
v/c Ratio	0.37	0.90	0.87	0.80	0.65	0.30	0.38	0.49	0.53
Control Delay	23.3	41.0	50.4	28.0	37.1	40.5	8.1	30.9	43.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.3	41.0	50.4	28.0	37.1	40.5	8.1	30.9	43.9
Queue Length 50th (ft)	13	366	188	401	127	77	0	117	139
Queue Length 95th (ft)	14	#468	230	474	97	94	15	151	200
Internal Link Dist (ft)		992		349		838			447
Turn Bay Length (ft)	700		875		275		125	425	
Base Capacity (vph)	163	1178	448	1754	371	411	494	460	411
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.87	0.81	0.78	0.64	0.30	0.38	0.48	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	124	1438	128	1257	225	170	181	302	296
v/c Ratio	0.66	0.95	0.71	0.83	0.74	0.48	0.42	0.72	0.72
Control Delay	34.0	37.3	40.1	31.5	42.9	45.4	11.1	38.0	49.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.0	37.3	40.1	31.5	42.9	45.4	11.1	38.0	49.4
Queue Length 50th (ft)	32	516	40	389	114	109	9	162	188
Queue Length 95th (ft)	33	#666	#126	487	140	156	48	230	251
Internal Link Dist (ft)		952		349		838			477
Turn Bay Length (ft)	700		875		275		125	425	
Base Capacity (vph)	188	1516	180	1516	307	354	434	427	411
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.95	0.71	0.83	0.73	0.48	0.42	0.71	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	64	1827	666	2372	308	186	340	321	292	40
v/c Ratio	0.25	0.91	0.89	0.84	0.52	0.24	0.59	0.52	0.43	0.10
Control Delay	11.6	33.2	44.2	23.6	32.9	36.4	12.0	35.9	42.0	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.6	33.2	44.2	23.6	32.9	36.4	12.0	35.9	42.0	0.5
Queue Length 50th (ft)	6	456	182	486	86	57	28	90	97	0
Queue Length 95th (ft)	m6	m510	193	535	63	63	30	106	128	0
Internal Link Dist (ft)		992		349		838			447	
Turn Bay Length (ft)	700		875		275		125	425		100
Base Capacity (vph)	253	2021	781	2824	588	774	573	621	673	405
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.90	0.85	0.84	0.52	0.24	0.59	0.52	0.43	0.10

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	142	2595	238	2133	305	246	334	384	293	85
v/c Ratio	0.76	1.07	0.85	0.83	0.82	0.48	0.74	1.03	0.57	0.28
Control Delay	74.2	59.3	76.7	24.1	67.0	46.7	42.2	102.2	48.5	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.2	59.3	76.7	24.1	67.0	46.7	42.2	102.2	48.5	10.9
Queue Length 50th (ft)	52	~745	87	430	110	85	185	~149	102	0
Queue Length 95th (ft)	52	m#823	#155	503	125	111	241	#228	132	0
Internal Link Dist (ft)		952		349		838			477	
Turn Bay Length (ft)	700		875		275		125	425		100
Base Capacity (vph)	187	2435	280	2562	374	514	454	374	518	308
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	1.07	0.85	0.83	0.82	0.48	0.74	1.03	0.57	0.28

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	81	120	210	13	142	456	72	721
v/c Ratio	0.26	0.20	0.82	0.02	0.28	0.21	0.11	0.35
Control Delay	35.2	0.8	65.0	0.1	10.8	15.5	6.9	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	0.8	65.0	0.1	10.8	15.5	6.9	13.3
Queue Length 50th (ft)	48	0	142	0	42	91	14	126
Queue Length 95th (ft)	54	0	208	0	m55	m117	32	150
Internal Link Dist (ft)		185				109		430
Turn Bay Length (ft)	200			50	200		75	
Base Capacity (vph)	512	777	420	872	579	2167	660	2071
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	3	0	0	0	0	0	33
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.16	0.50	0.01	0.25	0.21	0.11	0.35

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	182	167	252	35	223	560	45	553
v/c Ratio	0.47	0.21	0.88	0.05	0.40	0.28	0.09	0.31
Control Delay	35.7	0.6	66.6	0.2	15.2	21.4	10.1	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	0.6	66.6	0.2	15.2	21.4	10.1	17.6
Queue Length 50th (ft)	107	0	170	0	86	142	10	107
Queue Length 95th (ft)	117	0	240	0	m102	m166	29	150
Internal Link Dist (ft)		127				130		414
Turn Bay Length (ft)	200			50	200		75	
Base Capacity (vph)	589	937	437	862	655	1988	528	1773
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	4
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.18	0.58	0.04	0.34	0.28	0.09	0.31

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

APPENDIX F

Conceptual Site Plan

SITE LEGEND

- PROPERTY BOUNDARY LINE
- R.O.W. LINE
- EASEMENT BOUNDARY LINE
- EXISTING TO REMAIN
- EXISTING CURB & GUTTER TO REMAIN
- PROPOSED CURB & GUTTER
- PROPOSED CONCRETE PAVING
- PROPOSED ASPHALT PAVING
- PROPOSED HEAVY DUTY ASPHALT PAVING
- PROPOSED RETAINING WALL
- PROPOSED SIDEWALK
- STREET LIGHT
- EXISTING FIRE HYDRANT
- PROPOSED MANHOLE COVER
- PROPOSED REGULATORY SIGN
- PROPOSED INLET

BENCHMARK

CITY OF AND COUNTY OF BROOMFIELD BM "LUCY" ELEVATION: 5297.00 FEET (NAVD 1988 DATUM)

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH RIGHT-OF-WAY LINE OF STATE HIGHWAY NO. 7 BEARING N89°38'37"W AS REFERENCED AND BOUNDED BY THE MONUMENTS SHOWN HEREON.

LEGAL DESCRIPTION

A PARCEL OF LAND ACROSS PARCELS 33 AND 34 OF "VISTA RIDGE MASTER FINAL PLAT" AND LOT 2 AND TRACT A OF "VISTA RIDGE FILING NO. 12", LOCATED IN THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH P.M., TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO. SEE SURVEY FOR DETAILED DESCRIPTION.

CAUTION - NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.

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

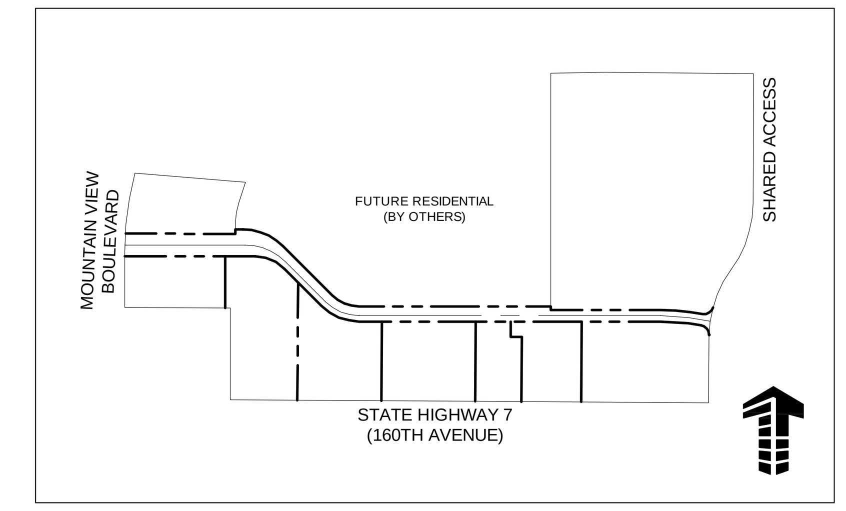
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

SCHEDULE

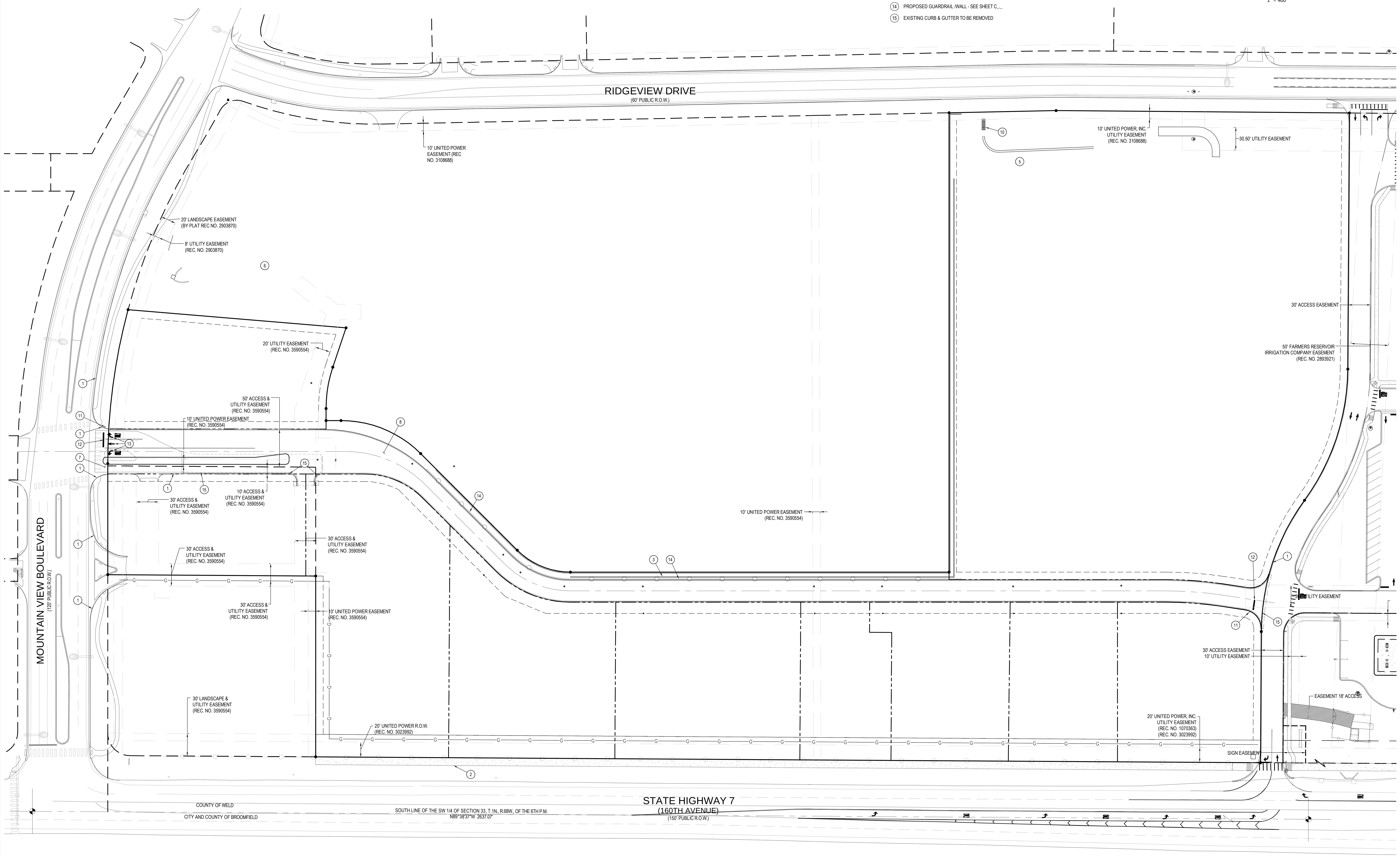
1. CURB AND GUTTER TO REMAIN
2. PROPOSED 8' WIDE SIDEWALK TO BE DEVELOPED WITH EACH PADS.
3. PROPOSED RETAINING WALL SEE SHEET C7.1
4. PROPOSED 10' TYPE R INLET
5. PROPOSED DETENTION POND - SEE SHEET C_._
6. EXISTING DETENTION POND - SEE SHEET C_._
7. EXISTING ASPHALT TO REMAIN - SEE SHEET C_._
8. PROPOSED ASPHALT - SEE SHEET C_._
9. PROPOSED CURB & GUTTER - SEE DETAIL ___ , SHEET C_._ (1' PAN 6" VERTICAL)
10. PROPOSED OUTLET STRUCTURE - SEE SHEET C_._
11. PROPOSED R1.1 STOP SIGN (SEE SITE DETAILS SHEET C_._)
12. PROPOSED STOP BAR (SEE SITE DETAILS SHEET C_._)
13. PROPOSED TRAFFIC DIRECTIONAL ARROW (SEE SITE DETAILS SHEET C_._)
14. PROPOSED GUARDRAIL /WALL - SEE SHEET C_._
15. EXISTING CURB & GUTTER TO BE REMOVED

N

0 10 30 60
SCALE: 1"=60'



KEY MAP
1" = 400'



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VISTA RIDGE COMMERCIAL WEST CIVIL CONSTRUCTION DRAWINGS

ERIE, COLORADO

#	Date	Issue / Description	Init.

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Checked By:	PJD
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SITE PLAN

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GEOTECHNICAL ENGINEERING STUDY
PROPOSED COMMERCIAL DEVELOPMENT
NORTHEAST CORNER OF STATE HIGHWAY 7
AND MOUNTAIN VISTA DRIVE
ERIE, COLORADO

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Project No. 15-3-164

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SUMMARY

1. The subsurface conditions encountered at the site were evaluated by drilling 31 exploratory borings to depths ranging from about 10 to 30 feet below existing ground surface. The borings generally encountered a variable thickness of topsoil overlying man-placed fills and natural overburden soils underlain by claystone and sandstone bedrock. Existing fill was encountered in four of the borings and extended to depths estimated to range from about 5 to 8 feet.

   Natural overburden lean to fat clay was encountered near the ground surface or beneath the fill in the exploratory borings and ranged in thickness from nil to about 16 feet. The natural soils encountered in the borings generally were light brown to brown, and moist. Occasional calcareous zones were noted within the overburden soils.

   Bedrock was encountered in all of the borings at depths ranging from a few inches to about 18 feet below ground surface. The bedrock encountered in the borings consisted generally of claystone bedrock with occasional zones of interbedded sandstone and claystone. The claystone was moist, and brown to gray. Based on sampler penetration resistance, the bedrock was medium hard to very hard. The interbedded sandstone and claystone bedrock was fine to medium grained, firm to very hard, and light brown to brown to gray. The sandstone also had nil to weak cementation. The bedrock surface elevations ranged from about 5224 to 5283 feet.

   Groundwater was encountered in two of the borings during drilling at depths ranging from about 8 to 18 feet. The borings were left open in order to measure stabilized groundwater levels, where present. Follow-up groundwater level measurements made 14 days after drilling did not encountered groundwater.

2. The project site has highly varied subsurface conditions. Considering the magnitude of the planned mass grading efforts, we recommend shallow spread footing foundations placed on properly compacted structural fill material be used to support the buildings at the site. Site grading should be planned accordingly, as discussed in more detail in the "Site Grading" section of the report.

   Swelling soils require overexcavation and replacement to create a pad of suitable bearing material for shallow foundations. Spread footings bearing directly on a minimum of 10 feet of properly compacted structural fill should be designed for an allowable soil bearing pressure of 3,000 psf

3. Slab-on-grade construction will be acceptable across the site. Overexcavation and replacement will be necessary due to high to very high swell potential.

4. Drilled shaft and structural floor options are viable on the project site. Discussion of drilled shafts and structurally supported floor systems along with design criteria are presented herein.

5. We recommend that all pavement sections be underlain by at least 3 feet of properly compacted fill material. The following table presents the minimum pavement thickness recommendations for this facility and roadways.

Paved Area	Full Depth Asphalt (inches)	Composite Section Asphalt/ABC (inches)	PCCP (inches)
Light Duty	6.5	3.5 / 8.0	6.0
Heavy Duty	7.5	5.0 /10.0	7.0

ABC – Aggregate Base Course
PCCP – Portland Cement Concrete Pavement

PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical engineering study for the proposed commercial development being planned for the northeast corner of State Highway 7 (SH 7) and Mountain Vista Drive in Erie, Colorado. The project site is generally shown on Fig. 1. The study was conducted in accordance with the scope of work in our Proposal No. P3-15-207 dated August 21, 2015 and revised August 26, 2015.

A field exploration program consisting of exploratory borings was conducted to obtain information on subsurface conditions. Samples of soils and bedrock obtained during the field exploration were tested in the laboratory to determine their strength, compressibility or swell characteristics, and classification. Results of the field exploration and laboratory testing were analyzed to develop recommendations for the building foundations and floor slabs, exterior flatwork areas, and pavements. The results of the field exploration and laboratory testing are presented herein.

This report has been prepared to summarize the data obtained during this study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction of the proposed facility are included in the report.

PROPOSED CONSTRUCTION

We have not been provided with the exact layout and type of structures to be constructed on the site; however, we anticipate that the structures will likely consist of single story retail and/or commercial storefronts. Paved surfaces and minor landscaping will likely be provided in and around the site.

Initial site grading plans indicate that the proposed ground surfaces will require minor cuts across the site as deep as about 2 to 3 feet and major fills as deep as about 12 to 15 feet.

If the proposed construction varies significantly from that generally described above or depicted in this report, we should be notified to reevaluate the conclusions and recommendations provided herein.

SITE CONDITIONS

At the time of drilling, the site was being used as an actively farmed agricultural field. The project site lies between SH 7 on the south and Ridgeview Drive on the north. Mountain View Drive lies on the western property boundary. The project site extends approximately 1,700 feet east of Mountain View Drive. This project includes portions of the property within the limits described above.

The site slopes gently down to the west and north. Maximum difference of elevation across the subject site of 50 to 60 feet.

SUBSURFACE CONDITIONS

As requested by the Kentro Group, the subsurface conditions encountered at the site were evaluated by drilling a total of 31 exploratory borings to depths ranging from about 10 to 30 feet below existing ground surface. Specifically, eight borings were located within areas of proposed structures, seven borings within proposed drive lanes and parking areas, and sixteen borings in future pad sites. The approximate locations of the borings are shown on Fig. 1. The logs of the exploratory borings are presented on Figs. 2 through 5, and a legend and associated explanatory notes are also presented on Fig. 6.

Subsurface Soil and Bedrock Conditions: The borings generally encountered a variable thickness of topsoil overlying man-placed fills and natural overburden soils underlain by claystone and sandstone bedrock. Existing fill was encountered in four of the borings and extended to depths estimated to range from about 5 to 8 feet. The fill generally consisted of lean clay with occasional fine to medium grained sand lenses. The fill was generally moist and light brown to brown. The lateral extent, depth and degree of compaction of the existing fill were not determined as part of this study.

Natural overburden lean to fat clay was encountered near the ground surface or beneath the fill in the exploratory borings and ranged in thickness from nil to about 16 feet. The natural soils encountered in the borings generally were light brown to brown, and moist. Occasional calcareous zones were noted within the overburden soils. Based on sampler penetration resistance, the natural overburden soils were generally very stiff to hard.

Bedrock was encountered in all of the borings at depths ranging from a few inches to about 18 feet below ground surface. The bedrock encountered in the borings consisted generally of claystone bedrock with occasional zones of interbedded sandstone and claystone. The claystone was moist, and brown to gray. Based on sampler penetration resistance, the bedrock was medium hard to very hard. The interbedded sandstone and claystone bedrock was fine to medium grained, firm to very hard, and light brown to brown to gray. The sandstone also had nil to weak cementation. The bedrock surface elevations ranged from about 5224 to 5283 feet.

Groundwater Conditions: Groundwater was encountered in two of the borings during drilling at depths ranging from about 8 to 18 feet. The borings were left open in order to measure stabilized groundwater levels, where present. Follow-up groundwater level measurements made 14 days after drilling did not encountered groundwater. Development of perched groundwater on top of or within the fractured zones of the bedrock will occur, particularly after wet weather and landscape irrigation subsequent to development.

LABORATORY TESTING

Laboratory testing was performed on selected soil and bedrock samples obtained from the borings to determine in-situ soil moisture content and dry density, Atterberg limits, swell-consolidation characteristics, gradation, and concentration of water soluble sulfates. The results of the laboratory tests are shown to the right of the logs on Figs. 2 through 5 and summarized in Table 1. The results of specific tests are graphically plotted on Figs. 7 through 20. The testing was conducted in general accordance with recognized test procedures, primarily those of the American Society for Testing of Materials (ASTM).

Swell-Consolidation: Swell-consolidation tests were conducted on samples of the existing fill, the natural lean clay, and the claystone bedrock. The swell-consolidation tests were performed in order to determine the compressibility and swell characteristics of the samples under loading and when submerged in water. Each sample was prepared and placed in a confining ring between porous discs, subjected to a surcharge pressure of 200 or 1,000 psf, and allowed to consolidate before being submerged. The sample height was monitored until deformation practically ceased under each load increment.

Results of the swell-consolidation tests are plotted as a curve of the final strain at each increment of pressure against the log of the pressure, and are presented on Figs. 7 through 20. Based on the results of swell-consolidation tests, the fill and natural soil samples exhibited low to very high swell potential upon wetting at surcharge pressures of both 200 and 1,000 psf. The bedrock samples generally exhibited low to very high swell potential upon wetting under the surcharge pressures of both 200 and 1,000 psf. One sample of claystone bedrock indicated low to moderate consolidation potential; however, we believe that this does not reflect the on-site bedrock materials. It is highly probable that the apparent consolidation is likely the result of sample disturbance prior to or during the testing procedure.

Index Properties: Samples were classified into categories of similar engineering properties in general accordance with the Unified Soil Classification System. This system is based on index properties, including liquid limit and plasticity index and grain size distribution. Values for moisture content, dry density, liquid limit and plasticity index, and the percent of soil passing the U.S. No. 4 and 200 sieves are presented in Table I and adjacent to the corresponding sample on the boring logs.

GEOTECHNICAL CONSIDERATIONS

As previously discussed, site subsurface conditions generally consist of variable depths of fill and natural overburden soils underlain by claystone and sandstone bedrock. The existing fills are considered non-engineered and unsuitable in their current state for support of foundations and slab-on-grade. The existing soils, including the fills, and the underlying bedrock exhibited a tendency to swell. Our experience in the area also indicates that very high swell potential soils and bedrock are prominent.

With proper site preparation, shallow spread footing foundations and slab-on-grade construction should be feasible. Proper site preparation should include complete removal of existing non-engineered fills where present within the proposed building footprint and beneath other structures, down to the natural soils or bedrock and replacement with compacted structural fill. Although complete removal would be preferable beneath pavement areas, partial removal of existing fills below planned pavement subgrade may be considered with the understanding that unwanted pavement settlement and associated distress could occur over time if the deeper fills left in place were not properly compacted.

Site preparation should also include providing a layer of compacted structural fill below spread footing foundations and slab on grade floors. Including a minimum thickness of structural fill would result in more uniform bearing conditions beneath footings and floor slab support, and a more predictable foundation settlement. Depending on site finished grades, overexcavation into natural soils and/or bedrock will be required. In general, a minimum of 10 feet of properly compacted structural fill should be provided below spread footings and 13 feet of properly compacted structural fill should be provided below floor slabs.

Excavated existing fills, natural overburdens soils, and sandstone bedrock, should suitable for use as site grading fill and may be suitable for use as structural fill beneath buildings and other structures provided they can be properly moisture conditioned and compacted. Claystone may be suitable for use as site grading fill but should not be used for structural fill beneath buildings or other structures, and should not be used as compacted fill within three feet of the subgrade elevation in pavement or exterior flatwork areas.

A deep foundation alternative is feasible (and possibly desirable) for the structures on the site. The primary reasoning for selecting a deep foundation alternative would be the elimination of risks associated with heaving movements of the floor slabs or where small structures will be constructed that would not be included in a larger site-wide earthwork scheme to provide the required thickness of structural fill below structures. Creating a deep excavation for relatively small structures may be more costly than using different construction techniques. If structures are founded on deep foundations, we recommend that the floor slabs be structurally supported by foundation elements and isolated from the underlying soils to prevent heaving movements. We recommend that a minimum 12-inch void be provided beneath the structurally supported floor slabs.

SITE GRADING

In general, the currently proposed site grades will be raised from the current elevations over most of the site. Given the proposed site grades, it appears that significant amounts of imported fill materials will be required.

<u>Cut and Fill Slopes</u>: The site specifically and the area in general is gently to moderately sloping. Major stability problems are not anticipated if site grading is carefully planned and cut and fill slopes do not exceed approximately 15 feet in height.

Permanent unretained cuts in the overburden soils less than 10 feet in height should be sloped at 3 horizontal to 1 vertical, or flatter. Permanent unretained cuts in the hard to very hard bedrock should be sloped at 2 horizontal to 1 vertical, or flatter. The risk of slope instability will be significantly increased if seepage is encountered in cuts. For shallow cuts in the existing overburden soils, we do not anticipate seepage will be encountered. However, cuts extending into bedrock may encounter seepage from water perched at the interface zone between the overburden soils and bedrock. Where groundwater seepage is anticipated or encountered during construction, a stability analysis should be conducted to determine if the seepage will adversely affect the cut.

Permanent fills up to 20 feet in height can be used if the fill slopes do not exceed 3 horizontal to 1 vertical and the fills are properly compacted and drained. The ground surface underlying all fills should be carefully prepared by removing all organic matter, scarification to a depth of 12 inches and compacting to 95% of the standard Proctor (ASTM D698) maximum dry density at moisture contents near optimum. Fills should be benched into existing slopes that exceeding 4 horizontal to 1 vertical.

Good surface drainage should be provided around all permanent cuts and fills to direct surface runoff away from the slope faces. Fill slopes, cut slopes and other stripped areas should be protected against erosion by vegetation or other methods.

No formal stability analyses were performed to evaluate the slopes recommended above. Published literature and our experience with similar cuts and fills indicate the recommended slopes should have adequate factors of safety. If a detailed stability analysis is required, we should be notified.

<u>Temporary Excavations</u>: We assume that the site excavations will be constructed by generally over-excavating the side slopes to a stable configuration where enough space is available. All excavations greater than 4 feet and less than 20 feet in depth should be constructed in accordance with OSHA requirements, as well as state, local and other applicable requirements. OSHA requires excavations or trenching over 20 feet deep be designed by a registered professional engineer.

The existing fills generally classify as OSHA Type C soils and the natural clayey soils generally classify as OSHA Type B. The bedrock underlying the site is anticipated to classify as OSHA Type A soil, although fractured bedrock and non- to weakly-cemented sandstone bedrock would classify as OSHA Type B soils and may classify as Type C soils depending on the degree of fracturing and/or cementation. If unstable soil conditions or groundwater are encountered, the geotechnical engineer should be notified so that additional recommendations can be provided, if necessary.

Excavated slopes may soften or loosen due to construction traffic and erode from surface runoff. Measures to keep surface runoff from excavation slopes, including diversion berms, should be considered.

<u>Existing Fill</u>: The current level of compaction and moisture content of the existing fill materials appears to be erratic. The existing fills should not be considered suitable for support of any structure or flatwork and should be completely removed and recompacted as necessary.

Material Specifications: The following material specifications are presented for fills on the project site. A geotechnical engineer should evaluate the suitability of all proposed import fill material, if required, for the project prior to placement.

1. *Structural Fill Beneath Buildings*: Fill placed beneath building structures should consist of 6 feet of imported Select Fill below the proposed subgrade elevation is preferred. Fill materials used below the structural fill should consist of Common Fill. (See Material Suitability below for Common and Select Fill description and criteria).

2. *Pavement Subgrade*: Materials placed within 3 feet of the pavement subgrade elevation may consist of the on-site soils exclusive of claystone (Common Fill). Excavated, on-site claystone bedrock material may be used in deeper fills, outside of building limits, at depths greater than 3 feet below the proposed pavement subgrade elevation. Claystone bedrock, as well as other on-site materials not suitable for use as structural fill, may be used in fill areas outside of building footprints and pavement subgrades.

3. *Pipe Bedding Material*: Pipe bedding material should be a free draining, coarse grained sand and/or fine gravel. The on-site soils are generally non to very cohesive, fine grained soils and are susceptible to erosion and scour.

4. *Aggregate Base Course*: Material should be crushed stone, crushed slag, recycled concrete, crushed gravel or natural gravel which conforms to CDOT Specifications for Class 6 or Class 5 criteria for aggregate base course.

5. *Utility Trench Backfill*: Material excavated from the utility trenches may be used for backfill provided it does not contain unsuitable material or particles larger than 4 inches.

6. *Material Suitability*: The upper 13 feet of material placed in the building pad overexcavation zone should consist of 6 feet of Select Fill overlying a minimum of 7 feet of Common Fill consisting of any of the overburden soils on site exclusive of claystone bedrock, although sandstone bedrock may be included. A second class of fill to be used for grading will be Claystone Fill. Claystone Fill may be used outside of building areas, either in landscaped areas or more than 3 feet below pavement subgrade elevation.

Claystone encountered in cut areas should be overexcavated 2 feet below the pavement subgrade elevation, the base of subexcavated area should be scarified 12 inches, moisture conditioned and recompacted, and then the upper 2 feet replaced with Common Fill, resulting a total of 3 feet of moisture conditioned material.

Imported Select Fill should contain less than 40% passing the No. 200 sieve, have a maximum liquid limit of 35 and a maximum plasticity index of 10. Also, the swell potential when remolded to 100% of the ASTM D 698 standard Proctor maximum dry density at optimum moisture content should be less than ½% under a 1,000 pcf surcharge pressure.

Imported Common Fill should contain 20% to 70% passing the No. 200 sieve, have a maximum liquid limit of 40 and a maximum plasticity index of 15, and a maximum swell potential of 1% when remolded as described above.

All fill material should be free of vegetation, brush, sod and other deleterious substances and should not contain rocks, debris or lumps having a diameter of more than 4 inches. Rocks, debris or lumps should be dispersed throughout the fill and "nesting" of these materials should be avoided. The geotechnical engineer should evaluate the suitability of proposed import fill materials prior to placement.

<u>Placement and Compaction Specifications</u>: We recommend the following compaction criteria be used on the project:

1. *Moisture Content*: Compaction of all fill materials should be compacted as outlined below with moisture contents between the optimum moisture content and 3 percentage points above optimum moisture for clayey material and within -2 to +2 percentage points of optimum for granular soils.

   The contractor should be aware that the on-site and/or proposed imported fine-grained soils may become somewhat unstable and deform under wheel loads if placed near the upper end of the moisture range(s). Some fill instability is not a concern in deeper fills provided the required density is achieved; instability is a concern primarily in the upper 2 to 3 feet of pavement subgrade fill.

2. *Placement and Degree of Compaction*: Structural fill beneath foundations and slab-on-grade floors, fill adjacent to shallow spread footing foundations, and wall backfill should be placed in lifts no thicker than 8 inches loose.

The following compaction criteria should be followed during construction:

Fill Location	Percentage of Maximum Standard Proctor Density (ASTM D-698)
Beneath Spread Footing Foundations	98%
Beneath Building Floor Slabs	
Fill less Than 8 Feet below finished grade	95%
Fill more Than 8 Feet below finished grade	98%
Adjacent to Spread Footing Foundations	95%
Wall Backfill	
Backfill Less than 8 Feet below finished grade	95%
Settlement Sensitive Areas	98%[1]
Exterior Backfill More than 8 Feet below finished grade	98%[1]
Beneath Pavements and Settlement-Sensitive Hardscape Areas	
Fill Less Than 8 Feet below finished grade	95%
Fill More Than 8 Feet below finished grade	98%
Utility Trenches	
Interior	95%
Exterior – Backfill Less Than 15 Feet thick	95%
Exterior - Backfill More Than 15 Feet Thick	98%
Landscape and Other Areas	95%

[1] Some difficulty could be encountered achieving adequate compaction with small equipment to avoid exerting excessive compaction stresses on walls.

3. *Subgrade Preparation*: Areas receiving new fill should be prepared as recommended in specific sections of this report to provide a uniform base for fill placement. All other areas to receive new fill not specifically addressed herein should be scarified to a depth of at least 8 inches and recompacted to at least 95% of the standard Proctor (ASTM D 698) maximum dry density at moisture contents recommended above.

Construction Monitoring: A representative of the geotechnical engineer should observe and test fill placement. Structural fills beneath buildings and foundations should be observed and tested on a full-time basis. Full time observation and testing is a critical component to reducing the risk of post-construction settlement of the fills.

FOUNDATION RECOMMENDATIONS

Spread Footings: As discussed previously, we recommend that the commercial and retail buildings near the northeast side of the site (in the area of Borings 1 through 8) be founded on spread footings placed on properly compacted structural fill. It is likely that buildings constructed on the future pad sites (Borings F-1 through F-16) will be able to utilize similar recommendations; however, individual site specific geotechnical engineering studies should be performed to verify or develop geotechnical engineering related recommendations.

The design and construction criteria presented below should be observed for a spread footing foundation system. The construction details should be considered when preparing project documents.

1. Spread footings should be placed on a minimum of 10 feet of structural fill extending to undisturbed natural soils and/or bedrock. The structural fill zone should consist of at least 3 feet of imported Select Fill below the footings overlying a minimum of 7 feet of Common Fill as described in the “Site Grading” section of this report. Areas of loose or soft material or existing fill encountered within the foundation excavation should be removed replaced with structural fill meeting the material and placement requirements outlined in the “Site Grading” section of this report. New structural fill should extend down from the edges of the footings at a 1 horizontal to 1 vertical projection.

2. Footings supported on properly compacted structural fill as recommended herein should be designed for an allowable soil bearing pressure of 3,000 psf and a minimum dead load pressure of 1,000 psf. In order to satisfy the minimum dead load pressure and minimum footing width criteria recommended herein, it may be necessary to concentrate loads by using a grade beam and pad or similar foundation design. If this system is used, a void should be provided beneath the grade beams between pads.

3. Based on experience, we estimate total settlement for footings designed and constructed as discussed in this section will be approximately 1 inch or less. Differential settlements across the building are estimated to be approximately ¾ of the total settlement.

4. Spread footings should have a minimum footing width of 16 inches for continuous footings and of 24 inches for isolated pads.

5. Exterior footings and footings beneath unheated areas should be provided with adequate soil cover above their bearing elevation for frost protection. Placement of foundations at least 36 inches below the exterior grade is typically used in this area.

6. The lateral resistance of a spread footing placed on properly compacted structural fill material will be a combination of the sliding resistance of the footing on the foundation materials and passive earth pressure against the side of the footing. Resistance to sliding at the bottoms of the footings can be calculated based on a coefficient of friction of 0.3. Passive pressure against the sides of the footings can be calculated using an equivalent fluid unit weight of 175 pcf. The above values are working values.

   Compacted fill placed against the sides of the footings to resist lateral loads should meet the material and placement requirements outlined in the "Site Grading" section of this report.

7. Continuous foundation walls should be reinforced top and bottom to span an unsupported length of at least 10 feet.

8. A representative of the geotechnical engineer should observe all footing excavations prior to concrete placement.

Drill Shaft Foundations: If it is deemed by the design team to be more economical or desirable to eliminate the zone of subexcavation below building structures, the structures may be founded on straight shaft drilled piers. The values provided below are for building constructed within the areas of Borings 1 through 8 and may not be appropriate for structures elsewhere on the site. We should be contacted to re-evaluate the design criteria at specific locations on the site.

The design and construction criteria presented below should be observed for a straight-shaft pier foundation system. The construction details should be considered when preparing project documents.

1. Piers should be designed for an allowable end bearing pressure of 18,000 psf and a skin friction of 1,800 psf for the portion of the pier in bedrock. Uplift due to structural loadings on the piers can be resisted by using 75% of the allowable skin friction value plus an allowance for pier weight.

2. Piers should also be designed for a minimum dead load pressure of 30,000 psf calculated as the unfactored dead load applied to the pier cross sectional area. Our experience indicates application of dead load pressure is the most effective way to resist foundation movement due to swelling soils. However, if the minimum dead load

requirement cannot be achieved and the piers are loaded as heavily as practicable, the pier length should be extended beyond the minimum bedrock penetration and minimum length to mitigate the dead load deficit. This can be accomplished by assuming one-half of the skin friction given above acts in the direction to resist uplift caused by swelling soil around the upper portion of the pier. The owner should be aware of an increased potential for foundation movement if the recommended minimum dead load pressure is not met.

3. A minimum penetration of 8 feet into the bedrock and a minimum pier length of 25 feet are recommended.

4. Piers should be designed to resist lateral loads using a modulus of horizontal subgrade reaction in the clay soils of 50 tcf and a modulus of horizontal subgrade reaction of 250 tcf in the bedrock. The modulus values given are linear modulus values intended for use in simplified hand calculations and are for a long one-foot wide pier and must be corrected for pier size. If more rigorous analysis is desired, a computer application such as LPILE should be used.

5. The lateral capacity of the piers may be analyzed using the LPile computer program and the parameters provided in the following table. The strength criteria provided in the table are for use with that software application only and may not be appropriate for other usages.

Material	c (psf)	ø	γ_T	k_s	k_c	ε_{50}	Soil Model Type
Overburden soils / Properly Compacted Fill	750	0	120	500	200	0.007	1
Bedrock	8,000	0	125	2,000	800	0.004	1

c Cohesion intercept (pounds per square foot)
Φ Angle of internal friction (degrees)
γ_T Total unit weight (pounds per cubic foot)
k_s Initial static modulus of horizontal subgrade reaction (pounds per cubic inch)
k_c Initial cyclic modulus of horizontal subgrade reaction (pounds per cubic inch)
ε_{50} Strain at 50 percent of peak shear strength

Soil Types:
1. Stiff clay without free water (Reese)

6. Closely-spaced piers and pier groups will require appropriate reductions of the axial, uplift and lateral capacities based on the effective envelope of the pier group. These reductions can be avoided by spacing the piers at a distance of at least 3 pier diameters

center-to-center for axial loading, 6 pier diameters center-to-center in the direction parallel to lateral loading, and 5 pier diameters center-to-center in the direction perpendicular to lateral loading. More closely spaced piles should be studied on an individual basis to determine the appropriate reduction in axial and lateral load design parameters.

7. If the minimum pier spacings recommended above for lateral loading cannot be achieved, we recommend that the lateral load-displacement curve (p-y curve) for an isolated pier be modified for closely-spaced piers using p-multipliers to reduce all the p-values on the curve. With this approach, the computed load carrying capacity of the pier in a group is reduced relative to the isolated pile capacity. The modified p-y curve should then be reentered into the L-Pile software to calculate the pile deflection. The reduction in capacity for the leading pier, the pier leading the direction of movement of the group, is less than that for the trailing piers.

   For center-to-center spacing of piers in the group in the direction of loading expressed in multiples of the pier diameter, we recommend p-multipliers of 0.7 and 1.0 for pier spacings of 3 and 5 diameters, respectively, for the leading row of piers, 0.4 and 0.85 for pier spacings of 3 and 5 diameters, respectively, for the second row of piers, and 0.3 and 0.7 for pier spacings of 3 and 5 diameters, respectively, for rows 3 and higher. For loading in a direction perpendicular to the row of piers, the p-multipliers are 1.0 for a pier spacing of 5 diameters, 0.7 for a pier spacing of 3 diameters, and 0.5 for a pier spacing of 1 diameter. P-multiplier values for other pier spacing values should be determined by interpolation. These values are consistent with Table 10.7.2.4-1 of the 2012 AASHTO LRFD Bridge Design Specifications. It will be necessary to determine the load distribution between the piers that attain deflection compatibility because the leading pier carries a higher proportion of the group load and the pier cap prevents differential movement between the piers.

8. Piers should be reinforced their full length to resist an unfactored net tensile force from swelling soil pressure of at least 130 kips. The recommended tensile force is for a 1-foot diameter pier and should be increased in proportion to the pier diameter for larger piers. If the design dead load greater than or less than the recommended dead load, the requirement for tension reinforcement should be decreased or increased accordingly to account for the difference.

9. A 12-inch void should be provided beneath the grade beams to concentrate pier loadings and to separate the expansive soil from the grade beams. Absence of a void space will result in a reduction in dead load pressure on the piers which could result in upward movement of the foundation system. A void should also be provided beneath necessary pier caps.

10. The pier length-to-diameter ratio should not exceed 30 to facilitate proper cleaning and observation of the pier hole.

11 Concrete used in the piers should be a fluid mix with sufficient slump so it will fill the void between reinforcing steel and the pier hole. We recommend a concrete slump in the range of 5 to 8 inches be used.

12. Based on the results of our field exploration, laboratory testing, and our experience with similar, properly constructed drilled pier foundations, we estimate pier settlement will be low. Generally, we estimate the settlement of a pier 1 to 3 feet in diameter will be less than 1-inch when designed according to the criteria presented herein. The settlement of closely spaced piers will be larger and should be studied on an individual basis.

13. Pier holes should be properly cleaned prior to the placement of concrete.

14. The presence of water in some of the exploratory borings indicates the use of temporary casing or dewatering equipment in the pier holes may be required to reduce water infiltration. The requirements for casing and dewatering equipment can sometimes be reduced by placing concrete immediately upon cleaning and observing the pier hole. In no case should concrete be placed in more than 3 inches of water unless placed through an approved tremie method.

15. When water and/or drilling slurry is present outside the casing, care should be taken that concrete of sufficiently high slump is placed to a sufficiently high elevation inside the casing to prevent intrusion of the water and/or slurry into the concrete when the casing is withdrawn.

16. The drilled shaft contractor should mobilize equipment of sufficient size and operating condition to achieve the required bedrock penetration.

17. Care should be taken that the pier shafts are not oversized at the top. Mushroomed pier tops can reduce the effective dead load pressure on the piers.

18. Concrete should be placed in piers the same day they are drilled. The presence of water or caving soils may require that concrete be placed immediately after the pier hole is completed. Failure to place concrete the day of drilling will normally result in a requirement for additional bedrock penetration.

19. Difficulty may be encountered in establishing a casing seat in the sandstone to achieve a positive cutoff of groundwater seepage into the hole. Additional bedrock penetration may be required to compensate for the skin friction lost due to disturbance caused by installation of the casing. Skin friction should be neglected in the cased portion of the hole. The amount of additional penetration should be determined in the field at the time of construction. The contract documents should advise potential drilled shaft contractors of these subsurface conditions. In addition, careful consideration should be given to preparing bid items to avoid high costs for potential overruns.

20. A representative of the geotechnical engineer should observe pier drilling operations on a full-time basis to assist in identification of adequate bedrock strata and monitor pier construction procedures.

FLOOR SLABS

We recommend that at least 13 feet of structural fill be placed below slabs on grade. The planned mass site grading activities associated with footing foundation systems should result in at least 13 feet of structural fill placed below the floor slabs on grade. Prior to placing the floor slab, the subgrade should be thoroughly plowed and scarified to a depth of 12 inches, moisture conditioned and compacted as listed below.

<u>General Floor Slab Recommendations</u>: The following measures should be taken to reduce damage which could result from movement should the underslab materials be subjected to moisture changes.

1. Floor slabs should be separated from all bearing walls and columns with expansion joints which allow unrestrained vertical movement.

2. Interior non-bearing partitions resting on floor slabs should be provided with slip joints at the tops or bottoms so that, if the slabs move, the movement cannot be transmitted to the upper structure. This detail is also important for wallboards, stairways and door frames. Slip joints which will allow at least 2 inches of vertical movement are recommended.

   If wood or metal stud partition walls are used, the slip joints should preferably be placed at the bottoms of the walls so differential slab movement won't damage the partition wall. If slab bearing masonry block partitions are constructed, the slip joints will have to be placed at the tops of the walls. If slip joints are provided at the tops of walls and the floors move, it is likely the partition walls will show signs of distress, such as cracking. An alternative, if masonry block walls or other walls without slip joints at the bottoms are required, is to found them on spread footings and to construct the slabs independently of the foundation. If slab bearing partition walls are required, distress may be reduced by connecting the partition walls to the exterior walls using slip channels.

   Floor slabs should not extend beneath exterior doors or over foundation walls, unless saw cut at the wall after construction.

3. Floor slab control joints should be used to reduce damage due to shrinkage cracking. Joint spacing is dependent on slab thickness, concrete aggregate size, and slump, and should be consistent with recognized guidelines such as those of the Portland Cement Association (PCA) or American Concrete Institute (ACI). We suggest joints be provided on the order of 12 to 15 feet apart in both directions. The requirements for slab reinforcement should be established by the designer based on experience and the intended slab use.

4. If moisture-sensitive floor coverings will be used, mitigation of moisture penetration into the slabs, such as by use of a vapor barrier, may be required. If an impervious vapor barrier membrane is used, special precautions will be required to prevent differential curing problems which could cause the slabs to warp. ACI 302.1R addresses this topic.

5. New fill placed within 8 feet of the floor slab subgrade elevation should meet the criteria outlined in the Site Grading section of this report.

6. The bedrock encountered during this study will be expansive when placed in a compacted condition. Consequently, it should not be used as fill beneath floor slabs. The bedrock can be used for fill near the bottom of fills outside the building areas.

7. All plumbing lines should be tested before operation. Where plumbing lines enter through the floor, a positive bond break should be provided. Flexible connections should be provided for slab-bearing mechanical equipment.

Structurally Supported Floors: In the event the drilled piers and structurally supported floor slabs are desired, we recommend that design of a crawl space or underfloor void consider drainage and moisture control. We recommend a minimum 12-inch void beneath floors. Providing a full crawl space (3 feet or more) rather than a 12-inch void beneath the floor has the advantages that utilities can be suspended above the expansive subgrade and crawl space surface drainage can be provided. Utility lines should not be supported on the subgrade, unless adequate measures are taken to account for differential movement between grade supported utilities and slabs. If utilities are connected to the floor or floor openings, void spaces should also be provided below the utility lines. The utility lines should be supported by suitable means such as hangers as necessary. We recommend that void and crawl spaces be designed with positive surface drainage and a collection point or outlet so that free-water introduced into these spaces can be removed. High humidity can develop in crawl spaces due to the transmission of water vapor through moist soils. Crawl space humidity should be controlled through ventilation and/or the use of a vapor barrier on the crawl space floor or on the underside of the structure floor.

It is extremely important that exterior slabs-on-grade and pavements be isolated from the building foundations. Many expansive soil related problems are related to ineffective isolation between pavements/floor slabs and foundation-supported components of structures. Careful design detaining is necessary at locations such as exterior stairway landings and entry points.

Subgrade materials below pavement and exterior flat work adjacent to the building should be placed as described in the Pavement Design section.

FOUNDATION WALLS AND RETAINING STRUCTURES

Foundation walls and retaining structures associated with loading docks which are laterally supported and can be expected to undergo only a moderate amount of deflection should be designed for an at-rest lateral earth pressure computed on the basis of an equivalent fluid unit weight of 72 pcf for backfill consisting of the on-site fine grained soils and 60 pcf for backfill consisting of imported granular materials conforming to CDOT Class 1 Structure Backfill requirements.

Cantilevered retaining structures less than 8 feet in height which can be expected to deflect sufficiently to mobilize the full active earth pressure condition should be designed for a lateral earth pressure computed on the basis of an equivalent fluid unit weight of 50 pcf for backfill consisting of the on-site soils and 40 pcf for backfill consisting of imported granular materials conforming to CDOT Class 1 Structure Backfill.

All foundation and retaining structures should be designed for appropriate hydrostatic and surcharge pressures such as adjacent buildings, traffic, construction materials and equipment. The pressures recommended above assume drained conditions behind the walls and a horizontal backfill surface. The buildup of water behind a wall or an upward sloping backfill surface will increase the lateral pressure imposed on a foundation wall or retaining structure.

Compacted fill placed against the sides of the footings to resist lateral loads should be a granular material meeting the requirements for fill beneath buildings presented in the "Site Grading" section.

SEISMIC DESIGN CRITERIA

The soil profile generally will consist of about 15 to 30 feet of overburden soils underlain by firm to very hard bedrock. The bedrock is considered to extend to a depth of at least 100 feet below ground surface. The existing and anticipated overburden soils will classify as International Building Code (IBC) Site Class D. The underlying bedrock generally classifies as IBC Site Class B or C. The IBC limits the use of Site Class B to profiles where the overburden thickness between the base of the foundations and the rock surface is 10 feet or less. Based on the proposed depth of overburden, we recommend a design soil profile of IBC Site Class C. Based on the subsurface profile, site seismicity, and the anticipated depth of ground water, liquefaction is not a design consideration.

UNDERDRAIN SYSTEM

Our experience indicates that local perched water conditions can develop on relatively shallow bedrock and/or vary during times of heavy precipitation, seasonal runoff, or as a result of site improvements and irrigation. Depending on site grading, overexcavation and backfilling beneath buildings underlain by relatively shallow bedrock could create a potential for water to collect immediately below floor slabs.

To reduce the potential for groundwater to collect at the base of the structural fill zone, we recommend providing an underdrain system for buildings where bedrock will be within 3 feet of the base of the structural fill zone. The underdrain system should consist of a subdrain extending along the perimeter of the structural fill zone. Subdrain pipes should consist of 4-inch diameter, rigid, perforated or slotted, PVC plastic pipes. The pipes should be placed in trenches excavated at least 12 inches below the base of the structural fill zone and covered with drainage aggregate extending up to at least footing subgrade level. Drainage aggregate used in the subdrain systems should consist of a material with a gradation meeting the requirements for a No. 67 coarse aggregate in accordance with ASTM D448. Drain pipe trenches and drainage aggregate should be wrapped with a geotextile filter fabric to prevent migration of fines from the surrounding soil and/or bedrock into the drainage material.

The subdrain system should be sloped at a minimum slope of ½% to a sump or sumps where water can be removed by pumping or gravity drainage. Sumps should be provided with alarms and/or redundant pumps in the event the pumping equipment malfunctions.

WATER SOLUBLE SULFATES

Concentrations of water-soluble sulfates measured in samples of on-site soils ranged from non-detectable levels to 0.16%. These concentrations represent a Class 0 to Class 1 severity exposure to sulfate attack on concrete exposed to these materials. The degree of attack is based on a range of Class 0, Class 1, Class 2, and Class 3 severity exposure as presented in ACI 201 and in Section 601 of the 2011 Colorado Department of Transportation (CDOT) Standards and Specifications.

Based on the laboratory data and our experience with soils on this site and adjacent properties, we recommend all concrete exposed to the on-site materials meet the cement requirements for Class 2 exposure as presented in ACI 201. Alternatively, the concrete could meet the Colorado Department of Transportation's (CDOT) cement requirements for Class 2 exposure as presented in Section 601.04 of the CDOT Standard Specifications for Road and Bridge Construction (2011).

SURFACE DRAINAGE

Proper surface drainage is very important for acceptable performance of site structures during construction and after the construction has been completed. Drainage recommendations provided by local, state and national entities should be followed based on the intended use of each structure. The following recommendations should be used as guidelines and changes should be made only after consultation with the geotechnical engineer.

1. Excessive wetting or drying of the foundation and slab subgrade(s) should be avoided during construction.

2. Exterior backfill meet the material and placement requirements outlined in the "Site Grading" section of this report.

3. Care should be taken when compacting around the foundation walls and underground structures to avoid damage to the structures. Hand compaction procedures, if necessary, should be used to prevent lateral pressures from exceeding the design values.

4. The ground surface surrounding the exterior of site structures should be sloped to drain away from the foundations in all directions. We recommend a minimum slope of 12 inches in the first 10 feet in unpaved areas. Site drainage beyond the 10-foot zone should be designed to promote runoff and reduce infiltration. A minimum slope of 3 inches in the first 10 feet is recommended in the paved areas. These slopes may be changed as required for handicap access points in accordance with the Americans with Disabilities Act.

5. The upper 2 feet of the backfill should be relatively impervious material compacted as recommended above to limit infiltration of surface runoff.

6. Ponding of water should not be allowed in backfill material or in a zone within 10 feet of the foundations, whichever is greater.

7. Roof downspouts and drains should discharge well beyond the limits of all backfill.

8. Landscaping which requires relatively heavy irrigation and lawn sprinkler heads should be located at least 10 feet from foundations. Irrigation schemes are available which

allow placement of lightly irrigated landscape near foundation walls in moisture sensitive soil areas. Drip irrigation heads with main lines located at least 10 feet from the foundation walls are acceptable provided irrigation quantities are limited.

9. Plastic membranes should not be used to cover the ground surface adjacent to foundation walls.

PAVEMENT DESIGN

A pavement section is a layered system designed to distribute concentrated traffic loads to the subgrade. Performance of the pavement structure is directly related to the physical properties of the subgrade soils and traffic loadings. Soils are represented for pavement design purposes by means of a soil support value for flexible pavements and a modulus of subgrade reaction for rigid pavements. Both values are empirically related to strength.

Subgrade Materials: Based on the results of the field and laboratory studies, the majority of the subgrade materials at the site classify between A-4 and A-7-6 with group indices between 0 and 42 in accordance with the American Association of State Highway and Transportation Officials (AASHTO) classification. Soils classifying as A-4 would generally be considered to provide fair subgrade support, while soils classifying as A-6 and A-7-6 would generally be considered to provide poor subgrade support. The probable subgrade soils are expected to consist primarily of compacted fill composed of material generally classifying as A-6 and A-7-6 soils. For design purposes, a resilient modulus value of 3,025 psi was selected for flexible pavements and a modulus of subgrade reaction of 40 pci was selected for rigid pavements.

Design Traffic: Since anticipated traffic loading information was not available at the time of this report preparation, an 18-kip equivalent single axle loading (ESAL) value of 73,000 was assumed for the paved parking surfaces and an ESAL of 219,000 was assumed for truck routes. The values are selected based on our past experience for facilities of this nature. We believe that the ESAL values of 73,000 and 219,000 should be considered to classify as Light Duty and Heavy Duty pavement sections, respectively. The Light Duty pavement section should be constructed in locations restricted to automobile traffic only and the Heavy Duty pavement section should be constructed in locations of heavy vehicular traffic movements such as truck and tanker routes.

If estimated daily traffic volumes for the development are known to be different from those assumed, we should be provided with this information in order to reevaluate the pavement sections provided below.

Pavement Design: The following table presents the minimum pavement thickness recommendations for this development.

Paved Area	Full Depth Asphalt (inches)	Composite Section Asphalt/ABC (inches)	PCCP (inches)
Light Duty	6.5	3.5 / 8.0	6.0
Heavy Duty	7.5	5.0 /10.0	7.0

ABC – Aggregate Base Course
PCCP – Portland Cement Concrete Pavement

Truck loading dock areas and other areas where truck turning movements are concentrated should be paved with 7 inches of Portland cement concrete. The concrete pavement should contain sawed or formed joints to ¼ of the depth of the slab at a maximum distance of 12 feet on center. Concrete pavements may be a suitable alternative for parking lots, fuel center and delivery areas.

The asphalt binder selected for the proposed pavements should meet criteria for performance graded binders PG 58-28 that conform to requirements outlined in the CDOT Pavement Design Manual. The binder recommendations are based on the design 20-year 18-kip equivalent single axle load ($ESAL_{20}$) application values. The $ESAL_{20}$ values also indicate an N_{DESIGN} value for the gyratory method of compaction and design of 75.

Rigid Pavements: The above Portland cement concrete pavement thicknesses are presented as un-reinforced slabs. Based on projects with similar heavy vehicular loading, we recommend that dowels be provided at transverse joints within the slabs located in the travel lanes of heavily loaded vehicles and tie bars for the longitudinal joints. Additionally, curbs and/or pans should be tied to the slabs. The dowels and tie bars will help minimize the risk for differential movements between slabs to assist in more uniformly transferring axle loads to the subgrade. The Colorado Department of Transportation (CDOT) provides some guidance on dowel and tie bar placement in the current Standard Specifications for Road and Bridge Construction as well as in the current Standard Plans: M&S Standards. It is critical to the performance of the concrete pavement that the joints are properly sealed and maintained to minimize the infiltration of surface water, especially if dowels and tie bars are not installed.

All Portland cement concrete pavement (PCCP) should be based on a mix design established by a qualified engineer. In general, the design mix should consist of aggregate, Portland cement, water and additives that will meet the requirements contained in this section. The fine and coarse aggregate should conform to AASHTO M-6, M-43 and M-80. Cement should be Portland cement conforming to AASHTO M-85 or ASTM C-150 and all additives should be approved by a qualified engineer. Concrete used for drive lanes should meet the requirements established by CDOT for Class P concrete.

Subgrade Preparation: We recommend that areas of pavement be underlain by at least 3 feet of properly moisture conditioned compacted structural fill.

Pavement subgrade materials across significant portions of the site may consist of existing non-engineered fills. Ideally, all non-engineered fill beneath pavements should be removed and replaced with compacted fill consistent the material described in this report. However, a partial fill removal option may be considered, particularly in areas of relatively deep fill. If a partial removal option is selected, we recommend that areas of existing fill within proposed pavement areas be sub-excavated to a minimum depth of 3 feet below the proposed subgrade elevation.

The owner should be aware that partial subexcavation and replacement of existing fills and/or limited subexcavation of claystone bedrock or natural clay soils will reduce but not eliminate potential movement of pavements should moisture levels increase within these materials where present beneath the replacement fill and/or pavement. Also, the owner should be aware that rigid PCCP will be less tolerant of differential settlement- or heave-related movement than flexible pavements. Where rigid PCCP is constructed over existing fills, claystone or natural clay soils, providing reinforcing and doweling as discussed in the previous section of this report would help reduce the risk of pavement distress due to differential settlement- or heave-related movement.

Prior to placing new fill or the pavement section, the entire subgrade area should be scarified to a depth of 8 inches, adjusted to a moisture content near optimum and compacted to at least 95% of the standard Proctor (ASTM D 698) maximum dry density. Fill placed beneath the pavement should meet the material and compaction requirements for structural fill presented in the “Site Grading” section of this report.

The pavement subgrade should be proofrolled with a heavily loaded pneumatic-tired vehicle. Pavement design procedures assume a stable subgrade. Areas that deform excessively under heavy wheel loads are not considered stable and should be removed and replaced to achieve a stable subgrade prior to paving. The contractor should be aware that the clay soils, including on-site and imported materials, may become somewhat unstable and deform under wheel loads if placed near the upper end of the moisture range.

Drainage: The collection and diversion of surface drainage away from paved areas is extremely important to the satisfactory performance of pavement. Drainage design should provide for the removal of water from paved areas and prevent the wetting of the subgrade soils.

DESIGN AND CONSTRUCTION SUPPORT SERVICES

Kumar & Associates, Inc. should be retained to review the project plans and specifications for conformance with the recommendations provided in our report. We are also available to assist the design team in preparing specifications for geotechnical aspects of the project, and performing additional studies if necessary to accommodate possible changes in the proposed construction.

We recommend that Kumar & Associates, Inc. be retained to provide construction observation and testing services to document that the intent of this report and the requirements of the plans and specifications are being followed during construction. This will allow us to identify possible variations in subsurface conditions from those encountered during this study and to allow us to re-evaluate our recommendations, if needed. We will not be responsible for implementation of the recommendations presented in this report by others, if we are not retained to provide construction observation and testing services.

LIMITATIONS

This study has been conducted in accordance with generally accepted geotechnical engineering practices in this area for exclusive use by the client for design purposes. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory borings at the locations indicated on Fig. 1, and the proposed type of construction. This report may not reflect subsurface variations that occur between the exploratory borings, and the nature and extent of variations across the site may not become evident until site grading and excavations are performed. If during construction, fill, soil, rock or water conditions appear to be different from those described herein, Kumar & Associates, Inc. should be advised at once so that a re-evaluation of the recommendations presented in this report can be made. Kumar & Associates, Inc. is not responsible for liability associated with interpretation of subsurface data by others.

Swelling soils occur on this site. Such soils are stable at their natural moisture content but will undergo high volume changes with changes in moisture content. The extent and amount of perched water beneath the building site as a result of area irrigation and inadequate surface drainage is difficult, if not impossible, to foresee.

The recommendations presented in this report are based on current theories and experience of our engineers on the behavior of swelling soil in this area. The owner should be aware that there is a risk in constructing a building in an expansive soil area. Following the recommendations given by a geotechnical engineer, careful construction practice and prudent maintenance by the owner can, however, decrease the risk of foundation movement due to expansive soils.

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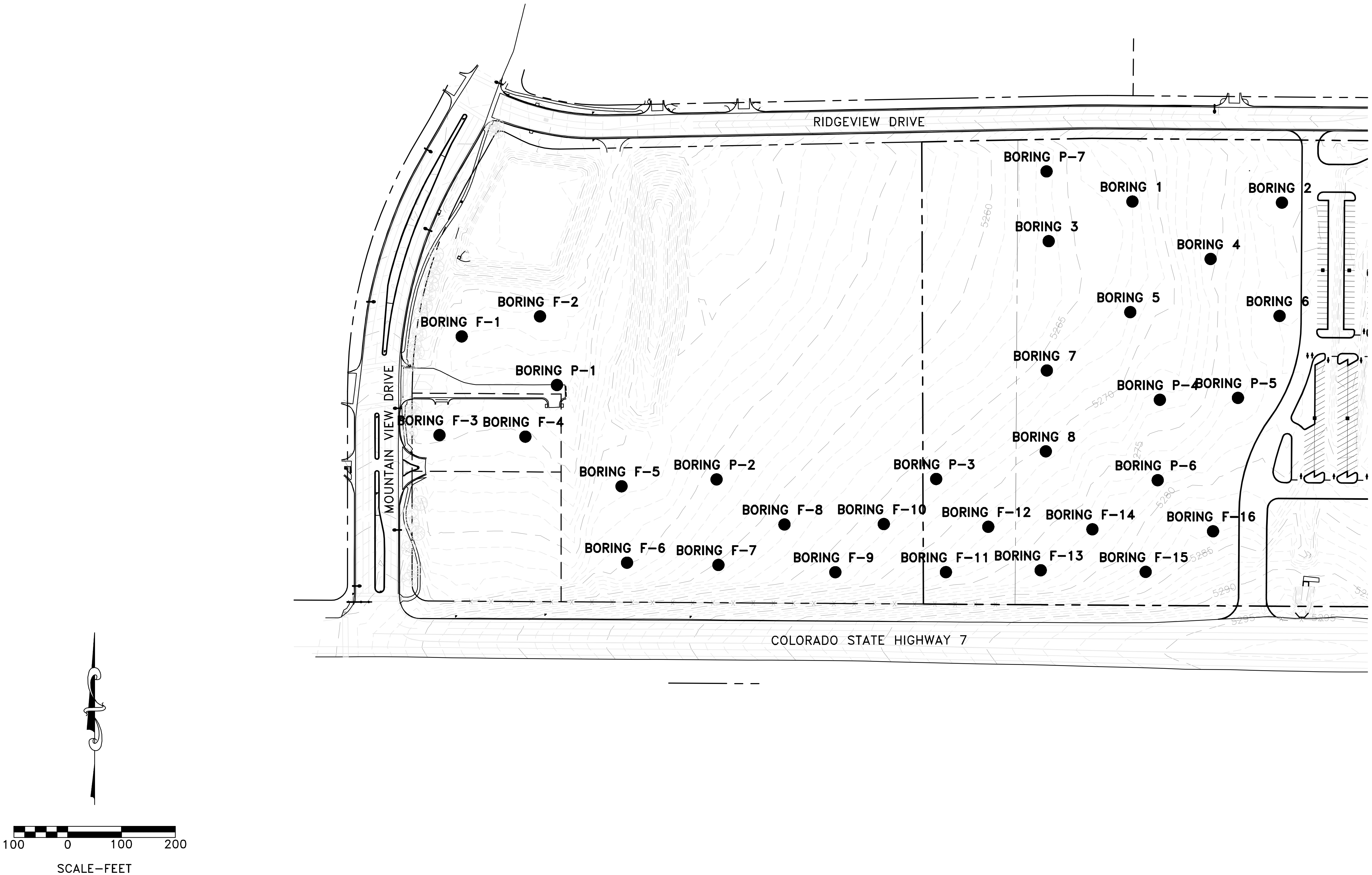

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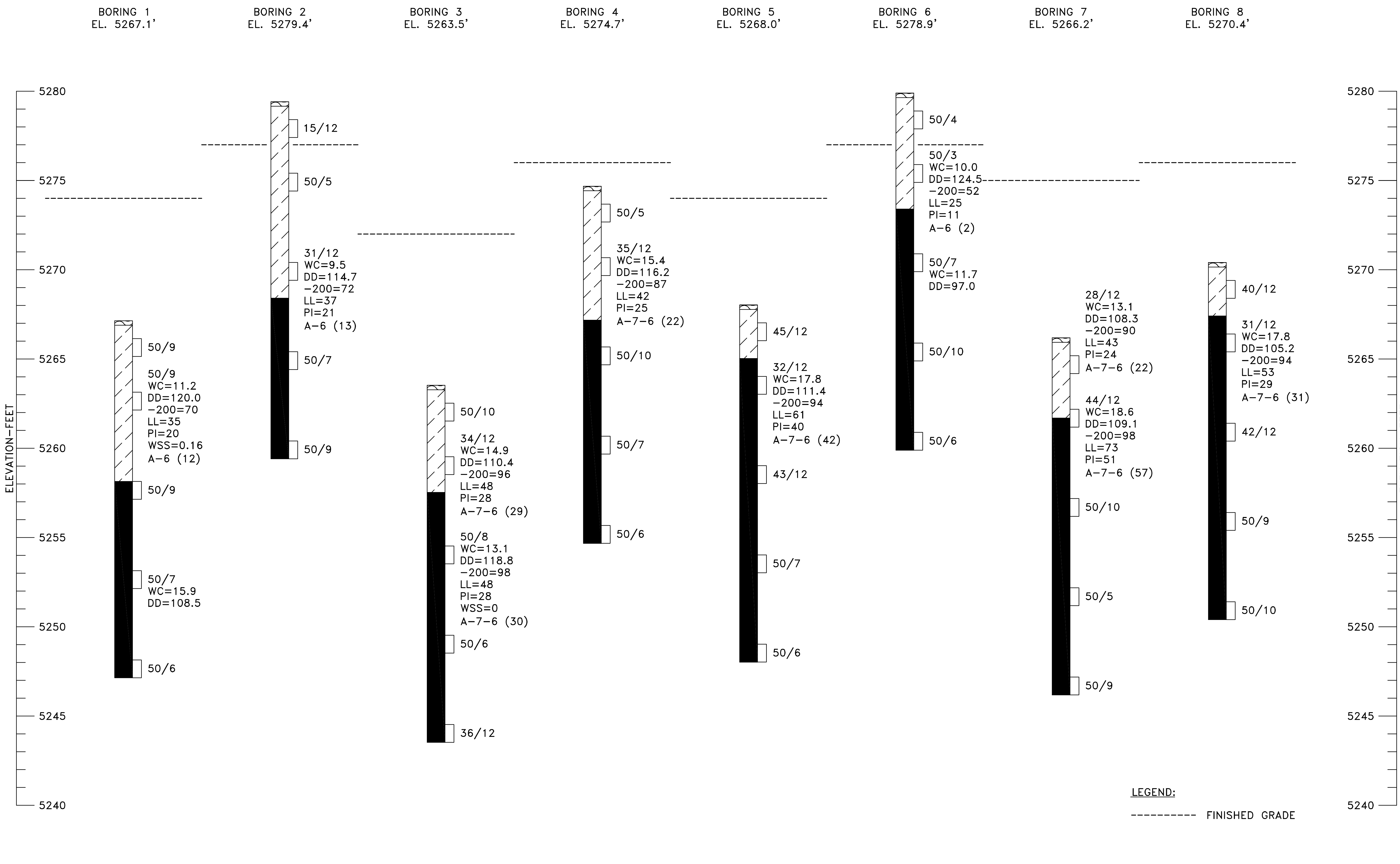
15-3-164	Kumar & Associates	PROPOSED ERIE COMMERCIAL DEVELOPMENT	LOCATIONS OF EXPLORATORY BORINGS	Fig. 1



15−3−164	Kumar & Associates	PROPOSED ERIE COMMERCIAL DEVELOPMENT	LOGS OF EXPLORATORY BORINGS	Fig. 2

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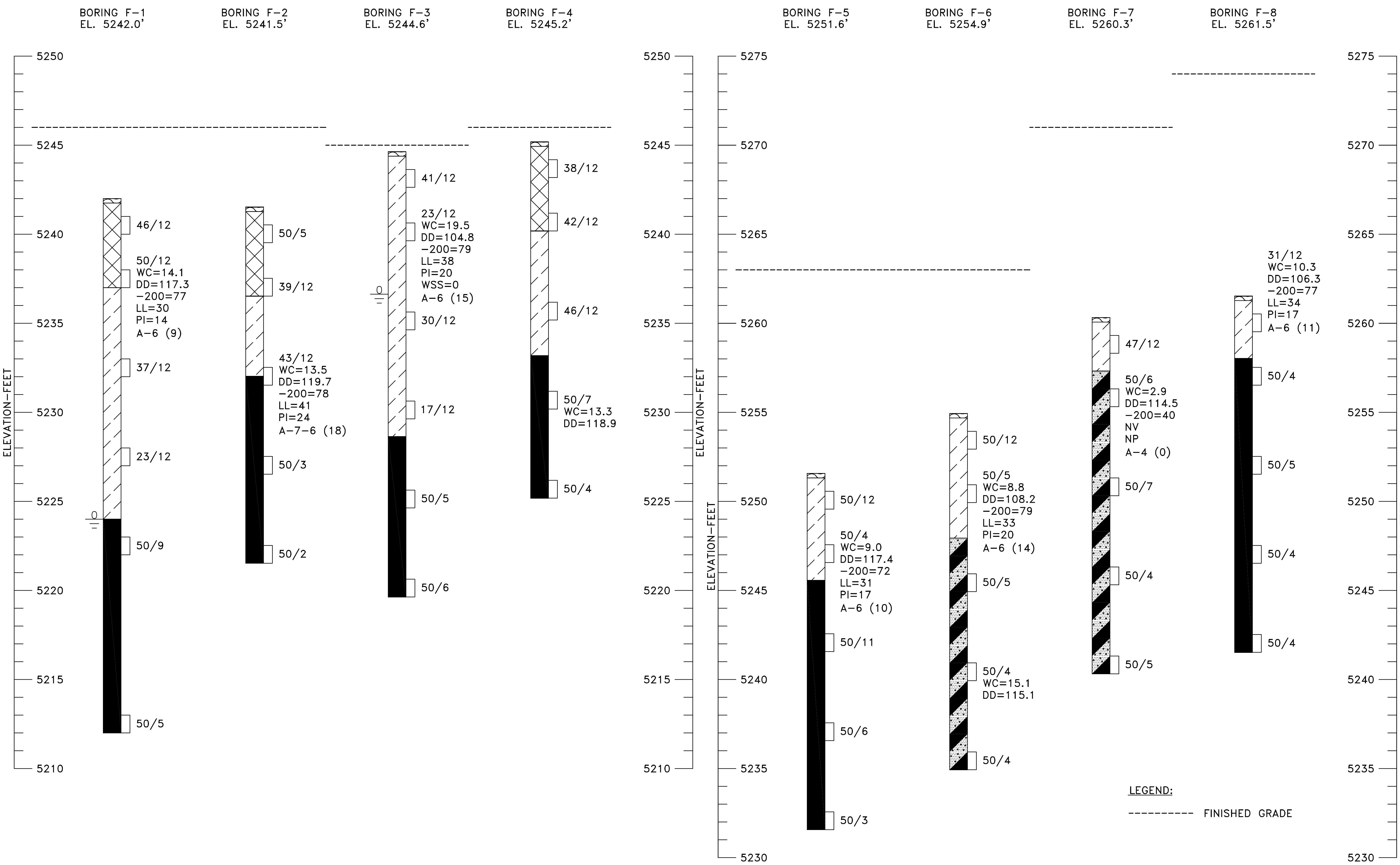
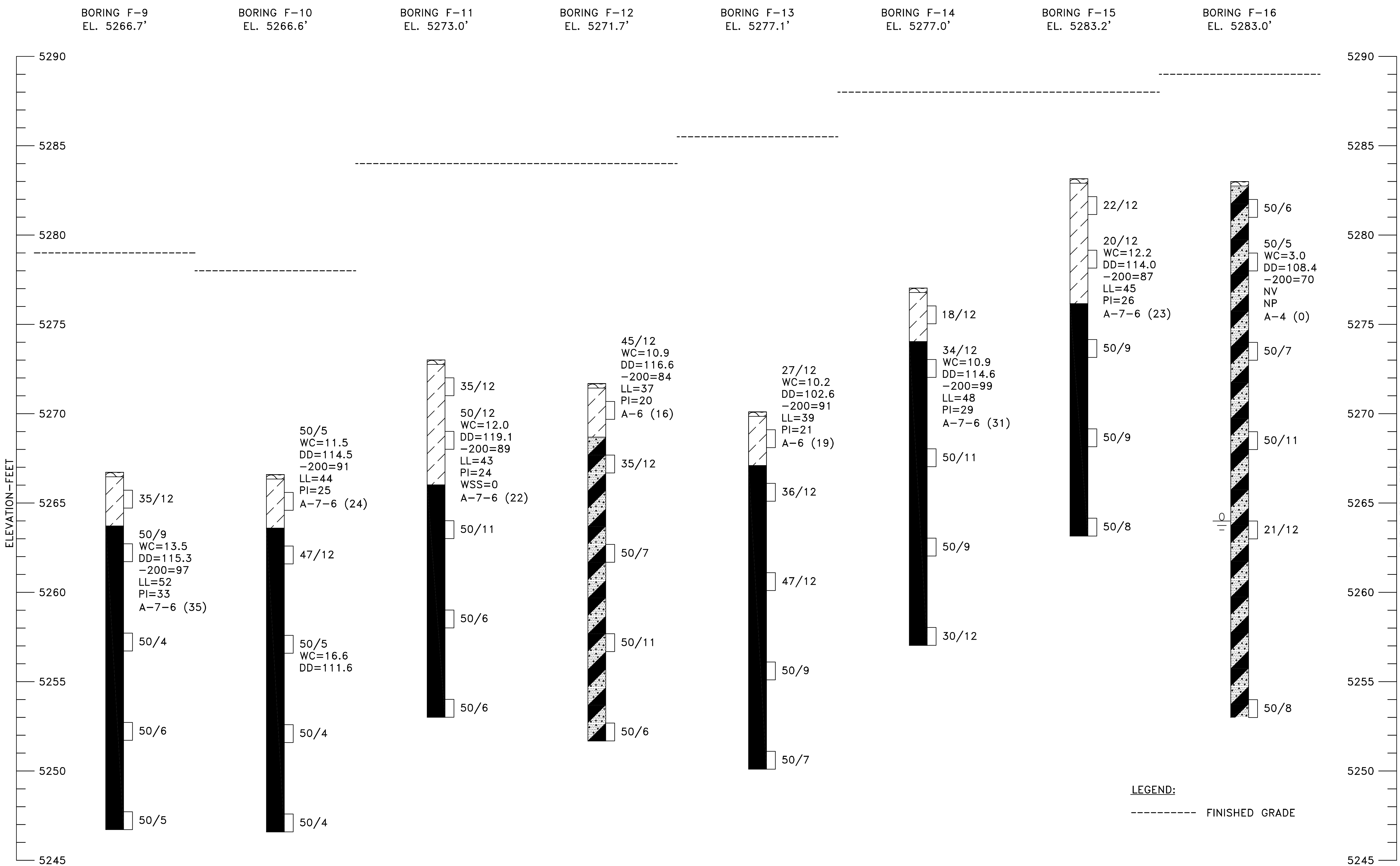
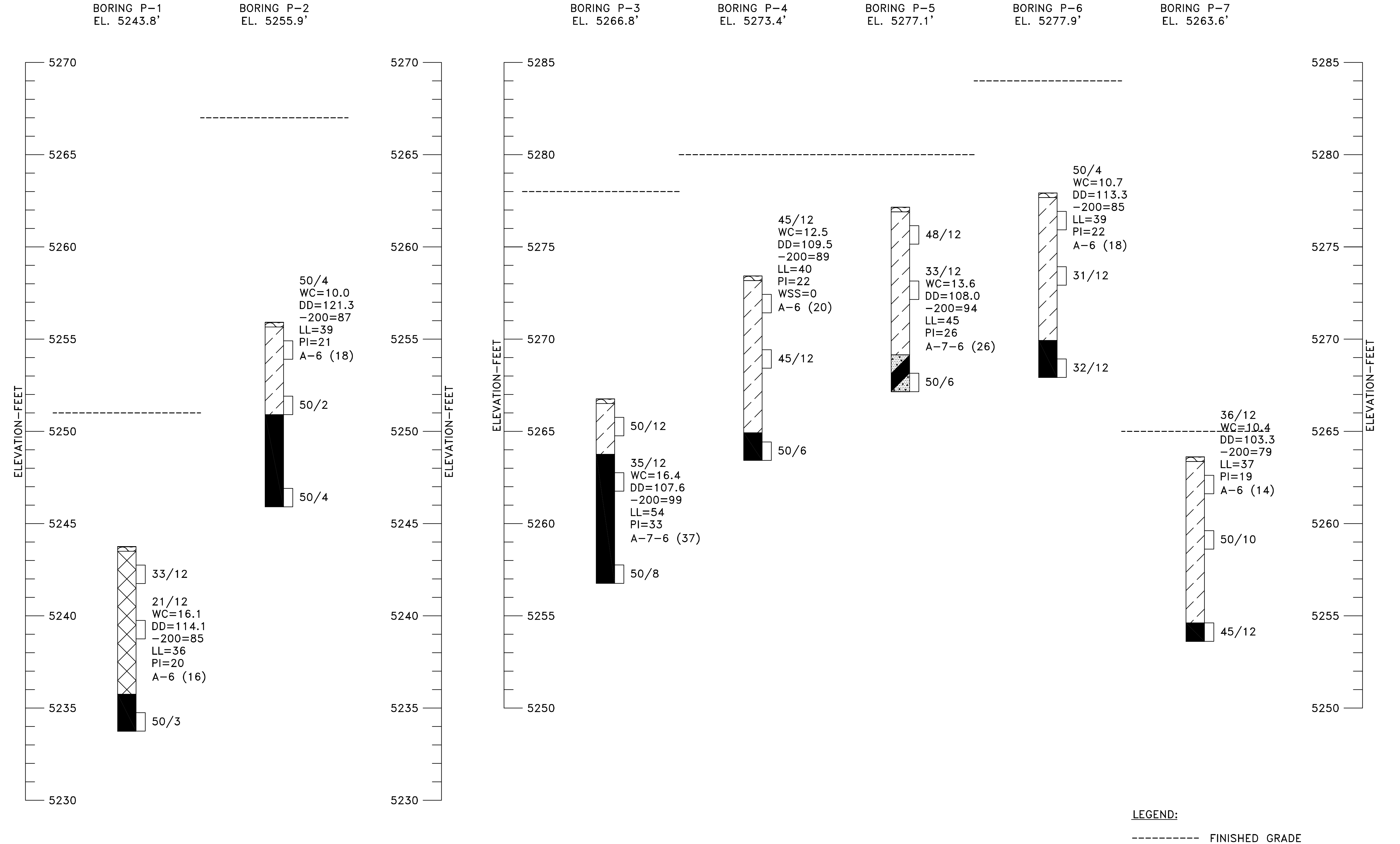


15-3-164	Kumar & Associates	PROPOSED ERIE COMMERCIAL DEVELOPMENT	LOGS OF EXPLORATORY BORINGS	Fig. 3



15–3–164	Kumar & Associates	PROPOSED ERIE COMMERCIAL DEVELOPMENT	LOGS OF EXPLORATORY BORINGS	Fig. 4



15-3-164	Kumar & Associates	PROPOSED ERIE COMMERCIAL DEVELOPMENT	LOGS OF EXPLORATORY BORINGS	Fig. 5

LEGEND

TOPSOIL.

FILL: LEAN CLAY WITH SAND (CL), FINE TO MEDIUM GRAINED, MOIST, LIGHT BROWN TO BROWN.

LEAN CLAY TO SANDY LEAN CLAY (CL), FINE TO COARSE GRAINED, VERY STIFF TO HARD, SLIGHTLY MOIST TO MOIST, LIGHT BROWN TO BROWN, OCCASIONAL CALCAREOUS ZONES.

CLAYSTONE BEDROCK, FINE TO MEDIUM GRAINED, MEDIUM HARD TO VERY HARD, MOIST, GRAY TO BROWN.

INTERBEDDED SANDSTONE AND CLAYSTONE BEDROCK, OCCASIONAL SILTSTONE INTERBEDS, FINE TO MEDIUM GRAINED, FIRM TO VERY HARD, MOIST, GRAY TO BROWN, NIL TO WEAK CEMENTATION.

DRIVE SAMPLE, 2–INCH I.D. CALIFORNIA LINER SAMPLE.

50/9 DRIVE SAMPLE BLOW COUNT. INDICATES THAT 50 BLOWS OF A 140–POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE THE SAMPLER 9 INCHES.

DISTURBED BULK SAMPLE.

0 DEPTH TO WATER LEVEL ENCOUNTERED AT THE TIME OF DRILLING.

NOTES

1. THE EXPLORATORY BORINGS WERE DRILLED ON SEPTEMBER 8TH AND 10TH, 2015 WITH A 4–INCH DIAMETER CONTINUOUS FLIGHT POWER AUGER.

2. THE LOCATIONS OF THE EXPLORATORY BORINGS WERE MEASURED APPROXIMATELY BY PACING FROM FEATURES SHOWN ON THE SITE PLAN PROVIDED.

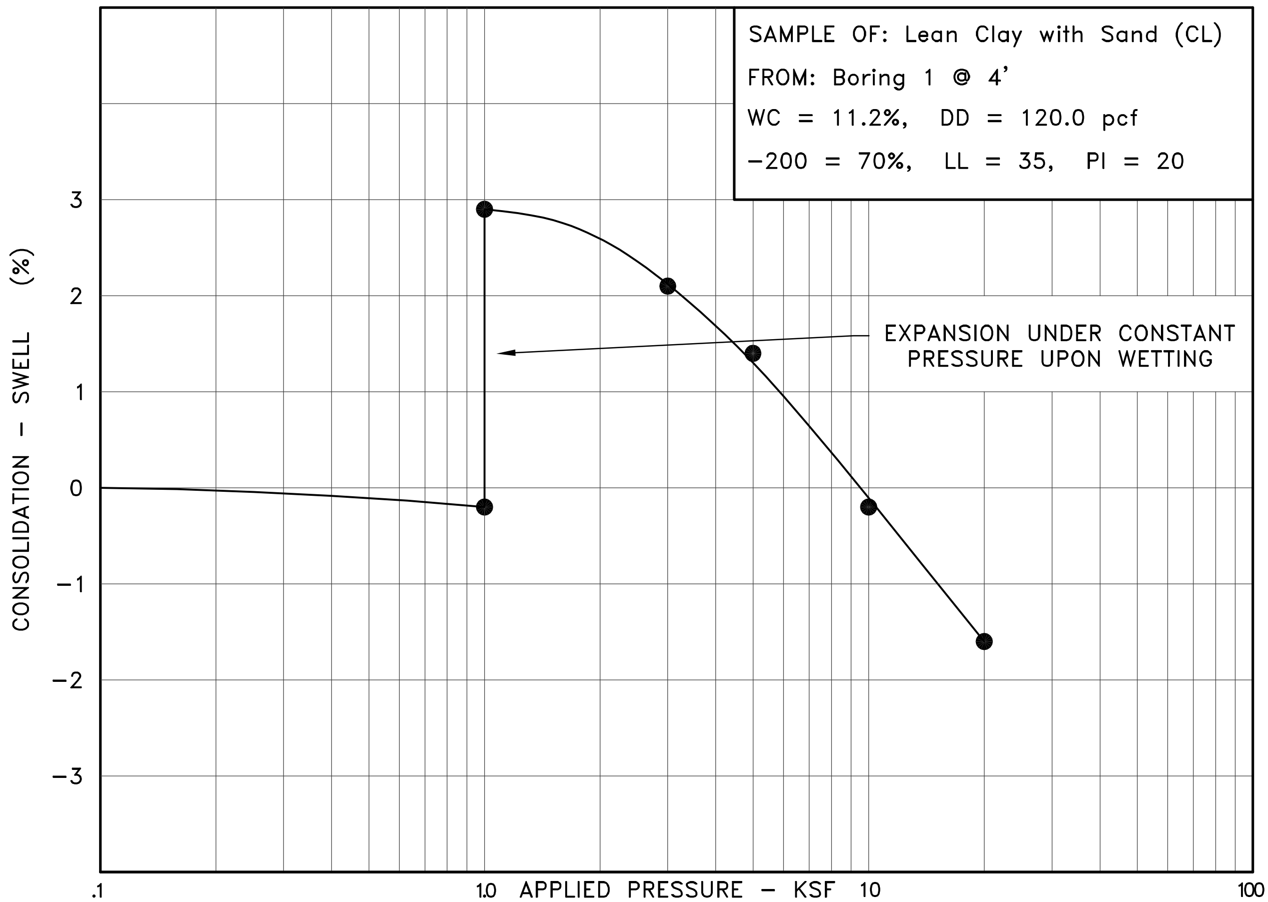
3. THE ELEVATIONS OF THE EXPLORATORY BORINGS WERE OBTAINED BY INTERPOLATION BETWEEN CONTOURS ON THE SITE PLAN PROVIDED.

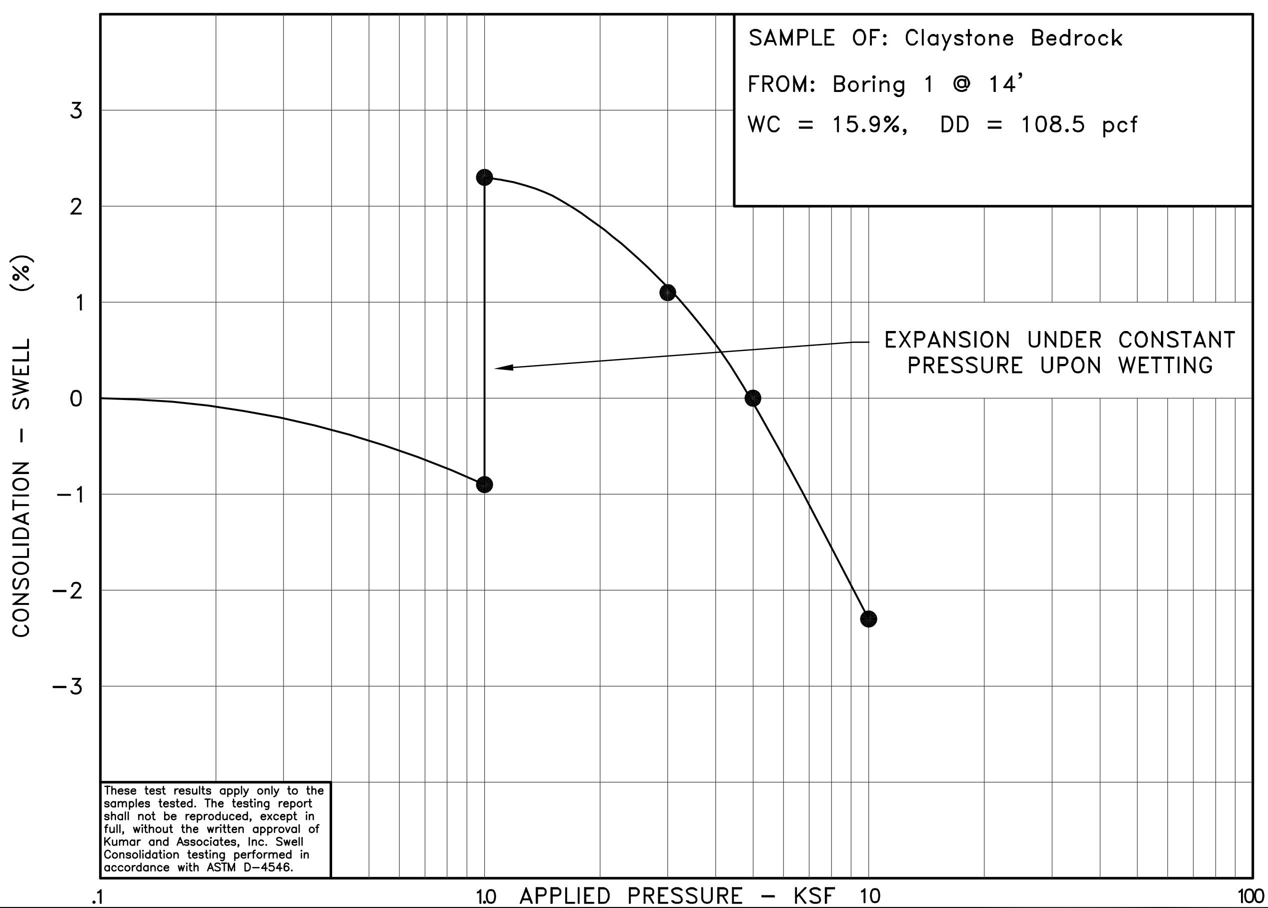
4. THE EXPLORATORY BORING LOCATIONS AND ELEVATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

5. THE LINES BETWEEN MATERIALS SHOWN ON THE EXPLORATORY BORING LOGS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES AND THE TRANSITIONS MAY BE GRADUAL.

6. GROUND WATER LEVELS SHOWN ON THE LOGS WERE MEASURED AT THE TIME AND UNDER CONDITIONS INDICATED. FLUCTUATIONS IN THE WATER LEVEL MAY OCCUR WITH TIME.

7. LABORATORY TEST RESULTS:
   WC = WATER CONTENT (%) (ASTM D 2216);
   DD = DRY DENSITY (pcf) (ASTM D 2216);
   –200= PERCENTAGE PASSING NO. 200 SIEVE (ASTM D 1140);
   LL = LIQUID LIMIT (ASTM D 4318);
   PI = PLASTICITY INDEX (ASTM D 4318);
   NP = NON–PLASTIC (ASTM D 4318);
   NV = NO LIQUID LIMIT VALUE (ASTM D 4318);
   WSS = WATER SOLUBLE SULFATES (%) (CP–L 2103);
   A–2–6 (0) = AASHTO CLASSIFICATION (GROUP INDEX) (AASHTO M 145).





15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 7

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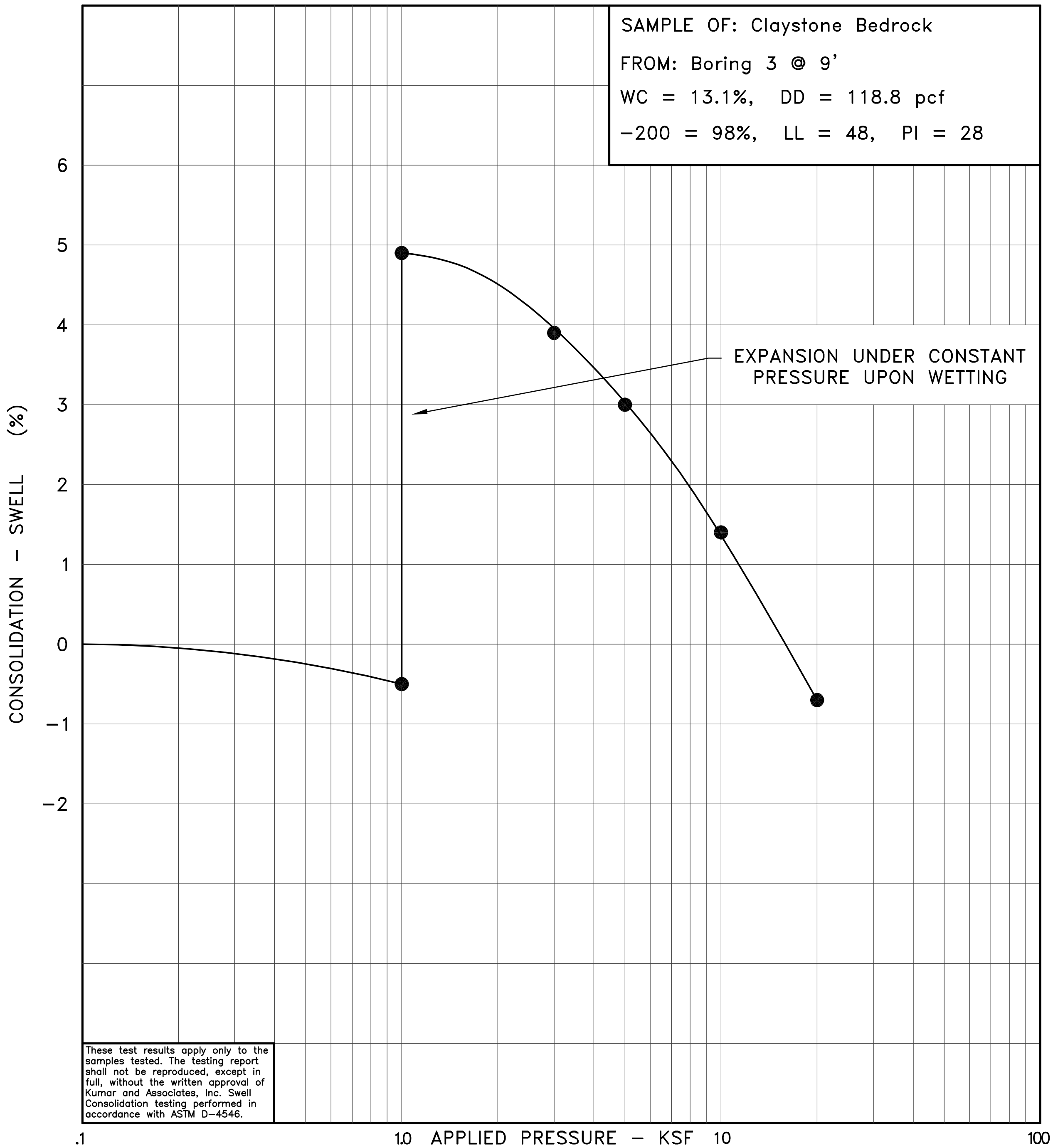
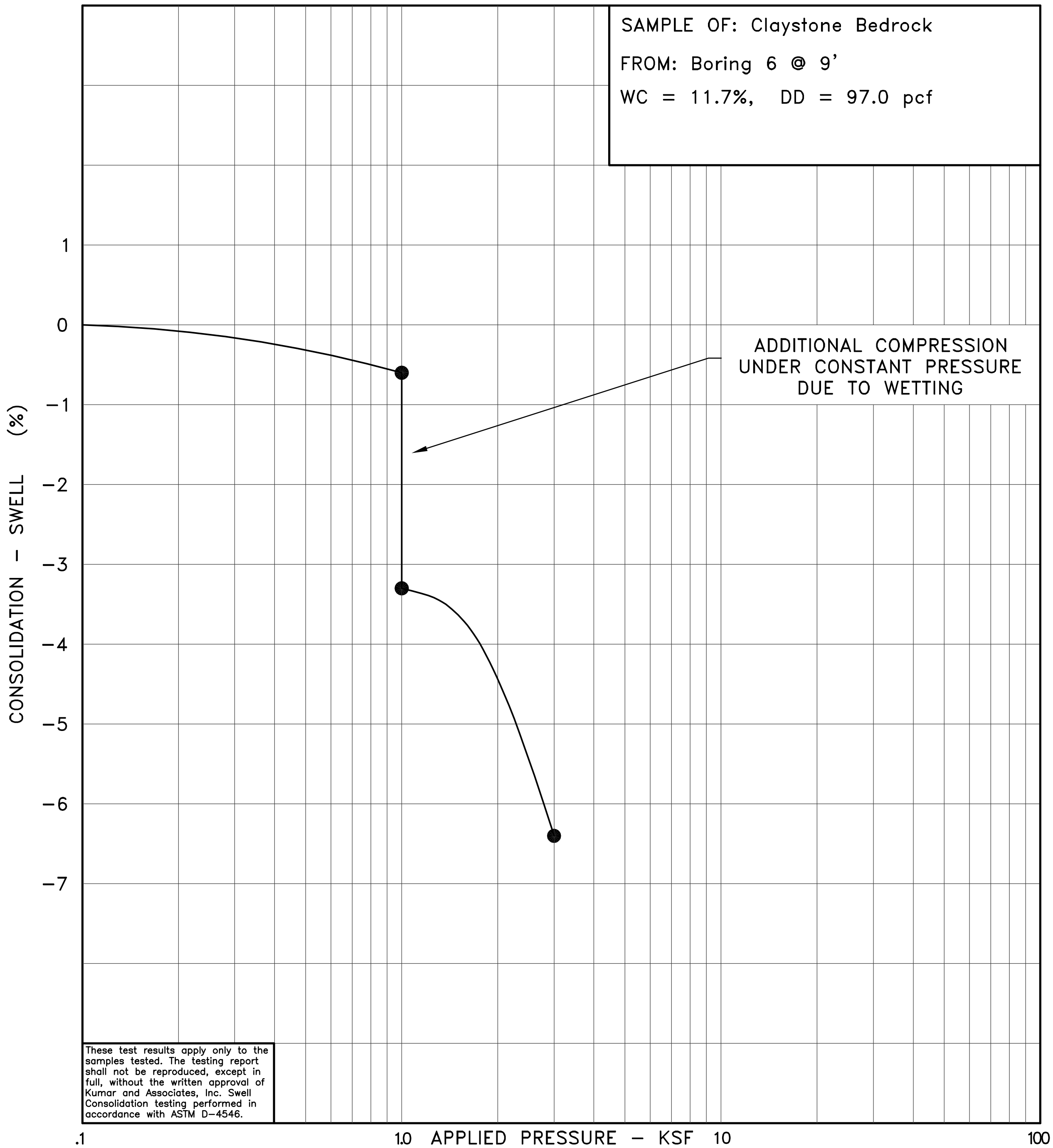


15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 8



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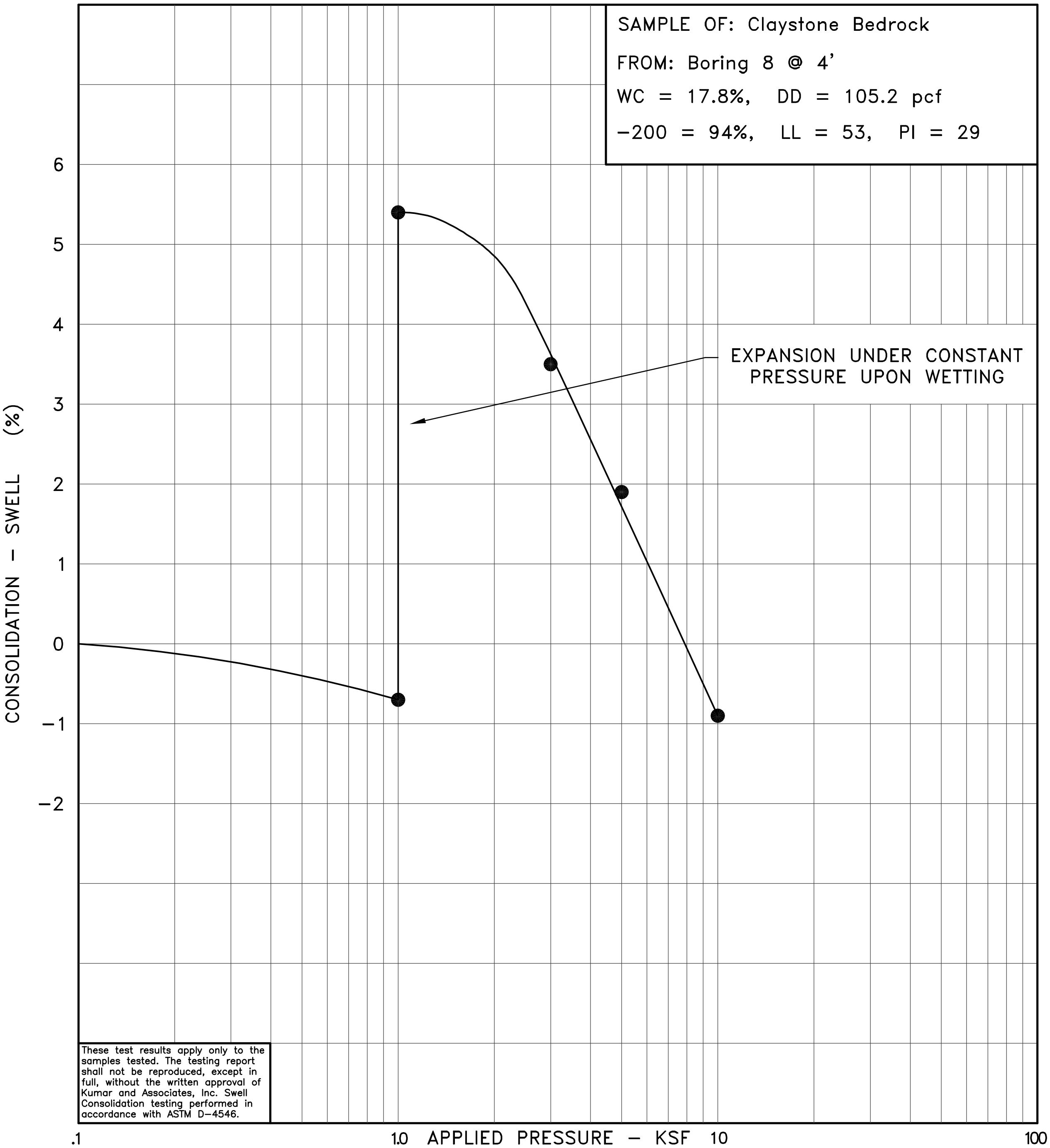
15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 9



These test results apply only to the samples tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar and Associates, Inc. Swell Consolidation testing performed in accordance with ASTM D-4546.

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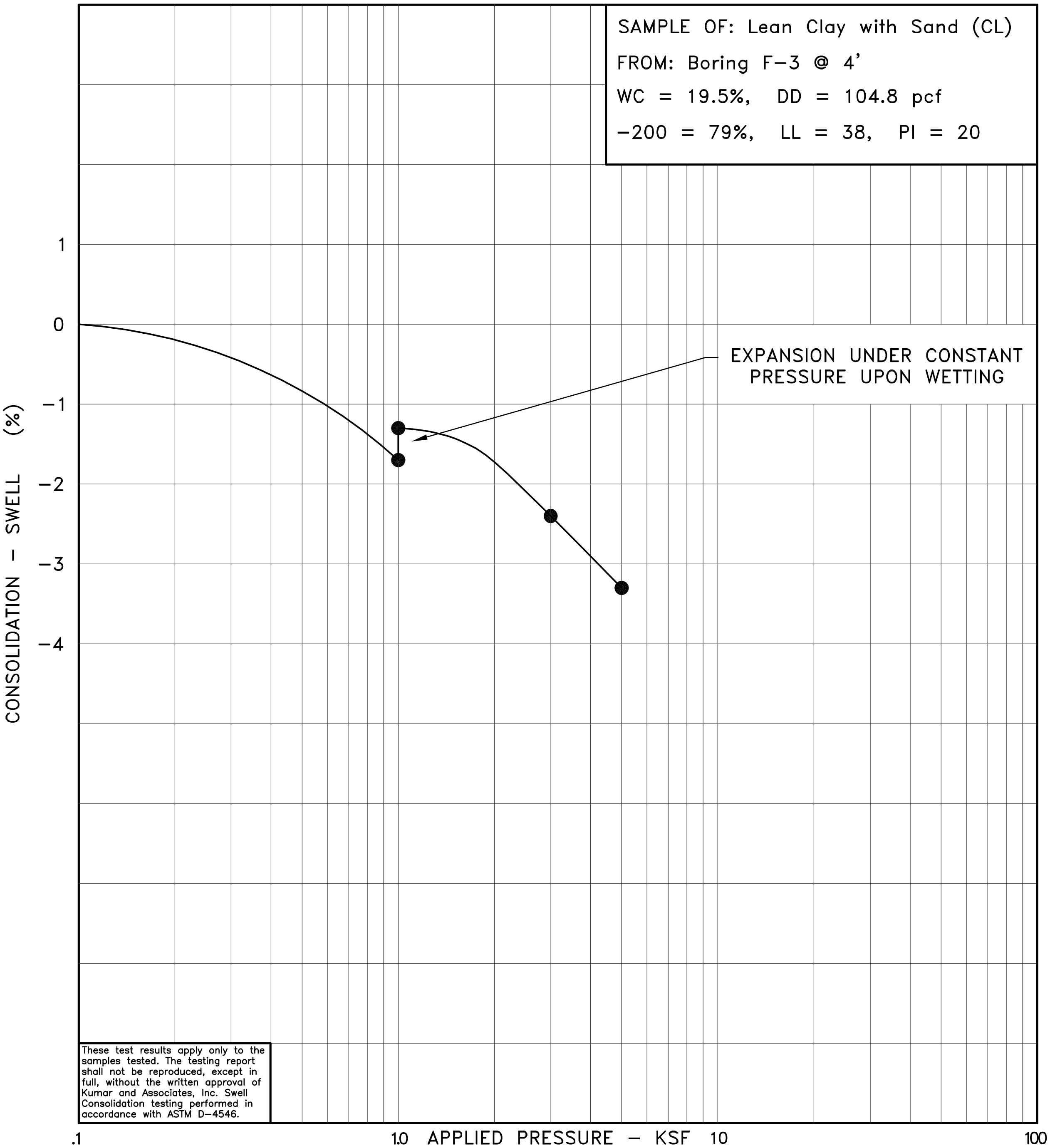
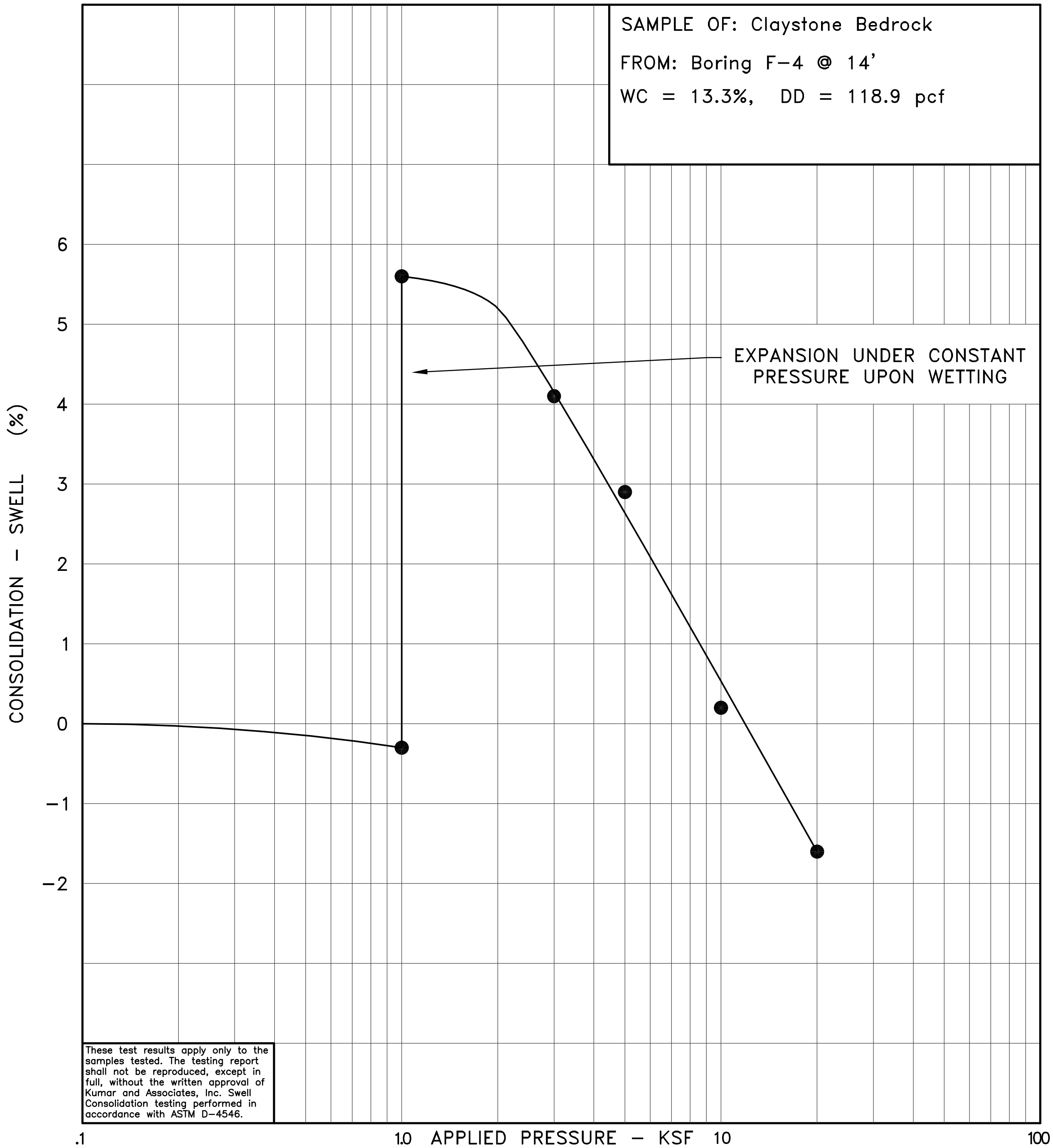
15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 10



15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 11



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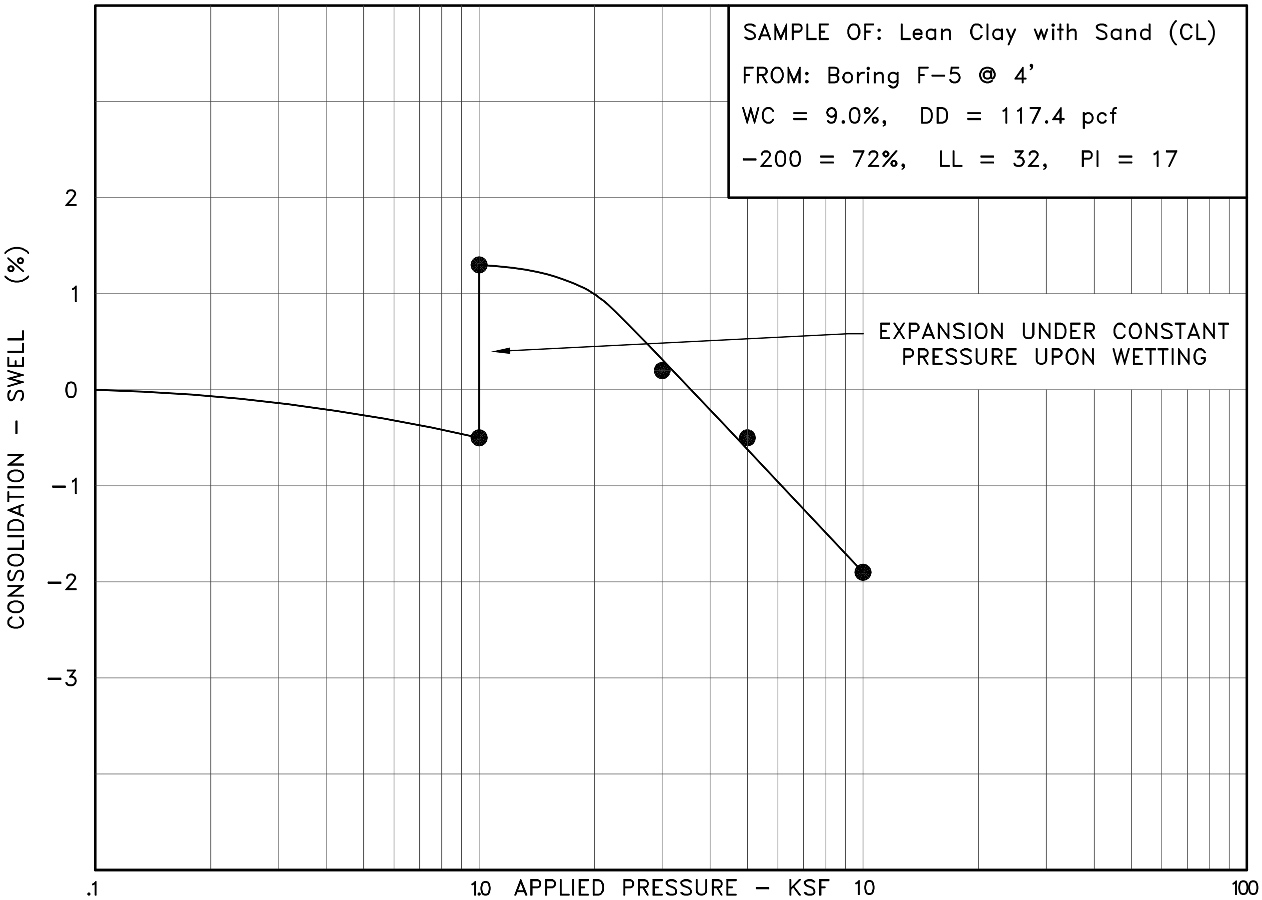
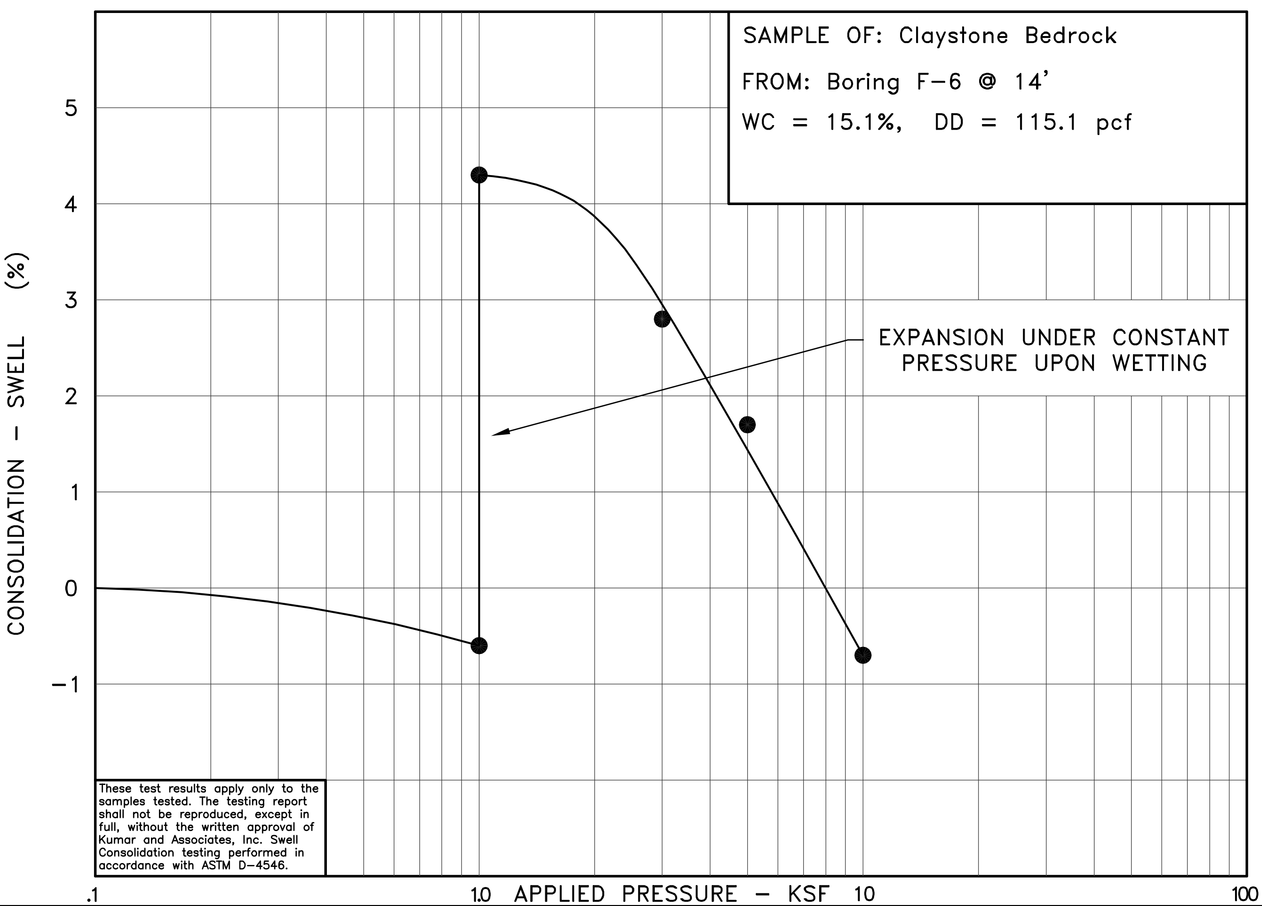
15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 12





15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 13

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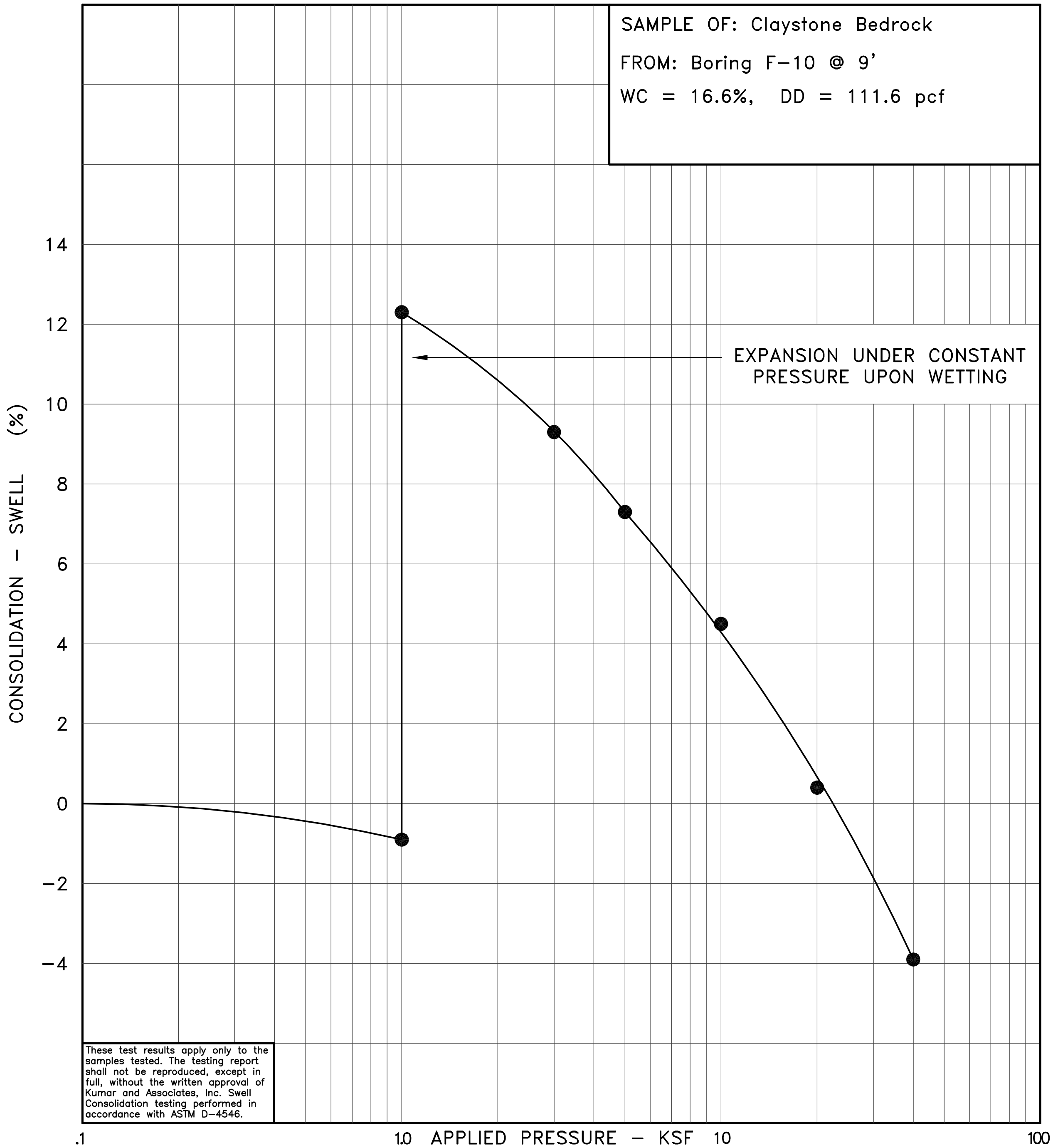
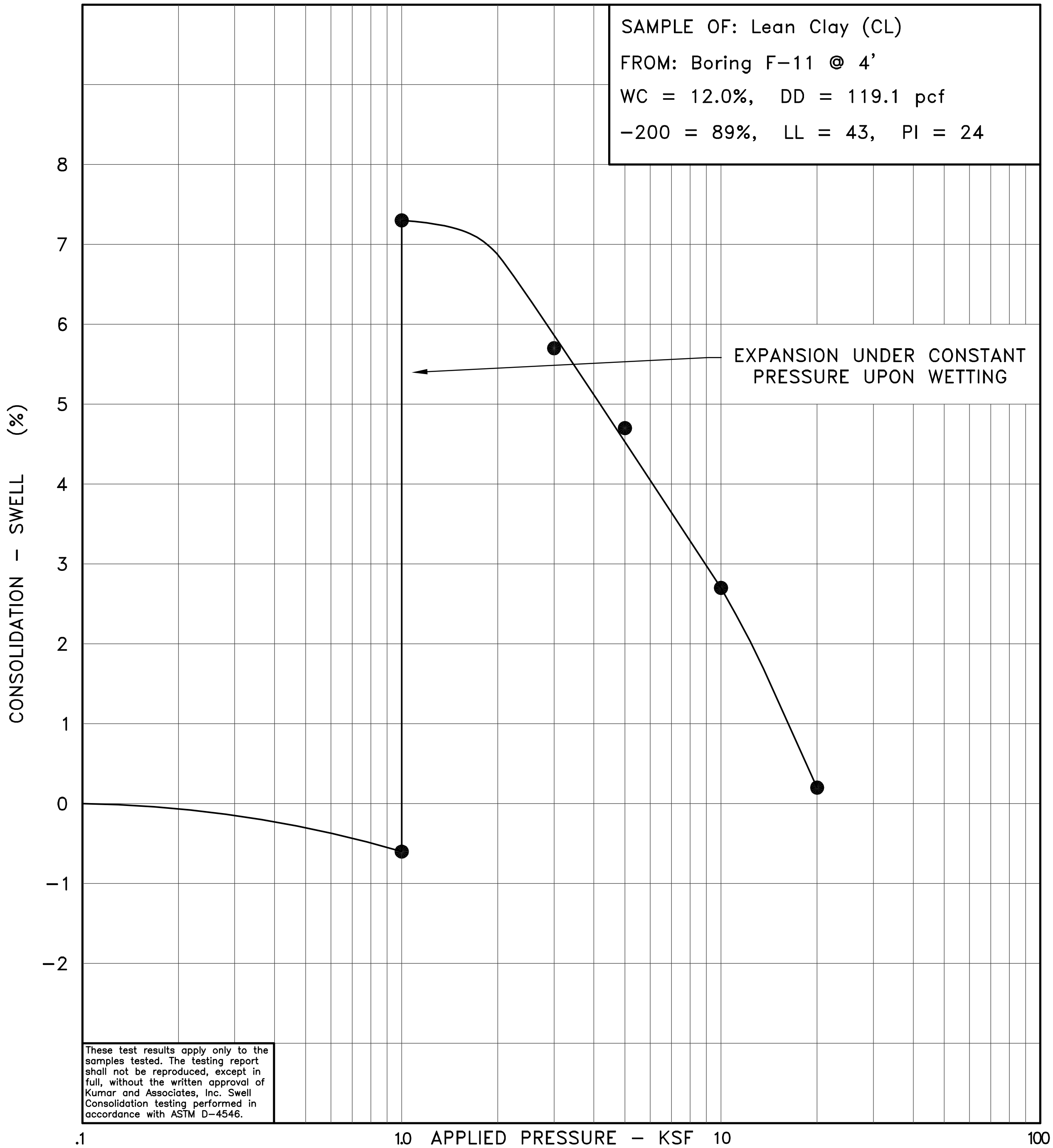
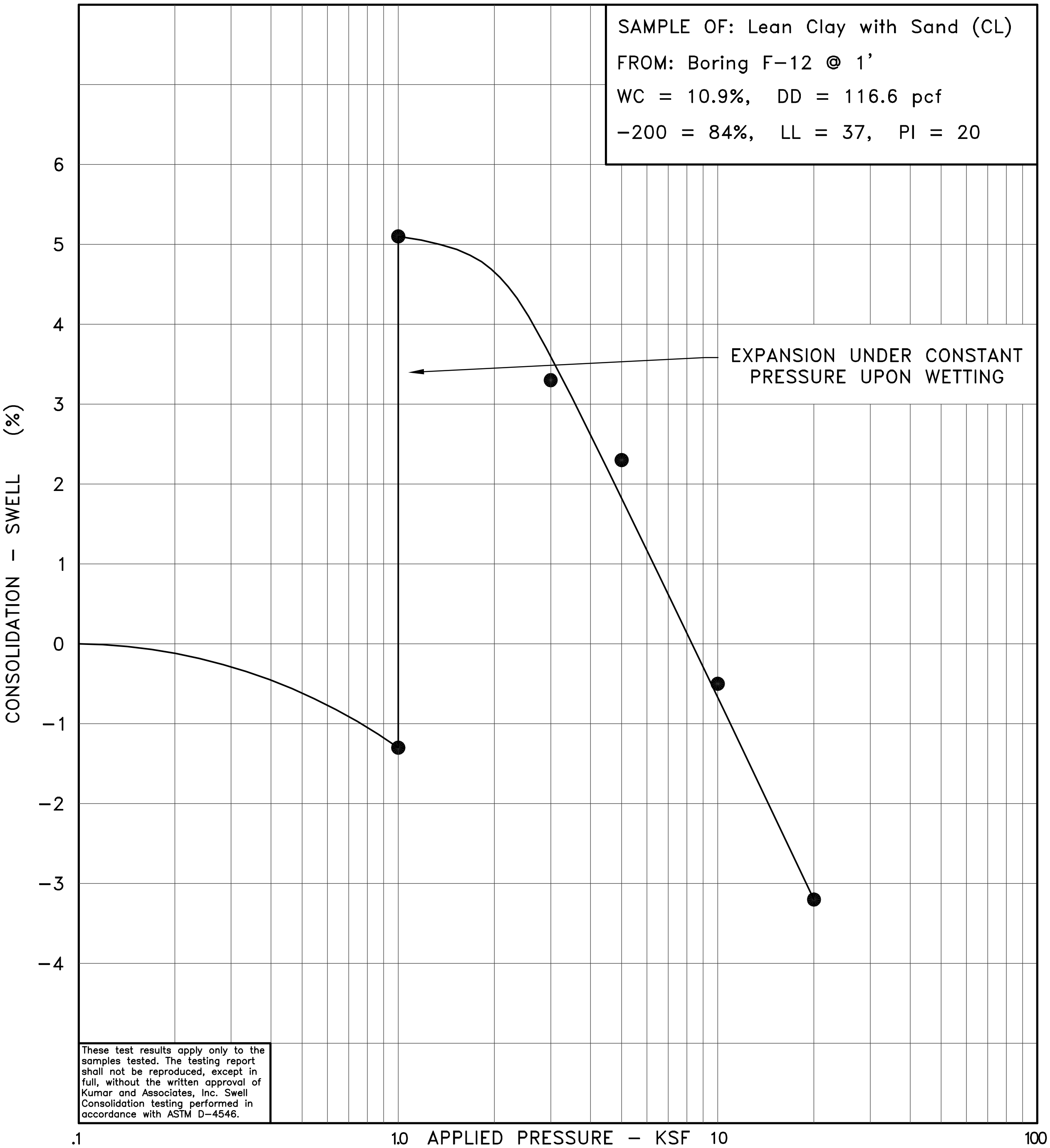


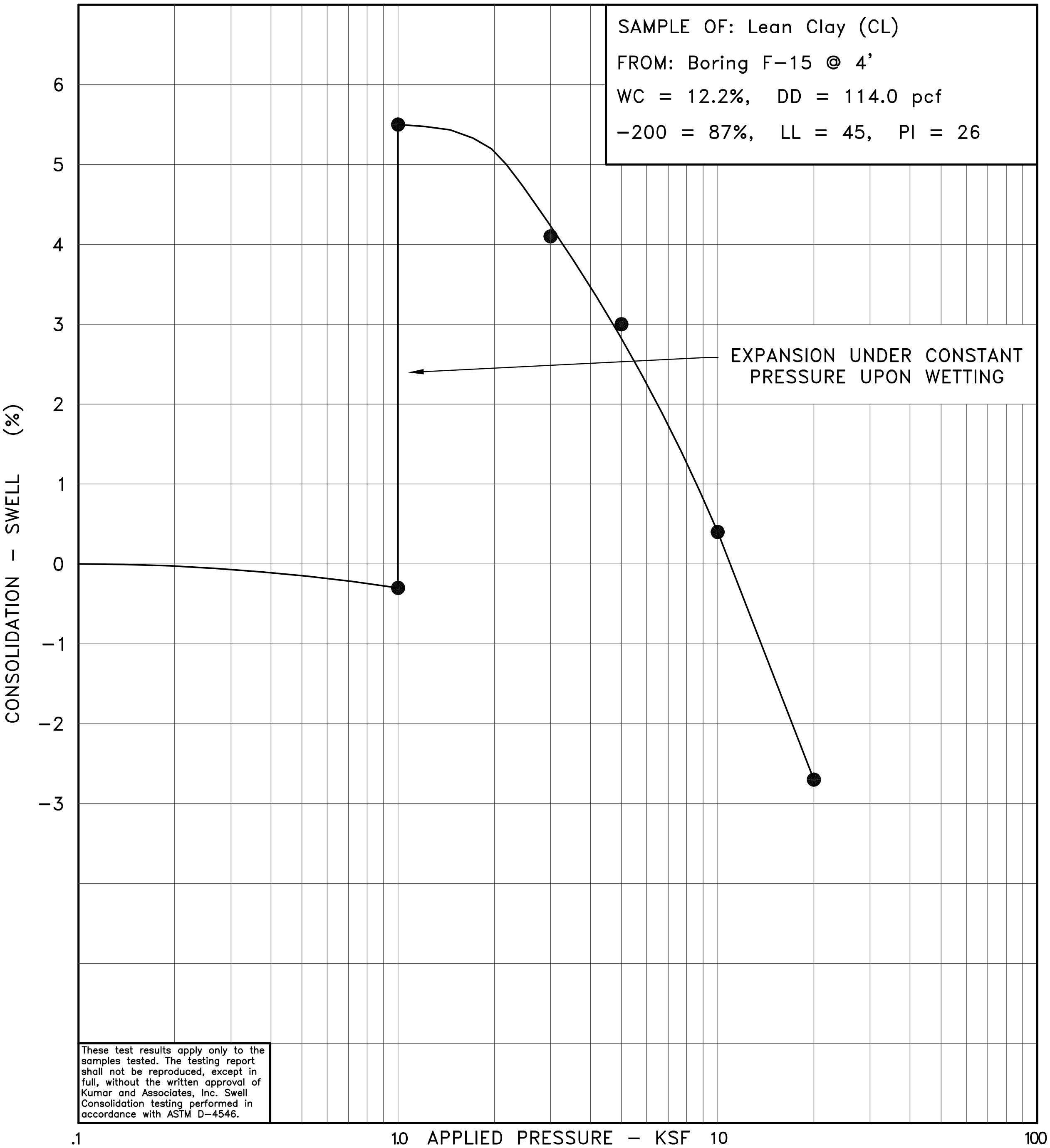
15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 14



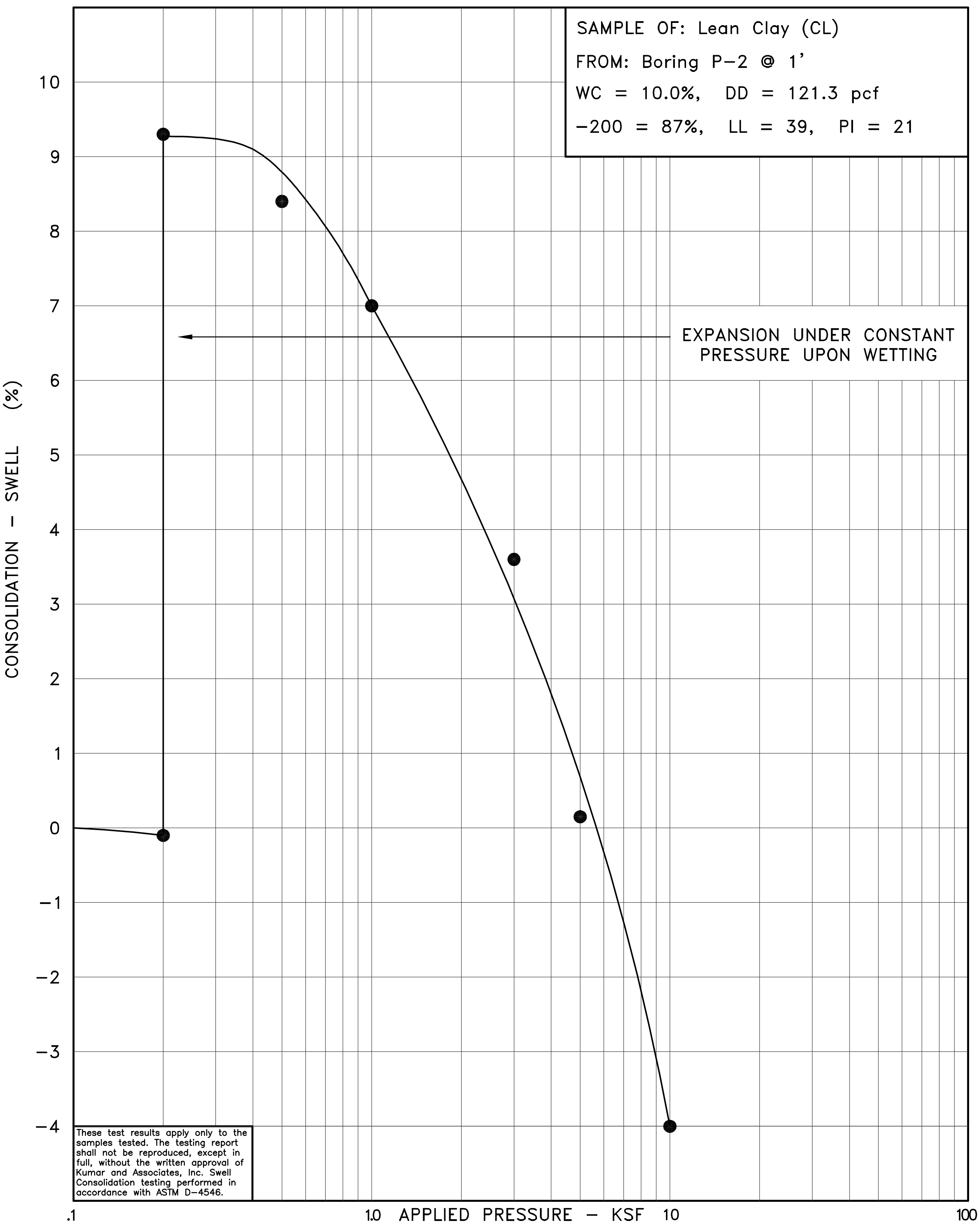
15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 15



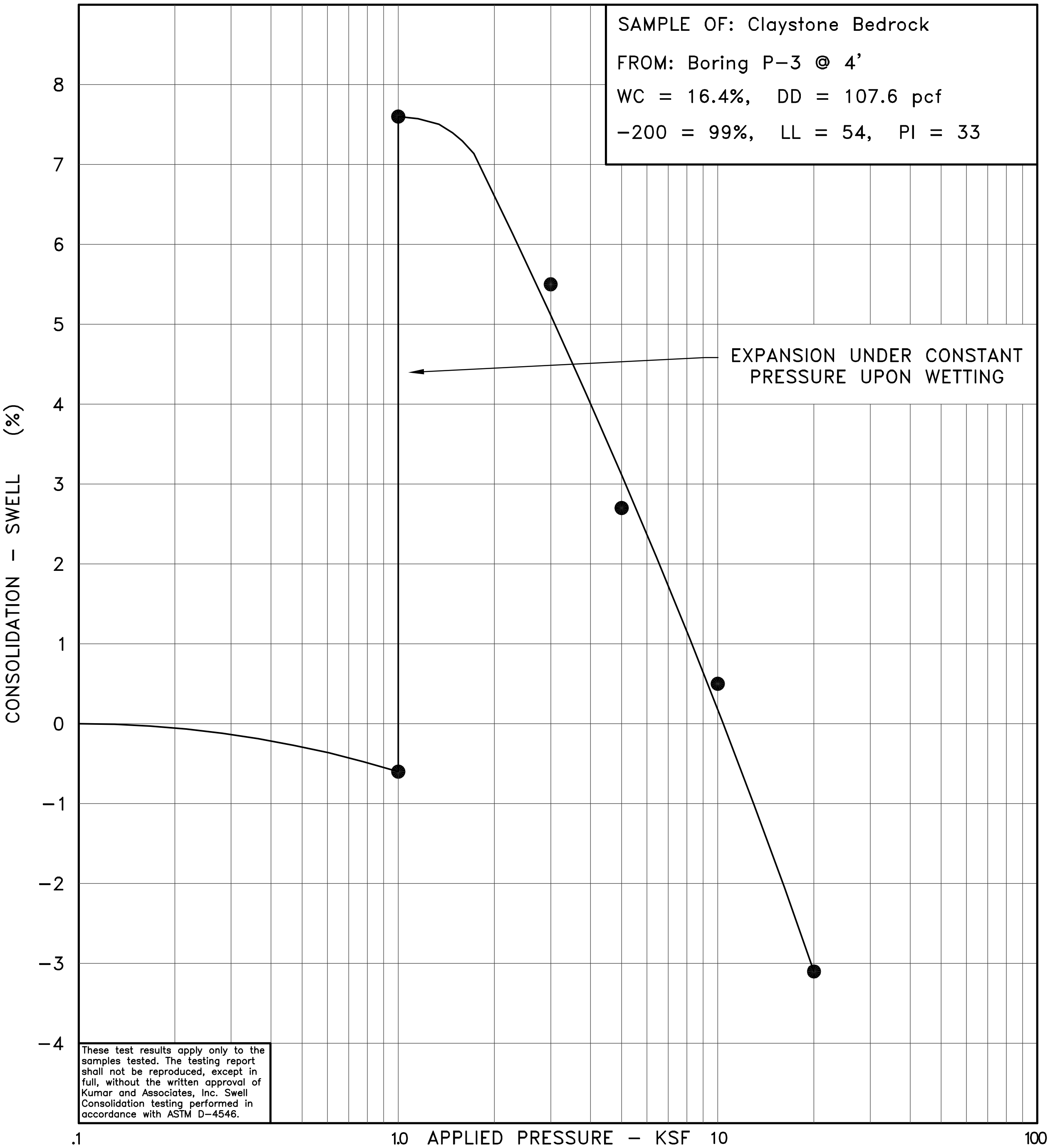
15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 16



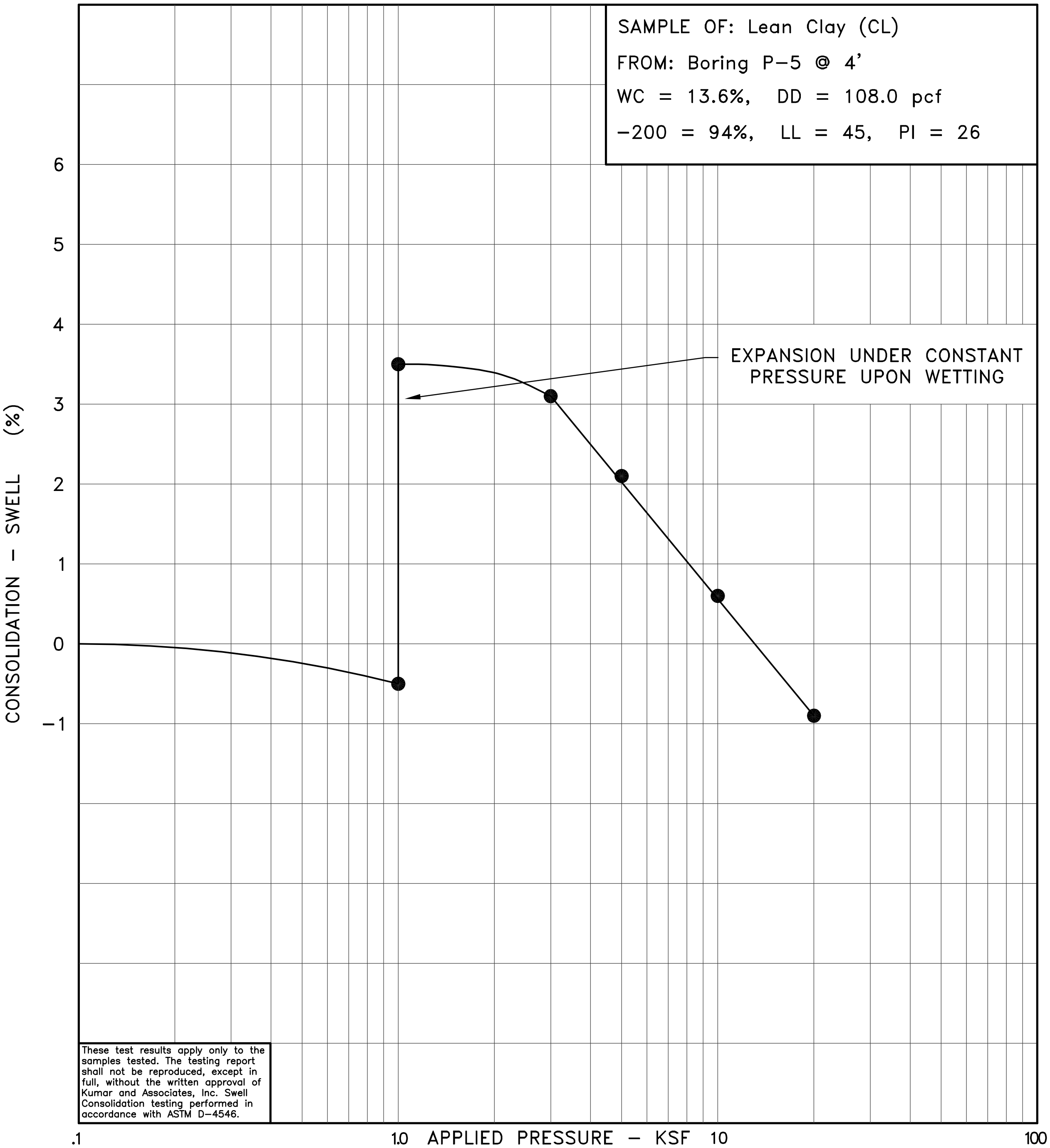
15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 17



15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 18



15−3−164	Kumar & Associates	SWELL−CONSOLIDATION TEST RESULTS	Fig. 19



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15-3-164	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 20

Table I
Summary of Laboratory Test Results

Project No.: 15-3-164
Project Name: Erie Commercial
Date Sampled: September 8 and 10, 2015
Date Received: September 17, 2015

Sample Location		Date Tested	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Passing No. 200 Sieve	Atterberg Limits		Water Soluble Sulfates (%)	AASHTO Classification (Group Index)	Soil or Bedrock Type
Boring	Depth (Feet)					Liquid Limit (%)	Plasticity (%)			
1	4	9/21/15	11.2	120.0	70	35	20	0.16	A-6 (12)	Lean Clay with Sand (CL)
1	14	9/21/15	15.9	108.5						Claystone Bedrock
2	9	9/21/15	9.5	114.7	72	37	21		A-6 (13)	Lean Clay with Sand (CL)
3	4	9/21/15	14.9	110.4	96	48	28		A-7-6 (29)	Lean Clay (CL)
3	9	9/21/15	13.1	118.8	98	48	28	0	A-7-6 (30)	Claystone Bedrock
4	4	9/21/15	15.4	116.2	87	42	25		A-7-6 (22)	Lean Clay (CL)
5	4	9/21/15	17.8	111.4	94	61	40		A-7-6 (42)	Claystone B edrock
6	4	9/21/15	10.0	124.5	52	25	11		A-6 (2)	Sandy Lean Clay (CL)
6	9	9/21/15	11.7	97.0						Claystone Bedrock
7	1	9/21/15	13.1	108.3	90	43	24		A-7-6 (22)	Lean Clay (CL)
7	4	9/21/15	18.6	109.1	98	73	51		A-7-6 (57)	Claystone Bedrock
8	4	9/21/15	17.8	105.2	94	53	29		A-7-6 (31)	Claystone Bedrock
F-1	4	9/21/15	14.1	117.3	77	30	14		A-6 (9)	Fill: Lean Clay with Sand (CL)
F-2	9	9/21/15	13.5	119.7	78	41	24		A-7-6 (18)	Claystone Bedrock
F-3	4	9/21/15	19.5	104.8	79	38	20	0	A-6 (15)	Lean Clay with Sand (CL)
F-4	14	9/21/15	13.3	118.9						Claystone Bedrock
F-5	4	9/21/15	9.0	117.4	72	32	17		A-6 (10)	Lean Clay with Sand (CL)
F-6	4	9/21/15	8.8	108.2	79	33	20		A-6 (14)	Lean Clay with Sand (CL)
F-6	14	9/21/15	15.1	115.1						Claystone Bedrock
F-7	4	9/21/15	2.9	114.5	40	NV	NP		A-4 (0)	Sandstone Bedrock
F-8	1	9/21/15	10.3	106.3	77	34	17		A-6 (11)	Lean Clay with Sand (CL)
F-9	4	9/21/15	13.5	115.3	97	52	33		A-7-6 (35)	Claystone Bedrock
F-10	1	9/21/15	11.5	114.5	91	44	25		A-7-6 (24)	Lean Clay (CL)
F-10	9	9/21/15	16.6	111.6						Claystone Bedrock
F-11	4	9/21/15	12.0	119.1	89	43	24	0	A-7-6 (22)	Lean Clay (CL)
F-12	1	9/21/15	10.9	116.6	84	37	20		A-6 (16)	Lean Clay with Sand (CL)
F-13	1	9/21/15	10.2	102.6	91	39	21		A-6 (19)	Lean Clay (CL)
F-14	4	9/21/15	10.9	114.6	99	48	29		A-7-6 (31)	Claystone Bedrock
F-15	4	9/21/15	12.2	114.0	87	45	26		A-7-6 (23)	Lean Clay (CL)
F-16	4	9/21/15	3.0	108.4	70	NV	NP		A-4 (0)	Siltstone Bedrock
P-1	4	9/21/15	16.1	114.1	85	36	20		A-6 (16)	Fill: Lean Clay with Sand (CL)
P-2	1	9/21/15	10.0	121.3	87	39	21		A-6 (18)	Lean Clay (CL)
P-3	4	9/21/15	16.4	107.6	99	54	33		A-7-6 (37)	Claystone Bedrock
P-4	1	9/21/15	12.5	109.5	89	40	22	0	A-6 (20)	Lean Clay (CL)
P-5	4	9/21/15	13.6	108.0	94	45	26		A-7-6 (26)	Lean Clay (CL)
P-6	1	9/21/15	10.7	113.3	85	39	22		A-6 (18)	Lean Clay with Sand (CL)
P-7	1	9/21/15	10.4	103.3	79	37	19		A-6 (14)	Lean Clay with Sand (CL)

VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BOULEVARD & STATE HIGHWAY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
ERIE, COLORADO
CIVIL CONSTRUCTION DRAWINGS

PROJECT INFORMATION
ADDRESS: NEC OF STATE HIGHWAY & MOUNTAIN VIEW BLVD.

PROPERTY OWNER
SH7 MARKETPLACE, LLC.
9750 W. CAMBRIDGE PLACE
LITTLETON, CO 80127
TEL: 303-920-9400
ATTN: JAMES SPEHALSKI

DEVELOPER/APPLICANT
SH7 MARKETPLACE, LLC.
9750 W. CAMBRIDGE PLACE
LITTLETON, CO 80127
TEL: 303-920-9400
ATTN: JAMES SPEHALSKI

CIVIL ENGINEER/ ENTITLEMENT CONSULTANT
GALLOWAY & COMPANY, INC.
6162 S. WILLOW DRIVE, SUITE 320
GREENWOOD VILLAGE, COLORADO 80111
TEL: (303) 770-8884
FAX: (303) 770-3636
ATTN: PHIL DALRYMPLE

GEOTECHNICAL ENGINEER
KUMAR & ASSOCIATES
2390 SOUTH LIPAN ST.
DENVER, CO 80223
TEL: (303) 742-9700
FAX: (303) 742-9666
ATTN: JOSH BARKER

PUBLIC WORKS
TOWN OF ERIE PUBLIC WORKS
645 HOLBROOK ST.
P.O. BOX 756
TEL: (303) 926-2895
ATTN: TODD FESSENDEN

PLANNING
TOWN OF ERIE COMMUNITY DEVELOPMENT
645 HOLBROOK ST.
P.O. BOX 756
TEL: (303) 926-2776
ATTN: CHRIS LARUE

FIRE DEPARTMENT
MOUNTAIN VIEW FIRE PROTECTION DISTRICT
3561 STAGECOACH ROAD
LONGMONT, CO 80504
TEL: (303) 772-0710
ATTN: LUANN PENFOLD

POWER
UNITED POWER COMPANY
PO BOX 929
500 COOPERATIVE WAY
BRIGHTON, COLORADO 80601
TEL: (303) 637-1234
ATTN: KATHY A. ROTELLO

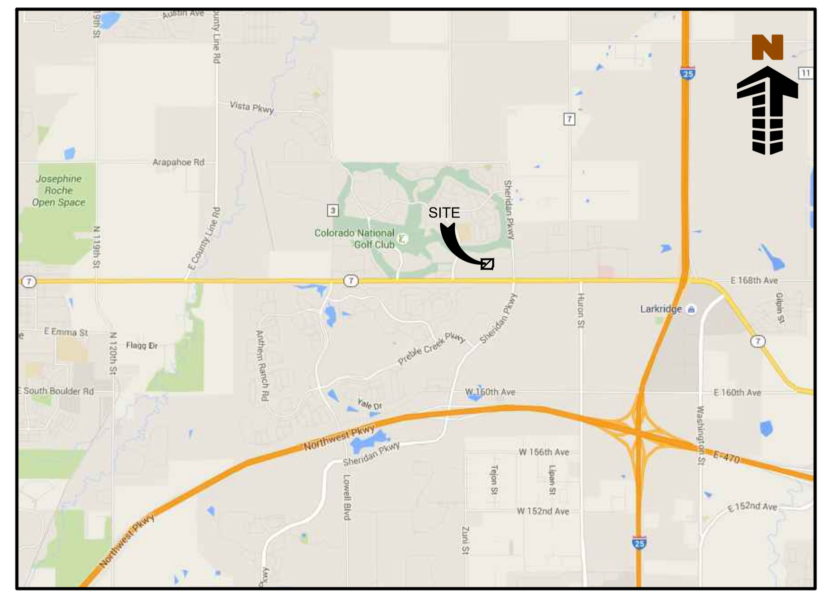
GAS
XCEL ENERGY
1123 WEST 3RD AVENUE
DENVER, CO 80223
TEL: (303) 571-3306
ATTN: DONNA GEORGE

TELEPHONE
CENTURY LINK COMMUNICATIONS
3702 AUTOMATION WAY, SUITE 106
FORT COLLINS, COLORADO 80525
TEL: (720) 490-7508
ATTN: TERRY SPEER

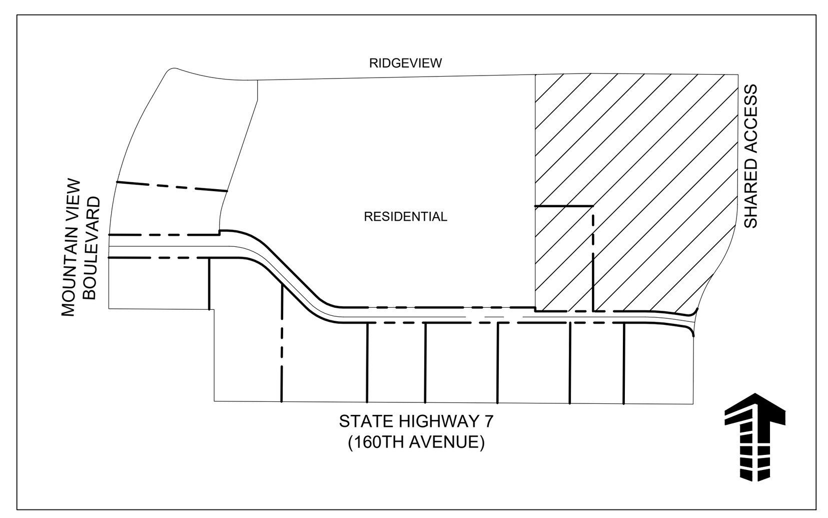
WATER
TOWN OF ERIE
645 HOLBROOK ST.
ERIE, CO 80516
TEL: (303) 926-2895

SANITARY SEWER
TOWN OF ERIE
645 HOLBROOK ST.
ERIE, CO 80516
TEL: (303) 926-2895

STORM SEWER
TOWN OF ERIE
645 HOLBROOK ST.
ERIE, CO 80516
TEL: (303) 926-2895



VICINITY MAP
SCALE: 1"=1000'



KEY MAP
1" = 400'

SHEET INDEX

DWG No.	DESCRIPTION
C0.0	COVER SHEET
C0.1	GENERAL NOTES
C1.1	OVERALL SITE & UTILITY PLAN
C1.2	ROADWAY PLAN AND PROFILE
C1.3	SITE DETAILS
C2.1	GRADING PLAN
C3.1	EROSION CONTROL PLAN
C3.2	EROSION CONTROL DETAILS
C3.3	EROSION CONTROL DETAILS
C5.1	STORM SEWER PLAN AND PROFILE
C5.2	STORM DETAILS
C6.1	WATER PLAN AND PROFILE
C6.2	WATER DETAILS
C7.1	SANITARY SEWER PLAN AND PROFILE
C7.2	SANITARY DETAILS
C7.3	SANITARY DETAILS

PUBLIC WORKS DRAWING ACCEPTANCE
ALL WORK SHALL BE CONSTRUCTED TO TOWN OF ERIE STANDARDS AND SPECIFICATIONS. THIS DRAWING HAS BEEN REVIEWED AND FOUND TO BE IN GENERAL COMPLIANCE WITH THESE STANDARDS AND SPECIFICATIONS AND OTHER TOWN REQUIREMENTS. THE ENGINEERING DESIGN AND CONCEPT REMAINS THE RESPONSIBILITY OF THE ENGINEER WHOSE STAMP AND SIGNATURE APPEAR HEREON.

ACCEPTED BY: ______________________ DATE:
TOWN ENGINEER

BENCHMARK
CITY OF AND COUNTY OF BROOMFIELD BM "LUCY" ELEVATION: 5297.00 FEET (NAVD 1988 DATUM)

BASIS OF BEARING
BEARINGS ARE BASED ON THE NORTH RIGHT-OF-WAY LINE OF STATE HIGHWAY NO. 7 BEARING N89°38'37"W AS REFERENCED AND BOUNDED BY THE MONUMENTS SHOWN HEREON.

LEGAL DESCRIPTION
A PARCEL OF LAND ACROSS PARCELS 33 AND 34 OF "VISTA RIDGE MASTER FINAL PLAT" AND LOT 2 AND TRACT A OF "VISTA RIDGE FILING NO. 12", LOCATED IN THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH P.M., TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO. SEE SURVEY FOR DETAILED DESCRIPTION.

SURVEYOR TO OBTAIN AUTOCAD FILE FROM ENGINEER AND VERIFY ALL HORIZONTAL CONTROL DIMENSIONING PRIOR TO CONSTRUCTION STAKING. SURVEYOR MUST VERIFY ALL BENCHMARK, BASIS OF BEARING AND DATUM INFORMATION TO ENSURE IMPROVEMENTS WILL BE AT THE SAME HORIZONTAL AND VERTICAL LOCATIONS SHOWN ON THE DESIGN CONSTRUCTION DRAWINGS. PRIOR TO CONSTRUCTION STAKING ANY DISCREPANCY MUST BE REPORTED TO OWNER AND ENGINEER PRIOR TO CONTINUATION OF ANY FURTHER STAKING OR CONSTRUCTION WORK.

NOTE: CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE LICENSED SURVEYOR REPLACE ANY DAMAGED OR DISTURBED MONUMENTATION AT THEIR COST.

NOTE: CONTRACTOR MUST COORDINATE WORK WITH UTILITY COMPANY AND CITY PRIOR TO BEGINNING WORK AND IS RESPONSIBLE FOR ALL MATERIALS, LABOR, REPAIRS, ETC. TO COMPLETE WORK AND RESTORE AREA TO SAME STATE PRIOR TO STARTING WORK

NOTE: CONTRACTOR RESPONSIBLE FOR AS-BUILT DRAWINGS, TESTS, REPORTS AND/OR ANY OTHER CERTIFICATES OR INFORMATION AS REQUIRED FOR ACCEPTANCE OF WORK FROM CITY, UTILITY DISTRICTS OR ANY OTHER GOVERNING AGENCY.

SOIL PREPARATION AND PAVEMENT DESIGN NOTE
SOIL PREPARATION AND PAVEMENT DESIGN SHALL BE PER RECOMMENDATIONS FROM A GEOTECHNICAL REPORT PREPARED FOR THIS SITE AS FOLLOWS: SUBSURFACE INVESTIGATION AND ENGINEERING ANALYSIS: PROPOSED COMMERCIAL STRUCTURE

GEOTECHNICAL ENGINEER: KUMAR & ASSOCIATES

PROJECT NO: 15-3-164 DATE: 10/12/2015

THE CONTRACTOR MUST FULLY REVIEW THIS REPORT PRIOR TO CONSTRUCTION. INFORMATION IN THE GEOTECHNICAL REPORT SUPERSEDES ANY CONFLICTING INFORMATION CONTAINED IN THE CONSTRUCTION PLANS AND SPECIFICATIONS. REFER TO GENERAL STRUCTURAL NOTES FOR SPECIFIC SOIL PREPARATION AT SITE STRUCTURES.

CAUTION - NOTICE TO CONTRACTOR
1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

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

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303.770.8884 O
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VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BLVD & STATE HWY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
CIVIL CONSTRUCTION DRAWINGS
ERIE, COLORADO

#	Date	Issue / Description	Init.
1	06/04/2018	1ST CITY SUBMITTAL	PJD
2	11/09/2018	2ND CITY SUBMITTAL	PJD
3	01/30/2019	3RD CITY SUBMITTAL	PJD
4	05/01/2019	4TH CITY SUBMITTAL	PJD
5	06/25/2019	5TH CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	CAC
Checked By:	PJD
Date:	06/21/19

COVER SHEET

C0.0

TOWN OF ERIE GENERAL NOTES - CONSTRUCTION

1. ALL CONSTRUCTION SHALL CONFORM TO THE LATEST "STANDARDS AND SPECIFICATIONS FOR DESIGN AND CONSTRUCTION OF PUBLIC IMPROVEMENTS" BY THE TOWN OF ERIE. COPIES OF THE TOWN OF ERIE STANDARDS AND SPECIFICATIONS MAY BE OBTAINED FROM THE TOWN OF ERIE WEB SITE. CONTRACTOR SHALL HAVE A SET ON SITE AT ALL TIMES.
2. THE OWNER SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE TOWN OF ERIE ENGINEERING STAFF AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION. THOSE IN ATTENDANCE SHALL INCLUDE THE OWNER, HIS ENGINEER, THE TOWN OF ERIE ENGINEERING STAFF, REPRESENTATIVES OF THE CONTRACTORS AND OTHER AFFECTED AGENCIES. PLANS SIGNED AND ACCEPTED BY THE TOWN OF ERIE WILL BE DISTRIBUTED AT THE PRE-CONSTRUCTION MEETING. CONTRACTOR SHALL HAVE (1) COPY OF THE SIGNED PLANS ON SITE AT ALL TIMES.
3. THE TOWN OF ERIE, THROUGH ACCEPTANCE OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT. THE OWNER AND DESIGN ENGINEER UNDERSTAND THAT THE RESPONSIBILITY FOR THE ENGINEERING ADEQUACY OF THE FACILITIES DEPICTED IN THIS DOCUMENT LIES SOLELY WITH THE REGISTERED PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE ARE AFFIXED TO THIS DOCUMENT. REPORT ALL DISCREPANCIES TO THE DESIGN ENGINEER IMMEDIATELY.
4. PRIOR TO BEGINNING THE WORK, THE CONTRACTOR SHALL OBTAIN ANY/ALL WRITTEN AGREEMENTS FOR INGRESS AND EGRESS TO THE WORK SITE FROM ADJACENT PRIVATE PROPERTY OWNERS. A COPY OF ALL AGREEMENTS SHALL BE PROVIDED TO THE TOWN. ACCESS TO ANY ADJACENT PRIVATE PROPERTY SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
5. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE TOWN OF ERIE ENGINEERING STAFF. THE TOWN RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO TOWN STANDARDS AND SPECIFICATIONS. INSPECTIONS AND ONSITE VISITS ARE NOT TO BE CONSTRUED AS A GUARANTEE BY THE TOWN ENGINEERING STAFF OF THE CONTRACTORS" CONTRACTUAL COMMITMENT. REQUESTS FOR INSPECTION BY THE TOWN OF ERIE SHALL BE MADE BY THE CONTRACTOR A MINIMUM OF TWENTY-FOUR (24) HOURS IN ADVANCE.
6. CONSTRUCTION WATER IS AVAILABLE TO THE CONTRACTOR AS ESTABLISHED IN THE TOWN OF ERIE STANDARDS AND SPECIFICATIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT THE TOWN OF ERIE REGARDING CURRENT REGULATIONS, FEES AND REQUIRED AGREEMENTS RELATED TO THE PROVISION OF CONSTRUCTION WATER.
7. THE CONTRACTOR SHALL COORDINATE HIS ACTIVITIES WITH THE AFFECTED UTILITY COMPANIES AND SHALL NOTIFY THE UTILITY NOTIFICATION CENTER, PHONE NUMBER 811, FORTY-EIGHT (48) HOURS PRIOR TO THE START OF CONSTRUCTION.
8. UTILITIES IN THE AREA OF CONSTRUCTION ARE APPROXIMATE ONLY. THEY HAVE BEEN LOCATED FROM FIELD INVESTIGATION AND THE BEST AVAILABLE UTILITY RECORDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION, PROTECTION AND REPAIR OF ALL UTILITIES ENCOUNTERED DURING CONSTRUCTION WHETHER SHOWN ON THESE PLANS OR NOT. THE CONTRACTOR SHALL CONTACT ALL RESPECTIVE UTILITIES AND HAVE ALL UTILITIES FIELD-LOCATED PRIOR TO CONSTRUCTION. IF ANY UNKNOWN SUBSURFACE STRUCTURES ARE ENCOUNTERED DURING CONSTRUCTION, IT SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE TOWN OF ERIE ENGINEERING STAFF AND DESIGN ENGINEER PRIOR TO PROCEEDING.
9. THE CONTRACTOR SHALL NOTIFY TOWN OF ERIE ENGINEERING STAFF OF ANY PROBLEM IMPACTING WATER AND WASTE WATER FACILITIES THAT WOULD POTENTIALLY REQUIRE A VARIANCE FROM THE APPROVED PLANS AND SPECIFICATIONS. ANY VARIANCE FROM THE APPROVED DOCUMENTS SHALL BE AT THE SOLE DISCRETION OF THE TOWN OF ERIE ENGINEERING STAFF.
10. CONTRACTOR SHALL OBTAIN, AT HIS OWN EXPENSE, ALL APPLICABLE SPECIFICATIONS AND PERMITS NECESSARY TO PERFORM THE PROPOSED WORK.
11. AS-BUILT DRAWINGS AND A CD INCLUDING AUTOCAD AND PDF FILES, AS REQUIRED IN THE SPECIFICATIONS, ARE TO BE SUBMITTED BY THE OWNER/DEVELOPER PRIOR TO SUBSTANTIAL COMPLETION/CONSTRUCTION ACCEPTANCE OF THE CONSTRUCTION.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND REPLACING ANY EXISTING SIGNS, STRUCTURES, FENCES, ETC., ENCOUNTERED ON THE JOB AND RESTORING THEM TO THEIR ORIGINAL CONDITION.
13. THE CONTRACTOR IS RESPONSIBLE FOR:
    - A. NOTIFYING THE TOWN OF ERIE UTILITY CUSTOMERS OF POTENTIAL SERVICE OUTAGES, AND COORDINATE WITH THE TOWN OF ERIE FOR DETERMINATION OF MINIMUM TIME REQUIREMENT.
    - B. NOTIFYING THE TOWN OF ERIE ENGINEERING STAFF IF WORK IS SUSPENDED FOR ANY PERIOD OF TIME AFTER INITIAL START-UP. THE CONTRACTOR SHALL NOTIFY THE TOWN OF ERIE FORTY-EIGHT (48) HOURS PRIOR TO RESTART.
    - C. IN THE EVENT OF AN AFTER HOURS EMERGENCY, CALL 303-441-4444.
    - D. NOTIFYING THE MOUNTAIN VIEW FIRE PROTECTION DISTRICT OF ALL STREET CLOSURES AND EXISTING FIRE HYDRANTS TAKEN OUT OF SERVICE A MINIMUM OF FORTY-EIGHT (48) HOURS PRIOR TO THE START OF CONSTRUCTION.
14. PRIOR TO INSTALLATION OF UTILITY MAINS, ROAD CONSTRUCTION MUST HAVE PROGRESSED TO AT LEAST THE "SUB-GRADE" STAGE.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ANY GROUNDWATER ENCOUNTERED DURING THE CONSTRUCTION OF ANY PORTION OF THIS PROJECT. A CONSTRUCTION DEWATERING PERMIT MUST BE OBTAINED FROM THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT (CDPHE). GROUNDWATER SHALL BE PUMPED, PIPED, REMOVED AND DISPOSED OF IN A MANNER WHICH DOES NOT CAUSE FLOODING OF EXISTING STREETS OR EROSION OF ABUTTING PROPERTIES IN ORDER TO CONSTRUCT THE IMPROVEMENTS SHOWN ON THESE PLANS. THE USE OF ANY SANITARY SEWER TO DISPOSE OF TRENCH WATER WILL NOT BE PERMITTED. NO CONCRETE SHALL BE PLACED WHERE GROUNDWATER IS VISIBLE OR UNTIL THE GROUNDWATER TABLE HAS BEEN LOWERED BELOW THE PROPOSED IMPROVEMENTS. ANY UNSTABLE AREAS, AS A RESULT OF GROUNDWATER, ENCOUNTERED DURING THE CONSTRUCTION OF THE PROPOSED IMPROVEMENTS SHALL BE STABILIZED AS AGREED UPON BY THE CONTRACTOR, THE TOWN OF ERIE, AND THE DESIGN ENGINEER AT THE TIME OF THE OCCURRENCE
16. IT SHALL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER TO RESOLVE CONSTRUCTION PROBLEMS WITH THE TOWN OF ERIE DUE TO CHANGED CONDITIONS ENCOUNTERED BY THE CONTRACTOR DURING THE PROGRESS OF ANY PORTION OF THE PROPOSED WORK. IF, IN THE OPINION OF THE TOWN OF ERIE, PROPOSED ALTERATIONS TO THE SIGNED CONSTRUCTION PLANS INVOLVES SIGNIFICANT CHANGES TO THE CHARACTER OF THE WORK, OR TO THE FUTURE CONTIGUOUS PUBLIC OR PRIVATE IMPROVEMENTS, THE DESIGN ENGINEER SHALL BE RESPONSIBLE FOR SUBMITTING REVISED PLANS TO THE TOWN OF ERIE FOR REVIEW, PRIOR TO ANY FURTHER CONSTRUCTION RELATED TO THAT PORTION OF THE WORK.
17. DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS AT AND ADJACENT TO THE JOB INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THE CONTRACTOR SHALL PROVIDE ALL LIGHTS, SIGNS, BARRICADES, FLAGMEN, OR OTHER DEVICES NECESSARY TO PROVIDE FOR PUBLIC SAFETY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND IS NOT LIMITED TO NORMAL WORKING HOURS. THE TOWN OF ERIE OR THE DESIGN ENGINEER EXERCISE NO CONTROLS OVER THE SAFETY OR ADEQUACY OF ANY EQUIPMENT, BUILDING COMPONENTS, SCAFFOLDING, FORMS OR OTHER WORK AIDS USED IN OR ABOUT THE PROJECT, OR IN THE SUPERINTENDING OF THE SAME. THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD HARMLESS FROM ANY AND ALL LIABILITY, REAL AND ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER, THE DESIGN ENGINEER OR THE TOWN. THE TOWN OF ERIE ENGINEERING STAFF, OR ANY CONTRACTED ENGINEER, ARE NOT RESPONSIBLE FOR SAFETY IN, ON OR ABOUT THE PROJECT SITE, NOR FOR COMPLIANCE BY THE APPROPRIATE PARTY OF ANY REGULATIONS RELATING THERETO.
18. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE PROSECUTED TO COMPLETION WITHOUT DELAY SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
19. THE CONTRACTOR SHALL TAKE ALL NECESSARY AND PROPER PRECAUTIONS TO PROTECT ADJACENT PROPERTIES FROM ANY AND ALL DAMAGE THAT MAY OCCUR FROM STORM WATER RUNOFF AND/OR DEPOSITION OF DEBRIS RESULTING FROM ANY AND ALL WORK. THE OWNER/CONTRACTOR IS RESPONSIBLE FOR OBTAINING A STORMWATER DISCHARGE PERMIT FOR CONSTRUCTION ACTIVITIES FOR ANY PROJECT DISTURBING OVER ONE ACRE FROM BOTH THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND THE TOWN OF ERIE.
20. EACH TYPE OF CONSTRUCTION SHALL BE COMPLETED BY A CONTRACTOR THAT HAS DEMONSTRATED ACCEPTABLE QUALIFICATIONS TO THE TOWN AND IS A LICENSED CONTRACTOR IN THE TOWN OF ERIE.
21. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL DURING CONSTRUCTION. ALL TRAFFIC CONTROLS SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, (MUTCD) LATEST EDITION. A PLAN SHALL BE SUBMITTED TO THE TOWN FOR REVIEW AND APPROVAL PRIOR TO THE PRE-CONSTRUCTION MEETING.
22. ALL BACKFILL SHALL CONFORM TO THE TRENCH DETAIL LOCATED IN THE TOWN OF ERIE STANDARDS & SPECIFICATIONS.
23. THE CONTRACTOR SHALL IMMEDIATELY REMOVE ANY CONSTRUCTION DEBRIS OR MUD TRACKED ONTO EXISTING ROADWAYS.
24. THE CONTRACTOR SHALL REPAIR ANY EXCAVATION OR PAVEMENT FAILURES CAUSED BY HIS CONSTRUCTION.
25. THE CONTRACTOR SHALL RENEW OR REPLACE ANY EXISTING TRAFFIC STRIPING AND/OR PAVEMENT MARKINGS, WHICH HAVE BEEN EITHER REMOVED OR THE EFFECTIVENESS OF WHICH HAS BEEN REDUCED DURING HIS OPERATION. RENEWAL OF PAVEMENT STRIPING AND MARKING SHALL BE DONE IN CONFORMANCE WITH THE TOWN OF ERIE STANDARD SPECIFICATIONS.
26. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO TAKE EVERY MEASURE NECESSARY TO COMPLY WITH ANY STATE, COUNTY OR TOWN DUST CONTROL ORDINANCE.
27. CONSTRUCTION VEHICLES SHALL USE TRUCK ROUTES DESIGNATED BY THE TOWN.
28. THE OWNER/DEVELOPER WILL BE HELD RESPONSIBLE FOR THE PROPER FUNCTIONING OF THE IMPROVEMENTS FOR A MINIMUM OF TWO (2) YEARS FROM THE DATE OF SUBSTANTIAL COMPLETION/ CONSTRUCTION ACCEPTANCE OF THE IMPROVEMENTS BY THE TOWN OF ERIE. ANY FAILURE DURING THIS PERIOD OF GUARANTEE SHALL BE REMEDIED BY THE OWNER/CONTRACTOR TO THE SATISFACTION OF THE TOWN OF ERIE AT NO EXPENSE TO THE TOWN.
29. THE DESIGN ENGINEER SHALL PERFORM SUFFICIENT INSPECTIONS AND SURVEYS DURING GRADING AND CONSTRUCTION SO THAT AN OPINION CAN BE RENDERED AND VERIFIED IN WRITING AS TO COMPLIANCE WITH THE PLANS AND CODES WITHIN THE DESIGN ENGINEER'S PURVIEW.
30. THE SOILS ENGINEER SHALL PERFORM SUFFICIENT INSPECTIONS DURING GRADING AND CONSTRUCTION SO THAT AN OPINION CAN BE RENDERED AND VERIFIED IN WRITING AS TO COMPLIANCE WITH THE PLANS AND CODES WITHIN THE SOILS ENGINEER'S PURVIEW.

TOWN OF ERIE GENERAL NOTES - GRADING

1. ALL CONSTRUCTION ACTIVITIES THAT DISTURBS ONE OR MORE ACRES OF LAND, AS WELL AS ACTIVITIES THAT DISTURB LESS THAN ONE ACRE OF LAND, BUT IS PART OF A LARGER COMMON PLAN OF DEVELOPMENT, MUST COMPLY WITH BOTH LOCAL AND STATE REGULATIONS REGARDING STORMWATER DRAINAGE ON CONSTRUCTION SITES. OWNERS OR CONTRACTORS MUST OBTAIN A COLORADO STORMWATER DISCHARGE PERMIT FOR CONSTRUCTION ACTIVITIES FROM THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT (CDPHE) AND EITHER A PUBLIC IMPROVEMENT PERMIT OR A GRADING AND STORMWATER QUALITY PERMIT FROM THE TOWN OF ERIE. CONTRACTOR SHALL:
    - A. MAINTAIN A COPY OF THE STORM WATER MANAGEMENT PLAN (SWMP) ONSITE AT ALL TIMES. THE SWMP MUST BE MAINTAINED AND MADE AVAILABLE TO TOWN OF ERIE INSPECTORS UPON REQUEST.
    - B. INSTALL AND MAINTAIN EROSION, SEDIMENT, AND MATERIALS MANAGEMENT CONTROL BMPS AS SPECIFIED IN THE SWMP.
    - C. INSPECT ALL BEST MANAGEMENT PRACTICES (BMPS) AT LEAST EVERY FOURTEEN (14) DAYS AND WITHIN TWENTY FOUR (24) HOURS AFTER ANY PRECIPITATION OR SNOWMELT EVENT THAT CAUSES SURFACE RUNOFF.
    - D. MAINTAIN INSPECTION AND MAINTENANCE RECORDS OF BMPS ONSITE WITH THE SWMP. COPIES OF THESE REPORTS SHALL BE PROVIDED TO THE TOWN OF ERIE ENGINEERING STAFF.
    - E. BASED ON INSPECTIONS PERFORMED BY THE PERMIT HOLDER OR BY TOWN PERSONNEL, MODIFICATIONS TO THE SWMP WILL BE NECESSARY IF AT ANY TIME THE SPECIFIED BMPS DO NOT MEET THE OBJECTIVES OF THE PERMIT. ALL MODIFICATIONS SHALL BE COMPLETED AS SOON AS PRACTICABLE AFTER THE REFERENCED INSPECTION, AND SHALL BE RECORDED ON THE OWNER'S COPY OF THE SWMP.
    - F. THE OPERATOR SHALL AMEND THE SWMP WHENEVER THERE IS A SIGNIFICANT CHANGE IN DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE, WHICH HAS A SIGNIFICANT EFFECT ON THE POTENTIAL FOR DISCHARGE OF POLLUTANTS TO THE RECEIVING WATERS, OR IF THE SWMP PROVES TO BE INEFFECTIVE IN ACHIEVING THE GENERAL OBJECTIVES OF CONTROLLING POLLUTANTS IN STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES.
    - G. INSTALLATION AND MAINTENANCE OF BMPS SHALL BE SUPERVISED BY PERSONNEL CERTIFIED IN EROSION AND SEDIMENT CONTROL.
2. ALL SITE GRADING (EXCAVATION, EMBANKMENT, AND COMPACTION) SHALL CONFORM TO THE RECOMMENDATIONS OF THE LATEST SOILS INVESTIGATION FOR THIS PROPERTY AND SHALL FURTHER BE IN CONFORMANCE WITH THE TOWN OF ERIE "STANDARDS AND SPECIFICATIONS FOR THE DESIGN AND CONSTRUCTION OF PUBLIC IMPROVEMENTS", LATEST EDITION.
3. ALL GRADING AND FILLING OPERATIONS SHALL BE OBSERVED, INSPECTED AND TESTED BY A LICENSED SOILS ENGINEER. ALL TEST RESULTS SHALL BE SUBMITTED TO THE TOWN OF ERIE ENGINEERING STAFF.
4. NATURAL VEGETATION SHALL BE RETAINED AND PROTECTED WHEREVER POSSIBLE. EXPOSURE OF SOIL TO EROSION BY REMOVAL OR DISTURBANCE OF VEGETATION SHALL BE LIMITED TO THE AREA REQUIRED FOR IMMEDIATE CONSTRUCTION OPERATION AND FOR THE SHORTEST PRACTICAL PERIOD OF TIME. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO AVOID ANY DAMAGE TO EXISTING FOLIAGE THAT LIES IN THE PROJECT AREA UNLESS DESIGNATED FOR REMOVAL AND SHALL BE LIABLE FOR SUCH DAMAGE AT HIS/HER EXPENSE.
5. TOPSOIL SHALL BE STOCKPILED TO THE EXTENT PRACTICABLE ON THE SITE FOR USE ON AREAS TO BE RE-VEGETATED. ANY AND ALL STOCKPILES SHALL BE LOCATED AND PROTECTED FROM EROSIVE ELEMENTS.
6. TEMPORARY VEGETATION SHALL BE INSTALLED ON ALL DISTURBED AREAS WHERE PERMANENT SURFACE IMPROVEMENTS ARE NOT SCHEDULED FOR IMMEDIATE INSTALLATION. SEEDING WILL BE DONE ACROSS THE SLOPE FOLLOWING THE CONTOURS. VEGETATION SHALL CONFORM TO THE TOWN OF ERIE STANDARDS AND SPECIFICATIONS. PROJECT SCHEDULING SHOULD TAKE ADVANTAGE OF SPRING OR FALL PLANTING SEASONS FOR NATURAL GERMINATION. SEEDED AREAS SHALL BE IRRIGATED IN ACCORDANCE WITH THE TOWN OF ERIE'S STANDARDS AND SPECIFICATIONS.
7. AT ALL TIMES, A WATER TRUCK SHALL BE ON-SITE AND THE PROPERTY SHALL BE MAINTAINED AND/OR WATERED TO PREVENT WIND-CAUSED EROSION. EARTHWORK OPERATIONS SHALL BE DISCONTINUED WHEN FUGITIVE DUST SIGNIFICANTLY IMPACTS ADJACENT PROPERTY. IF EARTHWORK IS COMPLETE OR DISCONTINUED AND DUST FROM THE SITE CONTINUES TO CREATE PROBLEMS, THE OWNER/DEVELOPER SHALL IMMEDIATELY INSTITUTE MITIGATIVE MEASURES AND SHALL CORRECT DAMAGE TO ADJACENT PROPERTY.
8. FILL SLOPES SHALL BE COMPACTED BY MEANS OF SHEEPSFOOT COMPACTOR OR OTHER SUITABLE EQUIPMENT. COMPACTING SHALL CONTINUE UNTIL SLOPES ARE STABLE AND THERE IS NOT AN APPRECIABLE AMOUNT OF LOOSE SOIL ON THE SLOPES.
9. TEMPORARY CUT/FILL SLOPES SHALL ABIDE BY THE SOILS REPORT. PERMANENT SLOPES SHALL BE AS SHOWN ON PLANS.
10. DEPTH OF MOISTURE-DENSITY CONTROL SHALL BE FULL DEPTH ON ALL EMBANKMENT AND SIX (6) INCHES ON THE BASE OF CUTS AND FILLS.
11. OUTLET SIDES OF ALL STORM PIPES SHALL BE GRADED TO DRAIN AND SHALL HAVE SUFFICIENT EROSION PROTECTION.
12. THE PERMITTEE OR HIS AGENT SHALL NOTIFY THE SITE GEOTECHNICAL ENGINEER WHEN THE GRADING OPERATION IS READY FOR EACH OF THE FOLLOWING INSPECTIONS:
    - A. INITIAL INSPECTION WHEN THE PERMITTEE IS READY TO BEGIN WORK, BUT NOT LESS THAN TWO (2) DAYS BEFORE ANY GRADING OR GRUBBING IS STARTED.
    - B. AFTER THE NATURAL GROUND OR BEDROCK IS EXPOSED AND PREPARED TO RECEIVE FILL, BUT BEFORE FILL IS PLACED.
    - C. EXCAVATION INSPECTION AFTER THE EXCAVATION IS STARTED BUT BEFORE THE VERTICAL DEPTH OF THE EXCAVATION EXCEEDS TEN (10) FEET.
    - D. FILL INSPECTION AFTER THE FILL PLACEMENT IS STARTED, BUT BEFORE THE FILL EXCEEDS TEN (10) FEET.

TOWN OF ERIE GENERAL NOTES - SEWER

1. THE CONTRACTOR SHALL VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING SEWERS TO BE CONNECTED TO PRIOR TO CONSTRUCTION STAKING.
2. CONNECTION TO EXISTING TOWN OF ERIE LINES WILL BE PERMITTED UPON SUBSTANTIAL COMPLETION/CONSTRUCTION ACCEPTANCE OF THE NEW SANITARY SEWER SYSTEM. EXISTING PIPE AT THE POINT OF CONNECTION SHALL NOT BE "BROKEN OUT" UNTIL THE NEW SYSTEM IS ACCEPTED. IF CONNECTING TO AN EXISTING MANHOLE, THE NEW LINE SHALL BE PLUGGED UNTIL THE NEW SYSTEM IS ACCEPTED.
3. MINIMUM VERTICAL SEPARATIONS BETWEEN ALL UTILITY PIPES SHALL BE EIGHTEEN (18) INCHES. IF VERTICAL SEPARATIONS ARE LESS THAN EIGHTEEN (18) INCHES, THE UTILITY PIPES SHALL BE REINFORCED AND PROTECTED AS REQUIRED BY CURRENT TOWN STANDARD SPECIFICATIONS.
4. WATER AND SANITARY SEWER LINES SHALL HAVE A MINIMUM HORIZONTAL SEPARATION OF TEN (10) FEET. WHEN A TEN (10) FOOT SEPARATION IS NOT PROVIDED OR WHEN SEWER LINES CROSS WATER LINES WITH LESS THAN ONE AND ONE-HALF (11/2) FEET OF VERTICAL SEPARATION, SEWER LINE JOINTS SHALL BE CONCRETE ENCASED. FOR PERPENDICULAR CROSSINGS, ENCASED JOINTS SHALL EXTEND TEN (10) FEET, PERPENDICULAR TO THE WATER LINE IN BOTH DIRECTIONS.
5. ALL SANITARY SEWER SERVICES AND WATER SERVICES ARE TO BE TEN (10) FEET APART.
6. SERVICE LATERALS SHALL EXTEND FIVE (5) FEET BEYOND RIGHTS OF WAY OR UTILITY EASEMENTS, WHICHEVER IS GREATER. THE ENDS SHALL BE MARKED BY A GREEN PAINTED WOOD POST UNTIL CURB AND GUTTER IS IN PLACE. WHEN CURB AND GUTTER IS IN PLACE THE LATERALS SHALL BE MARKED ON THE CONCRETE CURB FACE WITH AN “S” or "X".
7. THE LENGTH OF SANITARY SEWER LINE IS THE HORIZONTAL DISTANCE BETWEEN CENTER OF MANHOLE TO CENTER OF MANHOLE. THEREFORE, THE DISTANCES INDICATED ON THE PLANS ARE APPROXIMATE AND COULD VARY DUE TO VERTICAL ALIGNMENT AND MANHOLE DIMENSIONS.
8. SERVICE LINE CONNECTIONS TO DEAD END MANHOLES THAT HAVE NO FURTHER POSSIBILITY OF EXTENSION SHALL BE ALLOWED AND SHALL HAVE A MINIMUM DROP OF 0.75 X MAIN DIAMETER. SERVICE LINE CONNECTING TO IN-LINE MANHOLES ARE NOT PERMITTED. MINIMUM SERVICE LINE SLOPE; 4 INCHES=2%; 6 INCHES= 1%; 8 INCHES=0.4%.
9. ALL FOUR (4) THROUGH FIFTEEN (15) INCH SANITARY SEWER PIPE SHALL BE POLYVINYL CHLORIDE (PVC) AND SHALL BE IN ACCORDANCE WITH ASTM D-3034-SDR35, "STANDARD SPECIFICATION FOR PVC SEWER PIPE AND FITTINGS". ANY SANITARY SEWER HAVING A DEPTH IN EXCESS OF FIFTEEN (15) FEET SHALL BE COORDINATED WITH THE PUBLIC WORKS DEPARTMENT.
10. BEDDING MATERIAL SHALL CONFORM TO TOWN OF ERIE STANDARDS AND SPECIFICATIONS.
11. WARNING TAPE SHALL BE INSTALLED 12” MINIMUM AND 18” MAXIMUM ABOVE SEWER PIPE.
12. PRECAST CONCRETE MANHOLE SECTIONS SHALL BE IN ACCORDANCE WITH ASTM C0478. MANHOLE STEPS SHALL BE POLYPROPYLENE COVERED STEEL CONFORMING TO ASTM. D-4101 AND ASTMA-615. CAST IRON RING AND COVER SHALL CONFORM TO ASTM A-48.
13. MANHOLES SHALL BE A MINIMUM FOUR (4) FOOT DIAMETER AND CONSTRUCTED PER THE STANDARDS AND SPECIFICATIONS.
14. THE CONTRACTOR SHALL TAKE CARE TO PROPERLY SHAPE ALL MANHOLE INVERTS AND BENCHES IN ACCORDANCE WITH THE TOWN OF ERIE STANDARDS AND SPECIFICATIONS, TO PROMOTE SMOOTH FLOW THROUGH THE MANHOLE. INVERTS OF LINES INTERSECTING AT 90 DEGREES AND AT HIGHLY DIVERGENT OR FLAT SLOPES ARE ESPECIALLY CRITICAL. MANHOLE INVERTS SHALL BE CONSTRUCTED WITH A SMOOTH TROWEL FINISH, AND BENCH FINISHED WITH A LIGHT BROOMED, NON-SKID, FINISH.
15. SEWER TEES AND/OR WYES SHALL BE STAKED BY A SURVEY CREW. THE CONTRACTOR SHALL FURNISH TO THE ENGINEER "AS-CONSTRUCTED" LOCATION OF TEES AND WYES. ALL SERVICE LINES ARE FOUR (4) INCH UNLESS OTHERWISE NOTED.
16. THE CONTRACTOR, AT THE OWNER'S EXPENSE, WILL MAKE ALL SEWER SERVICE TAPS.
17. PRIOR TO BACKFILL THE TOWN OF ERIE ENGINEERING STAFF SHALL INSPECT ALL SANITARY SEWER MAINS AND SERVICE EXTENSIONS.
18. MANHOLE RIMS SHALL BE SET AT AN ELEVATION RELATIVE TO THE PAVEMENT, IN ACCORDANCE WITH THE TOWN OF ERIE STANDARDS. WHETHER THE MANHOLE IS AT PAVED OR UNPAVED GRADE, A MINIMUM OF ONE (1) AND A MAXIMUM OF FOUR (4) CONCRETE RINGS SHALL BE USED TO ADJUST THE RIM ELEVATION TO FINAL GRADE. THE MAXIMUM ACCEPTABLE VERTICAL ADJUSTMENT UTILIZING CONCRETE RINGS IS EIGHTEEN (18) INCHES.
19. A SUBSTANTIAL COMPLETION/CONSTRUCTION ACCEPTANCE OF THE NEW SANITARY SEWER MAINS IS CONTINGENT UPON THE RECEIPT OF COPIES OF:
    - A. SANITARY SEWER TRENCH COMPACTION TEST RESULT, AND
    - B. RECORD DRAWINGS, BOTH MYLAR AND ELECTRONIC FILES AND THE SANITARY SEWER SYSTEM BEING TESTED IN ACCORDANCE WITH THE TOWN OF ERIE STANDARDS AND SPECIFICATIONS WHICH INCLUDES:
    - C. LOW PRESSURE AIR TEST 100% OF THE NEW SYSTEM, AND
    - D. VACUUM TEST 100% OF THE NEW SYSTEM MANHOLES.
    - E. JET VACUUM 100% OF THE NEW SYSTEM.

TOWN OF ERIE GENERAL NOTES - STORM DRAIN

1. EXCEPT WHERE NOTED, ALL STORM SEWER PIPE SHALL BE REINFORCED CONCRETE, CLASS III AND SHALL CONFORM TO REQUIREMENTS OF ASTM C76. ALL RCP SHALL HAVE RUBBER GASKETED JOINTS AND SHALL CONFORM TO REQUIREMENTS OF ASTM C443, AND SHALL PROVIDE WATERTIGHT PERFORMANCE CHARACTERISTICS.
2. TONGUE AND GROOVE JOINTS SHALL NOT BE ALLOWED.
3. THE MINIMUM COVERAGE FOR ALL STORM DRAINAGE PIPES SHALL BE 1.5 FEET FOR CLASS III PIPE AND 1 FOOT FOR CLASS IV PIPE.
4. BEDDING MATERIAL SHALL CONFORM TO TOWN OF ERIE STANDARDS AND SPECIFICATIONS.
5. ALL MANHOLES SHALL BE CONCRETE AND CONFORM TO CDOT STANDARD M-604-20.
6. THE MINIMUM MANHOLE DIAMETER SHALL BE AS SPECIFIED BELOW:

PIPE DIAMETER	MANHOLE SIZE
15" TO 18"	4' DIAMETER
21" TO 42"	5' DIAMETER
48" TO 54"	6' DIAMETER
60" AND LARGER	BOX BASE MANHOLE

7. ALL STREET INLETS SHALL BE CURB OPENING TYPE R, CONFORMING TO CDOT STANDARD M-604-12, EXCEPT WHERE OTHERWISE NOTED.
8. ALL INLET ACCESS COVERS SHALL HAVE THE WORDS “NO DUMPING - DRAINS TO RIVERS” AND “STORM SEWER” CAST INTO THE COVER PER TOWN OF ERIE STANDARD DETAIL.
9. ALL END SECTIONS SHALL CONFORM TO CDOT STANDARD M-603-10.
10. WHERE RIPRAP IS CALLED FOR ON THE PLANS FOR EROSION CONTROL, IT SHALL CONFORM TO THE URBAN STORM DRAINAGE CRITERIA MANUAL SPECIFICATIONS (LATEST REVISION).

TOWN OF ERIE GENERAL NOTES - ROADWAY

1. ALL STATIONING IS BASED ON CENTERLINE OF ROADWAYS UNLESS OTHERWISE NOTED.
2. THE CONTRACTOR SHALL PREPARE THE SUBGRADE BY SCARIFYING THE UPPER ONE (1) FOOT OF THE SUBGRADE IN CUT AREAS OR AREAS WITH LITTLE OR NO FILL, UNLESS SPECIFIED IN THE SOILS REPORT. THE WORK SHALL CONFORM TO THE COLORADO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.
3. PAVEMENT SHALL NOT BE CONSTRUCTED UNTIL ALL UNDERGROUND UTILITIES HAVE BEEN INSTALLED, TESTED AND ACCEPTED BY THE TOWN OF ERIE ENGINEERING STAFF.
4. IT SHALL BE THE RESPONSIBILITY OF THE OWNER/CONTRACTOR TO SUPERVISE AND CERTIFY THAT PROPER COMPACTION HAS BEEN OBTAINED BY SUBCONTRACTORS AND AGENCIES CONCERNING UTILITY LINE BACKFILL INCLUDING, BUT NOT LIMITED TO, SEWER, WATER, ELECTRICAL, GAS AND LANDSCAPE IRRIGATION LINES AND ACCEPTED BY THE TOWN OF ERIE ENGINEERING STAFF AND THE SOILS ENGINEER.
5. STREET PAVING SHALL NOT START UNTIL:
    - A. A SOILS REPORT AND PAVEMENT DESIGN IS ACCEPTED BY THE TOWN OF ERIE ENGINEERING STAFF.
    - B. ALL STREETS ARE COMPACTED IN ACCORDANCE WITH THE SOILS REPORT AND THE TOWN OF ERIE SPECIFICATIONS.
    - C. ALL COMPACTION TEST REPORTS HAVE BEEN SUBMITTED TO THE TOWN ENGINEERING STAFF PRIOR TO PROOF ROLLS.
    - D. PROOF ROLLS ARE PERFORMED USING SINGLE AXLE, FIVE (5) TON TRUCK AND MONITORED BY THE TOWN OF ERIE ENGINEERING STAFF.
6. THE OWNER/CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL UTILITY MANHOLE COVERS AND ACCESS LIDS TO GRADE.
7. ALL CONCRETE SHALL BE A MINIMUM OF CLASS B, IN CONFORMANCE WITH CDOT STANDARDS.
8. ALL CONCRETE EDGES MUST BE ROUNDED TO A FOURTH (1/4) INCH RADIUS, EXCEPT WHERE SHOWN OTHERWISE ON DRAWINGS.
9. ONE HALF (1/2) INCH EXPANSION JOINTS SHALL BE INSTALLED AT ALL CURB RETURNS, CURB CUTS AND EXISTING STRUCTURES. CONTROL JOINTS SHALL BE INSTALLED AT TEN (10) FOOT INTERVALS, HALF STONES ARE NOT ALLOWED.
10. BEFORE PLACING OF ASPHALT THE SUBGRADE SHALL RECEIVE A GROUND STERILANT APPLIED AT A RATE IN ACCORDANCE TO MANUFACTURERS RECOMMENDATIONS.
11. TACK COAT SHALL BE USED PRIOR TO OVERLAY, (CSS-1H), 50:50 DILUTION, 0.10 GAL/SY. ALL EDGES ABUTTING NEW PAVEMENT SHALL BE TACKED.
12. WHEN IT IS REQUIRED TO MATCH EXISTING PAVEMENT, EXISTING PAVEMENT SHALL BE SAW CUT IN A MANNER TO AFFECT A SMOOTH, VERTICAL STRAIGHT CUT EDGE.
13. ALL SAWCUT EDGES OF EXISTING PAVEMENT SHALL BE CLEAN AND COATED WITH TACK COAT PRIOR TO PLACING NEW PAVEMENT ADJACENT TO THE EXISTING PAVEMENT.
14. ALL ASPHALT SHALL BE ONE FOURTH (1/4) INCH ABOVE CONCRETE EDGES, MANHOLE COVERS AND ACCESS LIDS.
15. SIGNAGE AND STRIPING SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE COLORADO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, THE COLORADO DEPARTMENT OF TRANSPORTATION M&S STANDARDS, AND THE TOWN OF ERIE STANDARD DESIGN CRITERIA AND STANDARD CONSTRUCTION REQUIREMENTS.
16. THE PURCHASE AND INSTALLATION OF STREET NAME SIGNS SHALL BE THE RESPONSIBILITY OF THE OWNER/CONTRACTOR. THE OWNER/CONTRACTOR SHALL SECURE THE APPROVAL OF THE TOWN OF ERIE ENGINEERING STAFF FOR TYPE AND LOCATION OF THE STREET NAME SIGNS PRIOR TO INSTALLATION.
17. ALL NEW ROADWAY SECTIONS SHALL HAVE SUBGRADE PREPARATION AND INITIAL ASPHALT PAVEMENT PLACED WITH A 1% CROWN. FINAL OVERLAY IS TO BE PLACED WITH A 2% CROWN. SEE DETAIL ST7 IN THE “STANDARD DETAILS-STREET” FOR MORE INFORMATION.
18. DETERMINATION OF CROWN FOR CUL DE SAC PAVING SHALL BE EVALUATED ON A CASE BY CASE BASIS.

DEMOLITION NOTES

1. ALL DEMOLITION TO BE IN ACCORDANCE WITH STATE, LOCAL, AND FEDERAL REQUIREMENTS.
2. CONTRACTOR TO VERIFY ALL UTILITY MAIN AND LATERAL LOCATIONS AND EXISTING SITE CONDITIONS PRIOR TO PROCEEDING. ANY SITE CONDITIONS THAT ARE NOT AS SHOWN MUST BE REPORTED TO THE COMPANY REPRESENTATIVE PRIOR TO BID.
3. CONTRACTOR TO COORDINATE WITH UTILITY CO AND THE ENGINEER FOR DRY UTILITY LOCATIONS.
4. CONTRACTOR TO ERECT BARRIERS, FENCES, GUARDRAILS, ENCLOSURES, ETC. TO PROTECT SITE. THE PROTECTION PLAN MUST BE REVIEWED BY THE COMPANY REPRESENTATIVE PRIOR TO PROCEEDING.
5. COMPANY REPRESENTATIVE WILL DETERMINE WHEN CONDITIONS ARE SUITABLE TO COMMENCE WORK. CONTRACTOR TO VERIFY AREAS TO BE DEMOLISHED ARE UNOCCUPIED AND NOT IN USE.
6. DISPOSE OF AND TRANSPORT DEBRIS TO AREA OBTAINED BY CONTRACTOR. DO NOT STORE OR BURN MATERIALS ON SITE. CONTRACTOR TO HANDLE AND DISPOSE OF ALL DEBRIS IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS. DISPOSAL SHALL BE TRANSPORTED TO APPROVED LANDFILL OR OTHER APPROVED FACILITY.
7. FILL AND COMPACT BASEMENTS, CESSPOOLS, AND OTHER LARGE EXCAVATED AREAS WITH CLEAN FILL SUITABLE TO THE COMPANY REPRESENTATIVE AND IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS. GRADE TO MATCH EXISTING OR PROPOSED FINISH GRADE.
8. SEE PROJECT SPECIFICATIONS FOR EXISTING ITEMS TO BE SALVAGED AND OTHER REQUIREMENTS PERTAINING TO THE SALVAGE THEREOF.
9. ALL UNDERGROUND STORM SEWER, WATER, AND SANITARY SEWER MAIN LOCATIONS ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY.
10. ALL UNDERGROUND GAS AND ELECTRIC UTILITY INFORMATION SHOWN IS BASED ON MAPS PROVIDED BY UTILITY COMPANY AND ARE TO BE CONSIDERED AS AN APPROXIMATE LOCATION ONLY BASED ON SAID MAPS.
11. CONTRACTOR TO OBTAIN ALL PERMITS AND LICENSES REQUIRED FOR DEMOLITION OF WORK SHOWN.
12. CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE A LICENSED SURVEYOR REPLACE AND DAMAGED OR DISTURBED MONUMENTATION AT HIS/HER COST.
13. CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES (OVERHEAD AND UNDERGROUND) AT ALL TIMES DURING CONSTRUCTION OF WATER LINES, SANITARY SEWER LINES AND STORM LINES.
14. THIS PLAN PROVIDES GENERAL DEMOLITION INFORMATION ONLY AND DOES NOT NECESSARILY REPRESENT ALL ITEMS REQUIRED TO BE DEMOLISHED.
15. REFER TO ROADWAY SHEETS FOR DEMOLITION AND RELOCATIONS OCCURRING IN THE ADJACENT ROADWAYS AND INTERSECTIONS.
16. CLEARING AND GRUBBING OF SITE SHALL INCLUDE REMOVAL OF DOWNED TREES. DOWNED TREES ARE NOT SHOWN ON THIS PLAN.
17. CONCRETE FOUNDATIONS, BASEMENTS, CHANNELS, CURBS, AND OTHER CONCRETE STRUCTURES NOT SHOWN ON THIS PLAN SHALL BE REMOVED IF THEY CONFLICT WITH PROPOSED INFRASTRUCTURE OR LANDSCAPING. CONTRACTOR SHALL CONTACT OWNER'S REPRESENTATIVE WHEN THESE STRUCTURES ARE FOUND.
18. ALL STRIPING TO BE REMOVED SHALL BE GROUND OFF.

TOWN OF ERIE GENERAL NOTES – WATER

1. AT ALL POINTS OF CONNECTION OF NEW WATER MAINS TO EXISTING MAINS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR EXCAVATING AND VERIFYING LOCATION OF THE EXISTING LINES PRIOR TO ANY CONSTRUCTION.
2. EXCEPT IN CASE OF AN EMERGENCY, VALVES ON THE TOWN OF ERIE WATER SYSTEM SHALL BE OPERATED BY OR UNDER THE DIRECTION OF THE APPROPRIATE TOWN OF ERIE PERSONNEL. THE CONTRACTOR SHALL GIVE THE TOWN OF ERIE ENGINEERING STAFF 48 HOURS NOTICE TO ARRANGE FOR OPERATING VALVES. BOTH THE CONTRACTOR AND THE APPROPRIATE TOWN OF ERIE PERSONNEL SHALL BE PRESENT WHEN THE VALVES ARE OPERATED.
3. WATER AND SANITARY SEWER LINES SHALL HAVE A MINIMUM HORIZONTAL SEPARATION OF TEN (10) FEET. WHEN A TEN (10) FOOT SEPARATION IS NOT PROVIDED OR WHEN SEWER LINES CROSS WATER LINES WITH LESS THAN ONE AND ONE-HALF (1½) FEET OF VERTICAL SEPARATION, SEWER LINE JOINTS SHALL BE CONCRETE ENCASED. FOR PERPENDICULAR CROSSINGS, ENCASED JOINTS SHALL EXTEND TEN (10) FEET, PERPENDICULAR TO THE WATER LINE IN BOTH DIRECTIONS.
4. ALL WATER LINES SHALL HAVE A MINIMUM OF FOUR AND ONE-HALF (4½) FEET OF COVER AND BE LOCATED A MINIMUM OF TEN (10) FEET FROM THE SANITARY SEWER AND THREE (3) FEET FROM THE EDGE OF CONCRETE CURB AND GUTTER PAN.
5. CHANGES IN DIRECTION OF WATERLINE PIPE SHALL REQUIRE BENDS IN ALL INSTANCES. AXIAL DEFLECTION AT THE JOINTS SHALL NOT BE ALLOWED.
6. WHEN IT IS NECESSARY TO DEPRESS WATER LINES AT UTILITY CROSSINGS, A MINIMUM CLEARANCE OF ONE AND ONE-HALF (1-1/2) FEET SHALL BE MAINTAINED BETWEEN OUTSIDES OF PIPE.
7. DISTANCES FOR WATER LINES ARE THE HORIZONTAL DISTANCE BETWEEN THE CENTERS OF THE FITTINGS. THEREFORE, DISTANCES SHOWN ON THE PLANS ARE APPROXIMATE AND COULD VARY DUE TO VERTICAL ALIGNMENT AND FITTING DIMENSIONS.
8. ALL WATER LINE VALVES SHALL BE SET ADJACENT TO THE TEE, EXCEPT FOR POINTS THAT FALL IN THE FLOW LINE OF A CONCRETE CROSS PAN. IN WHICH CASE, THE VALVE SHALL BE LOCATED SO THAT SURFACE DRAINAGE DOES NOT INFILTRATE THE VALVE BOX. VALVE BOXES SHALL BE SET AT AN ELEVATION IN ACCORDANCE WITH TOWN PAVING REQUIREMENTS.
9. ALL WATER MAINS SHALL BE POLYVINYL CHLORIDE (PVC) PRESSURE PIPE UNLESS SPECIFIED OTHERWISE. NOMINAL PVC PIPE SIZES 6-INCH THROUGH 12-INCH SHALL CONFORM TO ALL REQUIREMENTS OF AWWA STANDARD C-900, PRESSURE CLASS 150 (DR18). NOMINAL PVC PIPE SIZES 16-INCH THROUGH 24-INCH SHALL CONFORM TO ALL REQUIREMENTS OF AWWA STANDARD C-905, PRESSURE CLASS 165 (DR25). ALL PVC PIPES SHALL HAVE OUTSIDE DIAMETERS EQUIVALENT TO CAST IRON PIPE.
10. FIRE HYDRANT ASSEMBLY INCLUDES THE FIRE HYDRANT, SIX (6) INCH VALVE, AND SIX (6) INCH PIPE. INSTALLATION SHALL BE IN ACCORDANCE WITH THE TOWN OF ERIE STANDARDS AND SPECIFICATIONS.
11. ALL FITTINGS SHALL BE MADE FROM DUCTILE IRON, FURNISHED WITH MECHANICAL JOINT ENDS OR INTEGRAL RESTRAINED JOINTS, AND SHALL HAVE A PRESSURE RATING OF 350 PSI.
12. POLYETHYLENE WRAPPING SHALL BE INSTALLED AROUND ALL DUCTILE IRON PIPES, FITTINGS, VALVES, FIRE HYDRANT BARRELS AND ROD AND CLAMPS. THE POLYETHYLENE SHALL HAVE A MINIMUM THICKNESS OF EIGHT (8) MILS, IN ACCORDANCE WITH AWWA STANDARD C-105.
13. ALL WATER LINE PIPE SHALL BE PROVIDED WITH A MINIMUM GAGE SIZE OF 12 SINGLE STRAND INSULATED COPPER WIRE. SPLICES IN TRACER WIRE SHALL BE CAPPED IN WATER PROOF GEL CAP TYPE CONNECTORS SUITED FOR DIRECT BURY APPLICATION (3M TYPE DBY-6 LOW VOLTAGE OR EQUAL). WIRE SHALL BE ATTACHED TO TOP OF WATER LINE WITH 2-INCH WIDE PVC TAPE @ 5-FT INTERVALS ALONG TRACER WIRE SHALL EXTEND TO THE SURFACE AND BE COILED IN A LOCATE BOX AT THE BACKSIDE OF EITHER EACH FIRE HYDRANT OR VALVE. UNDER THE SUPERVISION OF TOWN OF ERIE ENGINEERING STAFF, TEST SHALL BE MADE BY THE CONTRACTOR @ THE COMPLETION OF CONSTRUCTION TO INSURE THAT THE TRACER WIRES CARRY A CONTINUOUS CURRENT BETWEEN ALL ACCESS POINTS.
14. WARNING TAPE SHALL BE INSTALLED 12” MINIMUM AND 18” MAXIMUM ABOVE WATER PIPE.
15. BEDDING MATERIAL SHALL CONFORM TO TOWN OF ERIE STANDARDS AND SPECIFICATIONS.
16. VALVES SHALL OPEN COUNTER CLOCKWISE. VALVES 12-INCH AND SMALLER SHALL BE RESILIENT SEAT GATE VALVES. LARGER VALVES SHALL BE BUTTERFLY VALVES.
17. VALVE BOXES SHALL BE RAISED TO ONE-FOURTH (1/4) INCH BELOW GRADE AFTER COMPLETION OF SURFACE PAVING OR FINAL GRADING. VALVE BOXES IN NON-PAVED AREAS SHALL HAVE A CONCRETE COLLAR AROUND THE VALVE LID IN ACCORDANCE WITH THE DETAIL.
18. ALL SERVICE LINE TAPS SHALL HAVE DOUBLE STRAP BRASS TAPPING SADDLES. (ROMAC 202B OR APPROVED EQUAL).
19. ALL RESIDENTIAL WATER TAPS SHALL BE THREE-QUARTER (3/4) INCH OR AS REQUIRED BY THE CURRENT BUILDING CODE.
20. ALL WATER SERVICE LATERALS SHALL EXTEND FIVE (5) FEET BEYOND RIGHT OF WAY OR UTILITY EASEMENTS, WHICHEVER IS GREATER. THE ENDS SHALL BE MARKED BY A BLUE PAINTED WOOD POST UNTIL CURB AND GUTTER IS IN PLACE. WHEN CURB AND GUTTER IS IN PLACE THE LATERALS SHALL BE MARKED ON THE CONCRETE CURB FACE WITH A “V" or “W”.
21. CONCRETE THRUST BLOCKS AND/OR "MEGA-LUG" MECHANICAL RESTRAINTS ARE REQUIRED AT ALL MECHANICAL FITTINGS. THRUST BLOCKS MAY NOT BE REQUIRED IF PIPE RESTRAINT IS PROVIDED IN ACCORDANCE WITH RESTRAINED PIPE DETAIL.
22. NO WORK SHALL BE BACKFILLED (INCLUDING BEDDING MATERIAL ABOVE THE SPRING LINE OF THE PIPE) UNTIL THE CONSTRUCTION HAS BEEN INSPECTED AND APPROVED FOR BACKFILLING BY THE TOWN OF ERIE ENGINEERING STAFF.
23. ONLY ONE CONNECTION TO THE EXISTING WATER DISTRIBUTION SYSTEM SHALL BE MADE UNTIL ALL HYDROSTATIC TESTING, CHLORINATION AND FLUSHING HAS BEEN COMPLETED.
24. DISINFECTION AND HYDROSTATIC TESTING SHALL BE DONE IN THE PRESENCE OF A TOWN OF ERIE ENGINEERING STAFF. CONTACT THE TOWN OF ERIE DEPARTMENT OF PUBLIC WORKS, FORTY-EIGHT (48) HOURS PRIOR TO DISINFECTING AND/OR TESTING.
25. DISINFECTION AND FLUSHING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE COLORADO DEPARTMENT OF HEALTH AND THE PROCEDURE SET FORTH IN AWWA C651, "STANDARD FOR DISINFECTING WATER MAINS". THE CHLORINATION OF THE WATER LINE SHALL BE PERFORMED PRIOR TO THE HYDROSTATIC TESTING. ALL VALVES, FIRE HYDRANTS AND OTHER APPURTANCES SHALL BE OPERATED WHILE PIPELINE IS FILLED WITH THE CHLORINATING AGENT TO INSURE THAT HIGH CHLORINE CONTACT IS MADE WITH ALL INTERNAL SURFACES.
26. ALL WATER LINES SHALL BE HYDROSTATIC TESTED. PRESSURE AND LEAKAGE TESTS SHALL BE CONDUCTED ACCORDING TO THE APPLICABLE SECTIONS OF AWWA C600/605 TO A MINIMUM PRESSURE OF ONE HUNDRED AND FIFTY (150) POUNDS PER SQUARE (PSI) INCH AT THE LOW POINT OF THE SECTION BEING TESTED FOR THE DURATION OF TWO (2) HOURS. THE MAXIMUM LENGTH OF LINE TO BE TESTED SHALL BE ONE THOUSAND (1,000) FEET. ALL JOINTS IN CONNECTIONS ARE TO BE WATERTIGHT WITHIN TOLERANCES ALLOWED BY THE SPECIFICATIONS IN AWWA C600/605. ANY LEAKAGE THAT IS DISCOVERED BY OBSERVATION OR TESTS SHALL BE LOCATED AND MADE WATERTIGHT BY THE CONTRACTOR. PRESSURE AND LEAKAGE TESTS SHALL NOT BE CONDUCTED UNTIL THE LINE HAS PASSED ALL REQUIRED DISINFECTION TESTS.
27. SUBSTANTIAL COMPLETION/CONSTRUCTION ACCEPTANCE OF THE NEW WATER LINES ARE CONTINGENT UPON RECEIVING COPIES OF:
    - A. WATER TRENCH COMPACTION TEST RESULTS
    - B. HYDRO STATIC TESTING OF 100% OF THE SYSTEM
    - C. HEALTH DEPARTMENT TESTS. (CHLORINE AND/OR CLEAR WATER AS REQUIRED)
28. ALL METER PITS AND CURB STOPS SHALL BE PROTECTED AT THE TIME OF INSTALLATION WITH A MINIMUM OF THREE (3) T-POSTS AND ORANGE SAFETY FENCE. THE T-POST AND SAFETY FENCE SHALL REMAIN IN PLACE AND IN GOOD CONDITION UNTIL THE LANDSCAPING IS INSTALLED.
29. ALL WATER VAULTS SHALL BE WATER TIGHT. CONTRACTOR SHALL SEAL VAULTS TO ENSURE SURFACE WATER DOES NOT INFILTRATE INTO THE VAULTS. VAULT LIDS SHALL BE PLACED TO ENSURE THAT SURFACE WATER DOES NOT FLOW INTO THE VAULTS.

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VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BLVD & STATE HWY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
CIVIL CONSTRUCTION DRAWINGS

ERIE, COLORADO

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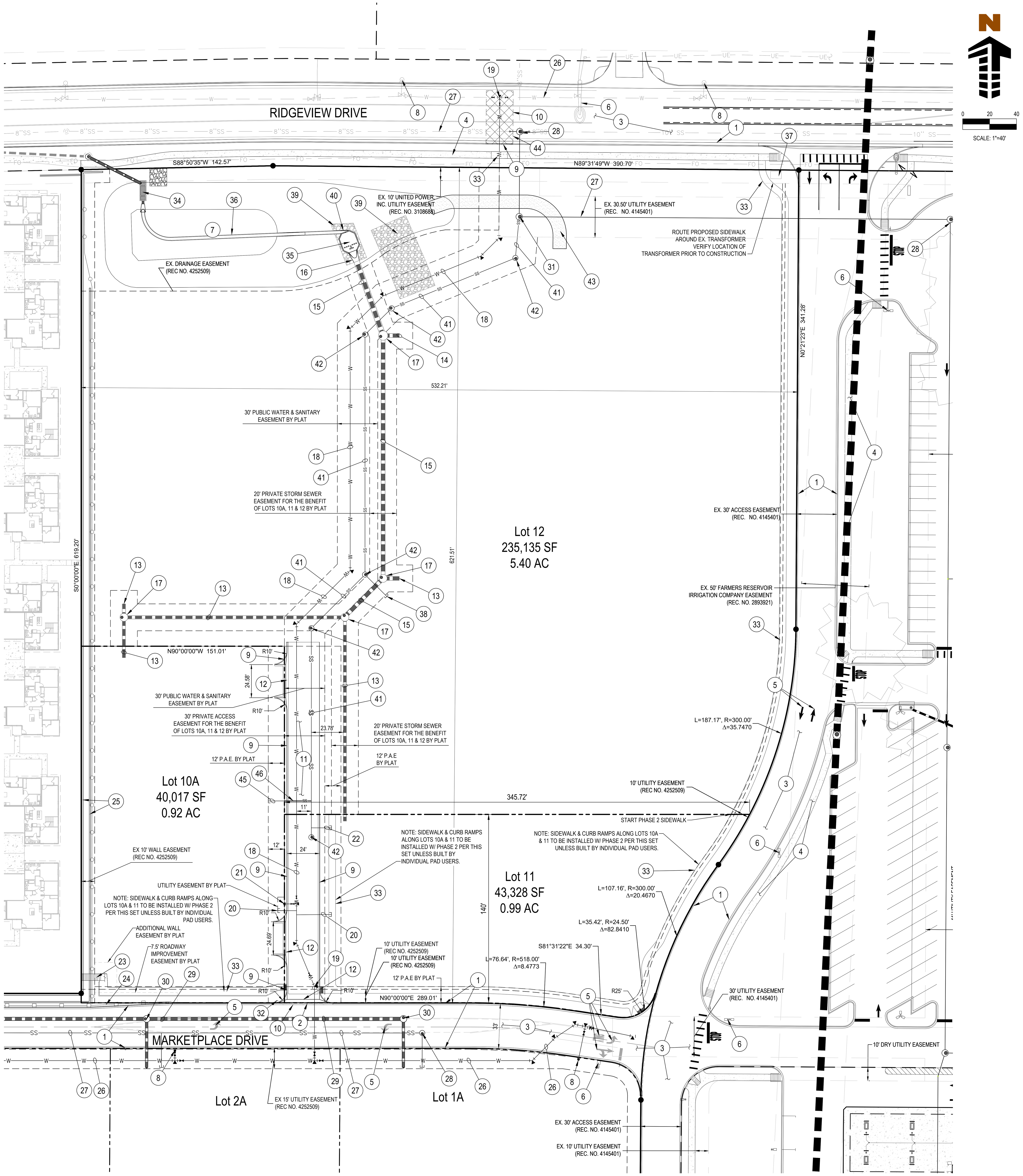
5	06/25/2019	5TH CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

GENERAL NOTES



SITE LEGEND

- PROPERTY BOUNDARY LINE
- R.O.W. LINE
- PROPOSED LOT LINE
- EASEMENT BOUNDARY LINE
- EXISTING TO REMAIN
- EXISTING CURB & GUTTER TO REMAIN
- PROPOSED CURB & GUTTER
- PROPOSED CONCRETE PAVING
- PROPOSED ASPHALT PAVING
- EXISTING ASPHALT TO BE REMOVED & REPLACED
- PROPOSED SIDEWALK

UTILITY LEGEND

- EXISTING WATER LINE
- PROPOSED WATER LINE
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- STREET LIGHT
- EXISTING FIRE HYDRANT
- PROPOSED MANHOLE COVER
- PROPOSED REGULATORY SIGN
- EXISTING INLET
- EXISTING VEHICULAR GUARDRAIL
- EXISTING PEDESTRIAN FENCE

SCHEDULE

1. EXISTING CURB AND GUTTER TO REMAIN
2. EXISTING CURB AND GUTTER TO BE REMOVED
3. EXISTING ASPHALT TO REMAIN
4. EXISTING SIDEWALK TO REMAIN
5. EXISTING STRIPING TO REMAIN
6. EXISTING STREET LIGHT TO REMAIN
7. EXISTING DETENTION POND TO REMAIN
8. EXISTING FIRE HYDRANT TO REMAIN
9. PROPOSED 6" VERTICAL CURB & GUTTER W/ 1' PAN (SEE DETAIL, SHEET C1.3)
10. PROPOSED SAWCUT OF EXISTING PAVEMENT
11. PROPOSED STANDARD DUTY ASPHALT (SEE DETAIL, SHEET C1.3)
12. PROPOSED CONCRETE CROSS PAN (WIDTH PER PLAN), (SEE DETAIL, SHEET C1.3)
13. PROPOSED PRIVATE 24" STORM SEWER LINE
14. PROPOSED PRIVATE 30" STORM SEWER LINE
15. PROPOSED PRIVATE 36" STORM SEWER LINE
16. PROPOSED 36" FES (SEE DETAIL, SHEET C5.2)
17. PROPOSED STORM SEWER MANHOLE - REF. STORM PLANS FOR SIZE (SEE SHEET C5.2)
18. PROPOSED 8" WATER LINE
19. CONNECT TO EXISTING WATER MAIN (SEE SHEET C6.2 & C6.3)
20. PROPOSED 1" WATER SERVICE STUB
21. PROPOSED FIRE HYDRANT ASSEMBLY AND LATERAL (SEE DETAIL, SHEET C6.2 & C6.3)
22. PROPOSED 4" SANITARY SEWER STUB
23. EXISTING SITE STAIRS TO REMAIN
24. EXISTING GUARDRAIL TO REMAIN
25. EXISTING RETAINING WALL TO REMAIN
26. EXISTING WATER LINE TO REMAIN
27. EXISTING SANITARY SEWER MAIN TO REMAIN
28. EXISTING SANITARY MANHOLE TO REMAIN
29. EXISTING STORM SEWER TO REMAIN
30. EXISTING STORM SEWER MANHOLE TO REMAIN
31. CONNECT TO EXISTING SANITARY SEWER
32. PROPOSED STOP SIGN
33. PROPOSED 5' DETACHED SIDEWALK
34. EXISTING OUTLET STRUCTURE TO REMAIN
35. PROPOSED CONCRETE FOREBAY (SEE DETAIL, SHEET C5.2)
36. EXISTING CONCRETE TRICKLE CHANNEL (SEE DETAIL, SHEET C5.2)
37. EXISTING ELECTRICAL TRANSFORMER
38. PROPOSED 8" SANITARY SEWER STUB FOR FUTURE MAIN EXTENSION
39. PROPOSED TYPE L RIPRAP (SEE DETAIL, SHEET C5.2)
40. PROPOSED 2' CONCRETE TRICKLE CHANNEL (SEE DETAIL, SHEET C5.2)
41. PROPOSED 8" SANITARY SEWER
42. PROPOSED 4' DIA SANITARY SEWER MANHOLE (SEE DETAIL, SHEET C7.2 & C7.3)
43. EXISTING ACCESS AND MAINTENANCE PATH FOR POND
44. PROPOSED ASPHALT PAVEMENT TO BE REMOVED & REPLACED (PATCH BACK TO MATCH EXISTING)
45. PROPOSED 6" SANITARY SEWER STUB
46. PROPOSED 20 LF CONCRETE PIPE ENCASEMENT (6" THICK) 10 LF EACH SIDE OF WATER CROSSING STARTING FROM TEE, PER ERIE SECTION 716.00)

BENCHMARK

BROOMFIELD CONTROL POINT KNOWN AS "LUCY", WHICH IS A BROOMFIELD DISK ON A #5 REBAR. CONTROL POINT "LUCY" IS IDENTIFIED BY AN ORANGE WITNESS POST AND LOCATED ON THE SOUTH SIDE OF STATE HIGHWAY 7, APPROXIMATELY 1.8 MILES WEST OF INTERSTATE 25, HAVING A PUBLISHED ELEVATION OF 5297.00 FEET, NAVD 88 DATUM.

BASIS OF BEARING

BEARINGS ARE BASED ON THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST. BEING MONUMENTED ON THE SOUTH BY A #6 REBAR AND CAP IN A RANGE BOX AND ON THE NORTH BY A 2.5" ALUMINUM CAP STAMPED PLS # 24302 AND IS CONSIDERED TO BEAR N00°12'01"W.

LEGAL DESCRIPTION

A PARCEL OF LAND ACROSS PARCELS 33 AND 34 OF "VISTA RIDGE MASTER FINAL PLAT" AND LOT 2 AND TRACT A OF "VISTA RIDGE FILING NO. 12", LOCATED IN THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH P.M., TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO. SEE SURVEY FOR DETAILED DESCRIPTION.

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VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BLVD & STATE HWY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
CIVIL CONSTRUCTION DRAWINGS

ERIE, COLORADO

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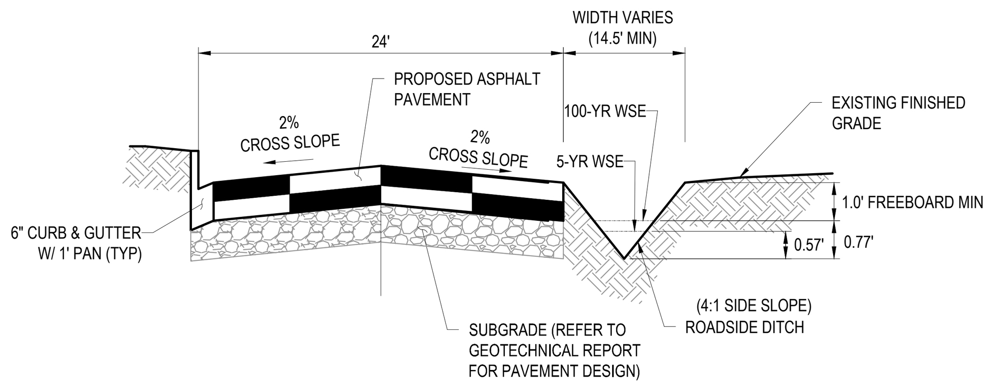
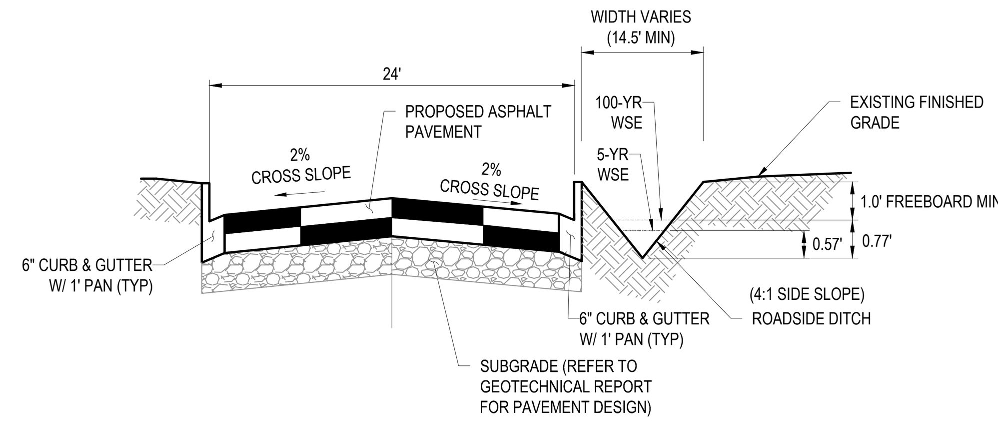
Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

OVERALL SITE & UTILITY PLAN

C1.1

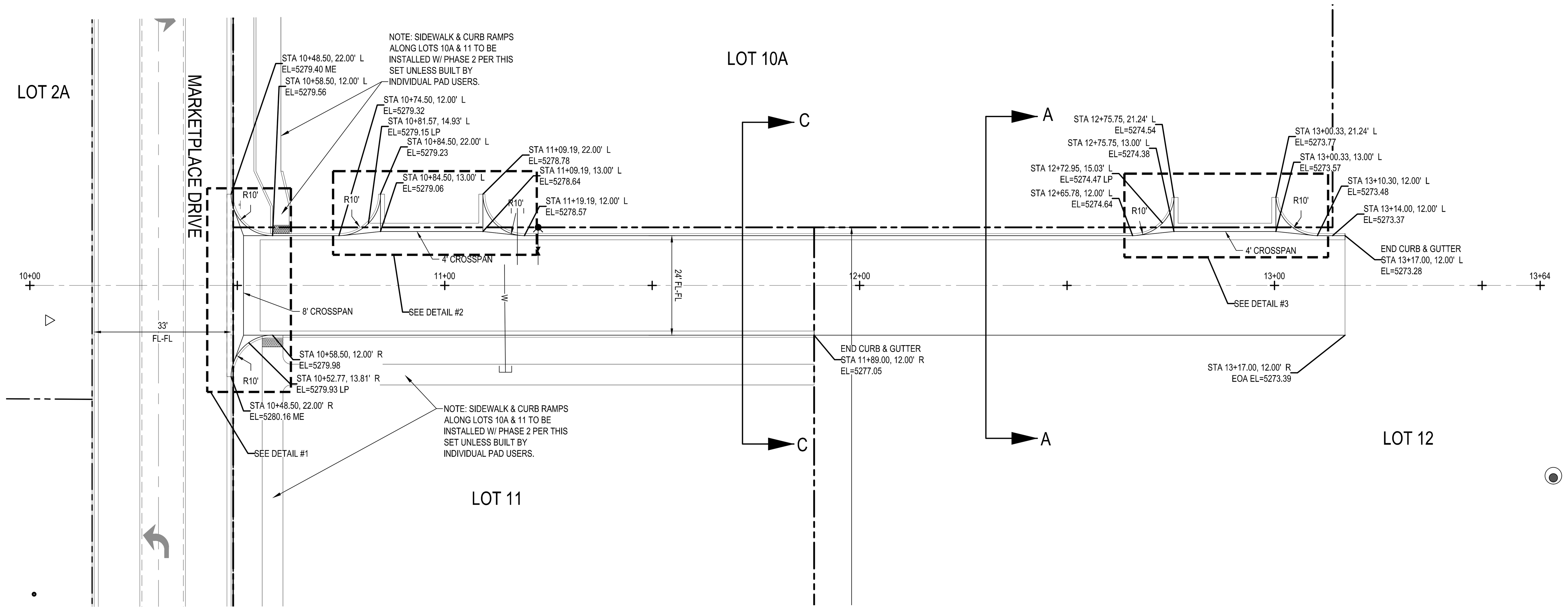


TYPICAL ACCESS ROAD SECTION A-A
SCALE: NOT TO SCALE

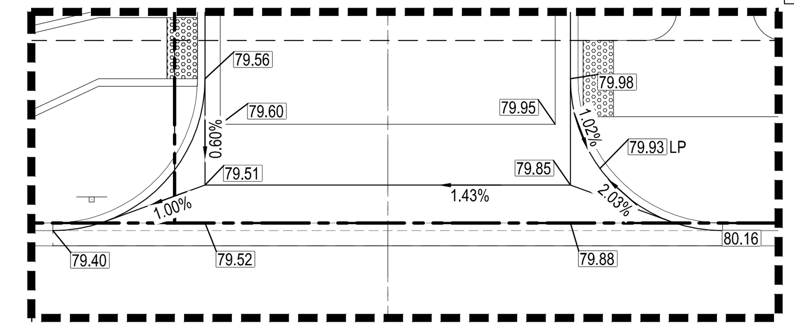


TYPICAL ACCESS ROAD SECTION C-C
SCALE: NOT TO SCALE

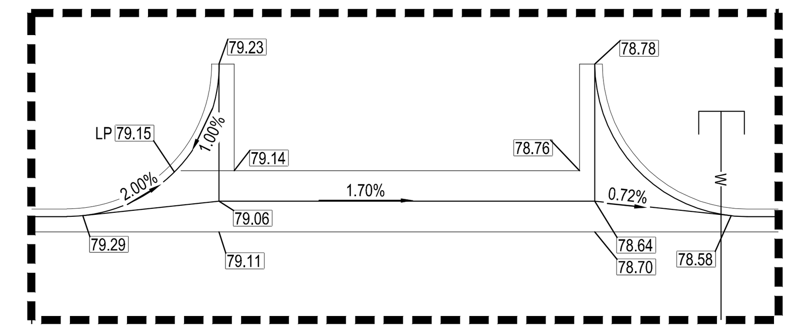
N
SCALE: 1"=20'



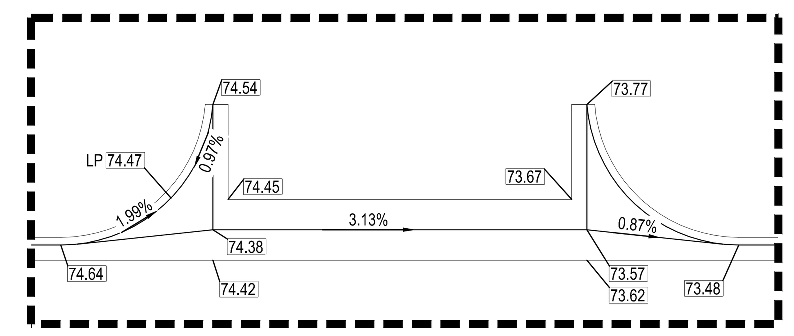
PLAN: LOT 10 ACCESS DRIVE (STA. 10+00 TO 13.64)
SCALE: 1"=20'



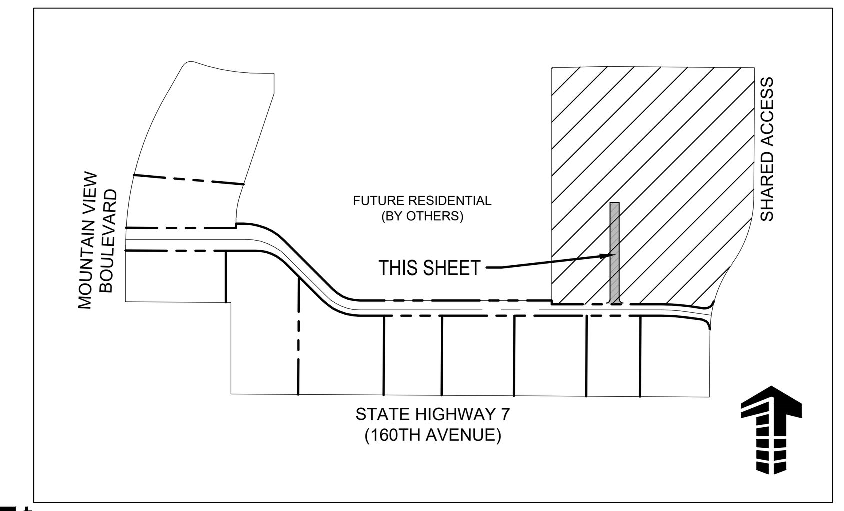
DETAIL #1: MARKETPLACE DRIVE CROSSPAN DETAIL
SCALE: 1" = 10'



DETAIL #2: LOT 10 SOUTH CROSSPAN DETAIL
SCALE: 1" = 10'



DETAIL # 3: LOT 10 NORTH CROSSPAN DETAIL
SCALE: 1" = 10'



KEY MAP
1" = 400'

SITE LEGEND

- PROPERTY BOUNDARY LINE
- ADJACENT PROPERTY BOUNDARY LINE
- EASEMENT LINE
- EXISTING TO REMAIN
- EXISTING TO BE REMOVED
- PROPOSED CURB AND GUTTER
- EXISTING STREET LIGHT
- EXISTING FIRE HYDRANT
- EXISTING MANHOLE COVER
- EXISTING UTILITY PEDESTAL

GENERAL NOTES

1. ALL ELEVATIONS SHOWN ARE AT THE FLOWLINE UNLESS OTHERWISE STATED.

NOTE: MAINTAIN MINIMUM 18" VERTICAL AND 10' HORIZONTAL SEPARATION (OUTSIDE OF PIPE TO OUTSIDE OF PIPE) BETWEEN POTABLE WATERLINE AND STORM OR SANITARY SEWERS AND LATERALS. AN 18" VERTICAL CLEARANCE MUST BE MAINTAINED BETWEEN IRRIGATION LINES.

NOTE: CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE LICENSED SURVEYOR REPLACE ANY DAMAGED OR DISTURBED MONUMENTATION AT THEIR COST.

NOTE: CONTRACTOR RESPONSIBLE FOR AS-BUILT DRAWINGS, TESTS, REPORTS AND/OR ANY OTHER CERTIFICATES OR INFORMATION AS REQUIRED FOR ACCEPTANCE OF WORK FROM CITY, UTILITY DISTRICTS OR ANY OTHER GOVERNING AGENCY.

NOTE: CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL INFORMATION FOR FINAL ACCEPTANCE OF WORK FOR ANY LOCAL, STATE OR FEDERAL AGENCY, UTILITY DISTRICT OR ANY OTHER AGENCY OR DISTRICT HAVING APPROVAL AUTHORITY OVER WORK. THIS INFORMATION MAY INCLUDE, BUT IS NOT LIMITED TO, AS-BUILT PLANS, CERTIFICATIONS, INSPECTIONS AND REPORTS.

SURVEYOR TO OBTAIN AUTOCAD FILE FROM ENGINEER AND VERIFY ALL HORIZONTAL CONTROL DIMENSIONING PRIOR TO CONSTRUCTION STAKING. SURVEYOR MUST VERIFY ALL BENCHMARK, BASIS OF BEARING AND DATUM INFORMATION TO ENSURE IMPROVEMENTS WILL BE AT THE SAME HORIZONTAL AND VERTICAL LOCATIONS SHOWN ON THE DESIGN CONSTRUCTION DRAWINGS. PRIOR TO CONSTRUCTION STAKING ANY DISCREPANCY MUST BE REPORTED TO OWNER AND ENGINEER PRIOR TO CONTINUATION OF ANY FURTHER STAKING OR CONSTRUCTION WORK.

BENCHMARK

BROOMFIELD CONTROL POINT KNOWN AS "LUCY", WHICH IS A BROOMFIELD DISK ON A #5 REBAR. CONTROL POINT "LUCY" IS IDENTIFIED BY AN ORANGE WITNESS POST AND LOCATED ON THE SOUTH SIDE OF STATE HIGHWAY 7, APPROXIMATELY 1.8 MILES WEST OF INTERSTATE 25, HAVING A PUBLISHED ELEVATION OF 5297.00 FEET, NAVD 88 DATUM.

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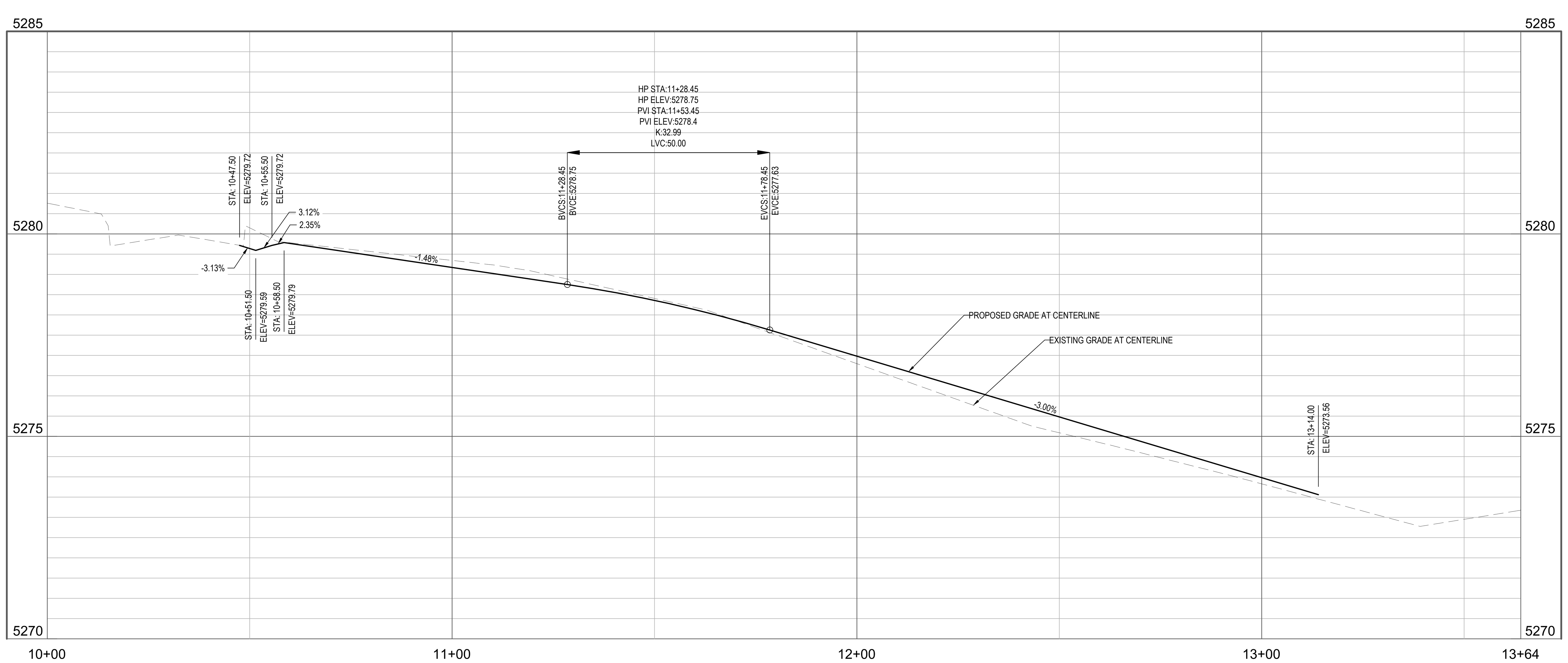

PROFILE: LOT 10 ACCESS DRIVE (STA. 10+00 TO 13+64)
SCALE: H: 1"=20' V: 1" = 2'

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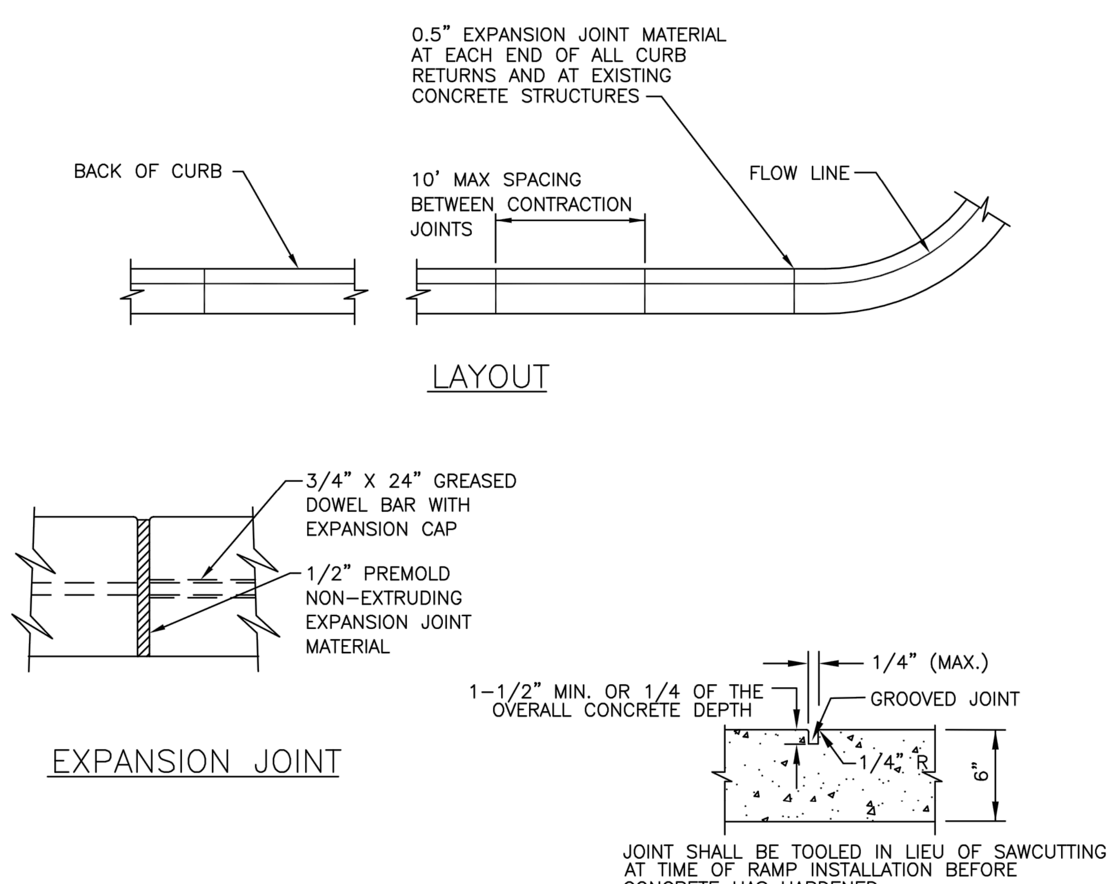
Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

ROADWAY
PLAN & PROFILE

C1.2

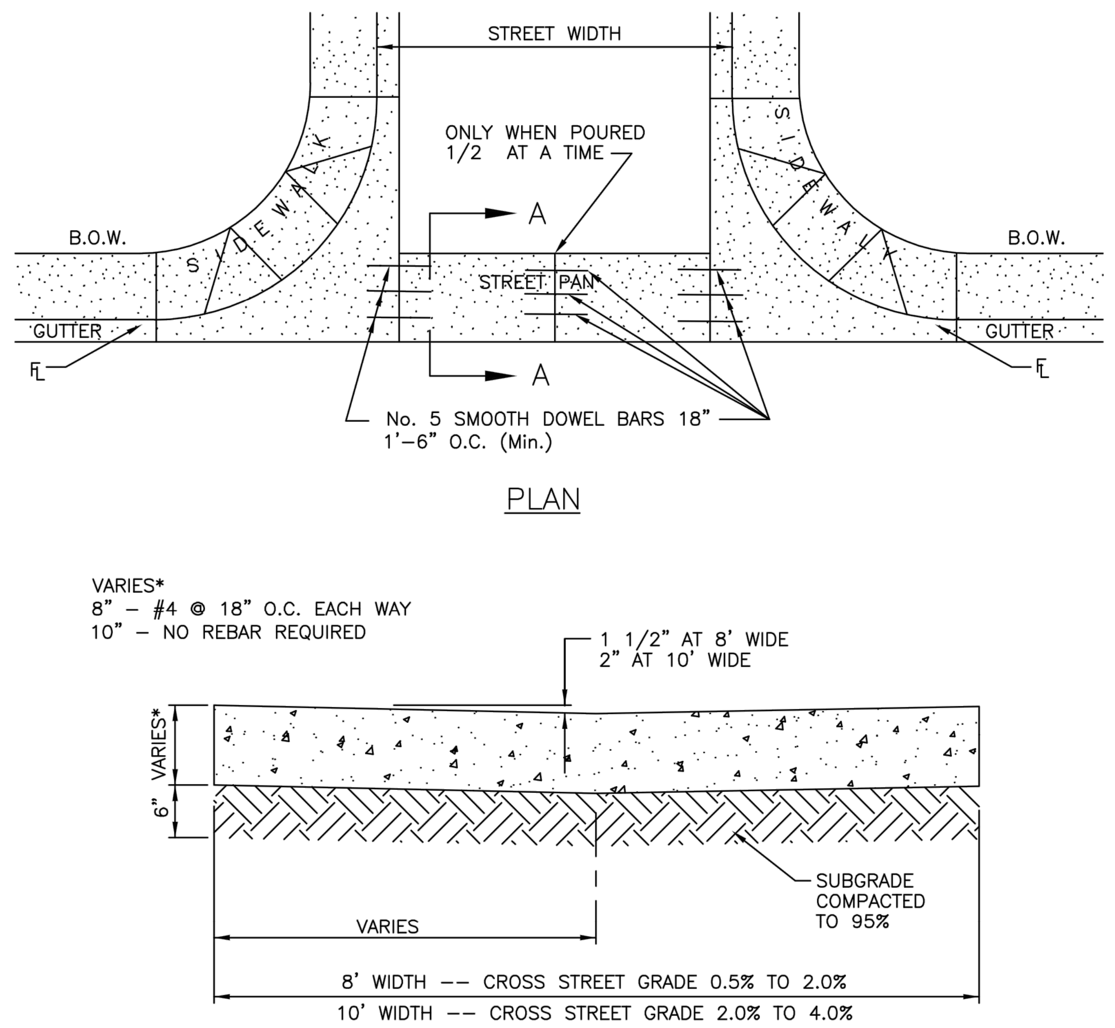


NOTES:

1. EXPANSION JOINT MATERIAL SHALL BE NON-EXTRUDING AND RESILIENT TYPE TO MEET AASHTO SPEC. M-213.
2. ANY OVER-EXCAVATION SHALL BE REPLACED BY GRANULAR BACKFILL COMPACTED TO 95% MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-698.

The Town of ERIE COLORADO

DRAWING TITLE: CURB AND GUTTER JOINT DETAIL
DRAWING NUMBER: SW1
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 01/2010

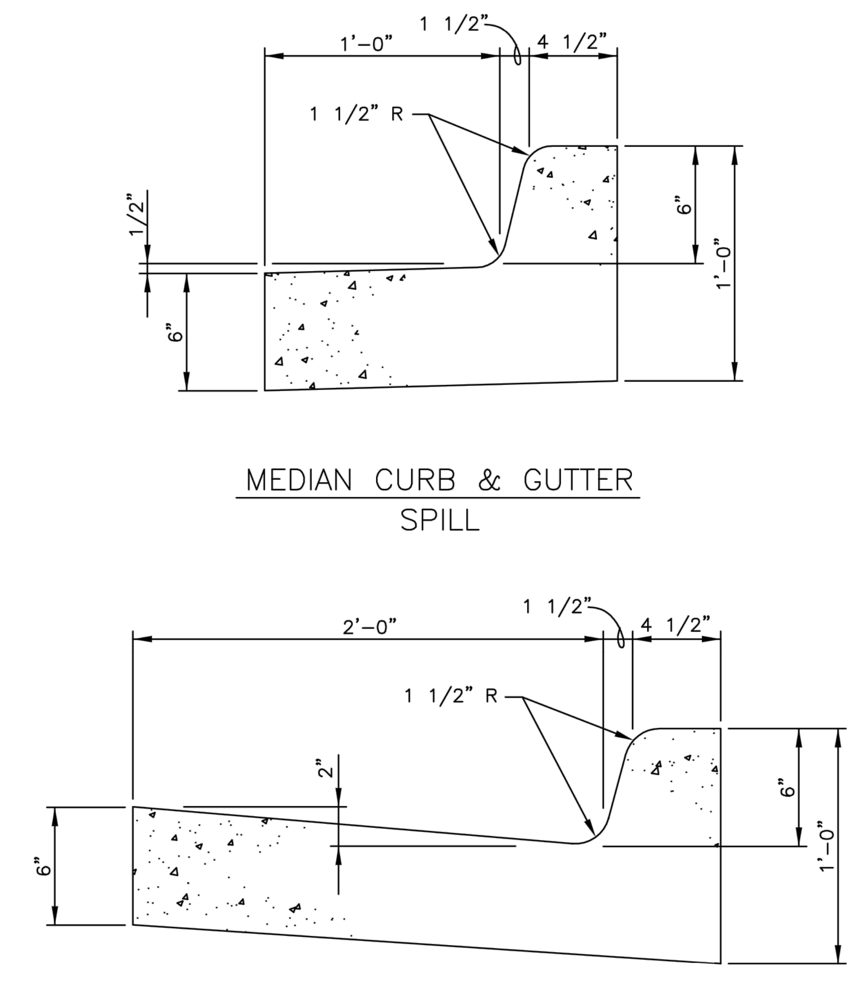


CONCRETE CROSS PAN

NOT TO SCALE

The Town of ERIE COLORADO

DRAWING TITLE: CONCRETE CROSS PAN
DRAWING NUMBER: SW3
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2010

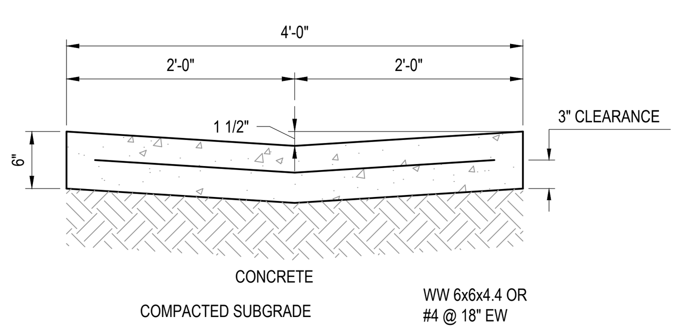


NOTES:

1. SUBGRADE TO BE COMPACTED TO 95% MODIFIED PROCTOR.

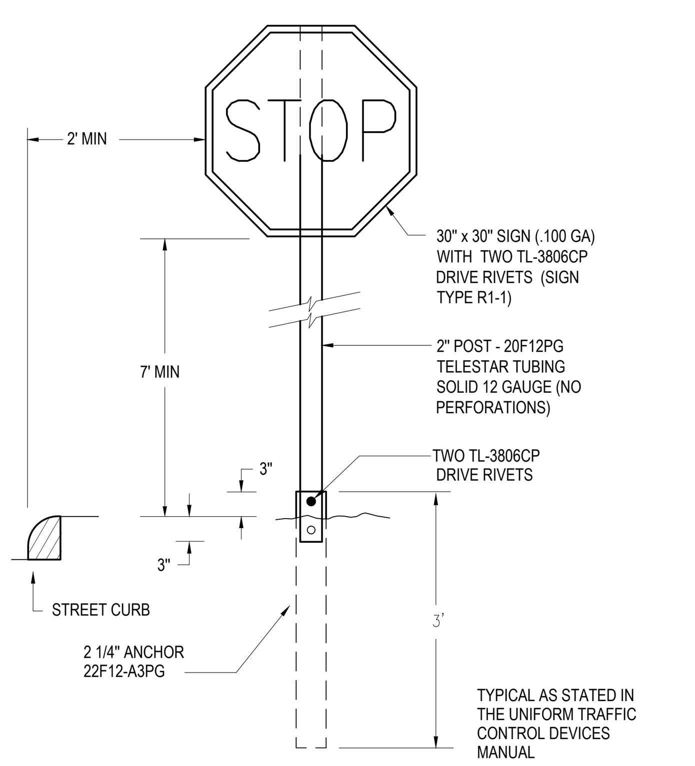
The Town of ERIE COLORADO

DRAWING TITLE: VERTICAL CURB SECTION
DRAWING NUMBER: SW12
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 01/2010



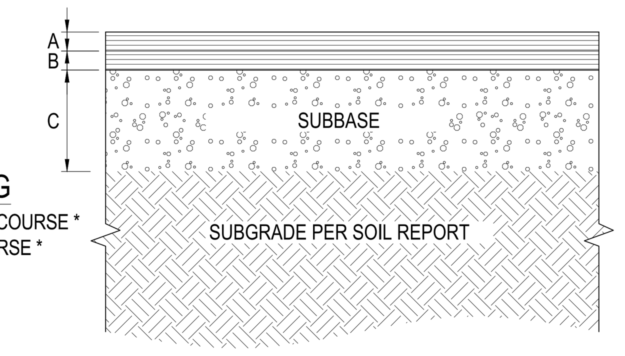
1 4' CROSS PAN DETAIL

SCALE: 3/4" = 1'-0"



2 STOP SIGN DETAIL

SCALE: 1 1/2" = 1'-0"



STANDARD DUTY PAVING

A = ASPHALT CONCRETE - SURFACE COURSE *
B = ASPHALT CONCRETE - BASE COURSE *
C = AGGREGATE BASE COURSE

*ALL PAVEMENT SECTION THICKNESSES SHALL BE AS INDICATED IN THE GEOTECHNICAL REPORT.

ASPHALT PAVING NOTES

A. SUBGRADE COMPACTION: PER PROJECT SPECIFICATIONS.
B. BASE COURSE TO CONFORM TO CDOT CLASS 5 OR 6 DESIGNATION, MOISTURE TREATED TO WITHIN 2% OF OPTIMUM AND COMPACTED TO AT LEAST 95% OF MAXIMUM MODIFIED PROCTOR DRY DENSITY.
C. ALL SUBGRADE AND PAVEMENT OPERATIONS AND MATERIALS SHALL MEET THE MINIMUM REQUIREMENTS OF THE CURRENT CDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
D. PROVIDE TACK COAT BETWEEN CONSECUTIVE COURSES NOT APPLIED WITHIN 24 HOURS OF PLACEMENT OF THE PRIOR COURSE.
E. MINIMUM AGGREGATE BASE COURSE IS 9-INCHES; USE A THICKER SECTION IF INDICATED IN THE GEOTECHNICAL REPORT.

3 ASPHALT PAVING DETAILS

NOT TO SCALE

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VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BLVD & STATE HWY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
CIVIL CONSTRUCTION DRAWINGS

ERIE, COLORADO

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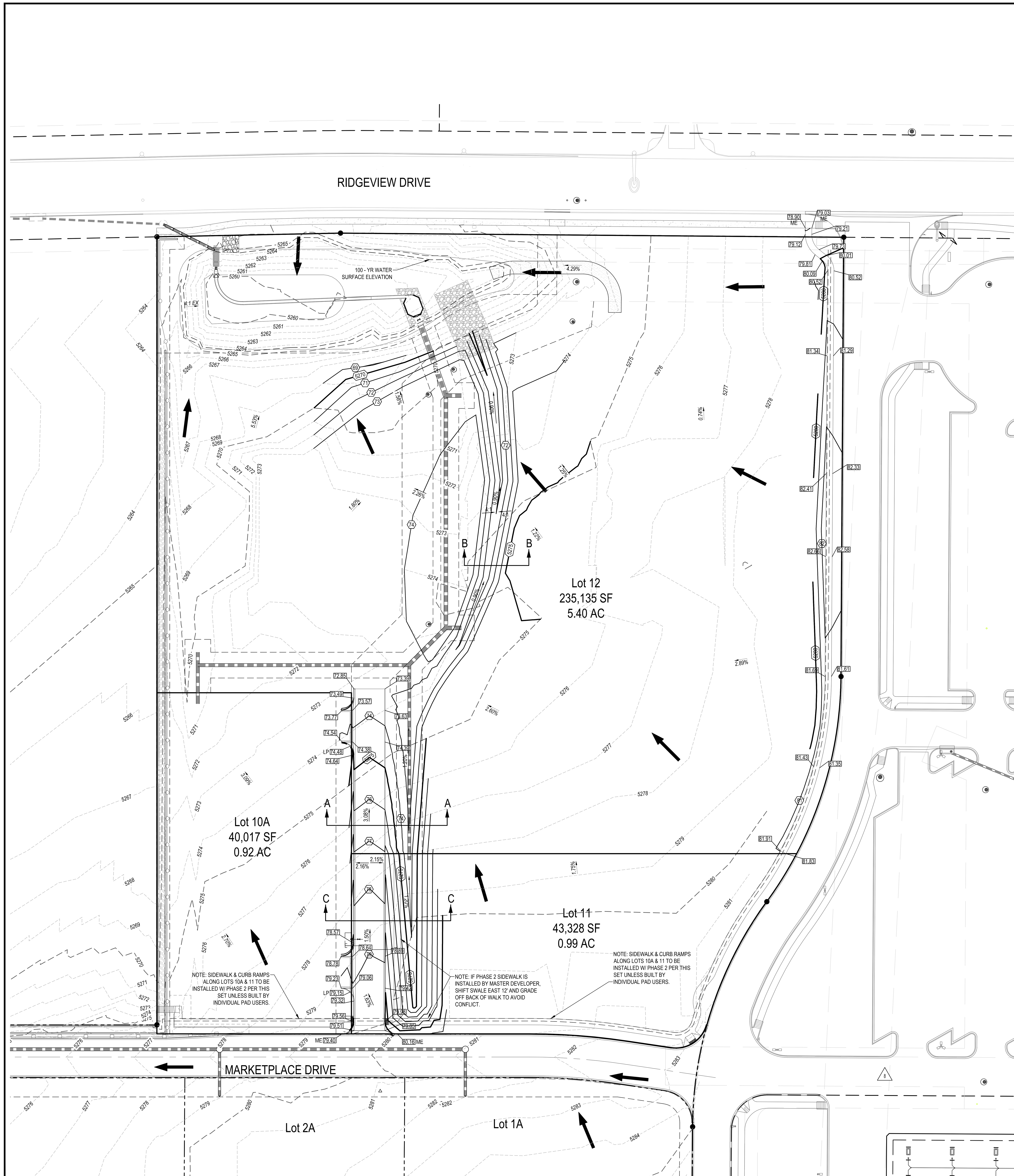
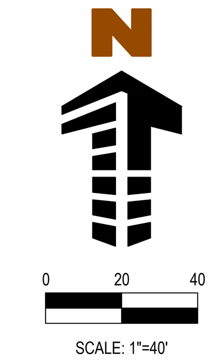
5	06/25/2019	5TH CITY SUBMITTAL	PJD

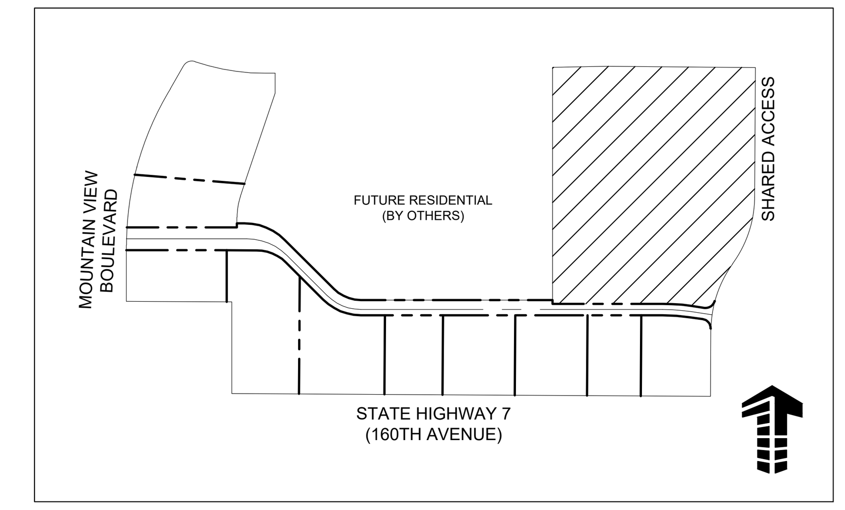
Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

SITE DETAILS

C1.3







KEY MAP
1" = 400'

NOTES

1. ADD 5200 TO ALL SPOT ELEVATIONS.
2. SEE STORM SEWER PLANS FOR STORM SEWER INFORMATION.
3. ALL GRADES SHOWN ARE TO FLOWLINE UNLESS OTHERWISE NOTED.
4. CONTRACTOR SHALL FIELD VERIFY GRADES IN THE LOCATIONS INDICATED AT THE TIME OF CONSTRUCTION. CARE SHALL BE TAKEN TO MATCH EXISTING GRADES AT PROPERTY LINE TO ENSURE A SMOOTH TRANSITION BETWEEN PROPOSED ASPHALT PAVEMENT AND ADJACENT PROPERTY .
5. EXISTING AND PROPOSED CONTOURS ARE SHOWN AT 1' INTERVALS.
6. MAX SIDEWALK CROSS SLOPE SHALL NOT EXCEED 2% AND MAX LONGITUDINAL SLOPE SHALL NOT EXCEED 5% AT ANY POINT.

CAUTION - NOTICE TO CONTRACTOR

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2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

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

GRADING LEGEND

05	EXISTING MAJOR CONTOUR
04	EXISTING MINOR CONTOUR
5205	PROPOSED MAJOR CONTOUR
04	PROPOSED MINOR CONTOUR
05.00	EXISTING SPOT ELEVATION
05.00	PROPOSED SPOT ELEVATION
ME	MATCH EXISTING
STS	EXISTING STORM SEWER
STS	PROPOSED STORM SEWER
	FLOW DIRECTION ARROW
1.0%	PROPOSED SLOPE

BASIS OF BEARING

BEARINGS ARE BASED ON THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST. BEING MONUMENTED ON THE SOUTH BY A #6 REBAR AND CAP IN A RANGE BOX AND ON THE NORTH BY A 2.5" ALUMINUM CAP STAMPED PLS # 24302 AND IS CONSIDERED TO BEAR N00°12'01"W.

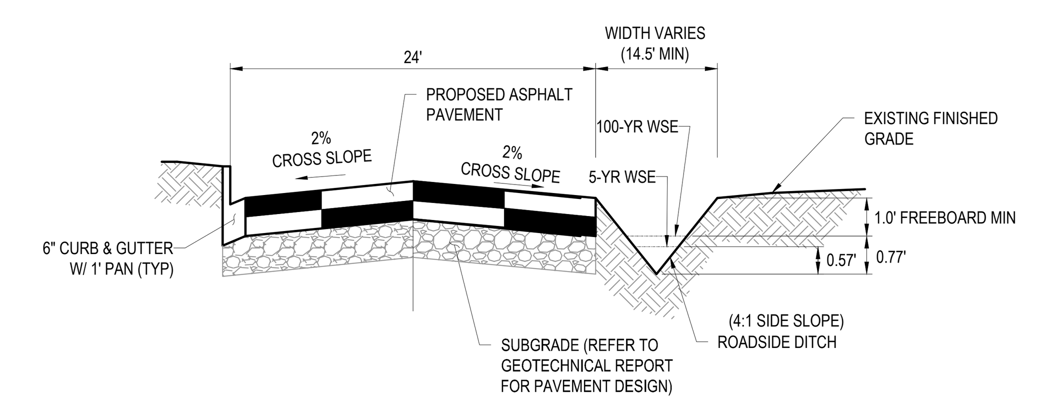
BENCHMARK

BROOMFIELD CONTROL POINT KNOWN AS "LUCY", WHICH IS A BROOMFIELD DISK ON A #5 REBAR. CONTROL POINT "LUCY" IS IDENTIFIED BY AN ORANGE WITNESS POST AND LOCATED ON THE SOUTH SIDE OF STATE HIGHWAY 7, APPROXIMATELY 1.8 MILES WEST OF INTERSTATE 25, HAVING A PUBLISHED ELEVATION OF 5297.00 FEET, NAVD 88 DATUM.

EARTHWORK CUT/FILL ANALYSIS

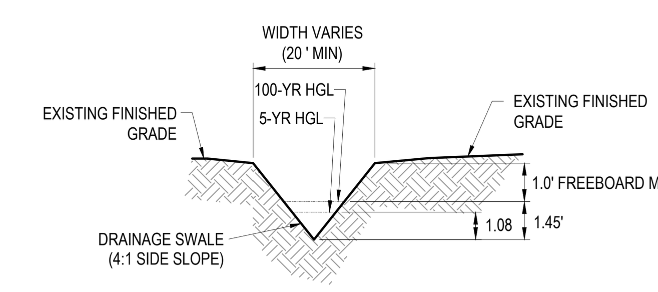
CUT = 1,415 CY
FILL = 1.406 CY
NET = 9 CY (CUT)

* EARTHWORK QUANTITIES ARE APPROXIMATE AND DO NOT ACCOUNT FOR SUBGRADE EXCAVATION, UTILITY SPOILS, OR OTHER SIMILAR FACTORS.



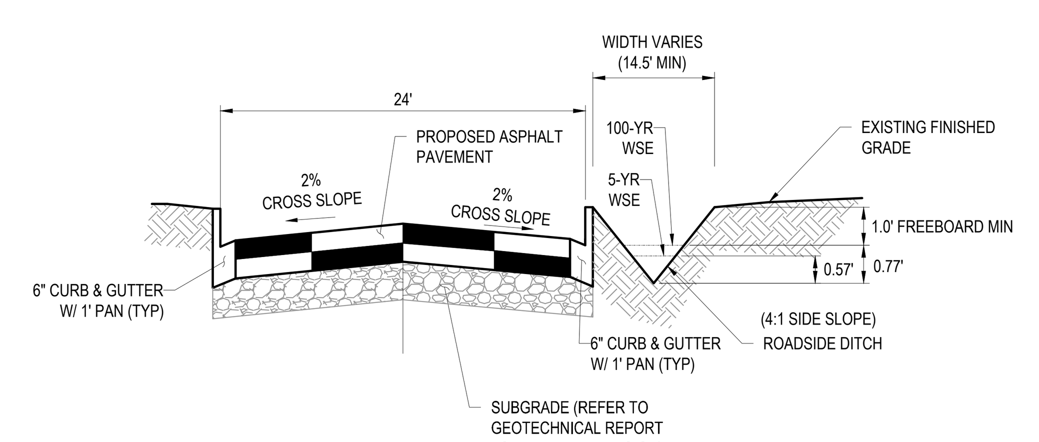
TYPICAL ACCESS ROAD SECTION A-A

SCALE: NOT TO SCALE



TYPICAL DRAINAGE SWALE SECTION B-B

SCALE: NOT TO SCALE



TYPICAL ACCESS ROAD SECTION C-C

SCALE: NOT TO SCALE

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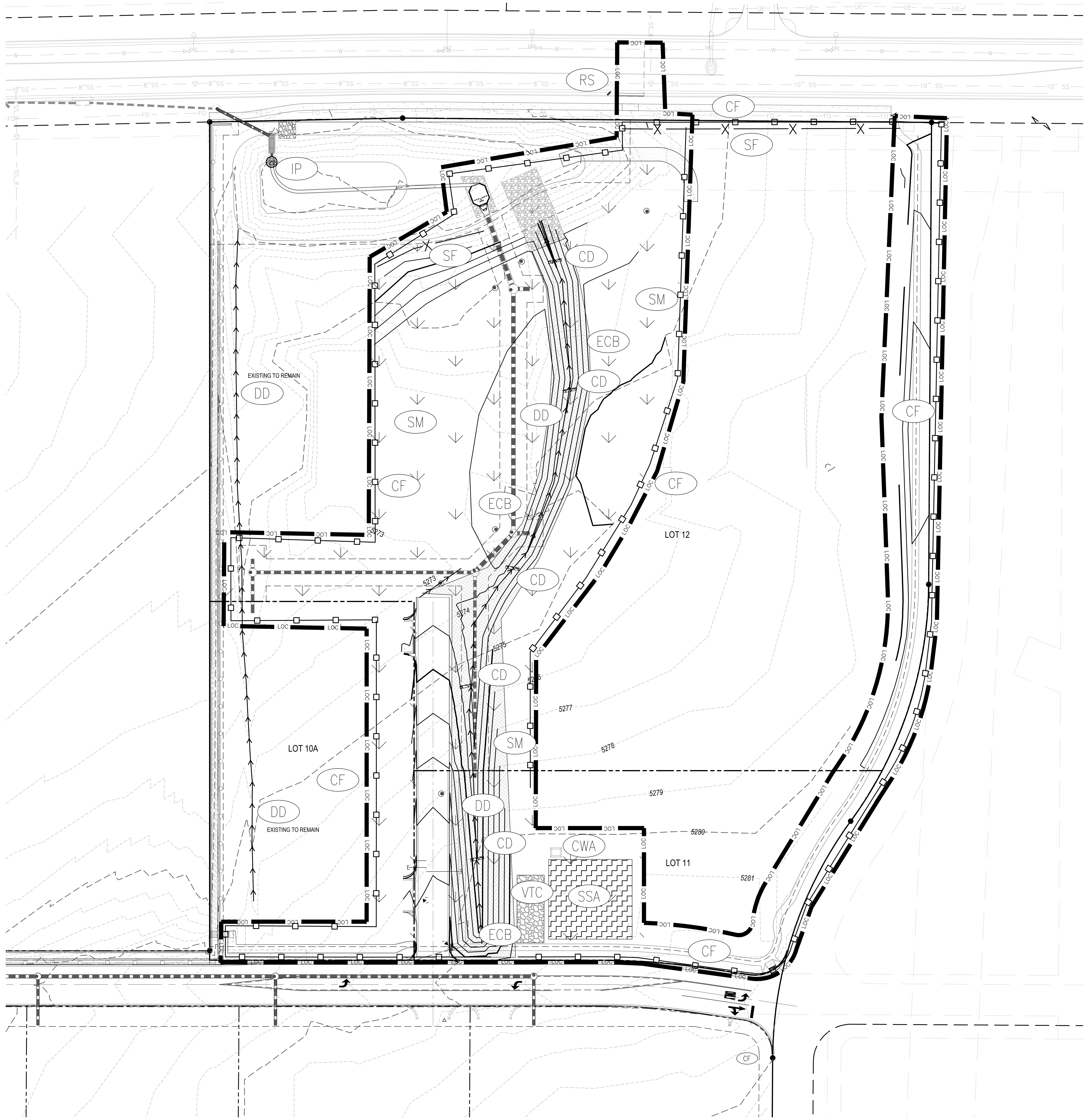
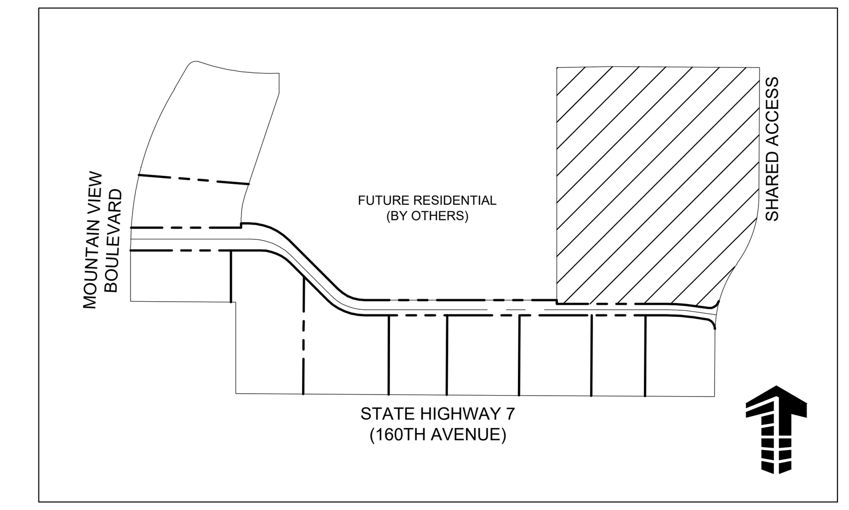
GRADING PLAN

C2.1





KEY MAP
1" = 400'

SCALE: 1"=40'

BMP LEGEND

5200	EXISTING MAJOR CONTOUR
5200	PROPOSED MAJOR CONTOUR
04	PROPOSED MINOR CONTOUR
STS	EXISTING STORM SEWER
STS	PROPOSED STORM SEWER
STS	PROPOSED STORM SEWER (LESS THAN 12")
LOC	LIMITS OF CONSTRUCTION / DISTURBANCE
VTC	VEHICLE TRACKING CONTROL
SF	SILT FENCE
CWA	CONCRETE WASHOUT AREA
SSA	STABILIZED STAGING AREA
IP	INLET PROTECTION
SM	SEEDING AND MULCHING
ECB	EROSION CONTROL BLANKET
CF	CONSTRUCTION FENCE
DD	DIVERSION DITCH
CD	CHECK DAM
SB	SEDIMENT BASIN
SP	SIGN POSTING & PERMIT
RS	ROCK SOCK

BASIS OF BEARING

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PROJECT DESCRIPTION

THE PROJECT WILL BE COMPOSED OF BUILDING THE SITE ACCESS DRIVE AND UTILITY INFRASTRUCTURE THROUGH THE MIDDLE OF THE 7.31 ACRE SITE. GRADING ACTIVITIES WILL BE LIMITED TO THOSE REQUIRED TO CONSTRUCT THE ACCESS DRIVE, ROADSIDE DITCH AND DRAINAGE SWALE AS SHOWN ON THE PLAN.

TOTAL DISTURBANCE AREA: 3.41 ACRES

PHASE 1: EROSION CONTROL
PRIOR TO ANY DISTURBANCE, CONSTRUCTION FENCE SHALL BE INSTALLED SURROUNDING THE PROJECT SITE AS SHOWN ON THE PLAN.

SUBSEQUENT PHASES: EROSION CONTROL
VEHICLE TRACKING PADS AND THE CONTRACTOR STAGING AREAS SHALL BE SET UP AS SHOWN ON THE PLAN. THE CONCRETE WASHOUT AREA SHALL BE PLACED AND IDENTIFIED FOR USE PRIOR TO COMMENCING CONCRETE WORK. UPON COMPLETION OF ON-SITE STORMWATER INSTALLATION, INLET PROTECTION MUST BE INSTALLED.

EXISTING SITE STABILIZATION CONSISTS OF NATIVE VEGETATION. FINAL AND PERMANENT STABILIZATION SHALL INCLUDE ASPHALT AND CONCRETE PAVING AND ESTABLISHED SEEDED AREAS.

NO SURFACE WATER EXISTS ONSITE. STORMWATER SHALL BE COLLECTED BY THE ROADSIDE DITCH AND DRAINAGE SWALE AND DIRECTED NORTH WEST TO THE EXISTING DETENTION POND ONSITE.

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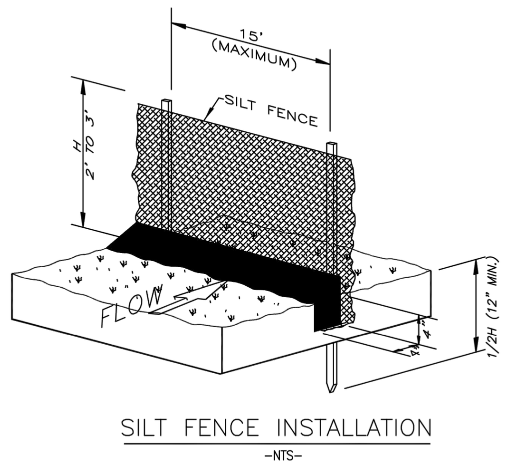
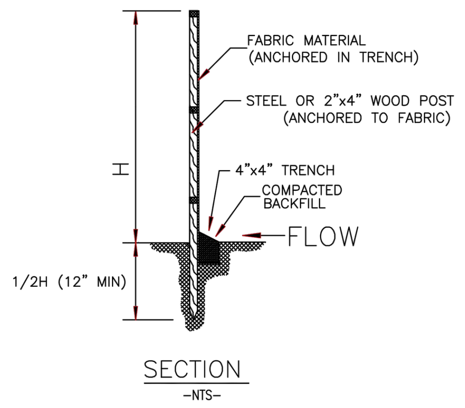
EROSION CONTROL PLAN

C3.1

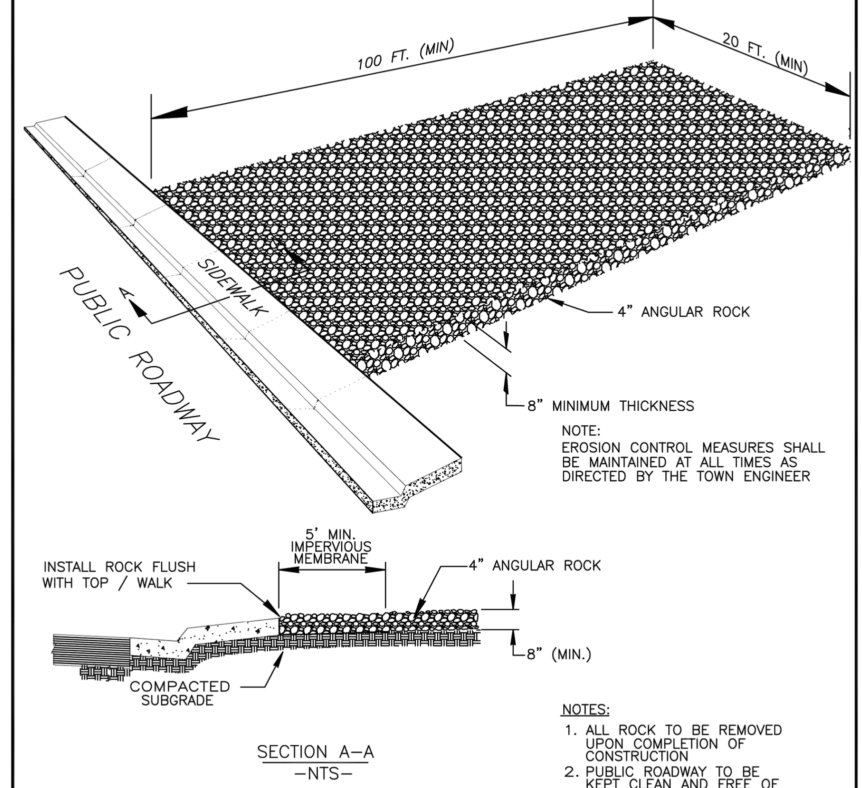




FOR SINGLE LOT EROSION CONTROL SEE SHEET STM8

NOTES:
1. INSTALL SILT FENCE PARALLEL TO THE CONTOUR OF THE LAND.
2. EXTEND ENDS UPSLOPE TO ALLOW WATER TO POND BEHIND FENCE.
3. EXCAVATE A TRENCH 4 INCHES WIDE AND 4 INCHES DEEP.
4. INSTALL FENCE WITH POSTS ON THE DOWNSLOPE SIDE.
5. PLACE 8 INCHES OF FABRIC IN THE TRENCH, EXTENDING THE BOTTOM 4 INCHES TOWARD THE UPSLOPE SIDE.
6. JOIN SILT FENCE SECTIONS BY USING A WRAP JOINT.
7. BACKFILL TRENCH WITH SOIL MATERIALS AND COMPACT.
8. INSPECT AT LEAST WEEKLY AND AFTER EACH STORM EVENT, REPAIRING AS NEEDED AND REMOVING SEDIMENT DEPOSITS WHEN THEY REACH ONE-HALF THE FENCE HEIGHT.

The Town of ERIE COLORADO
DRAWING TITLE: SILT FENCE EROSION BARRIER
DRAWING NUMBER: STM4
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004



NOTE:
EROSION CONTROL MEASURES SHALL BE MAINTAINED AT ALL TIMES AS DIRECTED BY THE TOWN ENGINEER

NOTES:
1. ALL ROCK TO BE REMOVED UPON COMPLETION OF CONSTRUCTION
2. PUBLIC ROADWAY TO BE KEPT CLEAN AND FREE OF MUD, DIRT AND DEBRIS AT ALL TIMES

The Town of ERIE COLORADO
DRAWING TITLE: TRACKING CONTROL PAD- CRUSHED ROCK
DRAWING NUMBER: STM6A
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 1/2013

CONSTRUCTION SEQUENCE FOR EROSION & SEDIMENT CONTROL PRACTICES FOR SINGLE LOT

1. INSTALL PERIMETER EROSION AND SEDIMENT CONTROLS
IDENTIFY THE AREAS WHERE SEDIMENT LADEN RUNOFF COULD LEAVE THE CONSTRUCTION SITE, AND INSTALL PERIMETER CONTROLS TO MINIMIZE THE POTENTIAL FOR OFF-SITE SEDIMENTATION. IT'S IMPORTANT THAT PERIMETER CONTROLS ARE IN PLACE BEFORE ANY LOT EXCAVATION ACTIVITIES BEGIN.

PREFERRED METHODS
- PROTECT DOWN-SLOPE AREAS WITH VEGETATIVE FILTER STRIPS
- PROTECT DOWN-SLOPE AREAS WITH SILT FENCES AND OTHER APPROPRIATE PRACTICES
- INSTALL STABLE CONSTRUCTION TRAFFIC ENTRANCE

2. PREPARE THE SITE FOR CONSTRUCTION
PREPARE THE SITE FOR CONSTRUCTION AND FOR INSTALLATION OF UTILITIES. NOTIFY ALL CONTRACTORS (ESPECIALLY THE EXCAVATION CONTRACTOR) OF AREAS TO BE PROTECTED.

PREFERRED METHOD
- SALVAGE AND STOCKPILE TOPSOIL OR SUBSOIL

3. BUILD STRUCTURE(S) AND CONNECT UTILITIES
CONSTRUCT THE HOME AND CONNECT THE UTILITIES.

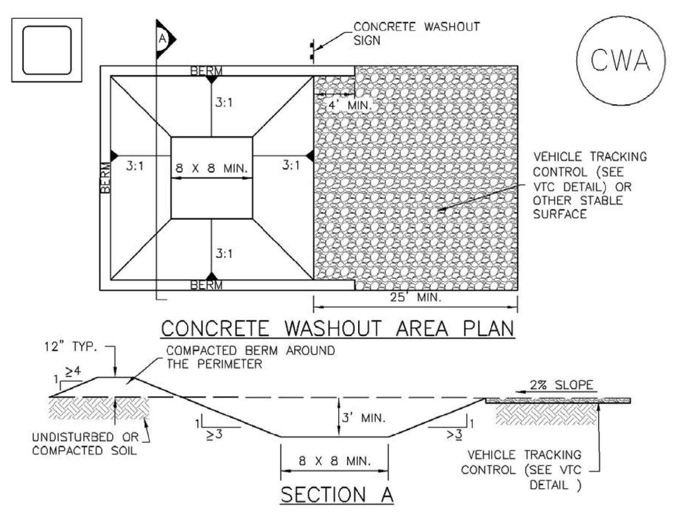
4. MAINTAIN CONTROL PRACTICES
MAINTAIN ALL EROSION AND SEDIMENT CONTROL PRACTICES UNTIL CONSTRUCTION IS COMPLETED AND THE LOT IS STABILIZED.

5. RE-VEGETATE BUILDING SITE
IMMEDIATELY AFTER ALL OUTSIDE CONSTRUCTION ACTIVITIES ARE COMPLETED, STABILIZE THE LOT WITH SOD, SEED AND/OR MULCH.

METHODS
- REDISTRIBUTE THE STOCKPILED SUBSOIL AND TOPSOIL
- SEED OR SOD BARE AREAS
- MULCH NEWLY SEEDED AREAS

6. REMOVE REMAINING TEMPORARY CONTROL MEASURES
ONCE THE SOD AND/OR VEGETATION IS WELL ESTABLISHED, REMOVE ANY REMAINING TEMPORARY EROSION AND SEDIMENT CONTROL PRACTICES.

The Town of ERIE COLORADO
DRAWING TITLE: EROSION CONTROL SEQUENCE SINGLE LOT
DRAWING NUMBER: STM7
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004



CWA-1. CONCRETE WASHOUT AREA

CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
-CWA INSTALLATION LOCATION.

2. DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.

3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.

4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8' BY 8' SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.

5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.

6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.

7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.

8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

CWA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.

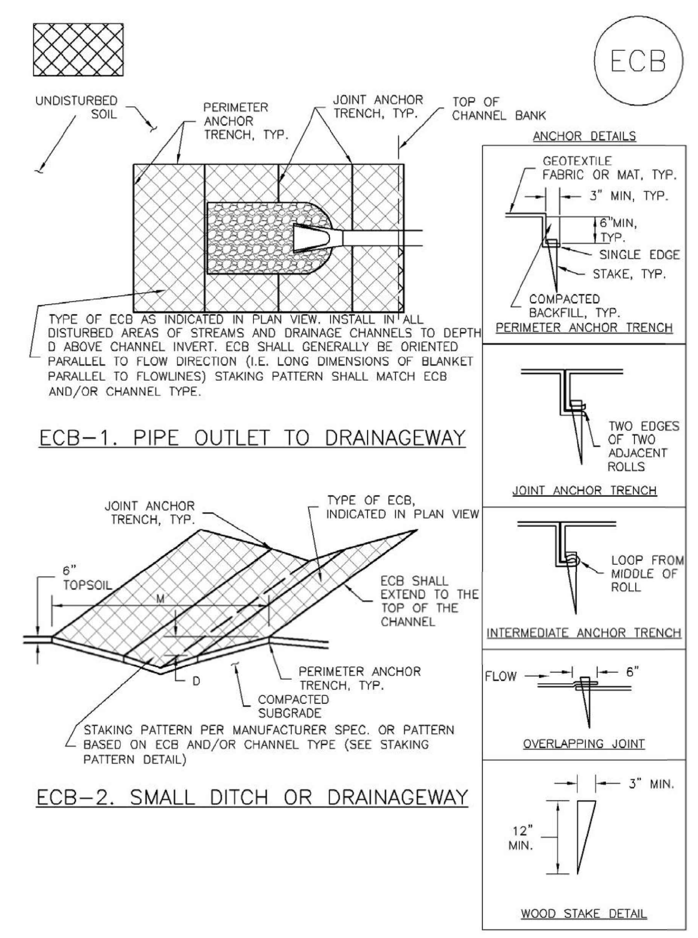
5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.

6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.

7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD).

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.



EROSION CONTROL BLANKET INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
-LOCATION OF ECB.
-TYPE OF ECB (STRAW, STRAW-COCONUT, COCONUT, OR EXCELSIOR).
-AREA, A, IN SQUARE YARDS OF EACH TYPE OF ECB.

2. 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECPs, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.

3. IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERMITTEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOIST PRIOR TO ECB INSTALLATION AND THE ECB SHALL BE IN FULL CONTACT WITH SUBGRADE. NO GAPS OR VOIDS SHALL EXIST UNDER THE BLANKET.

4. PERIMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERIMETER OF ALL BLANKET AREAS.

5. JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL ECBs EXCEPT STRAW WHICH MAY USE AN OVERLAPPING JOINT.

6. INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE-HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.

7. OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.

8. MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB-1.

9. ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBS SHALL BE RESEEDED AND MULCHED.

10. DETAILS ON DESIGN PLANS FOR MAJOR DRAINAGEWAY STABILIZATION WILL GOVERN IF DIFFERENT FROM THOSE SHOWN HERE.

TABLE ECB-1. ECB MATERIAL SPECIFICATIONS

TYPE	COCONUT CONTENT	STRAW CONTENT	EXCELSIOR CONTENT	RECOMMENDED NETTING**
STRAW*	–	100%	–	DOUBLE/ NATURAL
STRAW-COCONUT	30% MIN	70% MAX	–	DOUBLE/ NATURAL
COCONUT	100%	–	–	DOUBLE/ NATURAL
EXCELSIOR	–	–	100%	DOUBLE/ NATURAL

*STRAW ECBs MAY ONLY BE USED OUTSIDE OF STREAMS AND DRAINAGE CHANNEL.
**ALTERNATE NETTING MAY BE ACCEPTABLE IN SOME JURISDICTIONS

EROSION CONTROL BLANKET MAINTENANCE NOTES

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2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.

5. ANY ECB PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CREATED A VOID UNDER THE BLANKET, OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEEDED AND MULCHED AND THE ECB REINSTALLED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

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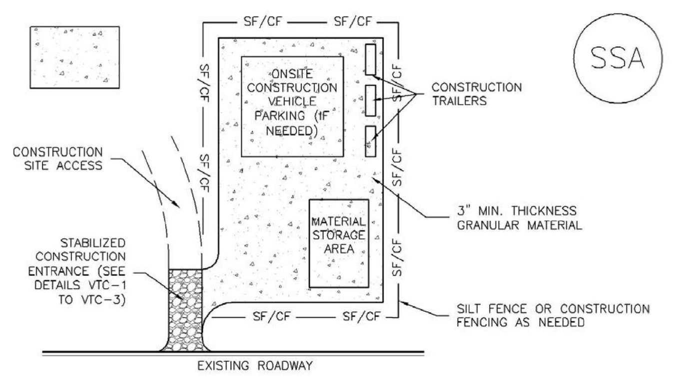
4	05/01/2019	4TH CITY SUBMITTAL	PJD
5	06/25/2019	5TH CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

EROSION CONTROL DETAILS

C3.2

Stabilized Staging Area (SSA) — SM-6



SSA–1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   –LOCATION OF STAGING AREA(S).
   –CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.

3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.

4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.

5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

SM-6 — Stabilized Staging Area (SSA)

STABILIZED STAGING AREA MAINTENANCE NOTES

5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.

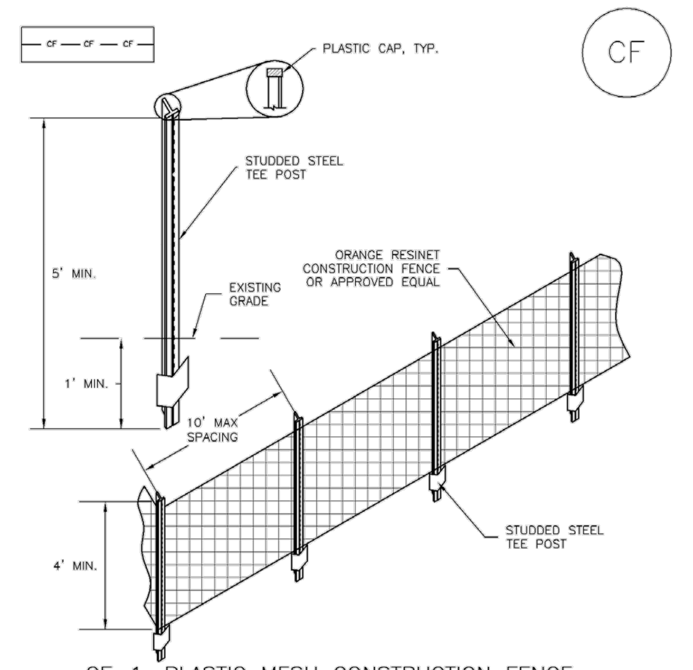
6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE–ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

SM-3 — Construction Fence (CF)



CF–1. PLASTIC MESH CONSTRUCTION FENCE

CONSTRUCTION FENCE INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF CONSTRUCTION FENCE.

2. CONSTRUCTION FENCE SHOWN SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

3. CONSTRUCTION FENCE SHALL BE COMPOSED OF ORANGE, CONTRACTOR–GRADE MATERIAL THAT IS AT LEAST 4' HIGH. METAL POSTS SHOULD HAVE A PLASTIC CAP FOR SAFETY.

4. STUDDED STEEL TEE POSTS SHALL BE UTILIZED TO SUPPORT THE CONSTRUCTION FENCE. MAXIMUM SPACING FOR STEEL TEE POSTS SHALL BE 10'.

5. CONSTRUCTION FENCE SHALL BE SECURELY FASTENED TO THE TOP, MIDDLE, AND BOTTOM OF EACH POST.

Construction Fence (CF) — SM-3

CONSTRUCTION FENCE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

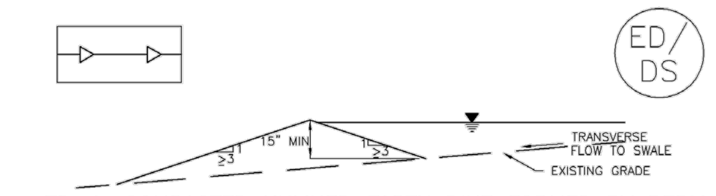
4. CONSTRUCTION FENCE SHALL BE REPAIRED OR REPLACED WHEN THERE ARE SIGNS OF DAMAGE SUCH AS RIPS OR SAGS. CONSTRUCTION FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

5. WHEN CONSTRUCTION FENCES ARE REMOVED, ALL DISTURBED AREAS ASSOCIATED WITH THE INSTALLATION, MAINTENANCE, AND/OR REMOVAL OF THE FENCE SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

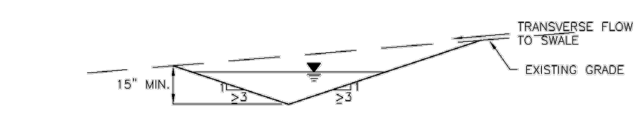
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

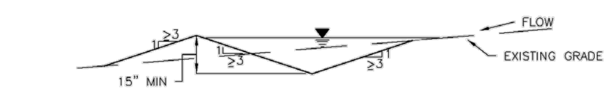
Earth Dikes and Drainage Swales (ED/DS) — EC-10



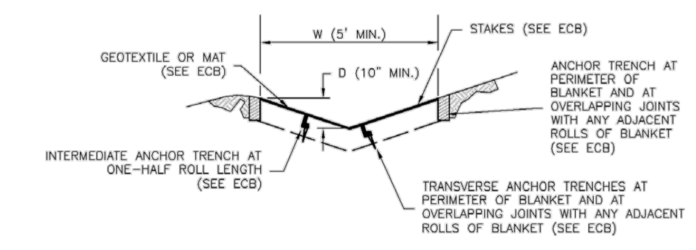
ED–1. COMPACTED UNLINED EARTH DIKE FORMED BY BERM



DS–1. COMPACTED UNLINED EXCAVATED SWALE

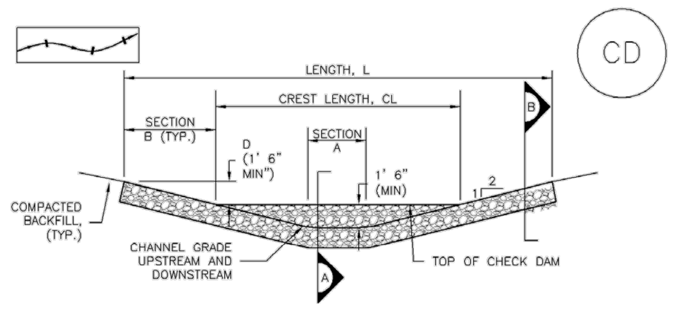


DS–2. COMPACTED UNLINED SWALE FORMED BY CUT AND FILL

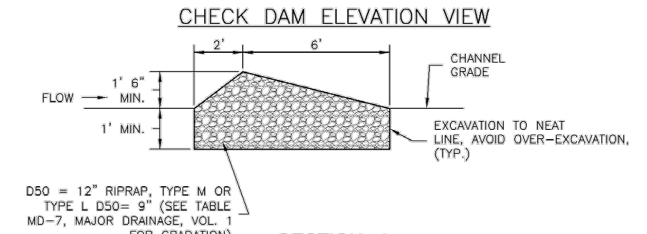


DS–3. ECB LINED SWALE (CUT AND FILL OR BERM)

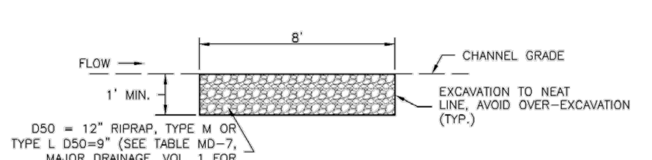
Check Dams (CD) — EC-12



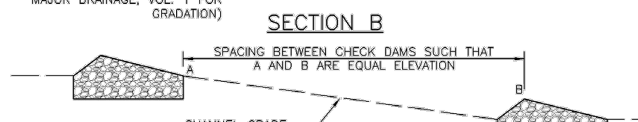
CHECK DAM ELEVATION VIEW



SECTION A



SECTION B



PROFILE

CD–1. CHECK DAM

EC-12 — Check Dams (CD)

CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF CHECK DAMS.
   –CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM).
   –LENGTH (L), CREST LENGTH (CL), AND DEPTH (D).

2. CHECK DAMS INDICATED ON INITIAL SWMP SHALL BE INSTALLED AFTER CONSTRUCTION FENCE, BUT PRIOR TO ANY UPSTREAM LAND DISTURBING ACTIVITIES.

3. RIPRAP UTILIZED FOR CHECK DAMS SHOULD BE OF APPROPRIATE SIZE FOR THE APPLICATION. TYPICAL TYPES OF RIPRAP USED FOR CHECK DAMS ARE TYPE M (D50 12") OR TYPE L (D50 9").

4. RIPRAP PAD SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1'.

5. THE ENDS OF THE CHECK DAM SHALL BE A MINIMUM OF 1' 6" HIGHER THAN THE CENTER OF THE CHECK DAM.

CHECK DAM MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF THE CHECK DAMS SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS WITHIN ½ OF THE HEIGHT OF THE CREST.

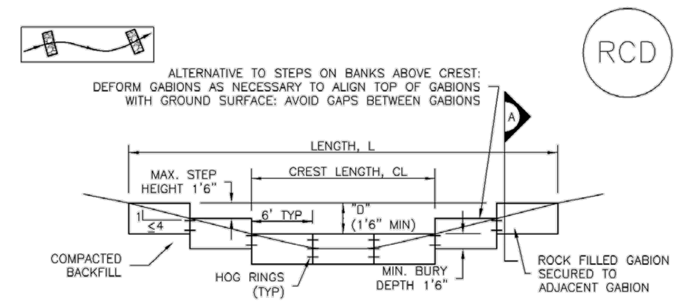
5. CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

6. WHEN CHECK DAMS ARE REMOVED, EXCAVATIONS SHALL BE FILLED WITH SUITABLE COMPACTED BACKFILL. DISTURBED AREA SHALL BE SEEDED AND MULCHED AND COVERED WITH GEOTEXTILE OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

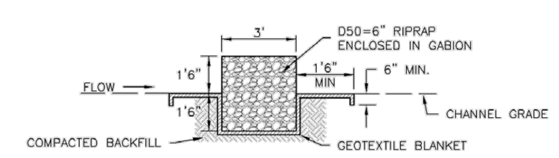
(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Check Dams (CD) — EC-12



REINFORCED CHECK DAM ELEVATION VIEW



SECTION A

REINFORCED CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATIONS OF CHECK DAMS.
   –CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM).
   –LENGTH (L), CREST LENGTH (CL), AND DEPTH (D).

2. CHECK DAMS INDICATED ON THE SWMP SHALL BE INSTALLED PRIOR TO AN UPSTREAM LAND–DISTURBING ACTIVITIES.

3. REINFORCED CHECK DAMS, GABIONS SHALL HAVE GALVANIZED TWISTED WIRE NETTING WITH A MAXIMUM OPENING DIMENSION OF 4½" AND A MINIMUM WIRE THICKNESS OF 0.10". WIRE "HOG RINGS" AT 4" SPACING OR OTHER APPROVED MEANS SHALL BE USED AT ALL GABION SEAMS AND TO SECURE THE GABION TO THE ADJACENT SECTION.

4. THE CHECK DAM SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1' 6".

5. GEOTEXTILE BLANKET SHALL BE PLACED IN THE REINFORCED CHECK DAM TRENCH EXTENDING A MINIMUM OF 1' 6" ON BOTH THE UPSTREAM AND DOWNSTREAM SIDES OF THE REINFORCED CHECK DAM.

CD–2. REINFORCED CHECK DAM

EC-12 — Check Dams (CD)

REINFORCED CHECK DAM MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF REINFORCED CHECK DAMS SHALL BE REMOVED AS NEEDED TO MAINTAIN THE EFFECTIVENESS OF BMP, TYPICALLY WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN ½ THE HEIGHT OF THE CREST.

5. REPAIR OR REPLACE REINFORCED CHECK DAMS WHEN THERE ARE SIGNS OF DAMAGE SUCH AS HOLES IN THE GABION OR UNDERCUTTING.

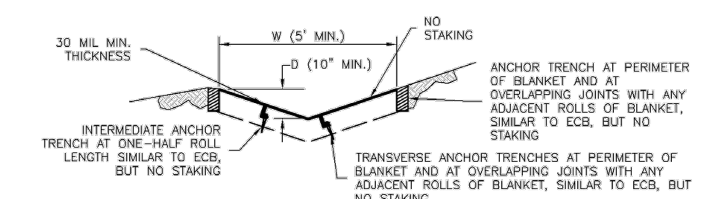
6. REINFORCED CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

7. WHEN REINFORCED CHECK DAMS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED, AND COVERED WITH A GEOTEXTILE BLANKET, OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

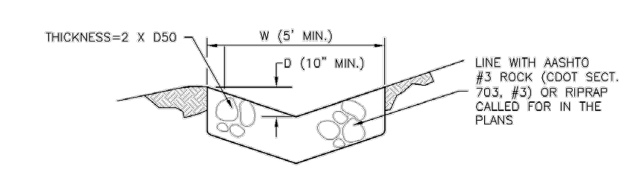
(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

EC-10 — Earth Dikes and Drainage Swales (ED/DS)



DS–4. SYNTHETIC LINED SWALE



DS–5. RIPRAP LINED SWALE

EARTH DIKE AND DRAINAGE SWALE INSTALLATION NOTES

1. SEE SITE PLAN FOR:
   – LOCATION OF DIVERSION SWALE
   – TYPE OF SWALE (UNLINED, COMPACTED AND/OR LINED).
   – LENGTH OF EACH SWALE.
   – DEPTH, D, AND WIDTH, W DIMENSIONS.
   – FOR ECB/TRM LINED DITCH, SEE ECB DETAIL.
   – FOR RIPRAP LINED DITCH, SIZE OF RIPRAP, D50.

2. SEE DRAINAGE PLANS FOR DETAILS OF PERMANENT CONVEYANCE FACILITIES AND/OR DIVERSION SWALES EXCEEDING 2–YEAR FLOW RATE OR 10 CFS.

3. EARTH DIKES AND SWALES INDICATED ON SWMP PLAN SHALL BE INSTALLED PRIOR TO LAND–DISTURBING ACTIVITIES IN PROXIMITY.

4. EMBANKMENT IS TO BE COMPACTED TO 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D698.

5. SWALES ARE TO DRAIN TO A SEDIMENT CONTROL BMP.

6. FOR LINED DITCHES, INSTALLATION OF ECB/TRM SHALL CONFORM TO THE REQUIREMENTS OF THE ECB DETAIL.

7. WHEN CONSTRUCTION TRAFFIC MUST CROSS A DIVERSION SWALE, INSTALL A TEMPORARY CULVERT WITH A MINIMUM DIAMETER OF 12 INCHES.

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VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BLVD & STATE HWY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
CIVIL CONSTRUCTION DRAWINGS

ERIE, COLORADO

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1	06/04/2018	1ST CITY SUBMITTAL	PJD
2	11/09/2018	2ND CITY SUBMITTAL	PJD
3	01/30/2019	3RD CITY SUBMITTAL	PJD
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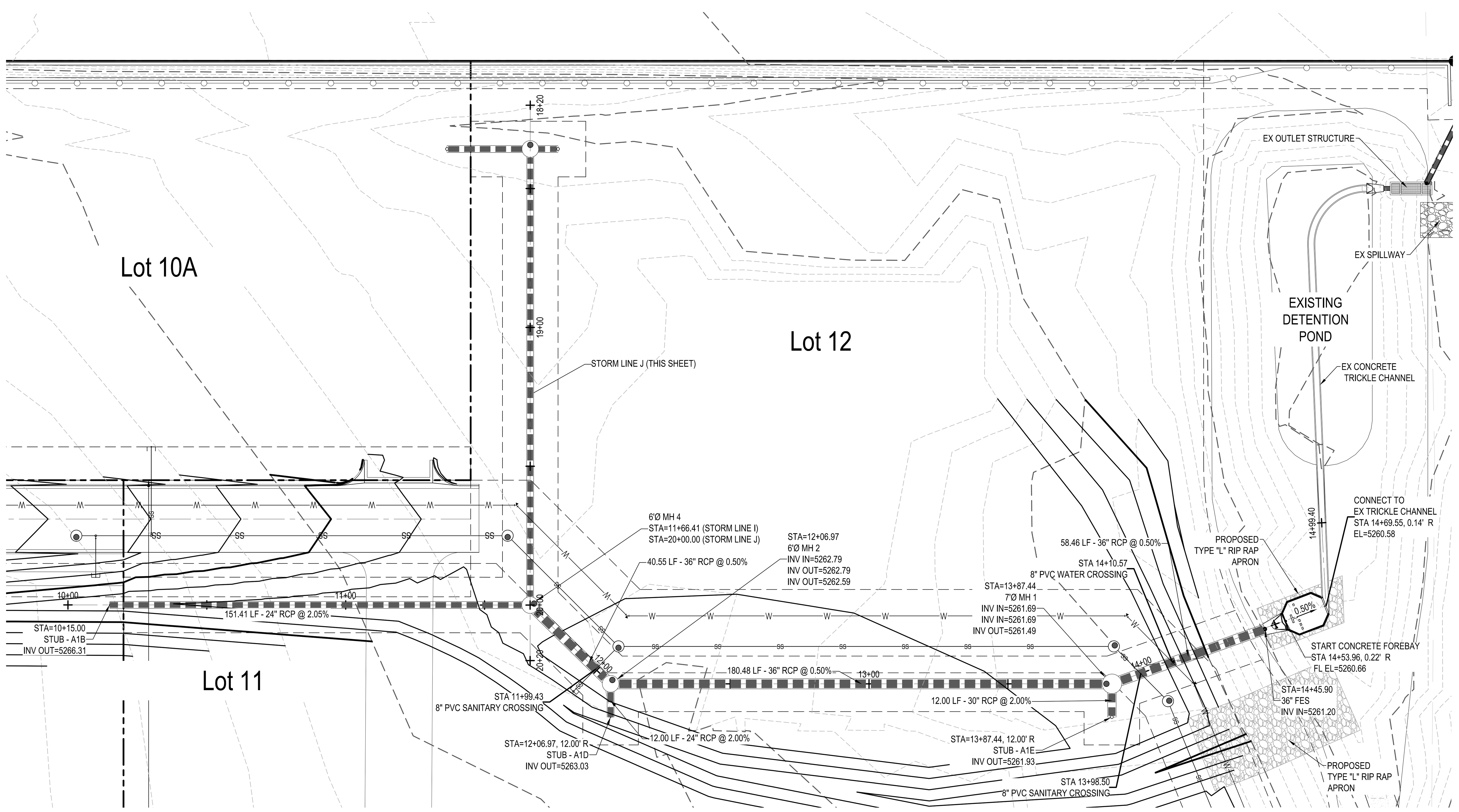
5	06/25/2019	5TH CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

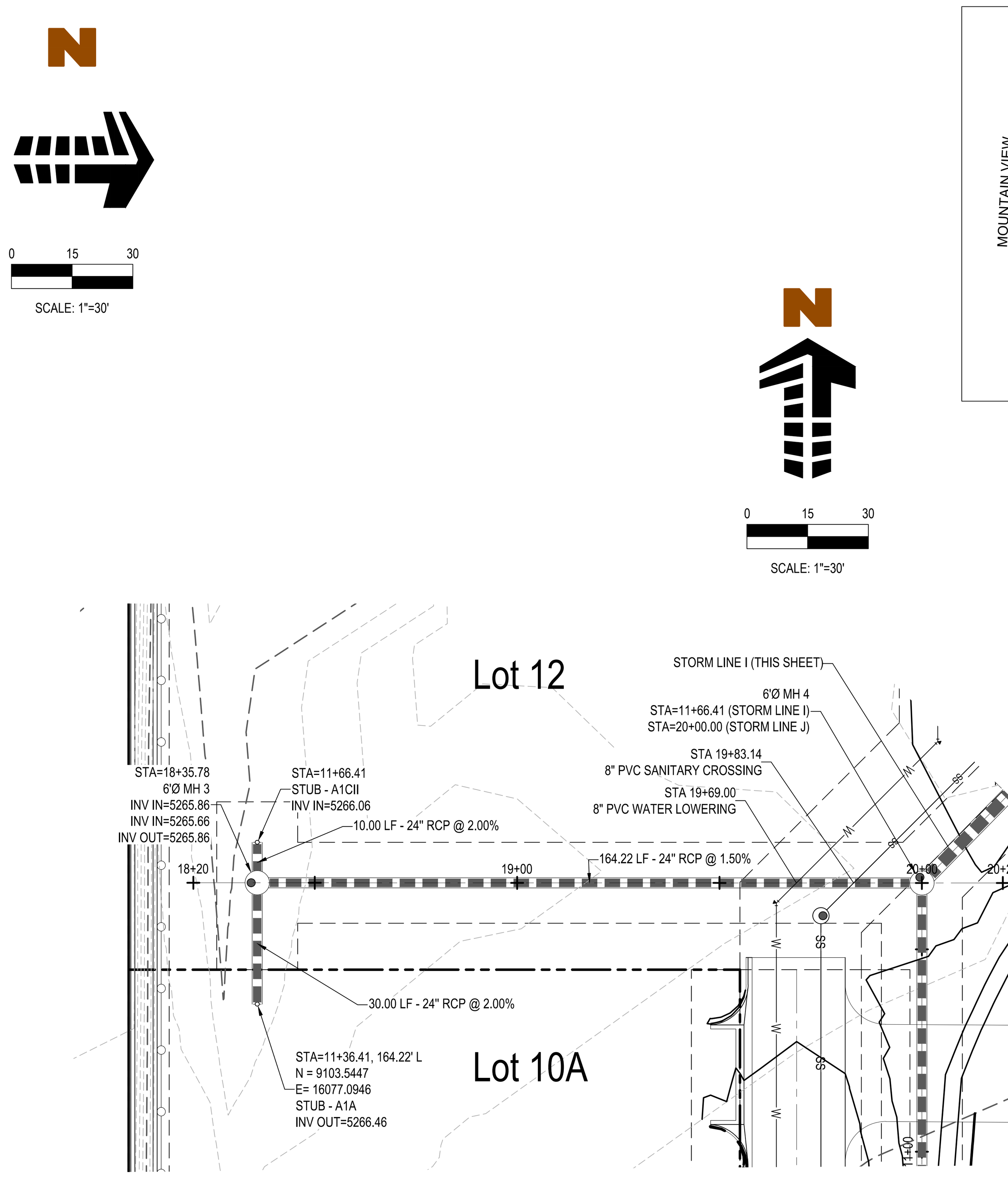
EROSION CONTROL DETAILS

C3.3



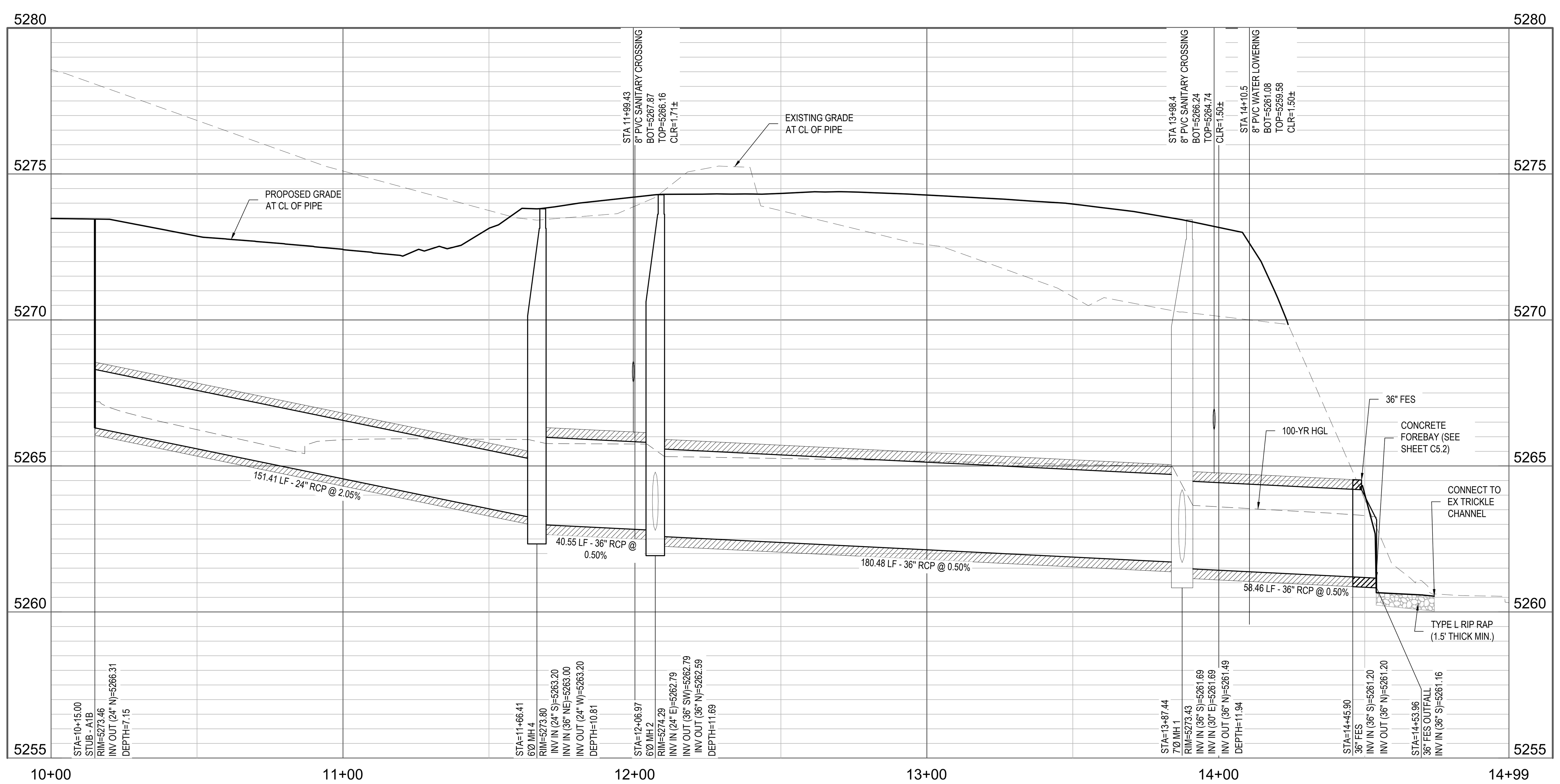
PLAN: STORM LINE I (STA. 10+00 TO END)

SCALE: 1:30



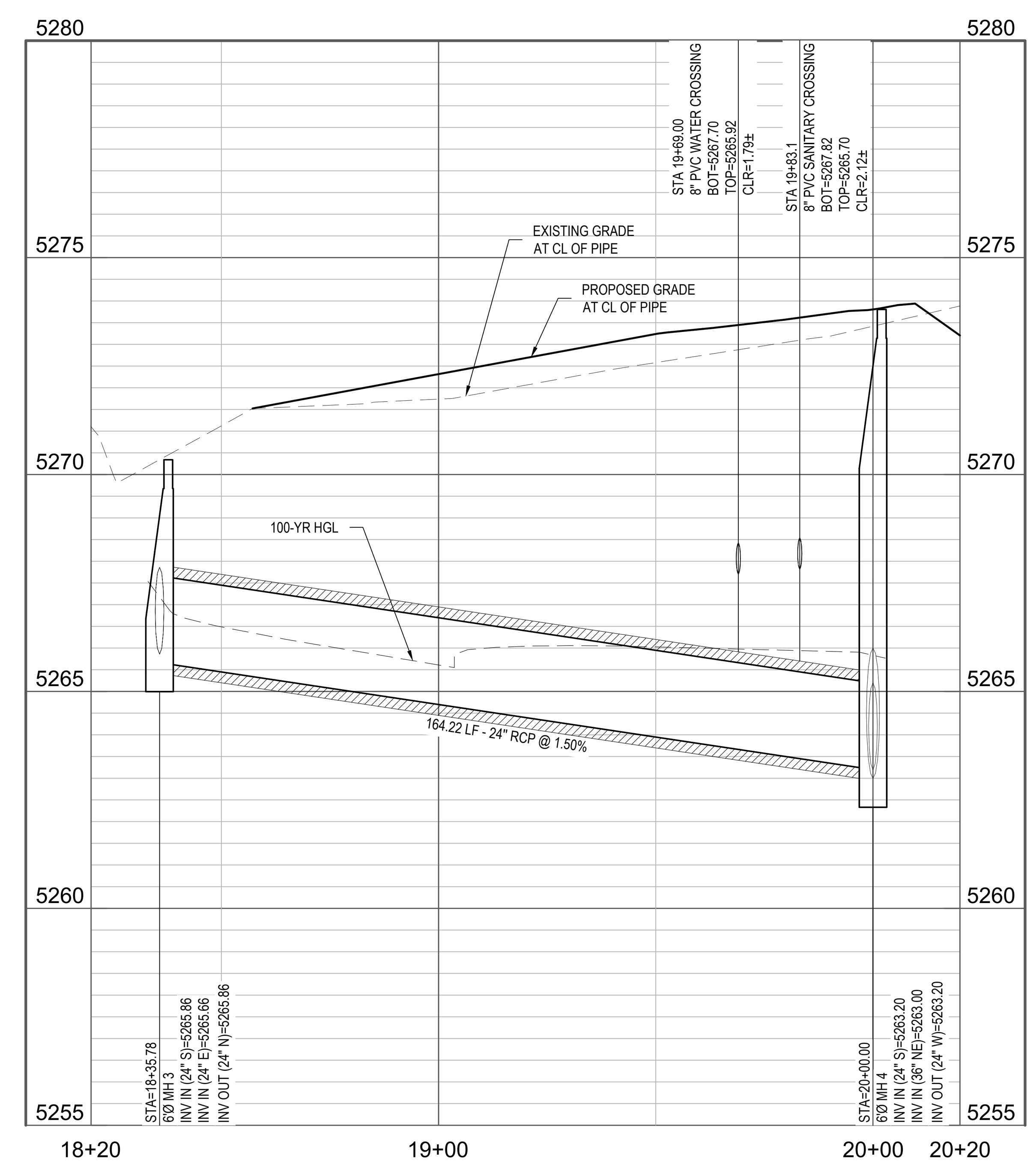
PROFILE: STORM LINE J (STA. 18+35.78 TO 20+00.00)

SCALE: 1:30



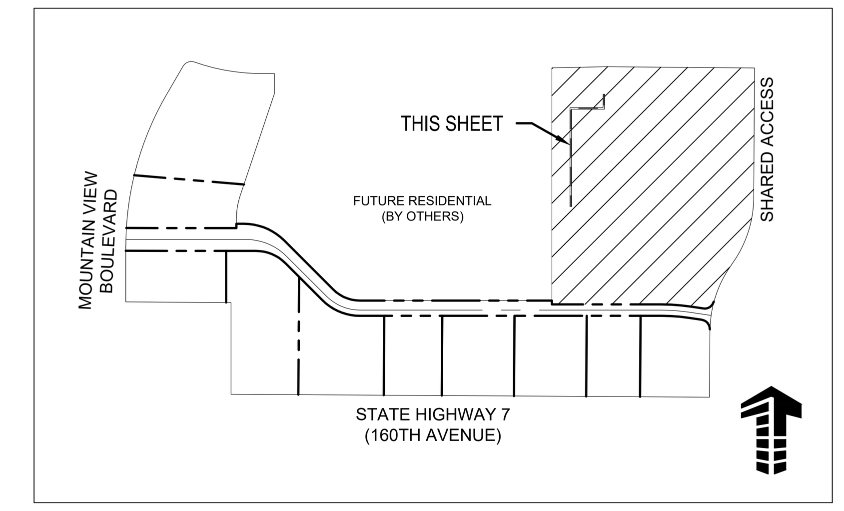
PROFILE: STORM LINE I (STA. 10+00 TO END)

SCALE: H: 1"=30' V: 1" = 3'



PROFILE: STORM LINE J (STA. 18+35.78 TO 20+00.00)

SCALE: H: 1"=30' V: 1" = 3'



KEY MAP

1" = 400'

UTILITY LEGEND

- EXISTING WATER LINE
- PROPOSED WATER LINE
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING STORM SEWER
- PROPOSED STORM SEWER

GENERAL NOTES

1. REFER TO UTILITY PLAN FOR GENERAL NOTES.
2. REFER TO SANITARY PLANS AND WATER PLANS FOR ADDITIONAL UTILITY COORDINATION
3. EXISTING DRY UTILITY ELEVATIONS ARE ASSUMED. PROPOSED DRY UTILITY ELEVATIONS ARE INDICATED AS SUCH AND TYPICALLY MAINTAIN 3 FEET OF COVER.
4. REFER TO THE ERIE UTILITIES STANDARD DETAILS FOR CONSTRUCTION DETAILS.

NOTE: MAINTAIN MINIMUM 18" VERTICAL AND 10' HORIZONTAL SEPARATION (OUTSIDE OF PIPE TO OUTSIDE OF PIPE) BETWEEN POTABLE WATERLINE AND STORM OR SANITARY SEWERS AND LATERALS. AN 18" VERTICAL CLEARANCE MUST BE MAINTAINED BETWEEN IRRIGATION LINES.

NOTE: CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE LICENSED SURVEYOR REPLACE ANY DAMAGED OR DISTURBED MONUMENTATION AT THEIR COST.

NOTE: CONTRACTOR RESPONSIBLE FOR AS-BUILT DRAWINGS, TESTS, REPORTS AND/OR ANY OTHER CERTIFICATES OR INFORMATION AS REQUIRED FOR ACCEPTANCE OF WORK FROM CITY, UTILITY DISTRICTS OR ANY OTHER GOVERNING AGENCY.

NOTE: CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL INFORMATION FOR FINAL ACCEPTANCE OF WORK FOR ANY LOCAL, STATE OR FEDERAL AGENCY, UTILITY DISTRICT OR ANY OTHER AGENCY OR DISTRICT HAVING APPROVAL AUTHORITY OVER WORK. THIS INFORMATION MAY INCLUDE, BUT IS NOT LIMITED TO, AS-BUILT PLANS, CERTIFICATIONS, INSPECTIONS AND REPORTS.

SURVEYOR TO OBTAIN AUTOCAD FILE FROM ENGINEER AND VERIFY ALL HORIZONTAL CONTROL DIMENSIONING PRIOR TO CONSTRUCTION STAKING. SURVEYOR MUST VERIFY ALL BENCHMARK, BASIS OF BEARING AND DATUM INFORMATION TO ENSURE IMPROVEMENTS WILL BE AT THE SAME HORIZONTAL AND VERTICAL LOCATIONS SHOWN ON THE DESIGN CONSTRUCTION DRAWINGS. PRIOR TO CONSTRUCTION STAKING ANY DISCREPANCY MUST BE REPORTED TO OWNER AND ENGINEER PRIOR TO CONTINUATION OF ANY FURTHER STAKING OR CONSTRUCTION WORK.

BENCHMARK

BROOMFIELD CONTROL POINT KNOWN AS "LUCY", WHICH IS A BROOMFIELD DISK ON A #5 REBAR. CONTROL POINT "LUCY" IS IDENTIFIED BY AN ORANGE WITNESS POST AND LOCATED ON THE SOUTH SIDE OF STATE HIGHWAY 7, APPROXIMATELY 1.8 MILES WEST OF INTERSTATE 25, HAVING A PUBLISHED ELEVATION OF 5297.00 FEET, NAVD 88 DATUM.

BASIS OF BEARING

BEARINGS ARE BASED ON THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST. BEING MONUMENTED ON THE SOUTH BY A #6 REBAR AND CAP IN A RANGE BOX AND ON THE NORTH BY A 2.5" ALUMINUM CAP STAMPED PLS # 24302 AND IS CONSIDERED TO BEAR N00°12'01"W.

CAUTION - NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

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

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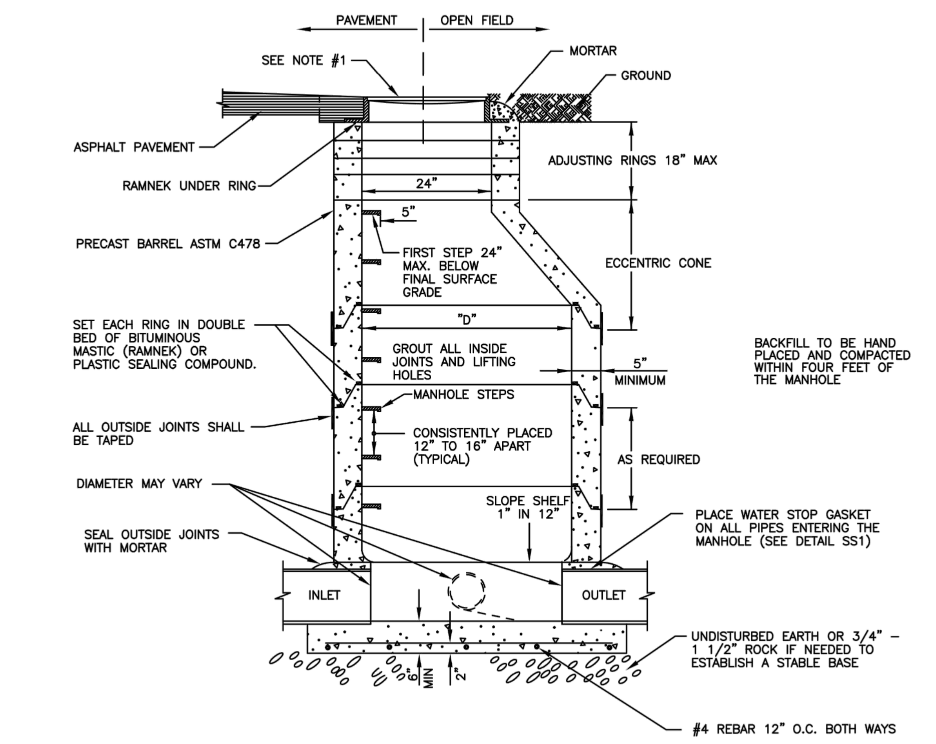
Project No:	SH7000003.01
Drawn By:	CAC
Checked By:	PJD
Date:	06/21/19

STORM SEWER
PLAN & PROFILE

C5.1



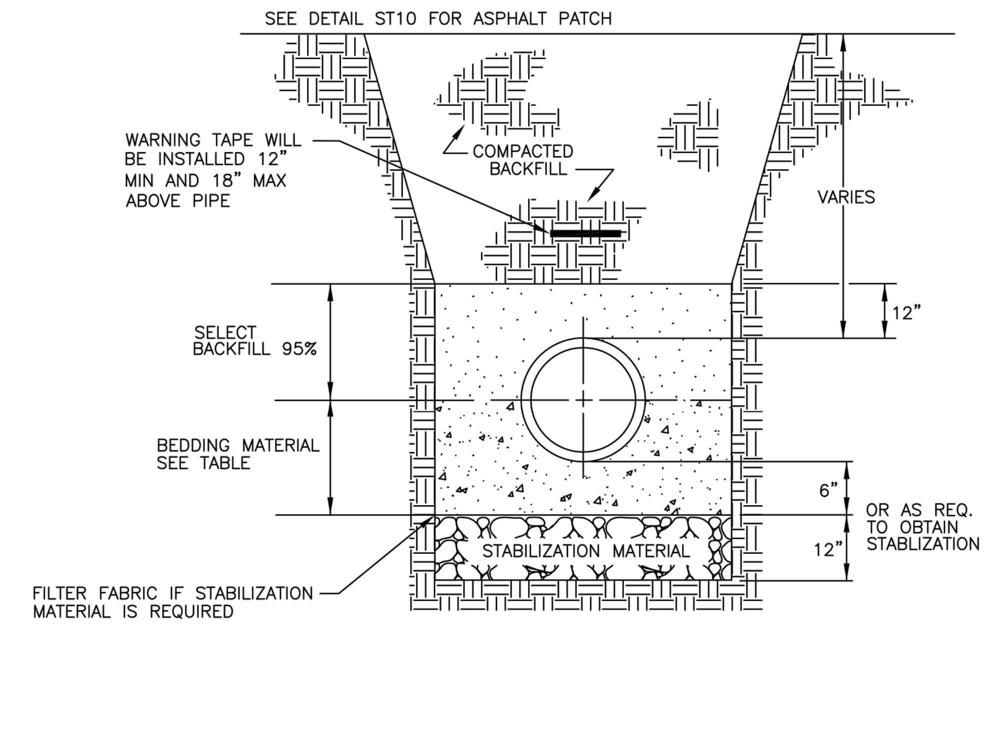
SECTION B–B

NOTES:

1. FINAL GRADE OF MANHOLE COVERS SHALL BE 1/4" LOWER THAN FINAL STREET.
2. STEPS SHOULD NOT BE PLACED OVER THE FLOW. NO STEPS ALLOWED IN THE ADJUSTING RING AREA.
3. PRECAST CONCRETE SECTIONS SHALL CONFORM TO ASTM C–478.
4. BLOCK–OUTS, WHEN APPROVED, SHALL EXTEND A MAX. OF 6" PAST MANHOLE O.D. AND BE SATISFACTORILY PLUGGED AND SEALED.
5. MANHOLES NOT IN ASPHALT OR CONCRETE SHALL BE RAISED 6" ABOVE FINAL GRADE AND A CONCRETE COLLAR INSTALLED WITH A GREEN CARSONITE POST

The Town of ERIE COLORADO

DRAWING TITLE: STANDARD MANHOLE
DRAWING NUMBER: STM8A
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN REV. DATE: 01/2012



NOTES:

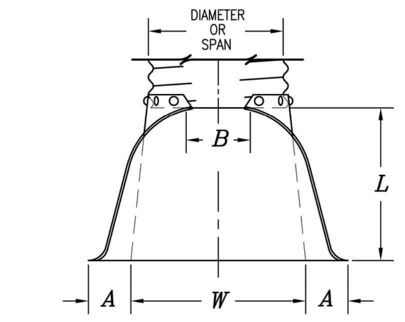
1. FULL TRENCH SECTION IN ROADWAY OR STREET R.O.W. LIMITS WILL REQUIRE 95% S.P.D. TRENCH ZONE ABOVE BEDDING MATERIALS, OUTSIDE OF STREET R.O.W. WILL REQUIRE 90% S.P.D.
2. FILTER FABRIC IS REQUIRED IF STABILIZATION MATERIAL IS USED. THE FABRIC SHALL BE INSTALLED AS SHOWN IN THE DETAIL.
3. TRENCH TO BE BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKMEN AND PROTECTION OF OTHER UTILITIES IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL SAFETY REGULATIONS.
4. PIPE SHALL BE BEDDED FROM 6" BELOW THE BOTTOM OF THE PIPE TO THE HORIZONTAL CENTERLINE OF THE PIPE. SEE TABLE FOR BEDDING MATERIAL GRADATION.
5. TRENCH WIDTH SHALL NOT BE MORE THAN 24" NOR LESS THAN 12" WIDER THAN THE LARGEST OUTSIDE DIAMETER OF THE PIPE.
6. SHOULD THE TRENCH BE EXCAVATED WIDER THAN ALLOWED, A CONCRETE CRADLE SHALL BE PLACED WITH 2500 P.S.I. CONCRETE FROM TRENCH BOTTOM TO PIPE SPRINGLINE.
7. BEDDING MATERIAL SHALL MEET THE GRADATION OF CDOT "NO.67 COARSE AGGREGATE" AS SPECIFIED IN SECTION 703.02 IN THE LATEST EDITION OF THE CDOT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION".

The Town of ERIE COLORADO

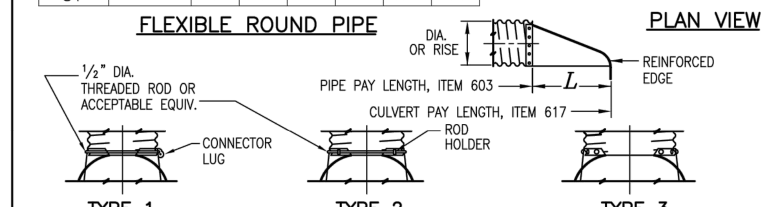
DRAWING TITLE: STORM SEWER TRENCH DETAIL
DRAWING NUMBER: STM12
DRAWN BY: S. ELKINS APPROVED BY: G. BEHLEN REV. DATE: 01/2017

PIPE DIA.	THICKNESS	DIMENSIONS A	B	H	L	W	T
IN.							
12	0.064	6	6	6	21	24	34
18	0.064	8	10	6	31	36	46
21	0.064	9	12	6	36	42	52
24	0.064	10	13	6	41	48	58
30	0.079	12	16	8	51	60	70
36	0.079	14	19	9	60	72	94
42	0.109	16	22	11	69	84	106
48	0.109	18	27	12	78	90	112
54	0.109	18	30	12	84	102	124
60	0.109	18	33	12	87	114	136
66	0.109	18	36	12	87	120	142
72	0.109	18	39	12	87	126	148
78	0.109	18	42	12	87	132	154
84	0.109	18	45	12	87	138	160

FLEXIBLE ROUND PIPE



PLAN VIEW



TYPE 1
FOR 18 IN. THRU 24 IN. ROUND PIPE WITH ANNULAR CORRUGATIONS. NOT TO BE USED ON HELICALLY–FORMED PIPE UNLESS RECORRUGATED.

TYPE 2
FOR 30 IN. THRU 36 IN. ROUND PIPE WITH ANNULAR CORRUGATIONS. NOT TO BE USED ON HELICALLY–FORMED PIPE UNLESS RECORRUGATED.

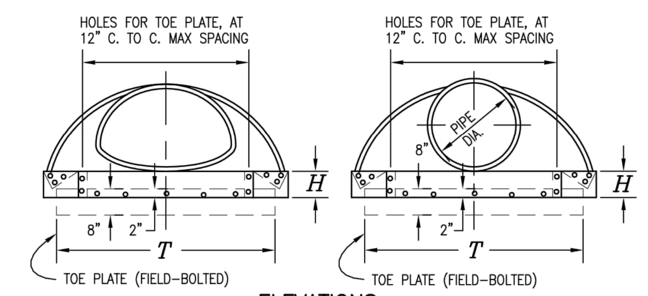
TYPE 3
FOR 42 IN. THRU 84 IN. ROUND PIPE WITH ANNULAR CORRUGATIONS AND ALL SIZES WITH HELICAL CORRUGATIONS AND FOR ALL METAL PIPE ARCH CULVERTS. SHOP ATTACH A 24 IN. MIN. LENGTH OF ANNULAR PIPE WITH GALV. RIVETS OR BOLTS, SPOT WELDS, OR 2 IN. LONG SKIP WELDS ON 8 IN. CTRS. REPAIR BURNT GALVANIZING IN ACCORDANCE WITH SUBSECTION 707.09.

TYPICAL CONNECTIONS

END SECTION AND CONNECTION DETAILS FOR ROUND AND ARCH METAL PIPES

PIPE ARCH SPAN x RISE	THICKNESS	DIMENSIONS A (±1")	B (MAX.)	H (±1")	L (±1.5")	W (±2")	T
IN.							
21 x 15	0.064	7	10	6	23	36	46
24 x 18	0.064	8	12	6	28	42	52
28 x 20	0.064	9	14	6	32	48	58
35 x 24	0.079	10	16	6	39	60	70
42 x 29	0.079	12	18	8	46	75	85
49 x 33	0.109	13	21	9	53	85	103
57 x 38	0.109	18	26	12	63	90	108
64 x 43	0.109	18	30	12	70	102	120
71 x 47	0.109	18	33	12	77	114	132

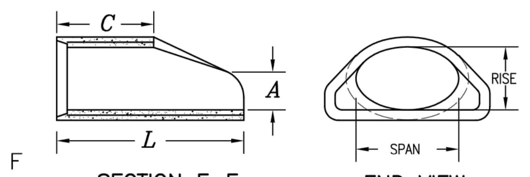
FLEXIBLE PIPE ARCH



ELEVATIONS

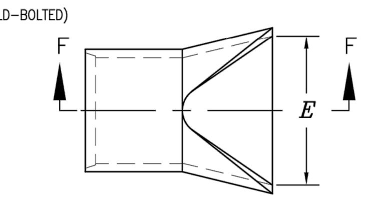
GENERAL NOTES

1. DIMENSIONS OF END SECTIONS MAY VARY SLIGHTLY FROM THOSE SHOWN ON THE TABLES DUE TO DIFFERENT MANUFACTURERS' CONFIGURATIONS.
2. CONCRETE END SECTIONS SHALL BE FURNISHED WITH TONGUE OR GROOVE AS REQUIRED.
3. DESIGN LENGTH OF PIPE OR SIDE DRAIN IS BASED ON LENGTH OF END SECTION SHOWN IN TABLE. ANY ADDITIONAL PIPE REQUIRED TO PROVIDE THE DESIGN LENGTH SHALL BE FURNISHED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE PROJECT.
4. THE INSIDE CONFIGURATION AND THE JOINT OF CONCRETE END SECTION AND PIPE SHALL MATCH.
5. END SECTIONS FOR CMP ARCH PIPE SHALL MATCH THE DIMENSIONS OF THE PIPE SHOWN ON THE PLANS.
6. GALVANIZED TOE PLATE AS SHOWN IS REQUIRED ON END SECTIONS FOR CORRUGATED STEEL PIPE AND SHALL BE THE SAME THICKNESS AS END SECTIONS. TOE PLATE SHALL BE FIELD–BOLTED TO END SECTION WITH 3/8 IN. GALVANIZED BOLTS, NUTS AND WASHERS.
7. GALVANIZED STEEL SHALL CONFORM TO AASHTO M 111, M 218 OR M 232.
8. FOR TYPE SD END SECTIONS, BARS SHALL BE FABRICATED FROM NPS–3 GALVANIZED STEEL SCHEDULE 40 PIPE WHICH SHALL CONFORM TO ASTM A 53.
9. FOR A TYPE SD END SECTION, THE INSTALLATION OF ALTERNATIVE 1 OR ALTERNATIVE 2 END SECTION SHALL BE THE CONTRACTOR'S OPTION.
10. CONCRETE PIPE JOINT FASTENERS, WHERE SHOWN ON PLANS, SHALL BE INSTALLED SO THAT A MINIMUM OF 15 LINEAR FEET OF THE OUTLET END OF THE PIPE ARE MECHANICALLY LOCKED TOGETHER. END SECTION LENGTHS WHEN USED, SHALL BE INCLUDED IN THE 15 LF REQUIREMENT.
11. CONNECTIONS OF METAL END SECTIONS TO PLASTIC PIPE SHALL BE APPROVED BY THE ENGINEER. PLASTIC END SECTIONS SHALL NOT BE USED.
12. THE END SECTION STYLE, EITHER REGULAR OR SAFETY, SHALL BE AS SHOWN ON THE PLANS.



SECTION F–F

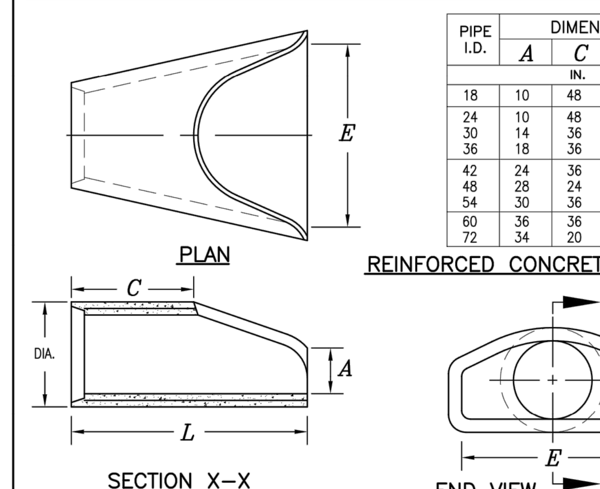
END VIEW



PLAN

PIPE I.D.	DIMENSIONS A	C	L	E
IN.				
18	10	48	78	36
24	10	48	78	48
30	14	36	96	60
36	18	36	96	72
42	24	36	96	78
48	28	24	96	84
54	30	36	96	90
60	36	36	96	96
72	34	20	96	108

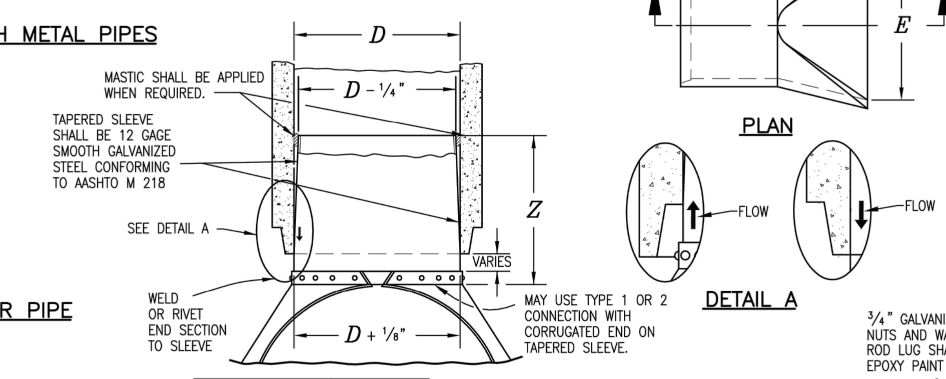
REINFORCED CONCRETE CIRCULAR PIPE



SECTION X–X

END VIEW

END SECTION FOR REINFORCED CONCRETE CIRCULAR PIPE



DETAIL A

D	Z (MIN.)
IN.	
18 – 24	12
30 AND 36	16
42 AND LARGER	24

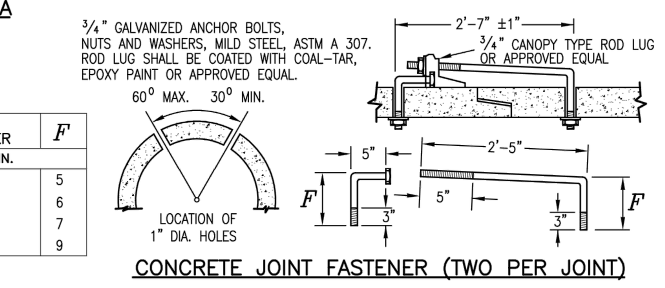
NOTE: METAL END SECTION SHALL BE FIRMLY WEDGED INTO PIPE END BEFORE BACKFILLING.

STEEL END SECTION FOR CONCRETE CIRCULAR PIPE
(ALTERNATIVE FOR CONCRETE END SECTION)

EQUIVALENT CIRCULAR DIA.	DIMENSIONS NOMINAL SPAN x RISE		A	C	L	E
IN.						
24	30	19	9	33	72	48
30	38	24	10	18	72	60
36	45	29	12	24	84	72
42	53	34	16	36	96	78
48	60	38	21	36	96	84
54	68	43	26	36	96	90
60	76	48	30	36	96	96

END SECTION FOR REINFORCED CONCRETE ELLIPTICAL PIPE

PIPE DIAMETER	F
IN.	
18 – 30	5
36 – 42	6
48 – 60	7
72 – 84	9



CONCRETE JOINT FASTENER (TWO PER JOINT)

Computer File Information	
Creation Date: 07/04/06	Initials: SJR
Last Modification Date: 07/04/06	Initials: LTA
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: 6030100102.dwg	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions

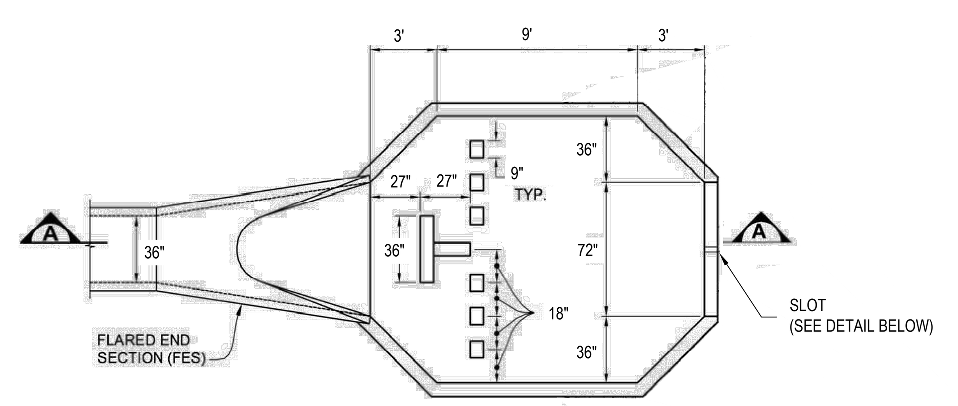
Date:	Comments
R–X	
R–X	
R–X	
R–X	

Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222
Phone: (303) 757–9083
Fax: (303) 757–9820
Project Development Branch SRJ/LTA

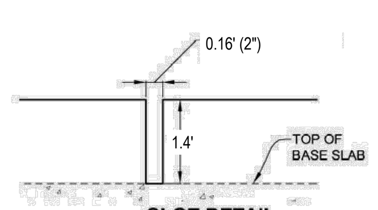
CONCRETE AND METAL END SECTIONS

Issued By: Project Development Branch on July 04, 2006

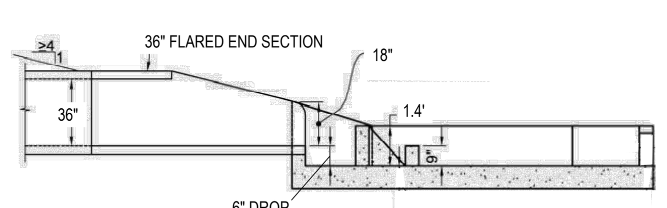
STANDARD PLAN NO.
M-603-10
Sheet No. 1 of 2



PLAN

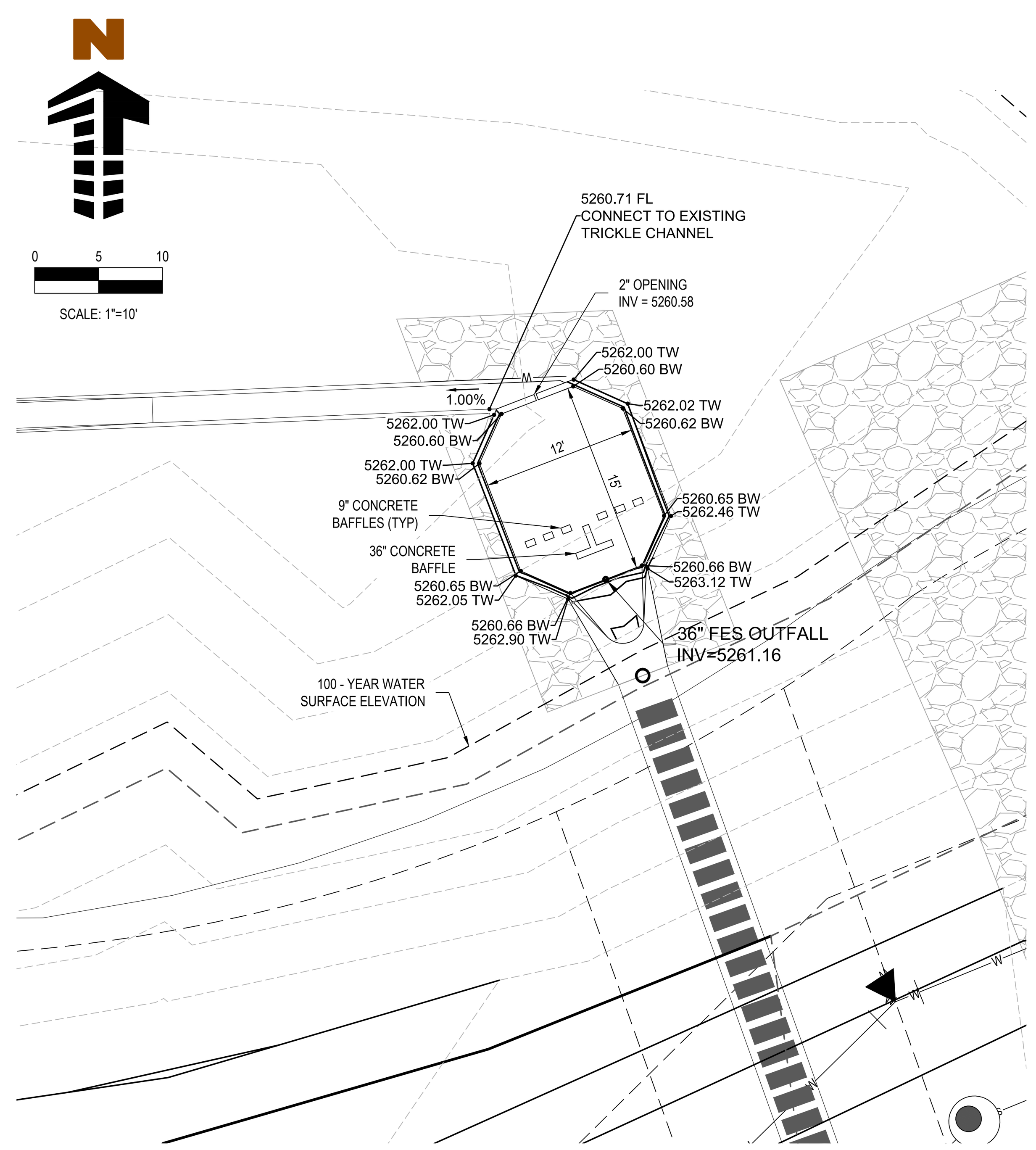


SLOT DETAIL

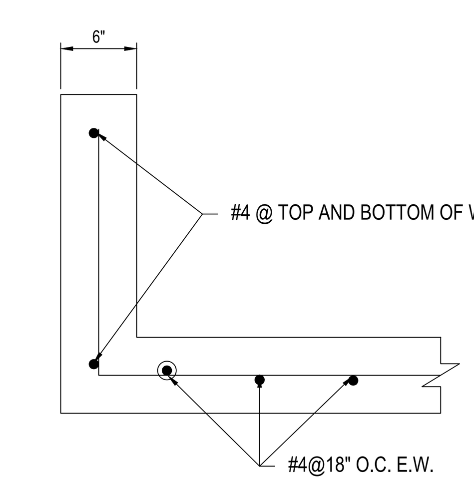


SECTION A

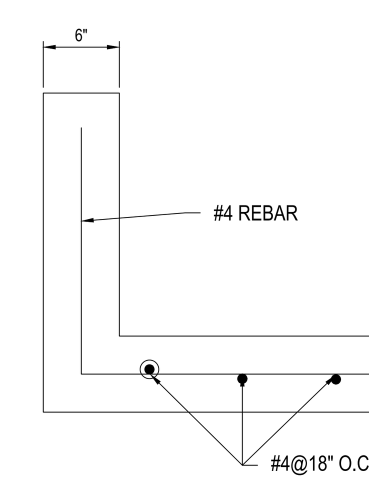
FOREBAY DESIGN DETAIL
SCALE: NOT TO SCALE



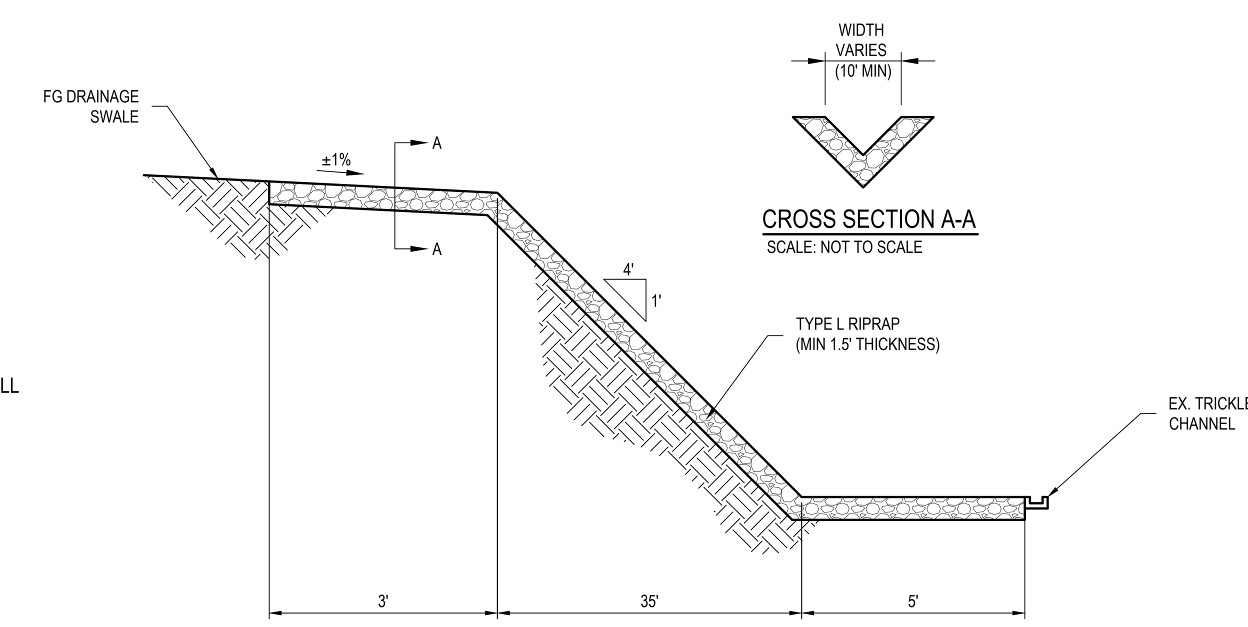
FOREBAY - PLAN VIEW
SCALE: 1" = 10'



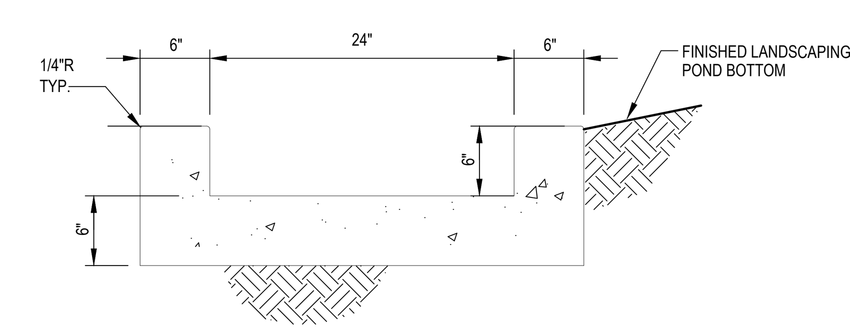
FOREBAY REINFORCING DETAIL
SCALE: NOT TO SCALE



BAFFLE REINFORCING DETAIL
SCALE: NOT TO SCALE



RIP RAP RUNDOWN DETAIL
SCALE: NOT TO SCALE



TRICKLE CHANNEL DETAIL
SCALE: 3/4" = 1'-0"

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VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BLVD & STATE HWY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
CIVIL CONSTRUCTION DRAWINGS

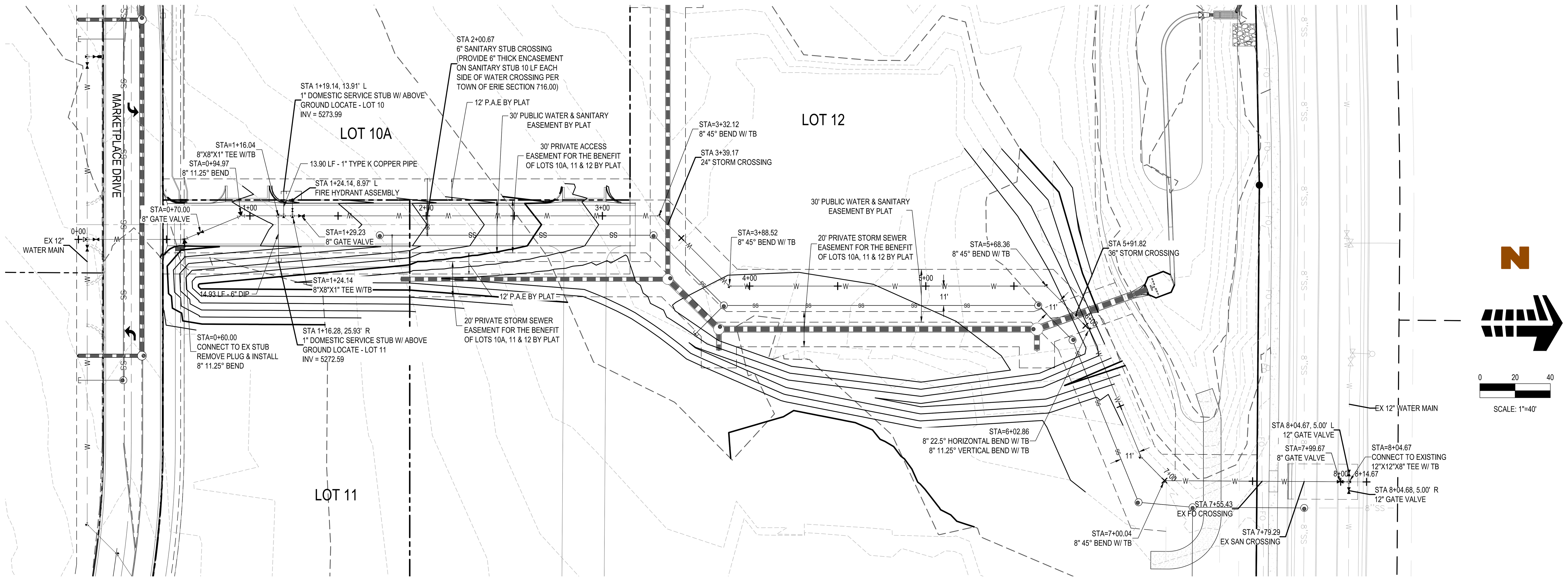
ERIE, COLORADO

#	Date	Issue / Description	Init.
1	06/04/2018	1ST CITY SUBMITTAL	PJD
2	11/09/2018	2ND CITY SUBMITTAL	PJD
3	01/30/2019	3RD CITY SUBMITTAL	PJD
4	05/01/2019	4TH CITY SUBMITTAL	PJD
5	06/25/2019	5TH CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

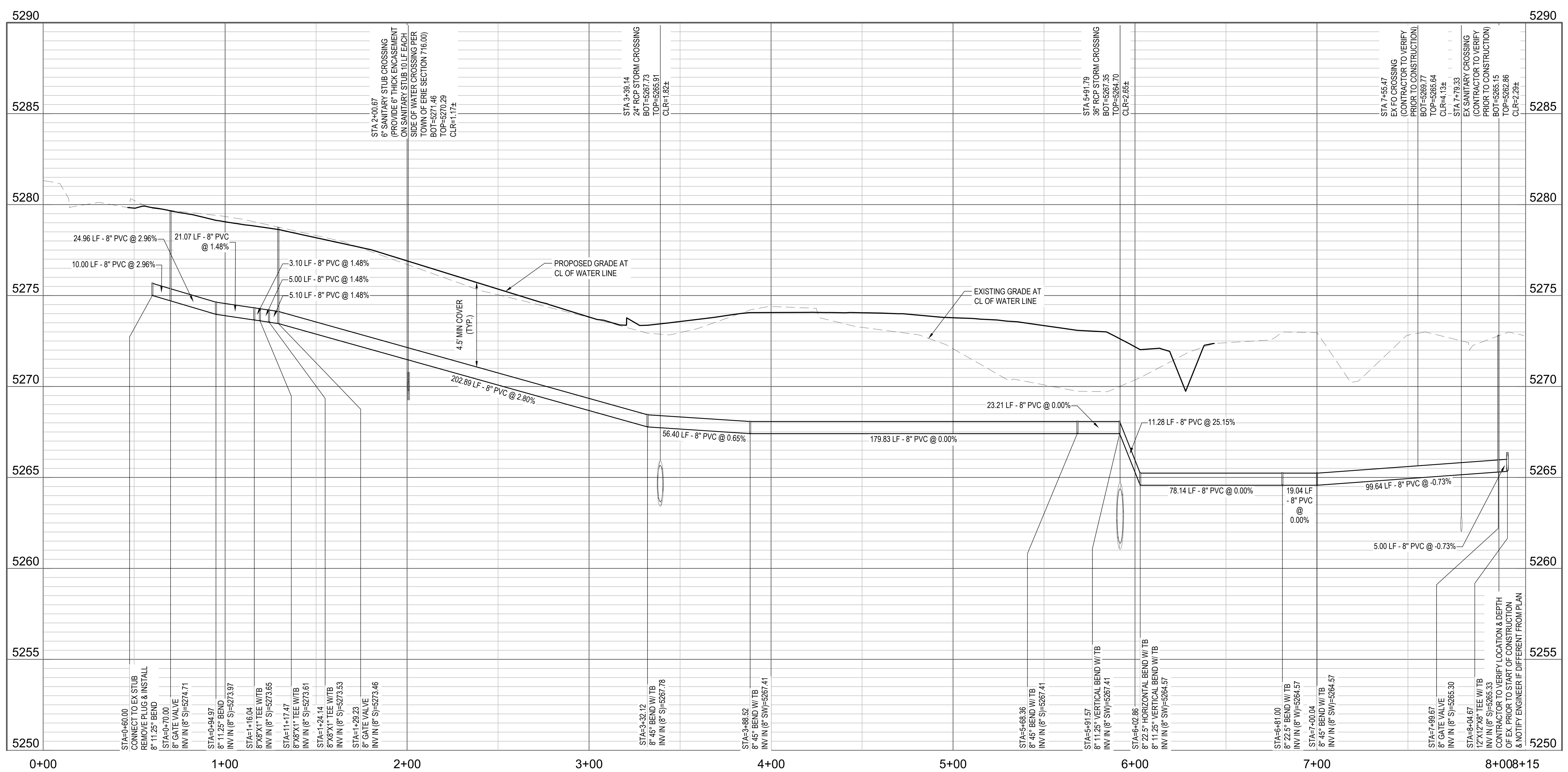
STORM DETAILS

C5.2



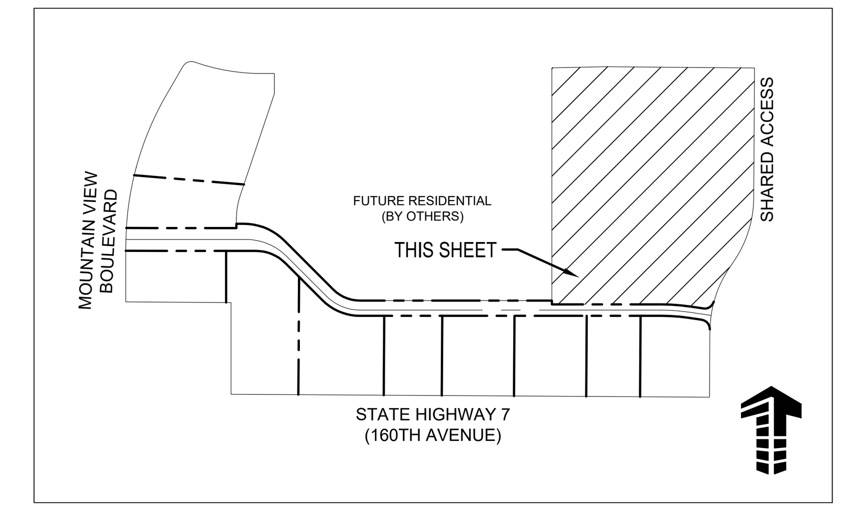
PLAN: WATER LINE A (STA. 0+00 TO END)

SCALE: 1"=40'



PROFILE: WATER LINE A (STA. 0+00 TO END)

SCALE: H: 1"=40' V: 1" = 4'



KEY MAP

1" = 400'

UTILITY LEGEND

W	EXISTING WATER LINE
W	PROPOSED WATER LINE
SS	EXISTING SANITARY SEWER
SS	PROPOSED SANITARY SEWER
STS	EXISTING STORM SEWER
STS	EXISTING STORM SEWER
STS	PROPOSED STORM SEWER
TB	THRUST BLOCK
ARV	AIR RELEASE VALVE

GENERAL NOTES

1. REFER TO GENERAL NOTES SHEET C0.1 FOR GENERAL NOTES.
2. REFER TO SANITARY SEWER PLANS AND STORM SEWER PLANS FOR ADDITIONAL UTILITY COORDINATION
3. EXISTING DRY UTILITY ELEVATIONS ARE ASSUMED. PROPOSED DRY UTILITY ELEVATIONS ARE INDICATED AS SUCH AND TYPICALLY MAINTAIN 3 FEET OF COVER.
4. REFER TO THE ERIE UTILITIES STANDARD DETAILS FOR CONSTRUCTION DETAILS.

BENCHMARK

BROOMFIELD CONTROL POINT KNOWN AS "LUCY", WHICH IS A BROOMFIELD DISK ON A #5 REBAR. CONTROL POINT "LUCY" IS IDENTIFIED BY AN ORANGE WITNESS POST AND LOCATED ON THE SOUTH SIDE OF STATE HIGHWAY 7, APPROXIMATELY 1.8 MILES WEST OF INTERSTATE 25, HAVING A PUBLISHED ELEVATION OF 5297.00 FEET, NAVD 88 DATUM.

BASIS OF BEARING

BEARINGS ARE BASED ON THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST. BEING MONUMENTED ON THE SOUTH BY A #6 REBAR AND CAP IN A RANGE BOX AND ON THE NORTH BY A 2.5" ALUMINUM CAP STAMPED PLS # 24302 AND IS CONSIDERED TO BEAR N00°12'01"W.

CAUTION - NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

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

NOTE: CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL INFORMATION FOR FINAL ACCEPTANCE OF WORK FOR ANY LOCAL, STATE OR FEDERAL AGENCY, UTILITY DISTRICT OR ANY OTHER AGENCY OR DISTRICT HAVING APPROVAL AUTHORITY OVER WORK. THIS INFORMATION MAY INCLUDE, BUT IS NOT LIMITED TO, AS-BUILT PLANS, CERTIFICATIONS, INSPECTIONS AND REPORTS.

SURVEYOR TO OBTAIN AUTOCAD FILE FROM ENGINEER AND VERIFY ALL HORIZONTAL CONTROL DIMENSIONING PRIOR TO CONSTRUCTION STAKING. SURVEYOR MUST VERIFY ALL BENCHMARK, BASIS OF BEARING AND DATUM INFORMATION TO ENSURE IMPROVEMENTS WILL BE AT THE SAME HORIZONTAL AND VERTICAL LOCATIONS SHOWN ON THE DESIGN CONSTRUCTION DRAWINGS. PRIOR TO CONSTRUCTION STAKING ANY DISCREPANCY MUST BE REPORTED TO OWNER AND ENGINEER PRIOR TO CONTINUATION OF ANY FURTHER STAKING OR CONSTRUCTION WORK.

NOTE: MAINTAIN MINIMUM 18" VERTICAL AND 10' HORIZONTAL SEPARATION (OUTSIDE OF PIPE TO OUTSIDE OF PIPE) BETWEEN POTABLE WATERLINE AND STORM OR SANITARY SEWERS AND LATERALS. AN 18" VERTICAL CLEARANCE MUST BE MAINTAINED BETWEEN IRRIGATION LINES.

NOTE: CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE LICENSED SURVEYOR REPLACE ANY DAMAGED OR DISTURBED MONUMENTATION AT THEIR COST.

NOTE: CONTRACTOR RESPONSIBLE FOR AS-BUILT DRAWINGS, TESTS, REPORTS AND/OR ANY OTHER CERTIFICATES OR INFORMATION AS REQUIRED FOR ACCEPTANCE OF WORK FROM CITY, UTILITY DISTRICTS OR ANY OTHER GOVERNING AGENCY.

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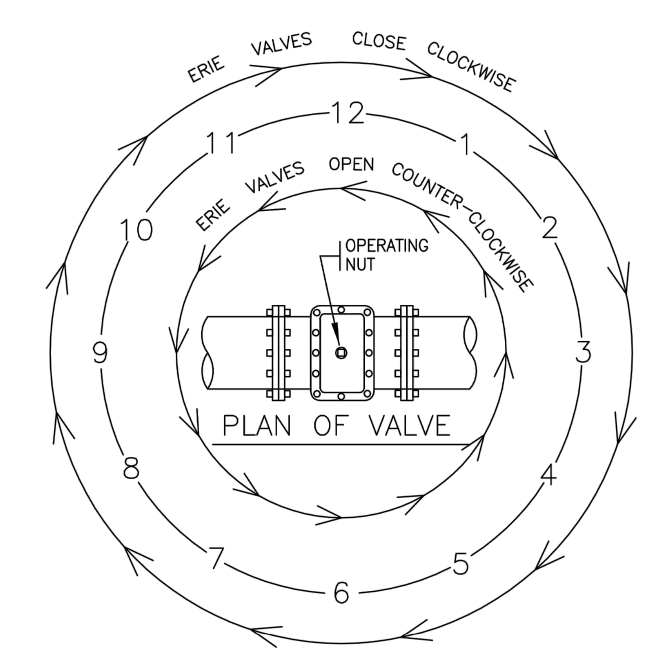
Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

WATER LINE
PLAN & PROFILE

C6.1



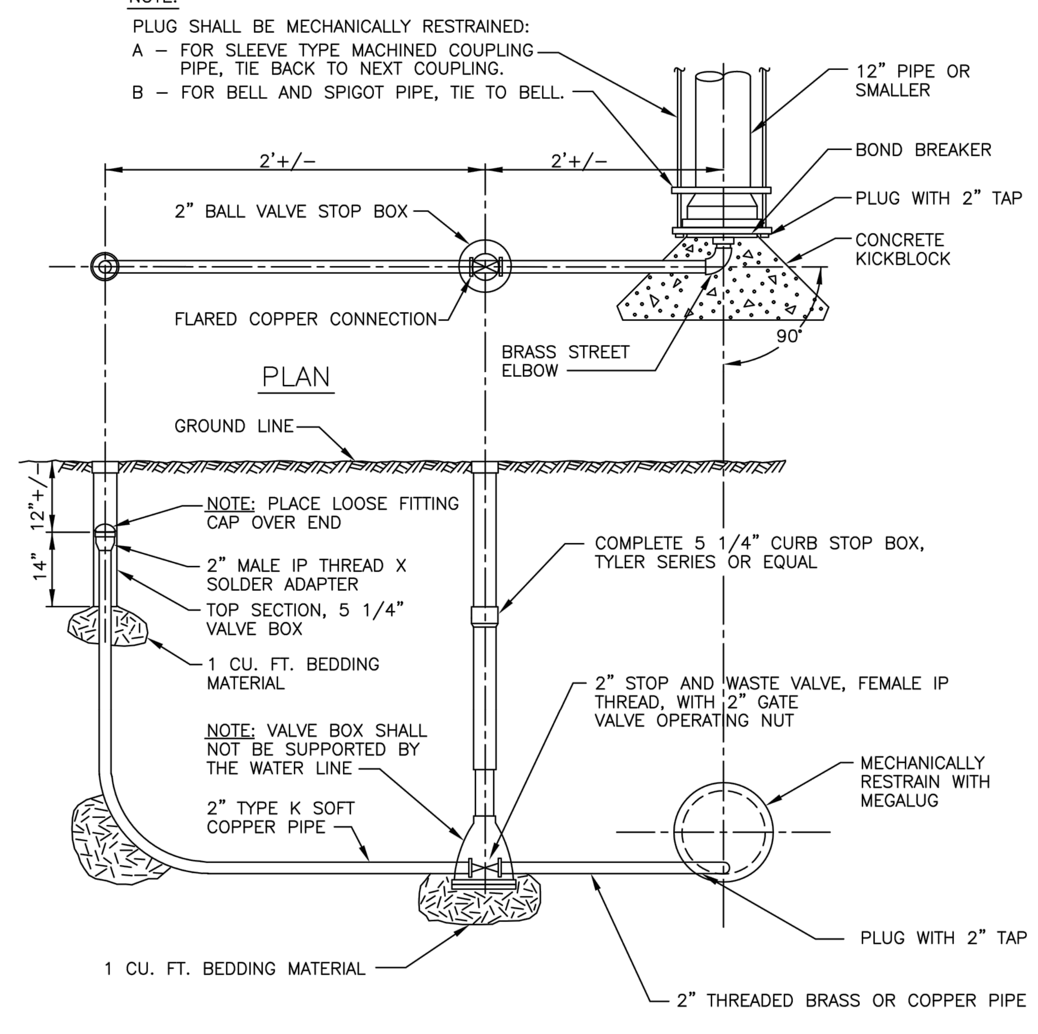
NOTE:
NORMALLY VALVES WITH A BLACK OPERATING NUT INDICATE A STANDARD ERIE VALVE. (OPEN LEFT)

VALVE OPENING & CLOSING PROCEDURE

The Town of ERIE COLORADO

DRAWING TITLE: VALVE OPERATION
DRAWING NUMBER: W1
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN REV. DATE: 01/2009

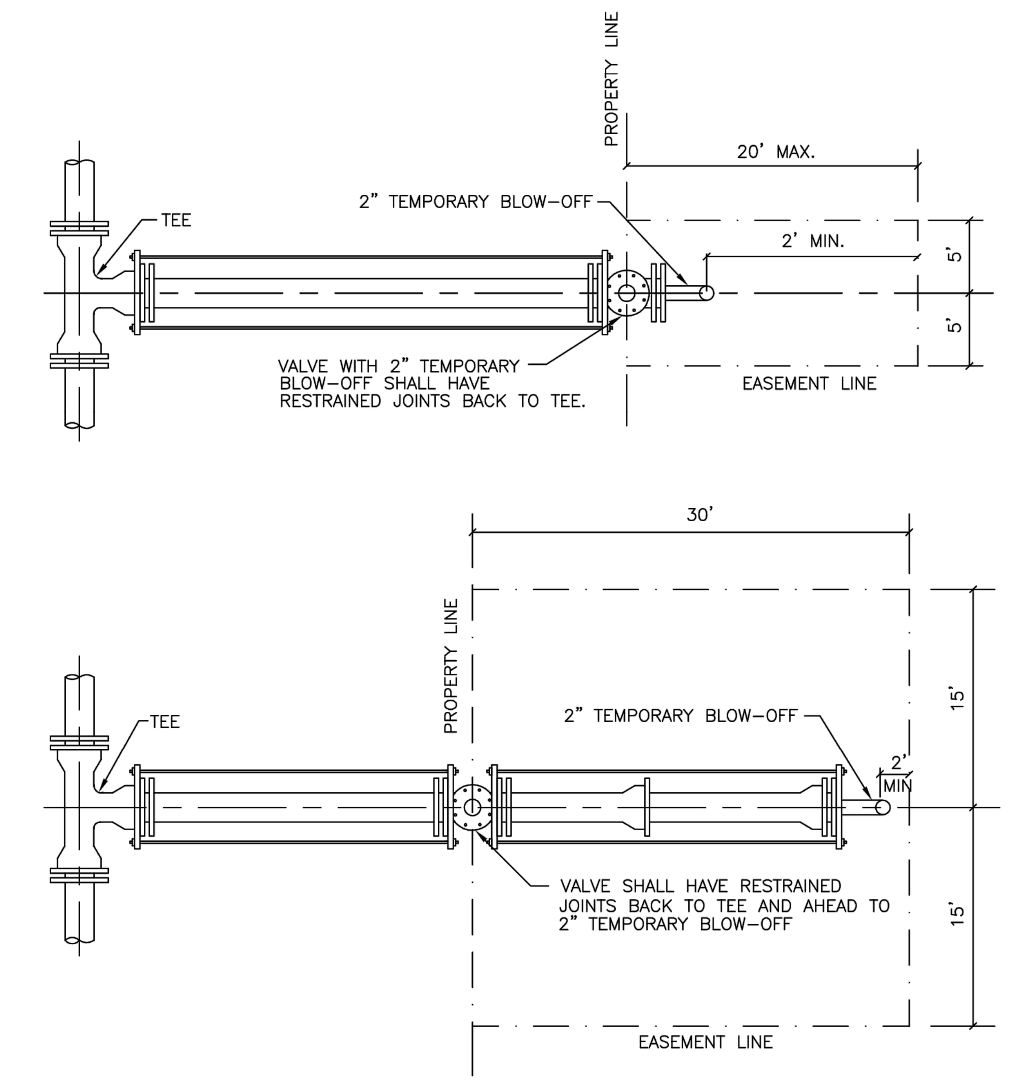
NOTE:
PLUG SHALL BE MECHANICALLY RESTRAINED:
A – FOR SLEEVE TYPE MACHINED COUPLING PIPE, TIE BACK TO NEXT COUPLING.
B – FOR BELL AND SPIGOT PIPE, TIE TO BELL.



ELEVATION

The Town of ERIE COLORADO

DRAWING TITLE: BLOW–OFF INSTALLATION FOR 12" AND SMALLER PIPE
DRAWING NUMBER: W5
DRAWN BY: J. ASCUNCE APPROVED BY: R. PENNINGTON DATE: 09/2017



The Town of ERIE COLORADO

DRAWING TITLE: STUB–OUT CONFIGURATIONS
DRAWING NUMBER: W6A (1 of 2)
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004

TABLE OF BEARING AREAS IN SQ. FT. FOR CONCRETE THRUST BLOCKING

FOR 100 P.S.I. INTERNAL STATIC PRESSURE AND 1,000 LBS. PER SQUARE FOOT SOIL BEARING CAPACITY.

SIZE	BENDS				TEES *	GATE VALVES	DEAD ENDS	CROSS W/ 1 BRANCH PLUGGED	CROSS W/ 2 BRANCHES PLUGGED
	90°	45°	22–1/2°	11–1/4°					
3	1.0	0.6	0.3	1.0	0.7	0.5	0.7	0.7	0.7
4	1.8	1.0	0.5	1.0	1.3	0.5	1.3	1.3	1.3
6	4.0	2.2	1.1	1.0	2.8	0.7	2.8	2.8	2.8
8	7.1	3.8	2.0	1.0	5.0	2.4	5.0	5.0	5.0
10	11.1	6.0	3.0	1.5	7.8	4.5	7.8	7.8	7.8
12	16.0	8.6	4.4	2.2	11.3	7.3	11.3	11.3	11.3
14	21.7	11.8	6.0	3.0	15.4	11.0	15.4	15.4	15.4
15	25.0	13.5	7.0	3.5	17.6	SPECIAL DESIGN	17.6	17.6	17.6
16	28.4	15.3	8.0	4.0	20.0		20.0	20.0	20.0
18	36.0	19.4	10.0	5.0	25.4		25.4	25.4	25.4
20	44.2	24.0	12.2	6.1	31.4		31.4	31.4	31.4
21	49.0	26.5	13.5	6.8	34.6		34.6	34.6	34.6
22	54.0	29.0	14.8	7.4	38.0		38.0	38.0	38.0
24	64.0	34.5	17.7	8.8	45.0		45.0	45.0	45.0
30	100.0	54.0	27.6	13.8	71.0		71.0	71.0	71.0
36	144.0	78.0	40.0	20.0	102.0		102.0	102.0	102.0

* SIZE IS BRANCH SIZE

AREAS GIVEN IN TABLE ARE BASED UPON AN INTERNAL STATIC PRESSURE OF 100 P.S.I. AND A SOIL BEARING CAPACITY OF 1,000 LBS. PER SQUARE FOOT. BEARING AREAS FOR ANY PRESSURE AND SOIL BEARING CAPACITY MAY BE OBTAINED BY MULTIPLYING THE TABULATED VALUES BY A CORRECTION FACTOR "F".

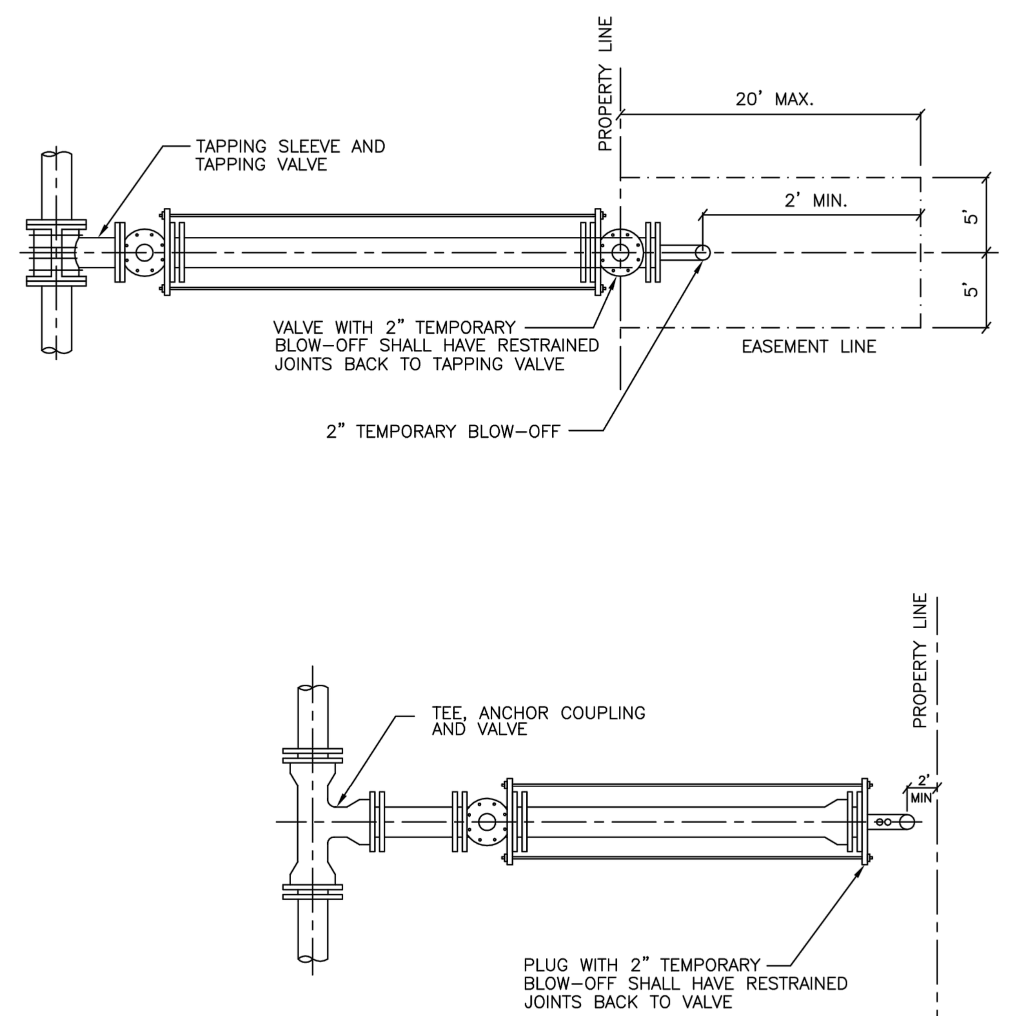
$$F = \frac{\text{ACTUAL SPECIFIED TEST PRESSURE IN HUNDRED OF LBS.}}{\text{ACTUAL SOIL BEARING CAPACITY IN THOUSANDS OF LBS.}}$$

EXAMPLE: TO FIND BEARING AREA FOR 8" – 90° BEND WITH A STATIC INTERNAL PRESSURE OF 150 P.S.I. AND WITH A SOIL BEARING CAPACITY OF 3,000 LBS. PER SQUARE FOOT.

F = 1.5 ÷ 3 = 0.5 TABULATED VALUE = 7.1 SQUARE FOOT.
0.5 x 7.1 = 3.56 SAY 4 SQUARE FEET OF 2 FOOT LONG BY 2 FOOT HIGH.

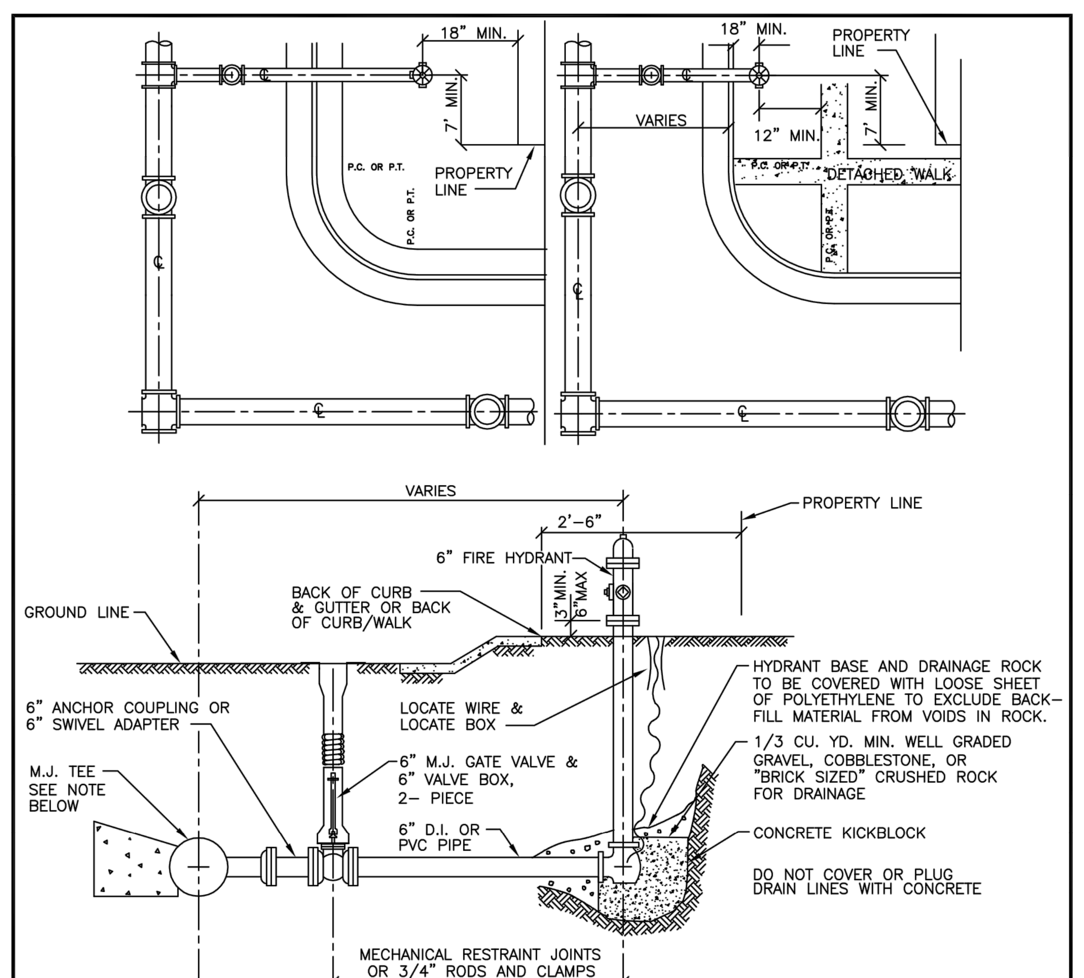
The Town of ERIE COLORADO

DRAWING TITLE: THRUST BLOCKING CHART
DRAWING NUMBER: W14B
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN REV. DATE: 01/2015



The Town of ERIE COLORADO

DRAWING TITLE: STUB–OUT CONFIGURATIONS
DRAWING NUMBER: W6B (2 OF 2)
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004

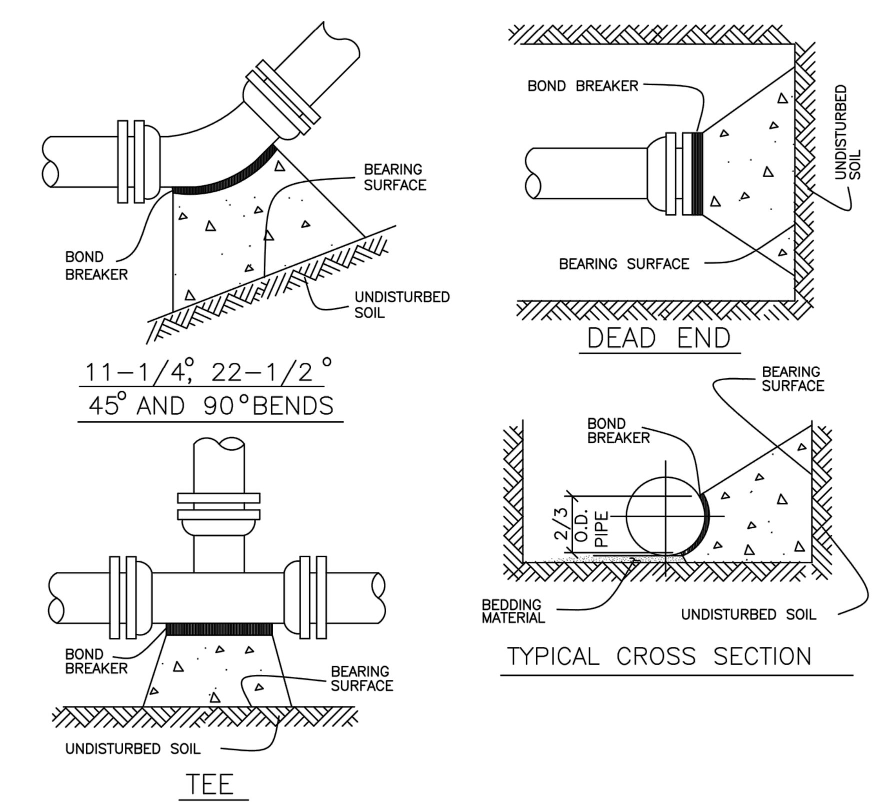


NOTES:

1. ALTERNATE TO THE ABOVE:
   FASTEN M.J. VALVE DIRECTLY TO A M.J. ANCHOR TEE (ALSO CALLED SWIVEL TEE)
2. NO HORIZONTAL OR VERTICAL BENDS ARE ALLOWED IN FIRE HYDRANT BRANCH OR SPRINKLER LINES
3. MAXIMUM OF ONE FIRE HYDRANT EXTENSION
4. CONTRACTOR TO TAKE CARE NOT TO BLOCK WEEP HOLES
5. ALL DUCTILE IRON PIPE TO BE POLYETHYLENE WRAPPED

The Town of ERIE COLORADO

DRAWING TITLE: FIRE HYDRANTS, MAINS & VALVES
DRAWING NUMBER: W7
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2010

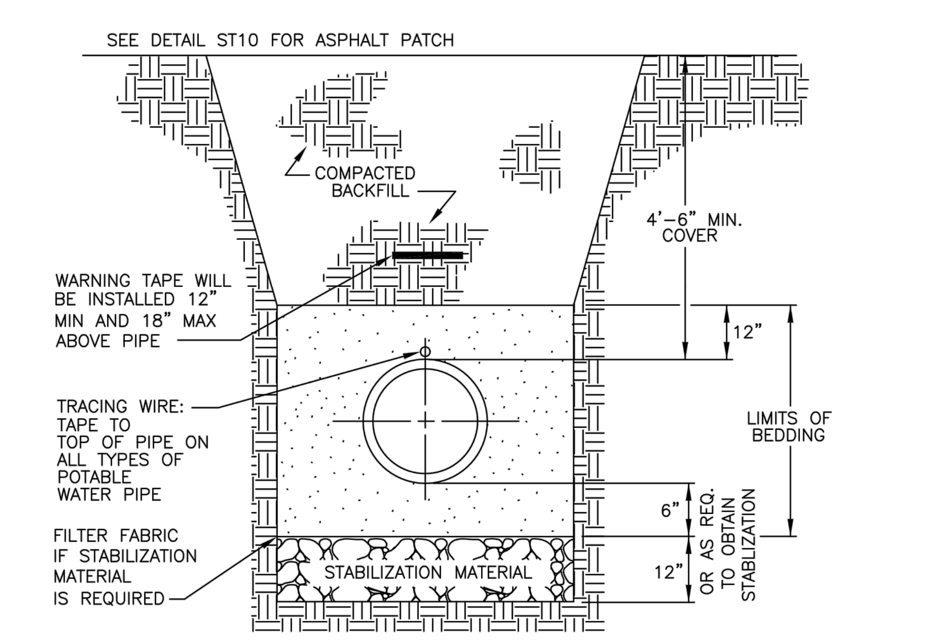


NOTES:

1. SEE THRUST BLOCKING CHART FOR MINIMUM BEARING SURFACE AREAS
2. BASED ON 150 PSI INTERNAL PIPE PRESSURE PLUS WATER HAMMER
   4",6",8" AND 12" WATER HAMMER=110 P.S.I.
   16",20' AND 24" WATER HAMMER =70 P.S.I.
3. BASED ON 3,000 pfs SOIL BEARING CAPACITY
4. THRUST BLOCKING SHALL BE CAST AGAINST UNDISTURBED EARTH. FORMS SHALL BE USED AS REQUIRED TO OBTAIN ADEQUATE BEARING AND TO CONFINE THE CONCRETE. THRUST BLOCKING SHALL BEAR ON THE FITTING OR END CAP ONLY AND SHOULD NOT BE ALLOWED TO SPILL OVER THE JOINT OR AGAINST THE PIPE

The Town of ERIE COLORADO

DRAWING TITLE: THRUST BLOCK
DRAWING NUMBER: W14A
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN REV. DATE: 01/2015



NOTES:

1. COMPACTION SHALL BE AS FOLLOWS: PIPE ZONE BEDDING 6" UNDER AND 12" OVER PIPE WILL REQUIRE 90% S.P.D. TRENCH ZONE ABOVE BEDDING MATERIALS, FULL TRENCH SECTION IN ROADWAY OR STREET R.O.W. LIMITS WILL REQUIRE 95% S.P.D. TRENCH ZONE ABOVE BEDDING MATERIALS, OUTSIDE OF STREET R.O.W. WILL REQUIRE 90% S.P.D.
2. 12 AWG. SINGLE STRAND INSULATED COPPER WIRE SHALL BE INSTALLED AS TRACING WIRE ABOVE ALL POTABLE WATER PIPES. THE WIRE SHALL BE CONNECTED AND COME TO THE SURFACE BEHIND THE FIRE HYDRANTS IN A TESTBOX.
3. FILTER FABRIC IS REQUIRED IF STABILIZATION MATERIAL IS USED. THE FABRIC SHALL BE INSTALLED AS SHOWN IN THE DETAIL.
4. TRENCH TO BE BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKMEN AND PROTECTION OF OTHER UTILITIES IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL SAFETY REGULATIONS.
5. PIPE SHALL BE BEDDED FROM 6" BELOW THE BOTTOM OF THE PIPE TO 12" ABOVE THE TOP OF THE PIPE.
6. TRENCH WIDTH SHALL NOT BE MORE THAN 24" NOR LESS THAN 12" WIDER THAN THE LARGEST OUTSIDE DIAMETER OF THE PIPE.

The Town of ERIE COLORADO

DRAWING TITLE: WATER TRENCH DETAIL
DRAWING NUMBER: W35
DRAWN BY: J. ASCUNCE APPROVED BY: R. PENNINGTON REV. DATE: 09/2017

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CIVIL CONSTRUCTION DRAWINGS

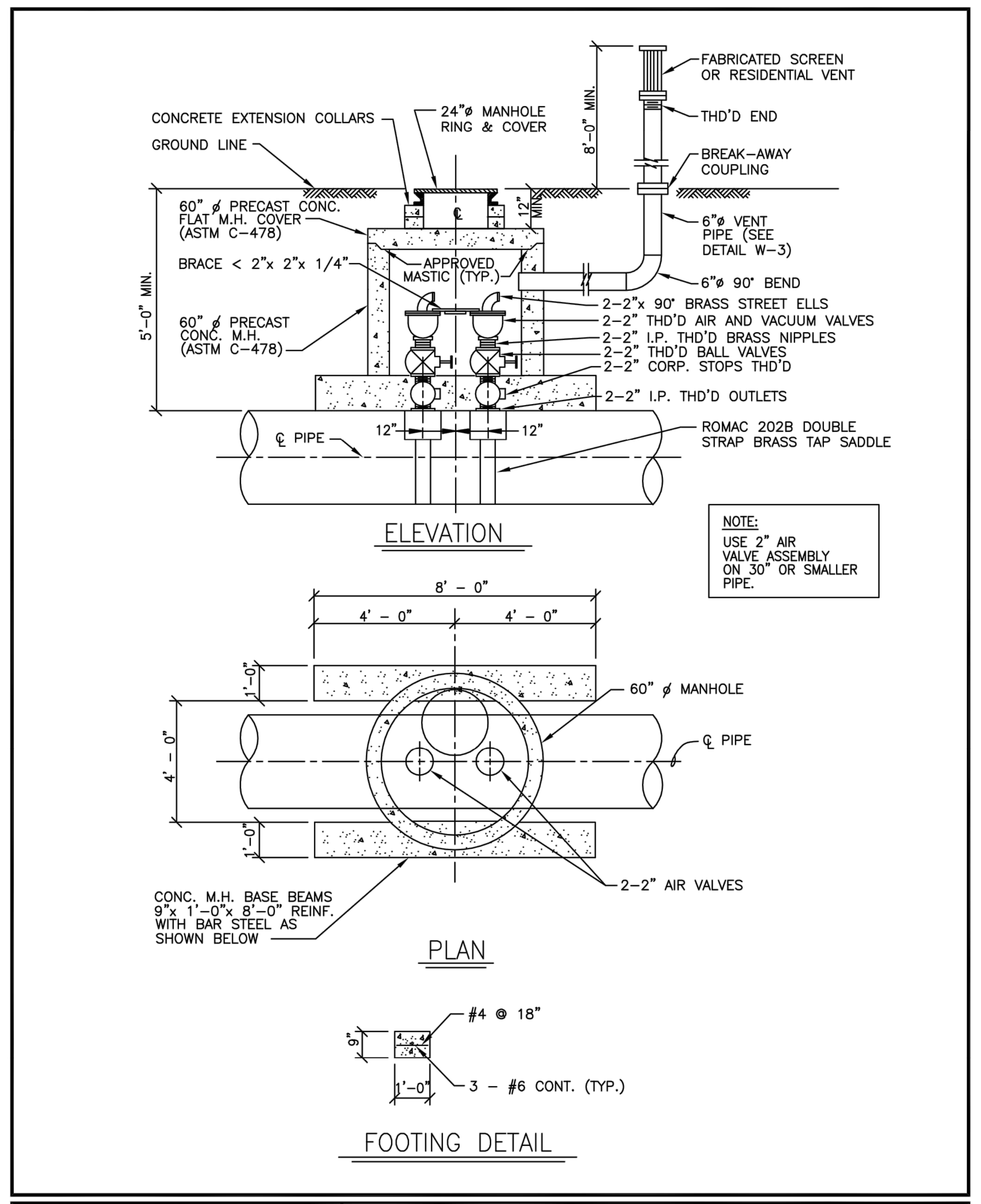
ERIE, COLORADO

#	Date	Issue / Description	Init.
1	06/04/2018	1ST CITY SUBMITTAL	PJD
2	11/09/2018	2ND CITY SUBMITTAL	PJD
3	01/30/2019	3RD CITY SUBMITTAL	PJD
4	05/01/2019	4TH CITY SUBMITTAL	PJD
5	06/25/2019	5TH CITY SUBMITTAL	PJD

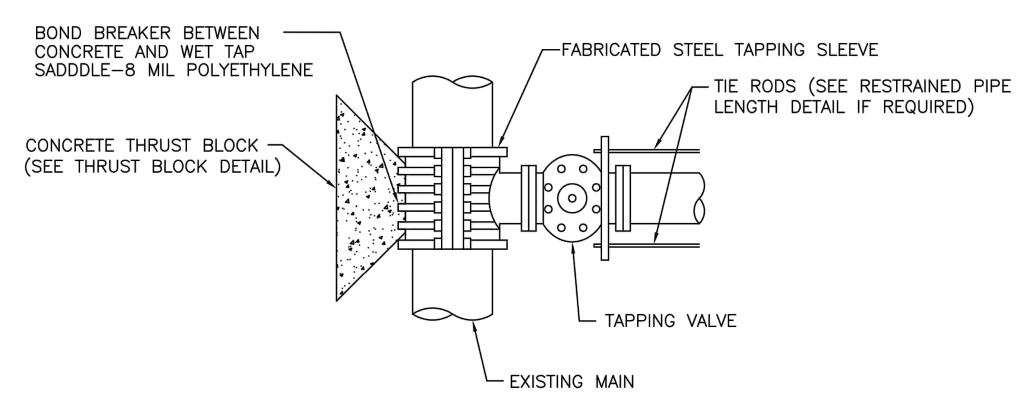
Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

WATER DETAILS

C6.2



The Town of ERIE COLORADO	DRAWING TITLE: AIR RELIEF VALVE DRAWING NUMBER: W2 DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004



NOTES:

1. FABRICATED STEEL TAPPING SLEEVE SHALL BE:

ROMAC FTS419 OR APPROVED EQUAL TO BE USED FOR PVC UP TO 75% OF EXISTING MAIN

ROMAC FTS420 OR APPROVED EQUAL TO BE USED FOR DIP UP TO 75% OF EXISTING MAIN

ROMAC FTS425 OR APPROVED EQUAL TO BE USED ON ALL AC PIPE AND ANYTIME BRANCH LINE IS GREATER THAN 75% OF EXISTING MAIN

The Town of ERIE COLORADO	DRAWING TITLE: TAPPING TEE AND VALVE DRAWING NUMBER: W21 DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN REV. DATE: 01/2015

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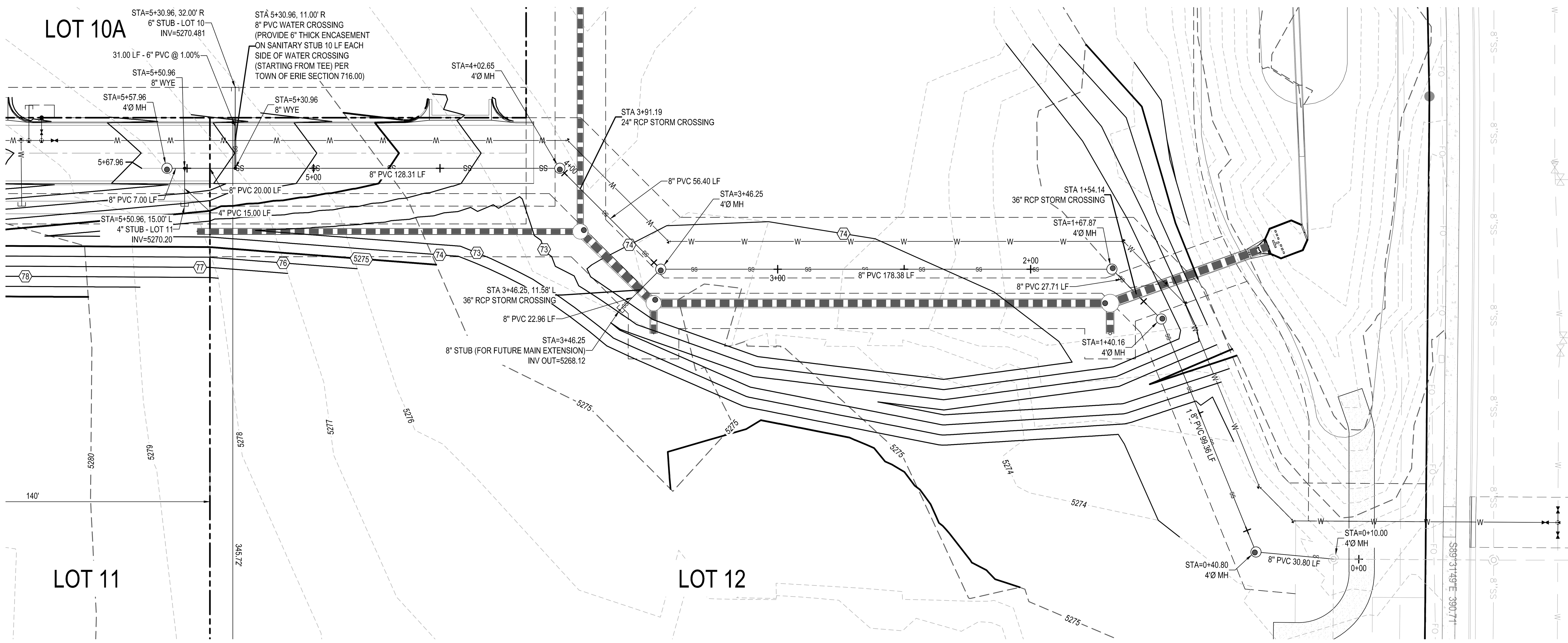
5	06/25/2019	5TH CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

WATER DETAILS

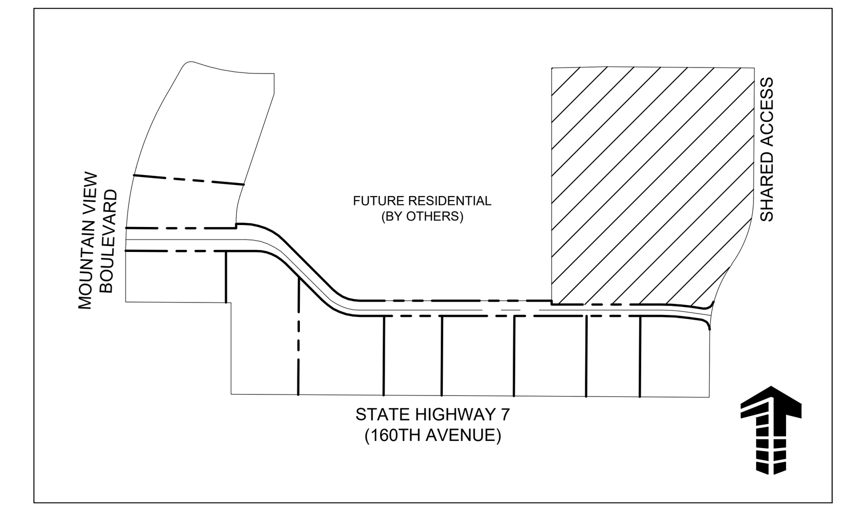
C6.3



N

0 15 30

SCALE: 1"=30'



KEY MAP
1" = 400'

UTILITY LEGEND

W	EXISTING WATER LINE
W	PROPOSED WATER LINE
SS	EXISTING SANITARY SEWER
SS	PROPOSED SANITARY SEWER
STS	EXISTING STORM SEWER
STS	EXISTING STORM SEWER
STS	PROPOSED STORM SEWER

GENERAL NOTES

1. REFER TO GENERAL NOTES SHEET C0.1 & SANITARY DETAILS SHEETS C7.2 & C7.3 FOR GENERAL NOTES.
2. REFER TO STORM SEWER PLANS AND WATER PLANS FOR ADDITIONAL UTILITY COORDINATION.
3. EXISTING DRY UTILITY ELEVATIONS ARE ASSUMED.
4. REFER TO THE ERIE UTILITIES STANDARD DETAILS FOR CONSTRUCTION DETAILS.

NOTE: MAINTAIN MINIMUM 18" VERTICAL AND 10' HORIZONTAL SEPARATION (OUTSIDE OF PIPE TO OUTSIDE OF PIPE) BETWEEN POTABLE WATERLINE AND STORM OR SANITARY SEWERS AND LATERALS. AN 18" VERTICAL CLEARANCE MUST BE MAINTAINED BETWEEN IRRIGATION LINES.

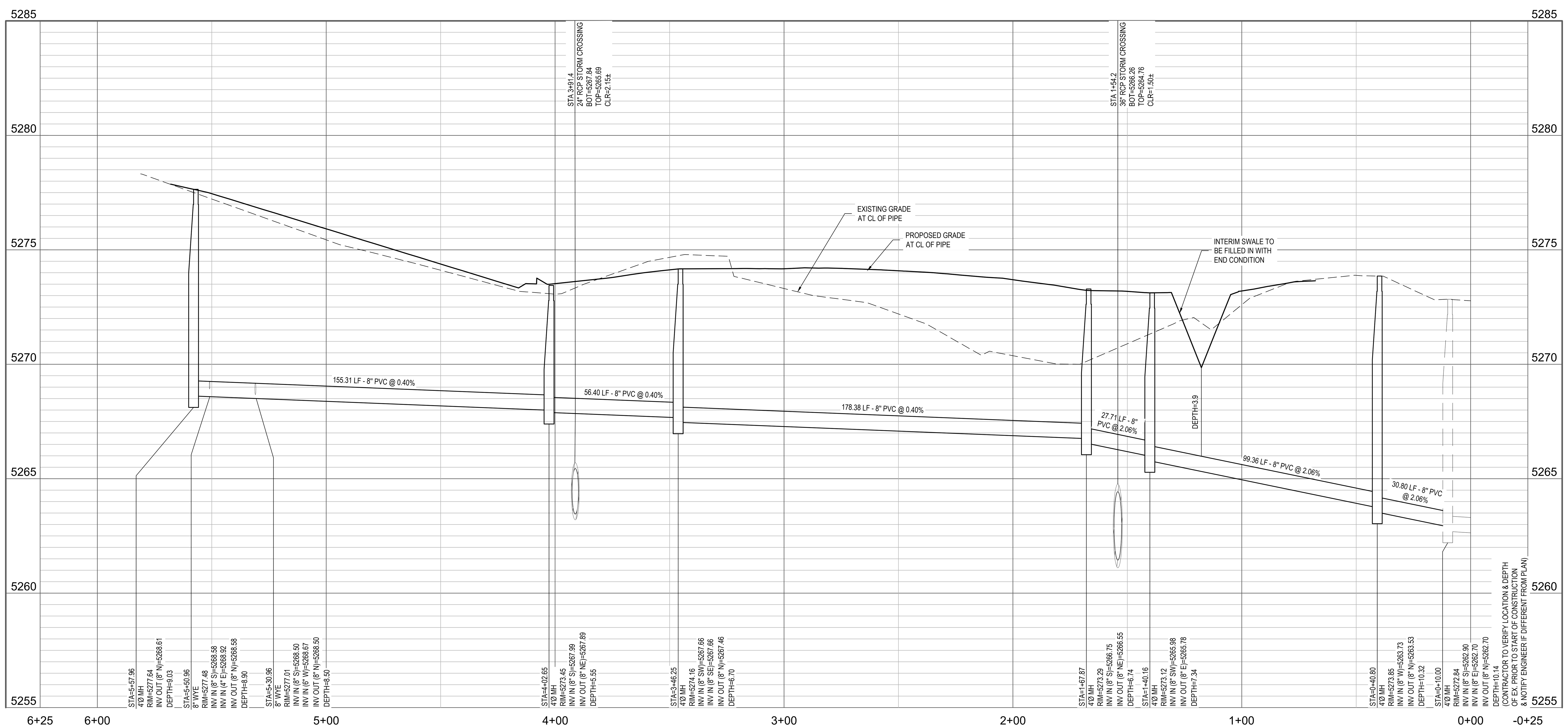
NOTE: CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION. CONTRACTOR SHALL HAVE LICENSED SURVEYOR REPLACE ANY DAMAGED OR DISTURBED MONUMENTATION AT THEIR COST.

NOTE: CONTRACTOR RESPONSIBLE FOR AS-BUILT DRAWINGS, TESTS, REPORTS AND/OR ANY OTHER CERTIFICATES OR INFORMATION AS REQUIRED FOR ACCEPTANCE OF WORK FROM CITY, UTILITY DISTRICTS OR ANY OTHER GOVERNING AGENCY.

NOTE: CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL INFORMATION FOR FINAL ACCEPTANCE OF WORK FOR ANY LOCAL, STATE OR FEDERAL AGENCY, UTILITY DISTRICT OR ANY OTHER AGENCY OR DISTRICT HAVING APPROVAL AUTHORITY OVER WORK. THIS INFORMATION MAY INCLUDE, BUT IS NOT LIMITED TO, AS-BUILT PLANS, CERTIFICATIONS, INSPECTIONS AND REPORTS.

SURVEYOR TO OBTAIN AUTOCAD FILE FROM ENGINEER AND VERIFY ALL HORIZONTAL CONTROL DIMENSIONING PRIOR TO CONSTRUCTION STAKING. SURVEYOR MUST VERIFY ALL BENCHMARK, BASIS OF BEARING AND DATUM INFORMATION TO ENSURE IMPROVEMENTS WILL BE AT THE SAME HORIZONTAL AND VERTICAL LOCATIONS SHOWN ON THE DESIGN CONSTRUCTION DRAWINGS. PRIOR TO CONSTRUCTION STAKING ANY DISCREPANCY MUST BE REPORTED TO OWNER AND ENGINEER PRIOR TO CONTINUATION OF ANY FURTHER STAKING OR CONSTRUCTION WORK.

PLAN: SANITARY LINE (STA. 0+00 TO END)
SCALE: 1"= 30'



PROFILE: SANITARY LINE (STA. 0+00 TO END)
SCALE: H: 1"=30' V: 1" = 3'

BENCHMARK

BROOMFIELD CONTROL POINT KNOWN AS "LUCY", WHICH IS A BROOMFIELD DISK ON A #5 REBAR. CONTROL POINT "LUCY" IS IDENTIFIED BY AN ORANGE WITNESS POST AND LOCATED ON THE SOUTH SIDE OF STATE HIGHWAY 7, APPROXIMATELY 1.8 MILES WEST OF INTERSTATE 25, HAVING A PUBLISHED ELEVATION OF 5297.00 FEET, NAVD 88 DATUM.

BASIS OF BEARING

BEARINGS ARE BASED ON THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 1 NORTH, RANGE 68 WEST. BEING MONUMENTED ON THE SOUTH BY A #6 REBAR AND CAP IN A RANGE BOX AND ON THE NORTH BY A 2.5" ALUMINUM CAP STAMPED PLS # 24302 AND IS CONSIDERED TO BEAR N00°12'01"W.

CAUTION - NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

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

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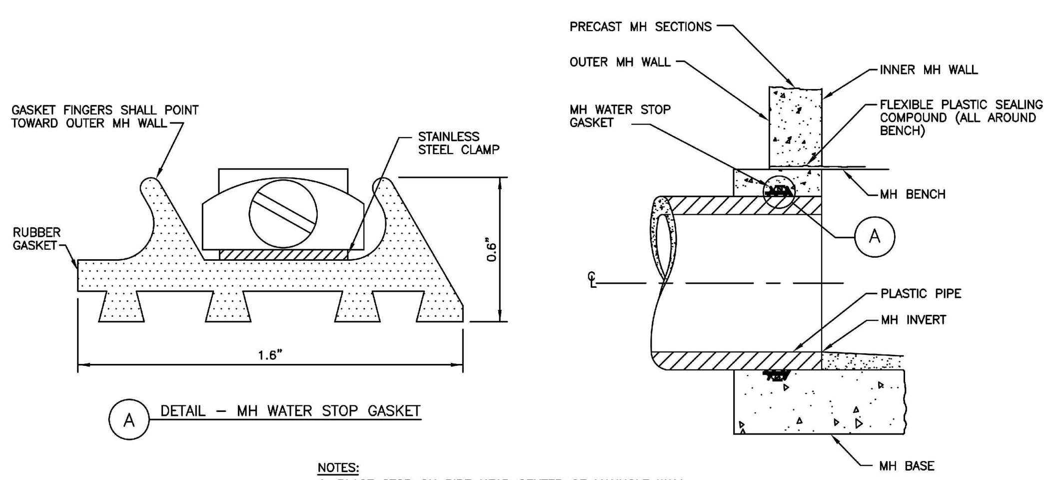
Project No:	SH7000003.01
Drawn By:	CAC
Checked By:	PJD
Date:	06/21/19

SANITARY SEWER
PLAN & PROFILE

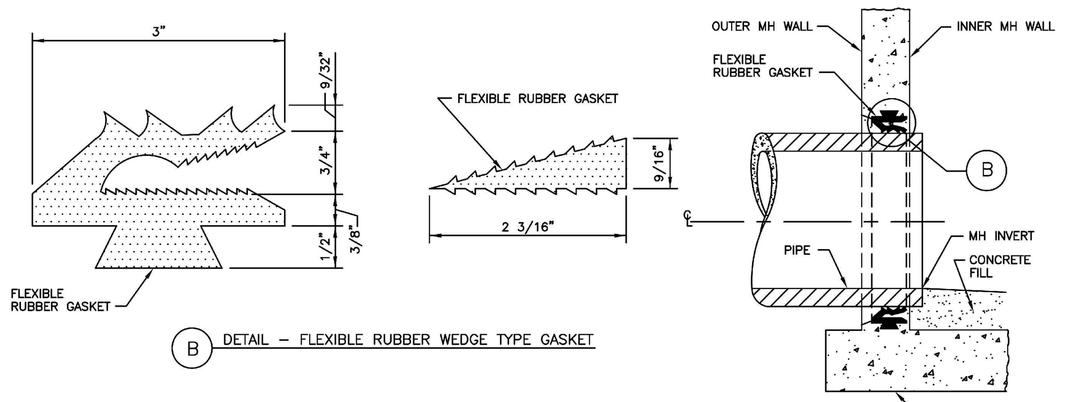
C7.1



(A) DETAIL – MH WATER STOP GASKET

NOTES:
1. PLACE STOP ON PIPE NEAR CENTER OF MANHOLE WALL.
2. TIGHTEN STEEL BAND TO ASSURE POSITIVE SEAL AGAINST PIPE OUTSIDE. A SCREWDRIVER MAY BE USED TO TAKE UP INITIAL SLACK BUT A SOCKET WRENCH (5/16") IS PREFERRED TO ENSURE PROPER TIGHTNESS.

CAST–IN–PLACE MANHOLE CONNECTION DETAILS FOR PLASTIC PIPE

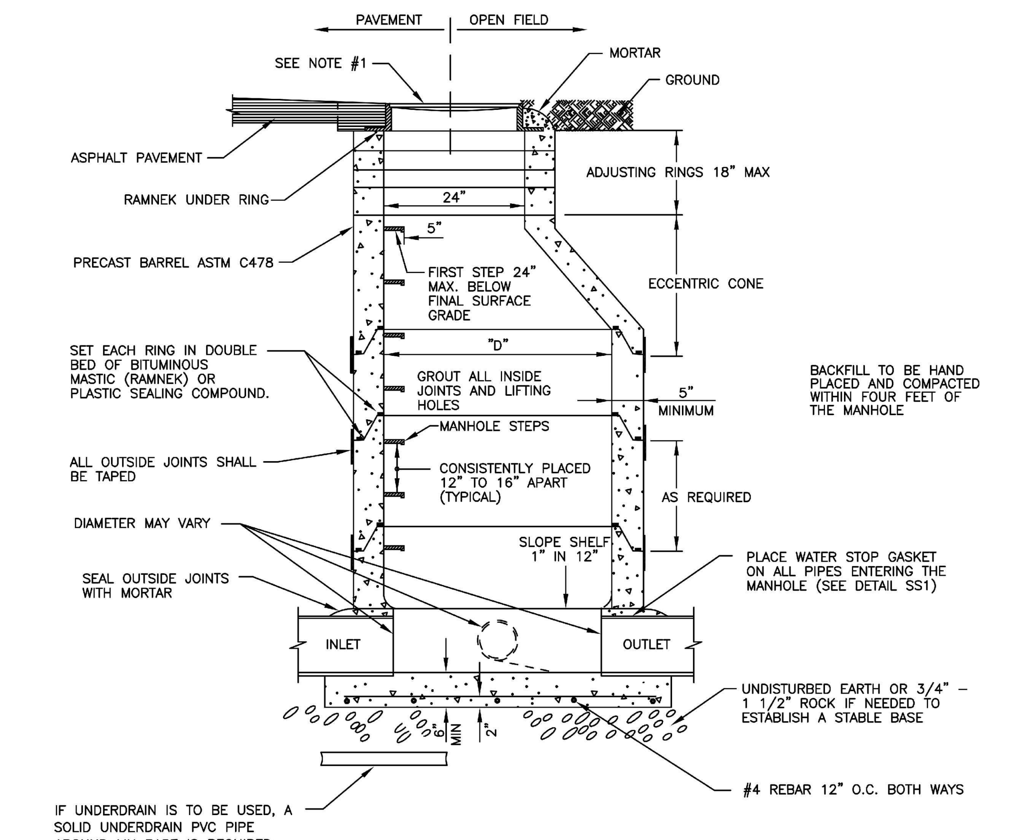


(B) DETAIL – FLEXIBLE RUBBER WEDGE TYPE GASKET

NOTE:
1. ALL MATERIAL SPECIFICATIONS AND INSTALLATION REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.

PRECAST MANHOLE CONNECTION DETAILS FOR ANY TYPE OF PIPE

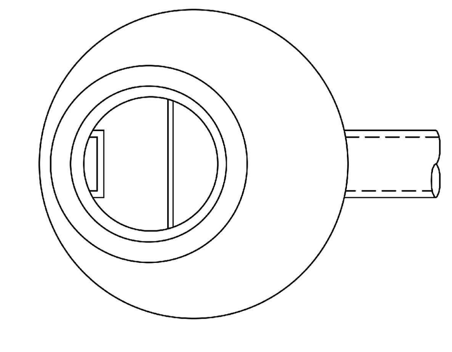
The Town of ERIE COLORADO
DRAWING TITLE: MH/PIPE WATER STOP GASKET
DRAWING NUMBER: SS1
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004



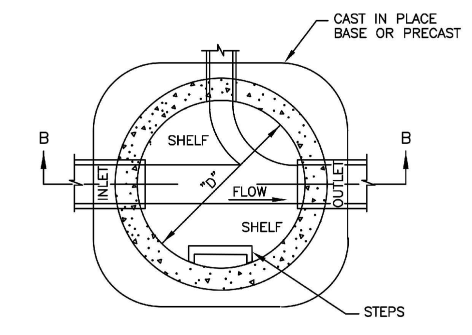
SECTION B–B

NOTES:
1. FINAL GRADE OF MANHOLE COVERS SHALL BE 1/4" LOWER THAN FINAL STREET.
2. ALL CHANNELS FLOWING INTO THE MAIN STREAM OF THE SEWER SHALL BE HAND FORMED INTO THE FLOW.
3. STEPS SHOULD BE PLACED OVER THE SHELF, NOT OVER THE FLOW. NO STEPS ALLOWED IN THE ADJUSTING RING AREA.
4. PRECAST CONCRETE SECTIONS SHALL CONFORM TO ASTM C–478.
5. BLOCK–OUTS, WHEN APPROVED, SHALL EXTEND A MAX. OF 6" PAST MANHOLE O.D. AND BE SATISFACTORILY PLUGGED AND SEALED.
6. BENCH MUST HAVE A BRUSHED, NON–SKID SURFACE.
7. BENCH IS TO BE EVEN WITH TOP OF PIPES
8. A MINIMUM OF 0.2' AND MAXIMUM OF 2' FALL REQUIRED FROM INLET TO OUTLET
9. MANHOLES NOT IN ASPHALT OR CONCRETE SHALL BE RAISED 6" ABOVE FINAL GRADE AND A CONCRETE COLLAR INSTALLED WITH A GREEN CARSONITE POST

The Town of ERIE COLORADO
DRAWING TITLE: STANDARD MANHOLE
DRAWING NUMBER: SS3A (1 OF 2)
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN REV. DATE: 01/2010



ECCENTRIC CONE PLAN VIEW

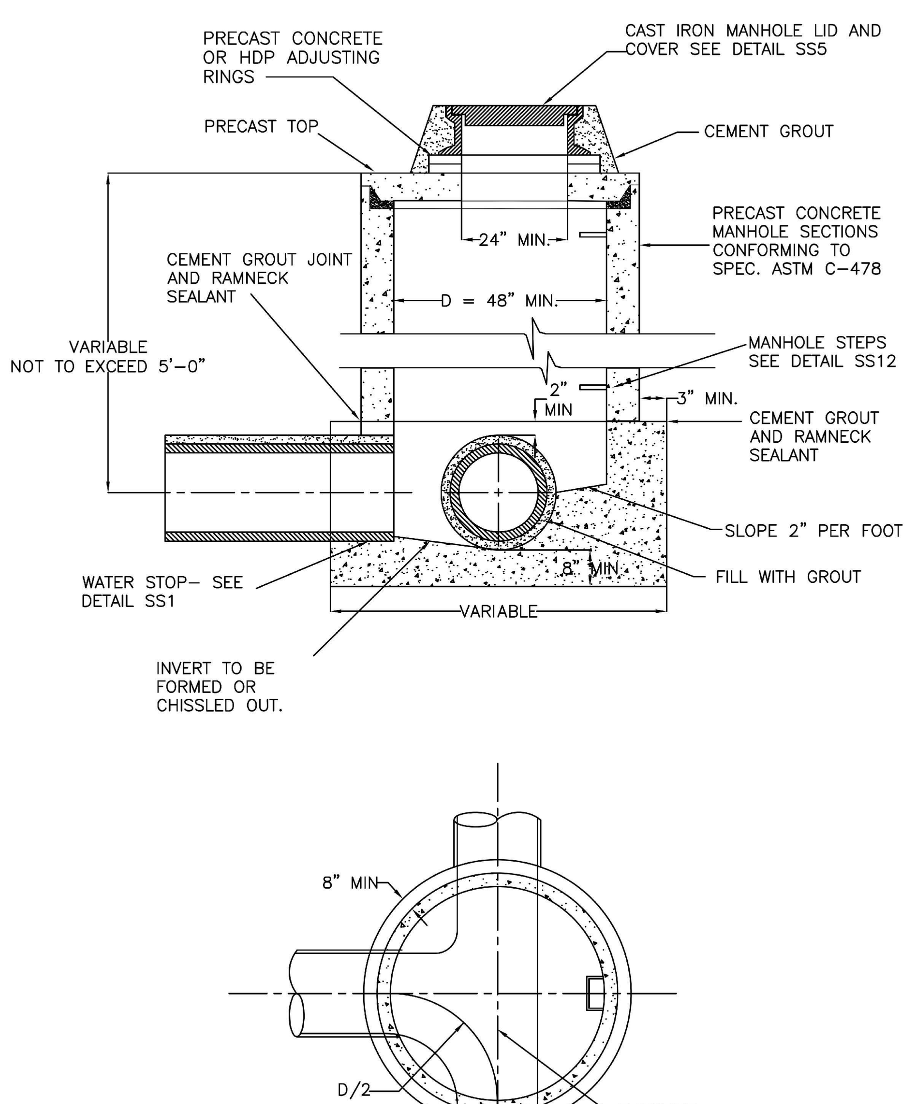


BASE PLAN VIEW

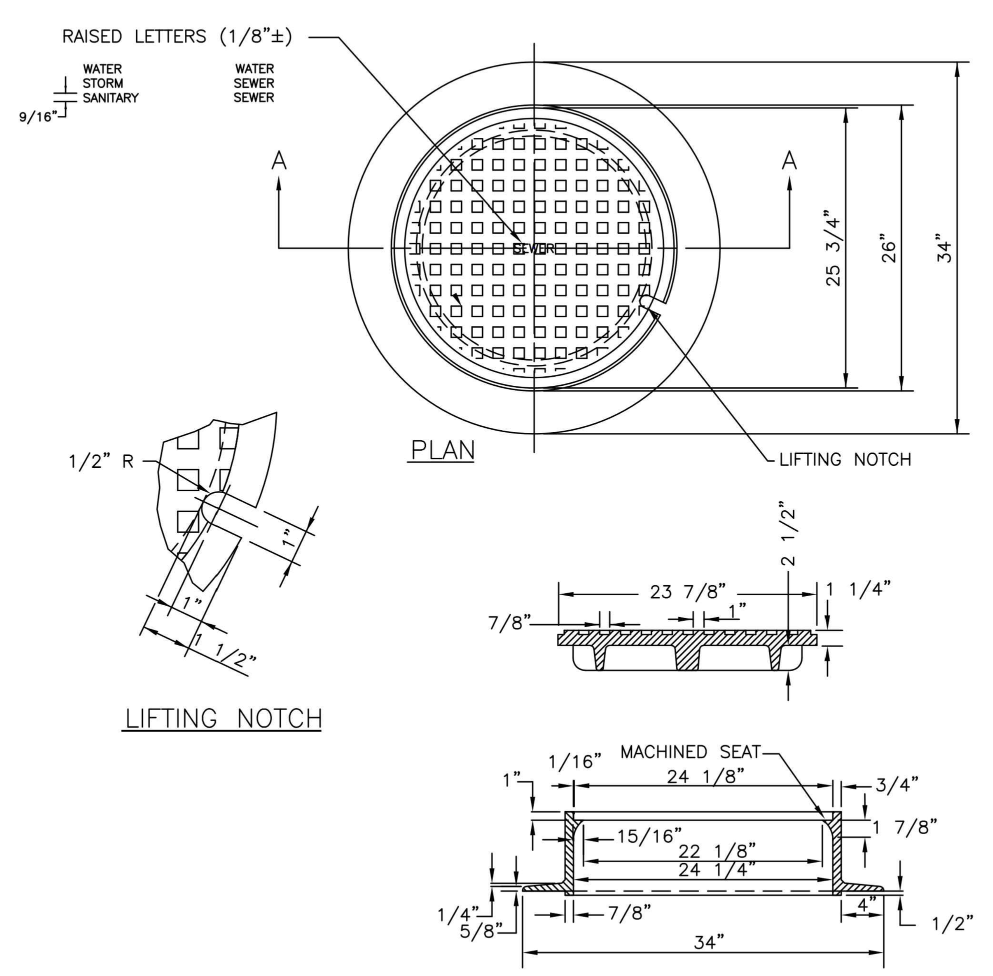
PIPE I.D.	MANHOLE I.D.	RING & COVER
18" & SMALLER	4'–0"▲	24"
21" TO 48"	5'–0"	30"
54"	6'–0"	30", 36" W/ 24"
60" & LARGER	SPECIAL DESIGN	INNER COVER

▲ WHENEVER MORE THAN A TWO WAY MANHOLE OF MAX. PIPE I.D. IS REQUIRED, THE MANHOLE SHOULD BE INCREASED TO LARGER DIA., EG. 18"x18"x18", REQUIRES 5'–0" I.D.

The Town of ERIE COLORADO
DRAWING TITLE: STANDARD MANHOLE
DRAWING NUMBER: SS3B (2 OF 2)
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004



The Town of ERIE COLORADO
DRAWING TITLE: SHALLOW MANHOLE
DRAWING NUMBER: SS5
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004



PLAN

LIFTING NOTCH

SECTION A–A

1. CASTING SPECIFICATIONS: ASTM A–48 WITH A MINIMUM TENSILE STRENGTH OF 25 KSI (CLASS 25)
2. ALL CASTINGS TO BE DIPPED IN ASPHALT BASE PAINT (OR APPROVED EQUAL)
3. CASTINGS SHALL BE AS SPECIFIED BELOW OR APPROVED EQUAL:

MANUFACTURERS	CAT. #
NEENAH	R–1706
CASTINGS, INC.	MH–400–24 C.I.
HUTCHINSON FDRY. & STL. INC.	MH–400

4. ALL NEW MANHOLES MUST INCLUDE A PLASTIC OR VINYL TAG ATTACHED TO THE TOP STEP STATING THE FOLLOWING "CAUTION CONFINED SPACE; ENTRY PERMIT REQUIRED.

The Town of ERIE COLORADO
DRAWING TITLE: 24" MANHOLE RING AND COVER
DRAWING NUMBER: SS6
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 1/2015

SANITARY SEWER NOTES:

1. ALL WORKMANSHIP AND MATERIALS SHALL CONFORM TO THE STANDARD WATER AND SEWER SPECIFICATIONS FOR TOWN, UTILITY SPECIFICATIONS, CURRENT EDITION.
2. THE CONTRACTOR SHALL NOTIFY THE TOWN 48 WORKING HOURS PRIOR TO BEGINNING CONSTRUCTION.
3. THE CONTRACTOR SHALL HAVE ONE SIGNED COPY OF THE APPROVED PLANS, ONE COPY OF THE APPROPRIATE STANDARDS AND SPECIFICATIONS AND A COPY OF ANY PERMITS AND EXTENSION AGREEMENTS NEEDED AT THE JOB SITE AT ALL TIMES.
4. THE CONTRACTOR SHALL VERIFY THE INVERT OF THE DOWNSTREAM TIE IN POINT PRIOR TO BEGINNING ANY CONSTRUCTION. REPORT ANY DISCREPANCY TO THE ENGINEER.
5. ALL SANITARY SEWER LINES AT 4.5 FOOT DEPTH OR GREATER SHALL BE POLYVINYL CHLORIDE PIPE (PVC), ASTM D-3034 SDR35. SEWER LINE MATERIALS AND CONSTRUCTION SHALL CONFORM TO ASTM STANDARDS AND SPECIFICATIONS.
6. DISTANCES FOR SANITARY SEWER ARE THE HORIZONTAL DISTANCES FROM CENTER OF MANHOLE OR CLEANOUT TO CENTER OF SAME.
7. ALL SANITARY SEWER MAIN TESTING SHALL BE IN ACCORDANCE WITH THE CITY UTILITY SPECIFICATIONS.
8. CONTRACTOR IS RESPONSIBLE FOR ALL SURFACE RESTORATION (I.E., LANDSCAPE, ASPHALT, CONCRETE, ETC.)
9. ALL TRENCH EXCAVATION SHALL BE PROPERLY SLOPED OR SUPPORTED IN A MANOR REQUIRED BY OSHA OR AS REQUIRED BY STATE OR LOCAL LAWS.
10. SANITARY SEWER PIPE SHALL BE BEDDED AND BACKFILLED PER TOWN / DISTRICT STANDARDS.
11. NO CONNECTIONS TO THE EXISTING SYSTEM SHALL BE MADE UNTIL THE NEW LINES HAVE BEEN TESTED AND ACCEPTED BY THE TOWN.
12. CONTRACTOR SHALL OBTAIN ALL NECESSARY TEMPLATES FROM EQUIPMENT SUPPLIERS AND STUB LINES ACCORDINGLY.
13. CONTRACTOR TO VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES, WHETHER SHOWN OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY CONFLICTS TO THE ENGINEER.
14. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL TAP FEES REQUIRED. OWNER SHALL PAY FOR ALL SPECIAL ASSESSMENTS.
15. ALL DIMENSIONS ARE MEASURED HORIZONTALLY FROM CENTER OF MANHOLE OR INLETS.

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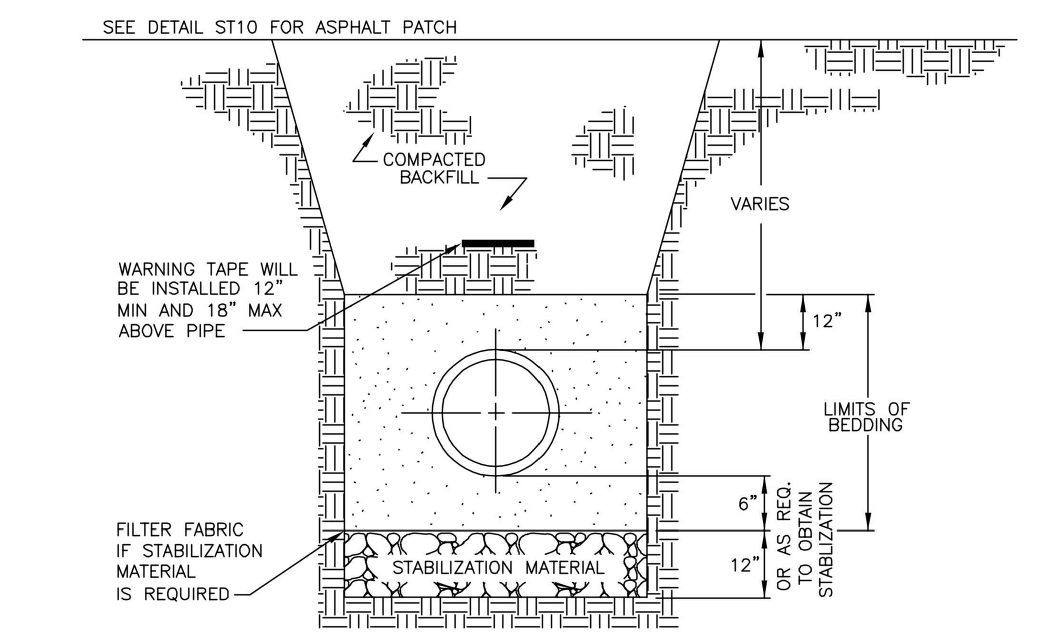
5	06/25/2019	5TH CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

SANITARY DETAILS

C7.2

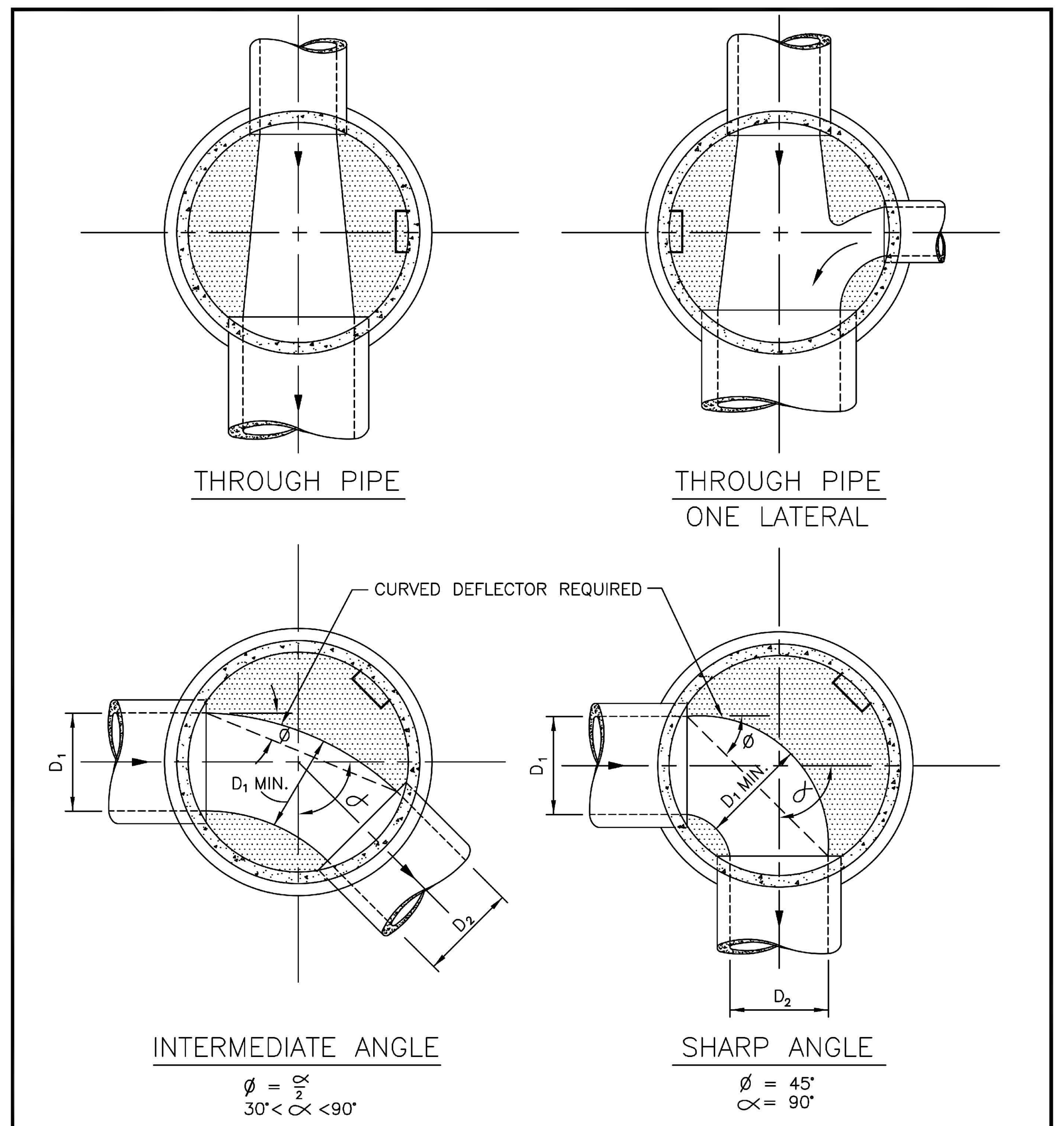


NOTES:

1. COMPACTION SHALL BE AS FOLLOWS: PIPE ZONE BEDDING 6" UNDER AND 12" OVER PIPE WILL REQUIRE 90% S.P.D. TRENCH ZONE ABOVE BEDDING MATERIALS, FULL TRENCH SECTION IN ROADWAY OR STREET R.O.W. LIMITS WILL REQUIRE 95% S.P.D. TRENCH ZONE ABOVE BEDDING MATERIALS, OUTSIDE OF STREET R.O.W. WILL REQUIRE 90% S.P.D.
2. FILTER FABRIC IS REQUIRED IF STABILIZATION MATERIAL IS USED. THE FABRIC SHALL BE INSTALLED AS SHOWN IN THE DETAIL.
3. TRENCH TO BE BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKMEN AND PROTECTION OF OTHER UTILITIES IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL SAFETY REGULATIONS.
4. PIPE SHALL BE BEDDED FROM 6" BELOW THE BOTTOM OF THE PIPE TO 12" ABOVE THE TOP OF THE PIPE.
5. TRENCH WIDTH SHALL NOT BE MORE THAN 24" NOR LESS THAN 12" WIDER THAN THE LARGEST OUTSIDE DIAMETER OF THE PIPE.
6. SHOULD THE TRENCH BE EXCAVATED WIDER THAN ALLOWED, A CONCRETE CRADLE SHALL BE PLACED WITH 2500 P.S.I. CONCRETE FROM TRENCH BOTTOM TO PIPE SPRINGLINE.

The Town of ERIE COLORADO

DRAWING TITLE: SANITARY SEWER TRENCH DETAIL
DRAWING NUMBER: SS8
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 01/2012



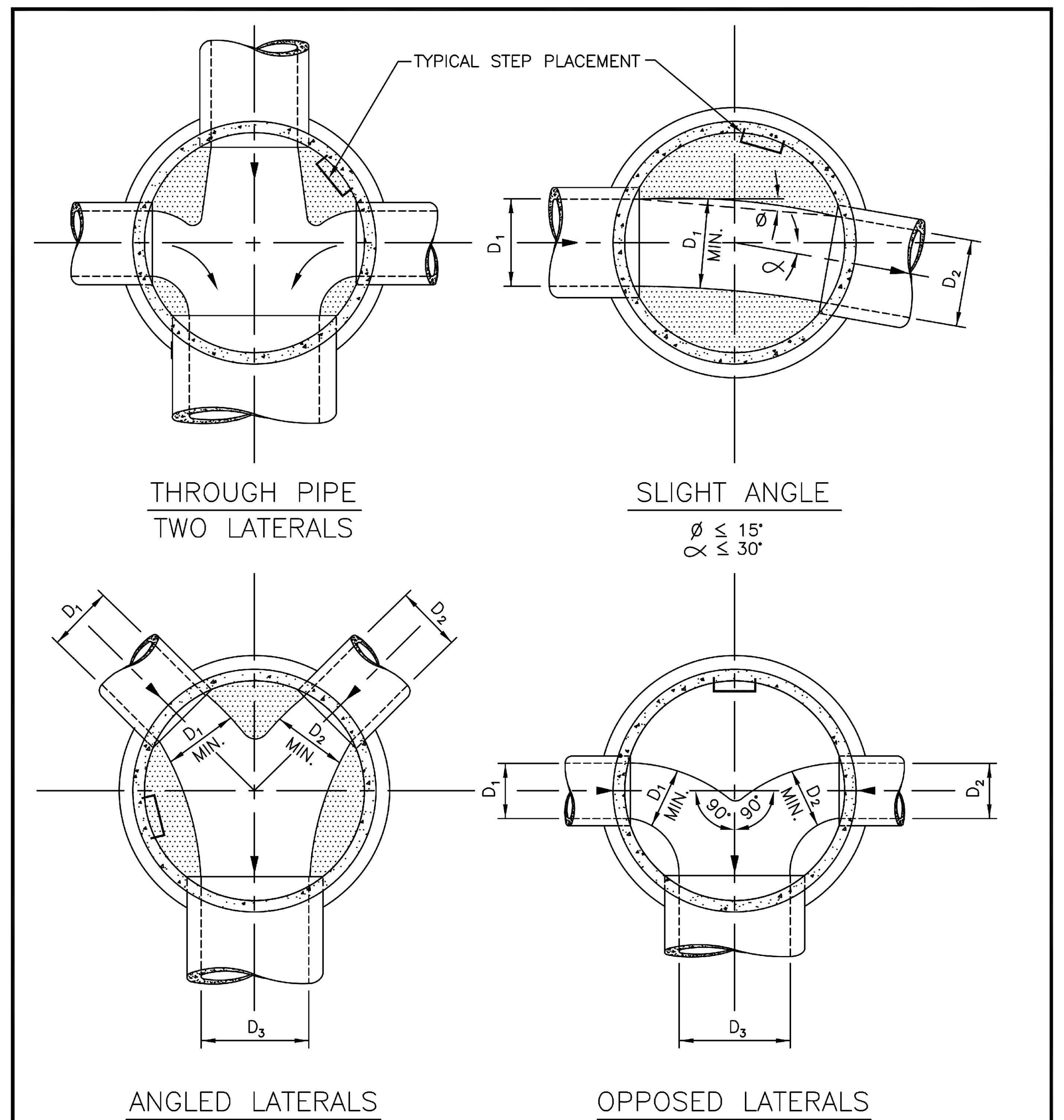
INTERMEDIATE ANGLE: $\phi = \frac{\alpha}{2}$, $30° < \alpha < 90°$

SHARP ANGLE: $\phi = 45°$, $\alpha = 90°$

NOTES:
1. DETAILS SHOWN ARE TYPICAL ONLY FOR INSTALLATIONS WITH ALL INVERTS AT SAME RELATIVE ELEVATION.
2. FOR EXCESSIVE ELEVATION DIFFERENCE BETWEEN INVERTS, ETC. SPECIAL BASE/CHANNEL DETAILS SHALL BE SHOWN ON PLANS.
3. CHANNELIZATION DETAILS & STEP PLACEMENT TYPICAL FOR BOTH STORM AND SANITARY SEWER MH'S.
4. THE MINUMUM VERTICAL DROP THRU MANHOLE BASE SHALL BE 0.20 FOOT.
5. FOR VERTICAL DROPS IN EXCESS OF 1.5 FEET AN OUTSIDE DROP MANHOLE IS REQUIRED.

The Town of ERIE COLORADO

DRAWING TITLE: TYPICAL MH BASE CHANNELIZATION (1 OF 2)
DRAWING NUMBER: SS11A
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004

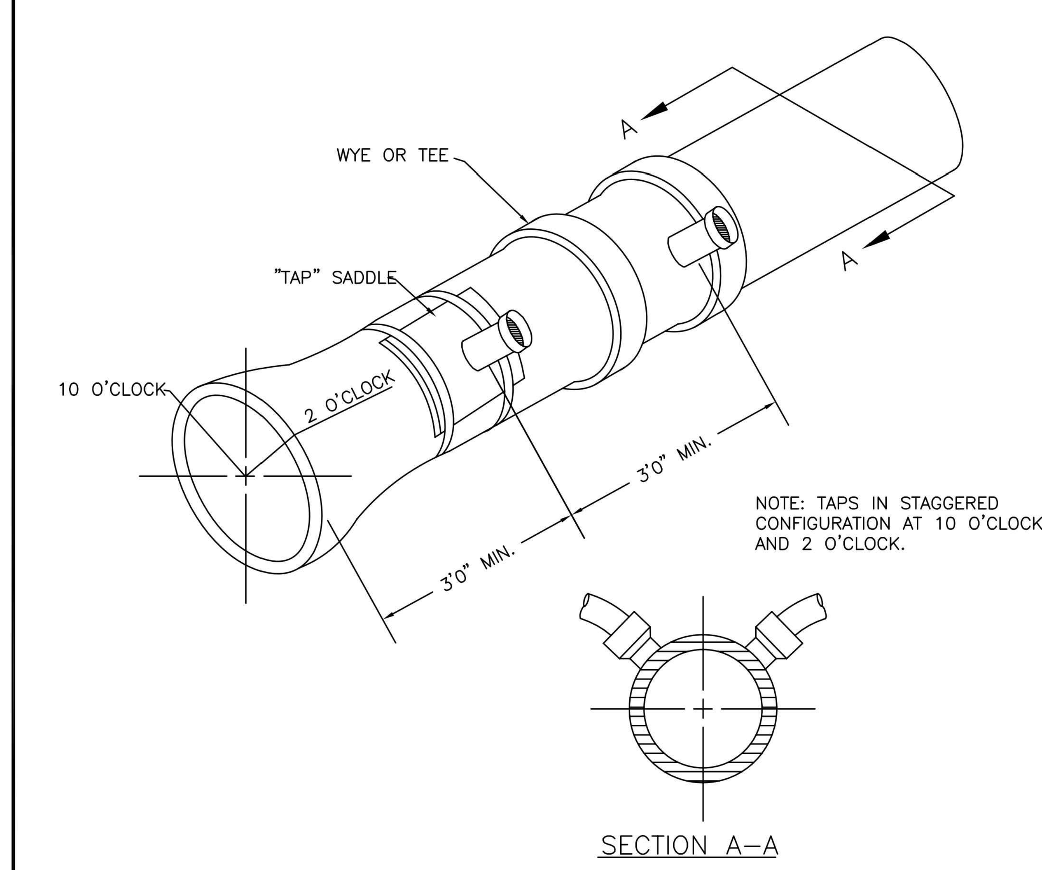


SLIGHT ANGLE: $\phi \leq 15°$, $\alpha \leq 30°$

NOTES:
1. DETAILS SHOWN ARE TYPICAL ONLY FOR INSTALLATIONS WITH ALL INVERTS AT SAME RELATIVE ELEVATION.
2. FOR EXCESSIVE ELEVATION DIFFERENCE BETWEEN INVERTS, ETC. SPECIAL BASE/CHANNEL DETAILS SHALL BE SHOWN ON PLANS.
3. CHANNELIZATION DETAILS & STEP PLACEMENT TYPICAL FOR BOTH STORM AND SANITARY SEWER MH'S.
4. THE MINUMUM VERTICAL DROP THRU MANHOLE BASE SHALL BE 0.20 FOOT.
5. FOR VERTICAL DROPS IN EXCESS OF 1.5 FEET AN OUTSIDE DROP MANHOLE IS REQUIRED.

The Town of ERIE COLORADO

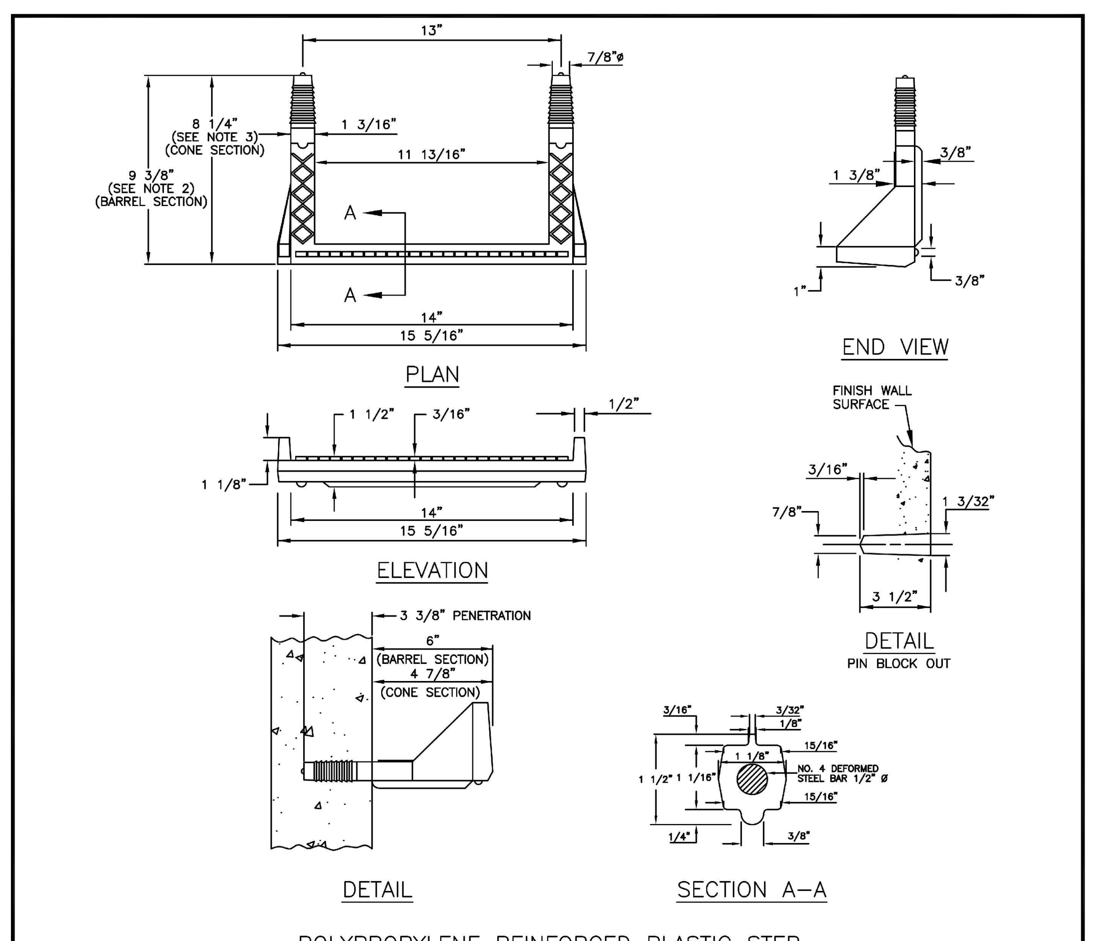
DRAWING TITLE: TYPICAL MH BASE CHANNELIZATION (2 OF 2)
DRAWING NUMBER: SS11B
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004



NOTES:
1. SEWER SERVICE CONNECTIONS SHALL BE POSITIONED AT EITHER THE 2 O'CLOCK OR THE 10 O'CLOCK POSITION ON THE CIRCUMFERENCE OF THE SEWER MAIN.
2. ON NEW INSTALLATIONS, EITHER WYE OR TEE FITTINGS SHALL BE USED. WHEN TAPPING INTO AN EXISTING SEWER MAIN, A SADDLE CONNECTION AND APPROVED CORING METHOD SHALL BE USED.
3. THE MINIMUM DISTANCE BETWEEN SERVICE CONNECTIONS MADE ALONG THE PIPE SHALL BE 3-FEET. THE MINIMUM DISTANCE FROM EITHER THE BELL OR SPIGOT END OF A PIPE SHALL BE 3-FEET. THE MINIMUM DISTANCE FROM THE CENTER OF A MANHOLE TO A SERVICE CONNECTION SHALL BE EITHER 5-FEET OR THE TRANSITION POINT FROM THE MANHOLE TRENCH, WHICHEVER IS GREATER.
4. A MAXIMUM OF 4 SEWER SERVICE CONNECTIONS SHALL BE ALLOWED PER 20-FEET LENGTH OF PIPE. A SPECIFIC SOILS INVESTIGATIONS SHOULD BE CONDUCTED TO ASSURE THAT THE EXTERNAL LOADING WILL BE WITHIN ALLOWABLE LIMITS REGARDLESS OF THE NUMBER OF TAPS INVOLVED.

The Town of ERIE COLORADO

DRAWING TITLE: DOMESTIC SEWER TAPPING
DRAWING NUMBER: SS15
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004

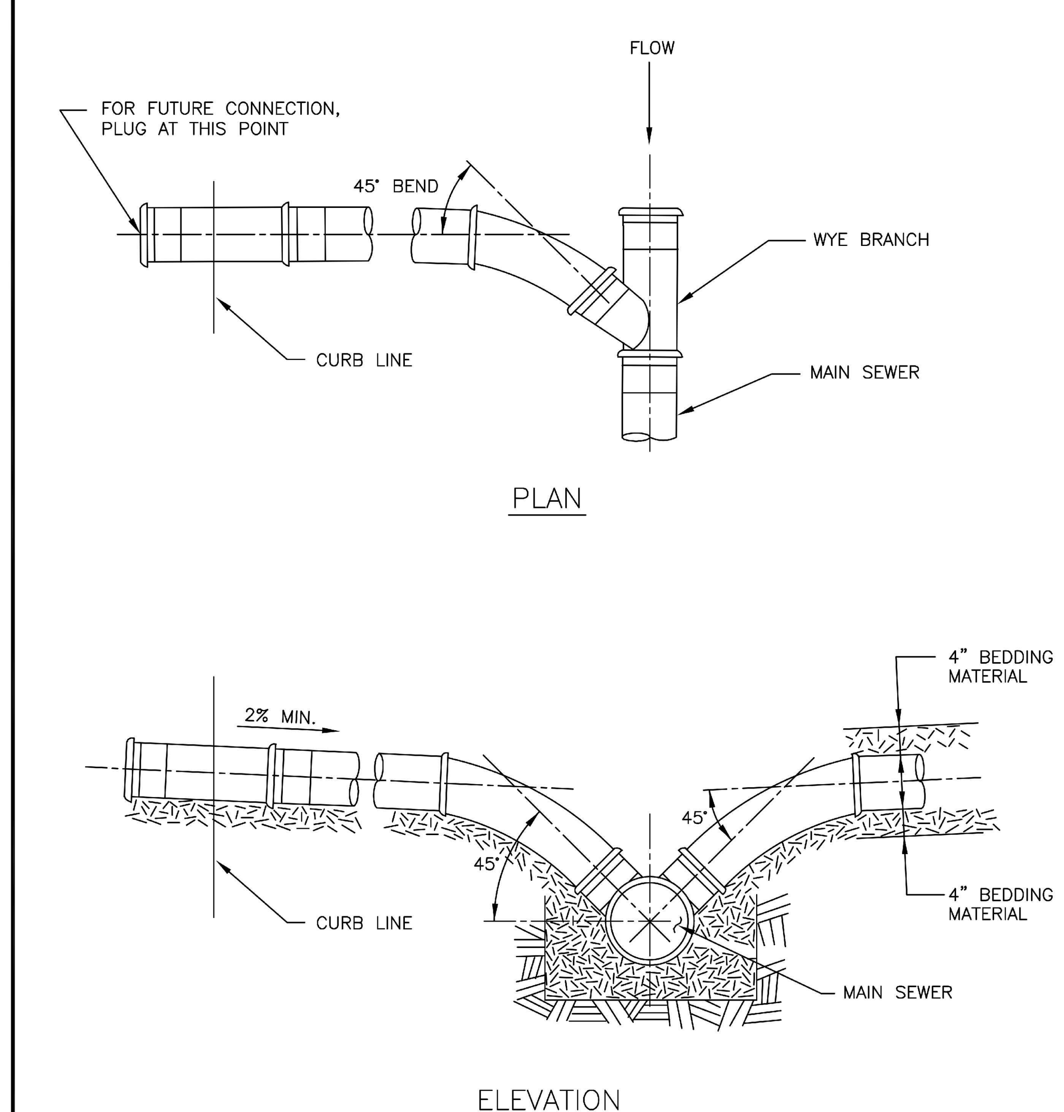


POLYPROPYLENE REINFORCED PLASTIC STEP

NOTES:
1. ASTM SPECIFICATIONS:
   A. ASTM C-478
   B. ASTM A-615 GRADE 60 (STEEL REBAR).
   C. ASTM 2146-69, TYPE III, GRADE 16906 (POLYPROPYLENE).
2. STEPS INSTALLED IN MANHOLE BARREL SECTIONS OR VERTICAL WALLS OF STRUCTURES SHALL HAVE A 9 3/8 INCH LEG AND SHALL PROJECT FROM THE WALL 6 INCHES.
3. STEPS INSTALLED IN MANHOLE CONE SECTIONS SHALL HAVE AN 8 1/4 INCH LEG AND SHALL PROJECT FROM THE WALL 4 7/8 INCHES.
4. ALL STEPS SHALL HAVE A PENETRATION DEPTH INTO THE WALL OF 3 3/8 INCHES.
5. STEPS SHALL BE INSTALLED BY THE "PRESS-FIT" METHOD UTILIZING A SPECIALLY TAPERED PIN TO FORM THE INSERT HOLE AS SHOWN, FOLLOWING MANUFACTURER'S RECOMMENDED PROCEDURE AND SHALL NOT BE GROUTED IN PLACE.
6. INSTALLED STEPS SHALL BE CAPABLE OF WITHSTANDING A PULL OUT FORCE OF 2500 LB. PER LEG FOR A MINIMUM PERIOD OF TWO MINUTES.
7. PINS MUST BE SMOOTH AND CONTINUOUSLY TAPERED. DIMENSIONS OF THE PIN AND THE INSERTED PORTION OF THE MANHOLE STEP ARE TYPICAL ONLY. W.M.D. INSTALLATIONS REQUIRE A MATCHED COMBINATION OF A TAPERED INSERT PIN AMD MANHOLE STEP, AS RECOMMENDED OR REQUIRED BY SPECIFIC MANUFACTURER OF THE STEP TO BE USED.
8. THIS STEP CAN ALSO BE USED IN TOE POCKET INSTALLATIONS PROVIDED 5" TOE CLEARANCE IS ALLOWED.

The Town of ERIE COLORADO

DRAWING TITLE: MANHOLE STEPS
DRAWING NUMBER: SS12
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004



The Town of ERIE COLORADO

DRAWING TITLE: SEWER SERVICE CONNECTION
DRAWING NUMBER: SS18
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004

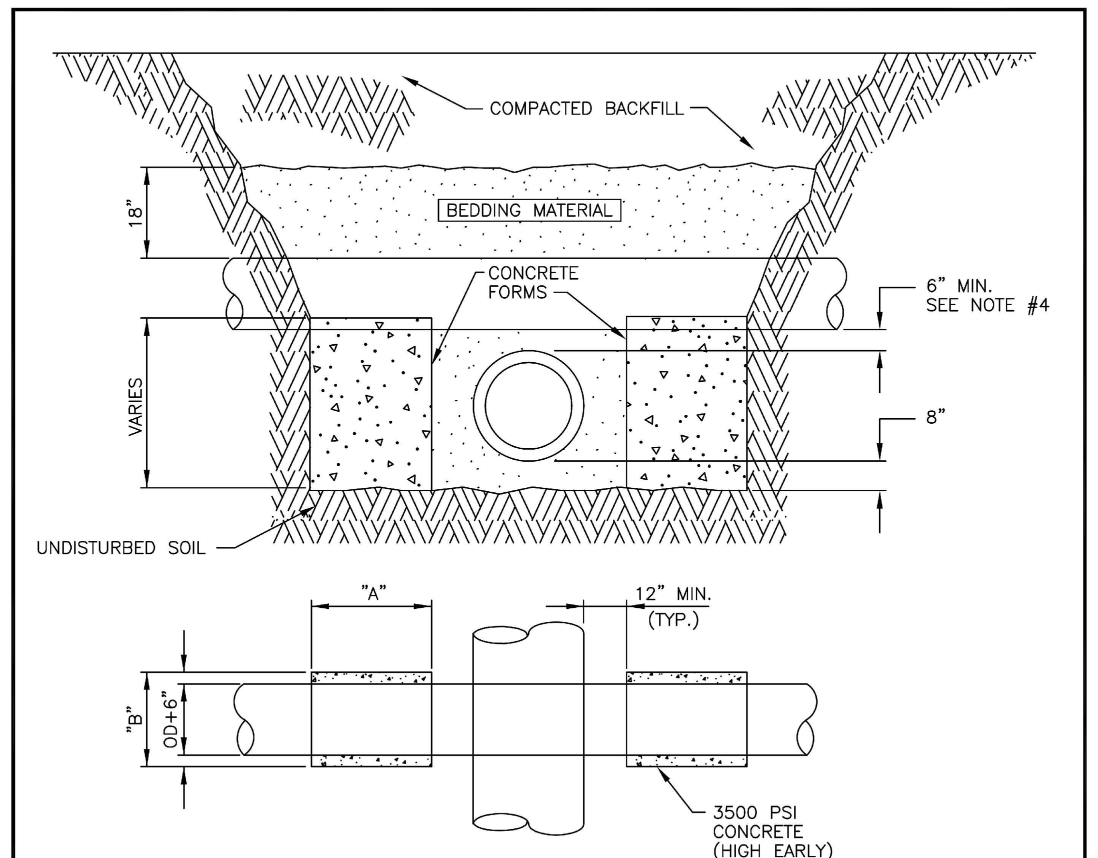


TABLE	
"A"	"B"
PIPES ≤12" =12" PIPES >12" =18"	PIPE O.D. + 6" ON BOTH SIDES.

NOTES:
1. PIPE SECTIONS SHALL BE CENTERED OVER THE PIPE BEING CROSSED.
2. SIZES ABOVE 24" WILL BE DETERMINED BY THE ENGINEER.
3. A BOND BREAKER SHOULD BE PLACED BETWEEN THE CONCRETE AND THE PIPE BEING SUPPORTED.
4. IF THE CROSSING INVOLVES A WATER LINE AND THERE IS 6" OF CLEARANCE, OR THERE IS LESS THAN 4' OF COVER OVER THE UPPER PIPE, A FIBER BOARD INSULATION (DOW 2" EXTRUDED POLYSTYRENE IN ACCORDANCE WITH ASTM-C578 OR APPROVED EQUAL) MUST BE INSTALLED BETWEEN THE PIPES. THE BOARD SHOULD EXTEND 2' BEYOND THE OUTSIDE EDGES OF BOTH PIPES.

The Town of ERIE COLORADO

DRAWING TITLE: PIPE CROSSING SUPPORT PAD
DRAWING NUMBER: SS19
DRAWN BY: D. JENKINS APPROVED BY: G. BEHLEN DATE: 06/2004

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VISTA RIDGE COMMERCIAL WEST
MOUNTAIN VIEW BLVD & STATE HWY 7 ROW:
VISTA RIDGE FILING NO. 14, 5TH AMENDMENT
CIVIL CONSTRUCTION DRAWINGS

ERIE, COLORADO

#	Date	Issue / Description	Init.
1	06/04/2018	1ST CITY SUBMITTAL	PJD
2	11/09/2018	2ND CITY SUBMITTAL	PJD
3	01/30/2019	3RD CITY SUBMITTAL	PJD
4	05/01/2019	4TH CITY SUBMITTAL	PJD
5	06/25/2019	5TH CITY SUBMITTAL	PJD

Project No:	SH7000003.01
Drawn By:	KRL
Checked By:	PJD
Date:	06/21/19

SANITARY DETAILS

C7.3