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.

[redacted]

PROJECT/BUSINESS NAME: Westerly - Southern Land Company

PROJECT ADDRESS: TBD - generally east of County Road 5 and south of Erie Parkway

PROJECT DESCRIPTION: The Westerly property is proposed to be a high quality addition to the Town of Erie, the proposal is for some minor adjustments to the existing zoning boundaries to align with the current design.

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

Subdivision Name: N/A

Filing #: Lot #: Block #: Section: 36 Township: 1 North Range: 69 West

OWNER *(attach separate sheets if multiple)*

Name/Company: Erie Land Company, LLC
Contact Person: Heidi Majerik
Address: 1225 17th Street, Suite 2420
City/State/Zip: Denver, CO - 80202
Phone: 303-888-3866 Fax:
E-mail: heidi.majerik@southernland.com

AUTHORIZED REPRESENTATIVE

Company/Firm:
Contact Person:
Address:
City/State/Zip:
Phone: Fax:
E-mail:

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

Name/Company: Anadarko Petroleum Corp.
Address: 1099 18th Street, Suite 1800
City/State/Zip: Denver, CO - 80202

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

Name/Company: Anadarko Petroleum Corp.
Address: 1099 18th Street, Suite 1800
City/State/Zip: Denver, CO - 80202

LAND-USE & SUMMARY INFORMATION

Present Zoning: NMU, LR, AG/OS
Proposed Zoning: NMU, LR, AG/OS
Gross Acreage: 266.66 acres
Gross Site Density (du/ac): approximately 3.6 du/ac
Lots/Units Proposed: 958 depending on product
Gross Floor Area: approx - 35,000

SERVICE PROVIDERS

Electric: Public Service
Metro District: N/A at this time
Water *(if other than Town)*:
Gas: Public Service
Fire District: Mountain View Fire
Sewer *(if other than Town)*:

PAGE TWO MUST BE SIGNED AND NOTARIZED

DEVELOPMENT REVIEW FEES

☐ 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
		☐ 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
		☐ Road Vacation (paper)	$ 100.00
☑ Rezoning	$ 1700.00 + 10.00 per acre		
☐ 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
		☐ Amendment (major)	$ 1100.00
☐ Major	$ 1000.00	☐ Amendment (minor)	$ 350.00
☐ Minor	$ 400.00		
☐ Oil & Gas	$ 1200.00		

*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: Heidi Majerik Date: 5/22/19

Owner: Date:

Applicant: Heidi Majerik Date: 5/22/19

STATE OF COLORADO)
) ss.
County of COLORADO)

The foregoing instrument was acknowledged before me this 22 day of MAY, 2019, by HEIDI MAJERIK.

My commission expires: 6-21-2022

Witness my hand and official seal.

Nancy Relihan
Notary Public

NANCY RELIHAN
Notary Public
State of Colorado
Notary ID # 20184026021
My Commission Expires 06-21-2022

Town of Erie - Community Development
645 Holbrook, - PO Box 750
Erie, CO 80516

May -2019

RE: Westerly Property - A Southern Land Company Community
- Town of Erie, Colorado - Initial Zoning Submittal Fee

Per the land use application please find enclosed with this application a check for the following submittal fee.

Initial Zoning/Rezoning	-	$1,700.00
266.66 acres @ $10.00 per acre	-	$2,666.60
Total	-	$4,366.60

Sincerely,

John Prestwich

John Prestwich - President, PCS Group, Inc. - RLA

Fidelity National Title Insurance Company
TITLE REPORT

SCHEDULE A

Title Report No: N0022408-010-TO2-ES

1. **Effective Date:** May 9, 2019 at 8:00 A.M.

2. The estate or interest in the land described or referred to in this Title Report is:

   A Fee Simple

3. Title to the estate or interest in the land is at the Effective Date vested in:

   Erie Land Company, LLC, a Delaware limited liability company

4. The land referred to in this Title Report is described as follows:

   See Attached Legal Description

(for informational purposes only) W 1/2 S21 T1N R68W, Frederick, CO

Attached Legal Description

A PARCEL OF LAND LOCATED IN THE WEST ONE-HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS WITH BEARINGS REFERENCED TO THE NORTH LINE OF THE NORTHWEST QUARTER OF SAID OF SECTION 21 ASSUMED TO BEAR NORTH 89°38'17" EAST, A DISTANCE OF 2663.55;

COMMENCE AT THE NORTHWEST CORNER OF SAID SECTION 21;
THENCE NORTH 89°38'17" EAST, COINCIDENT WITH SAID NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 21, A DISTANCE OF 79.42 FEET;
THENCE SOUTH 00°21'43" EAST A DISTANCE OF 70.00 FEET TO THE WELD COUNTY ROAD 8 RIGHT-OF-WAY AS DESCRIBED IN THAT CERTAIN DOCUMENT RECORDED _____ ___, 2019 IN THE OFFICE OF THE WELD COUNTY CLERK AND RECORDED UNDER RECEPTION NUMBER _____ ALSO BEING THE **POINT OF BEGINNING** OF THE PARCEL HEREINAFTER DESCRIBED;
THENCE NORTH 89°38'17" EAST, COINCIDENT WITH SAID RIGHT-OF-WAY, A DISTANCE OF 1,116.48 FEET TO THE WELD COUNTY ROAD 8 RIGHT-OF-WAY AS DESCRIBED IN THAT CERTAIN DOCUMENT RECORDED NOVEMBER 8, 2005 IN THE OFFICE OF THE WELD COUNTY CLERK AND RECORDED UNDER RECEPTION NUMBER 3338310;
THENCE NORTH 00°21'43" WEST, COINCIDENT WITH SAID RIGHT-OF-WAY, A DISTANCE OF 40.00 FEET TO THE WELD COUNTY ROAD 8 RIGHT-OF-WAY AS DESCRIBED IN THAT CERTAIN DOCUMENT DATED APRIL 18, 1889 IN THE OFFICE OF THE WELD COUNTY CLERK AND RECORDER IN COMMISSIONER'S BOOK 5 PAGE 205;
THENCE NORTH 89°38'17" EAST, COINCIDENT WITH SAID RIGHT-OF-WAY, A DISTANCE OF 218.38 FEET;
THENCE SOUTH 00°21'43" EAST, A DISTANCE OF 40.00 TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 00°21'43" EAST;
THENCE SOUTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 89°59'58" AN ARC DISTANCE OF 23.56 FEET;
THENCE SOUTH 00°21'41" EAST, A DISTANCE OF 126.22 FEET TO A TANGENT 530.50 FOOT RADIUS CURVE WHOSE CENTER BEARS SOUTHWESTERLY;
THENCE SOUTHERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 04°27'45" AN ARC DISTANCE OF 41.32 FEET TO A 15.00 FOOT REVERSE CURVE;
THENCE SOUTHEASTERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 90°08'48" AN ARC DISTANCE OF 23.60 FEET TO A 475.00 FOOT RADIUS COMPOUND CURVE;
THENCE EASTERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 04°18'58" AN ARC DISTANCE OF 35.78 FEET;
THENCE NORTH 89°38'19" EAST, A DISTANCE OF 97.49 FEET;
THENCE SOUTH 00°10'50" EAST, A DISTANCE OF 60.00 FEET;
THENCE SOUTH 00°00'00" EAST, A DISTANCE OF 54.91 FEET TO A TANGENT 15.00 FOOT RADIUS CURVE WHOSE CENTER BEARS SOUTHEASTERLY;
THENCE SOUTHEASTERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 90°21'41" AN ARC DISTANCE OF 23.66 FEET;
THENCE NORTH 89°38'19" EAST, A DISTANCE OF 169.48 FEET TO A TANGENT 45.00 FOOT RADIUS CURVE WHOSE CENTER BEARS SOUTHEASTERLY;
THENCE SOUTHEASTERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 69°20'58" AN ARC DISTANCE OF 54.47 FEET;
THENCE SOUTH 21°00'43" EAST, A DISTANCE OF 171.15 FEET TO A 2,249.61 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 24°04'09" EAST;
THENCE NORTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 01°55'09" AN ARC DISTANCE OF 75.35 FEET TO A 15.00 FOOT REVERSE CURVE;
THENCE NORTHEASTERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 88°51'43" ARC DISTANCE OF 23.26 FEET;
THENCE NORTH 68°59'17" EAST, A DISTANCE OF 60.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 68°59'17" EAST;
THENCE SOUTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 88°51'42" AN ARC DISTANCE OF 23.26 FEET TO A 2,250.00 FOOT REVERSE CURVE;

THENCE EASTERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 00°02'50" ARC DISTANCE OF 1.85 FEET;
THENCE SOUTH 19°49'36" EAST, A DISTANCE OF 60.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 19°49'36" EAST;
THENCE SOUTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 91°11'08" AN ARC DISTANCE OF 23.87 FEET;
THENCE SOUTH 21°00'43" EAST, A DISTANCE OF 190.04 FEET TO A TANGENT 15.00 FOOT RADIUS CURVE WHOSE CENTER BEARS NORTHEASTERLY;
THENCE SOUTHEASTERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 88°42'04" AN ARC DISTANCE OF 23.22 FEET TO A 1,970.00 FOOT REVERSE CURVE;
THENCE EASTERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 03°41'32" ARC DISTANCE OF 126.95 FEET;
THENCE SOUTH 16°01'15" EAST, A DISTANCE OF 60.00 FEET TO A 1,910.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 16°01'15" EAST;
THENCE EASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 03°23'11" AN ARC DISTANCE OF 112.89 FEET;
THENCE SOUTH 00°16'01" EAST, A DISTANCE OF 413.80 FEET;
THENCE NORTH 89°43'59" EAST, A DISTANCE OF 110.00 FEET;
THENCE SOUTH 00°16'01" EAST, A DISTANCE OF 44.60 FEET;
THENCE NORTH 89°43'59" EAST, A DISTANCE OF 60.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 89°43'59" EAST;
THENCE SOUTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 99°02'52" AN ARC DISTANCE OF 25.93 FEET;
THENCE SOUTH 09°18'53" EAST, A DISTANCE OF 60.00 FEET TO A 1,350.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 09°18'53" EAST;
THENCE WESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 00°36'56" AN ARC DISTANCE OF 14.51 FEET TO A 15.00 FOOT RADIUS COMPOUND CURVE;
THENCE SOUTHWESTERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 80°20'12" ARC DISTANCE OF 21.03 FEET;
THENCE SOUTH 00°16'01" EAST, A DISTANCE OF 18.53 FEET;
THENCE SOUTH 89°43'59" WEST, A DISTANCE OF 60.00 FEET;
THENCE SOUTH 00°16'01" EAST, A DISTANCE OF 94.14 FEET TO A 1,240.00 FOOT RADIUS NON-TANGENT CURVE THOSE CENTER BEARS SOUTH 14°13'28" EAST;
THENCE SOUTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 28°25'22" AN ARC DISTANCE OF 615.13 FEET;
THENCE NORTH 26°49'03" WEST, A DISTANCE OF 77.32 FEET;
THENCE SOUTH 63°10'57" WEST, A DISTANCE OF 60.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 63°10'57" WEST;
THENCE WESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 105°16'53" AN ARC DISTANCE OF 27.56 FEET;
THENCE NORTH 42°05'56" WEST, A DISTANCE OF 60.00 FEET TO A 1,470.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 42°05'56" WEST;
THENCE NORTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 01°05'50" AN ARC DISTANCE OF 28.15 FEET TO A 15.00 FOOT RADIUS COMPOUND CURVE;
THENCE NORTHERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 69°13'07" ARC DISTANCE OF 18.12 FEET TO A 1,030.00 FOOT REVERSE CURVE;
THENCE NORTHERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 00°48'17" ARC DISTANCE OF 14.47 FEET;
THENCE NORTH 21°36'35" WEST, A DISTANCE OF 482.14 FEET TO A TANGENT 15.00 FOOT RADIUS CURVE WHOSE CENTER BEARS SOUTHWESTERLY;
THENCE WESTERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 106°19'06" AN ARC DISTANCE OF 27.83 FEET TO A 1,910.00 FOOT RADIUS COMPOUND CURVE;
THENCE SOUTHWESTERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 01°50'28" ARC DISTANCE OF 61.37 FEET TO A 2,030.00 FOOT REVERSE CURVE;
THENCE SOUTHWESTERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 07°16'18" ARC DISTANCE OF 257.64 FEET;
THENCE SOUTH 57°30'09" WEST A DISTANCE OF 58.89 FEET TO A TANGENT 15.00 FOOT RADIUS CURVE WHOSE CENTER BEARS SOUTHEASTERLY;

THENCE SOUTHERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 90°58'05" AN ARC DISTANCE OF 23.82 FEET TO A 2,167.55 FOOT REVERSE CURVE;
THENCE SOUTHEASTERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 00°14'15" ARC DISTANCE OF 8.98 FEET;
THENCE SOUTH 56°46'19" WEST, A DISTANCE OF 45.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 56°46'19" WEST;
THENCE WESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 89°16'09" AN ARC DISTANCE OF 23.37 FEET;
THENCE SOUTH 57°30'09" WEST, A DISTANCE OF 180.02 FEET TO A TANGENT 15.00 FOOT RADIUS CURVE WHOSE CENTER BEARS SOUTHEASTERLY;
THENCE SOUTHERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 90°47'56" AN ARC DISTANCE OF 23.77 FEET TO A 1,912.50 FOOT REVERSE CURVE;
THENCE SOUTHEASTERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 10°04'15" ARC DISTANCE OF 336.15 FEET TO A 1,030.00 FOOT RADIUS COMPOUND CURVE;
THENCE SOUTHERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 06°46'47" ARC DISTANCE OF 121.88 FEET TO A 1,347.50 FOOT REVERSE CURVE;
THENCE SOUTHERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 00°58'54" ARC DISTANCE OF 23.09 FEET TO A 15.00 FOOT RADIUS COMPOUND CURVE;
THENCE EASTERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 105°04'11" ARC DISTANCE OF 27.51 FEET;
THENCE SOUTH 32°29'51" EAST, A DISTANCE OF 60.00 FEET;
THENCE SOUTH 57°30'09" WEST, A DISTANCE OF 20.92 FEET TO A TANGENT 15.00 FOOT RADIUS CURVE WHOSE CENTER BEARS SOUTHEASTERLY;
THENCE SOUTHERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 78°54'15" AN ARC DISTANCE OF 20.66 FEET TO A 1,347.50 FOOT RADIUS COMPOUND CURVE;
THENCE SOUTHERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 00°42'36" ARC DISTANCE OF 16.70 FEET;
THENCE SOUTH 67°53'18" WEST, A DISTANCE OF 60.00 FEET TO A 1,407.50 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 67°53'18" EAST;
THENCE SOUTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 03°50'52" AN ARC DISTANCE OF 94.53 FEET;
THENCE SOUTH 58°39'11" WEST, A DISTANCE OF 74.21 FEET TO A TANGENT 1,520.00 FOOT RADIUS CURVE WHOSE CENTER BEARS NORTHWESTERLY;
THENCE SOUTHWESTERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 15°39'25" AN ARC DISTANCE OF 415.36 FEET TO A 42,886.17 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 87°48'30" WEST;
THENCE SOUTHERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 00°01'27" AN ARC DISTANCE OF 18.07 FEET;
THENCE NORTH 87°44'48" WEST, A DISTANCE OF 60.00 FEET TO A 1,520.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 13°19'43" WEST;
THENCE WESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 08°29'03" AN ARC DISTANCE OF 225.08 FEET TO A 2,030.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 86°29'55" WEST;
THENCE NORTHERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 02°45'01" AN ARC DISTANCE OF 97.44 FEET;
THENCE NORTH 89°14'56" WEST, A DISTANCE OF 60.00 FEET TO A 1,970.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 89°14'56" WEST;
THENCE NORTHERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 07°56'46" AN ARC DISTANCE OF 273.21 FEET TO A 15.00 FOOT RADIUS COMPOUND CURVE;
THENCE NORTHWESTERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 84°53'33" ARC DISTANCE OF 22.22 FEET TO A 1,131.50 FOOT REVERSE CURVE;
THENCE WESTERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 00°30'15" ARC DISTANCE OF 9.95 FEET;
THENCE NORTH 01°35'00" WEST, A DISTANCE OF 54.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 01°35'00" WEST;
THENCE NORTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 98°05'23" AN ARC DISTANCE OF 25.68 FEET TO A 1,970.00 FOOT RADIUS COMPOUND CURVE;

THENCE NORTHERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 00°59'49" ARC DISTANCE OF 34.27 FEET TO A 1,530.00 FOOT REVERSE CURVE;
THENCE NORTHERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 06°40'54" ARC DISTANCE OF 178.43 FEET TO A 15.00 FOOT REVERSE CURVE;
THENCE NORTHWESTERLY, COINCIDENT WITH SAID REVERSE CURVE THROUGH A CENTRAL ANGLE OF 86°22'23" ARC DISTANCE OF 22.61 FEET;
THENCE SOUTH 89°38'19" WEST, A DISTANCE OF 3.09 FEET;
THENCE NORTH 00°21'41" WEST, A DISTANCE OF 80.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 00°21'41" WEST;
THENCE NORTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 90°00'00" AN ARC DISTANCE OF 23.56 FEET;
THENCE NORTH 00°21'43" WEST, A DISTANCE OF 214.98 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 89°38'50" WEST;
THENCE NORTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 90°01'05" AN ARC DISTANCE OF 23.57 FEET;
THENCE NORTH 00°21'43" WEST, A DISTANCE OF 45.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 00°21'43" WEST;
THENCE NORTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 90°00'00" AN ARC DISTANCE OF 23.56 FEET;
THENCE NORTH 00°21'43" WEST, A DISTANCE OF 212.96 FEET TO A 320.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 89°55'46" WEST;
THENCE NORTHERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 18°14'30" AN ARC DISTANCE OF 101.88 FEET;
THENCE NORTH 18°18'44" WEST, A DISTANCE OF 44.20 FEET TO A TANGENT 15.00 FOOT RADIUS CURVE WHOSE CENTER BEARS SOUTHWESTERLY;
THENCE NORTHWESTERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 90°00'00" AN ARC DISTANCE OF 23.56 FEET;
THENCE NORTH 18°18'44" WEST, A DISTANCE OF 45.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 18°18'44" WEST;
THENCE NORTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 90°00'00" AN ARC DISTANCE OF 23.56 FEET;
THENCE NORTH 18°18'44" WEST, A DISTANCE OF 62.50 FEET TO A 755.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 18°17'39" WEST;
THENCE WESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 17°55'58" AN ARC DISTANCE OF 236.30 FEET;
THENCE SOUTH 89°38'19" WEST, A DISTANCE OF 49.90 FEET;
THENCE NORTH 00°21'41" WEST, A DISTANCE OF 30.00 FEET;
THENCE SOUTH 89°38'19" WEST, A DISTANCE OF 7.51 FEET;
THENCE NORTH 00°02'53" WEST, A DISTANCE OF 91.68 FEET;
THENCE SOUTH 89°57'07" WEST, A DISTANCE OF 2.38 FEET;
THENCE NORTH 00°01'59" EAST, A DISTANCE OF 70.00 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 00°02'53" WEST;
THENCE NORTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 90°03'24" AN ARC DISTANCE OF 23.58 FEET;
THENCE NORTH 00°00'31" EAST, A DISTANCE OF 589.86 FEET TO A TANGENT 36.00 FOOT RADIUS CURVE WHOSE CENTER BEARS SOUTHEASTERLY;
THENCE NORTHEASTERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 89°37'46" AN ARC DISTANCE OF 56.32 FEET TO THE **POINT OF BEGINNING**.

ROBERT L. MEADOWS JR., PLS 34977
PREPARED FOR AND ON BEHALF OF MATRIX DESIGN GROUP
2435 RESEARCH PARKWAY, SUITE 300
COLORADO SPRINGS, CO. 80920
(719) 575-0100

SCHEDULE B

Exceptions

1. Any facts, rights, interests or claims that are shown by the Public Records but which could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.

2. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.

3. Any encroachments, encumbrances, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by Public Records.

4. Any lien or right to a lien, for services, labor or material heretofore or hereafter furnished, imposed by law and not shown by the Public Records.

5. Defects, liens, encumbrances, adverse claims or other matters, if any, created, first appearing in the Public Records or attaching subsequent to the effective date hereof but prior to the date the proposed Insured acquires of record for the value the estate or interest or mortgage thereon covered by this Commitment.

6. Water rights, claims of title to water, whether or not these matters are shown by the Public Records.

7. All taxes and assessments, now or heretofore assessed, due or payable.

8. Any existing leases or tenancies, and any and all parties claiming by, through or under said lessees.

9. Reservations by the Union Pacific Railroad Company of (l) oil, coal and other minerals underlying the land, (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 August 11, 1911 in Book 320 at Page 61, and any and all assignments thereof or interests therein.

   The effect of Release and Quitclaim Deed recorded December 17, 1998 at Reception No. 2661201.

   Request for Notification of Surface Development by RME Petroleum Company and RME Land Corp. (fka Union Pacific Resources Company and Union Pacific Land Resources) recorded February 28, 2002 at Reception No. 2954716.

   Relinquishment recorded September 4, 2018 at Reception No. 4428217.

10. An easement for communication and other facilities and incidental purposes granted to Mountain States Telephone and Telegraph Company by the instrument recorded May 7, 1930 in Book 894 at Page 390.

11. Terms, conditions, provisions, agreements and obligations specified under the Agreement by and between The Boulder Valley Coal Company and Union Pacific Railroad company and John J. Kirby and Joseph M. Kirby and Esther R. Kirby (the then owners of said property) recorded April 30, 1931 in Book 913 at Page 86.

    Relinquishment recorded September 4, 2018 at Reception No. 4428217

12. All oil, gas and associated liquid hydrocarbons as granted to Champlin Petroleum Company by Mineral Deed recorded November 30, 1972 in Book 681 at Reception No. 1602712, and the terms and conditions contained therein, and any and all assignments thereof or interest therein.

    Ratification of Lease recorded December 10, 1990 at Reception No. 2235517.

    Relinquishment recorded September 4, 2018 at Reception No. 4428217

13. Terms, agreements, provisions, conditions and obligations of a Oil and Gas Lease, executed by Amoco Production Company, as Lessee(s), recorded November 30, 1972 in Book 681 at Reception No. 1602713, and any and all assignments thereof or interests therein.

    Notice of Oil and Gas Interest and Surface Use recorded December 7, 2000 at Reception No. 2811876 in connection with the above lease.

    Recording Supplement to Operating Agreement and Financing Statement by Encana Oil & Gas Inc. and Non-operator parties all as set forth in said instrument as recorded October 9, 2018 at Reception No. 4437212, and any and all assignments thereof or interests therein.

    Relinquishment recorded September 4, 2018 at Reception No. 4428217

14. Terms, conditions, provisions, agreements and obligations specified under the Surface Owner's Agreement by and between Patricia S. Ackard and Champlin Petroleum Company recorded July 10, 1974 in Book 178 at Reception No. 1640298.

    Request for notification (Mineral Estate Owner) as Recorded December 21, 2007 at Reception No. 3525268.

    Assignment of Royalty (Quit Claim) Recorded September 7, 2016 at Reception No. 4234417.
    Assignment of Royalty (Quit Claim) Recorded December 22, 2017 at Reception No. 4362621.

    Relinquishment recorded September 4, 2018 at Reception No. 4428217

15. An easement for communication and other facilities and incidental purposes granted to Mountain States Telephone and Telegraph Company by the instrument recorded January 5, 1987 in Book 1141 at Reception No. 2083323.

16. The effect of the Communitization Agreement as Recorded November 21, 2008 at Reception No. 3591158.

17. Terms, conditions, provisions, agreements and obligations contained in the Setback Waiver as set forth below:

    Recording Date: September 4, 2018
    Recording No.: Reception No. 4428213

18. Terms, conditions, provisions, agreements and obligations contained in the Dearmin Zoning Map as set forth below:

    Recording Date: December 19, 2018
    Recording No.: Reception No. 4454695

19. Terms, conditions, provisions, agreements and obligations contained in the Relinquishment as set forth below:

Recording Date: September 4, 2018
Recording No.: Reception No. 4428217

END OF EXCEPTIONS

THIS IS A TITLE REPORT ONLY. **This is not a commitment to insure.**

The information set forth herein is based on information supplied to NCS Colorado, a division of Fidelity National Title by sources believed to be reliable and is provided for accommodation purposes only. NCS Colorado, a division of Fidelity National Title assumes no liability hereunder unless a policy or policies of title insurance are issued by NCS Colorado, a division of Fidelity National Title and fully paid for and the insured under said policy or policies and party to whom this report was issued have no knowledge of any defect in title not disclosed. Reliance on the information set forth herein is subject to the issuance of a mortgage and/or owner's policy of title insurance by NCS Colorado, a division of Fidelity National Title within six (6) months from the effective date hereof. If a title insurance policy is not issued insuring the property within such time, this title report shall be null and void as of its effective date and shall be deemed to have been furnished for informational purposes only.

LIMITATIONS OF LIABILITY

APPLICANT EXPRESSLY AGREES AND ACKNOWLEDGES THAT IT IS EXTREMELY DIFFICULT, IF NOT IMPOSSIBLE, TO DETERMINE THE EXTENT OF LOSS WHICH COULD ARISE FROM ERRORS OR OMISSIONS IN, OR THE COMPANY'S NEGLIGENCE IN PRODUCING, THE REPORT. APPLICANT RECOGNIZES THAT THE FEE CHARGED IS NOMINAL IN RELATION TO THE POTENTIAL LIABILITY WHICH COULD ARISE FROM SUCH ERRORS OR OMISSIONS OR NEGLIGENCE. THEREFORE, APPLICANT UNDERSTANDS THAT THE COMPANY IS NOT WILLING TO PROCEED IN THE PREPARATION AND ISSUANCE OF THE REQUESTED REPORT UNLESS THE COMPANY'S LIABILITY IS STRICTLY LIMITED. APPLICANT AGREES WITH THE PROPRIETY OF SUCH LIMITATION AND AGREES TO BE BOUND BY ITS TERMS.

THE LIMITATIONS ARE AS FOLLOWS AND THE LIMITATIONS WILL SURVIVE THE CONTRACT:

MATTERS AFFECTING TITLE BUT WHICH DO NOT APPEAR AS A LIEN OR ENCUMBRANCE, AS DEFINED ABOVE, AMONG THE TITLE INSTRUMENTS ARE OUTSIDE THE SCOPE OF THE REPORT.

APPLICANT AGREES, AS PART OF THE CONSIDERATION FOR THE ISSUANCE OF THE REPORT AND TO THE FULLEST EXTENT PERMITTED BY LAW, TO LIMIT THE LIABILITY OF THE COMPANY, ITS LICENSORS, AGENTS, SUPPLIERS, RESELLERS, SERVICE PROVIDERS, CONTENT PROVIDERS, OR ANY OTHER SUBSCRIBERS OR SUPPLIERS, SUBSIDIARIES, AFFILIATES, EMPLOYEES, AND SUBCONTRACTORS FOR ANY AND ALL CLAIMS, LIABILITIES, CAUSES OF ACTION, LOSSES, COSTS, DAMAGES AND EXPENSES OF ANY NATURE WHATSOEVER, INCLUDING ATTORNEY'S FEES, HOWEVER ALLEGED OR ARISING INCLUDING BUT NOT LIMITED TO THOSE ARISING FROM BREACH OF CONTRACT, NEGLIGENCE, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE, ERRORS, OMISSIONS, STRICT LIABILITY, BREACH OF WARRANTY, EQUITY, THE COMMON LAW, STATUTE, OR ANY OTHER THEORY OF RECOVERY, OR FROM ANY PERSON'S USE, MISUSE, OR INABILITY TO USE THE REPORT OR ANY OF THE MATERIALS CONTAINED THEREIN OR PRODUCED, SO THAT THE TOTAL AGGREGATE LIABILITY OF THE COMPANY AND ITS, AGENTS, SUBSIDIARIES, AFFILIATES, EMPLOYEES, AND SUBCONTRACTORS SHALL NOT IN ANY EVENT EXCEED THE COMPANY'S TOTAL FEE FOR THE REPORT.

APPLICANT AGREES THAT THE FOREGOING LIMITATION ON LIABILITY IS A TERM MATERIAL TO THE PRICE THE APPLICANT IS PAYING WHICH PRICE IS LOWER THAN WOULD OTHERWISE BE OFFERED TO THE APPLICANT WITHOUT SAID TERM. APPLICANT RECOGNIZES THAT THE COMPANY WOULD NOT ISSUE THE REPORT, BUT FOR THIS CUSTOMER AGREEMENT, AS PART OF THE CONSIDERATION GIVEN FOR THE REPORT, TO THE FOREGOING LIMITATION OF LIABILITY AND THAT ANY SUCH LIABILITY IS CONDITIONED AND PREDICATED UPON THE FULL AND TIMELY PAYMENT OF THE COMPANY'S INVOICE FOR THE REPORT.

THE REPORT IS LIMITED IN SCOPE AND IS NOT AN ABSTRACT OF TITLE, TITLE OPINION, PRELIMINARY TITLE REPORT, TITLE REPORT, COMMITMENT TO ISSUE TITLE INSURANCE, OR A TITLE POLICY, AND SHOULD NOT BE RELIED UPON AS SUCH. THE REPORT DOES NOT PROVIDE OR OFFER ANY TITLE INSURANCE, LIABILITY COVERAGE OR ERRORS AND OMISSIONS COVERAGE. THE REPORT IS NOT TO BE RELIED UPON AS A REPRESENTATION OF THE STATUS OF TITLE TO THE PROPERTY. THE COMPANY MAKES NO REPRESENTATIONS AS TO THE REPORT'S ACCURACY, DISCLAIMS ANY WARRANTIES AS TO THE REPORT, ASSUMES NO DUTIES TO APPLICANT, DOES NOT INTEND FOR APPLICANT TO RELY ON THE REPORT, AND ASSUMES NO LIABILITY FOR ANY LOSS OCCURRING BY REASON OF RELIANCE ON THE REPORT OR OTHERWISE.

IF APPLICANT DOES NOT WISH TO LIMIT LIABILITY AS STATED HEREIN AND APPLICANT DESIRES THAT ADDITIONAL LIABILITY BE ASSUMED BY THE COMPANY, APPLICANT MAY REQUEST AND PURCHASE A POLICY OF TITLE INSURANCE, A BINDER, OR A COMMITMENT TO ISSUE A POLICY OF TITLE INSURANCE. NO ASSURANCE IS GIVEN AS TO THE INSURABILITY OF THE TITLE OR STATUS OF TITLE. APPLICANT EXPRESSLY AGREES AND ACKNOWLEDGES IT HAS AN INDEPENDENT DUTY TO ENSURE AND/OR RESEARCH THE ACCURACY OF ANY INFORMATION OBTAINED FROM THE COMPANY OR ANY PRODUCTS OR SERVICES PURCHASED.

NO THIRD PARTY IS PERMITTED TO USE OR RELY UPON THE INFORMATION SET FORTH IN THE REPORT, AND NO LIABILITY TO ANY THIRD PARTY IS UNDERTAKEN BY THE COMPANY.

APPLICANT AGREES THAT, TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT WILL THE COMPANY, ITS LICENSORS, AGENTS, SUPPLIERS, RESELLERS, SERVICE PROVIDERS, CONTENT PROVIDERS, OR ANY OTHER SUBSCRIBERS OR SUPPLIERS, SUBSIDIARIES, AFFILIATES, EMPLOYEES, AND SUBCONTRACTORS BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, INDIRECT, PUNITIVE, EXEMPLARY, OR SPECIAL DAMAGES, OR LOSS OF PROFITS, REVENUE, INCOME, SAVINGS, DATA, BUSINESS, OPPORTUNITY, OR GOODWILL, PAIN AND SUFFERING, EMOTIONAL DISTRESS, NON-OPERATION OR INCREASED EXPENSE OF OPERATION, BUSINESS INTERRUPTION OR DELAY, COST OF CAPITAL, OR COST OF REPLACEMENT PRODUCTS OR SERVICES, REGARDLESS OF WHETHER SUCH LIABILITY IS BASED ON BREACH OF CONTRACT, TORT, NEGLIGENCE, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTIES, FAILURE OF ESSENTIAL PURPOSE, OR OTHERWISE AND WHETHER CAUSED BY NEGLIGENCE, ERRORS, OMISSIONS, STRICT LIABILITY, BREACH OF CONTRACT, BREACH OF WARRANTY, THE COMPANY'S OWN FAULT AND/OR NEGLIGENCE OR ANY OTHER CAUSES WHATSOEVER, AND EVEN IF THE COMPANY HAS BEEN ADVISED OF THE LIKELIHOOD OF SUCH DAMAGES OR KNEW OR SHOULD HAVE KNOWN OF THE POSSIBILITY FOR SUCH DAMAGE

645 Holbrook, - PO Box 750
Erie, CO 80516

May -2019

RE: Westerly Property - A Southern Land Company Community
- Town of Erie, Colorado - Letter of Authorization

The land being submitted for consideration of this Re-Zoning Request is owned by the applicant and therefore the Letter of Authorization is not application to this application.

Sincerely,

John Prestwich

John Prestwich - President, PCS Group, Inc. - RLA

RELINQUISHMENT

THIS RELINQUISHMENT (this "Relinquishment") is effective this 3rd day of July, 2018, by and among KERR-MCGEE OIL & GAS ONSHORE LP, KERR-MCGEE GATHERING LLC, ANADARKO LAND CORP. (formerly known as Union Pacific Land Resources Corporation), and ANADARKO E&P ONSHORE LLC, with an address of 1099 18th Street, Suite 1800, Denver, CO 80202 (hereinafter, together with their respective successors and assigns, collectively, "Anadarko Land") and ERIE LAND COMPANY, LLC, a Delaware limited liability company (hereinafter "Grantee").

W I T N E S S E T H:

RECITALS

1. The lands which are the subject of this Relinquishment are the lands that are described on attached Exhibit A and are hereinafter referred to as the "Subject Lands."

2. By deed dated July 18, 1911 and recorded in the Office of the Clerk and Recorder of Weld County (the "Official Records") in Book 320 at Page 61, Union Pacific Railroad Company ("Railway") conveyed to Joseph M Kirby and John J Kirby certain real estate in Weld County, Colorado, a portion of which are the Subject Lands. Said deed was made subject to certain reservations by the grantor (the "Deed").

3. By quitclaim deed dated September 28, 1995 recorded on November 23, 1998 in the Office of the Clerk and Recorder of Weld County at Reception No. 2661201, Union Pacific Railroad Company, formerly known as Union Pacific Railway Company, quitclaimed to Union Pacific Land Resources Corporation, all of its right, title, and interest in and to certain real estate in Weld County, Colorado, a portion of which was the Subject Lands.

4. This Relinquishment relates to surface entry only for all minerals, including coal, hard rock minerals as may be described in the instruments above, and also any and all oil, gas, energy resources, geothermal resources and all associated rights and hydrocarbons (all of the foregoing, collectively, "Minerals"), that Anadarko Land owns in the Subject Lands.

RELINQUISHMENT AND QUITCLAIM

NOW THEREFORE, Anadarko Land, for and in consideration of the sum of TEN DOLLARS ($10.00) and other good and valuable consideration to it paid, the receipt of which is hereby acknowledged, has RELINQUISHED and forever QUITCLAIMED, and by these presents does RELINQUISH and forever QUITCLAIM unto Grantee, its grantees, successors and assigns, with respect to the Subject Lands only, the right to enter upon the surface of the Subject Lands to explore for and remove the Minerals (including, without limitation, any right to enter upon the surface pursuant to that certain Oil and Gas Lease recorded in the Official Records on November 30, 1972, at Reception No. 1602713, and that certain deed recorded in the Official Records on February 23, 1965, in Book 535 at Reception No. 1457025), it being the

intent hereof to relinquish only the right to enter upon the surface of the Subject Lands to explore for and remove the Minerals and the right to place any facilities upon the surface of the Subject Lands, and to leave in full force and effect all other rights reserved to the Railway in the Deed, it being expressly understood that Anadarko Land's title to the Minerals shall be in no way affected and that Anadarko Land and any lessee, licensee, successor or assign of Anadarko Land shall have the right to remove the Minerals from the Subject Lands by subterranean entries, by means of operations conducted on the surface of other lands or otherwise by any means or methods suitable to Anadarko Land, its lessees, licensees, successors and assigns, but without entering upon or using the surface of the Subject Lands, and in such manner as not to damage the surface of the Subject Lands or to interfere with the use thereof by Grantee, its grantees, successors and assigns.

This Relinquishment is made subject to the specific understanding that all of the terms, conditions, provisions and reservations contained in the Deed and not heretofore relinquished shall continue in full force and effect with respect to all lands conveyed thereby and not covered by this Relinquishment, and it is further specifically understood that all the terms, conditions, provisions and reservations contained in that Deed shall continue in full force and effect with respect to the Subject Lands. Further, this Relinquishment is made subject to those certain two easements entered into by and between Grantee and Kerr-McGee Gathering LLC ("Kerr-McGee") on the date first written above, which affect the Subject Lands (the "Easements"), and it is further specifically understood that all the terms, conditions, provisions and the rights granted to Kerr-McGee in and to the Easements shall in no way be affected by this Relinquishment. For the avoidance of doubt, Anadarko Land hereby waives any rights to reasonable accommodation for surface entry as may be provided under Colorado law.

IN WITNESS WHEREOF, Anadarko Land has executed this Relinquishment on the date set forth in the acknowledgment, to be effective on the date first written above.

KERR-McGEE OIL & GAS ONSHORE LP

By: _____
Lindsay N. Jaffee
Agent & Attorney-in-Fact

MH
09
RES

KERR-McGEE GATHERING LLC

By: _____
Lindsay N. Jaffee
Agent & Attorney-in-Fact

MH
09
RES

ANADARKO LAND CORP.

By: _____
Lindsay N. Jaffee
Agent & Attorney-in-Fact

MH
09
RES

ANADARKO E&P ONSHORE LLC

By: _____
Lindsay N. Jaffee
Agent & Attorney-in-Fact

MH
09
RES

[End of Execution Pages]

ACKNOWLEDGEMENTS

STATE OF Colorado)
) ss.
COUNTY OF Denver)

The foregoing **AGREEMENT** was acknowledged before me this 11th day of July, 2018, by Lindsay N. Jaffee, as Agent & Attorney-in-Fact of Kerr-McGee Oil & Gas Onshore LP, on behalf of such partnership.

Witness my hand and official seal.

[SEAL] ANTHONY T RADER
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20164046156
COMMISSION EXPIRES DEC. 6, 2020

Notary Public
My Commission Expires: 12/6/2020

STATE OF Colorado)
) ss.
COUNTY OF Denver)

The foregoing **AGREEMENT** was acknowledged before me this 11th day of July, 2018, by Lindsay N. Jaffee, as Agent & Attorney-in-Fact of Kerr-McGee Gathering LLC, on behalf of such company.

Witness my hand and official seal.

[SEAL] ANTHONY T RADER
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20164046156
COMMISSION EXPIRES DEC. 6, 2020

Notary Public
My Commission Expires: 12/6/2020

STATE OF Colorado)
) ss.
COUNTY OF Denver)

The foregoing **AGREEMENT** was acknowledged before me this 11th day of July, 2018, by Lindsay N. Jaffee, as Agent & Attorney-in-Fact of Anadarko Land Corp., on behalf of such company.

Witness my hand and official seal.

[SEAL] ANTHONY T RADER
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20164046156
COMMISSION EXPIRES DEC. 6, 2020

Notary Public
My Commission Expires: 12/6/2020

STATE OF Colorado)
) ss.
COUNTY OF Denver)

The foregoing **AGREEMENT** was acknowledged before me this 11th day of July, 2018, by Lindsay N. Jaffee, as Agent & Attorney-in-Fact of Anadarko E&P Onshore LLC, on behalf of such company.

Witness my hand and official seal.

[SEAL]

ANTHONY T RADER
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20164046156
COMMISSION EXPIRES DEC. 6, 2020

Notary Public
My Commission Expires: 12/6/2020

[End of Acknowledgements Page]

Exhibit A
to
Relinquishment

Legal Description

PARCEL A:

A PARCEL OF LAND LOCATED IN THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF THE NORTHWEST QUARTER OF SAID SECTION 21, AND CONSIDERING THE NORTHERLY LINE OF THE NORTHWEST QUARTER OF SAID OF SECTION 21 TO BEAR NORTH 89°38'17" EAST WITH ALL BEARINGS SHOWN HEREON RELATIVE THERETO; THENCE SOUTH 00°16'01" EAST ALONG THE EASTERLY LINE OF THE NORTHWEST QUARTER OF SAID SECTION 21 A DISTANCE OF 30.00 FEET TO A POINT ON THE SOUTHERLY RIGHT-OF-WAY LINE OF ERIE PARKWAY (WELD COUNTY ROAD 8) AS DESCRIBED IN COMMISSIONERS BOOK 5, PAGE 206 OF THE RECORDS OF THE WELD COUNTY COMMISSIONERS AND THE **POINT OF BEGINNING**;

THENCE CONTINUING ALONG SAID EASTERLY LINE OF THE NORTHWEST QUARTER OF SECTION 21 SOUTH 00°16'01" EAST A DISTANCE OF 2,619.90 FEET TO THE CENTER CORNER OF SAID SECTION 21;

THENCE SOUTH 00°16'04" EAST ALONG THE EASTERLY LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 21 A DISTANCE OF 1,229.70 FEET TO A POINT ON THE WESTERLY BOUNDARY OF THE COMMUNITY DITCH AS DESCRIBED IN BOOK 63, PAGE 464, RECEPTION NO. 23030 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDER;

THENCE ALONG SAID WESTERLY BOUNDARY OF THE COMMUNITY DITCH THE FOLLOWING TWENTY-ONE (21) COURSES:

1) SOUTH 76°41'08" WEST A DISTANCE OF 77.18 FEET TO A POINT OF CURVATURE;
2) ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 26°32'10", A RADIUS OF 225.00 FEET, AN ARC LENGTH OF 104.21 FEET AND A CHORD THAT BEARS SOUTH 89°57'13" WEST A DISTANCE OF 103.28 FEET;
3) NORTH 76°46'42" WEST A DISTANCE OF 223.90 FEET TO A POINT OF CURVATURE;
4) ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 15°24'26", A RADIUS OF 425.00 FEET, AN ARC LENGTH OF 114.29 FEET AND A CHORD THAT BEARS NORTH 84°28'55" WEST A DISTANCE OF 113.94 FEET;
5) SOUTH 87°48'52" WEST A DISTANCE OF 145.31 FEET TO A POINT OF CURVATURE;
6) ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 34°36'07", A RADIUS OF 325.00 FEET, AN ARC LENGTH OF 196.27 FEET AND A CHORD THAT BEARS SOUTH 70°30'47" WEST A DISTANCE OF 193.30 FEET;
7) SOUTH 53°12'44" WEST A DISTANCE OF 80.82 FEET TO A POINT OF CURVATURE;
8) ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 13°09'14", A RADIUS OF 425.00 FEET, AN ARC LENGTH OF 95.57 FEET AND A CHORD THAT BEARS SOUTH 46°38'08" WEST A DISTANCE OF 97.36 FEET;
9) SOUTH 40°03'31" WEST A DISTANCE OF 199.79 FEET;
10) SOUTH 43°18'24" WEST A DISTANCE OF 274.93 FEET;
11) SOUTH 41°54'01" WEST A DISTANCE OF 126.84 FEET ;
12) SOUTH 43°57'21" WEST A DISTANCE OF 169.36 FEET TO A POINT OF CURVATURE;
13) ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 62°08'24", A RADIUS OF 225.00 FEET, AN ARC LENGTH OF 244.02 FEET AND A CHORD THAT BEARS SOUTH 12°53'09" WEST A DISTANCE OF 232.24 FEET;
14) SOUTH 18°11'03" EAST A DISTANCE OF 8.91 FEET TO A POINT OF CURVATURE;

JANSEN STRAWN
CONSULTING ENGINEERS
45 WEST 2ND AVENUE
DENVER, CO 80223
P.303.561.3333
F.303.561.3339

PROJECT:	DATE :	SHEET
ELEVATION	8/31/17	1 OF 7
JOB NO.: 14034	SCALE: N.A.	

15) ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 39°02'42", A RADIUS OF 175.00 FEET, AN ARC LENGTH OF 119.26 FEET AND A CHORD THAT BEARS SOUTH 37°42'25" EAST A DISTANCE OF 116.96 FEET;
16) SOUTH 57°13'46" EAST A DISTANCE OF 50.68 FEET TO A POINT OF CURVATURE;
17) ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 24°57'41", A RADIUS OF 425.00 FEET, AN ARC LENGTH OF 185.15 FEET AND A CHORD THAT BEARS SOUTH 69°42'37" EAST A DISTANCE OF 183.69 FEET;
18) SOUTH 82°11'27" EAST A DISTANCE OF 100.58 FEET TO A POINT OF CURVATURE;
19) ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 22°03'40", A RADIUS OF 575.00 FEET, AN ARC LENGTH OF 221.40 FEET AND A CHORD THAT BEARS SOUTH 71°09'37" EAST A DISTANCE OF 220.03 FEET;
20) SOUTH 60°07'47" EAST A DISTANCE OF 347.74 FEET TO A POINT OF CURVATURE;
21) ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 02°24'14", A RADIUS OF 475.00 FEET, AN ARC LENGTH OF 19.93 FEET AND A CHORD THAT BEARS SOUTH 58°55'40" EAST A DISTANCE OF 19.93 FEET TO A POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF WELD COUNTY ROAD 6 AS DESCRIBED IN COMMISSIONERS BOOK 86, PAGE 273 OF THE RECORDS OF THE WELD COUNTY COMMISSIONERS;

THENCE SOUTH 89°25'57" WEST ALONG SAID NORTHERLY RIGHT-OF-WAY LINE A DISTANCE OF 2,019.11 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF WELD COUNTY ROAD 5 AS DESCRIBED IN COMMISSIONERS BOOK 86, PAGE 273 OF THE RECORDS OF THE WELD COUNTY COMMISSIONERS;

THENCE NORTH 00°06'17" WEST ALONG SAID EASTERLY RIGHT-OF-WAY LINE A DISTANCE OF 874.06 FEET TO A POINT ON THE BOUNDARY OF THAT PARCEL OF LAND DESCRIBED AT RECEPTION NO. 2978817 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDER;

THENCE ALONG SAID BOUNDARY THE FOLLOWING FIVE (5) COURSES:

1) NORTH 89°53'43" EAST A DISTANCE OF 807.64 FEET;
2) NORTH 00°06'17" WEST A DISTANCE OF 457.00 FEET;
3) SOUTH 89°53'43" WEST A DISTANCE OF 608.07 FEET;
4) NORTH 00°06'17" WEST A DISTANCE OF 230.00 FEET;
5) SOUTH 89°53'43" WEST A DISTANCE OF 199.57 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF SAID WELD COUNTY ROAD 5;

THENCE ALONG SAID EASTERLY RIGHT-OF-WAY LINE THE FOLLOWING TWO (2) COURSES:

1) NORTH 00°06'17" WEST A DISTANCE OF 1,064.19 FEET;
2) NORTH 00°00'31" EAST A DISTANCE OF 1,574.75 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF WELD COUNTY ROAD 5 AS DESCRIBED IN THE DEEDS RECORDED AT RECEPTION NO. 3338310 AND RECEPTION NO. 3338311 OF THE WELD COUNTY CLERK AND RECORDER;
THENCE ALONG SAID EASTERLY RIGHT-OF-WAY LINE AND ALONG THE SOUTHERLY RIGHT-OF-WAY LINE OF ERIE PARKWAY (WELD COUNTY ROAD 8) THE FOLLOWING FOUR (4) COURSES:

1) SOUTH 89°59'29" EAST A DISTANCE OF 60.00 FEET;
2) NORTH 00°00'31" EAST A DISTANCE OF 980.30 FEET;
3) NORTH 89°38'17" EAST A DISTANCE OF 1,106.54 FEET;
4) NORTH 00°21'43" WEST A DISTANCE OF 70.00 FEET TO A POINT ON SAID SOUTHERLY RIGHT-OF-WAY LINE OF ERIE PARKWAY (WELD COUNTY ROAD 8) AS DESCRIBED IN COMMISSIONERS BOOK 5, PAGE 205 OF THE RECORDS OF THE WELD COUNTY COMMISSIONERS;

JANSEN STRAWN
CONSULTING ENGINEERS
45 WEST 2ND AVENUE
DENVER, CO 80223
P.303.561.3333
F.303.561.3339

PROJECT:	DATE :	SHEET
ELEVATION	8/31/17	2 OF 7
JOB NO.: 14034	SCALE: N.A.	

THENCE NORTH 89°38'17" EAST ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE A DISTANCE OF 1,467.60 FEET TO THE **POINT OF BEGINNING**.

PARCEL A CONTAINS 11,615,744 SQUARE FEET, OR 266.66 ACRES, MORE OR LESS.

PARCEL B:

A PARCEL OF LAND LOCATED IN THE SOUTHWEST QUARTER OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF THE NORTHWEST QUARTER OF SAID SECTION 21, AND CONSIDERING THE NORTHERLY LINE OF THE NORTHWEST QUARTER OF SAID OF SECTION 21 TO BEAR NORTH 89°38'17" EAST WITH ALL BEARINGS SHOWN HEREON RELATIVE THERETO; THENCE SOUTH 00°16'01" EAST ALONG THE EASTERLY LINE OF THE NORTHWEST QUARTER OF SAID SECTION 21 A DISTANCE OF 2,649.90 FEET TO THE CENTER CORNER OF SAID SECTION 21; THENCE SOUTH 00°16'04" EAST ALONG THE EASTERLY LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 21 A DISTANCE OF 1,281.03 FEET TO A POINT ON THE EASTERLY BOUNDARY OF THE COMMUNITY DITCH AS DESCRIBED IN BOOK 63, PAGE 464, RECEPTION NO. 23030 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDER AND THE **POINT OF BEGINNING**;

THENCE CONTINUING ALONG SAID EASTERLY LINE OF THE SOUTHWEST QUARTER OF SECTION 21 SOUTH 00°16'04" EAST A DISTANCE OF 1,339.39 FEET TO A POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF WELD COUNTY ROAD 6 AS DESCRIBED IN COMMISSIONERS BOOK 86, PAGE 273 OF THE RECORDS OF THE WELD COUNTY COMMISSIONERS;

THENCE SOUTH 89°25'57" WEST ALONG SAID NORTHERLY RIGHT-OF-WAY LINE A DISTANCE OF 551.20 FEET TO A POINT ON THE EASTERLY BOUNDARY OF SAID COMMUNITY DITCH;

THENCE ALONG SAID EASTERLY BOUNDARY OF THE COMMUNITY DITCH THE FOLLOWING TWENTY-ONE (21) COURSES:

1) ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 10°05'03", A RADIUS OF 525.00 FEET, AN ARC LENGTH OF 92.40 FEET AND A CHORD THAT BEARS NORTH 55°05'16" WEST A DISTANCE OF 92.28 FEET;
2) NORTH 60°07'47" WEST A DISTANCE OF 347.74 FEET TO A POINT OF CURVATURE;
3) ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 22°03'40", A RADIUS OF 625.00 FEET, AN ARC LENGTH OF 240.65 FEET AND A CHORD THAT BEARS NORTH 71°09'37" WEST A DISTANCE OF 239.17 FEET;
4) NORTH 82°11'27" WEST A DISTANCE OF 100.58 FEET TO A POINT OF CURVATURE;
5) ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 24°57'41", A RADIUS OF 375.00 FEET, AN ARC LENGTH OF 163.37 FEET AND A CHORD THAT BEARS NORTH 69°42'37" WEST A DISTANCE OF 162.08 FEET;
6) NORTH 57°13'46" WEST A DISTANCE OF 50.68 FEET TO A POINT OF CURVATURE;
7) ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 39°02'42", A RADIUS OF 125.00 FEET, AN ARC LENGTH OF 85.18 FEET AND A CHORD THAT BEARS NORTH 37°42'25" WEST A DISTANCE OF 83.54 FEET;
8) NORTH 18°11'03" WEST A DISTANCE OF 8.91 FEET TO A POINT OF CURVATURE;
9) ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 62°08'24", A RADIUS OF 175.00 FEET, AN ARC LENGTH OF 189.80 FEET AND A CHORD THAT BEARS NORTH 12°53'09" EAST A DISTANCE OF 180.63 FEET;

JANSEN STRAWN
CONSULTING ENGINEERS
45 WEST 2ND AVENUE
DENVER, CO 80223
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F.303.561.3339

PROJECT:	DATE :	SHEET
ELEVATION	8/31/17	3 OF 7
JOB NO.: 14034	SCALE: N.A.	

10) NORTH 43°57'21" EAST A DISTANCE OF 170.26 FEET;
11) NORTH 41°54'01" EAST A DISTANCE OF 127.12 FEET;
12) NORTH 43°18'24" EAST A DISTANCE OF 275.73 FEET;
13) NORTH 40°03'31" EAST A DISTANCE OF 201.21 FEET TO A POINT OF CURVATURE;
14) ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 13°09'14", A RADIUS OF 375.00 FEET, AN ARC LENGTH OF 86.09 FEET AND A CHORD THAT BEARS NORTH 46°38'08" EAST A DISTANCE OF 85.90 FEET;
15) NORTH 53°12'44" EAST A DISTANCE OF 80.82 FEET TO A POINT OF CURVATURE;
16) ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 34°36'07", A RADIUS OF 275.00 FEET, AN ARC LENGTH OF 166.08 FEET AND A CHORD THAT BEARS NORTH 70°30'47" EAST A DISTANCE OF 163.57 FEET;
17) NORTH 87°48'52" EAST A DISTANCE OF 145.31 FEET TO A POINT OF CURVATURE;
18) ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 15°24'26", A RADIUS OF 375.00 FEET, AN ARC LENGTH OF 100.84 FEET AND A CHORD THAT BEARS NORTH 84°28'55" EAST A DISTANCE OF 100.54 FEET;
19) SOUTH 76°46'42" EAST A DISTANCE OF 223.90 FEET TO A POINT OF CURVATURE;
20) ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 26°32'10", A RADIUS OF 275.00 FEET, AN ARC LENGTH OF 127.36 FEET AND A CHORD THAT BEARS NORTH 89°57'13" EAST A DISTANCE OF 126.23 FEET;
21) NORTH 76°41'08" EAST A DISTANCE OF 65.60 FEET THE **POINT OF BEGINNING.**

PARCEL B CONTAINS 1,548,137 SQUARE FEET, OR 35.54 ACRES, MORE OR LESS.

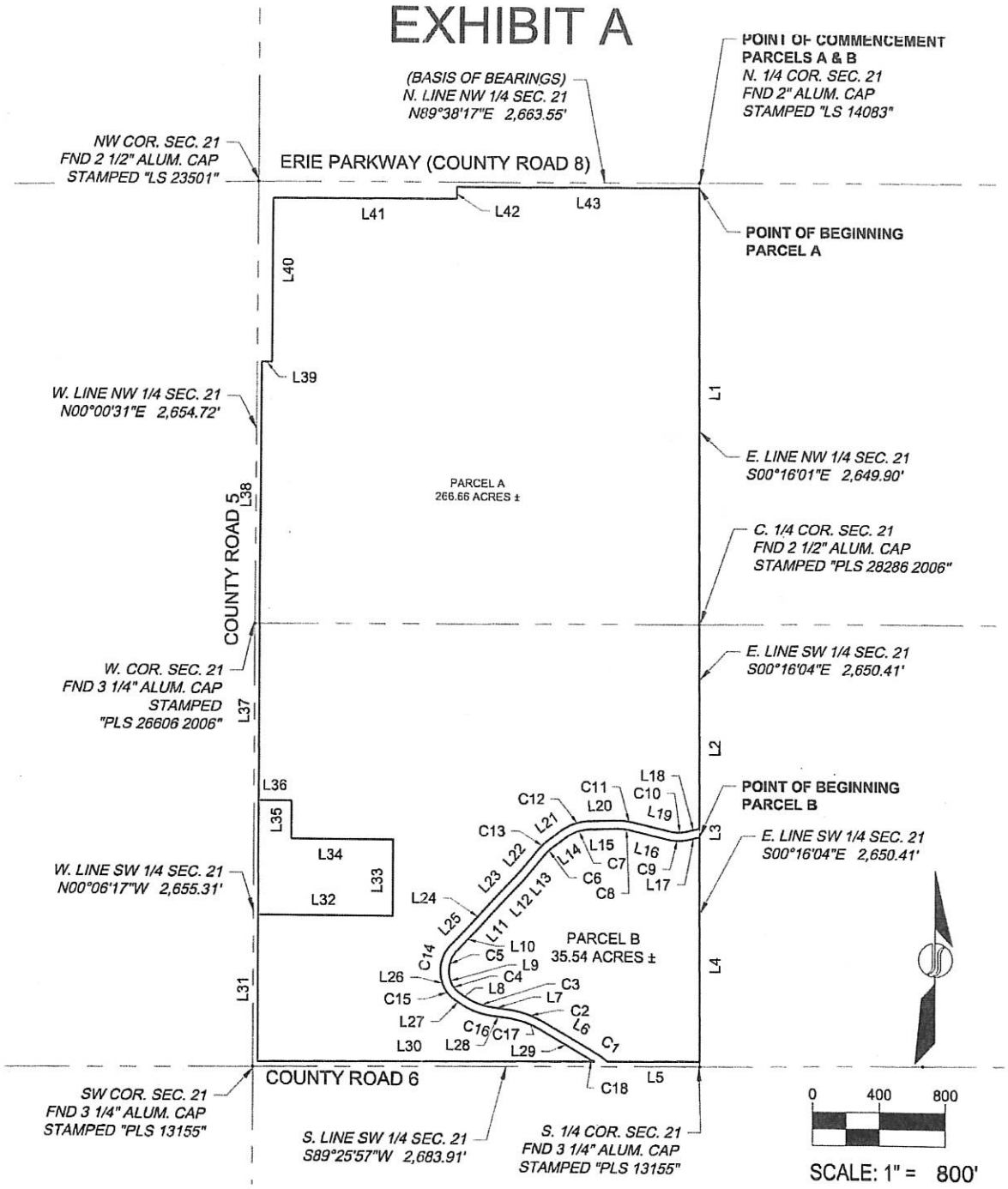
ALL LINEAL DISTANCE UNITS ARE REPRESENTED IN U.S. SURVEY FEET. THE UNITED STATES DEPARTMENT OF COMMERCE, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY DEFINES THE U.S. SURVEY FOOT AS 1200 / 3937 METERS.

I, THOMAS D. STAAB, A SURVEYOR LICENSED IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THE ABOVE LEGAL DESCRIPTION AND ATTACHED EXHIBIT WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND CHECKING.

THOMAS D. STAAB, P.L.S. 25965
FOR AND ON BEHALF OF
JANSEN STRAWN CONSULTING ENGINEERS
A WARE MALCOMB COMPANY
990 SOUTH BROADWAY, SUITE 230
DENVER, COLORADO 80209
303.561.3333

JANSEN STRAWN CONSULTING ENGINEERS 45 WEST 2ND AVENUE DENVER, CO 80223 P.303.561.3333 F.303.561.3339	PROJECT: ELEVATION	DATE : 8/31/17	SHEET 4 OF 7
	JOB NO.: 14034	SCALE: N.A.	

EXHIBIT A



JANSEN STRAWN
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P 303 561 3333
F 303 561 3339

PROJECT:	DATE :	SHEET
ELEVATION	8/31/17	5 OF 7
JOB NO.:	SCALE:	
14034	1"=800'	

Line Table		
LINE #	LENGTH	DIRECTION
L1	2,619.90'	S00°16'01"E
L2	1,229.70'	S00°16'04"E
L3	51.32'	S00°16'04"E
L4	1,339.39'	S00°16'04"E
L5	551.20'	S89°25'57"W
L6	347.74'	N60°07'47"W
L7	100.58'	N82°11'27"W
L8	50.68'	N57°13'46"W
L9	8.91'	N18°11'03"W
L10	170.26'	N43°57'21"E
L11	127.12'	N41°54'01"E
L12	275.73'	N43°18'24"E
L13	201.21'	N40°03'31"E
L14	80.82'	N53°12'44"E
L15	145.31'	N87°48'52"E
L16	223.90'	S76°46'42"E
L17	65.60'	N76°41'08"E
L18	77.18'	S76°41'08"W
L19	223.90'	N76°46'42"W
L20	145.31'	S87°48'52"W
L21	80.82'	S53°12'44"W
L22	199.79'	S40°03'31"W

Line Table		
LINE #	LENGTH	DIRECTION
L23	274.93'	S43°18'24"W
L24	126.84'	S41°54'01"W
L25	169.36'	S43°57'21"W
L26	8.91'	S18°11'03"E
L27	50.68'	S57°13'46"E
L28	100.58'	S82°11'27"E
L29	347.74'	S60°07'47"E
L30	2,019.11'	S89°25'57"W
L31	874.06'	N00°06'17"W
L32	807.64'	N89°53'43"E
L33	457.00'	N00°06'17"W
L34	608.07'	S89°53'43"W
L35	230.00'	N00°06'17"W
L36	199.57'	S89°53'43"W
L37	1,064.19'	N00°06'17"W
L38	1,574.75'	N00°00'31"E
L39	60.00'	S89°59'29"E
L40	980.30'	N00°00'31"E
L41	1,106.54'	N89°38'17"E
L42	70.00'	N00°21'43"W
L43	1,467.60'	N89°38'17"E

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PROJECT:	DATE :	SHEET
ELEVATION	8/31/17	6 OF 7
JOB NO.: 14034	SCALE: N.A.	

CURVE TABLE					
CURVE #	DELTA	RADIUS	LENGTH	CHORD DIRECTION	CHORD LENGTH
C1	010°05'03"	525.00'	92.40'	N55°05'16"W	92.28'
C2	022°03'40"	625.00'	240.65'	N71°09'37"W	239.17'
C3	024°57'41"	375.00'	163.37'	N69°42'37"W	162.08'
C4	039°02'42"	125.00'	85.18'	N37°42'25"W	83.54'
C5	062°08'24"	175.00'	189.80'	N12°53'09"E	180.63'
C6	013°09'14"	375.00'	86.09'	N46°38'08"E	85.90'
C7	034°36'07"	275.00'	166.08'	N70°30'47"E	163.57'
C8	015°24'26"	375.00'	100.84'	S84°28'55"E	100.54'
C9	026°32'10"	275.00'	127.36'	N89°57'13"E	126.23'
C10	026°32'10"	225.00'	104.21'	S89°57'13"W	103.28'
C11	015°24'26"	425.00'	114.29'	N84°28'55"W	113.94'
C12	034°36'07"	325.00'	196.27'	S70°30'47"W	193.30'
C13	013°09'14"	425.00'	97.57'	S46°38'08"W	97.36'
C14	062°08'24"	225.00'	244.02'	S12°53'09"W	232.24'
C15	039°02'42"	175.00'	119.26'	S37°42'25"E	116.96'
C16	024°57'41"	425.00'	185.15'	S69°42'37"E	183.69'
C17	022°03'40"	575.00'	221.40'	S71°09'37"E	220.03'
C18	002°24'14"	475.00'	19.93'	S58°55'40"E	19.93'

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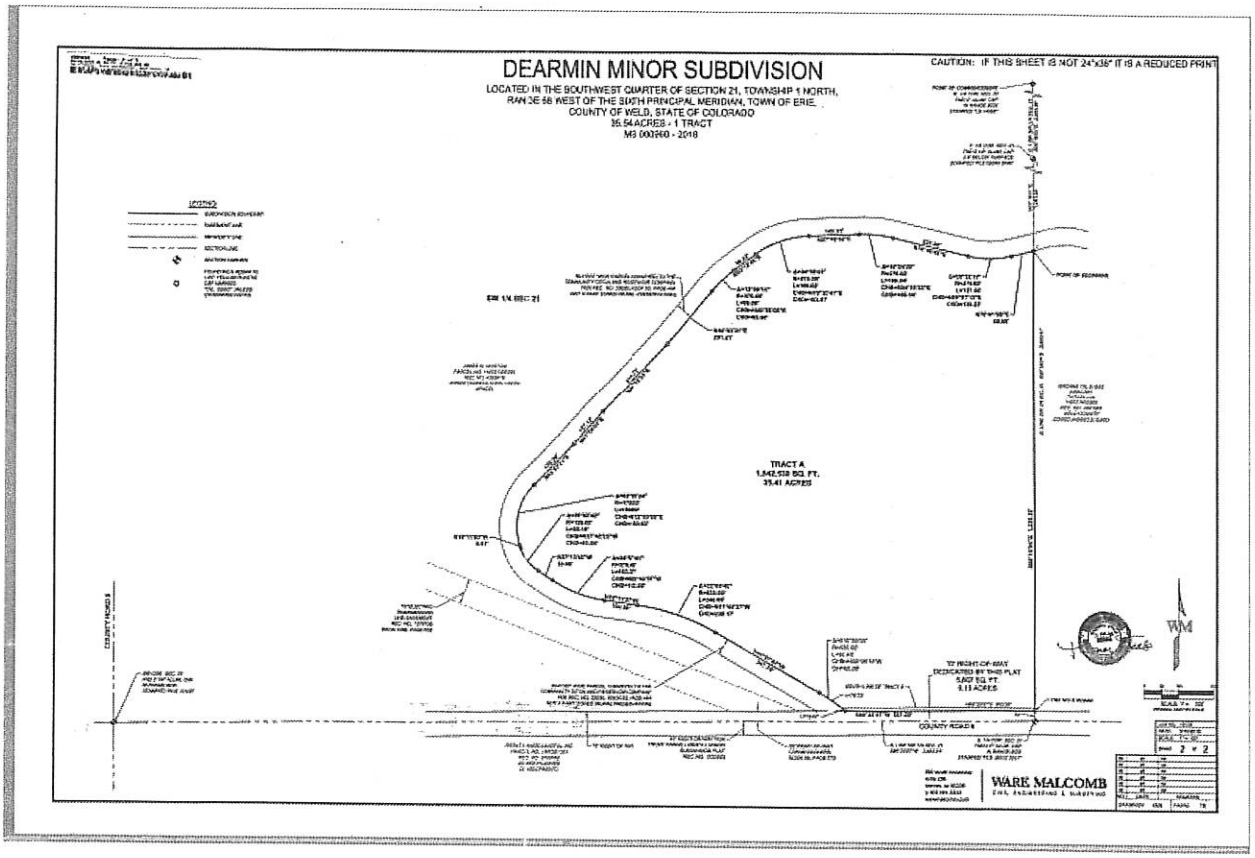
PROJECT:	DATE :	SHEET
ELEVATION	8/31/17	7 OF 7
JOB NO.: 14034	SCALE: N.A.	

LESS AND EXCEPT THE FOLLOWING DESCRIBED PARCEL OF LAND

Tract A, Dearmin Minor Subdivision, County of Weld, State of Colorado

ALSO DEPICTED AS:



[End of Exhibit A]

Erie Land Company, LLC
1225 17TH Street
Suite 2420
Denver, CO 80202
Phone: 303-888-3866

October, 2019

Town of Erie
Community Development Department
645 Holbrook Street
Erie, CO 80516

RE: ReZone, Westerly

To Whom It May Concern:

Erie Land Company, LLC ("Applicant") is pleased to submit the enclosed Rezone application for the property located at the southeast corner of Erie Parkway and Weld County Road 5. This project consists of a parcel with an area of approximately 266 acres that is located in the Town of Erie and is currently zoned NMU, LR and AG/OS, which is consistent with the Town Comprehensive Plan as well as this proposed PUD. The Re-Zone request is limited to adjusting the NMU and LR zoning areas to ensure that the zoning is consistent with the Preliminary Plat that is currently in process, the area within the Re-Zone request is approximately 225 acres because the approximately 41 acres of zoned Open Space is not changing with this request.

General Project Concept and Purpose of the Request

The General project concept is for the design of a walkable village at the northeast corner with a direct connection through the open space to the Neighborhood Park at the promontory towards the south and east property line. The vehicular circulation provides direct access through the community while leading to or terminating at the Neighborhood Park. Every resident is within a 5-minute walk to the Neighborhood Park, a Pocket Park and various connections to the pedestrian trail network.

The proposed plan anticipates approximately 900-915 homes on the approximately 266.6 acres, equating to a density of approximately 3.3 dwelling units per acre. As can be seen in the initial associated Preliminary Plat there is a diverse mix of residential home types being proposed for this community, ranging from Live Work, Townhomes, Paired Homes, and Single-Family homes, in a variety of alley load and front-loaded garage configurations. In addition, the Plan anticipates approximately 35,000 square feet of non-residential floor area in the Mixed-Use area.

The requested re-zoning is related to the change in the boundaries for the Neighborhood Mixed Use Area, the changes requested increase the size of the Mixed Use Area to correlate to the Initial Preliminary Plat.

Development Timeline

The project is likely to be constructed in multiple phases. The first phases will be centered around the northernmost proposed community amenity and NMU area and subsequent phases will be built to the south of that area. The timing of initial construction efforts is difficult to anticipate given the complexities of entitlements; however, if project entitlements can be completed towards the end of 2019 the development team is anxious to move forward with the construction of the initial phase of the community.

Relationship to Existing Land Uses

The Westerly property is bounded by WCR 5 on the west side, Erie Parkway to the north, the Swink property on the east, and the FRICO ditch on the south. WCR 5 and Erie Parkway provide significant boundaries to the adjacent properties. To the north is the Erie High School, to the west is the Erie Highlands master planned community, as well as a small out parcel that has Blake's Small Car Salvage. Homes in the Westerly community along both WCR5 and Erie Parkway will meet the required 30' landscape buffer setback to ensure compatibility. The adjacent Swink property to the east is currently being designed as an extension of the Westerly community. The southern boundary of the property includes a wide 300' minimum open space corridor to provide an appropriate buffer to the future Oil and Gas operations to the south of the Westerly community.

Comprehensive Plan and Approval Criteria

The Westerly plan is consistent with the Town of Erie Comprehensive Plan.

1. The Rezoning will promote the public health, safety, and general welfare;

    The Rezone proposal is a modest proposal to update the existing boundaries to coincide with the PUD and Preliminary Plat that are currently moving through the entitlement process. The Community design promotes public health, safety and general welfare by proposing standards that allow for the creation of a Complete community that can host a mix of uses that provide residents of Westerly the opportunity to live, work, play and interact. The highly connected street network makes Westerly walkable, drivable and bike-able. The provision of many sizes and types of open space common areas creates places for residents to be able to linger, interact with each other and live a healthy lifestyle for mind and body.

2. The Rezoning is consistent with the Town's Comprehensive Plan and the purposes of the Municipal Code, Title 10, Unified Development Code;

    The Rezone proposal is consistent with the Town's Comprehensive Plan and the purposes of the UDC, the modifications of the existing zoning boundaries are minor in nature.

3. Adequate facilities and services (including roads and transportation, water, gas, electric, police and fire protection, and sewage and waste disposal, as applicable) will be available to serve the subject property while maintaining adequate levels of service to existing development;

Adequate facilities and services will be available for the Westerly community.

4. The Rezoning is not likely to result in significant adverse impacts upon the natural environment, including air, water, noise, storm water management, wildlife, and vegetation, or such impacts will be substantially mitigated;

The Rezone proposal will not result in adverse impacts.

5. The Rezoning is not likely to result in significant adverse impacts upon other property in the vicinity of the subject property;

The Rezone proposal will not result in adverse impacts.

6. Future uses on the subject property will be compatible in scale with uses on other properties in the vicinity of the subject;

The Rezone proposal is compatible with the surrounding properties, again the proposal is for minor adjustments to the existing zoning boundaries.

Mineral Rights

A surface agreement has been executed with Anadarko and has been included with this Rezone submittal. This agreement assures that there are no future drilling sites located within this community.

Thank you for your consideration of the project and we look forward to reviewing the plans with the Town of Erie.

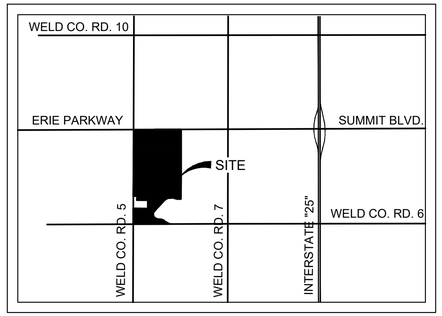
Sincerely,

Erie Land Company, LLC

Heidi Majerik
Vice President and General Manager

ALTA/NSPS LAND TITLE SURVEY

LOCATED IN THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO



VICINITY MAP
N.T.S.

LEGAL DESCRIPTION:

A PARCEL OF LAND LOCATED IN THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF THE NORTHWEST QUARTER OF SAID SECTION 21, AND CONSIDERING THE NORTHERLY LINE OF THE NORTHWEST QUARTER OF SAID OF SECTION 21 TO BEAR NORTH 89°38'17" EAST WITH ALL BEARINGS SHOWN HEREON RELATIVE THERETO; THENCE SOUTH 00°16'01" EAST ALONG THE EASTERLY LINE OF THE NORTHWEST QUARTER OF SAID SECTION 21 A DISTANCE OF 30.00 FEET TO A POINT ON THE SOUTHERLY RIGHT-OF-WAY LINE OF ERIE PARKWAY (WELD COUNTY ROAD 8) AS DESCRIBED IN COMMISSIONERS BOOK 5, PAGE 206 OF THE RECORDS OF THE WELD COUNTY COMMISSIONERS AND THE **POINT OF BEGINNING**;

THENCE CONTINUING ALONG SAID EASTERLY LINE OF THE NORTHWEST QUARTER OF SECTION 21 SOUTH 00°16'01" EAST A DISTANCE OF 2,619.90 FEET TO THE CENTER CORNER OF SAID SECTION 21;

THENCE SOUTH 00°16'04" EAST ALONG THE EASTERLY LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 21 A DISTANCE OF 1,229.70 FEET TO A POINT ON THE WESTERLY BOUNDARY OF THE COMMUNITY DITCH AS DESCRIBED IN BOOK 63, PAGE 464, RECEPTION NO. 23030 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDER;

THENCE ALONG SAID WESTERLY BOUNDARY OF THE COMMUNITY DITCH THE FOLLOWING TWENTY- ONE (21) COURSES:

1. THENCE SOUTH 76°41'08" WEST A DISTANCE OF 77.18 FEET TO A POINT OF CURVATURE;
2. THENCE ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 26°32'10", A RADIUS OF 225.00 FEET, AN ARC LENGTH OF 104.21 FEET AND A CHORD THAT BEARS SOUTH 89°57'13" WEST A DISTANCE OF 103.28 FEET;
3. THENCE NORTH 76°46'42" WEST A DISTANCE OF 223.90 FEET TO A POINT OF CURVATURE;
4. THENCE ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 15°24'26", A RADIUS OF 425.00 FEET, AN ARC LENGTH OF 114.29 FEET AND A CHORD THAT BEARS NORTH 84°28'55" WEST A DISTANCE OF 113.94 FEET;
5. THENCE SOUTH 87°48'52" WEST A DISTANCE OF 145.31 FEET TO A POINT OF CURVATURE;
6. THENCE ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 34°36'07", A RADIUS OF 325.00 FEET, AN ARC LENGTH OF 196.27 FEET AND A CHORD THAT BEARS SOUTH 70°30'47" WEST A DISTANCE OF 193.30 FEET;
7. THENCE SOUTH 53°12'44" WEST A DISTANCE OF 80.82 FEET TO A POINT OF CURVATURE;
8. THENCE ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 13°09'14", A RADIUS OF 425.00 FEET, AN ARC LENGTH OF 95.57 FEET AND A CHORD THAT BEARS SOUTH 46°38'08" WEST A DISTANCE OF 97.36 FEET;
9. THENCE SOUTH 40°03'31" WEST A DISTANCE OF 199.79 FEET;
10. THENCE SOUTH 43°18'24" WEST A DISTANCE OF 274.93 FEET;
11. THENCE SOUTH 41°54'01" WEST A DISTANCE OF 126.84 FEET;
12. THENCE SOUTH 43°57'21" WEST A DISTANCE OF 169.36 FEET TO A POINT OF CURVATURE;
13. THENCE ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 62°08'24", A RADIUS OF 225.00 FEET, AN ARC LENGTH OF 244.02 FEET AND A CHORD THAT BEARS SOUTH 12°53'09" WEST A DISTANCE OF 232.24 FEET;
14. THENCE SOUTH 18°11'03" EAST A DISTANCE OF 8.91 FEET TO A POINT OF CURVATURE;
15. THENCE ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 39°02'42", A RADIUS OF 175.00 FEET, AN ARC LENGTH OF 119.26 FEET AND A CHORD THAT BEARS SOUTH 37°42'25" EAST A DISTANCE OF 116.96 FEET;
16. THENCE SOUTH 57°13'46" EAST A DISTANCE OF 50.68 FEET TO A POINT OF CURVATURE;
17. THENCE ALONG A CURVE TO THE LEFT HAVING A CENTRAL ANGLE OF 24°57'41", A RADIUS OF 425.00 FEET, AN ARC LENGTH OF 185.15 FEET AND A CHORD THAT BEARS SOUTH 69°42'37" EAST A DISTANCE OF 183.69 FEET;
18. THENCE SOUTH 82°11'27" EAST A DISTANCE OF 100.58 FEET TO A POINT OF CURVATURE;
19. THENCE ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 22°03'40", A RADIUS OF 575.00 FEET, AN ARC LENGTH OF 221.40 FEET AND A CHORD THAT BEARS SOUTH 71°09'37" EAST A DISTANCE OF 220.03 FEET;
20. THENCE SOUTH 60°07'47" EAST A DISTANCE OF 347.74 FEET TO A POINT OF CURVATURE;
21. THENCE ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 02°24'14", A RADIUS OF 475.00 FEET, AN ARC LENGTH OF 19.93 FEET AND A CHORD THAT BEARS SOUTH 58°55'40" EAST A DISTANCE OF 19.93 FEET TO A POINT ON THE NORTHERLY RIGHT-OF-WAY LINE OF WELD COUNTY ROAD 6 AS DESCRIBED IN COMMISSIONERS BOOK 86, PAGE 273 OF THE RECORDS OF THE WELD COUNTY COMMISSIONERS;

THENCE SOUTH 89°25'57" WEST ALONG SAID NORTHERLY RIGHT-OF-WAY LINE A DISTANCE OF 2,019.11 TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF WELD COUNTY ROAD 5 AS DESCRIBED IN COMMISSIONERS BOOK 86, PAGE 273 OF THE RECORDS OF THE WELD COUNTY COMMISSIONERS;

THENCE NORTH 00°06'17" WEST ALONG SAID EASTERLY RIGHT-OF-WAY LINE A DISTANCE OF 874.06 TO A POINT ON THE BOUNDARY OF THAT PARCEL OF LAND DESCRIBED AT RECEPTION NO. 2978817 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDER;

THENCE ALONG SAID BOUNDARY THE FOLLOWING FIVE (5) COURSES:

1. THENCE NORTH 89°53'43" EAST A DISTANCE OF 807.64 FEET;
2. THENCE NORTH 00°06'17" WEST A DISTANCE OF 457.00 FEET;
3. THENCE SOUTH 89°53'43" WEST A DISTANCE OF 608.07 FEET;
4. THENCE NORTH 00°06'17" WEST A DISTANCE OF 230.00 FEET;
5. THENCE SOUTH 89°53'43" WEST A DISTANCE OF 199.57 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF SAID WELD COUNTY ROAD 5;

THENCE ALONG SAID EASTERLY RIGHT-OF-WAY LINE THE FOLLOWING TWO (2) COURSES:

1. THENCE NORTH 00°06'17" WEST A DISTANCE OF 1,064.19 FEET;
2. THENCE NORTH 00°00'31" EAST A DISTANCE OF 1,574.75 FEET TO A POINT ON THE EASTERLY RIGHT-OF-WAY LINE OF WELD COUNTY ROAD 5 AS DESCRIBED IN THE DEEDS RECORDED AT RECEPTION NO. 3338310 AND RECEPTION NO. 3338311 OF THE WELD COUNTY CLERK AND RECORDER;

THENCE SOUTH 89°59'29" EAST A DISTANCE OF 30.00 FEET TO A POINT ON THE VACATED RIGHT-OF-WAY RECORDED AT RECEPTION NO.4506864 OF THE WELD COUNTY CLERK AND RECORDER;

THENCE ALONG SAID RIGHT-OF-WAY VACATION THE FOLLOWING FOUR (4) COURSES:

1. THENCE NORTH 00°00'31" EAST A DISTANCE OF 990.23 FEET TO A POINT OF CURVATURE;
2. THENCE ALONG A CURVE TO THE RIGHT HAVING A CENTRAL ANGLE OF 89°37'46", A RADIUS OF 20.00 FEET. AN ARC LENGTH OF 31.29 FEET AND A CHORD THAT BEARS NORTH 44°49'24" EAST A DISTANCE OF 28.19 FEET;
3. THENCE NORTH 89°38'17" EAST A DISTANCE OF 1,116.48 FEET TO THE EASTERLY LINE OF ERIE PARKWAY AS DESCRIBED IN RECEPTION NO. 33338310;
4. THENCE NORTH 00°21'43" WEST, ALONG SAID EASTERLY LINE, A DISTANCE OF 40.00 FEET TO A POINT ON SAID SOUTHERLY RIGHT-OF-WAY LINE OF ERIE PARKWAY (WELD COUNTY ROAD 8) AS DESCRIBED IN COMMISSIONERS BOOK 5, PAGE 205 OF THE RECORDS OF THE WELD COUNTY COMMISSIONERS;

THENCE NORTH 89°38'17" EAST ALONG SAID SOUTHERLY RIGHT-OF-WAY LINE A DISTANCE OF 1,467.60 FEET TO THE **POINT OF BEGINNING**.

TITLE COMMITMENT:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY MATRIX DESIGN GROUP, INC., TO DETERMINE THE COMPATIBILITY OF THIS DESCRIPTION WITH THAT OF ADJACENT TRACTS OF LAND, OWNERSHIP OR EASEMENTS OF RECORD. FOR ALL INFORMATION REGARDING EASEMENTS, RIGHTS-OF-WAY OR TITLE OF RECORD, MATRIX DESIGN GROUP INC., RELIED UPON TITLE COMMITMENT NO. 100-N00178170-010-T02, AMENDMENT NO.4 PREPARED BY FIDELITY NATIONAL TITLE GROUP WITH AN EFFECTIVE DATE OF AUGUST 15, 2019 AT 7:00 A.M. ALL SCHEDULE B, EXCEPTIONS THAT ARE GRAPHICALLY PLOTTABLE ARE DEPICTED ON HEREON.

8.A. RESERVATIONS BY THE UNION PACIFIC RAILROAD COMPANY OF (L) OIL, COAL AND OTHER MINERALS UNDERLYING THE LAND, (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 AUGUST 11, 1911 IN BOOK 320 AT PAGE 61, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN (SECTION 21).

8.B. THE EFFECT OF RELEASE AND QUITCLAIM DEED RECORDED DECEMBER 17, 1998 AT RECEPTION NO. 2661201.

8.C. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT BY RME PETROLEUM COMPANY AND RME LAND CORP. (FKA UNION PACIFIC RESOURCES COMPANY AND UNION PACIFIC LAND RESOURCES) RECORDED FEBRUARY 28, 2002 AT RECEPTION NO. 2954716. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS AND COMPLETELY ENCOMPASSES THE SUBJECT PROPERTY).*

9. AN EASEMENT FOR ELECTRICAL FACILITIES AND INCIDENTAL PURPOSES GRANTED TO UNION RURAL ELECTRIC ASSOCIATION, INC. BY THE INSTRUMENT RECORDED FEBRUARY 2, 1970 IN BOOK 620 AT RECEPTION NO. 1542146. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTION CITED IN THIS DOCUMENT DOES NOT ENCUMBER THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN AND IDENTIFIED HEREON).*

10. AN EASEMENT FOR ELECTRIC TRANSMISSION LINES AND INCIDENTAL PURPOSES GRANTED TO THE UNITED STATES OF AMERICA BY THE INSTRUMENT RECORDED APRIL 5, 1958 IN BOOK 1266 AT PAGE 552. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTION CITED IN THIS DOCUMENT ENCUMBERS A PORTION OF THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN AND IDENTIFIED HEREON).*

11. AN EASEMENT FOR COMMUNICATION AND OTHER FACILITIES AND INCIDENTAL PURPOSES GRANTED TO MOUNTAIN STATES TELEPHONE AND TELEGRAPH COMPANY BY THE INSTRUMENT RECORDED MAY 7, 1930 IN BOOK 894 AT PAGE 390. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THIS DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS ALL OF THE SUBJECT PROPERTY WITH THE EXCEPTION OF THE WEST ONE-HALF OF THE WEST HALF - SEE PAGE 3).*

12. TERMS, CONDITIONS, PROVISIONS, AGREEMENTS AND OBLIGATIONS SPECIFIED UNDER THE AGREEMENT BY AND BETWEEN THE BOULDER VALLEY COAL COMPANY AND UNION PACIFIC RAILROAD COMPANY AND JOHN J. KIRBY AND JOSEPH M. KIRBY AND ESTHER R. KIRBY (THE THEN OWNERS OF SAID PROPERTY) RECORDED APRIL 30, 1931 IN BOOK 913 AT PAGE 86. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THIS DOCUMENT DESCRIBES A PARCEL OF LAND THAT ENCUMBERS THAT PORTION OF THE SUBJECT PROPERTY LYING IN THE WEST ONE-HALF OF THE WEST ONE-HALF OF SECTION 21- SEE PAGE 3).*

13. ALL OIL, GAS AND ASSOCIATED LIQUID HYDROCARBONS AS GRANTED TO CHAMPLIN PETROLEUM COMPANY BY MINERAL DEED RECORDED NOVEMBER 30, 1972 IN BOOK 681 AT RECEPTION NO. 1602712, AND THE TERMS AND CONDITIONS CONTAINED THEREIN, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTEREST THEREIN. (NW 1/4, EXCEPT COMMUNITY DITCH RIGHT OF WAY OF SECTION 21). *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THIS DOCUMENT DESCRIBES A PARCEL OF LAND THAT ENCUMBERS THAT PORTION OF THE SUBJECT PROPERTY LYING IN THE NORTH ONE-HALF OF THE SOUTHWEST ONE-QUARTER OF SECTION 21- SEE PAGE 3).*

14.A. TERMS, AGREEMENTS, PROVISIONS, CONDITIONS AND OBLIGATIONS OF A OIL AND GAS LEASE, EXECUTED BY AMOCO PRODUCTION COMPANY, AS LESSEE(S), RECORDED NOVEMBER 30, 1972 IN BOOK 681 AT RECEPTION NO. 1602713, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THIS DOCUMENT DESCRIBES A PARCEL OF LAND THAT ENCUMBERS THAT PORTION OF THE SUBJECT PROPERTY LYING IN THE NORTH ONE-HALF OF THE SOUTHWEST ONE-QUARTER OF SECTION 21- SEE PAGE 3).*

14.B. NOTICE OF OIL AND GAS INTEREST AND SURFACE USE RECORDED DECEMBER 7, 2000 AT RECEPTION NO. 2811876 IN CONNECTION WITH THE ABOVE LEASE. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTION CITED IN THIS DOCUMENT ENCUMBERS A PORTION OF THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN AND IDENTIFIED HEREON).*

14.C. RECORDING SUPPLEMENT TO OPERATING AGREEMENT AND FINANCING STATEMENT BY ENCANA OIL & GAS INC. AND NON-OPERATOR PARTIES ALL AS SET FORTH IN SAID INSTRUMENT AS RECORDED JUNE 22, 2015 AT RECEPTION NO, 4117884, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THIS DOCUMENT DESCRIBES A PARCEL OF LAND THAT ENCUMBERS THAT PORTION OF THE SUBJECT PROPERTY LYING IN THE WEST ONE-HALF OF THE SOUTHWEST ONE-QUARTER OF SECTION 21- SEE PAGE 3).*

14.D. RECORDING SUPPLEMENT TO OPERATING AGREEMENT AND FINANCING STATEMENT BY ENCANA OIL & GAS INC. AND NON-OPERATOR PARTIES ALL AS SET FORTH IN SAID INSTRUMENT AS RECORDED JUNE 22, 2015 AT RECEPTION NO, 4117885, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THIS DOCUMENT DESCRIBES A PARCEL OF LAND THAT ENCUMBERS THAT PORTION OF THE SUBJECT PROPERTY LYING IN THE SOUTHWEST ONE-QUARTER OF THE SOUTHWEST ONE-QUARTER OF SECTION 21- SEE PAGE 3).*

14.E. DECLARATIONS OF POOLING RECORDED JULY 29, 2019 AT RECEPTION NO. 4509251 AND JULY 29, 2019 AT RECEPTION NO. 4509252 (*SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THIS DOCUMENT DESCRIBES A PARCEL OF LAND THAT ENCUMBERS THAT PORTION OF THE SUBJECT PROPERTY LYING IN THE SOUTH ONE-HALF OF THE NORTH WEST ONE-QUARTER OF SECTION 21 - SEE PAGE 3*)

15.A. TERMS, CONDITIONS, PROVISIONS, AGREEMENTS AND OBLIGATIONS SPECIFIED UNDER THE SURFACE OWNER'S AGREEMENT BY AND BETWEEN PATRICIA S. ACKARD AND CHAMPLIN PETROLEUM COMPANY RECORDED JULY 10, 1974 IN BOOK 178 AT RECEPTION NO. 1640298. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THIS DOCUMENT DESCRIBES A PARCEL OF LAND THAT ENCUMBERS THAT PORTION OF THE SUBJECT PROPERTY LYING IN THE EAST ONE-HALF OF THE WEST ONE-HALF OF SECTION 21 - SEE PAGE 3).*

15.B. REQUEST FOR NOTIFICATION (MINERAL ESTATE OWNER) AS RECORDED DECEMBER 21, 2007 AT RECEPTION NO. 3525268. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS AND COMPLETELY ENCOMPASSES THE SUBJECT PROPERTY- SEE PAGE 3).*

15.C. ASSIGNMENT OF ROYALTY (QUIT CLAIM) RECORDED SEPTEMBER 7, 2016 AT RECEPTION NO. 4234417. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS AND COMPLETELY ENCOMPASSES THE SUBJECT PROPERTY).*

16. AN EASEMENT FOR COMMUNICATION AND OTHER FACILITIES AND INCIDENTAL PURPOSES GRANTED TO MOUNTAIN STATES TELEPHONE AND TELEGRAPH COMPANY BY THE INSTRUMENT RECORDED JANUARY 5, 1987 IN BOOK 1141 AT RECEPTION NO. 2083323. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTION CITED IN THIS DOCUMENT ENCUMBERS A PORTION OF THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN AND IDENTIFIED HEREON).*

17. TERMS, CONDITIONS, PROVISIONS, AGREEMENTS AND OBLIGATIONS SPECIFIED UNDER THE AMENDED SPECIAL USE AGREEMENT BY AND BETWEEN THE TOWN OF ERIE AND DANIEL R. HORST RECORDED MAY 1, 1990 IN BOOK 1262 AT RECEPTION NO. 2212313. *(SURVEYOR'S NOTE: THIS DOCUMENT APPEARS TO AFFECT THE SUBJECT PROPERTY, HOWEVER, EXHIBIT "A" OF THE DOCUMENT WHICH IS APPARENTLY INTENDED TO DESCRIBE THE DOCUMENT'S SUBJECT PROPERTY IS REFERENCED BUT NOT CONTAINED WITHIN THE DOCUMENT).*

18. THE EFFECT OF THE COMMUNITZATION AGREEMENT AS RECORDED NOVEMBER 21, 2008 AT RECEPTION NO. 3591158. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THIS DOCUMENT DESCRIBES A PARCEL OF LAND THAT ENCUMBERS THAT PORTION OF THE SUBJECT PROPERTY LYING IN THE NORTH ONE-HALF OF THE NORTHWEST ONE-QUARTER OF SECTION 21 - SEE PAGE 3).*

19. NOTICE OF PIPELINE LOCATION BY KERR-MCGEE OIL & GAS ONSHORE LP AS RECORDED DECEMBER 11, 2007 AT RECEPTION NO. 3522838. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTION CITED IN THIS DOCUMENT DOES NOT ENCUMBER THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN AND IDENTIFIED HEREON).*

20. TERMS, CONDITIONS, PROVISIONS, AGREEMENTS AND OBLIGATIONS CONTAINED IN THE AGREEMENT FOR SETTLEMENT OF SURFACE DAMAGES AND GRANT OF RIGHTS AND WAIVERS AS SET FORTH BELOW: RECORDING DATE: DECEMBER 6, 2017 RECORDING NO. :RECEPTION NO. 4358124. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTION CITED IN THIS DOCUMENT DOES NOT ENCUMBER THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN AND IDENTIFIED HEREON).*

21. WASTE INDUSTRY RESTRICTIONS CONTAINED IN SPECIAL WARRANTY DEEDS RECORDED DECEMBER 22, 2017 AT RECEPTION NO. 4362618 AND RECEPTION NO. 4362619 *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS AND COMPLETELY ENCOMPASSES THE SUBJECT PROPERTY).*

22. *RIGHT OF WAY GRANT TO KERR-MC GEE GATHERING LLC A COLORADO LIMITED LIABILITY COMPANY AS RECORDED SEPTEMBER 4, 2018 AT RECEPTION N O. 4428219. (SURVEYOR'S NOTE: THE LEGAL DESCRIPTION CITED IN THIS DOCUMENT ENCUMBERS A PORTION OF THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN AND IDENTIFIED HEREON).*

23. *RIGHT OF WAY GRANT TO KERR-MC GEE GATHERING LLC A COLORADO LIMITED LIABILITY COMPANY AS RECORDED SEPTEMBER 4, 2018 AT RECEPTION N O. 4428218. (SURVEYOR'S NOTE: THE LEGAL DESCRIPTION CITED IN THIS DOCUMENT ENCUMBERS A PORTION OF THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN AND IDENTIFIED HEREON).*

24. *RELINQUISHMENT UNTO ERIE LAND COMPANY BY KERR-MC GEE GATHERING LLC, KERR MCGEE OIL & GAS OFFSHORE LP AND ANADARKOLAND CORP AND ANADARKO E&P ONSHORE LLC AS RECORDED SEPTEMBER 4, 2018 AT RECEPTION N O. 4428217.(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS AND COMPLETELY ENCOMPASSES THE SUBJECT PROPERTY).*

TITLE COMMITMENT CONT.:

25. TERMS, CONDITIONS, PROVISIONS, AGREEMENTS AND OBLIGATIONS CONTAINED IN THE SET BACK WAIVER AS RECORDED SEPTEMBER 4, 2018 AT RECEPTION N O. 4428213. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS AND COMPLETELY ENCOMPASSES THE SUBJECT PROPERTY).*

26. NOTES AND EASEMENTS AS SET FORTH ON THE RECORDED PLAT FOR DEARMIN MINOR SUBDIVISION AS RECORDED JUNE 6, 2018 AT RECEPTION NO. 4405019. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTION CITED IN THIS DOCUMENT DOES NOT ENCUMBER THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN AND IDENTIFIED HEREON).*

27. TERMS, CONDITIONS, PROVISIONS, AGREEMENTS AND OBLIGATIONS CONTAINED IN THE MODEL FORM RECORDING SUPPLEMENT TO OPERATING AGREEMENT AND FINANCING STATEMENT AS RECORDED OCTOBER 9, 2018 AT RECEPTION NO. 4437212. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS AND COMPLETELY ENCOMPASSES THE SUBJECT PROPERTY).*

28. TERMS, CONDITIONS, PROVISIONS, AGREEMENTS AND OBLIGATIONS CONTAINED IN THE MEMORANDUM OF AGREEMENT AS RECORDED OCTOBER 12, 2018 AT RECEPTION NO. 4438250 AND AT RECEPTION NO. 4438252. *(SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS AND COMPLETELY ENCOMPASSES THE SUBJECT PROPERTY).*

29. THOSE MATTERS SET FORTH AND SHOWN ON THE DEARMIN ZONING MAP RECORDED DECEMBER 19, 2018 AT RECEPTION NO. 4454695 (*SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS AND COMPLETELY ENCOMPASSES THE SUBJECT PROPERTY*).

30. EASEMENT FOR PIPELINES GRANTED TO KERR-MCGEE GATHERING LLC AS CONTAINED IN EXCLUSIVE RIGHT-OF-WAY GRANT RECORDED JANUARY 11, 2019 AT RECEPTION NO. 4459419 (*SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN HEREON*).

31. EASEMENT FOR PIPELINES GRANTED TO KERR-MCGEE GATHERING LLC AS CONTAINED IN EXCLUSIVE RIGHT-OF-WAY GRANT RECORDED JANUARY 11, 2019 AT RECEPTION NO. 4459420 (*SURVEYOR'S NOTE: THE LEGAL DESCRIPTIONS CITED IN THESE DOCUMENTS DESCRIBE A PARCEL OF LAND THAT ENCUMBERS THE SUBJECT PROPERTY AND IS GRAPHICALLY SHOWN HEREON*).

GENERAL NOTES:

1. THE BASIS OF BEARINGS FOR THIS MAP IS THE WEST LINE OF THE NORTHWEST ONE-QUARTER OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN BEING MONUMENTED ON THE NORTH END BY A FOUND 2-1/2 INCH ALUMINUM CAP WITHIN A MONUMENT CASING STAMPED WITH THE APPROPRIATE TEXT AND SYMBOLOGY FOR THE NORTHWEST CORNER OF SECTION 21 AND "LS 23501" AND MONUMENTED ON THE SOUTH END BY A FOUND 3-1/4 INCH ALUMINUM CAP WITHIN A MONUMENT CASING STAMPED WITH THE APPROPRIATE TEXT AND SYMBOLOGY FOR THE WEST ONE-QUARTER CORNER OF SECTION 21 AND "PLS 26606" BEARING NORTH 00°00'31 EAST A DISTANCE OF 2654.72 FEET BETWEEN SAID MONUMENTS.
2. NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST 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.
3. AT THE TIME OF THE SURVEY THERE WAS NO EVIDENCE OF RECENT EARTH MOVING WORK OR SIGNS OF CONSTRUCTION ACTIVITY.
4. PROPERTY ADDRESS PER PUBLIC RECORD: NOT ASSIGNED VACANT PROPERTY. TAX SCHEDULE NUMBER OF PROPERTY AFFECTED AT THE TIME OF SURVEY: 146721301002 AND 146721000030
5. THE PROPERTY IS LOCATED WITHIN ZONE X (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN). OBTAINED FROM THE FLOOD INSURANCE RATE MAP (FIRM), MAP NUMBER 08013C0583J, EFFECTIVE DECEMBER 18, 2012.
6. THE 50 FOOT WIDE STRIP ENCOMPASSING THE PHYSICAL COMMUNITY DITCH WAS DESCRIBED BOOK 63 PAGE 464 AS A CONTINUOUS DITCH MEANDERING THROUGH SECTION 21 WITH NO SPECIFIC LOCATION PROVIDED. IT IS APPARENT THAT AN UNRECORDED SURVEY OF THE WEST ONE-HALF OF SECTION 21 PERFORMED BY CVL CONSULTANTS (PLS 35593) AND LATER RETRACED ON MAP REFERENCE 4 SURVEYED THE APPROXIMATE PHYSICAL CENTERLINE OF THE DITCH AND DOCUMENTED THE 50 FOOT WIDE STRIP SURVEY BY CITING SPECIFIC BEARINGS AND DISTANCES AND SETTING SURVEY MONUMENTS IN THE FIELD. SUBSEQUENT TO THE UNRECORDED SURVEY AND APPARENTLY WITHOUT KNOWLEDGE OF THE PRIOR SURVEY'S EXISTENCE, THE AUTHORS OF MAP REFERENCE 3 AND LATER 5 PERFORMED A SIMILAR MONUMENTED PROCEDURE IN THE EAST ONE-HALF OF SECTION 21. THIS INTERPRETATION OF THE DITCH IN THE EAST ONE-HALF OF SECTION 21 DIFFERS FROM THE ONE PERFORMED IN THE WEST ONE-HALF OF SECTION 21 BY APPROXIMATELY 6 FEET PRODUCING A 5.89 FOOT JOG AT THE NORTH-SOUTH CENTER SECTION LINE. THE SURVEY PERFORMED HERON DOCUMENTS AND ACCEPTS THIS JOG AT THE NORTH-SOUTH CENTERLINE OF SECTION 21.
7. THE SUBJECT PROPERTY DESCRIPTION YIELDS A CALCULATED AREA OF 11,615,748 SQ. FT. (266.66089 ACRES) MORE OR LESS.

SURVEYOR'S CERTIFICATION:

TO ERIE LAND COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY AND COMMONWEALTH LAND TITLE INSURANCE COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 3, 4, 8, 13, AND 17 OF TABLE A THEREOF.

THE FIELD WORK WAS COMPLETED IN SEPTEMBER 2018.

COLORADO LICENSED
ROBERT LEE MEADOWS JR.
34977
8/23/19
PROFESSIONAL LAND SURVEYOR

ROBERT L. MEADOWS JR., PLS 34977

FOR AND ON BEHALF OF
MATRIX DESIGN GROUP, INC.
2435 RESEARCH PARKWAY
COLORADO SPRINGS, CO. 80920

ALTA / NSPS LAND SURVEY DEPOSITING CERTIFICATE:

DEPOSITED THIS _____ DAY OF _____, 2017 A.D. AT _____ O'CLOCK ____M., IN BOOK _____ OF THE COUNTY SURVEY'S LAND SURVEY PLATS/RIGHT OF WAY SURVEYS AT PAGE _____, RECORDS OF WELD COUNTY, COLORADO.

RECEPTION NUMBER:_____

SHEET INDEX

PREPARED BY:
Matrix DESIGN GROUP
AN EMPLOYEE-OWNED COMPANY

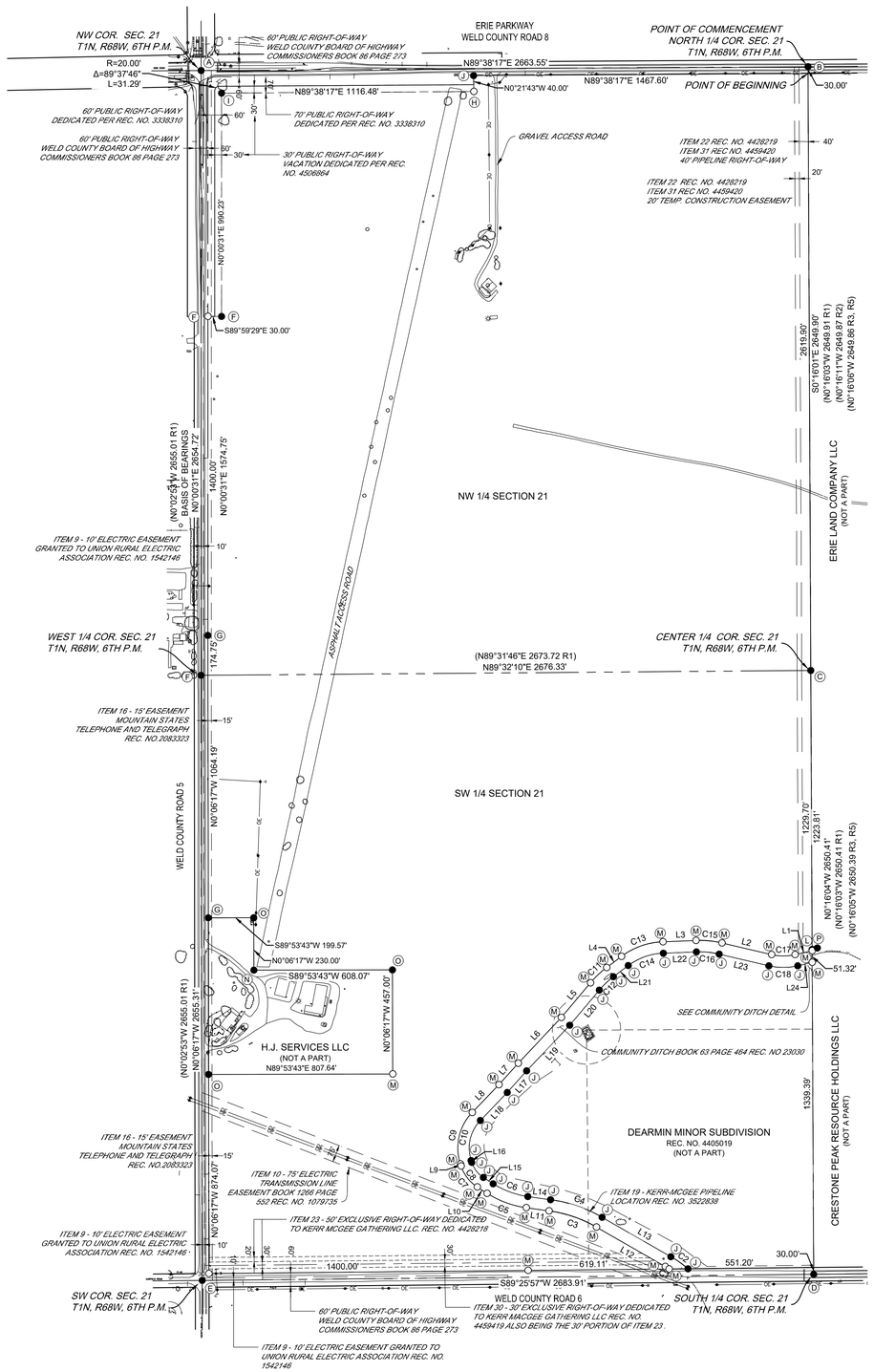
ALTA/NSPS LAND TITLE SURVEY
LOCATED IN THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO

DRAWN BY: RLM
CHECKED BY: RLM
SCALE: 1" = NA
DATE ISSUED: AUG 22, 2019
SHEET 1 OF 3 SHEETS

\\poseidon\Projects\18.994.001 (Dearmin Swink)\Survey\Dwg\ALTA\02 DEARMIN ALTA.dwg

ALTA/NSPS LAND TITLE SURVEY

LOCATED IN THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO



MAP REFERENCE LEGEND

THE FOLLOWING RECORDED DOCUMENTS WERE CONSIDERED IN DEVELOPING THE BOUNDARY DEPICTED ON THIS MAP:

R1 AN ALTA LAND TITLE SURVEY DEPOSITED FOR RECORD ON AUGUST 3, 2006 IN THE WELD COUNTY CLERK AND RECORDER'S OFFICE UNDER RECEPTION NUMBER 3408839.

R2 AN ALTA LAND TITLE SURVEY DEPOSITED FOR RECORD ON JANUARY 29, 2009 IN THE WELD COUNTY CLERK AND RECORDER'S OFFICE UNDER RECEPTION NUMBER 3602215.

R3 AN ALTA LAND TITLE SURVEY DEPOSITED FOR RECORD ON MAY 5, 2014 IN THE WELD COUNTY CLERK AND RECORDER'S OFFICE UNDER RECEPTION NUMBER 4015551.

R4 AN ALTA LAND TITLE SURVEY DEPOSITED FOR RECORD ON SEPTEMBER 3, 2014 IN THE WELD COUNTY CLERK AND RECORDER'S OFFICE UNDER RECEPTION NUMBER 4043099.

R5 AN ALTA LAND TITLE SURVEY DEPOSITED FOR RECORD ON OCTOBER 25, 2017 IN THE WELD COUNTY CLERK AND RECORDER'S OFFICE UNDER RECEPTION NUMBER 4346911.

R6 THE FINAL PLAT OF DEARMIN MINOR SUBDIVISION RECORDED JUNE 6, 2018 IN THE WELD COUNTY CLERK AND RECORDER'S OFFICE UNDER RECEPTION NUMBER 4405019.

MONUMENTATION LEGEND

A - INDICATES A FOUND REBAR WITH 2-1/2 INCH ALUMINUM CAP APPROPRIATELY STAMPED WITH SYMBOLOGY FOR THE NORTHWEST CORNER OF SECTION 21 AND "POWERS ELEVATION COMPANY 1993 PLS 23501" ENCASED IN A STANDARD MONUMENT WELL PER MAP REFERENCES R1 AND R4.

B - INDICATES A FOUND REBAR WITH 2 INCH ALUMINUM CAP ILLEGIBLY STAMPED ENCASED IN A STANDARD MONUMENT WELL PER MAP REFERENCES R1, R2, R3, R4, R5 AND R6.

C - INDICATES A FOUND 6/8 INCH REBAR WITH 2-1/2 INCH ALUMINUM CAP STAMPED "2006 - C 1/4 - S21 - T1N R68 W - PLS 28286" PER MAP REFERENCES R1, R2, R3, R4, R5 AND R6.

D - INDICATES A FOUND REBAR WITH 2-1/2 INCH ALUMINUM CAP APPROPRIATELY STAMPED WITH SYMBOLOGY FOR THE SOUTH ONE-QUARTER CORNER OF SECTION 21 AND " 2017 PLS 38512" ENCASED IN A STANDARD MONUMENT WELL MAP REFERENCE R6.

E - INDICATES A FOUND REBAR WITH 3-1/4 INCH ALUMINUM CAP APPROPRIATELY STAMPED WITH SYMBOLOGY FOR THE SOUTHWEST CORNER OF SECTION 21 AND "1998 LS 13155" ENCASED IN A STANDARD MONUMENT WELL PER MAP REFERENCES R1, R4 AND R6.

F - INDICATES A FOUND 6/8 INCH REBAR WITH 3-1/4 INCH ALUMINUM CAP APPROPRIATELY STAMPED WITH SYMBOLOGY FOR THE WEST ONE-QUARTER CORNER OF SECTION 21 AND "2006 VIGIL LAND CONSULTANTS PLS 26606 ENCASED IN A STANDARD MONUMENT WELL PER MAP REFERENCE R4.

G - INDICATES A FOUND 4/8 INCH REBAR WITH 1 INCH YELLOW PLASTIC CAP STAMPED "PLS 25965" PER MAP REFERENCE R4.

H - INDICATES A FOUND 4/8 INCH REBAR VISIBLY DISTURBED. ACCEPTED AS REMAINS OF MONUMENT PER MAP REFERENCE R4 REPLACED WITH A 5/8 INCH REBAR WITH 1-1/2 INCH ALUMINUM CAP STAMPED "MATRIX PLS 34977".

I - INDICATES A FOUND 5/8 INCH REBAR. ACCEPTED AS REMAINS OF MONUMENT PER MAP REFERENCE R4 REPLACED MISSING PLASTIC CAP WITH A 1-1/2 INCH ALUMINUM CAP STAMPED "MATRIX PLS 34977".

J - INDICATES A FOUND 5/8 INCH REBAR WITH 1-1/4 INCH YELLOW PLASTIC CAP STAMPED "CVL LS 35593" PER MAP REFERENCE R4.

K - INDICATES A FOUND 5/8 INCH REBAR WITH 1-1/4 INCH YELLOW PLASTIC CAP STAMPED "PLS 38257" PER MAP REFERENCE R3, R4 AND R5.

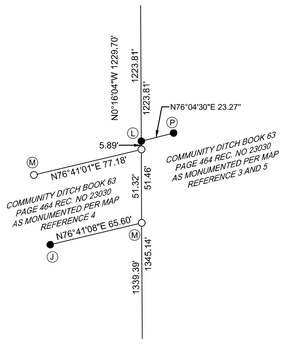
L - INDICATES A FOUND 5/8 INCH REBAR. ACCEPTED AS REMAINS OF MONUMENT PER MAP REFERENCE R5.

M - INDICATES A FOUND 5/8 INCH REBAR VISIBLY DISTURBED. ACCEPTED AS REMAINS OF MONUMENT PER MAP REFERENCE R4 REPLACED WITH A 5/8 INCH REBAR WITH 1-1/2 INCH ALUMINUM CAP STAMPED "MATRIX PLS 34977".

N - INDICATES A FOUND 5/8 INCH REBAR. ACCEPTED AS REMAINS OF MONUMENT PER MAP REFERENCE R4 REPLACED MISSING PLASTIC CAP WITH A 1-1/2 INCH ALUMINUM CAP STAMPED "MATRIX PLS 34977".

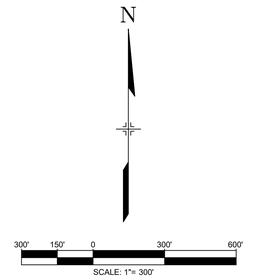
O - INDICATES A FOUND 5/8 INCH REBAR WITH 1-1/4 INCH YELLOW PLASTIC CAP ILLEGIBLY STAMPED. ACCEPTED AS REMAINS OF MONUMENT PER MAP REFERENCE R4.

P - INDICATES A FOUND 5/8 INCH REBAR. ACCEPTED AS REMAINS OF MONUMENT PER MAP REFERENCE R5.



COMMUNITY DITCH DETAIL 1" = 50'

SEE NOTE 6 ON SHEET 1



● INDICATES A FOUND MONUMENT DESCRIBED WITHIN THE MONUMENTATION LEGEND

○ INDICATES A SET NO. 5 REBAR WITH 1-1/2" ALUMINUM CAP STAMPED "MATRIX PLS 34977"

SYMBOL LEGEND FROM AERIAL SURVEY

FENCE	RAILROAD LIGHT
POLE	RAILROAD SWITCH
POST	POLE ANCHOR
SIGN	MANHOLE
2-POST SIGN	ELECTRIC BOX
TREE	POWER POLE
WALL	TRAFFIC LIGHT
CONCRETE GUARD RAIL	LIGHT POLE
GUARD RAIL	STORM INLET
MONITORING WELL	WATER VALVE

CURVE TABLE					
CURVE	DELTA	RADIUS	LENGTH	CHORD BEARING	CHORD LENGTH
C1	2°24'14"	475.00'	19.93'	N58°55'40"W	19.93'
C2	10°05'03"	525.00'	92.40'	N55°05'16"W	92.28'
C3	22°03'40"	575.00'	221.40'	N71°09'37"W	220.03'
C4	22°03'40"	625.00'	240.65'	N71°09'37"W	239.17'
C5	24°57'41"	425.00'	185.15'	S69°42'37"E	183.69'
C6	24°57'41"	375.00'	163.37'	S69°42'37"E	162.08'
C7	39°02'42"	175.00'	119.26'	S37°42'25"E	116.96'
C8	39°02'42"	125.00'	85.18'	S37°42'25"E	83.54'
C9	62°08'24"	225.00'	244.02'	S12°53'09"W	232.24'
C10	62°08'24"	175.00'	189.80'	S12°53'09"W	180.63'
C11	13°09'14"	425.00'	97.57'	S46°38'08"W	97.36'
C12	13°09'14"	375.00'	86.09'	S46°38'08"W	85.90'
C13	34°36'07"	325.00'	196.27'	S70°30'47"W	193.30'
C14	34°36'07"	275.00'	166.08'	S70°30'47"W	163.57'
C15	15°24'26"	425.00'	114.29'	N84°28'55"W	113.94'
C16	15°24'26"	375.00'	100.84'	N84°28'55"W	100.54'
C17	26°32'10"	225.00'	104.21'	N89°57'13"E	103.28'

LINE TABLE		
LINE	BEARING	LENGTH
L1	S76°41'08"W	77.18'
L2	N76°46'42"W	223.90'
L3	S87°48'52"W	145.31'
L4	S53°12'44"W	80.82'
L5	S40°03'31"W	199.79'
L6	S43°18'24"W	274.93'
L7	S41°54'01"W	126.84'
L8	S43°57'21"W	169.36'
L9	S18°11'03"E	8.91'
L10	S57°13'46"E	50.68'
L11	S82°11'27"E	100.58'
L12	S60°07'47"E	347.74'

LINE TABLE		
LINE	BEARING	LENGTH
L13	N60°07'47"W	347.74'
L14	N82°11'27"W	100.58'
L15	N57°13'46"W	50.68'
L16	N18°11'03"W	8.91'
L17	N41°54'01"E	127.12'
L18	N43°57'21"E	170.26'
L19	N43°18'24"E	275.73'
L20	N40°03'31"E	201.21'
L21	N53°12'44"E	80.82'
L22	N87°48'52"E	145.31'
L23	S76°46'42"E	223.90'
L24	N76°41'08"E	65.60'

PREPARED BY:
Matrix DESIGN GROUP
AN EMPLOYEE-OWNED COMPANY

ALTA/NSPS LAND TITLE SURVEY
LOCATED IN THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO

DRAWN BY: RLM
CHECKED BY: RLM
SCALE: 1" = 300'
DATE ISSUED: AUG 22, 2019
SHEET 2 OF 3 SHEETS

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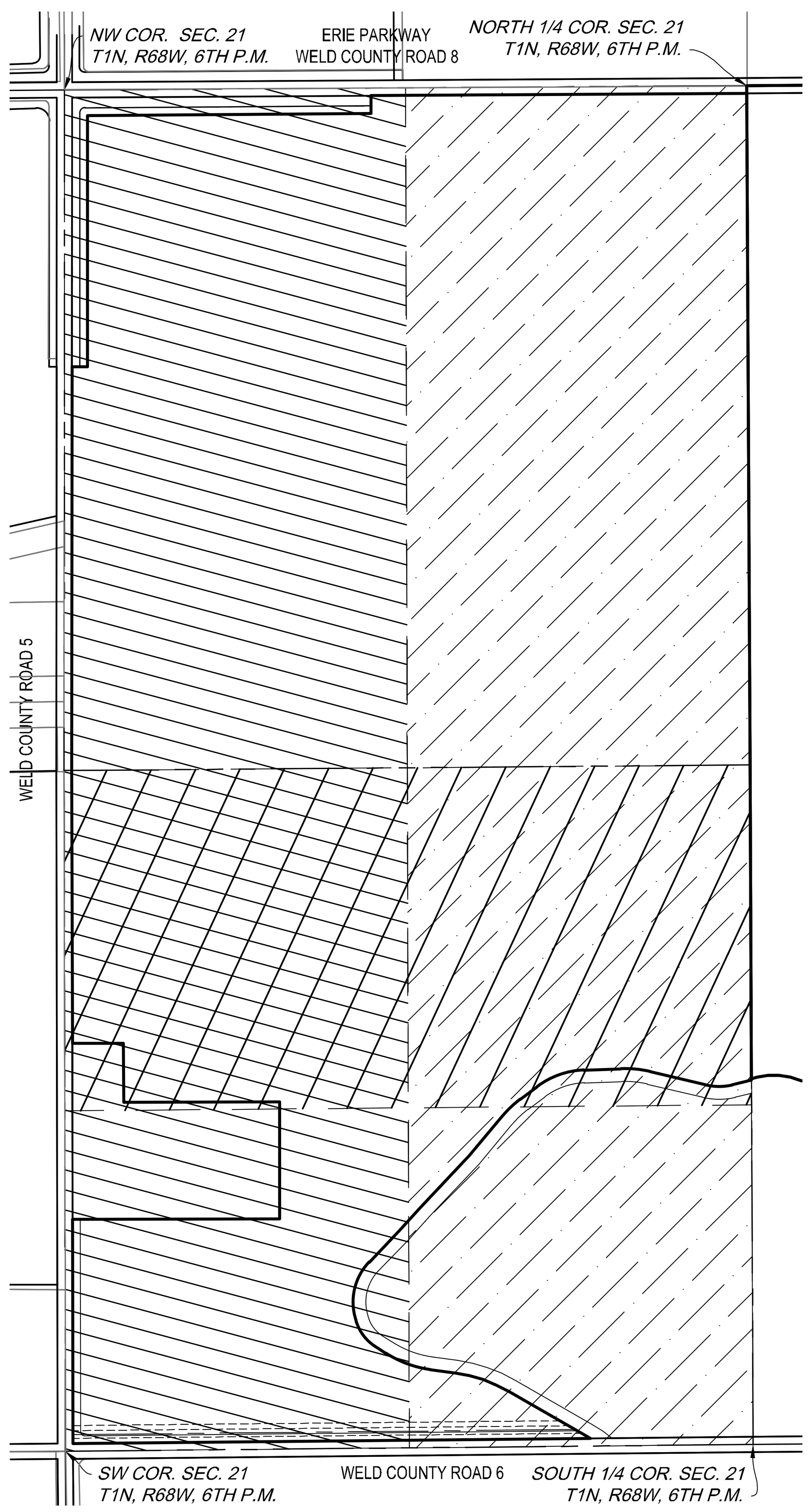
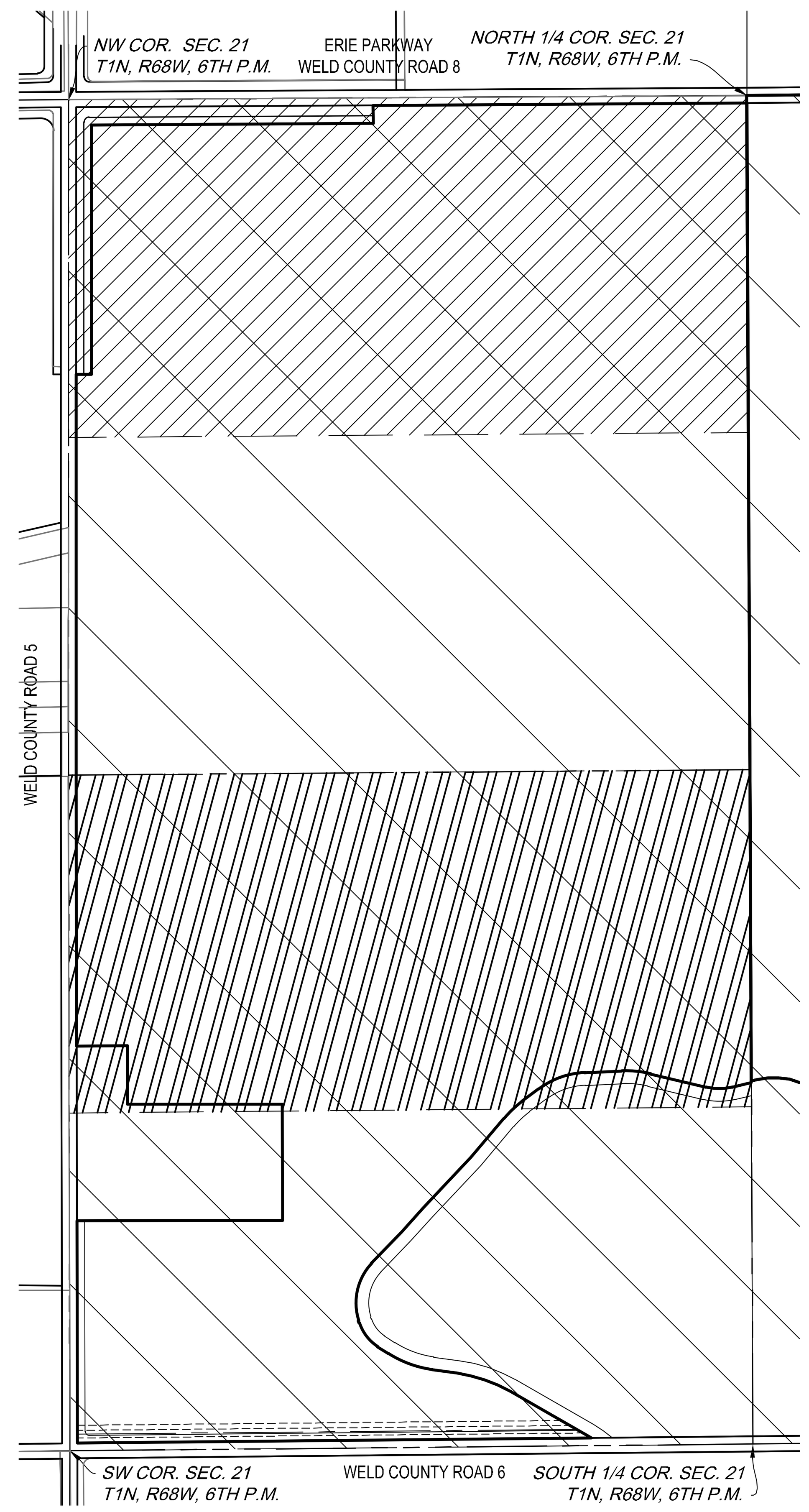
ALTA/NSPS LAND TITLE SURVEY

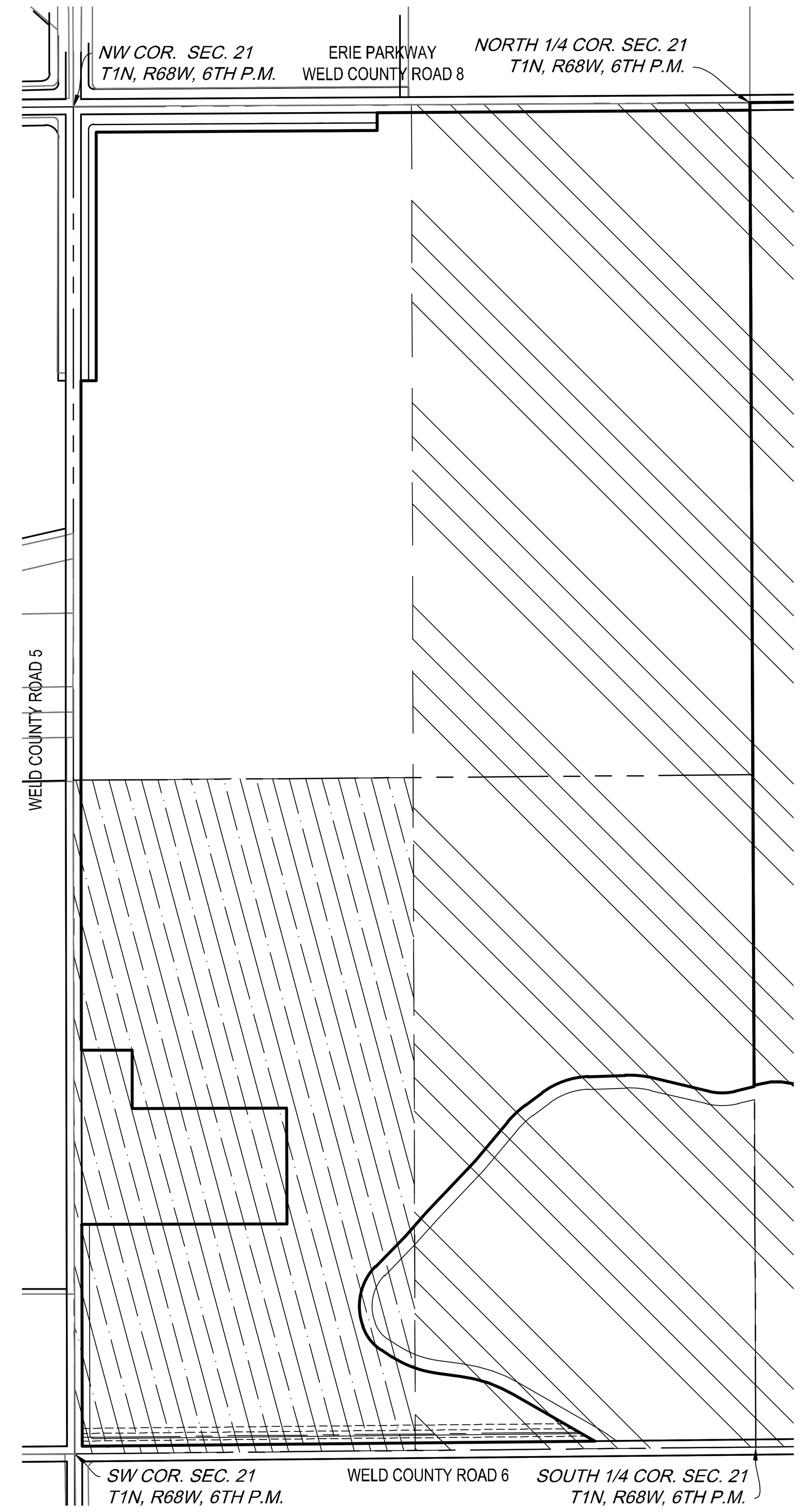
LOCATED IN THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO



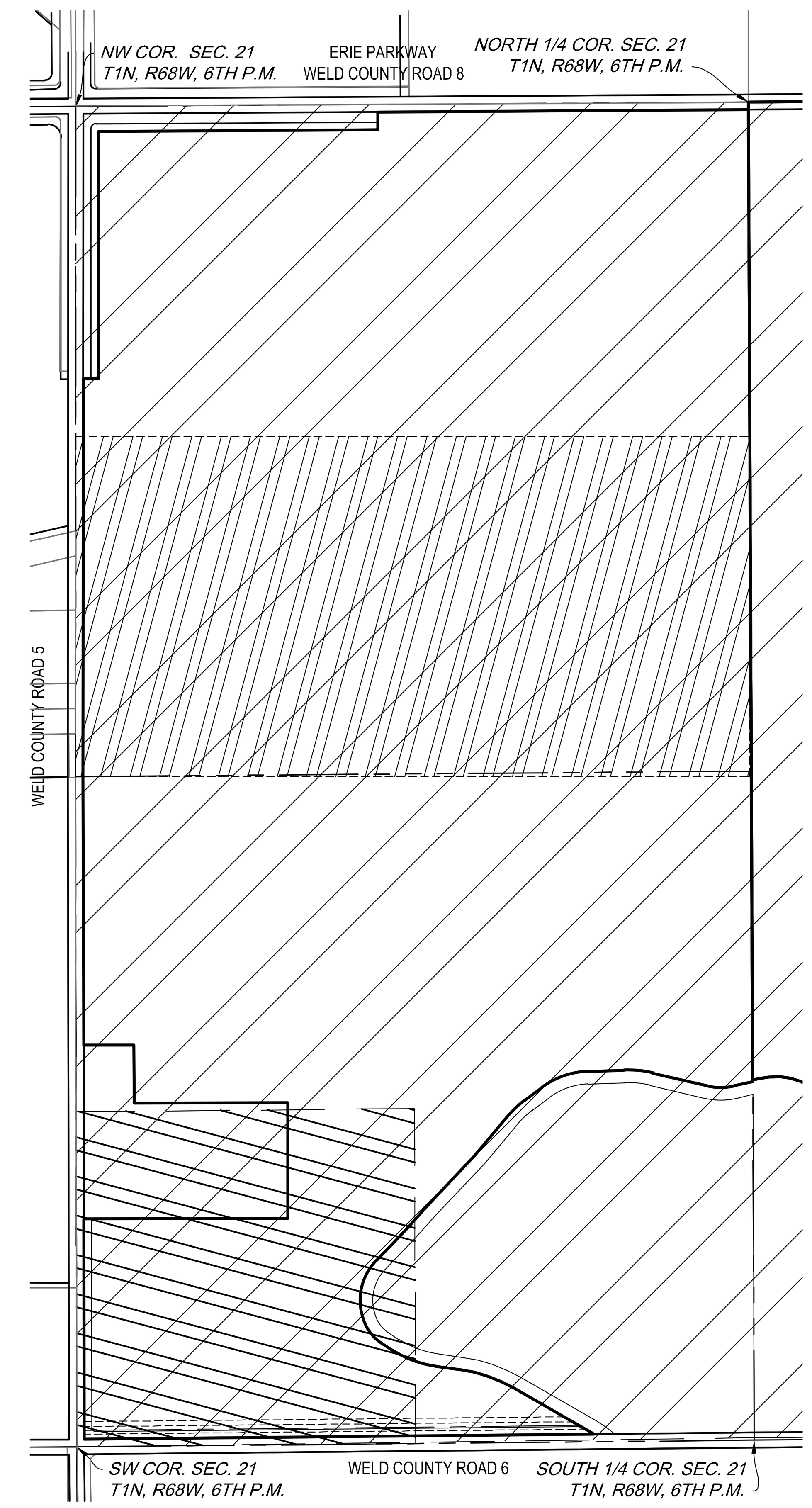
BOOK 913 PAGE 87 (ITEM 12)
RECORDING NUMBER 1640298 (ITEM 15A)
RECORDING NUMBER 1602713 (ITEM 14A)



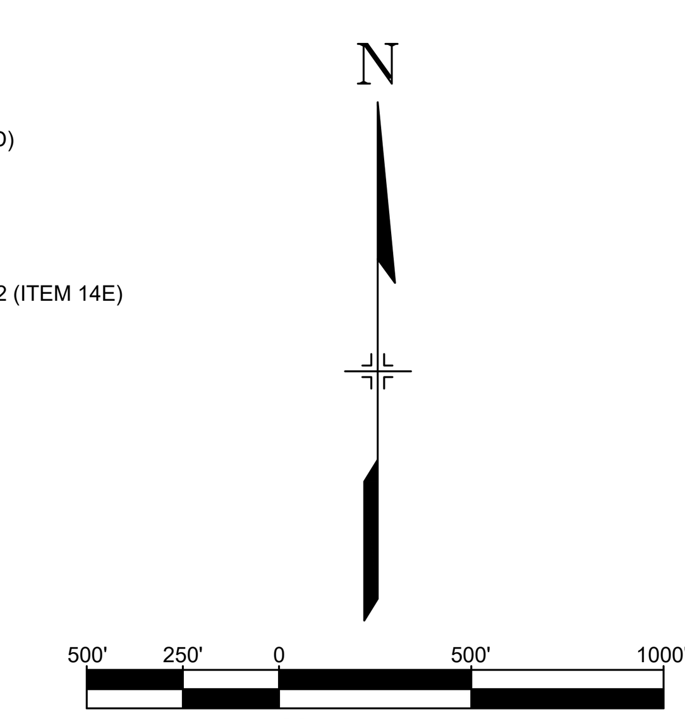
RECORDING NUMBER 1602712 (ITEM 13)
RECORDING NUMBER 3525268 (ITEM 15B)
RECORDING NUMBER 3591158 (ITEM 18)



RECORDING NUMBER 4117884 (ITEM 14C)
BOOK 894 PAGE 390 (ITEM 11)



RECORDING NUMBER 4117885 (ITEM 14D)
BOOK 320 PAGE 61 (ITEM 8A)
RECORDING NUMBER 4509251 & 4509252 (ITEM 14E)



PREPARED BY:
Matrix DESIGN GROUP
AN EMPLOYEE-OWNED COMPANY

ALTA/NSPS LAND TITLE SURVEY		
LOCATED IN THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO		
DRAWN BY: RLM CHECKED BY: RLM	SCALE: 1" = 300'	DATE ISSUED: AUG 22, 2019 SHEET 3 OF 3 SHEETS

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WESTERLY - ZONING MAP

A PORTION OF THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST, 6TH PRINCIPAL MERIDIAN TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO 225.64 ACRES RZ-001097-2019

BASIS OF BEARINGS STATEMENT

THE BASIS OF BEARINGS FOR THIS MAP IS THE WEST LINE OF THE NORTHWEST ONE-QUARTER OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE 6TH PRINCIPAL MERIDIAN BEING MONUMENTED ON THE NORTH END BY A FOUND 2-1/2 INCH ALUMINUM CAP WITHIN A MONUMENT CASING STAMPED WITH THE APPROPRIATE TEXT AND SYMBOLOGY FOR THE NORTHWEST CORNER OF SECTION 21 AND "LS 23501" AND MONUMENTED ON THE SOUTH END BY A FOUND 3-1/4 INCH ALUMINUM CAP WITHIN A MONUMENT CASING STAMPED WITH THE APPROPRIATE TEXT AND SYMBOLOGY FOR THE WEST ONE-QUARTER CORNER OF SECTION 21 AND "PLS 26606" AND IS ASSUMED TO BEAR NORTH 00°00'31 EAST A DISTANCE OF 2654.72 FEET.

OVERALL LEGAL DESCRIPTION:

A PARCEL OF LAND LOCATED IN THE WEST ONE-HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS;

BEGIN AT THE NORTHWEST CORNER OF SAID SECTION 21; THENCE NORTH 89°38'17" EAST, COINCIDENT WITH THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 21, A DISTANCE OF 2,663.55 FEET TO THE NORTHEAST CORNER OF THE NORTHWEST QUARTER OF SAID SECTION 21;

THENCE SOUTH 00°16'01" EAST, COINCIDENT WITH THE EASTERLY LINE OF THE NORTHWEST ONE-QUARTER OF SAID SECTION 21, A DISTANCE OF 2,649.90 FEET TO THE SOUTHEAST CORNER OF SAID NORTHWEST ONE-QUARTER SECTION 21;

THENCE SOUTH 00°16'04" EAST, COINCIDENT WITH THE EASTERLY LINE OF THE SOUTHWEST QUARTER OF SAID SECTION 21, A DISTANCE OF 414.50 FEET;

THENCE SOUTH 89°43'56" WEST, A DISTANCE OF 430.01 FEET;

THENCE SOUTH 17°55'57" WEST, A DISTANCE OF 121.26 FEET TO A 380.00 FOOT RADIUS NON-TANGENT CURVE, WHOSE CENTER BEARS NORTH 71°49'29" WEST;

THENCE SOUTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 63°32'08", AN ARC DISTANCE OF 421.38 FEET TO A 720.00 FOOT RADIUS REVERSE CURVE;

THENCE SOUTHWESTERLY, COINCIDENT WITH SAID REVERSE CURVE, THROUGH A CENTRAL ANGLE OF 7°33'56", AN ARC DISTANCE OF 95.07 FEET;

THENCE SOUTH 15°51'17" EAST, A DISTANCE OF 110.00 FEET TO A 610.03 FOOT RADIUS NON-TANGENT CURVE, WHOSE CENTER BEARS SOUTH 15°51'20" EAST;

THENCE SOUTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 31°16'36", AN ARC DISTANCE OF 333.00 FEET;

THENCE SOUTH 42°52'05" WEST, A DISTANCE OF 524.23 FEET TO A 2,251.04 FOOT RADIUS NON-TANGENT CURVE, WHOSE CENTER BEARS SOUTH 06°20'32" WEST;

THENCE WESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 06°26'49", AN ARC DISTANCE OF 253.29 FEET;

THENCE NORTH 89°53'43" WEST, A DISTANCE OF 111.61 FEET TO THE EXTERIOR BOUNDARY OF THAT CERTAIN PARCEL OF LAND DESCRIBED IN A DOCUMENT RECORDED IN THE OFFICE OF THE CLERK AND RECORDER OF WELD COUNTY UNDER AT RECEPTION NO. 2978817.

THENCE NORTHERLY AND WESTERLY, COINCIDENT WITH SAID EXTERIOR BOUNDARY, THE FOLLOWING FOUR (4) COURSES:

1. THENCE NORTH 00°06'17" WEST, A DISTANCE OF 143.39 FEET;
2. THENCE SOUTH 89°53'43" WEST A DISTANCE OF 608.07 FEET;
3. THENCE NORTH 00°06'17" WEST A DISTANCE OF 230.00 FEET;
4. THENCE SOUTH 89°53'43" WEST, COINCIDENT WITH THE NORTHERLY LINE OF SAID EXTERIOR BOUNDARY AND ITS WESTERLY EXTENSION, A DISTANCE OF 229.57 FEET TO THE WEST LINE OF THE SOUTHWEST ONE-QUARTER OF SAID SECTION 21;

THENCE NORTH 00°06'17" WEST, COINCIDENT WITH SAID WEST LINE, A DISTANCE OF 1,064.00 FEET TO THE NORTHWEST CORNER OF THE SAID SOUTHWEST ONE-QUARTER OF SAID SECTION 21;

THENCE NORTH 00°00'31" EAST , COINCIDENT WITH THE WEST LINE OF THE NORTHWEST ONE-QUARTER OF SAID SECTION 21, A DISTANCE OF 2,654.72 FEET TO THE **POINT OF BEGINNING;**

THE ABOVE DESCRIPTION CONTAINS A CALCULATED AREA OF 9,828,961 SQUARE FEET (225.64189 ACRES), MORE OR LESS.

LOW DENSITY RESIDENTIAL (LR) LEGAL DESCRIPTION:

A PARCEL OF LAND LOCATED IN THE WEST ONE-HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS;

BEGIN AT THE NORTHWEST CORNER OF SAID SECTION 21;

THENCE NORTH 89°38'17" EAST, COINCIDENT WITH SAID NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 21, A DISTANCE OF 912.10 FEET;

THENCE SOUTH 00°21'43" EAST A DISTANCE OF 70.00 FEET TO THE SOUTHERLY LINE OF THE WELD COUNTY ROAD 8 RIGHT-OF-WAY AS DESCRIBED IN THAT CERTAIN DOCUMENT RECORDED JULY 18, 2019 IN THE OFFICE OF THE WELD COUNTY CLERK AND RECORDED UNDER RECEPTION NUMBER 4506864;

THENCE SOUTH 00°24'06" EAST A DISTANCE OF 230.92 FEET;

THENCE SOUTH 48°32'14" WEST A DISTANCE OF 182.44 FEET TO A 48.50 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 41°27'42" EAST;

THENCE SOUTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 48°04'50" AN ARC DISTANCE OF 40.70 FEET;

THENCE SOUTH 00°27'32" WEST A DISTANCE OF 32.42 FEET TO A 507.50 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 00°44'28" WEST;

THENCE WESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 19°03'12" AN ARC DISTANCE OF 168.76 FEET;

THENCE SOUTH 71°41'16" WEST A DISTANCE OF 38.58 FEET TO A 40.00 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS SOUTHERLY;

THENCE SOUTHWESTERLY, COINCIDENT WITH SAID TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 90°00'00" AN ARC DISTANCE OF 62.83 FEET;

THENCE SOUTH 18°18'44" EAST A DISTANCE OF 67.50 FEET;

THENCE NORTH 71°41'16" EAST A DISTANCE OF 78.58 FEET TO A 400.00 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS SOUTHERLY;

THENCE EASTERLY, COINCIDENT WITH SAID TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 38°15'27" AN ARC DISTANCE OF 267.09 FEET;

THENCE SOUTH 70°03'17" EAST A DISTANCE OF 144.50 FEET TO A 1,000.00 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS NORTHERLY;

THENCE EASTERLY, COINCIDENT WITH SAID TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 14°25'38" AN ARC DISTANCE OF 251.80 FEET TO A 933.88 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 88°31'21" EAST;

THENCE NORTHERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 16°19'47" AN ARC DISTANCE OF 266.16 FEET;

LOW DENSITY RESIDENTIAL (LR) LEGAL DESCRIPTION (CONTINUED):

THENCE SOUTH 71°45'45" EAST A DISTANCE OF 61.10 FEET TO A 93.50 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS NORTHERLY;

THENCE EASTERLY, COINCIDENT WITH SAID TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 18°57'37" AN ARC DISTANCE OF 30.94 FEET;

THENCE NORTH 89°16'38" EAST A DISTANCE OF 46.45 FEET;

THENCE SOUTH 13°58'51" WEST A DISTANCE OF 72.68 FEET TO A 15.00 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS SOUTHEASTERLY;

THENCE SOUTHEASTERLY, COINCIDENT WITH SAID TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 109°08'30" AN ARC DISTANCE OF 28.57 FEET TO A 850.00 FOOT RADIUS COMPOUND CURVE;

THENCE EASTERLY, COINCIDENT WITH SAID COMPOUND CURVE, THROUGH A CENTRAL ANGLE OF 21°02'17" AN ARC DISTANCE OF 312.11 FEET TO A 15.00 FOOT COMPOUND CURVE;

THENCE NORTHERLY, COINCIDENT WITH SAID COMPOUND CURVE THROUGH A CENTRAL ANGLE OF 84°07'44" AND ARC DISTANCE OF 22.02 FEET;

THENCE NORTH 21°00'43" WEST A DISTANCE OF 41.78 FEET TO A 10.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 68°59'33" WEST;

THENCE NORTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 69°21'30" AN ARC DISTANCE OF 12.10 FEET;

THENCE SOUTH 89°38'19" WEST A DISTANCE OF 173.31 FEET TO A 15.00 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS SOUTHERLY;

THENCE SOUTHWESTERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 91°05'03" AN ARC DISTANCE OF 23.85 FEET;

THENCE SOUTH 00°43'22" EAST A DISTANCE OF 14.42 FEET;

THENCE SOUTH 89°16'38" WEST A DISTANCE OF 30.00 FEET;

THENCE NORTH 00°21'41" WEST A DISTANCE OF 159.90 FEET;

THENCE NORTH 89°38'19" EAST A DISTANCE OF 162.65 FEET;

THENCE NORTH 00°25'16" WEST A DISTANCE OF 30.00 FEET;

THENCE NORTH 00°03'27" WEST A DISTANCE OF 239.97 FEET TO THE SOUTHERLY LINE OF THE WELD COUNTY ROAD 8 RIGHT-OF-WAY AS DESCRIBED IN THAT CERTAIN DOCUMENT RECORDED NOVEMBER 8, 2005 IN THE OFFICE OF THE WELD COUNTY CLERK AND RECORDED UNDER RECEPTION NUMBER 3338310;

THENCE NORTH 00°21'43" WEST A DISTANCE OF 30.00 FEET TO THE NORTH LINE OF THE NORTHWEST ONE-QUARTER OF SAID SECTION 21;

THENCE NORTH 89°38'17" EAST, COINCIDENT WITH SAID NORTH LINE, A DISTANCE OF 985.11 FEET TO THE NORTHEAST CORNER OF THE NORTHWEST ONE-QUARTER OF SAID SECTION 21;

THENCE SOUTH 00°16'01" EAST, COINCIDENT WITH THE EAST LINE OF THE NORTHWEST ONE-QUARTER OF SAID SECTION 21, A DISTANCE OF 2,649.90 FEET TO THE SOUTHEAST CORNER OF SAID NORTHWEST ONE-QUARTER OF SECTION 21;

THENCE SOUTH 00°16'04" EAST, COINCIDENT WITH THE EASTERLY LINE OF THE SOUTHWEST ONE-QUARTER OF SAID SECTION 21, A DISTANCE OF 414.50 FEET;

THENCE SOUTH 89°43'56" WEST, A DISTANCE OF 430.01 FEET;

THENCE SOUTH 17°55'57" WEST, A DISTANCE OF 121.26 FEET TO A 380.00 FOOT RADIUS NON-TANGENT CURVE, WHOSE CENTER BEARS NORTH 71°49'29" WEST;

THENCE SOUTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 63°32'08" AN ARC DISTANCE OF 421.38 FEET TO A 720.00 FOOT RADIUS REVERSE CURVE;

THENCE WESTERLY, COINCIDENT WITH SAID REVERSE CURVE, THROUGH A CENTRAL ANGLE OF 07°33'56" AN ARC DISTANCE OF 95.07 FEET;

THENCE SOUTH 15°51'17" EAST A DISTANCE OF 110.00 FEET TO A 610.03 FOOT RADIUS NON-TANGENT CURVE, WHOSE CENTER BEARS SOUTH 15°51'20" EAST;

THENCE SOUTHWESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 31°16'36" AN ARC DISTANCE OF 333.00 FEET;

THENCE SOUTH 42°52'05" WEST A DISTANCE OF 524.23 FEET TO A 2,251.04 FOOT RADIUS NON-TANGENT CURVE, WHOSE CENTER BEARS SOUTH 06°20'32" WEST;

THENCE WESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 06°26'49" AN ARC DISTANCE OF 253.29 FEET;

THENCE SOUTH 89°53'43" WEST A DISTANCE OF 111.61 FEET TO A POINT ON THE BOUNDARY OF THAT PARCEL OF LAND DESCRIBED AT RECEPTION NO. 2978817 OF THE RECORDS OF THE WELD COUNTY CLERK AND RECORDER;

THENCE COINCIDENT WITH SAID BOUNDARY THE FOLLOWING FOUR (4) COURSES:

1. THENCE NORTH 00°06'17" WEST A DISTANCE OF 143.39 FEET;
2. THENCE SOUTH 89°53'43" WEST A DISTANCE OF 608.07 FEET;
3. THENCE NORTH 00°06'17" WEST A DISTANCE OF 230.00 FEET;
4. THENCE SOUTH 89°53'43" WEST, COINCIDENT WITH THE NORTH LINE OF SAID PARCEL AND THE WESTERLY EXTENSION THEREOF, A DISTANCE OF 229.57 FEET TO A POINT ON THE WESTERLY LINE OF THE SOUTHWEST ONE-QUARTER OF SAID SECTION 21;

THENCE NORTH 00°06'17" WEST, COINCIDENT WITH SAID WESTERLY LINE, A DISTANCE OF 1,064.00 FEET TO THE NORTHEAST CORNER OF THE SOUTHWEST ONE-QUARTER OF SAID SECTION 21;

THENCE NORTH 00°00'31" EAST , ALONG THE WEST LINE OF THE NORTHWEST ONE-QUARTER OF SAID SECTION 21 A DISTANCE OF 2,654.72 FEET TO THE NORTHWEST CORNER OF SAID SECTION 21 AND THE **POINT OF BEGINNING**;

THE ABOVE DESCRIPTION CONTAINS A CALCULATED AREA OF 9,318,978 SQUARE FEET (213.93430 ACRES), MORE OR LESS.

NEIGHBORHOOD MIXED USE (NMU) LEGAL DESCRIPTION:

A PARCEL OF LAND LOCATED IN THE NORTHWEST ONE-QUARTER OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST OF THE SIXTH PRINCIPAL MERIDIAN, TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS;

COMMENCE AT THE NORTHWEST CORNER OF SAID SECTION 21; THENCE NORTH 89°38'17" EAST, COINCIDENT WITH THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 21, A DISTANCE OF 912.10 FEET TO THE **POINT OF BEGINNING**;

THENCE CONTINUE NORTH 89°38'17" EAST, COINCIDENT WITH SAID NORTH LINE, A DISTANCE OF 766.34 FEET;

THENCE SOUTH 00°21'43" EAST A DISTANCE OF 30.00 FEET TO THE SOUTHERLY LINE OF THE WELD COUNTY ROAD 8 RIGHT-OF-WAY AS DESCRIBED IN THAT CERTAIN DOCUMENT RECORDED NOVEMBER 8, 2005 IN THE OFFICE OF THE WELD COUNTY CLERK AND RECORDED UNDER RECEPTION NUMBER 3338310;

THENCE SOUTH 00°03'27" EAST A DISTANCE OF 239.97 FEET;

THENCE SOUTH 00°25'16" EAST A DISTANCE OF 30.00 FEET;

THENCE SOUTH 89°38'19" WEST A DISTANCE OF 162.65 FEET;

THENCE SOUTH 00°21'41" EAST A DISTANCE OF 159.89 FEET;

THENCE NORTH 89°16'38" EAST A DISTANCE OF 29.37 FEET;

THENCE NORTH 00°43'22" WEST A DISTANCE OF 14.42 FEET TO A 15.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 88°33'16" EAST;

THENCE NORTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 91°05'03" AN ARC DISTANCE OF 23.85 FEET;

THENCE NORTH 89°38'19" EAST A DISTANCE OF 173.31 FEET TO A 10.00 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS SOUTHERLY;

THENCE SOUTHEASTERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 69°21'30" AN ARC DISTANCE OF 12.10 FEET;

THENCE SOUTH 21°00'43" EAST A DISTANCE OF 41.78 FEET TO A 15.00 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS SOUTHWESTERLY;

THENCE SOUTHERLY, COINCIDENT WITH SAID CURVE, THROUGH A CENTRAL ANGLE OF 84°07'44" AN ARC DISTANCE OF 22.02 FEET TO A 850.00 FOOT RADIUS COMPOUND CURVE;

THENCE WESTERLY, COINCIDENT WITH SAID COMPOUND CURVE, THROUGH A CENTRAL ANGLE OF 21°22'17" AN ARC DISTANCE OF 317.05 FEET TO A 15.00 FOOT RADIUS COMPOUND CURVE;

THENCE NORTHWESTERLY, COINCIDENT WITH SAID COMPOUND CURVE, THROUGH A CENTRAL ANGLE OF 109°08'30" AN ARC DISTANCE OF 28.57 FEET;

THENCE NORTH 13°58'51" EAST A DISTANCE OF 72.68 FEET;

THENCE SOUTH 89°16'38" WEST A DISTANCE OF 46.45 FEET TO A 93.50 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS NORTHERLY;

THENCE WESTERLY, COINCIDENT WITH SAID TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 18°57'37" AN ARC DISTANCE OF 30.94 FEET;

THENCE NORTH 71°45'45" WEST A DISTANCE OF 61.10 FEET TO A 933.88 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 72°11'33" EAST;

THENCE SOUTHERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 16°19'47" AN ARC DISTANCE OF 266.16 FEET TO A 1,000.00 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS NORTH 05°31'05" EAST;

THENCE WESTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 14°25'38" AN ARC DISTANCE OF 251.80 FEET;

THENCE NORTH 70°03'17" WEST A DISTANCE OF 144.50 FEET TO A 400.00 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS SOUTHERLY;

THENCE WESTERLY, COINCIDENT WITH SAID TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 38°15'27" AN ARC DISTANCE OF 267.09 FEET;

THENCE SOUTH 71°41'16" WEST A DISTANCE OF 78.58 FEET;

THENCE NORTH 18°18'44" WEST A DISTANCE OF 67.50 FEET TO A 40.00 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS NORTHEASTERLY;

THENCE NORTHEASTERLY, COINCIDENT WITH SAID TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 90°00'00" AN ARC DISTANCE OF 62.83 FEET;

THENCE NORTH 71°41'16" EAST A DISTANCE OF 38.58 FEET TO A 507.50 FOOT RADIUS TANGENT CURVE WHOSE CENTER BEARS SOUTHERLY;

THENCE EASTERLY, COINCIDENT WITH SAID TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 19°03'12" AN ARC DISTANCE OF 168.76 FEET;

THENCE NORTH 00°27'32" EAST A DISTANCE OF 32.42 FEET TO A 48.50 FOOT RADIUS NON-TANGENT CURVE WHOSE CENTER BEARS SOUTH 89°32'32" EAST;

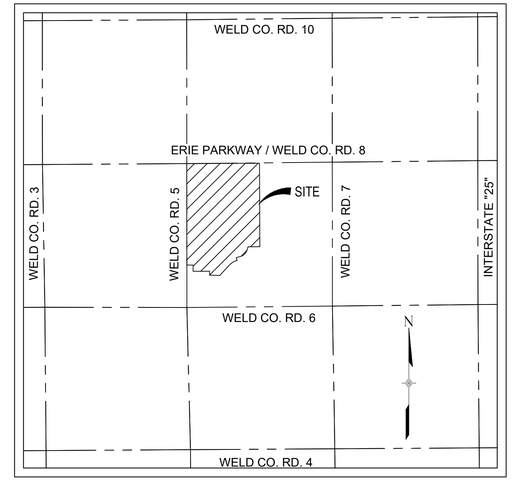
THENCE NORTHEASTERLY, COINCIDENT WITH SAID NON-TANGENT CURVE, THROUGH A CENTRAL ANGLE OF 48°04'50" AN ARC DISTANCE OF 40.70 FEET;

THENCE NORTH 48°32'14" EAST A DISTANCE OF 182.44 FEET;

THENCE NORTH 00°24'06" WEST A DISTANCE OF 230.92 FEET TO THE SOUTHERLY LINE OF THE WELD COUNTY ROAD 8 RIGHT-OF-WAY AS DESCRIBED IN THAT CERTAIN DOCUMENT RECORDED JULY 18, 2019 IN THE OFFICE OF THE WELD COUNTY CLERK AND RECORDED UNDER RECEPTION NUMBER 4506864;

THENCE NORTH 00°21'43" WEST A DISTANCE OF 70.00 FEET TO THE NORTH LINE OF THE NORTHWEST ONE-QUARTER OF SAID SECTION 21 AND THE **POINT OF BEGINNING**.

THE ABOVE DESCRIPTION CONTAINS A CALCULATED AREA OF 509,977 SQUARE FEET (11.70746 ACRES), MORE OR LESS,



VICINITY MAP

1/4 MI 0 1/2 MI

SCALE: 1"= 1/2 MILE

SURVEYOR'S CERTIFICATION:

I, JEFFREY A. MILLER, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS ZONING MAP TRULY AND CORRECTLY REPRESENTS THE ABOVE DESCRIBED LEGAL DESCRIPTION FOR EACH ZONE DISTRICT.

I ATTEST THE ABOVE ON THIS 7TH DAY OF APRIL, 2020.

_____

JEFFREY A. MILLER
COLORADO LICENSED
PROFESSIONAL LAND SURVEYOR NO. 38467
FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.

BOARD OF TRUSTEES APPROVAL CERTIFICATE

THIS ZONING MAP IS APPROVED AND ACCEPTED BY THE ORDINANCE NO._____, PASSED AND ADOPTED AT THE REGULAR MEETING OF THE BOARD OF TRUSTEES OF ERIE, COLORADO HELD ON _____, 2020.

_____
MAYOR

ATTEST _____
TOWN CLERK

CLERK AND RECORDER'S CERTIFICATE

STATE OF COLORADO)
) ss
COUNTY OF WELD)

I HEREBY CERTIFY THAT THIS ANNEXATION MAP WAS FILED IN MY OFFICE ON THIS _____ DAY OF _____ A.D., 20___ AND WAS RECORDED AT

RECEPTION NUMBER _____

_____
WELD COUNTY CLERK AND RECORDER

SHEET 1 of 3

DATE: 2019.06.18
REVISED 2019.09.06
REVISED 2019.10.09
REVISED 2019.12.11
REVISED 2020.04.07
REVISED 2020.04.15

DEVELOPER
ERIE LAND COMPANY, LLC
1601 BLAKE STREET, SUITE 200
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SOUTHERN LAND COMPANY

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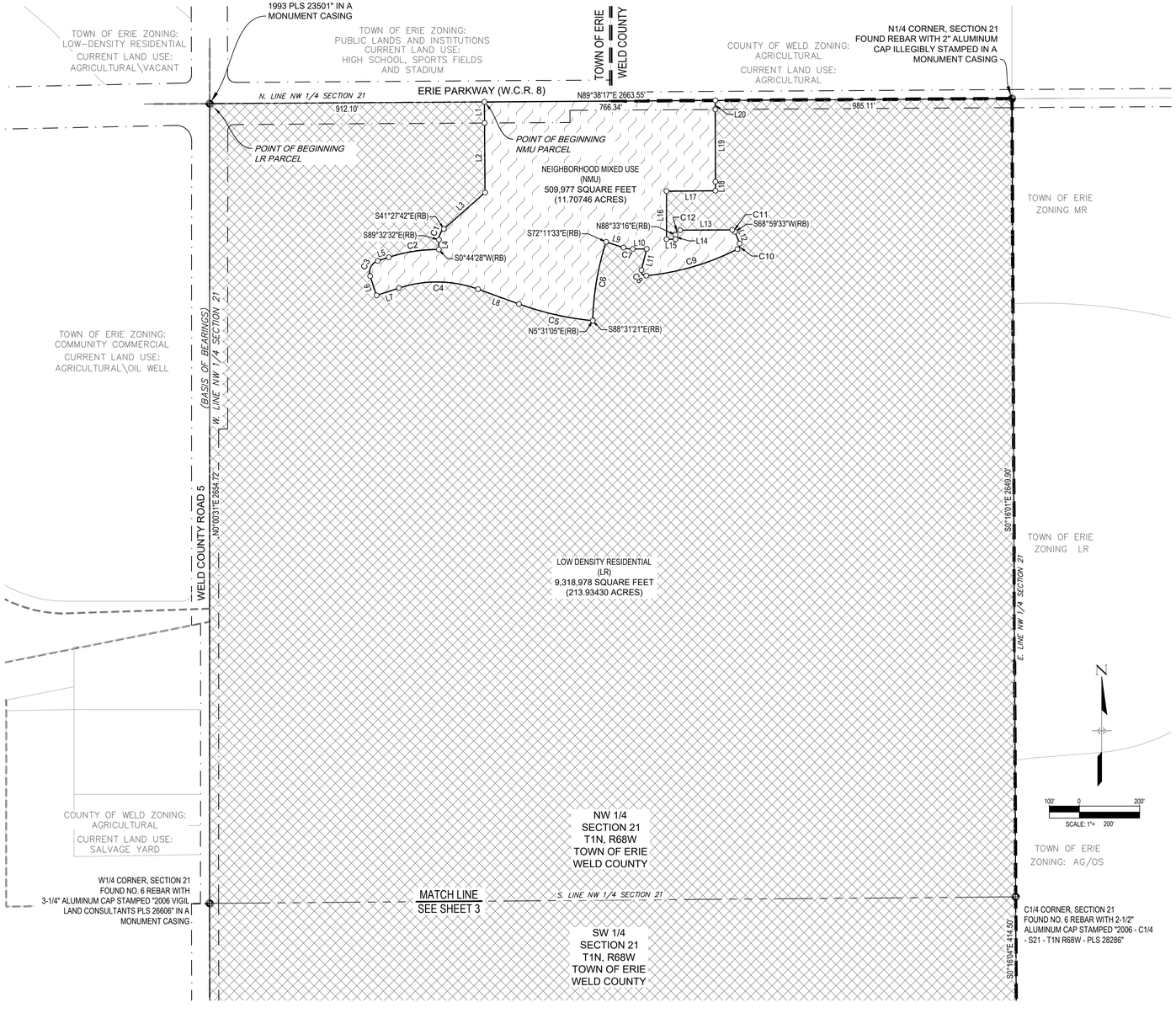
bob_meadows@matrixdesigngroup.com
Matrix DESIGN GROUP AN EMPLOYEE-OWNED COMPANY

WESTERLY - ZONING MAP

A PORTION OF THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH, RANGE 68 WEST, 6TH PRINCIPAL MERIDIAN TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO

225.64 ACRES

RZ-001097-2019



ZONING LEGEND

- NEIGHBORHOOD MIXED USE (NMU)
- LOW DENSITY RESIDENTIAL (LR)
- N XX°XX'XX"E(RB) INDICATES A RADIAL BEARING

CURVE TABLE					
CURVE	DELTA	RADIUS	LENGTH	CHORD BEARING	CHORD LENGTH
C1	048°04'50"	48.50'	40.70'	N24°29'53"E	39.52'
C2	019°03'12"	507.50'	168.76'	N81°12'52"E	167.99'
C3	090°00'00"	40.00'	62.83'	N26°41'16"E	56.57'
C4	038°15'27"	400.00'	267.09'	N89°11'00"W	262.15'
C5	014°25'38"	1000.00'	251.80'	N77°16'06"W	251.14'
C6	016°19'47"	933.88'	266.16'	S09°38'33"W	265.26'
C7	018°57'37"	93.50'	30.94'	N81°14'33"W	30.80'
C8	109°08'30"	15.00'	28.57'	N40°56'28"W	24.44'
C9	021°22'17"	850.00'	317.05'	S73°48'09"W	315.21'
C10	084°07'44"	15.00'	22.02'	S21°03'09"W	20.10'
C11	069°21'30"	10.00'	12.10'	S55°41'12"E	11.38'
C12	091°05'03"	15.00'	23.85'	N44°05'47"E	21.41'

LINE TABLE		
LINE	BEARING	LENGTH
L1	N00°21'43"W	70.00'
L2	N00°24'06"W	230.92'
L3	N48°32'14"E	182.44'
L4	N00°27'32"E	32.42'
L5	N71°41'16"E	38.58'
L6	N18°18'44"W	67.50'
L7	S71°41'16"W	78.58'
L8	N70°03'17"W	144.50'
L9	N71°45'45"W	61.10'
L10	S89°16'38"W	46.45'

LINE TABLE		
LINE	BEARING	LENGTH
L11	N13°58'51"E	72.68'
L12	S21°00'43"E	41.78'
L13	N89°38'19"E	173.31'
L14	N00°01'08"E	14.42'
L15	N89°16'38"E	30.00'
L16	S00°04'04"E	159.90'
L17	S89°38'19"W	162.65'
L18	S00°25'16"E	30.00'
L19	S00°03'27"E	239.97'
L20	S00°21'43"E	30.00'

LEGEND

- ZONING DISTRICT BOUNDARY
- TOWN OF ERIE BOUNDARY
- RIGHT-OF-WAY

DEVELOPER

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bob_meadows@matrixdesigngroup.com

Matrix DESIGN GROUP
AN EMPLOYEE-OWNED COMPANY

DATE: 2019.06.18
REVISED 2019.09.06
REVISED 2019.10.09
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REVISED 2020.04.07
REVISED 2020.04.15

R:\18.994.001 (Dearmin Swink)\Survey\Dwg\ZONING\ZM01 - Westerly_R4.dwg

WESTERLY - ZONING MAP

A PORTION OF THE WEST HALF OF SECTION 21, TOWNSHIP 1 NORTH,
RANGE 68 WEST, 6TH PRINCIPAL MERIDIAN
TOWN OF ERIE, COUNTY OF WELD, STATE OF COLORADO
225.64 ACRES
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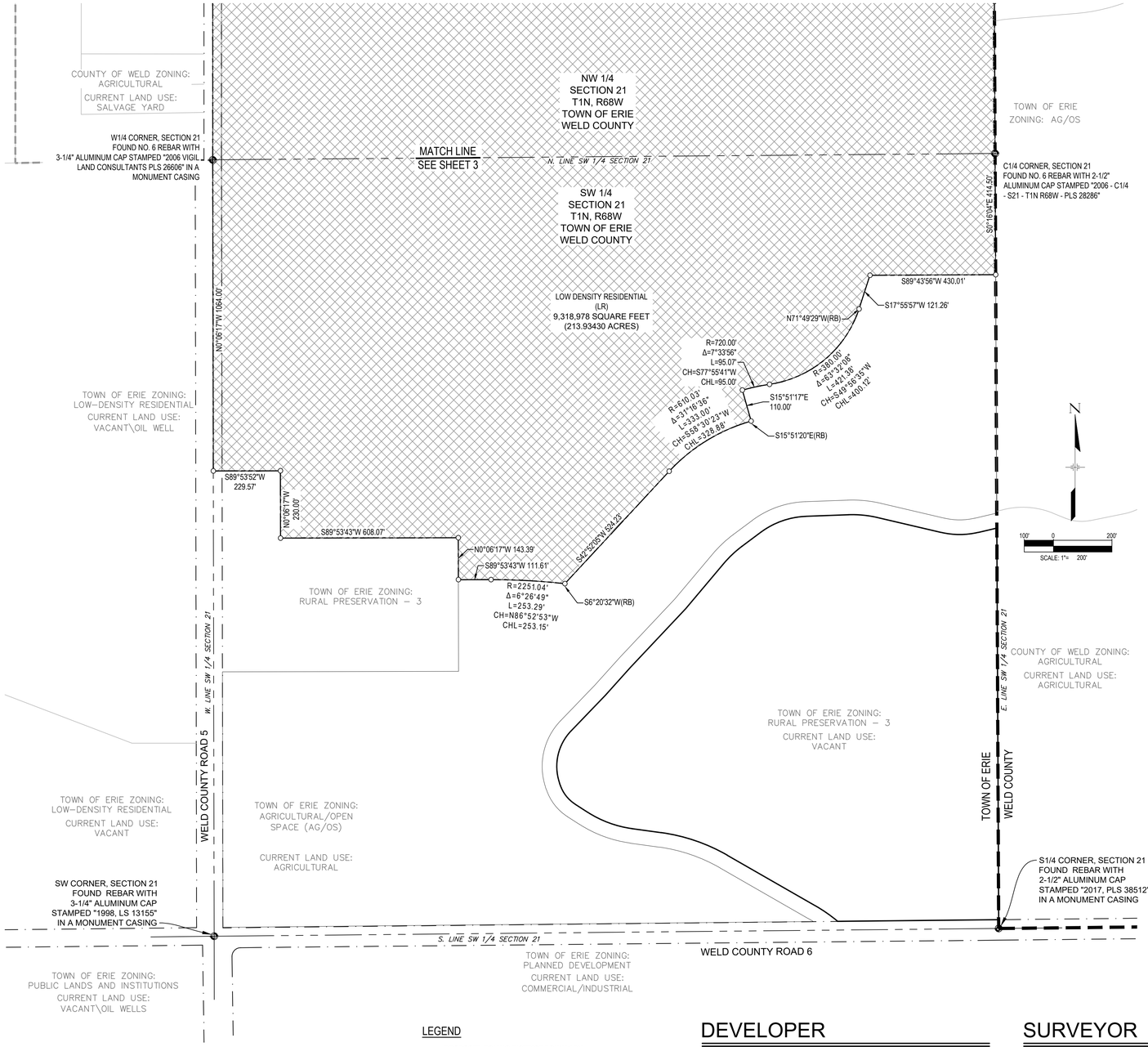

ZONING LEGEND

- NEIGHBORHOOD MIXED USE (NMU)
- LOW DENSITY RESIDENTIAL (LR)

N XX°XX'XX"E(RB) INDICATES A RADIAL BEARING

LEGEND

- PROPOSED ZONING DISTRICT BOUNDARY
- TOWN OF ERIE BOUNDARY
- RIGHT-OF-WAY

DEVELOPER

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SHEET 3 of 3

DATE: 2019.06.18
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REVISED 2020.04.15

R:\18.994.001 (Dearmin Swink)\Survey\Dwg\ZONING\ZM01 - Westerly_R4.dwg

PRODUCT TYPE	LOT SIZE	TYPE
LW	22' X 50' (MIN)	MIXED USE - LIVE/WORK ALLEY LOAD
G2	24' X 70' (MIN)	TOWNHOME ALLEY LOAD
G1	56' X 72' (MIN)	DUPLEX ALLEY LOAD
F	22' X 90' (MIN)	TOWNHOME ALLEY LOAD
D1/D2	35' X 90'	SFD ALLEY LOAD
C	50' X 110'	SFD FRONT LOAD
A	60' X 110' (MIN)	SFD FRONT LOAD
P	70' X 110'	SFD FRONT LOAD
COMM	N.A.	FIRST FLOOR AREA (SQ. FT.)

WESTERLY - CONCEPT PLAN - REZONING

ERIE, CO

SEPTEMBER - 2019

300' 900' 150' 600'

N

Westerly Assessment of Impact Report

Water Distribution System

The Westerly Water Distribution system will follow the recommendations outlined in the Merrick Utility Study commissioned by the Town of Erie for the development of this region. Water looping will be provided by connecting to the 30" waterline within Erie Parkway and we expect to have to connect to the project directly to the west of this parcel across County Road 5. Waterlines will be constructed throughout the development within roadways to service the proposed homes and commercial buildings within the development.

There is a new non-potable storage tank being constructed directly north of the site and we anticipate a conveyance line being constructed within County Road 5 to the south to the project boundary. We anticipate having a non-potable system within the development to service the larger community parks and in order to have proper flow and pressure, that a storage pond with pumps will be required.

Sanitary Sewer System

Sanitary sewer mains, laterals and manholes will be constructed throughout the project street network and will gravity flow to the sanitary sewer interceptor line at the northwest corner of the Westerly property in Erie Parkway. It is anticipated the sewer will outflow along to a new main within Erie Parkway and connect to the existing conveyance system.

Roadway Network

The addition of this property to the Town of Erie will include improvements to Erie Parkway and a County Road 5 adjacent to the property.

The interior streets will include curb and gutter. The street network will be developed to provide dual access to neighborhood pods to meet life safety requirements. Intersection locations will be designed with consideration of appropriate separation from existing streets and line up with known future planned roadways.

Storm Drainage and Detention

The site lies within the St. Vrain Creek and Middle South Platte basins. Development is focused in the St Vrain Creek basin and is shown and described in the Town of Erie Outfall Systems Plan (East of Coal Creek). Development of Westerly will create a series of piped conveyance systems that will convey runoff to Erie Parkway and County Road 5 where a new detention and water quality pond will be constructed by this project. After being treated and attenuated, runoff will discharge to north west into the recently constructed conveyance system in the Colliers project where it will eventually outfall into Coal Creek.

Dry Utilities

The electric, gas and cable services that will be constructed within the project will be similar to what is already being anticipated for this area.

Parks, & Open Space

As part of the overall Westerly Community, and as depicted in the concept plan, we will meet the dedication requirements for Park and Open Space within the property.

Law Enforcement and Fire Protection

As is typical for residential development the new residents that are being served by the Town of Erie Fire and Police will have an additional modest impact on the existing services. This impact is offset by the fees, and additional taxes that the new residents pay within the Town of Erie.

School Impact

We are in discussions with the St. Vrain County School District, about the potential of a school site within this property and where the appropriate location is within the development.

Phase II Drainage Report for:

Westerly

Prepared for:

Southern Land Company
1601 Blake Street, Suite 200
Denver, Colorado 80202

Prepared by:

Matrix DESIGN GROUP

TABLE OF CONTENTS

APPENDICIES

ENGINEER'S CERTIFICATION

"I hereby certify that this Phase II Drainage report for the design of Westerly was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Erie Standards and Specifications for Design and Construction for the owners thereof. I understand that the Town of Erie does not and will not assume liability for drainage facilities designed by others, including the designs presented in this report."

_____

Patrick Chelin
Registered Professional Engineer
State of Colorado
No. 36448

TOWN ACCEPTANCE

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

Accepted by: _____ _____
Town Engineer Date

If during the construction process or at any time within one year following the acceptance by the TOWN of the completed improvements, any deficiencies or errors are discovered in the construction plans, specifications, drainage reports, or the actual constructed improvements, the TOWN shall have the right to require the developer to make any and all corrections which may be deemed necessary by the TOWN. The costs associated with any such corrections shall be the sole responsibility of the developer.

I. GENERAL LOCATION AND DESCRIPTION

This report summarizes the proposed stormwater system for the Westerly project in the Town of Erie. Westerly is a combination of two parcels of land. The Swink property lies within the east ½ of section 21, Township 1 North, Range 68 West of the 6th Principal Meridian. The Dearmin property lies within the west ½ of the aforementioned section. This report is prepared for both parcels. This development is a proposed single-family project to be developed by Erie Land Company, LLC. Discussed are the overall stormwater concepts, site hydrology and hydraulics, detention basins and water quality facilities.

A. Location

The project area is located within the following location:

Township, Range, ¼ Section. The property is contained within a portion of section 21, Township 1 North, Range 68 West of the 6th Principal Meridian, County of Weld, State of Colorado.

Street Location. The property is located in the Town of Erie, County of Weld, State of Colorado. The property is bordered by Erie Parkway (Weld County Road 8 – 140' R.O.W.) on the north, Weld County Road 5 (120' R.O.W.) on the West, Weld County Road 6 on the south and a community ditch on the east. Interstate 25 is located approximately 1 mile to the east of the site.

Major Drainageways. There are no major drainageways on this property.

Surrounding Developments. To the west of the site is Erie Highlands Subdivision Filing 11, which is currently under construction, and an abandoned auto-salvage yard. To the north is Erie High School and vacant land. East of the site are existing residential, agricultural and commercial sites. South of the site are existing commercial sites in addition to vacant land. No other proposed or existing developments, adjacent to the site, exist currently.

B. Property Description

Area. This drainage report is for 417.68 acres.

Ground Cover and Soils. The site is currently undeveloped land. The ground cover consists of native grass vegetation sloping from the southeast to the northwest at approximately 3 to 6 percent. Soils are Cascajo gravelly sandy loam, Colby loam, Midway-Shingle complex, Nunn loam, Nunn clay loam, Weld loam and Wiley-Colby complex. The soils are classified as NRCS hydrologic soils groups A, B, C and D.

Major Drainageways. There are no major drainageways on or adjacent to this property. Flows released from this site will enter an existing 7'x5' box culvert which runs from south to north, under Erie Parkway, just west of Weld County Road 5. Flows from this box culvert enter an existing Regional Channel. This Regional Channel was designed to accommodate flows from the Westerly site as well as flows from Colliers Hill Filings 4&5 (Reference 3).

General Project Description. Westerly will consist of approximately 1,175 single family residential lots, 3.92 acres of mixed-use, a school, open space and a detention pond. Proposed development activities will include overlot grading, utility improvements, paving, landscaping and building construction. Access to the site will be provided from Weld County Road 5, Weld County Road 7 and Erie Parkway.

Irrigation Facilities. An existing irrigation ditch referred to as "Community Ditch" is located east of the site. This existing ditch flows south to north and does not impact the site. Nor does stormwater enter this existing ditch.

Proposed Land Use. Westerly is proposed to be a Low Density Residential (LR), Medium Density Residential (MR) and Neighborhood Mixed Use (NMU) development.

Wetland Areas. There are no existing wetland areas within the site.

Existing Easements. An existing 10' Vessels oil and gas easement (Rec. No. 2078820 & 2078821) exists within Weld County Road 7. An existing Left hand water district easement (Rec. No. 3833970) exists in the northeast portion of the site, adjacent to Weld County Road 7.

II. DRAINAGE BASINS

A. Major Basin Description

Westerly lies within the St. Vrain Creek and Middle South Platte Basin. FIRM Panels 08013C0442J, 08123C2070E and 08013CO444J encompass the site. Existing use for this parcel is Agricultural with the planned use being Residential. An existing irrigation ditch named Community Ditch runs along the east portion of the site. Community Ditch is currently used for irrigation and will not be impacted by this development. There are no existing ponds, lakes or other drainage structures existing onsite.

B. Sub-Basin Description

This site mainly lies within the St. Vrain Creek Watershed Basin with a small portion lying within the Middle South Platte Watershed Basin. On-site historic flows within the St. Vrain Creek Basin drain northwest towards a low point near the northwest corner of the site. Historic flows are collected in an existing culvert and conveyed under Weld County Road 5 and Erie Parkway. Flows continue northwest through the Colliers Hill Subdivision then into an existing swale and ultimately into Boulder and Weld County Ditch. Historic flows within the Middle South Platte Watershed Basin

drain southeast into Community Ditch. Proposed development will not change existing flow patterns. There are no historic flows coming onsite.

III. DRAINAGE DESIGN CRITERIA

A. Development Criteria Reference and Constraints

No adverse impacts to downstream or adjacent drainage facilities are to be expected. No jurisdictional wetlands are present on the project site. This site is not part of a larger master plan. A Phase I drainage report was not prepared for this site.

B. Hydrological Criteria

Rainfall depths of 0.81, 1.39 and 2.68-inches were used for the 2-year, 10 year and 100-year storm events respectively.

The rational method was used to compute design flow rates for the minor (2-year) and major (100-year) storm for sizing onsite storm sewer systems within the Westerly basins. Land use characteristics and the associated runoff coefficients were determined for each basin. Time of concentrations were calculated based on the initial time or overland flow time, plus the travel time in the storm sewer, gutter, or drainage swale. The one-hour rainfall and time of concentrations were used to calculate rainfall intensities. Detailed runoff calculations for each basin and design points will be included with the Phase III Drainage Report.

C. Hydraulic Criteria

1. Storm Sewers – Pipes will be sized to convey the 100-year storm in accordance the Town's hydraulic criteria limits for the major storm event. StormCAD will be used to check the proposed pipe size and to determine the HGL/EGL. StormCAD results will be included within the Phase III Drainage Report.
2. Inlets – Storm drain inlets have been designed to capture all of the basin flows for the 100-year event with no runover to downstream inlets. UD-Inlet v4.05 was used to calculate inlet capacities and is attached. Allowable street capacities for the proposed improvements meet the requirements of the Town of Erie Standards. Internal streets for Westerly are public. Runoff from both the minor and major storm events is contained within the curb section of the proposed streets and will not adversely impact the adjacent buildings. Inlet sizing calculation will be included in the Phase III Drainage Report.
3. Manholes/Inlets – Headloss was analyzed in the StormCAD model utilizing Figure 7-13 Bend Loss Coefficients from Urban Storm Drainage Criteria Manual Volume 1.
4. Detention Pond – UD-Detention v3.07 was used to determine the size and release rate of the proposed detention pond. The detention pond and outlet structure have been designed to

release 70% of the predeveloped flows. A proposed culvert from the outlet structure will connect to the existing 7'x5' box culvert which runs under Weld County Road 5.

D. Adaptations from Criteria

No variances are requested.

IV. DRAINAGE FACILITY DESIGN

A. General Concept

Stormwater runoff will generally flow from southeast to northwest. Stormwater runoff from within the site will be conveyed be a combination of overland, street and storm sewer flow to the onsite detention pond.

The onsite detention pond is designed using Urban Drainage version 3.07, UD-Detention Spreadsheet and has a required volume of 27.19 acre-feet. The spillway is located on the northwest side of the site and will overflow onto Erie Parkway (Weld County Road 8). This spillway will only activate in storms greater than the 100-year storm. The 100-year storm and smaller storms will be contained within the pond and will flow out through the outlet structure. There is currently no storm sewer system or detention on the site.

There are no off-site flows entering the proposed site. The detention pond and outlet structure have been designed to release 70% of the predeveloped flows. No adverse impacts to downstream or adjacent drainage facilities are to be expected.

B. Specific Details

The detention pond was designed using *UD-Detention, Version 3.07 (February 20007)* by UDFCD. Maintenance access roads have been provided to the forebays and outlet structure. The existing 7'x5' box culvert located in Erie Parkway replaced the original conceptual design of a 300' 6'x4' RCB as shown on the Town of Erie OSP Preliminary Design Plan (Reference 4). Peak outflow from the proposed detention pond is 290.0 CFS. Peak outflow from the pond located in the Erie Highlands Planning Area 8 & 9 Subdivision pond is 78.4 CFS (Reference 5). Refer to Appendix C for 7'x5' box culvert calculation based on as-built information. The existing regional channel downstream of the existing 7'x5' box culvert has a full flow capacity of 1,418 CFS. Refer to Appendix C for Regional Channel calculation based on Colliers Hill design information (Reference 3).

V. SUMMARY

A. Compliance with Standards

The stormwater system design adheres with the *2018 Town of Erie – Standards and Specifications* and the *Urban Storm Drainage Criteria Manual by the Urban Drainage and Flood Control District*.

B. Drainage Concepts

Although site grading will change localized patterns, existing drainage patterns for the site will stay relatively the same,

VI. REFERENCES

1. Town of Erie, revised Janurary 2019. *2019 Standards and Specifications.*
2. Urban Drainage and Flood Control District, *Design Criteria Manual, Volume 1 (August 2018) and Volume 2 (September 2017).*
3. Hurst and Associates, Inc., *Colliers Hill Filing 4&5 - Phase III Drainage Report,* Revised October 5, 2016.
4. Love & Associates, Inc., December 2007, *Erie Outfall Systems Planning – Preliminary Design.*
5. CORE Consultants, July 2018, *Erie Highlands Planning Area 8&9 – Phase II Drainage Report.*

Appendix A – Vicinity Map

R:\18.994.001 (Dearmin Swink)\Dwg\Exhibits\Vicinity Map.dwg

VICINITY MAP

WESTERLY

MAY 2019

FIGURE No. 1

Matrix DESIGN GROUP
AN EMPLOYEE-OWNED COMPANY

Appendix B – Site Hydrologic Calculations

WESTERLY - ERIE, CO

Matrix Project #: 18.994

Prepared By: GMV

COMPOSITE BASIN - WEIGHTED "C" CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-3

	Residential							Lawns				
	Single Family			Multi-Unit				Clay Soil				
	0.25 acres	2.5 acres or larger	5 DU's/Ac 3,000 sf 2 story	(attached)	Roof	Streets: Paved	Gravel	2-7% Slope	>7% Slope	Historic		
% Imperv.	45.00%	12.00%	63.00%	75.00%	90.00%	100.00%	40.00%	2.00%	2.00%	2.00%		
											Total	Percent
BASIN	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Impervious
1	0.00					0.32				3.79	4.11	9.6%
2	0.00					0.32				0.19	0.51	63.5%
3	0.00					0.49				6.41	6.90	9.0%
4	0.00					0.68				0.28	0.96	71.4%
5	1.38					0.92				1.80	4.10	38.5%
6	1.93					0.50				0.16	2.59	53.0%
7	1.01					0.76				0.30	2.07	59.0%
8	4.93					1.84				2.35	9.12	45.0%
9	0.00					0.56				0.17	0.73	77.2%
10	1.03					0.82				0.97	2.82	46.2%
11	2.07					1.47				0.98	4.52	53.6%
12	4.10					1.12				0.35	5.57	53.4%
13	2.64					0.82				0.25	3.71	54.3%
14	0.00					0.52				6.17	6.69	9.6%
15	0.11					0.12				0.25	0.48	36.4%
16	2.95					0.85				0.27	4.07	53.6%
17	2.12					0.84				3.74	6.70	27.9%
18	0.00					0.36				0.16	0.52	69.8%
19	6.23					0.57				0.23	7.03	48.1%
20	2.64					0.95				1.37	4.96	43.7%
21	2.34					0.92				1.51	4.77	42.0%

	Residential							Lawns				
	Single Family			Multi-Unit				Clay Soil				
	0.25 acres	2.5 acres or larger	5 DU's/Ac 3,000 sf 2 story	(attached)	Roof	Streets: Paved	Gravel	2-7% Slope	>7% Slope	Historic		
% Imperv.	45.00%	12.00%	63.00%	75.00%	90.00%	100.00%	40.00%	2.00%	2.00%	2.00%		
											Total	Percent
BASIN	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Impervious
22	0.00					1.64				0.40	2.04	80.8%
23	2.97					1.90				1.84	6.71	48.8%
24	2.22					1.19				0.33	3.74	58.7%
25	2.31					0.60				0.19	3.10	53.0%
26	0.94					0.84				9.53	11.31	12.9%
27	0.00					1.20				2.72	3.92	32.0%
28	2.80					0.54				0.17	3.51	51.4%
29	2.33					0.78				0.23	3.34	54.9%
30	3.09					0.94				0.30	4.33	54.0%
31	0.00					0.37				0.12	0.49	76.0%
32	2.88					0.39				0.12	3.39	49.8%
33	2.71					0.86				0.27	3.84	54.3%
34	0.00					0.25				0.08	0.33	76.2%
35	3.28					1.21				1.36	5.85	46.4%
36	2.33					0.53				0.16	3.02	52.4%
37	1.92					1.46				0.29	3.67	63.5%
38	0.75					1.04				0.09	1.88	73.4%
39	0.41					0.39				0.15	0.95	60.8%
40	0.00					0.08				0.18	0.26	32.2%
41	3.46					0.82				1.06	5.34	44.9%
42	2.71					1.04				0.82	4.57	49.8%
43	2.35					0.93				0.59	3.87	51.7%
44	2.13					1.27				0.67	4.07	55.1%
45	1.23					0.70				0.27	2.20	57.2%
46	1.39					0.93				0.41	2.73	57.3%
47	1.31					0.19				0.07	1.57	49.7%
48	0.00					0.17				0.19	0.36	48.3%
49	0.15					0.46				0.17	0.78	68.1%

	Residential							Lawns				
	Single Family			Multi-Unit				Clay Soil				
	0.25 acres	2.5 acres or larger	5 DU's/Ac 3,000 sf 2 story	(attached)	Roof	Streets: Paved	Gravel	2-7% Slope	>7% Slope	Historic		
% Imperv.	45.00%	12.00%	63.00%	75.00%	90.00%	100.00%	40.00%	2.00%	2.00%	2.00%		
											Total	Percent
BASIN	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Impervious
50	0.38					0.41				0.12	0.91	64.1%
51	2.68					0.86				0.27	3.81	54.4%
52	6.19					1.65				0.86	8.70	51.2%
53	3.32					1.27				1.56	6.15	45.5%
54	0.59					0.78				0.43	1.80	58.6%
55	1.52					0.34				0.13	1.99	51.6%
56	2.68					0.60				0.19	3.47	52.2%
57	0.00					0.49				0.16	0.65	75.9%
58	2.20					0.80				1.83	4.83	37.8%
59	0.44					0.26				0.39	1.09	42.7%
60	1.70					0.41				0.12	2.23	52.8%
61	1.83					1.15				0.67	3.65	54.4%
62	1.72					1.38				2.04	5.14	42.7%
63	2.63					0.86				0.28	3.77	54.4%
64	0.00					0.24				0.16	0.40	60.8%
65	3.00					0.95				0.30	4.25	54.3%
66	5.26					0.91				0.29	6.46	50.8%
67	3.43					1.87				1.32	6.62	52.0%
68	2.84					1.72				1.89	6.45	47.1%
69	2.30					0.31				0.10	2.71	49.7%
70	0.00					0.63				1.27	1.90	34.5%
71	0.00					0.22				0.07	0.29	76.3%
72	2.19					0.79				0.29	3.27	54.5%
73	0.00					0.43				0.06	0.49	88.0%
74	2.20					0.48				0.14	2.82	52.2%
75	1.50					0.60				0.29	2.39	53.6%
76	3.13					1.08				0.26	4.47	55.8%
77	3.88					1.23				0.44	5.55	53.8%

	Residential							Lawns				
	Single Family			Multi-Unit				Clay Soil				
	0.25 acres	2.5 acres or larger	5 DU's/Ac 3,000 sf 2 story	(attached)	Roof	Streets: Paved	Gravel	2-7% Slope	>7% Slope	Historic		
% Imperv.	45.00%	12.00%	63.00%	75.00%	90.00%	100.00%	40.00%	2.00%	2.00%	2.00%		
											Total	Percent
BASIN	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Impervious
78	2.29					1.16				0.65	4.10	53.7%
79	1.42					0.69				0.25	2.36	56.5%
80	2.41					1.28				0.54	4.23	56.2%
81	1.16					0.00				11.25	12.41	6.0%
82	0.00					0.48				0.17	0.65	74.4%
83	0.00					1.88				0.44	2.32	81.4%
84	1.12					0.31				0.10	1.53	53.3%
85	0.00					0.39				0.12	0.51	76.9%
86	0.00					0.32				0.08	0.40	80.4%
87	1.85					0.89				0.71	3.45	50.3%
88	0.00					2.39				0.66	3.05	78.8%
89	1.05					1.00				1.02	3.07	48.6%
90	0.26					0.81				1.53	2.60	36.8%
Total	**150.32**	**0.00**	**0.00**	**0.00**	**0.00**	**72.79**	**0.00**	**0.00**	**0.00**	**87.93**	**311.04**	**45.7%**

WESTERLY - ERIE, CO

Matrix Project #: 18.994
Prepared By: GMV

COMPOSITE DEVELOPED BASIN -WEIGHTED "C" CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-4

i = % imperviousness/100 expressed as a decimal
C_A = Runoff coefficient for NRCS HSG A soils
C_B = Runoff coefficient for NRCS HSG B soils
C_{CD} = Runoff coefficient for NRCS HSG C and D soils.
Natural Resource Conservation Service (NRCS)

Table 6-4. Runoff coefficient equations based on NRCS soil group and storm return period

NRCS Soil Group	Storm Return Period						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
A	$C_A = 0.84i^{1.302}$	$C_A = 0.86i^{1.276}$	$C_A = 0.87i^{1.232}$	$C_A = 0.84i^{1.124}$	$C_A = 0.85i+0.025$	$C_A = 0.78i+0.110$	$C_A = 0.65i+0.254$
B	$C_B = 0.84i^{1.169}$	$C_B = 0.86i^{1.088}$	$C_B = 0.81i+0.057$	$C_B = 0.63i+0.249$	$C_B = 0.56i+0.328$	$C_B = 0.47i+0.426$	$C_B = 0.37i+0.536$
C/D	$C_{C/D} = 0.83i^{1.122}$	$C_{C/D} = 0.82i+0.035$	$C_{C/D} = 0.74i+0.132$	$C_{C/D} = 0.56i+0.319$	$C_{C/D} = 0.49i+0.393$	$C_{C/D} = 0.41i+0.484$	$C_{C/D} = 0.32i+0.588$

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
1	9.6%	0.10	A	0.04	0.04	0.05	0.19	4.07	4.11	0.04	0.04	0.05	0.19
			B	0.05	0.07	0.14	0.47						
			C or D	0.06	0.11	0.20	0.52	0.04					
2	63.5%	0.63	A	0.46	0.48	0.50	0.61	0.36	0.51	0.47	0.50	0.53	0.65
			B	0.49	0.52	0.57	0.72						
			C or D	0.50	0.56	0.60	0.74	0.15					
3	9.0%	0.09	A	0.04	0.04	0.04	0.18	2.30	6.90	0.05	0.06	0.10	0.37
			B	0.05	0.06	0.13	0.47	4.38					
			C or D	0.06	0.11	0.20	0.52	0.22					
4	71.4%	0.71	A	0.54	0.56	0.57	0.67		0.96	0.57	0.60	0.64	0.77
			B	0.57	0.60	0.64	0.76	0.66					
			C or D	0.57	0.62	0.66	0.78	0.30					
5	38.5%	0.38	A	0.24	0.25	0.27	0.41		4.10	0.28	0.31	0.38	0.61
			B	0.27	0.30	0.37	0.61	3.15					
			C or D	0.28	0.35	0.42	0.64	0.95					
6	53.0%	0.53	A	0.37	0.38	0.40	0.52		2.59	0.40	0.43	0.49	0.68
			B	0.40	0.43	0.49	0.67	2.31					
			C or D	0.41	0.47	0.52	0.70	0.28					
7	59.0%	0.59	A	0.42	0.44	0.45	0.57		2.07	0.46	0.50	0.55	0.72
			B	0.45	0.48	0.53	0.70	0.88					
			C or D	0.46	0.52	0.57	0.73	1.19					

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
8	45.0%	0.45	A	0.30	0.31	0.33	0.46						
			B	0.33	0.36	0.42	0.64	0.08	9.12	0.34	0.40	0.46	0.67
			C or D	0.34	0.40	0.47	0.67	9.04					
9	77.2%	0.77	A	0.60	0.62	0.63	0.71						
			B	0.62	0.65	0.68	0.79	0.03	0.73	0.62	0.67	0.70	0.80
			C or D	0.62	0.67	0.70	0.80	0.70					
10	46.2%	0.46	A	0.31	0.32	0.34	0.47						
			B	0.34	0.37	0.43	0.64	2.82	2.82	0.34	0.37	0.43	0.64
			C or D	0.35	0.41	0.47	0.67	0.00					
11	53.6%	0.54	A	0.37	0.39	0.40	0.53						
			B	0.40	0.44	0.49	0.68	3.76	4.52	0.41	0.44	0.50	0.68
			C or D	0.41	0.47	0.53	0.70	0.76					
12	53.4%	0.53	A	0.37	0.39	0.40	0.53						
			B	0.40	0.43	0.49	0.68	5.57	5.57	0.40	0.43	0.49	0.68
			C or D	0.41	0.47	0.53	0.70	0.00					
13	54.3%	0.54	A	0.38	0.39	0.41	0.53						
			B	0.41	0.44	0.50	0.68	3.71	3.71	0.41	0.44	0.50	0.68
			C or D	0.42	0.48	0.53	0.71	0.00					
14	9.6%	0.10	A	0.04	0.04	0.05	0.19						
			B	0.05	0.07	0.13	0.47	6.91	6.69	0.05	0.07	0.13	0.47
			C or D	0.06	0.11	0.20	0.52	(0.22)					
15	36.4%	0.36	A	0.22	0.24	0.25	0.39						
			B	0.26	0.29	0.35	0.60	0.48	0.48	0.26	0.29	0.35	0.60
			C or D	0.27	0.33	0.40	0.63	0.00					
16	53.6%	0.54	A	0.37	0.39	0.40	0.53						
			B	0.41	0.44	0.49	0.68	1.76	4.07	0.41	0.46	0.51	0.69
			C or D	0.41	0.47	0.53	0.70	2.31					
17	27.9%	0.28	A	0.16	0.17	0.18	0.33	5.20					
			B	0.19	0.21	0.28	0.56	1.38	6.70	0.17	0.18	0.20	0.38
			C or D	0.20	0.26	0.34	0.60	0.12					
18	69.8%	0.70	A	0.53	0.54	0.56	0.65	0.23					
			B	0.55	0.58	0.62	0.75	0.26	0.49	0.54	0.56	0.59	0.71
			C or D	0.55	0.61	0.65	0.77	0.00					
19	48.1%	0.48	A	0.32	0.34	0.35	0.48	1.39					
			B	0.36	0.39	0.45	0.65	5.64	7.03	0.35	0.38	0.43	0.62
			C or D	0.36	0.43	0.49	0.68	0.00					

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
			A	0.29	0.30	0.31	0.45						
20	43.7%	0.44	B	0.32	0.35	0.41	0.63	0.13	4.96	0.33	0.39	0.45	0.66
			C or D	0.33	0.39	0.46	0.66	4.83					
			A	0.27	0.28	0.30	0.44						
21	42.0%	0.42	B	0.30	0.33	0.40	0.62	4.65	4.77	0.30	0.34	0.40	0.62
			C or D	0.31	0.38	0.44	0.66	0.12					
			A	0.64	0.66	0.67	0.74						
22	80.8%	0.81	B	0.65	0.68	0.71	0.81		2.04	0.65	0.70	0.73	0.82
			C or D	0.65	0.70	0.73	0.82	2.04					
			A	0.33	0.34	0.36	0.49						
23	48.8%	0.49	B	0.36	0.39	0.45	0.66	0.32	6.71	0.37	0.43	0.49	0.68
			C or D	0.37	0.44	0.49	0.68	6.39					
			A	0.42	0.44	0.45	0.57						
24	58.7%	0.59	B	0.45	0.48	0.53	0.70	3.37	3.74	0.45	0.49	0.54	0.70
			C or D	0.46	0.52	0.57	0.72	0.37					
			A	0.37	0.38	0.40	0.52						
25	53.0%	0.53	B	0.40	0.43	0.49	0.68	3.02	3.10	0.40	0.43	0.49	0.68
			C or D	0.41	0.47	0.52	0.70	0.08					
			A	0.06	0.06	0.07	0.21	10.28					
26	12.9%	0.13	B	0.08	0.09	0.16	0.49	1.15	11.31	0.06	0.06	0.08	0.23
			C or D	0.08	0.14	0.23	0.54	(0.12)					
			A	0.19	0.20	0.21	0.36	1.02					
27	32.0%	0.32	B	0.22	0.25	0.32	0.58	1.68	3.92	0.22	0.25	0.31	0.53
			C or D	0.23	0.30	0.37	0.62	1.22					
			A	0.35	0.37	0.38	0.51						
28	51.4%	0.51	B	0.39	0.42	0.47	0.67	2.20	3.51	0.39	0.43	0.49	0.68
			C or D	0.39	0.46	0.51	0.69	1.31					
			A	0.38	0.40	0.42	0.54						
29	54.9%	0.55	B	0.42	0.45	0.50	0.68	1.94	3.34	0.42	0.46	0.52	0.69
			C or D	0.42	0.49	0.54	0.71	1.40					
			A	0.38	0.39	0.41	0.53						
30	54.0%	0.54	B	0.41	0.44	0.49	0.68	0.20	4.33	0.42	0.48	0.53	0.70
			C or D	0.42	0.48	0.53	0.71	4.13					
			A	0.59	0.61	0.62	0.70						
31	76.0%	0.76	B	0.61	0.64	0.67	0.78	0.00	0.49	0.61	0.66	0.69	0.80
			C or D	0.61	0.66	0.69	0.80	0.49					

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
32	49.8%	0.50	A	0.34	0.35	0.37	0.50						
			B	0.37	0.40	0.46	0.66	0.97	3.39	0.38	0.43	0.49	0.68
			C or D	0.38	0.44	0.50	0.69	2.42					
33	54.3%	0.54	A	0.38	0.39	0.41	0.53						
			B	0.41	0.44	0.50	0.68	3.84	3.84	0.41	0.44	0.50	0.68
			C or D	0.42	0.48	0.53	0.71	0.00					
34	76.2%	0.76	A	0.59	0.61	0.62	0.70						
			B	0.61	0.64	0.67	0.78	0.33	0.33	0.61	0.64	0.67	0.78
			C or D	0.61	0.66	0.70	0.80	0.00					
35	46.4%	0.46	A	0.31	0.32	0.34	0.47						
			B	0.34	0.37	0.43	0.64	6.13	5.85	0.34	0.37	0.43	0.64
			C or D	0.35	0.42	0.48	0.67	(0.28)					
36	52.4%	0.52	A	0.36	0.38	0.39	0.52						
			B	0.39	0.43	0.48	0.67	3.02	3.02	0.39	0.43	0.48	0.67
			C or D	0.40	0.46	0.52	0.70	0.00					
37	63.5%	0.63	A	0.46	0.48	0.50	0.61						
			B	0.49	0.52	0.57	0.72	3.00	3.67	0.49	0.53	0.58	0.73
			C or D	0.50	0.56	0.60	0.74	0.67					
38	73.4%	0.73	A	0.56	0.58	0.59	0.68						
			B	0.58	0.61	0.65	0.77	0.72	1.88	0.59	0.63	0.67	0.78
			C or D	0.59	0.64	0.67	0.78	1.16					
39	60.8%	0.61	A	0.44	0.46	0.47	0.58						
			B	0.47	0.50	0.55	0.71	0.95	0.95	0.47	0.50	0.55	0.71
			C or D	0.47	0.53	0.58	0.73	0.00					
40	32.2%	0.32	A	0.19	0.20	0.21	0.36	0.26					
			B	0.22	0.25	0.32	0.58		0.26	0.19	0.20	0.21	0.36
			C or D	0.23	0.30	0.37	0.62	0.00					
41	44.9%	0.45	A	0.30	0.31	0.32	0.46	0.48					
			B	0.33	0.36	0.42	0.64	4.82	5.34	0.33	0.36	0.41	0.62
			C or D	0.34	0.40	0.46	0.67	0.04					
42	49.8%	0.50	A	0.34	0.35	0.37	0.50	0.58					
			B	0.37	0.40	0.46	0.66	3.63	4.57	0.37	0.40	0.45	0.64
			C or D	0.38	0.44	0.50	0.69	0.36					

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
			A	0.36	0.37	0.39	0.51						
43	51.7%	0.52	B	0.39	0.42	0.48	0.67	0.06	3.87	0.40	0.46	0.51	0.70
			C or D	0.40	0.46	0.51	0.70	3.81					
			A	0.39	0.40	0.42	0.54						
44	55.1%	0.55	B	0.42	0.45	0.50	0.68		4.07	0.43	0.49	0.54	0.71
			C or D	0.43	0.49	0.54	0.71	4.07					
			A	0.41	0.42	0.44	0.56						
45	57.2%	0.57	B	0.44	0.47	0.52	0.69	0.93	2.20	0.44	0.49	0.54	0.71
			C or D	0.44	0.50	0.56	0.72	1.27					
			A	0.41	0.42	0.44	0.56						
46	57.3%	0.57	B	0.44	0.47	0.52	0.70	2.73	2.73	0.44	0.47	0.52	0.70
			C or D	0.44	0.50	0.56	0.72	0.00					
			A	0.34	0.35	0.37	0.50						
47	49.7%	0.50	B	0.37	0.40	0.46	0.66	1.57	1.57	0.37	0.40	0.46	0.66
			C or D	0.38	0.44	0.50	0.69	0.00					
			A	0.33	0.34	0.35	0.49						
48	48.3%	0.48	B	0.36	0.39	0.45	0.65	0.36	0.36	0.36	0.39	0.45	0.65
			C or D	0.37	0.43	0.49	0.68	0.00					
			A	0.51	0.53	0.54	0.64						
49	68.1%	0.68	B	0.54	0.57	0.61	0.75	0.78	0.78	0.54	0.57	0.61	0.75
			C or D	0.54	0.59	0.64	0.76	0.00					
			A	0.47	0.49	0.50	0.61						
50	64.1%	0.64	B	0.50	0.53	0.58	0.73	0.25	0.91	0.50	0.55	0.60	0.74
			C or D	0.50	0.56	0.61	0.75	0.66					
			A	0.38	0.40	0.41	0.53						
51	54.4%	0.54	B	0.41	0.44	0.50	0.68	0.96	3.81	0.42	0.47	0.53	0.70
			C or D	0.42	0.48	0.53	0.71	2.85					
			A	0.35	0.37	0.38	0.51	0.55					
52	51.2%	0.51	B	0.38	0.41	0.47	0.67	3.99	8.70	0.39	0.43	0.48	0.67
			C or D	0.39	0.45	0.51	0.69	4.16					
			A	0.30	0.31	0.33	0.46						
53	45.5%	0.45	B	0.33	0.36	0.43	0.64	3.32	6.15	0.34	0.38	0.45	0.65
			C or D	0.34	0.41	0.47	0.67	2.83					
			A	0.42	0.43	0.45	0.57						
54	58.6%	0.59	B	0.45	0.48	0.53	0.70	0.29	1.80	0.45	0.51	0.56	0.72
			C or D	0.46	0.52	0.57	0.72	1.51					

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
			A	0.35	0.37	0.38	0.51						
55	51.6%	0.52	B	0.39	0.42	0.47	0.67	0.54	1.99	0.39	0.45	0.50	0.69
			C or D	0.39	0.46	0.51	0.70	1.45					
			A	0.36	0.37	0.39	0.52						
56	52.2%	0.52	B	0.39	0.42	0.48	0.67		3.47	0.40	0.46	0.52	0.70
			C or D	0.40	0.46	0.52	0.70	3.47					
			A	0.59	0.60	0.62	0.70						
57	75.9%	0.76	B	0.61	0.64	0.67	0.78		0.65	0.61	0.66	0.69	0.80
			C or D	0.61	0.66	0.69	0.80	0.65					
			A	0.24	0.25	0.26	0.40						
58	37.8%	0.38	B	0.27	0.30	0.36	0.60	4.44	4.83	0.27	0.30	0.37	0.61
			C or D	0.28	0.35	0.41	0.64	0.39					
			A	0.28	0.29	0.31	0.44						
59	42.7%	0.43	B	0.31	0.34	0.40	0.63	1.09	1.09	0.31	0.34	0.40	0.63
			C or D	0.32	0.39	0.45	0.66	0.00					
			A	0.37	0.38	0.40	0.52						
60	52.8%	0.53	B	0.40	0.43	0.48	0.67	0.08	2.23	0.41	0.47	0.52	0.70
			C or D	0.41	0.47	0.52	0.70	2.15					
			A	0.38	0.40	0.41	0.53						
61	54.4%	0.54	B	0.41	0.44	0.50	0.68	0.61	3.65	0.42	0.48	0.53	0.70
			C or D	0.42	0.48	0.53	0.71	3.04					
			A	0.28	0.29	0.30	0.44						
62	42.7%	0.43	B	0.31	0.34	0.40	0.63	0.05	5.14	0.32	0.38	0.45	0.66
			C or D	0.32	0.39	0.45	0.66	5.09					
			A	0.38	0.40	0.41	0.53						
63	54.4%	0.54	B	0.41	0.44	0.50	0.68		3.77	0.42	0.48	0.53	0.71
			C or D	0.42	0.48	0.53	0.71	3.77					
			A	0.44	0.46	0.47	0.58						
64	60.8%	0.61	B	0.47	0.50	0.55	0.71		0.40	0.47	0.53	0.58	0.73
			C or D	0.47	0.53	0.58	0.73	0.40					
			A	0.38	0.39	0.41	0.53						
65	54.3%	0.54	B	0.41	0.44	0.50	0.68		4.25	0.42	0.48	0.53	0.71
			C or D	0.42	0.48	0.53	0.71	4.25					
			A	0.35	0.36	0.38	0.51						
66	50.8%	0.51	B	0.38	0.41	0.47	0.66		6.46	0.39	0.45	0.51	0.69
			C or D	0.39	0.45	0.51	0.69	6.46					

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
67	52.0%	0.52	A	0.36	0.37	0.39	0.52		6.62	0.40	0.46	0.52	0.70
			B	0.39	0.42	0.48	0.67						
			C or D	0.40	0.46	0.52	0.70	6.62					
68	47.1%	0.47	A	0.31	0.33	0.34	0.48		6.45	0.36	0.42	0.48	0.68
			B	0.35	0.38	0.44	0.65						
			C or D	0.36	0.42	0.48	0.68	6.45					
69	49.7%	0.50	A	0.34	0.35	0.37	0.50		2.71	0.38	0.44	0.50	0.69
			B	0.37	0.40	0.46	0.66						
			C or D	0.38	0.44	0.50	0.69	2.71					
70	34.5%	0.34	A	0.21	0.22	0.23	0.38		1.90	0.25	0.32	0.39	0.62
			B	0.24	0.27	0.34	0.59	0.06					
			C or D	0.25	0.32	0.39	0.63	1.84					
71	76.3%	0.76	A	0.59	0.61	0.62	0.71		0.29	0.61	0.66	0.70	0.80
			B	0.61	0.64	0.68	0.78						
			C or D	0.61	0.66	0.70	0.80	0.29					
72	54.5%	0.54	A	0.38	0.40	0.41	0.53		3.27	0.42	0.47	0.52	0.70
			B	0.41	0.44	0.50	0.68	1.22					
			C or D	0.42	0.48	0.54	0.71	2.05					
73	88.0%	0.88	A	0.71	0.73	0.74	0.80		0.49	0.72	0.76	0.78	0.84
			B	0.72	0.75	0.77	0.84						
			C or D	0.72	0.76	0.78	0.84	0.49					
74	52.2%	0.52	A	0.36	0.38	0.39	0.52		2.82	0.40	0.46	0.52	0.70
			B	0.39	0.42	0.48	0.67						
			C or D	0.40	0.46	0.52	0.70	2.82					
75	53.6%	0.54	A	0.37	0.39	0.40	0.53		2.39	0.41	0.44	0.49	0.68
			B	0.41	0.44	0.49	0.68	2.39					
			C or D	0.41	0.47	0.53	0.70	0.00					
76	55.8%	0.56	A	0.39	0.41	0.42	0.55		4.47	0.43	0.49	0.54	0.71
			B	0.42	0.46	0.51	0.69						
			C or D	0.43	0.49	0.54	0.71	4.47					
77	53.8%	0.54	A	0.37	0.39	0.41	0.53		5.55	0.41	0.44	0.50	0.68
			B	0.41	0.44	0.49	0.68	4.95					
			C or D	0.41	0.48	0.53	0.70	0.60					
78	53.7%	0.54	A	0.37	0.39	0.40	0.53		4.10	0.41	0.46	0.52	0.70
			B	0.41	0.44	0.49	0.68	1.38					
			C or D	0.41	0.48	0.53	0.70	2.72					

Basin ID	% Imperv.	*i*	Soil Type	Runoff Coefficients, C				Basin Area	Total Area	Weighted Runoff Coefficients, C			
				2-Year	5-Year	10-Year	100-Year			2-Year	5-Year	10-Year	100-Year
79	56.5%	0.57	A	0.40	0.42	0.43	0.55						
			B	0.43	0.46	0.51	0.69	0.50	2.36	0.44	0.49	0.54	0.71
			C or D	0.44	0.50	0.55	0.72	1.86					
80	56.2%	0.56	A	0.40	0.41	0.43	0.55						
			B	0.43	0.46	0.51	0.69	3.14	4.23	0.43	0.47	0.52	0.70
			C or D	0.43	0.50	0.55	0.71	1.09					
81	6.0%	0.06	A	0.02	0.02	0.03	0.16						
			B	0.03	0.04	0.11	0.45	9.54	12.41	0.03	0.05	0.12	0.47
			C or D	0.04	0.08	0.18	0.51	2.87					
82	74.4%	0.74	A	0.57	0.59	0.60	0.69						
			B	0.59	0.62	0.66	0.78	0.60	0.65	0.59	0.62	0.66	0.78
			C or D	0.60	0.64	0.68	0.79	0.05					
83	81.4%	0.81	A	0.64	0.66	0.68	0.75						
			B	0.66	0.69	0.72	0.81		2.32	0.66	0.70	0.73	0.82
			C or D	0.66	0.70	0.73	0.82	2.32					
84	53.3%	0.53	A	0.37	0.39	0.40	0.53						
			B	0.40	0.43	0.49	0.68		1.53	0.41	0.47	0.53	0.70
			C or D	0.41	0.47	0.53	0.70	1.53					
85	76.9%	0.77	A	0.60	0.62	0.63	0.71						
			B	0.62	0.65	0.68	0.79		0.51	0.62	0.67	0.70	0.80
			C or D	0.62	0.67	0.70	0.80	0.51					
86	80.4%	0.80	A	0.63	0.65	0.66	0.74						
			B	0.65	0.68	0.71	0.80		0.40	0.65	0.69	0.73	0.81
			C or D	0.65	0.69	0.73	0.81	0.40					
87	50.3%	0.50	A	0.34	0.36	0.37	0.50						
			B	0.38	0.41	0.46	0.66		3.45	0.38	0.45	0.50	0.69
			C or D	0.38	0.45	0.50	0.69	3.45					
88	78.8%	0.79	A	0.62	0.63	0.65	0.72						
			B	0.64	0.66	0.70	0.80	1.50	3.05	0.64	0.67	0.71	0.80
			C or D	0.64	0.68	0.72	0.81	1.55					
89	48.6%	0.49	A	0.33	0.34	0.36	0.49						
			B	0.36	0.39	0.45	0.65		3.07	0.37	0.43	0.49	0.68
			C or D	0.37	0.43	0.49	0.68	3.07					
90	36.8%	0.37	A	0.23	0.24	0.25	0.40						
			B	0.26	0.29	0.36	0.60	2.08	2.60	0.26	0.30	0.37	0.61
			C or D	0.27	0.34	0.40	0.64	0.52					

WESTERLY - ERIE, CO

Matrix Project #: 18.994

Prepared By: GMV

TIME OF CONCENTRATION CALCULATIONS

-REFERENCE UDFCD Vol.1 Section 2.4

NRCS Conveyance factors, K -REFERENCE UDFCD Vol.1 RUNOFF Table 6-2

SF-2

Heavy Meadow	2.50	Short Grass Pasture & Lawns	7.00	Grassed Waterway	15.00
Tillage/field	5.00	Nearly Bare Ground	10.00	Paved Area & Shallow Gutter	20.00

SUB-BASIN DATA			INITIAL / OVERLAND TIME			TRAVEL TIME T(t)						T(c) CHECK (URBANIZED BASINS)		FINAL T(c)
DRAIN BASIN	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	% IMPER-VIOUS	USDCM Eq . 6-5	min.
1	4.11	0.04	300	4.3	20.4	415	5.3	7.00	1.6	4.3	24.7	9.6%		24.7
2	0.51	0.50	13	3.9	2.5	488	1.8	20.00	2.7	3.0	5.5	63.5%	15.5	5.5
3	6.90	0.06	300	6.3	17.8	406	5.9	7.00	1.7	4.0	21.8	9.0%		21.8
4	0.96	0.60	14	3.5	2.3	1154	2.5	20.00	3.2	6.0	8.3	71.4%	14.5	8.3
5	4.10	0.31	18	2.8	4.2	798	2.0	20.00	2.8	4.8	9.0	38.5%	20.1	9.0
6	2.59	0.43	280	5.7	11.3	218	1.8	20.00	2.7	1.3	12.6	53.0%	17.2	12.6
7	2.07	0.50	16	3.1	3.0	515	1.7	20.00	2.6	3.3	6.3	59.0%	16.4	6.3
8	9.12	0.40	189	2.6	12.5	1155	1.0	20.00	2.0	9.6	22.1	45.0%	19.6	19.6
9	0.73	0.67	12	4.1	1.7	817	0.9	20.00	1.9	7.2	8.9	77.2%	13.6	8.9
10	2.82	0.37	16	3.2	3.5	612	1.5	20.00	2.4	4.3	7.8	46.2%	18.7	7.8
11	4.52	0.44	13	4.0	2.7	870	2.2	20.00	3.0	4.8	7.5	53.6%	17.5	7.5
12	5.57	0.43	13	3.8	2.8	874	1.9	20.00	2.8	5.2	8.0	53.4%	17.6	8.0
13	3.71	0.44	35	1.4	6.2	761	2.0	20.00	2.8	4.5	10.7	54.3%	17.3	10.7
14	6.69	0.07	210	3.3	18.2	501	3.0	7.00	1.2	7.0	25.2	9.6%		25.2
15	0.48	0.29	15	3.4	3.8	336	0.6	20.00	1.5	3.7	7.5	36.4%	20.3	7.5
16	4.07	0.46	12	4.1	2.5	893	1.7	20.00	2.6	5.7	8.2	53.6%	17.6	8.2
17	6.70	0.18	216	8.3	12.1	545	2.0	20.00	2.8	3.2	15.3	27.9%	21.8	15.3
18	0.52	0.56	15	3.4	2.5	336	0.6	20.00	1.5	3.7	6.2	69.8%	14.5	6.2
19	7.03	0.38	251	8.4	10.2	874	0.9	20.00	1.9	7.7	17.9	48.1%	18.8	17.9
20	4.96	0.39	300	4.0	14.0	337	3.0	20.00	3.4	1.7	15.7	43.7%	18.8	15.7
21	4.77	0.34	12	4.1	3.0	830	1.4	20.00	2.4	5.8	8.8	42.0%	19.6	8.8
22	2.04	0.70	17	11.6	1.3	853	2.0	20.00	2.8	5.1	6.4	80.8%	12.8	6.4
23	6.71	0.43	300	0.7	23.8	1105	2.5	20.00	3.2	5.8	29.6	48.8%	18.4	18.4
24	3.74	0.49	12	4.1	2.4	713	2.4	20.00	3.1	3.8	6.2	58.7%	16.5	6.2

SUB-BASIN DATA			INITIAL / OVERLAND TIME			TRAVEL TIME T(t)						T(c) CHECK (URBANIZED BASINS)		FINAL T(c)
DRAIN BASIN	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	% IMPER-VIOUS	USDCM Eq . 6-5	min.
25	3.10	0.43	14	3.7	2.9	781	1.8	20.00	2.7	4.8	7.7	53.0%	17.6	7.7
26	11.31	0.06	300	10.3	15.0	504	3.8	20.00	3.9	2.2	17.2	12.9%		17.2
27	3.92	0.25	25	2.0	6.1	1204	3.1	20.00	3.5	5.7	11.8	32.0%	21.4	11.8
28	3.51	0.43	15	3.3	3.1	777	6.7	20.00	5.2	2.5	5.6	51.4%	17.6	5.6
29	3.34	0.46	10	5.0	2.1	579	2.6	20.00	3.2	3.0	5.1	54.9%	17.0	5.1
30	4.33	0.48	236	2.5	12.7	408	1.7	20.00	2.6	2.6	15.3	54.0%	17.1	15.3
31	0.49	0.66	12	4.1	1.7	451	1.6	20.00	2.5	3.0	4.7	76.0%	13.4	5.0
32	3.39	0.43	322	3.1	14.9	465	1.5	20.00	2.5	3.1	18.0	49.8%	17.9	17.9
33	3.84	0.44	255	3.1	13.0	196	2.5	20.00	3.2	1.0	14.0	54.3%	16.9	14.0
34	0.33	0.64	9	5.4	1.4	327	3.1	20.00	3.5	1.6	3.0	76.2%	13.2	5.0
35	5.85	0.37	247	4.0	13.1	419	1.9	20.00	2.8	2.5	15.6	46.4%	18.4	15.6
36	3.02	0.43	12	4.0	2.7	642	2.5	20.00	3.2	3.3	6.0	52.4%	17.5	6.0
37	3.67	0.53	108	0.5	13.8	739	1.6	20.00	2.5	4.9	18.7	63.5%	15.7	15.7
38	1.88	0.00	17	6.0	4.5	717	1.8	20.00	2.7	4.4	8.9	73.4%	14.0	8.9
39	0.95	0.50	30	1.7	5.0	542	1.7	20.00	2.6	3.5	8.5	60.8%	16.1	8.5
40	0.26	0.20	210	3.3	15.8	501	3.0	20.00	3.5	2.4	18.2	32.2%	20.9	18.2
41	5.34	0.36	112	3.6	9.4	987	1.3	20.00	2.3	7.2	16.6	44.9%	19.3	16.6
42	4.57	0.40	231	0.9	20.2	556	3.6	20.00	3.8	2.4	22.6	49.8%	17.8	17.8
43	3.87	0.46	216	1.4	15.3	686	2.6	20.00	3.2	3.6	18.9	51.7%	17.7	17.7
44	4.07	0.49	13	3.9	2.5	761	2.1	20.00	2.9	4.4	6.9	55.1%	17.2	6.9
45	2.20	0.49	14	3.7	2.6	712	2.4	20.00	3.1	3.8	6.4	57.2%	16.7	6.4
46	2.73	0.47	13	4.0	2.6	479	2.1	20.00	2.9	2.8	5.4	57.3%	16.6	5.4
47	1.57	0.40	119	2.5	10.1	270	1.9	20.00	2.7	1.7	11.8	49.7%	17.8	11.8
48	0.36	0.39	15	3.3	3.3	252	2.0	20.00	2.8	1.5	4.8	48.3%	18.0	5.0
49	0.78	0.57	30	1.7	4.4	542	1.7	20.00	2.6	3.5	7.9	68.1%	14.8	7.9
50	0.91	0.55	12	4.3	2.1	841	2.7	20.00	3.3	4.2	6.3	64.1%	15.6	6.3
51	3.81	0.47	19	2.6	3.6	817	1.6	20.00	2.5	5.4	9.0	54.4%	17.4	9.0
52	8.70	0.43	14	3.6	3.0	1455	1.9	20.00	2.7	9.0	12.0	51.2%	18.4	12.0
53	6.15	0.38	19	2.7	4.1	1226	2.1	20.00	2.9	7.0	11.1	45.5%	19.2	11.1
54	1.80	0.51	12	4.3	2.2	841	2.7	20.00	3.3	4.2	6.4	58.6%	16.5	6.4
55	1.99	0.45	14	3.6	2.9	527	1.3	20.00	2.3	3.8	6.7	51.6%	17.7	6.7
56	3.47	0.46	14	3.5	2.8	598	2.3	20.00	3.1	3.2	6.0	52.2%	17.5	6.0

SUB-BASIN DATA			INITIAL / OVERLAND TIME			TRAVEL TIME T(t)						T(c) CHECK (URBANIZED BASINS)		FINAL T(c)
DRAIN BASIN	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	% IMPER-VIOUS	USDCM Eq . 6-5	min.
57	0.65	0.66	13	3.8	1.9	609	3.1	20.00	3.5	2.9	4.8	75.9%	13.4	5.0
58	4.83	0.30	293	3.8	15.9	399	2.5	20.00	3.2	2.1	18.0	37.8%	19.9	18.0
59	1.09	0.34	50	2.0	7.7	230	6.5	20.00	5.1	0.8	8.5	42.7%	18.8	8.5
60	2.23	0.47	12	4.3	2.4	841	2.7	20.00	3.3	4.2	6.6	52.8%	17.5	6.6
61	3.65	0.48	14	3.5	2.8	731	3.6	20.00	3.8	3.2	6.0	54.4%	17.1	6.0
62	5.14	0.38	4	11.5	1.2	1555	3.0	20.00	3.5	7.4	8.6	42.7%	19.7	8.6
63	3.77	0.48	13	3.8	2.6	1005	1.6	20.00	2.5	6.7	9.3	54.4%	17.6	9.3
64	0.40	0.53	19	2.6	3.2	309	1.6	20.00	2.5	2.1	5.3	60.8%	15.9	5.3
65	4.25	0.48	17	2.9	3.3	909	2.5	20.00	3.2	4.7	8.0	54.3%	17.3	8.0
66	6.46	0.45	286	1.7	16.5	1118	2.5	20.00	3.2	5.8	22.3	50.8%	18.1	18.1
67	6.62	0.46	12	4.0	2.6	535	2.4	20.00	3.1	2.9	5.5	52.0%	17.5	5.5
68	6.45	0.42	17	3.0	3.5	1845	1.8	20.00	2.7	11.4	14.9	47.1%	19.5	14.9
69	2.71	0.44	14	3.7	2.9	247	1.6	20.00	2.5	1.6	4.5	49.7%	17.8	5.0
70	1.90	0.32	7	6.8	2.0	665	2.4	20.00	3.1	3.6	5.6	34.5%	20.7	5.6
71	0.29	0.66	11	4.7	1.5	277	0.7	20.00	1.7	2.7	4.2	76.3%	13.3	5.0
72	3.27	0.47	13	3.9	2.6	892	2.1	20.00	2.9	5.1	7.7	54.5%	17.4	7.7
73	0.49	0.76	19	2.6	2.0	312	1.3	20.00	2.3	2.3	4.3	88.0%	11.3	5.0
74	2.82	0.46	16	3.2	3.1	597	1.7	20.00	2.6	3.8	6.9	52.2%	17.6	6.9
75	2.39	0.44	11	4.6	2.4	564	2.3	20.00	3.0	3.1	5.5	53.6%	17.3	5.5
76	4.47	0.49	12	4.0	2.4	606	0.7	20.00	1.6	6.3	8.7	55.8%	17.3	8.7
77	5.55	0.44	11	4.7	2.3	707	2.7	20.00	3.3	3.6	5.9	53.8%	17.3	5.9
78	4.10	0.46	13	3.8	2.7	1352	2.1	20.00	2.9	7.8	10.5	53.7%	17.8	10.5

SUB-BASIN DATA			INITIAL / OVERLAND TIME			TRAVEL TIME T(t)						T(c) CHECK (URBANIZED BASINS)		FINAL T(c)
DRAIN BASIN	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	% IMPER-VIOUS	USDCM Eq . 6-5	min.
79	2.36	0.49	17	3.0	3.1	704	1.8	20.00	2.7	4.3	7.4	56.5%	16.9	7.4
80	4.23	0.47	18	2.8	3.4	1152	1.9	20.00	2.8	6.9	10.3	56.2%	17.3	10.3
81	12.41	0.05	300	3.3	22.1	898	2.2	20.00	3.0	5.0	27.1	6.0%		27.1
82	0.65	0.62	9	5.8	1.4	677	1.2	20.00	2.2	5.1	6.5	74.4%	13.9	6.5
83	2.32	0.70	32	1.6	3.5	1323	0.9	20.00	1.9	11.6	15.1	81.4%	13.3	13.3
84	1.53	0.47	18	2.8	3.4	232	2.6	20.00	3.2	1.2	4.6	53.3%	17.1	5.0
85	0.51	0.67	12	4.3	1.6	430	0.9	20.00	1.9	3.8	5.4	76.9%	13.3	5.4
86	0.40	0.69	14	3.6	1.8	334	0.9	20.00	1.9	2.9	4.7	80.4%	12.6	5.0
87	3.45	0.45	44	1.1	7.5	475	2.1	20.00	2.9	2.7	10.2	50.3%	17.8	10.2
88	3.05	0.67	12	4.2	1.6	1214	2.0	20.00	2.8	7.2	8.8	78.8%	13.3	8.8
89	3.07	0.43	13	3.8	2.8	1352	2.1	20.00	2.9	7.8	10.6	48.6%	18.7	10.6
90	2.60	0.30	10	9.9	2.2	533	1.5	20.00	2.5	3.6	5.8	36.8%	20.3	5.8

WESTERLY - ERIE, CO

Matrix Project #: 18.994

Prepared By: GMV

RATIONAL METHOD PEAK RUNOFF

2-YR STORM

SF-3 *Rainfall Depth-Duration-Frequency (1-hr) =* **0.81**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	2yr RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
1	1	4.11	0.04	24.7	0.16	1.42	0.2					
2	2	0.51	0.47	5.5	0.24	2.68	0.6					
3	3	6.90	0.05	21.8	0.31	1.52	0.5					
4	4	0.96	0.57	8.3	0.54	2.35	1.3					
5	5	4.10	0.28	9.0	1.14	2.28	2.6					
6	6	2.59	0.40	12.6	1.04	1.99	2.1					
7	7	2.07	0.46	6.3	0.94	2.57	2.4					
8	8	9.12	0.34	19.6	3.09	1.61	5.0					
9	9	0.73	0.62	8.9	0.45	2.29	1.0					
10	10	2.82	0.34	7.8	0.96	2.40	2.3					
11	11	4.52	0.41	7.5	1.84	2.43	4.5					
12	12	5.57	0.40	8.0	2.25	2.38	5.3					
13	13	3.71	0.41	10.7	1.52	2.13	3.3					
14	14	6.69	0.05	25.2	0.36	1.41	0.5					
15	15	0.48	0.26	7.5	0.12	2.43	0.3					
16	16	4.07	0.41	8.2	1.67	2.36	3.9					
17	17	6.70	0.17	15.3	1.11	1.82	2.0					
18	18	0.52	0.54	6.2	0.28	2.59	0.7					
19	19	7.03	0.35	17.9	2.46	1.69	4.2					
20	20	4.96	0.33	15.7	1.62	1.80	2.9					
21	21	4.77	0.30	8.8	1.45	2.30	3.3					
22	22	2.04	0.65	6.4	1.33	2.56	3.4					
23	23	6.71	0.37	18.4	2.49	1.66	4.1					
24	24	3.74	0.45	6.2	1.69	2.59	4.4					

RATIONAL METHOD PEAK RUNOFF

2-YR STORM

SF-3 *Rainfall Depth-Duration-Frequency (1-hr) =* **0.81**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	2yr RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
25	25	3.10	0.40	7.7	1.24	2.41	3.0					
26	26	11.31	0.06	17.2	0.68	1.72	1.2					
27	27	3.92	0.22	11.8	0.85	2.05	1.7					
28	28	3.51	0.39	5.6	1.36	2.66	3.6					
29	29	3.34	0.42	5.1	1.40	2.73	3.8					
30	30	4.33	0.42	15.3	1.80	1.82	3.3					
31	31	0.49	0.61	5.0	0.30	2.75	0.8					
32	32	3.39	0.38	17.9	1.28	1.69	2.2					
33	33	3.84	0.41	14.0	1.58	1.90	3.0					
34	34	0.33	0.61	5.0	0.20	2.75	0.6					
35	35	5.85	0.34	15.6	2.00	1.80	3.6					
36	36	3.02	0.39	6.0	1.19	2.61	3.1					
37	37	3.67	0.49	15.7	1.82	1.80	3.3					
38	38	1.88	0.69	8.9	1.30	2.29	3.0					
39	39	0.95	0.47	8.5	0.45	2.33	1.0					
40	40	0.26	0.19	18.2	0.05	1.67	0.1					
41	41	5.34	0.33	16.6	1.74	1.75	3.1					
42	42	4.57	0.37	17.8	1.68	1.69	2.8					
43	43	3.87	0.40	17.7	1.53	1.70	2.6					
44	44	4.07	0.43	6.9	1.73	2.50	4.3					
45	45	2.20	0.44	6.4	0.97	2.56	2.5					
46	46	2.73	0.44	5.4	1.20	2.69	3.2					
47	47	1.57	0.37	11.8	0.58	2.05	1.2					
48	48	0.36	0.36	5.0	0.13	2.75	0.4					
49	49	0.78	0.54	7.9	0.42	2.39	1.0					
50	50	0.91	0.50	6.3	0.46	2.57	1.2					
51	51	3.81	0.42	9.0	1.59	2.28	3.6					
52	52	8.70	0.39	12.0	3.35	2.03	6.8					

RATIONAL METHOD PEAK RUNOFF

2-YR STORM

SF-3 *Rainfall Depth-Duration-Frequency (1-hr) =* **0.81**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	2yr RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
53	53	6.15	0.34	11.1	2.08	2.10	4.4					
54	54	1.80	0.45	6.4	0.82	2.56	2.1					
55	55	1.99	0.39	6.7	0.78	2.53	2.0					
56	56	3.47	0.40	6.0	1.39	2.61	3.6					
57	57	0.65	0.61	5.0	0.40	2.75	1.1					
58	58	4.83	0.27	18.0	1.31	1.68	2.2					
59	59	1.09	0.31	8.5	0.34	2.33	0.8					
60	60	2.23	0.41	6.6	0.90	2.54	2.3					
61	61	3.65	0.42	6.0	1.53	2.61	4.0					
62	62	5.14	0.32	8.6	1.64	2.32	3.8					
63	63	3.77	0.42	9.3	1.58	2.25	3.6					
64	64	0.40	0.47	5.3	0.19	2.70	0.5					
65	65	4.25	0.42	8.0	1.78	2.38	4.2					
66	66	6.46	0.39	18.1	2.51	1.68	4.2					
67	67	6.62	0.40	5.5	2.64	2.68	7.1					
68	68	6.45	0.36	14.9	2.30	1.84	4.2					
69	69	2.71	0.38	5.0	1.03	2.75	2.8					
70	70	1.90	0.25	5.6	0.48	2.66	1.3					
71	71	0.29	0.61	5.0	0.18	2.75	0.5					
72	72	3.27	0.42	7.7	1.36	2.41	3.3					
73	73	0.49	0.72	5.0	0.35	2.75	1.0					
74	74	2.82	0.40	6.9	1.13	2.50	2.8					
75	75	2.39	0.41	5.5	0.97	2.68	2.6					
76	76	4.47	0.43	8.7	1.93	2.31	4.5					
77	77	5.55	0.41	5.9	2.26	2.62	5.9					
78	78	4.10	0.41	10.5	1.69	2.15	3.6					
79	79	2.36	0.44	7.4	1.03	2.44	2.5					
80	80	4.23	0.43	10.3	1.82	2.17	3.9					

RATIONAL METHOD PEAK RUNOFF

2-YR STORM

SF-3 *Rainfall Depth-Duration-Frequency (1-hr) =* **0.81**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	2yr RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
81	81	12.41	0.03	27.1	0.40	1.35	0.5					
82	82	0.65	0.59	6.5	0.39	2.55	1.0					
83	83	2.32	0.66	13.3	1.53	1.94	3.0					
84	84	1.53	0.41	5.0	0.63	2.75	1.7					
85	85	0.51	0.62	5.4	0.32	2.69	0.8					
86	86	0.40	0.65	5.0	0.26	2.75	0.7					
87	87	3.45	0.38	10.2	1.33	2.17	2.9					
88	88	3.05	0.64	8.8	1.94	2.30	4.5					
89	89	3.07	0.37	10.6	1.13	2.14	2.4					
90	90	2.60	0.26	5.8	0.68	2.64	1.8					

WESTERLY - ERIE, CO

Matrix Project #: 18.994

Prepared By: GMV

RATIONAL METHOD PEAK RUNOFF

100-YR STORM

SF-3

Rainfall Depth-Duration-Frequency (1-hr) = **2.68**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	100yr RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
1	1	4.11	0.19	24.7	0.77	4.70	3.6					
2	2	0.51	0.65	5.5	0.33	8.86	2.9					
3	3	6.90	0.37	21.8	2.58	5.04	13.0					
4	4	0.96	0.77	8.3	0.74	7.77	5.7					
5	5	4.10	0.61	9.0	2.52	7.55	19.0					
6	6	2.59	0.68	12.6	1.76	6.59	11.6					
7	7	2.07	0.72	6.3	1.48	8.52	12.6					
8	8	9.12	0.67	19.6	6.09	5.32	32.4					
9	9	0.73	0.80	8.9	0.58	7.58	4.4					
10	10	2.82	0.64	7.8	1.81	7.95	14.4					
11	11	4.52	0.68	7.5	3.08	8.05	24.8					
12	12	5.57	0.68	8.0	3.77	7.88	29.7					
13	13	3.71	0.68	10.7	2.53	7.06	17.8					
14	14	6.69	0.47	25.2	3.14	4.65	14.6					
15	15	0.48	0.60	7.5	0.29	8.05	2.3					
16	16	4.07	0.69	8.2	2.82	7.81	22.0					
17	17	6.70	0.38	15.3	2.54	6.03	15.3					
18	18	0.52	0.71	6.2	0.37	8.56	3.1					
19	19	7.03	0.62	17.9	4.35	5.58	24.3					
20	20	4.96	0.66	15.7	3.28	5.95	19.6					
21	21	4.77	0.62	8.8	2.98	7.61	22.7					
22	22	2.04	0.82	6.4	1.66	8.47	14.1					
23	23	6.71	0.68	18.4	4.58	5.50	25.2					
24	24	3.74	0.70	6.2	2.63	8.56	22.5					

RATIONAL METHOD PEAK RUNOFF

100-YR STORM

SF-3 *Rainfall Depth-Duration-Frequency (1-hr) =* **2.68**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	100yr RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
25	25	3.10	0.68	7.7	2.10	7.98	16.7					
26	26	11.31	0.23	17.2	2.66	5.69	15.1					
27	27	3.92	0.53	11.8	2.09	6.78	14.1					
28	28	3.51	0.68	5.6	2.38	8.81	21.0					
29	29	3.34	0.69	5.1	2.32	9.04	21.0					
30	30	4.33	0.70	15.3	3.05	6.03	18.4					
31	31	0.49	0.80	5.0	0.39	9.09	3.5					
32	32	3.39	0.68	17.9	2.31	5.58	12.9					
33	33	3.84	0.68	14.0	2.62	6.28	16.4					
34	34	0.33	0.78	5.0	0.26	9.09	2.4					
35	35	5.85	0.64	15.6	3.76	5.97	22.4					
36	36	3.02	0.67	6.0	2.03	8.64	17.5					
37	37	3.67	0.73	15.7	2.67	5.94	15.9					
38	38	1.88	0.84	8.9	1.58	7.58	11.9					
39	39	0.95	0.71	8.5	0.68	7.71	5.2					
40	40	0.26	0.36	18.2	0.09	5.53	0.5					
41	41	5.34	0.62	16.6	3.32	5.79	19.2					
42	42	4.57	0.64	17.8	2.93	5.59	16.4					
43	43	3.87	0.70	17.7	2.69	5.62	15.1					
44	44	4.07	0.71	6.9	2.89	8.28	23.9					
45	45	2.20	0.71	6.4	1.56	8.47	13.2					
46	46	2.73	0.70	5.4	1.90	8.90	16.9					
47	47	1.57	0.66	11.8	1.04	6.78	7.0					
48	48	0.36	0.65	5.0	0.24	9.09	2.1					
49	49	0.78	0.75	7.9	0.58	7.91	4.6					
50	50	0.91	0.74	6.3	0.67	8.52	5.7					
51	51	3.81	0.70	9.0	2.67	7.55	20.1					
52	52	8.70	0.67	12.0	5.83	6.73	39.2					

RATIONAL METHOD PEAK RUNOFF

100-YR STORM

SF-3 *Rainfall Depth-Duration-Frequency (1-hr) =* **2.68**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	100yr RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
53	53	6.15	0.65	11.1	4.02	6.95	28.0					
54	54	1.80	0.72	6.4	1.30	8.47	11.0					
55	55	1.99	0.69	6.7	1.37	8.35	11.4					
56	56	3.47	0.70	6.0	2.42	8.64	20.9					
57	57	0.65	0.80	5.0	0.52	9.09	4.7					
58	58	4.83	0.61	18.0	2.93	5.57	16.3					
59	59	1.09	0.63	8.5	0.68	7.71	5.3					
60	60	2.23	0.70	6.6	1.56	8.39	13.1					
61	61	3.65	0.70	6.0	2.57	8.64	22.2					
62	62	5.14	0.66	8.6	3.39	7.68	26.0					
63	63	3.77	0.71	9.3	2.66	7.46	19.9					
64	64	0.40	0.73	5.3	0.29	8.95	2.6					
65	65	4.25	0.71	8.0	3.00	7.88	23.6					
66	66	6.46	0.69	18.1	4.47	5.55	24.8					
67	67	6.62	0.70	5.5	4.61	8.86	40.9					
68	68	6.45	0.68	14.9	4.37	6.10	26.7					
69	69	2.71	0.69	14.9	1.86	6.10	11.4					
70	70	1.90	0.62	14.9	1.19	6.10	7.2					
71	71	0.29	0.80	14.9	0.23	6.10	1.4					
72	72	3.27	0.70	14.9	2.28	6.10	13.9					
73	73	0.49	0.84	14.9	0.41	6.10	2.5					
74	74	2.82	0.70	14.9	1.97	6.10	12.0					
75	75	2.39	0.68	14.9	1.62	6.10	9.9					
76	76	4.47	0.71	14.9	3.19	6.10	19.4					
77	77	5.55	0.68	14.9	3.78	6.10	23.1					
78	78	4.10	0.70	14.9	2.85	6.10	17.4					
79	79	2.36	0.71	14.9	1.68	6.10	10.2					
80	80	4.23	0.70	14.9	2.94	6.10	18.0					

RATIONAL METHOD PEAK RUNOFF

100-YR STORM

SF-3 *Rainfall Depth-Duration-Frequency (1-hr) =* **2.68**

-REFERENCE UDFCD Vol.1 EQ 5-1 & EQ 6-1

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	100yr RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
81	81	12.41	0.47	14.9	5.79	6.10	35.4					
82	82	0.65	0.78	14.9	0.50	6.10	3.1					
83	83	2.32	0.82	14.9	1.90	6.10	11.6					
84	84	1.53	0.70	14.9	1.08	6.10	6.6					
85	85	0.51	0.80	14.9	0.41	6.10	2.5					
86	86	0.40	0.81	14.9	0.33	6.10	2.0					
87	87	3.45	0.69	14.9	2.38	6.10	14.5					
88	88	3.05	0.80	14.9	2.45	6.10	14.9					
89	89	3.07	0.68	14.9	2.10	6.10	12.8					
90	90	2.60	0.61	14.9	1.58	6.10	9.6					

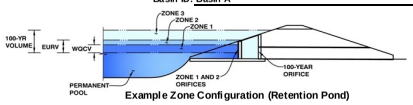
Appendix C – Site Hydraulic Calculations

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Westerly

Basin ID: Basin A



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB		
Watershed Area =	312.76	acres	
Watershed Length =	3,819	ft	
Watershed Slope =	0.010	ft/ft	
Watershed Imperviousness =	43.12%	percent	
Percentage Hydrologic Soil Group A =	29.4%	percent	
Percentage Hydrologic Soil Group B =	30.0%	percent	
Percentage Hydrologic Soil Groups C/D =	40.6%	percent	
Desired WQCV Drain Time =	40.0	hours	
Location for 1-hr Rainfall Depths =	User Input		
Water Quality Capture Volume (WQCV) =	4.901	acre-feet	
Excess Urban Runoff Volume (EURV) =	13.779	acre-feet	
2-yr Runoff Volume (P1 = 0.81 in.) =	7.594	acre-feet	
5-yr Runoff Volume (P1 = 1.11 in.) =	11.789	acre-feet	
10-yr Runoff Volume (P1 = 1.39 in.) =	16.751	acre-feet	
25-yr Runoff Volume (P1 = 1.84 in.) =	27.160	acre-feet	
50-yr Runoff Volume (P1 = 2.24 in.) =	36.188	acre-feet	
100-yr Runoff Volume (P1 = 2.68 in.) =	47.808	acre-feet	
500-yr Runoff Volume (P1 = 0 in.) =	0.000	acre-feet	
Approximate 2-yr Detention Volume =	7.120	acre-feet	
Approximate 5-yr Detention Volume =	11.100	acre-feet	
Approximate 10-yr Detention Volume =	14.618	acre-feet	
Approximate 25-yr Detention Volume =	19.189	acre-feet	
Approximate 50-yr Detention Volume =	22.123	acre-feet	
Approximate 100-yr Detention Volume =	27.189	acre-feet	

Optional User Override 1-hr Precipitation	
0.81	inches
1.11	inches
1.39	inches
1.84	inches
2.24	inches
2.68	inches
	inches

Stage-Storage Calculation

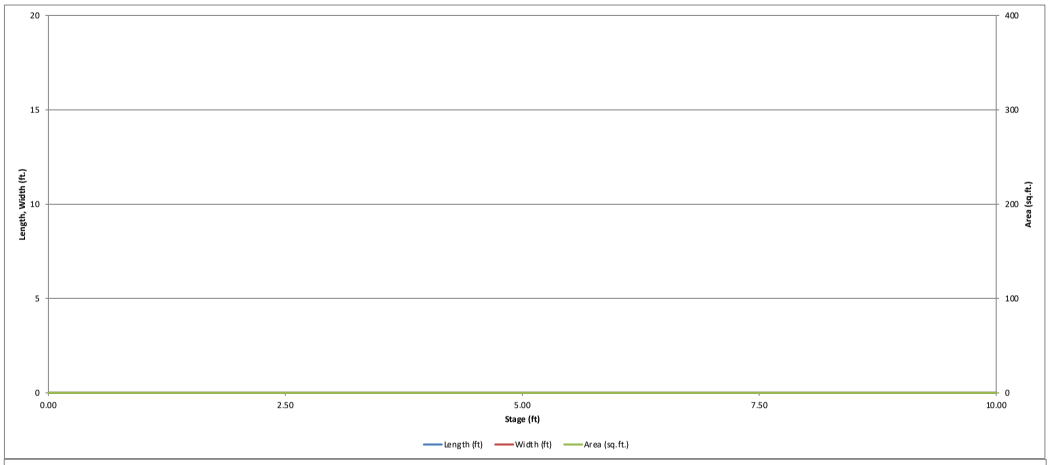
Zone 1 Volume (WQCV) =	4.901	acre-feet
Zone 2 Volume (EURV - Zone 1) =	8.879	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	13.410	acre-feet
Total Detention Basin Volume =	27.189	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

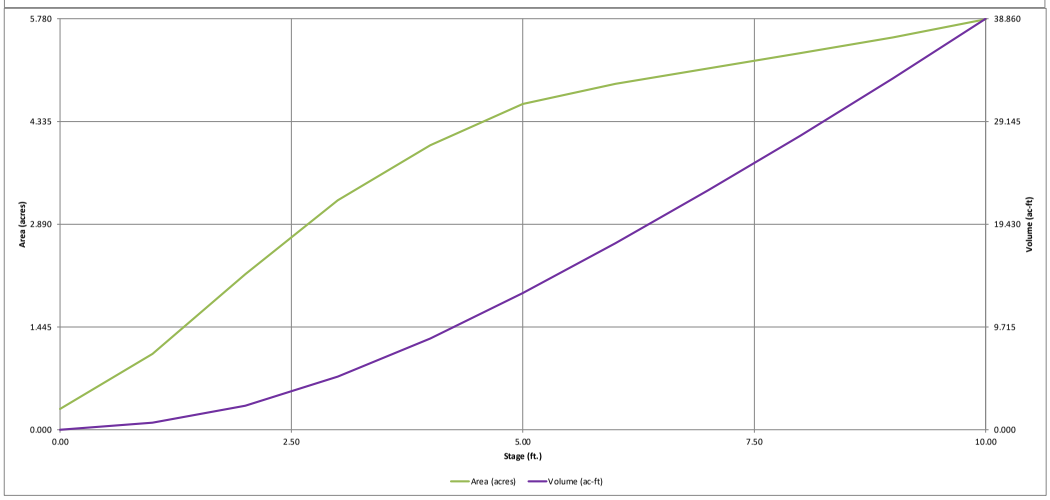
Depth Increment = 1 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	12,740	0.292		
5147	--	1.00	--	--	--	46,391	1.065	29,103	0.668
5148	--	2.00	--	--	--	95,285	2.187	99,453	2.283
5149	--	3.00	--	--	--	140,631	3.228	218,361	5.013
5150	--	4.00	--	--	--	174,324	4.002	375,839	8.628
5151	--	5.00	--	--	--	199,528	4.581	562,765	12.919
5152	--	6.00	--	--	--	211,955	4.866	768,506	17.642
5153	--	7.00	--	--	--	221,351	5.082	985,159	22.616
5154	--	8.00	--	--	--	230,625	5.294	1,211,147	27.804
5155	--	9.00	--	--	--	240,377	5.518	1,446,648	33.210
5156	--	10.00	--	--	--	251,436	5.772	1,692,555	38.856

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



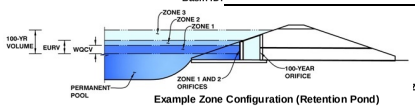


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: _____

Basin ID: _____



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.97	4.901	Orifice Plate
Zone 2 (EURV)	5.19	8.879	Orifice Plate
Zone 3 (100-year)	7.89	13.410	Weir&Pipe (Restrict)
		27.189	Total

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	5.05	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	N/A	inches
Orifice Plate: Orifice Area per Row =	27.00	sq. inches (use rectangular openings)

Calculated Parameters for Plate

WQ Orifice Area per Row =	1.875E-01	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.50	3.00					
Orifice Area (sq. inches)	27.00	27.00	27.00					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.05	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	10.00	N/A	feet
Overflow Weir Slope =	4.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	18.00	N/A	feet
Overflow Grate Open Area % =	72%	N/A	%, grate open area/total area
Debris Clogging % =	20%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	9.55	N/A	feet
Over Flow Weir Slope Length =	18.55	N/A	feet
Grate Open Area / 100-yr Orifice Area =	5.67	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	133.59	N/A	ft^2
Overflow Grate Open Area w/ Debris =	106.87	N/A	ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.25	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	66.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	64.00		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	23.55	N/A	ft^2
Outlet Orifice Centroid =	2.73	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	2.79	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =	8.28	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	415.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

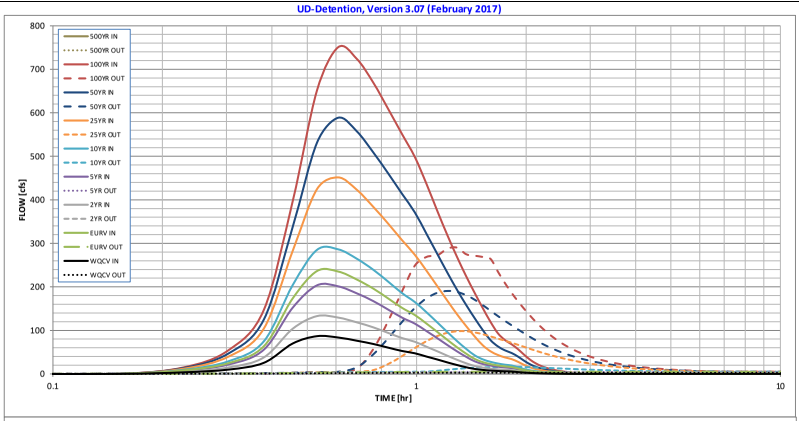
Spillway Design Flow Depth=	0.71	feet
Stage at Top of Freeboard =	9.99	feet
Basin Area at Top of Freeboard =	5.77	acres

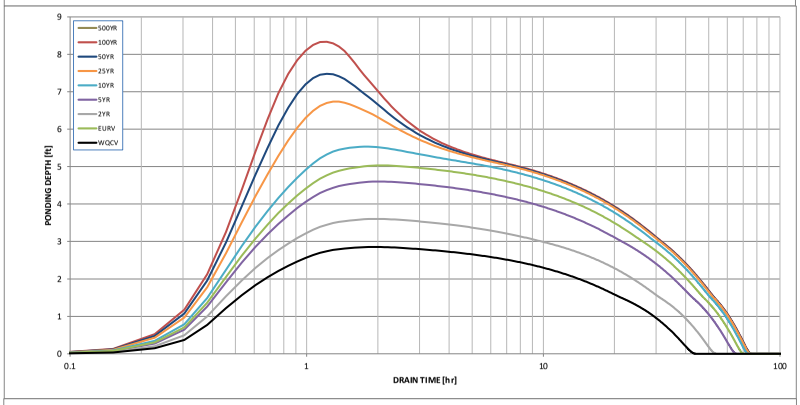
Routed Hydrograph Results

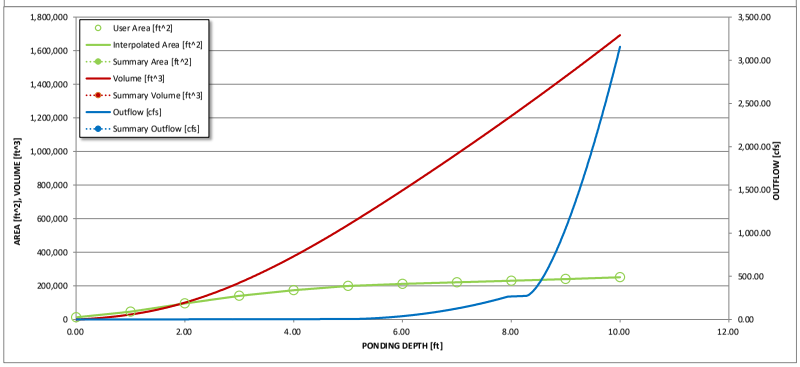
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	0.81	1.11	1.39	1.84	2.24	2.68	0.00
Calculated Runoff Volume (acre-ft) =	4.901	13.779	7.594	11.789	16.751	27.160	36.188	47.808	0.000
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	4.896	13.761	7.584	11.776	16.734	27.131	36.147	47.756	#N/A
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.05	0.18	0.54	0.84	1.26	0.00
Predevelopment Peak Q (cfs) =	0.0	0.0	2.4	15.2	56.6	169.0	262.7	392.9	0.0
Peak Inflow Q (cfs) =	86.7	236.3	132.8	203.5	286.2	451.5	588.6	750.5	#N/A
Peak Outflow Q (cfs) =	2.6	5.0	3.7	4.7	16.0	98.0	190.6	290.0	#N/A
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.3	0.6	0.7	0.7	#N/A
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Spillway	#N/A
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.1	0.7	1.4	2.0	#N/A
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	#N/A
Time to Drain 97% of Inflow Volume (hours) =	38	60	46	56	62	59	56	52	#N/A
Time to Drain 99% of Inflow Volume (hours) =	41	65	50	60	67	67	65	64	#N/A
Maximum Ponding Depth (ft) =	2.85	5.03	3.60	4.60	5.53	6.73	7.48	8.33	#N/A
Area at Maximum Ponding Depth (acres) =	3.07	4.59	3.69	4.35	4.73	5.02	5.18	5.37	#N/A
Maximum Volume Stored (acre-ft) =	4.540	13.057	7.089	11.133	15.387	21.252	25.080	29.563	#N/A

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, May 28 2019

Instra-Storm Colliers Hill (Hurst Design) - Design Capacity

Invert Elev Dn (ft)	=	5142.70
Pipe Length (ft)	=	164.45
Slope (%)	=	0.51
Invert Elev Up (ft)	=	5143.54
Rise (in)	=	60.0
Shape	=	Box
Span (in)	=	84.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Rectagular Concrete
Culvert Entrance	=	Tapered inlet throat
Coeff. K,M,c,Y,k	=	0.475, 0.667, 0.0179, 0.97, 0.2

Embankment

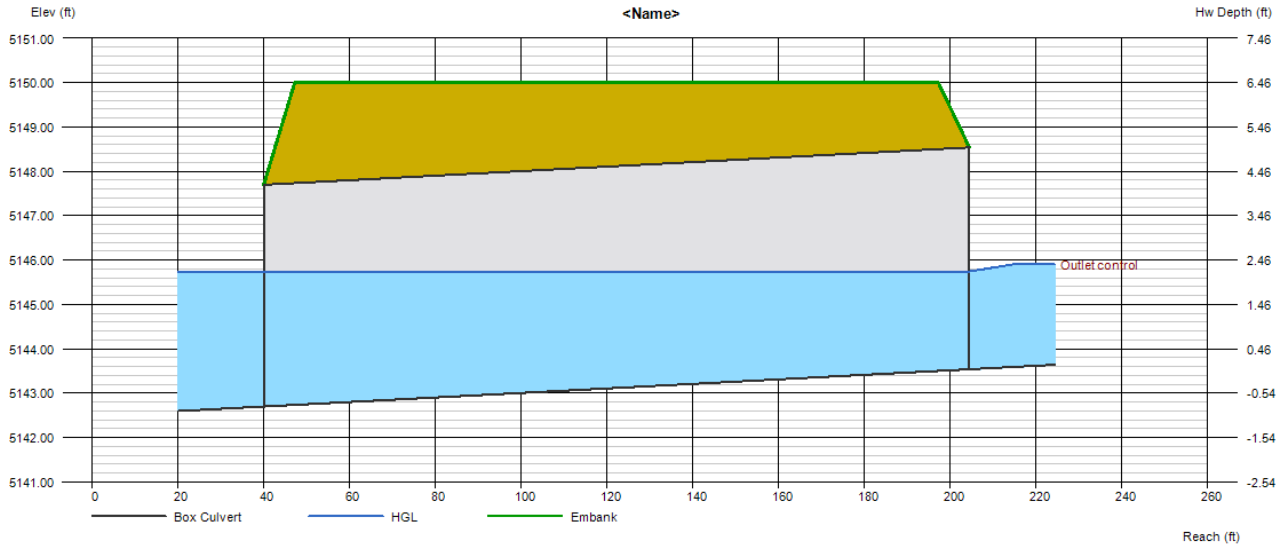
Top Elevation (ft)	=	5150.00
Top Width (ft)	=	150.00
Crest Width (ft)	=	350.00

Calculations

Qmin (cfs)	=	0.00
Qmax (cfs)	=	368.40
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	45.00
Qpipe (cfs)	=	45.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.11
Veloc Up (ft/s)	=	2.92
HGL Dn (ft)	=	5145.74
HGL Up (ft)	=	5145.75
Hw Elev (ft)	=	5145.90
Hw/D (ft)	=	0.47
Flow Regime	=	Outlet Control



Regional Channel - Colliers Hill (Reference 3)

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Channel Slope	0.750 %
Normal Depth	63.6 in

Section Definitions

Station (ft)	Elevation (ft)
0+00	100.00
0+13	96.70
0+23	96.70
0+31	94.70
0+41	94.70
0+49	96.70
0+59	96.70
0+72	100.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 100.00)	(0+72, 100.00)	0.045

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Discharge	1,418.39 cfs
Elevation Range	94.7 to 100.0 ft
Flow Area	231.4 ft²
Wetted Perimeter	73.7 ft
Hydraulic Radius	37.7 in
Top Width	72.40 ft
Normal Depth	63.6 in
Critical Depth	50.8 in
Critical Slope	2.226 %
Velocity	6.13 ft/s
Velocity Head	0.58 ft
Specific Energy	5.88 ft
Froude Number	0.605

Regional Channel - Colliers Hill (Reference 3)

Results	
Flow Type	Subcritical

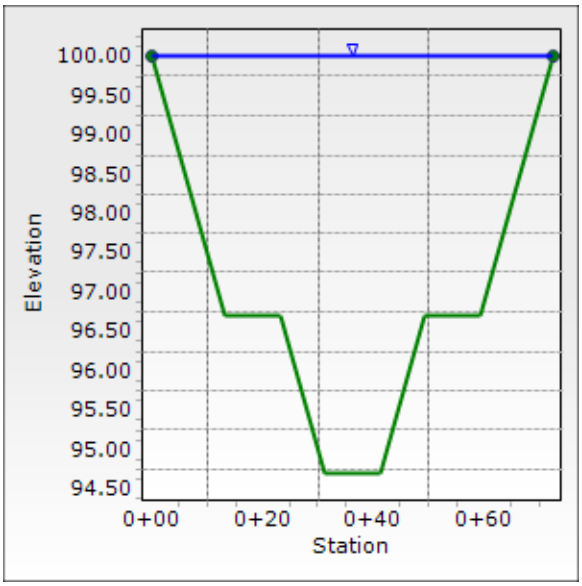
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	63.6 in
Critical Depth	50.8 in
Channel Slope	0.750 %
Critical Slope	2.226 %

Regional Channel - Colliers Hill (Reference 3)

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Channel Slope	0.750 %
Normal Depth	63.6 in
Discharge	1,418.39 cfs



Westerly Phase 1 - StormCAD Pipes 2Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 1	CB-3	5,203.83	MH16	5,203.31	67.5	0.008	18	0.013	5	5.29	9.14	5,204.69	5,204.11	5,205.04	5,204.54
PIPE 2	MH16	5,203.11	MH15	5,199.66	300	0.012	24	0.013	5	6.09	24.28	5,203.90	5,200.51	5,204.20	5,200.75
PIPE 3	CB-56	5,200.05	MH15	5,199.66	42.8	0.009	18	0.013	3.7	5.24	10.01	5,200.78	5,200.51	5,201.07	5,200.71
PIPE 4	MH15	5,199.46	MH14	5,193.87	210.5	0.027	24	0.013	8.7	9.6	36.85	5,200.51	5,194.53	5,200.93	5,195.97
PIPE 5	MH14	5,193.67	MH13	5,185.16	300	0.028	24	0.013	8.7	9.83	38.1	5,194.73	5,185.81	5,195.14	5,187.31
PIPE 6	CB-6	5,184.34	MH13	5,183.66	85	0.008	36	0.013	13.8	6.87	59.65	5,185.52	5,185.19	5,185.97	5,185.42
PIPE 7	MH12	5,185.10	CB-6	5,184.54	69.9	0.008	36	0.013	10.2	6.3	59.65	5,186.11	5,185.38	5,186.48	5,186.00
PIPE 8	MH11	5,187.76	MH12	5,185.10	265.7	0.01	30	0.013	10.2	6.94	41.01	5,188.83	5,185.95	5,189.23	5,186.70
PIPE 9	MH10	5,190.81	MH11	5,187.96	95.1	0.03	30	0.013	10.2	10.28	71.04	5,191.88	5,188.60	5,192.28	5,190.24
PIPE 10	MH9	5,193.63	MH10	5,191.01	97.1	0.027	30	0.013	10.2	9.9	67.39	5,194.70	5,191.67	5,195.11	5,193.19
PIPE 11	CB-5	5,196.12	MH9	5,195.83	19.2	0.015	18	0.013	0.1	2.17	12.86	5,196.24	5,195.93	5,196.28	5,196.00
PIPE 12	MH8	5,195.24	MH9	5,193.83	70.2	0.02	30	0.013	10.1	8.87	58	5,196.30	5,194.55	5,196.70	5,195.72
PIPE 13	CB-4	5,199.16	MH8	5,198.74	41.7	0.01	18	0.013	5.7	6.06	10.5	5,200.08	5,199.53	5,200.47	5,200.09
PIPE 14	MH7	5,199.82	MH8	5,195.74	204.1	0.02	24	0.013	4.4	7.14	31.98	5,200.55	5,196.24	5,200.83	5,197.03
PIPE 15	MH6	5,203.54	MH7	5,199.82	186.1	0.02	24	0.013	4.4	7.14	31.99	5,204.28	5,200.32	5,204.55	5,201.11
PIPE 16	MH5	5,206.69	MH6	5,204.04	139.6	0.019	24	0.013	4.4	7.01	31.18	5,207.43	5,204.55	5,207.70	5,205.31
PIPE 17	MH4	5,208.67	MH5	5,206.89	93.4	0.019	24	0.013	4.4	7.01	31.18	5,209.40	5,207.40	5,209.68	5,208.17
PIPE 18	MH3	5,211.03	MH4	5,208.87	114.1	0.019	24	0.013	4.4	7.01	31.15	5,211.77	5,209.38	5,212.04	5,210.14
PIPE 19	MH2	5,212.12	MH3	5,211.03	115	0.01	24	0.013	4.4	5.48	22.05	5,212.86	5,211.64	5,213.13	5,212.10
PIPE 20	MH1	5,212.62	MH2	5,212.12	52	0.01	24	0.013	4.4	5.48	22.05	5,213.35	5,212.73	5,213.63	5,213.20
PIPE 21	CB-1	5,212.80	MH1	5,212.62	19.2	0.01	18	0.013	3.1	5.08	10.24	5,213.47	5,213.35	5,213.73	5,213.55
PIPE 22	CB-2	5,212.80	MH1	5,212.62	19.2	0.01	18	0.013	1.3	3.97	10.24	5,213.33	5,213.35	5,213.41	5,213.39
PIPE 23	MH13	5,183.66	MH17	5,179.44	300	0.014	36	0.013	22.5	9.64	79.13	5,185.19	5,180.53	5,185.79	5,181.98
PIPE 24	MH17	5,179.44	MH18	5,172.08	300	0.025	36	0.013	22.5	11.78	104.45	5,180.96	5,173.03	5,181.57	5,175.18
PIPE 25	MH18	5,172.08	MH19	5,167.30	197.8	0.024	36	0.013	22.5	11.72	103.69	5,173.61	5,168.25	5,174.21	5,170.38
PIPE 26	MH19	5,167.06	MH20	5,166.27	42.7	0.018	36	0.013	26.8	11.15	90.53	5,168.73	5,167.50	5,169.41	5,168.99
PIPE 27	CB-57	5,168.16	MH19	5,167.30	43.2	0.02	18	0.013	4.3	7.27	14.85	5,168.96	5,168.73	5,169.28	5,168.82
PIPE 28	MH21	5,167.12	MH20	5,165.96	145.5	0.008	36	0.013	8.9	6.06	59.65	5,168.06	5,167.61	5,168.41	5,167.69
PIPE 29	CB-8	5,167.99	MH21	5,167.62	46	0.008	24	0.013	8.9	6.24	20.26	5,169.06	5,168.55	5,169.48	5,169.15
PIPE 30	CB-7	5,168.30	CB-8	5,167.99	38.5	0.008	24	0.013	3.7	4.9	20.23	5,168.97	5,169.06	5,169.22	5,169.13
PIPE 31	MH20	5,165.76	MH22	5,160.42	300	0.018	42	0.013	35.7	11.8	134.26	5,167.61	5,161.65	5,168.35	5,163.81
PIPE 32	MH22	5,160.42	MH-3	5,153.95	261.7	0.025	42	0.013	35.7	13.28	158.13	5,162.27	5,156.41	5,163.01	5,156.79
PIPE 32A	MH-3	5,153.57	MH23	5,153.21	38.3	0.009	72	0.013	110.8	12.35	411.6	5,156.41	5,155.61	5,157.51	5,157.31
PIPE 33	MH23	5,153.07	O-1	5,152.50	70.6	0.008	72	0.013	110.8	11.63	378.72	5,155.90	5,154.88	5,157.00	5,156.63
PIPE 34	CB-11	5,234.26	MH24	5,234.11	19.2	0.008	18	0.013	0.2	2.14	9.39	5,234.43	5,234.26	5,234.48	5,234.33
PIPE 35	CB-10	5,233.76	MH24	5,233.61	19.2	0.008	24	0.013	5.3	5.42	20.23	5,234.58	5,234.32	5,234.88	5,234.75
PIPE 36	MH24	5,233.41	MH25	5,232.97	54.9	0.008	24	0.013	5.5	5.48	20.23	5,234.24	5,233.84	5,234.55	5,234.11
PIPE 37	MH25	5,233.01	MH26	5,232.60	51.3	0.008	24	0.013	5.5	5.48	20.23	5,233.84	5,233.63	5,234.15	5,233.81
PIPE 38	MH26	5,232.80	MH27	5,223.63	305	0.03	24	0.013	5.5	8.81	39.23	5,233.63	5,224.13	5,233.94	5,225.34
PIPE 39	MH27	5,223.43	MH28	5,222.06	68.4	0.02	24	0.013	5.5	7.62	31.99	5,224.25	5,222.62	5,224.57	5,223.52
PIPE 40	MH28	5,221.86	MH29	5,220.56	64.9	0.02	24	0.013	5.5	7.62	31.99	5,222.69	5,221.12	5,223.00	5,222.02
PIPE 41	CB-12	5,220.94	MH29	5,220.56	19.2	0.02	24	0.013	5	7.41	31.99	5,221.73	5,221.14	5,222.03	5,221.82
PIPE 42	MH29	5,220.06	MH30	5,218.16	95	0.02	30	0.013	10.5	8.97	58	5,221.14	5,218.88	5,221.56	5,220.13
PIPE 43	MH30	5,217.96	MH31	5,215.41	127.3	0.02	30	0.013	10.5	8.97	58	5,219.04	5,216.13	5,219.46	5,217.38
PIPE 44	MH31	5,215.21	MH32	5,212.80	120.8	0.02	30	0.013	10.5	8.97	58	5,216.30	5,213.52	5,216.71	5,214.77
PIPE 45	MH32	5,212.60	MH33	5,209.78	141	0.02	30	0.013	10.5	8.97	58	5,213.68	5,210.50	5,214.09	5,211.75
PIPE 46	MH33	5,209.58	MH34	5,206.87	135.5	0.02	36	0.013	10.5	8.8	94.32	5,210.60	5,207.54	5,210.98	5,208.75
PIPE 47	MH34	5,206.67	MH35	5,204.35	115.8	0.02	36	0.013	10.5	8.8	94.32	5,207.70	5,205.03	5,208.07	5,206.23
PIPE 48	MH35	5,204.15	MH36	5,202.40	87.5	0.02	36	0.013	10.5	8.8	94.32	5,205.18	5,203.08	5,205.56	5,204.27
PIPE 49	CB-13	5,203.61	MH36	5,203.40	21.2	0.01	18	0.013	3.6	5.39	10.5	5,204.34	5,204.02	5,204.62	5,204.45
PIPE 50	MH36	5,202.20	MH37	5,200.82	69.1	0.02	36	0.013	14.1	9.59	94.32	5,203.40	5,201.63	5,203.85	5,202.94
PIPE 51	MH37	5,200.62	MH38	5,198.64	99.1	0.02	36	0.013	14.1	9.59	94.32	5,201.82	5,199.43	5,202.26	5,200.83
PIPE 52	MH38	5,198.44	MH39	5,196.46	99.1	0.02	36	0.013	14.1	9.59	94.32	5,199.63	5,197.25	5,200.08	5,198.65
PIPE 53	MH39	5,196.26	MH40	5,194.27	99.1	0.02	36	0.013	14.1	9.59	94.32	5,197.45	5,195.06	5,197.90	5,196.46

Westerly Phase 1 - StormCAD Pipes 2Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 54	MH40	5,194.07	MH41	5,193.08	99.1	0.01	36	0.013	14.1	7.48	66.69	5,195.27	5,194.02	5,195.72	5,194.89
PIPE 55	MH41	5,192.88	MH42	5,192.51	46.6	0.008	36	0.013	14.1	6.9	59.65	5,194.08	5,193.52	5,194.53	5,194.22
PIPE 56	CB-14	5,193.20	MH42	5,193.01	19.2	0.01	24	0.013	4.1	5.47	22.62	5,193.91	5,193.61	5,194.17	5,194.03
PIPE 57	CB-15	5,193.70	MH42	5,193.51	19.2	0.01	18	0.013	2.7	4.98	10.5	5,194.32	5,194.04	5,194.56	5,194.40
PIPE 58	MH42	5,192.01	MH43	5,191.59	52.6	0.008	42	0.013	20.9	7.62	89.98	5,193.41	5,192.77	5,193.94	5,193.61
PIPE 59	MH43	5,191.59	MH44	5,190.80	99.1	0.008	42	0.013	20.9	7.62	89.98	5,192.99	5,191.95	5,193.51	5,192.84
PIPE 60	MH44	5,190.80	MH45	5,190.15	81.1	0.008	42	0.013	20.9	7.62	89.98	5,192.20	5,191.31	5,192.72	5,192.18
PIPE 61	MH45	5,190.15	MH46	5,190.01	17.1	0.008	42	0.013	20.9	7.62	89.98	5,191.55	5,191.25	5,192.07	5,191.98
PIPE 62	MH47	5,195.01	MH46	5,193.50	151.3	0.01	36	0.013	15.2	7.64	66.7	5,196.26	5,194.47	5,196.73	5,195.38
PIPE 63	MH48	5,201.01	MH47	5,200.01	99.2	0.01	36	0.013	15.2	7.64	66.71	5,202.25	5,200.99	5,202.72	5,201.89
PIPE 64	MH49	5,205.49	MH48	5,204.50	99.2	0.01	36	0.013	15.2	7.64	66.68	5,206.73	5,205.47	5,207.20	5,206.37
PIPE 65	MH50	5,209.66	MH49	5,208.67	99.2	0.01	36	0.013	15.2	7.64	66.71	5,210.91	5,209.65	5,211.37	5,210.55
PIPE 66	MH51	5,212.84	MH50	5,211.85	99.2	0.01	36	0.013	15.2	7.64	66.71	5,214.08	5,212.82	5,214.55	5,213.72
PIPE 67	MH52	5,214.58	MH51	5,214.06	51.3	0.01	36	0.013	15.2	7.64	66.69	5,215.82	5,215.07	5,216.29	5,215.90
PIPE 68	MH53	5,216.40	MH52	5,215.09	65.5	0.02	30	0.013	7.1	8.01	58	5,217.28	5,215.68	5,217.61	5,216.66
PIPE 69	MH54	5,220.18	MH53	5,219.40	65.5	0.012	30	0.013	7.1	6.68	44.93	5,221.07	5,220.07	5,221.39	5,220.76
PIPE 70	MH55	5,221.17	MH54	5,220.38	65.5	0.012	30	0.013	7.1	6.68	44.93	5,222.05	5,221.06	5,222.38	5,221.74
PIPE 71	MH56	5,222.15	MH55	5,221.37	65.5	0.012	30	0.013	7.1	6.68	44.93	5,223.04	5,222.04	5,223.36	5,222.73
PIPE 72	MH57	5,224.71	MH56	5,224.15	46.5	0.012	30	0.013	7.1	6.68	44.93	5,225.60	5,224.84	5,225.92	5,225.50
PIPE 73	MH58	5,226.67	MH57	5,224.71	98.1	0.02	30	0.013	7.1	8.01	58	5,227.56	5,225.30	5,227.88	5,226.30
PIPE 74	CB-24	5,231.43	MH58	5,227.67	187.9	0.02	30	0.013	7.1	8.01	58	5,232.32	5,228.26	5,232.64	5,229.26
PIPE 75	MH59	5,231.90	CB-24	5,231.63	13.5	0.02	30	0.013	6.2	7.71	58	5,232.73	5,232.26	5,233.03	5,232.90
PIPE 76	CB-23	5,232.76	MH59	5,232.40	17.8	0.02	24	0.013	2.2	5.83	31.99	5,233.27	5,232.78	5,233.46	5,233.24
PIPE 77	MH60	5,233.45	MH59	5,232.40	38	0.028	30	0.013	4	7.58	68.1	5,234.11	5,232.82	5,234.34	5,233.66
PIPE 78	MH61	5,235.81	MH60	5,233.95	74.4	0.025	30	0.013	4	7.33	64.85	5,236.47	5,234.37	5,236.70	5,235.21
PIPE 79	MH62	5,237.78	MH61	5,235.92	74.4	0.025	30	0.013	4	7.33	64.85	5,238.43	5,236.34	5,238.67	5,237.17
PIPE 80	MH63	5,239.26	MH62	5,237.78	74.4	0.02	30	0.013	4	6.78	58	5,239.92	5,238.22	5,240.16	5,238.94
PIPE 81	MH64	5,239.86	MH63	5,239.26	74.4	0.008	30	0.013	4	4.9	36.68	5,240.52	5,239.82	5,240.75	5,240.19
PIPE 82	MH65	5,240.45	MH64	5,239.86	74.4	0.008	30	0.013	4	4.9	36.68	5,241.11	5,240.42	5,241.35	5,240.79
PIPE 83	MH66	5,241.05	MH65	5,240.45	74.4	0.008	30	0.013	4	4.9	36.68	5,241.71	5,241.01	5,241.94	5,241.38
PIPE 84	MH67	5,241.64	MH66	5,241.05	74.4	0.008	30	0.013	4	4.9	36.68	5,242.30	5,241.61	5,242.54	5,241.98
PIPE 85	MH68	5,242.90	MH67	5,241.64	253	0.005	30	0.013	4	4.14	28.88	5,243.56	5,242.27	5,243.79	5,242.54
PIPE 86	CB-21	5,243.04	MH68	5,242.90	17.9	0.008	24	0.013	3	4.61	20.2	5,243.65	5,243.56	5,243.86	5,243.73
PIPE 87	CB-22	5,243.06	MH68	5,242.90	20.4	0.008	18	0.013	1	3.46	9.39	5,243.54	5,243.56	5,243.60	5,243.58
PIPE 88	CB-26	5,216.16	MH52	5,215.59	19.2	0.03	24	0.013	8.1	9.83	39.18	5,217.17	5,216.29	5,217.57	5,217.33
PIPE 89	CB-25	5,220.38	CB-26	5,218.16	74.1	0.03	18	0.013	5.5	9.02	18.19	5,221.29	5,218.73	5,221.67	5,219.99
PIPE 90	MH46	5,188.50	MH69	5,184.15	289.7	0.015	54	0.013	36.1	10.89	240.84	5,190.23	5,185.33	5,190.87	5,187.17
PIPE 91	MH69	5,180.20	MH70	5,176.56	290.9	0.013	54	0.013	36.1	10.2	219.85	5,181.93	5,177.80	5,182.57	5,179.42
PIPE 92	MH71	5,176.90	MH70	5,176.39	29.6	0.017	18	0.013	5.7	7.39	13.7	5,177.82	5,177.10	5,178.21	5,177.85
PIPE 93	MH72	5,181.51	MH71	5,176.90	256.9	0.018	18	0.013	1.6	5.29	14.08	5,181.99	5,177.82	5,182.16	5,177.85
PIPE 94	CB-27	5,182.87	MH72	5,182.51	35.8	0.01	18	0.013	1.6	4.29	10.5	5,183.34	5,182.91	5,183.52	5,183.19
PIPE 96	CB-28	5,178.91	MH71	5,177.90	40.3	0.025	18	0.013	4.1	7.78	16.61	5,179.68	5,178.42	5,179.99	5,179.30
PIPE 97	MH73	5,176.47	MH70	5,175.39	135	0.008	48	0.013	12.8	6.53	128.47	5,177.52	5,176.24	5,177.89	5,176.91
PIPE 98	CB-20	5,177.38	MH73	5,177.22	19.2	0.008	18	0.013	0.7	3.12	9.39	5,177.69	5,177.50	5,177.80	5,177.65
PIPE 99	CB-19	5,177.38	MH73	5,177.22	19.2	0.008	18	0.013	4	5.1	9.39	5,178.14	5,177.91	5,178.44	5,178.31
PIPE 100	CB-18	5,177.76	CB-19	5,177.38	38.1	0.01	18	0.013	3.9	5.5	10.5	5,178.51	5,178.14	5,178.81	5,178.43
PIPE 101	MH74	5,177.20	MH73	5,176.47	91	0.008	36	0.013	8.1	5.9	59.65	5,178.10	5,177.52	5,178.42	5,177.73
PIPE 102	MH75	5,179.32	MH74	5,177.40	96.1	0.02	30	0.013	8.1	8.33	58	5,180.27	5,178.03	5,180.62	5,179.11
PIPE 103	MH76	5,181.81	MH75	5,179.52	114.6	0.02	30	0.013	8.1	8.33	58	5,182.76	5,180.15	5,183.11	5,181.23
PIPE 104	MH77	5,184.94	MH76	5,182.01	117	0.025	30	0.013	8.1	9.01	64.85	5,185.89	5,182.61	5,186.24	5,183.87
PIPE 105	MH78	5,188.10	MH77	5,185.14	118.5	0.025	30	0.013	8.1	9.01	64.85	5,189.05	5,185.74	5,189.40	5,187.00
PIPE 106	CB-17	5,189.69	MH78	5,189.10	19.6	0.03	30	0.013	3.8	7.69	71.04	5,190.33	5,189.53	5,190.56	5,190.26
PIPE 107	MH79	5,192.22	MH78	5,189.10	124.9	0.025	24	0.013	4.3	7.68	35.77	5,192.95	5,189.57	5,193.22	5,190.49
PIPE 108	MH80	5,195.61	MH79	5,193.22	95.4	0.025	24	0.013	4.3	7.68	35.77	5,196.34	5,193.69	5,196.61	5,194.61

Westerly Phase 1 - StormCAD Pipes 2Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 109	MH81	5,197.49	MH80	5,195.81	67.4	0.025	24	0.013	4.3	7.68	35.77	5,198.22	5,196.28	5,198.49	5,197.19
PIPE 110	CB-16	5,198.58	MH81	5,197.69	35.4	0.025	18	0.013	4.3	7.89	16.61	5,199.37	5,198.23	5,199.69	5,199.11
PIPE 111	MH70	5,171.75	MH84	5,169.64	170.2	0.012	60	0.013	54.6	11.35	290.46	5,173.83	5,171.13	5,174.61	5,173.05
PIPE 112	MH84	5,167.19	MH82	5,165.26	154.9	0.012	60	0.013	54.6	11.35	290.41	5,169.26	5,167.48	5,170.05	5,168.14
PIPE 113	CB-29	5,168.92	MH82	5,168.67	24.2	0.01	18	0.013	4	5.54	10.5	5,169.68	5,169.33	5,169.98	5,169.78
PIPE 114	CB-30	5,168.83	MH82	5,168.67	15.6	0.01	18	0.013	3.3	5.31	10.64	5,169.52	5,169.26	5,169.79	5,169.66
PIPE 115	MH82	5,165.26	MH83	5,164.94	40.5	0.008	60	0.013	61.9	10.03	232.93	5,167.48	5,166.83	5,168.32	5,168.11
PIPE 116	CB-31	5,167.90	MH83	5,167.74	20	0.008	18	0.013	4.9	5.37	9.39	5,168.75	5,168.52	5,169.10	5,168.95
PIPE 117	MH83	5,164.74	MH85	5,163.99	94.1	0.008	66	0.013	66.8	10.17	300.34	5,166.98	5,166.24	5,167.82	5,167.07
PIPE 118	MH85	5,164.00	MH86	5,162.79	150.6	0.008	66	0.013	66.8	10.17	300.34	5,166.24	5,164.58	5,167.08	5,166.12
PIPE 119	MH86	5,162.79	MH87	5,161.68	139.9	0.008	66	0.013	66.8	10.17	300.34	5,165.03	5,163.47	5,165.87	5,165.00
PIPE 120	MH87	5,161.67	MH88	5,161.17	62.6	0.008	66	0.013	66.8	10.17	300.34	5,163.91	5,163.04	5,164.75	5,164.41
PIPE 121	MH88	5,161.17	MH89	5,159.68	149.5	0.01	66	0.013	66.8	11.02	335.79	5,163.41	5,161.97	5,164.25	5,162.76
PIPE 122	MH91	5,162.47	MH89	5,160.66	112.9	0.016	24	0.013	7	7.53	28.61	5,163.41	5,161.97	5,163.77	5,162.13
PIPE 123	MH92	5,163.56	MH91	5,162.97	73.6	0.008	18	0.013	7	5.83	9.39	5,164.58	5,163.93	5,165.04	5,164.46
PIPE 124	CB-50	5,163.92	MH92	5,163.76	21.2	0.008	18	0.013	7	5.83	9.39	5,164.95	5,164.72	5,165.41	5,165.25
PIPE 125	MH89	5,159.68	MH93	5,158.81	106.9	0.008	72	0.013	73.8	10.43	381.13	5,161.97	5,160.67	5,162.83	5,162.20
PIPE 126	MH93	5,158.81	MH94	5,158.29	65.3	0.008	72	0.013	73.8	10.38	378.52	5,161.11	5,160.19	5,161.96	5,161.62
PIPE 127	MH94	5,158.29	MH95	5,157.55	92.7	0.008	72	0.013	73.8	10.38	378.83	5,160.59	5,159.42	5,161.44	5,160.91
PIPE 128	MH95	5,157.55	MH96	5,156.79	94.2	0.008	72	0.013	73.8	10.38	378.78	5,159.84	5,158.66	5,160.70	5,160.16
PIPE 129	MH96	5,156.79	MH97	5,156.20	73.9	0.008	72	0.013	73.8	10.38	378.83	5,159.09	5,159.02	5,159.94	5,159.52
PIPE 130	CB-51	5,156.20	MH97	5,155.92	35.6	0.008	72	0.013	73.8	2.61	378.89	5,159.02	5,158.50	5,159.41	5,159.35
PIPE 134	CB-58	5,157.96	MH 102	5,157.73	28.2	0.008	18	0.013	1.3	3.74	9.39	5,158.39	5,158.11	5,158.54	5,158.33
PIPE 135	MH 102	5,157.73	MH101	5,157.41	40.6	0.008	18	0.013	1.3	3.74	9.39	5,158.16	5,157.79	5,158.31	5,158.00
PIPE 136	MH101	5,157.41	MH100	5,157.01	49.3	0.008	18	0.013	1.3	3.74	9.39	5,157.84	5,157.39	5,157.99	5,157.61
PIPE 137	MH103	5,157.43	MH100	5,154.93	207.9	0.012	48	0.013	38.4	10.34	157.36	5,159.28	5,156.28	5,159.99	5,157.94
PIPE 138	MH104	5,161.79	MH103	5,159.29	207.9	0.012	48	0.013	38.4	10.34	157.36	5,163.63	5,160.64	5,164.35	5,162.30
PIPE 139	MH105	5,163.01	MH104	5,162.52	40.8	0.012	48	0.013	38.4	10.33	157.26	5,164.85	5,163.99	5,165.56	5,165.29
PIPE 140	MH106	5,164.23	MH105	5,163.74	40.8	0.012	48	0.013	38.4	10.33	157.26	5,166.07	5,165.21	5,166.78	5,166.51
PIPE 141	MH107	5,165.45	MH106	5,165.00	40.8	0.011	48	0.013	38.4	10.03	150.86	5,167.29	5,166.49	5,168.00	5,167.74
PIPE 142	MH108	5,166.67	MH107	5,166.18	40.8	0.012	48	0.013	38.4	10.34	157.42	5,168.51	5,167.65	5,169.22	5,168.95
PIPE 143	MH109	5,167.89	MH108	5,167.40	40.8	0.012	48	0.013	38.4	10.34	157.42	5,169.73	5,168.87	5,170.44	5,170.17
PIPE 144	MH110	5,169.10	MH109	5,168.62	40.8	0.012	48	0.013	38.4	10.33	157.26	5,170.95	5,170.09	5,171.66	5,171.38
PIPE 145	MH111	5,174.61	MH110	5,171.64	212.2	0.014	48	0.013	38.4	10.93	169.95	5,176.46	5,172.93	5,177.17	5,174.79
PIPE 146	MH112	5,177.17	MH111	5,176.04	94.2	0.012	48	0.013	38.4	10.34	157.35	5,179.01	5,177.43	5,179.73	5,178.94
PIPE 147	MH113	5,178.42	MH112	5,177.17	157.3	0.008	24	0.013	5.6	5.51	20.23	5,179.26	5,179.01	5,179.57	5,179.07
PIPE 148	MH114	5,179.07	MH113	5,178.42	42.6	0.015	24	0.013	5.6	6.92	27.8	5,179.90	5,179.05	5,180.22	5,179.75
PIPE 149	CB-43	5,179.50	MH114	5,179.27	29.3	0.008	24	0.013	4.4	5.15	20.26	5,180.24	5,179.91	5,180.51	5,180.31
PIPE 150	CB-44	5,179.49	MH114	5,179.28	27	0.008	24	0.013	1.2	3.53	20.23	5,179.87	5,179.90	5,180.00	5,179.93
PIPE 151	MH115	5,180.96	MH112	5,179.40	111.8	0.014	42	0.013	32.8	10.56	119	5,182.73	5,180.68	5,183.43	5,182.31
PIPE 152	MH116	5,182.88	MH115	5,181.92	68.7	0.014	42	0.013	32.8	10.57	119.06	5,184.65	5,183.24	5,185.35	5,184.74
PIPE 153	MH117	5,185.00	MH116	5,184.18	68.7	0.012	42	0.013	32.8	9.99	110.19	5,186.77	5,185.55	5,187.47	5,186.91
PIPE 154	MH118	5,187.56	MH117	5,186.60	68.7	0.014	42	0.013	32.8	10.56	119	5,189.33	5,187.93	5,190.03	5,189.42
PIPE 155	MH119	5,189.27	MH118	5,188.31	68.7	0.014	42	0.013	32.8	10.57	119.06	5,191.04	5,189.64	5,191.74	5,191.13
PIPE 156	MH120	5,189.86	MH119	5,189.27	59.2	0.01	42	0.013	32.8	9.35	100.56	5,191.64	5,190.71	5,192.33	5,191.91
PIPE 157	MH121	5,191.27	MH120	5,189.86	141.1	0.01	42	0.013	32.8	9.35	100.61	5,193.05	5,191.24	5,193.75	5,192.58
PIPE 158	MH122	5,192.84	MH121	5,191.27	98.2	0.016	30	0.013	6.5	7.21	51.77	5,193.68	5,193.05	5,193.99	5,193.09
PIPE 159	MH123	5,193.59	MH122	5,192.84	94.2	0.008	30	0.013	6.5	5.64	36.69	5,194.44	5,193.55	5,194.75	5,194.04
PIPE 160	MH124	5,194.35	MH123	5,193.59	94.2	0.008	30	0.013	6.5	5.64	36.69	5,195.19	5,194.30	5,195.50	5,194.80
PIPE 181	CB-42	5,195.31	MH124	5,194.93	19.2	0.02	24	0.013	1.1	4.75	31.97	5,195.68	5,195.19	5,195.80	5,195.52
PIPE 182	CB-41	5,194.52	MH124	5,194.35	19.2	0.009	30	0.013	5.4	5.57	38.85	5,195.29	5,195.19	5,195.56	5,195.40
PIPE 183	CB-40	5,194.83	CB-41	5,194.52	39.5	0.008	24	0.013	5.2	5.39	20.23	5,195.64	5,195.21	5,195.94	5,195.66
PIPE 184	MH125	5,195.29	MH121	5,194.47	44.6	0.018	42	0.013	26.3	10.94	136.14	5,196.87	5,195.62	5,197.47	5,197.05
PIPE 185	MH126	5,196.74	MH125	5,195.79	63.3	0.015	42	0.013	26.3	10.19	123.21	5,198.32	5,196.95	5,198.92	5,198.33

Westerly Phase 1 - StormCAD Pipes 2Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 186	MH127	5,199.00	MH126	5,196.73	126.5	0.018	42	0.013	26.3	10.86	134.84	5,200.58	5,198.32	5,201.18	5,198.91
PIPE 187	MH128	5,199.78	MH127	5,199.03	49.6	0.015	42	0.013	26.3	10.19	123.24	5,201.35	5,200.21	5,201.96	5,201.53
PIPE 188	MH129	5,200.56	MH128	5,199.78	98.3	0.008	36	0.013	16.3	7.19	59.67	5,201.85	5,201.35	5,202.34	5,201.64
PIPE 189	MH130	5,201.82	MH129	5,200.56	157	0.008	36	0.013	16.3	7.19	59.65	5,203.11	5,201.63	5,203.60	5,202.44
PIPE 190	MH131	5,202.16	MH130	5,201.82	42.1	0.008	36	0.013	16.3	7.19	59.67	5,203.44	5,202.92	5,203.93	5,203.67
PIPE 191	CB-36	5,203.77	MH131	5,203.62	19.2	0.008	18	0.013	1.4	3.82	9.39	5,204.21	5,204.01	5,204.37	5,204.23
PIPE 192	CB-35	5,203.77	MH131	5,203.62	19.2	0.008	18	0.013	4.5	5.26	9.39	5,204.58	5,204.35	5,204.91	5,204.77
PIPE 193	MH132	5,202.63	MH131	5,202.16	31.7	0.015	36	0.013	10.4	7.93	81.67	5,203.65	5,203.44	5,204.03	5,203.64
PIPE 194	MH133	5,203.10	MH132	5,202.63	31.5	0.015	36	0.013	10.4	7.93	81.69	5,204.12	5,203.40	5,204.50	5,204.22
PIPE 195	MH134	5,203.82	MH133	5,203.10	48	0.015	36	0.013	10.4	7.92	81.55	5,204.84	5,203.85	5,205.21	5,204.73
PIPE 196	MH135	5,207.25	MH134	5,203.83	136.9	0.025	30	0.013	10.4	9.69	64.85	5,208.33	5,204.51	5,208.74	5,205.97
PIPE 197	MH136	5,210.30	MH135	5,207.45	114	0.025	30	0.013	10.4	9.69	64.85	5,211.38	5,208.13	5,211.79	5,209.59
PIPE 198	MH137	5,213.01	MH136	5,210.50	140.4	0.018	30	0.013	10.4	8.59	54.8	5,214.09	5,211.24	5,214.50	5,212.39
PIPE 199	MH138	5,214.25	MH137	5,212.99	158	0.008	30	0.013	10.4	6.43	36.68	5,215.33	5,214.09	5,215.74	5,214.48
PIPE 200	MH141	5,216.83	MH138	5,214.25	322.8	0.008	24	0.013	4.4	5.15	20.23	5,217.57	5,215.33	5,217.84	5,215.43
PIPE 201	CB-34	5,216.99	MH141	5,216.83	19.2	0.008	24	0.013	4.4	5.15	20.23	5,217.72	5,217.48	5,218.00	5,217.87
PIPE 202	MH139	5,225.98	MH138	5,219.25	224.2	0.03	24	0.013	6	9.02	39.18	5,226.84	5,219.78	5,227.17	5,221.04
PIPE 203	MH140	5,234.52	MH139	5,230.98	118.2	0.03	24	0.013	6	9.02	39.18	5,235.39	5,231.51	5,235.72	5,232.77
PIPE 204	CB-32	5,234.71	MH140	5,234.52	19.2	0.01	18	0.013	1.5	4.21	10.5	5,235.37	5,235.39	5,235.44	5,235.42
PIPE 205	CB-33	5,234.72	MH140	5,234.52	19.6	0.01	18	0.013	4.5	5.71	10.5	5,235.53	5,235.39	5,235.86	5,235.67
PIPE 206	MH142	5,206.85	MH128	5,202.97	129.3	0.03	30	0.013	10	10.22	71.04	5,207.91	5,203.61	5,208.31	5,205.23
PIPE 207	MH143	5,210.31	MH142	5,207.05	137.5	0.024	30	0.013	10	9.4	63.12	5,211.37	5,207.73	5,211.77	5,209.10
PIPE 208	MH144	5,211.51	MH143	5,209.35	241.1	0.009	30	0.013	6.9	5.98	38.91	5,212.39	5,211.37	5,212.70	5,211.41
PIPE 209	CB-39	5,212.09	MH144	5,211.51	19.2	0.03	18	0.013	3.7	8.08	18.2	5,212.82	5,212.39	5,213.11	5,212.57
PIPE 210	CB-39a	5,212.09	MH144	5,211.51	19.2	0.03	18	0.013	3.2	7.76	18.2	5,212.77	5,212.39	5,213.03	5,212.53
PIPE 211	MH145	5,214.88	MH143	5,210.82	135.2	0.03	18	0.013	3.1	7.69	18.19	5,215.55	5,211.24	5,215.80	5,212.16
PIPE 212	CB-37	5,215.27	MH145	5,215.08	19.2	0.01	18	0.013	2.5	4.88	10.5	5,215.87	5,215.58	5,216.09	5,215.93
PIPE 213	CB-38	5,215.27	MH145	5,215.08	19.2	0.01	18	0.013	0.6	3.22	10.5	5,215.56	5,215.55	5,215.66	5,215.57
PIPE 214	MH100	5,154.44	MH146	5,152.31	266.7	0.008	54	0.013	39.7	8.93	175.88	5,156.26	5,153.76	5,156.94	5,155.00
PIPE 215	MH146	5,152.31	MH147	5,151.64	84.3	0.008	54	0.013	39.7	8.93	175.88	5,154.12	5,153.13	5,154.80	5,154.28
PIPE 216	MH150	5,156.67	MH149	5,155.48	47.6	0.025	36	0.013	17.2	10.99	105.45	5,158.00	5,156.37	5,158.51	5,157.88
PIPE 217	CB-52	5,158.45	MH150	5,158.37	9.2	0.008	18	0.013	3	4.73	9.39	5,159.11	5,158.97	5,159.36	5,159.30
PIPE 218	MH151	5,163.88	MH150	5,157.37	260.1	0.025	36	0.013	14.2	10.4	105.45	5,165.08	5,158.12	5,165.53	5,159.80
PIPE 219	MH152	5,172.07	MH151	5,164.38	307.7	0.025	30	0.013	14.2	10.58	64.85	5,173.34	5,165.17	5,173.84	5,166.91
PIPE 220	MH153	5,179.96	MH152	5,172.27	307.7	0.025	30	0.013	14.2	10.58	64.85	5,181.23	5,173.06	5,181.73	5,174.80
PIPE 221	MH154	5,187.37	MH153	5,180.46	246.6	0.028	30	0.013	8.1	9.38	68.63	5,188.31	5,181.04	5,188.66	5,182.41
PIPE 222	MH155	5,194.47	MH154	5,187.57	246.6	0.028	30	0.013	8.1	9.38	68.63	5,195.42	5,188.15	5,195.77	5,189.51
PIPE 223	MH156	5,201.87	MH155	5,194.97	246.6	0.028	30	0.013	8.1	9.38	68.63	5,202.82	5,195.55	5,203.17	5,196.92
PIPE 224	MH157	5,208.54	MH156	5,202.37	246.6	0.025	30	0.013	8.1	9.01	64.85	5,209.49	5,202.97	5,209.84	5,204.23
PIPE 225	MH158	5,214.21	MH157	5,208.74	202.4	0.027	30	0.013	8.1	9.27	67.41	5,215.15	5,209.32	5,215.50	5,210.66
PIPE 226	MH159	5,214.81	MH158	5,214.21	75.9	0.008	24	0.013	5.5	5.48	20.23	5,215.64	5,215.15	5,215.95	5,215.37
PIPE 227	CB-46	5,214.90	MH159	5,214.81	11.2	0.008	24	0.013	4.8	5.27	20.23	5,215.67	5,215.64	5,215.96	5,215.88
PIPE 228	CB-47	5,215.54	MH159	5,215.31	45.2	0.005	18	0.013	0.7	2.64	7.43	5,215.85	5,215.64	5,215.96	5,215.73
PIPE 229	MH160	5,221.16	MH158	5,214.71	215	0.03	18	0.013	2.6	7.3	18.19	5,221.77	5,215.09	5,222.00	5,215.92
PIPE 230	CB-45	5,222.43	MH160	5,221.36	107.5	0.01	18	0.013	2.6	4.93	10.5	5,223.04	5,221.86	5,223.27	5,222.24
PIPE 231	MH149	5,154.26	MH-1	5,152.37	148.6	0.013	36	0.013	17.2	8.62	75.18	5,155.59	5,153.35	5,156.09	5,154.50
PIPE 232	MH-1	5,152.37	MH147	5,151.63	57.5	0.013	42	0.013	17.2	8.58	114.71	5,153.64	5,153.28	5,154.10	5,153.51
PIPE 233	CB-54	5,154.91	MH147	5,154.63	19.2	0.015	24	0.013	4.6	6.53	27.73	5,155.67	5,155.21	5,155.95	5,155.77
PIPE 234	MH147	5,151.14	CB-55	5,150.98	19.2	0.008	66	0.013	61.5	9.94	300.34	5,153.28	5,153.17	5,154.08	5,153.93
PIPE 235	CB-55	5,150.97	O-2	5,150.50	59	0.008	66	0.013	64.3	10.06	300.4	5,153.17	5,152.33	5,153.99	5,153.67
PIPE 236	CB-60	5,147.57	CB-61	5,146.92	80.9	0.008	18	0.013	10	5.66	9.39	5,150.23	5,149.50	5,150.73	5,150.00
PIPE 237	CB-61	5,146.92	MH161	5,146.61	38.6	0.008	18	0.013	20	11.32	9.39	5,149.50	5,148.08	5,151.49	5,150.09
PIPE 238	OutletStructur	5,144.86	MH161	5,144.10	150.6	0.005	60	0.013	20	6.14	184.18	5,146.09	5,145.88	5,146.53	5,146.04
PIPE 239	MH161	5,144.11	MH162	5,143.94	34.6	0.005	60	0.013	40	7.5	184.15	5,145.88	5,145.56	5,146.53	5,146.38

Westerly Phase 1 - StormCAD Pipes 2Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 240	MH162	5,143.94	O-4	5,143.25	138.3	0.005	60	0.013	40	7.5	184.15	5,145.71	5,144.83	5,146.35	5,145.71
PIPE 242	CB-62	5,143.57	MH163	5,143.46	13.4	0.008	18	0.013	20	11.32	9.51	5,145.51	5,145.02	5,147.50	5,147.01
PIPE 243	MH163	5,143.26	O-3	5,143.18	9.8	0.008	18	0.013	20	11.32	9.49	5,145.02	5,144.65	5,147.01	5,146.66
PIPE 244	CB-48	5,182.61	CB-49	5,182.04	56.3	0.01	24	0.013	5.2	5.85	22.62	5,183.41	5,182.70	5,183.71	5,183.23
PIPE 245	CB-49	5,181.54	MH153	5,180.46	135.4	0.008	24	0.013	6.1	5.64	20.23	5,182.42	5,181.21	5,182.75	5,181.71
PIPE 247	MH98	5,154.36	MH-3	5,153.95	53.6	0.008	72	0.013	75.1	10.29	371.36	5,156.68	5,156.41	5,157.54	5,157.15
PIPE 248	CB-51	5,155.92	MH98	5,154.36	193.9	0.008	72	0.013	75.1	10.45	379.36	5,158.24	5,156.19	5,159.10	5,157.84

Westerly Phase 1 - StormCAD Pipes 100Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 1	CB-3	5,203.83	MH16	5,203.31	67.5	0.008	18	0.013	14.1	7.98	9.14	5,205.98	5,204.70	5,206.97	5,205.76
PIPE 2	MH16	5,203.11	MH15	5,199.66	300	0.012	24	0.013	14.1	8.02	24.28	5,204.47	5,201.24	5,205.07	5,201.67
PIPE 3	CB-56	5,200.05	MH15	5,199.66	42.8	0.009	18	0.013	11.7	6.62	10.01	5,201.77	5,201.24	5,202.45	5,201.92
PIPE 4	MH15	5,199.46	MH14	5,193.87	210.5	0.027	24	0.013	25.8	12.69	36.85	5,201.24	5,195.11	5,202.42	5,197.61
PIPE 5	MH14	5,193.67	MH13	5,185.16	300	0.028	24	0.013	25.8	13.03	38.1	5,195.45	5,186.37	5,196.64	5,189.01
PIPE 6	CB-6	5,184.34	MH13	5,183.66	85	0.008	36	0.013	58.1	9.62	59.65	5,186.81	5,186.47	5,188.17	5,187.58
PIPE 7	MH12	5,185.10	CB-6	5,184.54	69.9	0.008	36	0.013	43.5	9.21	59.65	5,187.25	5,186.81	5,188.25	5,187.70
PIPE 8	MH11	5,187.76	MH12	5,185.10	265.7	0.01	30	0.013	43.5	9.42	41.01	5,189.98	5,187.30	5,191.36	5,188.71
PIPE 9	MH10	5,190.81	MH11	5,187.96	95.1	0.03	30	0.013	43.5	15.2	71.04	5,193.01	5,189.46	5,194.42	5,192.56
PIPE 10	MH9	5,193.63	MH10	5,191.01	97.1	0.027	30	0.013	43.5	14.59	67.39	5,195.83	5,192.56	5,197.24	5,195.46
PIPE 11	CB-5	5,196.12	MH9	5,195.83	19.2	0.015	18	0.013	10.1	8.06	12.86	5,197.35	5,196.89	5,198.01	5,197.79
PIPE 12	MH8	5,195.24	MH9	5,193.83	70.2	0.02	30	0.013	33.4	12.23	58	5,197.21	5,195.83	5,198.22	5,196.81
PIPE 13	CB-4	5,199.16	MH8	5,198.74	41.7	0.01	18	0.013	15.9	9	10.5	5,201.16	5,200.16	5,202.42	5,201.47
PIPE 14	MH7	5,199.82	MH8	5,195.74	204.1	0.02	24	0.013	17.5	10.41	31.98	5,201.33	5,196.79	5,202.06	5,198.48
PIPE 15	MH6	5,203.54	MH7	5,199.82	186.1	0.02	24	0.013	17.5	10.41	31.99	5,205.05	5,200.87	5,205.79	5,202.56
PIPE 16	MH5	5,206.69	MH6	5,204.04	139.6	0.019	24	0.013	17.5	10.21	31.18	5,208.20	5,205.11	5,208.94	5,206.73
PIPE 17	MH4	5,208.67	MH5	5,206.89	93.4	0.019	24	0.013	17.5	10.21	31.18	5,210.18	5,207.98	5,210.91	5,209.54
PIPE 18	MH3	5,211.03	MH4	5,208.87	114.1	0.019	24	0.013	17.5	10.2	31.15	5,212.54	5,209.95	5,213.28	5,211.54
PIPE 19	MH2	5,212.12	MH3	5,211.03	115	0.01	24	0.013	17.5	7.79	22.05	5,213.63	5,212.38	5,214.37	5,213.32
PIPE 20	MH1	5,212.62	MH2	5,212.12	52	0.01	24	0.013	17.5	7.79	22.05	5,214.13	5,213.48	5,214.86	5,214.41
PIPE 21	CB-1	5,212.80	MH1	5,212.62	19.2	0.01	18	0.013	13	7.36	10.24	5,214.42	5,214.13	5,215.26	5,214.97
PIPE 22	CB-2	5,212.80	MH1	5,212.62	19.2	0.01	18	0.013	4.5	5.61	10.24	5,214.15	5,214.13	5,214.26	5,214.23
PIPE 23	MH13	5,183.66	MH17	5,179.44	300	0.014	36	0.013	83.9	12.63	79.13	5,186.47	5,182.11	5,188.78	5,184.59
PIPE 24	MH17	5,179.44	MH18	5,172.08	300	0.025	36	0.013	83.9	16.43	104.45	5,182.24	5,174.12	5,184.56	5,178.30
PIPE 25	MH18	5,172.08	MH19	5,167.30	197.8	0.024	36	0.013	83.9	16.33	103.69	5,174.88	5,171.02	5,177.20	5,173.21
PIPE 26	MH19	5,167.06	MH20	5,166.27	42.7	0.018	36	0.013	98.1	13.88	90.53	5,171.02	5,170.10	5,174.01	5,173.09
PIPE 27	CB-57	5,168.16	MH19	5,167.30	43.2	0.02	18	0.013	14.2	8.04	14.85	5,171.81	5,171.02	5,172.81	5,172.02
PIPE 28	MH21	5,167.12	MH20	5,165.96	145.5	0.008	36	0.013	37.4	5.29	59.65	5,170.55	5,170.10	5,170.99	5,170.53
PIPE 29	CB-8	5,167.99	MH21	5,167.62	46	0.008	24	0.013	37.4	11.9	20.26	5,171.81	5,170.55	5,174.02	5,172.76
PIPE 30	CB-7	5,168.30	CB-8	5,167.99	38.5	0.008	24	0.013	12	3.82	20.23	5,171.92	5,171.81	5,172.15	5,172.04
PIPE 31	MH20	5,165.76	MH22	5,160.42	300	0.018	42	0.013	135.5	14.08	134.26	5,170.10	5,164.66	5,173.18	5,167.74
PIPE 32	MH22	5,160.42	MH-3	5,153.95	261.7	0.025	42	0.013	135.5	14.08	158.13	5,164.66	5,159.91	5,167.74	5,162.99
PIPE 32A	MH-3	5,153.57	MH23	5,153.21	38.3	0.009	72	0.013	504.2	17.83	411.6	5,159.91	5,159.37	5,164.85	5,164.31
PIPE 33	MH23	5,153.07	O-1	5,152.50	70.6	0.008	72	0.013	504.2	17.83	378.72	5,159.37	5,158.18	5,164.31	5,163.33
PIPE 34	CB-11	5,234.26	MH24	5,234.11	19.2	0.008	18	0.013	1.6	0.91	9.39	5,236.26	5,236.26	5,236.27	5,236.27
PIPE 35	CB-10	5,233.76	MH24	5,233.61	19.2	0.008	24	0.013	26.4	8.4	20.23	5,236.52	5,236.26	5,237.61	5,237.35
PIPE 36	MH24	5,233.41	MH25	5,232.97	54.9	0.008	24	0.013	28	8.91	20.23	5,236.26	5,235.41	5,237.49	5,236.65
PIPE 37	MH25	5,233.01	MH26	5,232.60	51.3	0.008	24	0.013	28	8.91	20.23	5,235.41	5,234.63	5,236.65	5,235.86
PIPE 38	MH26	5,232.80	MH27	5,223.63	305	0.03	24	0.013	28	13.57	39.23	5,234.63	5,224.88	5,235.97	5,227.74
PIPE 39	MH27	5,223.43	MH28	5,222.06	68.4	0.02	24	0.013	28	11.48	31.99	5,225.25	5,223.56	5,226.60	5,225.46
PIPE 40	MH28	5,221.86	MH29	5,220.56	64.9	0.02	24	0.013	28	11.48	31.99	5,223.69	5,222.40	5,225.03	5,223.73
PIPE 41	CB-12	5,220.94	MH29	5,220.56	19.2	0.02	24	0.013	25.6	11.31	31.99	5,222.72	5,222.40	5,223.89	5,223.52
PIPE 42	MH29	5,220.06	MH30	5,218.16	95	0.02	30	0.013	53.6	13.41	58	5,222.40	5,220.12	5,224.36	5,222.73
PIPE 43	MH30	5,217.96	MH31	5,215.41	127.3	0.02	30	0.013	53.6	13.41	58	5,220.30	5,217.35	5,222.26	5,220.03
PIPE 44	MH31	5,215.21	MH32	5,212.80	120.8	0.02	30	0.013	53.6	13.41	58	5,217.56	5,214.74	5,219.51	5,217.40
PIPE 45	MH32	5,212.60	MH33	5,209.78	141	0.02	30	0.013	53.6	13.41	58	5,214.94	5,211.71	5,216.90	5,214.41
PIPE 46	MH33	5,209.58	MH34	5,206.87	135.5	0.02	36	0.013	53.6	13.77	94.32	5,211.96	5,208.54	5,213.19	5,211.25
PIPE 47	MH34	5,206.67	MH35	5,204.35	115.8	0.02	36	0.013	53.6	13.77	94.32	5,209.05	5,206.05	5,210.28	5,208.68
PIPE 48	MH35	5,204.15	MH36	5,202.40	87.5	0.02	36	0.013	53.6	13.77	94.32	5,206.53	5,204.90	5,207.77	5,206.03
PIPE 49	CB-13	5,203.61	MH36	5,203.40	21.2	0.01	18	0.013	19.7	11.15	10.5	5,205.65	5,204.90	5,207.58	5,206.83
PIPE 50	MH36	5,202.20	MH37	5,200.82	69.1	0.02	36	0.013	73.3	14.75	94.32	5,204.90	5,202.98	5,206.76	5,205.80
PIPE 51	MH37	5,200.62	MH38	5,198.64	99.1	0.02	36	0.013	73.3	14.75	94.32	5,203.32	5,200.74	5,205.18	5,203.72
PIPE 52	MH38	5,198.44	MH39	5,196.46	99.1	0.02	36	0.013	73.3	14.75	94.32	5,201.14	5,199.32	5,203.00	5,201.05
PIPE 53	MH39	5,196.26	MH40	5,194.27	99.1	0.02	36	0.013	73.3	10.37	94.32	5,199.32	5,198.12	5,200.99	5,199.80

Westerly Phase 1 - StormCAD Pipes 100Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 54	MH40	5,194.07	MH41	5,193.08	99.1	0.01	36	0.013	73.3	10.37	66.69	5,198.12	5,196.93	5,199.80	5,198.60
PIPE 55	MH41	5,192.88	MH42	5,192.51	46.6	0.008	36	0.013	73.3	10.37	59.65	5,196.93	5,196.36	5,198.60	5,198.04
PIPE 56	CB-14	5,193.20	MH42	5,193.01	19.2	0.01	24	0.013	24.2	7.7	22.62	5,196.58	5,196.36	5,197.51	5,197.29
PIPE 57	CB-15	5,193.70	MH42	5,193.51	19.2	0.01	18	0.013	13.2	7.47	10.5	5,196.67	5,196.36	5,197.53	5,197.23
PIPE 58	MH42	5,192.01	MH43	5,191.59	52.6	0.008	42	0.013	110.7	11.51	89.98	5,196.36	5,195.73	5,198.42	5,197.79
PIPE 59	MH43	5,191.59	MH44	5,190.80	99.1	0.008	42	0.013	110.7	11.51	89.98	5,195.73	5,194.53	5,197.79	5,196.59
PIPE 60	MH44	5,190.80	MH45	5,190.15	81.1	0.008	42	0.013	110.7	11.51	89.98	5,194.53	5,193.53	5,196.59	5,195.63
PIPE 61	MH45	5,190.15	MH46	5,190.01	17.1	0.008	42	0.013	110.7	11.51	89.98	5,193.53	5,193.19	5,195.63	5,195.45
PIPE 62	MH47	5,195.01	MH46	5,193.50	151.3	0.01	36	0.013	93.2	13.19	66.7	5,199.40	5,196.36	5,202.10	5,199.16
PIPE 63	MH48	5,201.01	MH47	5,200.01	99.2	0.01	36	0.013	93.2	13.19	66.71	5,204.89	5,202.88	5,207.60	5,205.67
PIPE 64	MH49	5,205.49	MH48	5,204.50	99.2	0.01	36	0.013	93.2	13.19	66.68	5,209.38	5,207.36	5,212.08	5,210.15
PIPE 65	MH50	5,209.66	MH49	5,208.67	99.2	0.01	36	0.013	93.2	13.19	66.71	5,213.55	5,211.53	5,216.25	5,214.33
PIPE 66	MH51	5,212.84	MH50	5,211.85	99.2	0.01	36	0.013	93.2	13.19	66.71	5,216.73	5,214.71	5,219.43	5,217.50
PIPE 67	MH52	5,214.58	MH51	5,214.06	51.3	0.01	36	0.013	93.2	13.19	66.69	5,218.01	5,216.93	5,220.71	5,219.72
PIPE 68	MH53	5,216.40	MH52	5,215.09	65.5	0.02	30	0.013	65.7	13.38	58	5,219.69	5,218.01	5,222.47	5,220.79
PIPE 69	MH54	5,220.18	MH53	5,219.40	65.5	0.012	30	0.013	65.7	13.38	44.93	5,223.55	5,221.82	5,226.33	5,224.65
PIPE 70	MH55	5,221.17	MH54	5,220.38	65.5	0.012	30	0.013	65.7	13.38	44.93	5,225.23	5,223.55	5,228.01	5,226.33
PIPE 71	MH56	5,222.15	MH55	5,221.37	65.5	0.012	30	0.013	65.7	13.38	44.93	5,226.91	5,225.23	5,229.69	5,228.01
PIPE 72	MH57	5,224.71	MH56	5,224.15	46.5	0.012	30	0.013	65.7	13.38	44.93	5,228.10	5,226.91	5,230.89	5,229.69
PIPE 73	MH58	5,226.67	MH57	5,224.71	98.1	0.02	30	0.013	65.7	13.38	58	5,230.62	5,228.10	5,233.40	5,230.89
PIPE 74	CB-24	5,231.43	MH58	5,227.67	187.9	0.02	30	0.013	65.7	13.38	58	5,235.44	5,230.62	5,238.23	5,233.40
PIPE 75	MH59	5,231.90	CB-24	5,231.63	13.5	0.02	30	0.013	64.7	13.18	58	5,235.78	5,235.44	5,238.48	5,238.14
PIPE 76	CB-23	5,232.76	MH59	5,232.40	17.8	0.02	24	0.013	36.6	11.65	31.99	5,236.24	5,235.78	5,238.35	5,237.89
PIPE 77	MH60	5,233.45	MH59	5,232.40	38	0.028	30	0.013	28.1	5.72	68.1	5,235.96	5,235.78	5,236.47	5,236.29
PIPE 78	MH61	5,235.81	MH60	5,233.95	74.4	0.025	30	0.013	28.1	12.74	64.85	5,237.62	5,235.96	5,238.47	5,236.65
PIPE 79	MH62	5,237.78	MH61	5,235.92	74.4	0.025	30	0.013	28.1	12.74	64.85	5,239.58	5,237.14	5,240.43	5,239.30
PIPE 80	MH63	5,239.26	MH62	5,237.78	74.4	0.02	30	0.013	28.1	11.72	58	5,241.07	5,239.07	5,241.92	5,240.94
PIPE 81	MH64	5,239.86	MH63	5,239.26	74.4	0.008	30	0.013	28.1	8.24	36.68	5,241.67	5,240.91	5,242.52	5,241.96
PIPE 82	MH65	5,240.45	MH64	5,239.86	74.4	0.008	30	0.013	28.1	8.24	36.68	5,242.26	5,241.50	5,243.11	5,242.55
PIPE 83	MH66	5,241.05	MH65	5,240.45	74.4	0.008	30	0.013	28.1	8.24	36.68	5,242.86	5,242.10	5,243.71	5,243.15
PIPE 84	MH67	5,241.64	MH66	5,241.05	74.4	0.008	30	0.013	28.1	8.24	36.68	5,243.45	5,242.69	5,244.30	5,243.74
PIPE 85	MH68	5,242.90	MH67	5,241.64	253	0.005	30	0.013	28.1	6.7	28.88	5,244.89	5,243.45	5,245.59	5,244.30
PIPE 86	CB-21	5,243.04	MH68	5,242.90	17.9	0.008	24	0.013	24.7	7.86	20.2	5,245.10	5,244.89	5,246.06	5,245.85
PIPE 87	CB-22	5,243.06	MH68	5,242.90	20.4	0.008	18	0.013	3.4	1.92	9.39	5,244.91	5,244.89	5,244.97	5,244.95
PIPE 88	CB-26	5,216.16	MH52	5,215.59	19.2	0.03	24	0.013	27.5	8.75	39.18	5,218.29	5,218.01	5,219.48	5,219.20
PIPE 89	CB-25	5,220.38	CB-26	5,218.16	74.1	0.03	18	0.013	14.3	11.4	18.19	5,221.77	5,219.19	5,222.86	5,221.10
PIPE 90	MH46	5,188.50	MH69	5,184.15	289.7	0.015	54	0.013	203.9	16.99	240.84	5,192.56	5,187.39	5,195.39	5,191.70
PIPE 91	MH69	5,180.20	MH70	5,176.56	290.9	0.013	54	0.013	203.9	15.7	219.85	5,184.26	5,180.02	5,187.09	5,183.78
PIPE 92	MH71	5,176.90	MH70	5,176.39	29.6	0.017	18	0.013	21.5	12.17	13.7	5,179.12	5,177.87	5,181.42	5,180.18
PIPE 93	MH72	5,181.51	MH71	5,176.90	256.9	0.018	18	0.013	7.3	8.04	14.08	5,182.56	5,179.12	5,183.04	5,179.39
PIPE 94	CB-27	5,182.87	MH72	5,182.51	35.8	0.01	18	0.013	7.3	6.42	10.5	5,183.92	5,183.44	5,184.39	5,184.07
PIPE 96	CB-28	5,178.91	MH71	5,177.90	40.3	0.025	18	0.013	14.2	10.56	16.61	5,180.29	5,179.02	5,181.37	5,180.58
PIPE 97	MH73	5,176.47	MH70	5,175.39	135	0.008	48	0.013	61.7	10.12	128.47	5,178.84	5,177.37	5,179.83	5,178.91
PIPE 98	CB-20	5,177.38	MH73	5,177.22	19.2	0.008	18	0.013	2.4	4.45	9.39	5,178.85	5,178.84	5,178.88	5,178.87
PIPE 99	CB-19	5,177.38	MH73	5,177.22	19.2	0.008	18	0.013	17.6	9.96	9.39	5,179.38	5,178.84	5,180.92	5,180.38
PIPE 100	CB-18	5,177.76	CB-19	5,177.38	38.1	0.01	18	0.013	8.8	4.98	10.5	5,179.65	5,179.38	5,180.03	5,179.76
PIPE 101	MH74	5,177.20	MH73	5,176.47	91	0.008	36	0.013	41.7	9.13	59.65	5,179.30	5,178.84	5,180.27	5,179.59
PIPE 102	MH75	5,179.32	MH74	5,177.40	96.1	0.02	30	0.013	41.7	12.86	58	5,181.49	5,179.04	5,182.81	5,181.37
PIPE 103	MH76	5,181.81	MH75	5,179.52	114.6	0.02	30	0.013	41.7	12.86	58	5,183.98	5,181.14	5,185.30	5,183.53
PIPE 104	MH77	5,184.94	MH76	5,182.01	117	0.025	30	0.013	41.7	14.03	64.85	5,187.10	5,183.53	5,188.43	5,186.33
PIPE 105	MH78	5,188.10	MH77	5,185.14	118.5	0.025	30	0.013	41.7	14.03	64.85	5,190.27	5,186.65	5,191.59	5,189.46
PIPE 106	CB-17	5,189.69	MH78	5,189.10	19.6	0.03	30	0.013	17.6	12	71.04	5,191.11	5,190.13	5,191.69	5,191.48
PIPE 107	MH79	5,192.22	MH78	5,189.10	124.9	0.025	24	0.013	24.1	12.22	35.77	5,193.96	5,190.32	5,195.04	5,192.57
PIPE 108	MH80	5,195.61	MH79	5,193.22	95.4	0.025	24	0.013	24.1	12.22	35.77	5,197.35	5,194.46	5,198.42	5,196.63

Westerly Phase 1 - StormCAD Pipes 100Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 109	MH81	5,197.49	MH80	5,195.81	67.4	0.025	24	0.013	24.1	12.22	35.77	5,199.23	5,197.08	5,200.31	5,199.13
PIPE 110	CB-16	5,198.58	MH81	5,197.69	35.4	0.025	18	0.013	24.1	13.64	16.61	5,201.10	5,199.23	5,203.99	5,202.12
PIPE 111	MH70	5,171.75	MH84	5,169.64	170.2	0.012	60	0.013	287.1	16.86	290.46	5,176.37	5,173.79	5,179.94	5,178.00
PIPE 112	MH84	5,167.19	MH82	5,165.26	154.9	0.012	60	0.013	287.1	14.62	290.41	5,173.15	5,171.26	5,176.47	5,174.59
PIPE 113	CB-29	5,168.92	MH82	5,168.67	24.2	0.01	18	0.013	18.5	10.47	10.5	5,172.01	5,171.26	5,173.72	5,172.97
PIPE 114	CB-30	5,168.83	MH82	5,168.67	15.6	0.01	18	0.013	10.3	5.83	10.64	5,171.41	5,171.26	5,171.94	5,171.79
PIPE 115	MH82	5,165.26	MH83	5,164.94	40.5	0.008	60	0.013	315.9	16.09	232.93	5,171.26	5,170.67	5,175.29	5,174.69
PIPE 116	CB-31	5,167.90	MH83	5,167.74	20	0.008	18	0.013	19.4	10.98	9.39	5,171.35	5,170.67	5,173.22	5,172.54
PIPE 117	MH83	5,164.74	MH85	5,163.99	94.1	0.008	66	0.013	335.3	14.11	300.34	5,170.67	5,169.73	5,173.76	5,172.82
PIPE 118	MH85	5,164.00	MH86	5,162.79	150.6	0.008	66	0.013	335.3	14.11	300.34	5,169.73	5,168.23	5,172.82	5,171.34
PIPE 119	MH86	5,162.79	MH87	5,161.68	139.9	0.008	66	0.013	335.3	14.11	300.34	5,168.23	5,166.88	5,171.34	5,170.11
PIPE 120	MH87	5,161.67	MH88	5,161.17	62.6	0.008	66	0.013	335.3	14.11	300.34	5,166.88	5,166.13	5,170.11	5,169.57
PIPE 121	MH88	5,161.17	MH89	5,159.68	149.5	0.01	66	0.013	335.3	16.11	335.79	5,166.13	5,164.82	5,169.57	5,168.09
PIPE 122	MH91	5,162.47	MH89	5,160.66	112.9	0.016	24	0.013	27.9	8.88	28.61	5,166.54	5,164.82	5,167.77	5,166.05
PIPE 123	MH92	5,163.56	MH91	5,162.97	73.6	0.008	18	0.013	27.9	15.79	9.39	5,171.73	5,166.54	5,175.61	5,170.41
PIPE 124	CB-50	5,163.92	MH92	5,163.76	21.2	0.008	18	0.013	27.9	15.79	9.39	5,170.09	5,168.60	5,173.97	5,172.47
PIPE 125	MH89	5,159.68	MH93	5,158.81	106.9	0.008	72	0.013	363.2	15.34	381.13	5,164.82	5,163.60	5,167.90	5,167.10
PIPE 126	MH93	5,158.81	MH94	5,158.29	65.3	0.008	72	0.013	363.2	15.24	378.52	5,163.96	5,163.14	5,167.04	5,166.56
PIPE 127	MH94	5,158.29	MH95	5,157.55	92.7	0.008	72	0.013	363.2	15.26	378.83	5,163.44	5,162.75	5,166.51	5,165.77
PIPE 128	MH95	5,157.55	MH96	5,156.79	94.2	0.008	72	0.013	363.2	15.25	378.78	5,162.75	5,162.51	5,165.77	5,165.17
PIPE 129	MH96	5,156.79	MH97	5,156.20	73.9	0.008	72	0.013	363.2	15.26	378.83	5,162.51	5,162.10	5,165.17	5,164.69
PIPE 130	CB-51	5,156.20	MH97	5,155.92	35.6	0.008	72	0.013	363.2	12.85	378.89	5,162.10	5,161.35	5,164.67	5,164.43
PIPE 134	CB-58	5,157.96	MH 102	5,157.73	28.2	0.008	18	0.013	4.8	5.35	9.39	5,158.80	5,158.50	5,159.14	5,158.94
PIPE 135	MH 102	5,157.73	MH101	5,157.41	40.6	0.008	18	0.013	4.8	5.35	9.39	5,158.58	5,158.17	5,158.92	5,158.61
PIPE 136	MH101	5,157.41	MH100	5,157.01	49.3	0.008	18	0.013	4.8	5.35	9.39	5,158.25	5,158.25	5,158.59	5,158.40
PIPE 137	MH103	5,157.43	MH100	5,154.93	207.9	0.012	48	0.013	166.7	14.13	157.36	5,161.14	5,158.49	5,164.06	5,161.59
PIPE 138	MH104	5,161.79	MH103	5,159.29	207.9	0.012	48	0.013	166.7	14.13	157.36	5,165.49	5,162.85	5,168.42	5,165.95
PIPE 139	MH105	5,163.01	MH104	5,162.52	40.8	0.012	48	0.013	166.7	14.12	157.26	5,166.71	5,166.13	5,169.64	5,169.16
PIPE 140	MH106	5,164.23	MH105	5,163.74	40.8	0.012	48	0.013	166.7	14.12	157.26	5,167.93	5,167.35	5,170.86	5,170.38
PIPE 141	MH107	5,165.45	MH106	5,165.00	40.8	0.011	48	0.013	166.7	13.27	150.86	5,169.31	5,168.70	5,172.10	5,171.63
PIPE 142	MH108	5,166.67	MH107	5,166.18	40.8	0.012	48	0.013	166.7	14.14	157.42	5,170.37	5,169.79	5,173.30	5,172.82
PIPE 143	MH109	5,167.89	MH108	5,167.40	40.8	0.012	48	0.013	166.7	14.14	157.42	5,171.59	5,171.01	5,174.52	5,174.04
PIPE 144	MH110	5,169.10	MH109	5,168.62	40.8	0.012	48	0.013	166.7	14.12	157.26	5,172.81	5,172.23	5,175.73	5,175.26
PIPE 145	MH111	5,174.61	MH110	5,171.64	212.2	0.014	48	0.013	166.7	15.42	169.95	5,178.32	5,174.90	5,181.24	5,178.49
PIPE 146	MH112	5,177.17	MH111	5,176.04	94.2	0.012	48	0.013	166.7	14.13	157.35	5,180.87	5,179.62	5,183.80	5,182.68
PIPE 147	MH113	5,178.42	MH112	5,177.17	157.3	0.008	24	0.013	21	6.68	20.23	5,182.23	5,180.87	5,182.92	5,181.57
PIPE 148	MH114	5,179.07	MH113	5,178.42	42.6	0.015	24	0.013	21	6.68	27.8	5,182.60	5,182.23	5,183.29	5,182.92
PIPE 149	CB-43	5,179.50	MH114	5,179.27	29.3	0.008	24	0.013	18.5	5.89	20.26	5,182.79	5,182.60	5,183.33	5,183.14
PIPE 150	CB-44	5,179.49	MH114	5,179.28	27	0.008	24	0.013	2.5	0.8	20.23	5,182.60	5,182.60	5,182.61	5,182.61
PIPE 151	MH115	5,180.96	MH112	5,179.40	111.8	0.014	42	0.013	145.7	15.14	119	5,185.19	5,182.77	5,188.75	5,186.42
PIPE 152	MH116	5,182.88	MH115	5,181.92	68.7	0.014	42	0.013	145.7	15.14	119.06	5,186.80	5,185.29	5,190.37	5,188.94
PIPE 153	MH117	5,185.00	MH116	5,184.18	68.7	0.012	42	0.013	145.7	15.14	110.19	5,189.06	5,187.55	5,192.63	5,191.20
PIPE 154	MH118	5,187.56	MH117	5,186.60	68.7	0.014	42	0.013	145.7	15.14	119	5,191.48	5,189.97	5,195.05	5,193.62
PIPE 155	MH119	5,189.27	MH118	5,188.31	68.7	0.014	42	0.013	145.7	15.14	119.06	5,193.19	5,191.68	5,196.76	5,195.33
PIPE 156	MH120	5,189.86	MH119	5,189.27	59.2	0.01	42	0.013	145.7	15.14	100.56	5,194.44	5,193.19	5,198.00	5,196.76
PIPE 157	MH121	5,191.27	MH120	5,189.86	141.1	0.01	42	0.013	145.7	15.14	100.61	5,197.39	5,194.44	5,200.96	5,198.00
PIPE 158	MH122	5,192.84	MH121	5,191.27	98.2	0.016	30	0.013	27.5	5.6	51.77	5,197.84	5,197.39	5,198.32	5,197.88
PIPE 159	MH123	5,193.59	MH122	5,192.84	94.2	0.008	30	0.013	27.5	5.6	36.69	5,198.26	5,197.84	5,198.75	5,198.32
PIPE 160	MH124	5,194.35	MH123	5,193.59	94.2	0.008	30	0.013	27.5	5.6	36.69	5,198.68	5,198.26	5,199.17	5,198.75
PIPE 181	CB-42	5,195.31	MH124	5,194.93	19.2	0.02	24	0.013	2.5	0.8	31.97	5,198.69	5,198.68	5,198.70	5,198.69
PIPE 182	CB-41	5,194.52	MH124	5,194.35	19.2	0.009	30	0.013	25	5.09	38.85	5,198.75	5,198.68	5,199.16	5,199.09
PIPE 183	CB-40	5,194.83	CB-41	5,194.52	39.5	0.008	24	0.013	11.1	3.53	20.23	5,198.85	5,198.75	5,199.04	5,198.95
PIPE 184	MH125	5,195.29	MH121	5,194.47	44.6	0.018	42	0.013	118.2	15.93	136.14	5,198.52	5,197.28	5,201.04	5,200.45
PIPE 185	MH126	5,196.74	MH125	5,195.79	63.3	0.015	42	0.013	118.2	14.58	123.21	5,199.97	5,198.69	5,202.49	5,201.67

Westerly Phase 1 - StormCAD Pipes 100Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 186	MH127	5,199.00	MH126	5,196.73	126.5	0.018	42	0.013	118.2	15.8	134.84	5,202.24	5,199.97	5,204.75	5,202.48
PIPE 187	MH128	5,199.78	MH127	5,199.03	49.6	0.015	42	0.013	118.2	14.59	123.24	5,203.01	5,201.96	5,205.53	5,204.89
PIPE 188	MH129	5,200.56	MH128	5,199.78	98.3	0.008	36	0.013	72.2	10.21	59.67	5,204.16	5,203.01	5,205.79	5,204.63
PIPE 189	MH130	5,201.82	MH129	5,200.56	157	0.008	36	0.013	72.2	10.21	59.65	5,206.00	5,204.16	5,207.63	5,205.79
PIPE 190	MH131	5,202.16	MH130	5,201.82	42.1	0.008	36	0.013	72.2	10.21	59.67	5,206.50	5,206.00	5,208.12	5,207.63
PIPE 191	CB-36	5,203.77	MH131	5,203.62	19.2	0.008	18	0.013	4.7	2.66	9.39	5,206.54	5,206.50	5,206.65	5,206.61
PIPE 192	CB-35	5,203.77	MH131	5,203.62	19.2	0.008	18	0.013	21.1	11.94	9.39	5,207.27	5,206.50	5,209.49	5,208.71
PIPE 193	MH132	5,202.63	MH131	5,202.16	31.7	0.015	36	0.013	46.4	6.56	81.67	5,206.65	5,206.50	5,207.32	5,207.17
PIPE 194	MH133	5,203.10	MH132	5,202.63	31.5	0.015	36	0.013	46.4	6.56	81.69	5,206.80	5,206.65	5,207.47	5,207.32
PIPE 195	MH134	5,203.82	MH133	5,203.10	48	0.015	36	0.013	46.4	6.56	81.55	5,207.04	5,206.80	5,207.71	5,207.47
PIPE 196	MH135	5,207.25	MH134	5,203.83	136.9	0.025	30	0.013	46.4	14.36	64.85	5,209.50	5,207.04	5,211.05	5,208.42
PIPE 197	MH136	5,210.30	MH135	5,207.45	114	0.025	30	0.013	46.4	14.36	64.85	5,212.55	5,209.08	5,214.10	5,212.00
PIPE 198	MH137	5,213.01	MH136	5,210.50	140.4	0.018	30	0.013	46.4	12.52	54.8	5,215.26	5,212.30	5,216.81	5,214.65
PIPE 199	MH138	5,214.25	MH137	5,212.99	158	0.008	30	0.013	46.4	9.45	36.68	5,217.38	5,215.26	5,218.77	5,216.78
PIPE 200	MH141	5,216.83	MH138	5,214.25	322.8	0.008	24	0.013	20	6.37	20.23	5,219.90	5,217.38	5,220.53	5,218.01
PIPE 201	CB-34	5,216.99	MH141	5,216.83	19.2	0.008	24	0.013	20	6.37	20.23	5,220.05	5,219.90	5,220.68	5,220.53
PIPE 202	MH139	5,225.98	MH138	5,219.25	224.2	0.03	24	0.013	26.4	13.38	39.18	5,227.77	5,220.45	5,229.00	5,223.24
PIPE 203	MH140	5,234.52	MH139	5,230.98	118.2	0.03	24	0.013	26.4	13.38	39.18	5,236.32	5,232.20	5,237.54	5,234.86
PIPE 204	CB-32	5,234.71	MH140	5,234.52	19.2	0.01	18	0.013	5.9	3.34	10.5	5,236.38	5,236.32	5,236.55	5,236.49
PIPE 205	CB-33	5,234.72	MH140	5,234.52	19.6	0.01	18	0.013	20.5	11.6	10.5	5,237.06	5,236.32	5,239.16	5,238.41
PIPE 206	MH142	5,206.85	MH128	5,202.97	129.3	0.03	30	0.013	46	15.39	71.04	5,209.09	5,204.49	5,210.62	5,207.87
PIPE 207	MH143	5,210.31	MH142	5,207.05	137.5	0.024	30	0.013	46	14.03	63.12	5,212.55	5,208.68	5,214.08	5,211.56
PIPE 208	MH144	5,211.51	MH143	5,209.35	241.1	0.009	30	0.013	32.9	6.7	38.91	5,214.10	5,212.55	5,214.80	5,213.25
PIPE 209	CB-39	5,212.09	MH144	5,211.51	19.2	0.03	18	0.013	17.7	10.02	18.2	5,214.65	5,214.10	5,216.21	5,215.66
PIPE 210	CB-39a	5,212.09	MH144	5,211.51	19.2	0.03	18	0.013	15.2	8.6	18.2	5,214.50	5,214.10	5,215.65	5,215.25
PIPE 211	MH145	5,214.88	MH143	5,210.82	135.2	0.03	18	0.013	13.1	11.21	18.19	5,216.23	5,212.55	5,217.18	5,213.41
PIPE 212	CB-37	5,215.27	MH145	5,215.08	19.2	0.01	18	0.013	11.7	6.62	10.5	5,216.66	5,216.38	5,217.39	5,217.18
PIPE 213	CB-38	5,215.27	MH145	5,215.08	19.2	0.01	18	0.013	1.4	4.13	10.5	5,216.23	5,216.23	5,216.25	5,216.25
PIPE 214	MH100	5,154.44	MH146	5,152.31	266.7	0.008	54	0.013	171.5	12.6	175.88	5,158.25	5,155.90	5,160.47	5,158.37
PIPE 215	MH146	5,152.31	MH147	5,151.64	84.3	0.008	54	0.013	171.5	12.6	175.88	5,156.12	5,155.71	5,158.34	5,157.70
PIPE 216	MH150	5,156.67	MH149	5,155.48	47.6	0.025	36	0.013	81.9	16.48	105.45	5,159.46	5,158.33	5,161.69	5,160.50
PIPE 217	CB-52	5,158.45	MH150	5,158.37	9.2	0.008	18	0.013	12.9	7.3	9.39	5,159.94	5,159.72	5,160.77	5,160.65
PIPE 218	MH151	5,163.88	MH150	5,157.37	260.1	0.025	36	0.013	69	15.9	105.45	5,166.52	5,159.15	5,168.22	5,163.05
PIPE 219	MH152	5,172.07	MH151	5,164.38	307.7	0.025	30	0.013	69	14.87	64.85	5,174.36	5,166.62	5,177.69	5,170.05
PIPE 220	MH153	5,179.96	MH152	5,172.27	307.7	0.025	30	0.013	69	14.87	64.85	5,182.25	5,174.51	5,185.59	5,177.95
PIPE 221	MH154	5,187.37	MH153	5,180.46	246.6	0.028	30	0.013	40.2	14.53	68.63	5,189.50	5,181.84	5,190.76	5,185.12
PIPE 222	MH155	5,194.47	MH154	5,187.57	246.6	0.028	30	0.013	40.2	14.53	68.63	5,196.60	5,188.94	5,197.86	5,192.22
PIPE 223	MH156	5,201.87	MH155	5,194.97	246.6	0.028	30	0.013	40.2	14.53	68.63	5,204.01	5,196.34	5,205.27	5,199.63
PIPE 224	MH157	5,208.54	MH156	5,202.37	246.6	0.025	30	0.013	40.2	13.91	64.85	5,210.67	5,203.80	5,211.93	5,206.81
PIPE 225	MH158	5,214.21	MH157	5,208.74	202.4	0.027	30	0.013	40.2	14.33	67.41	5,216.34	5,210.13	5,217.60	5,213.32
PIPE 226	MH159	5,214.81	MH158	5,214.21	75.9	0.008	24	0.013	28.9	9.2	20.23	5,217.58	5,216.34	5,218.89	5,217.65
PIPE 227	CB-46	5,214.90	MH159	5,214.81	11.2	0.008	24	0.013	26.2	8.34	20.23	5,217.73	5,217.58	5,218.81	5,218.66
PIPE 228	CB-47	5,215.54	MH159	5,215.31	45.2	0.005	18	0.013	2.7	1.53	7.43	5,217.61	5,217.58	5,217.64	5,217.61
PIPE 229	MH160	5,221.16	MH158	5,214.71	215	0.03	18	0.013	11.3	10.85	18.19	5,222.44	5,216.34	5,223.21	5,216.97
PIPE 230	CB-45	5,222.43	MH160	5,221.36	107.5	0.01	18	0.013	11.3	∞	10.5	5,223.81	5,222.64	5,224.50	5,223.41
PIPE 231	MH149	5,154.26	MH-1	5,152.37	148.6	0.013	36	0.013	81.9	11.59	75.18	5,158.33	5,156.09	5,160.42	5,158.18
PIPE 232	MH-1	5,152.37	MH147	5,151.63	57.5	0.013	42	0.013	81.9	8.51	114.71	5,156.09	5,155.71	5,157.22	5,156.83
PIPE 233	CB-54	5,154.91	MH147	5,154.63	19.2	0.015	24	0.013	17.8	9.37	27.73	5,156.43	5,155.91	5,157.18	5,156.99
PIPE 234	MH147	5,151.14	CB-55	5,150.98	19.2	0.008	66	0.013	271.2	14.31	300.34	5,155.71	5,155.60	5,158.27	5,158.12
PIPE 235	CB-55	5,150.97	O-2	5,150.50	59	0.008	66	0.013	278.2	14.36	300.4	5,155.60	5,154.82	5,158.24	5,157.82
PIPE 236	CB-60	5,147.57	CB-61	5,146.92	80.9	0.008	18	0.013	10	5.66	9.39	5,152.53	5,151.80	5,153.03	5,152.30
PIPE 237	CB-61	5,146.92	MH161	5,146.61	38.6	0.008	18	0.013	20	11.32	9.39	5,152.19	5,150.79	5,154.18	5,152.78
PIPE 238	OutletStructur	5,144.86	MH161	5,144.10	150.6	0.005	60	0.013	302	15.38	184.18	5,152.82	5,150.79	5,156.49	5,154.47
PIPE 239	MH161	5,144.11	MH162	5,143.94	34.6	0.005	60	0.013	322	16.4	184.15	5,150.79	5,150.26	5,154.97	5,154.44

Westerly Phase 1 - StormCAD Pipes 100Yr

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
PIPE 240	MH162	5,143.94	O-4	5,143.25	138.3	0.005	60	0.013	322	16.4	184.15	5,150.26	5,147.99	5,154.44	5,152.34
PIPE 242	CB-62	5,143.57	MH163	5,143.46	13.4	0.008	18	0.013	22	12.45	9.51	5,145.69	5,145.10	5,148.10	5,147.51
PIPE 243	MH163	5,143.26	O-3	5,143.18	9.8	0.008	18	0.013	22	12.45	9.49	5,145.10	5,144.66	5,147.51	5,147.08
PIPE 244	CB-48	5,182.61	CB-49	5,182.04	56.3	0.01	24	0.013	26.8	8.53	22.62	5,185.38	5,184.59	5,186.51	5,185.72
PIPE 245	CB-49	5,181.54	MH153	5,180.46	135.4	0.008	24	0.013	28.8	9.17	20.23	5,184.59	5,182.30	5,185.89	5,183.71
PIPE 247	MH98	5,154.36	MH-3	5,153.95	53.6	0.008	72	0.013	368.7	14.97	371.36	5,160.27	5,159.91	5,162.93	5,162.56
PIPE 248	CB-51	5,155.92	MH98	5,154.36	193.9	0.008	72	0.013	368.7	15.29	379.36	5,161.09	5,160.27	5,164.23	5,162.93

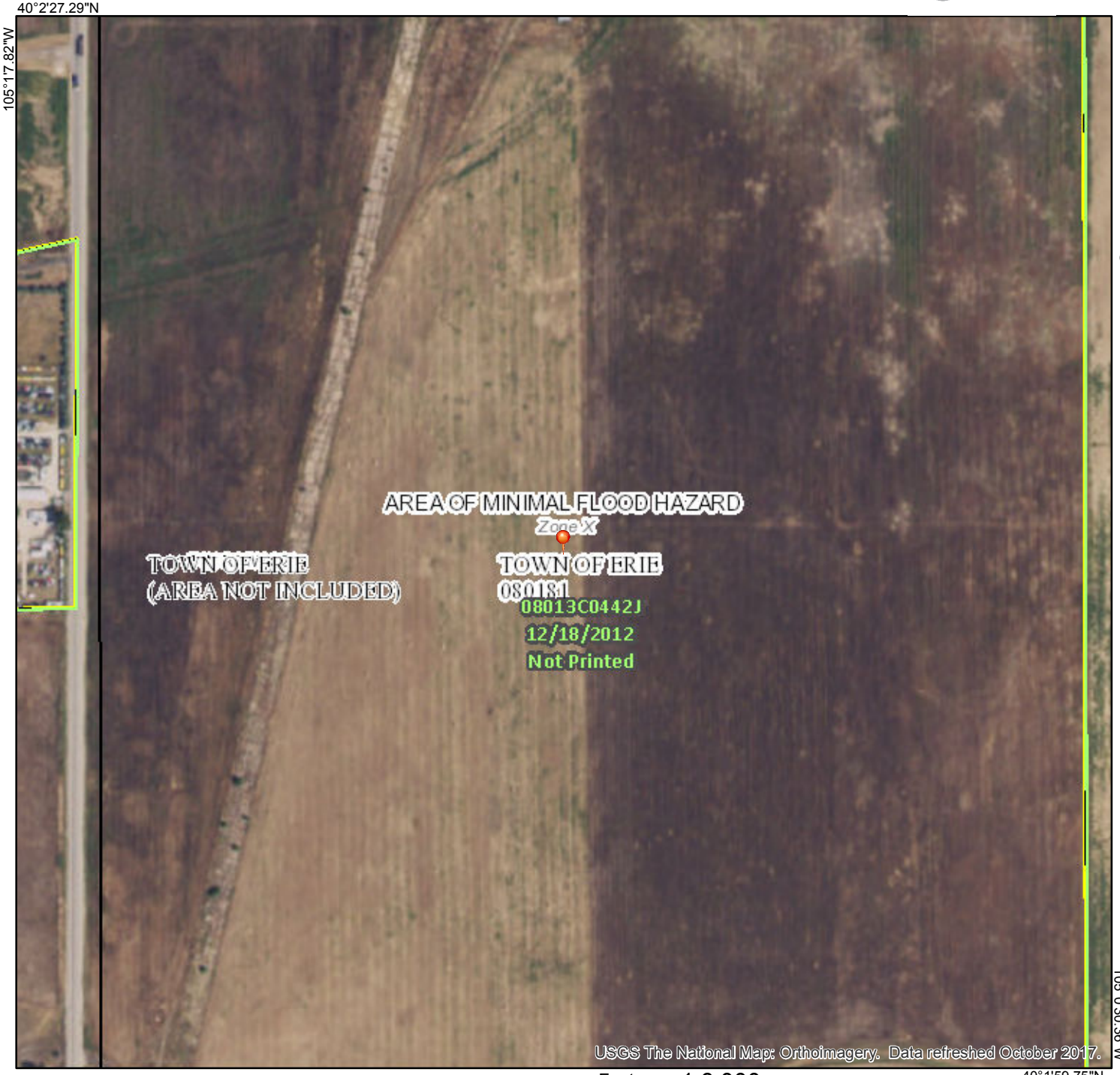
Appendix D – FEMA Map

National Flood Hazard Layer FIRMette

FEMA

40°2'27.29"N

105°17.82"W



105°0'30.36"W

40°1'59.75"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

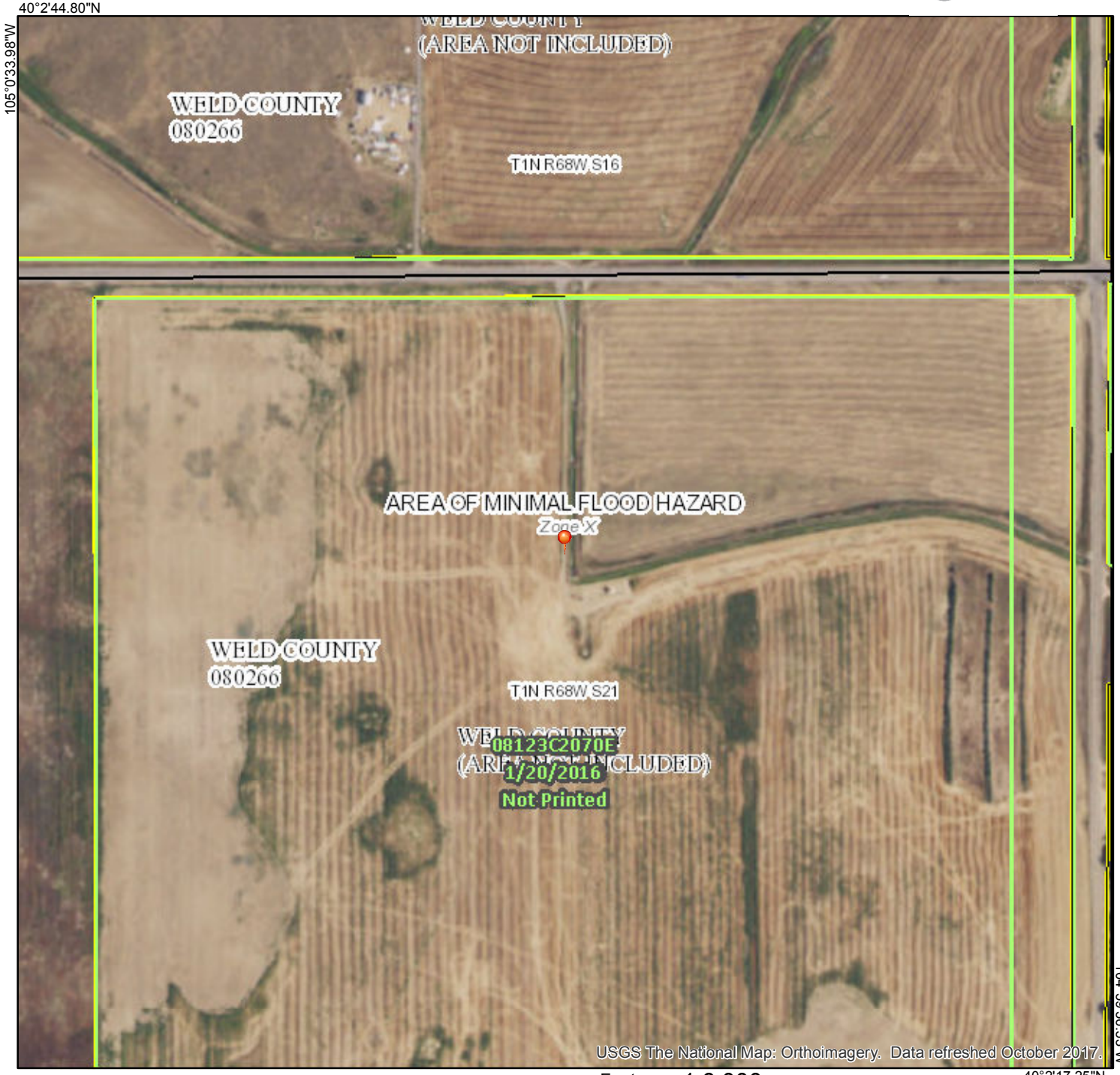
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/12/2018 at 2:21:10 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

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- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
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- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/12/2018 at 2:23:41 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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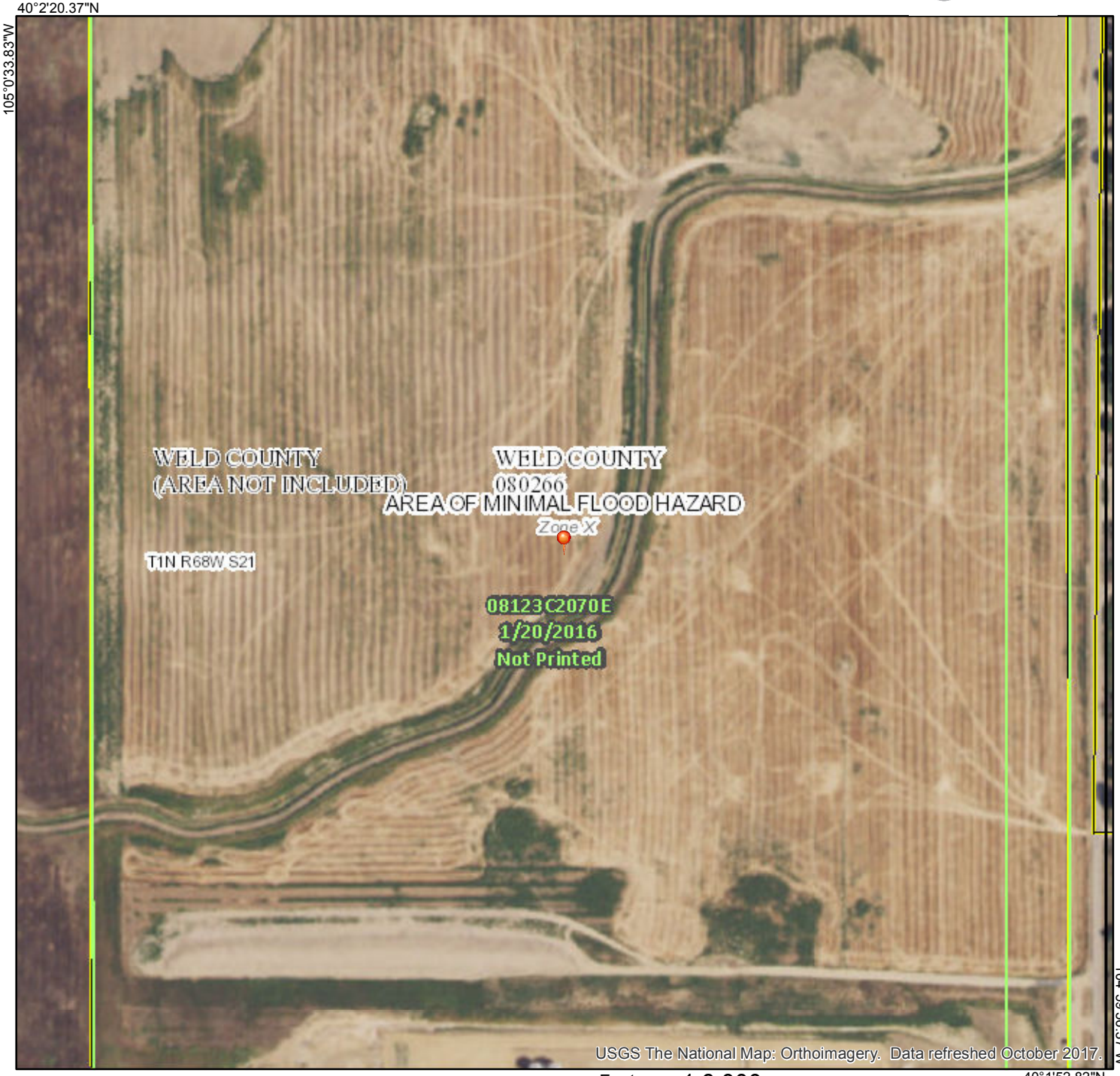
National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/12/2018 at 2:28:16 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

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- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
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- Area with Flood Risk due to Levee *Zone D*

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- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

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- 20.2 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

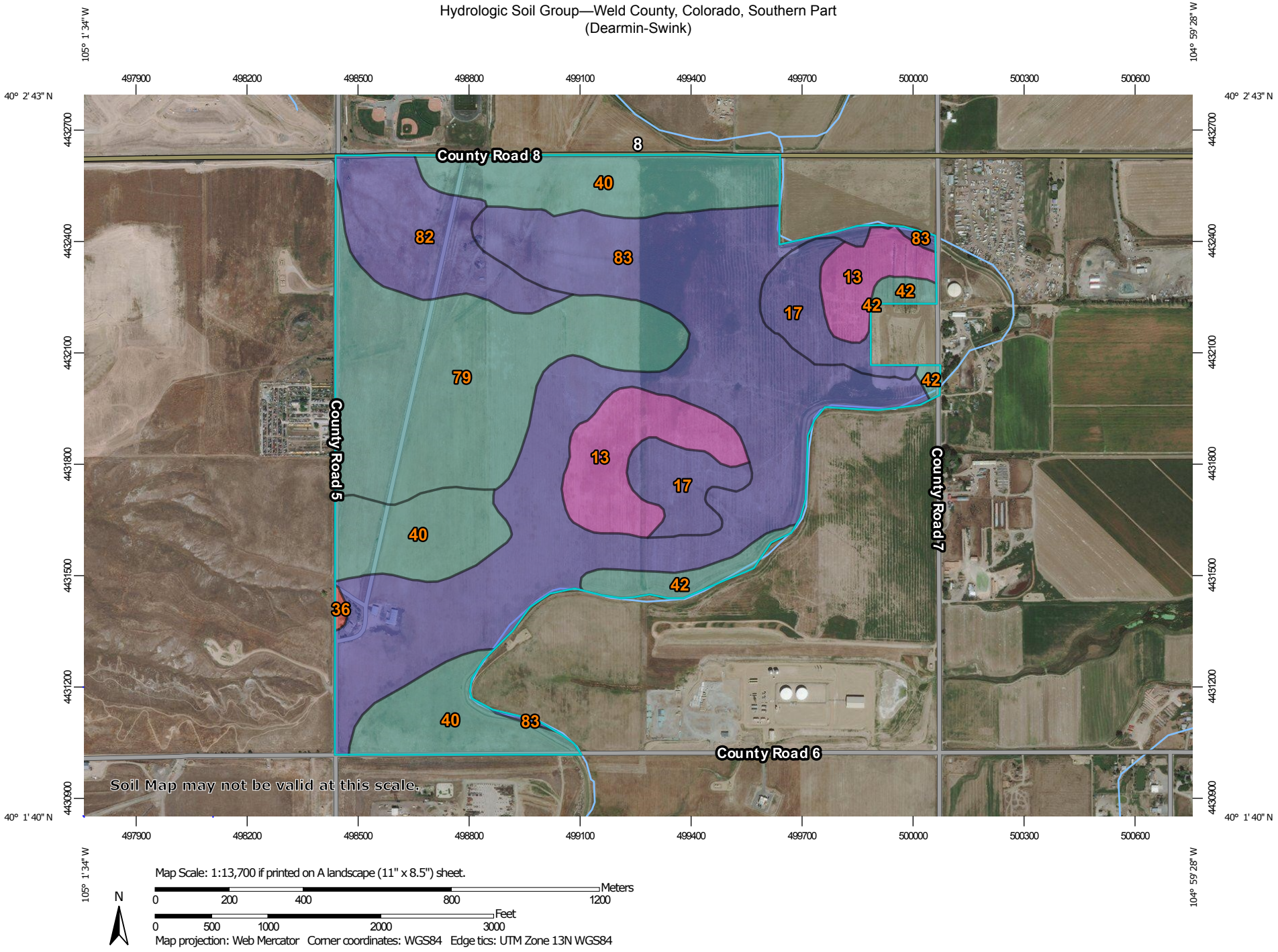
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/12/2018 at 2:19:46 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix E – Soils Map

Hydrologic Soil Group—Weld County, Colorado, Southern Part
(Dearmin-Swink)



Map Scale: 1:13,700 if printed on A landscape (11" x 8.5") sheet.

N

0 200 400 800 1200 Meters

0 500 1000 2000 3000 Feet

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Weld County, Colorado, Southern Part
Survey Area Data: Version 16, Oct 10, 2017

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

Date(s) aerial images were photographed: Sep 20, 2015—Oct 15, 2016

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13	Cascajo gravelly sandy loam, 5 to 20 percent slopes	A	38.2	8.5%
17	Colby loam, 5 to 9 percent slopes	B	27.8	6.2%
36	Midway-Shingle complex, 5 to 20 percent slopes	D	0.7	0.2%
40	Nunn loam, 1 to 3 percent slopes	C	80.7	18.0%
42	Nunn clay loam, 1 to 3 percent slopes	C	12.4	2.8%
79	Weld loam, 1 to 3 percent slopes	C	88.8	19.7%
82	Wiley-Colby complex, 1 to 3 percent slopes	B	33.7	7.5%
83	Wiley-Colby complex, 3 to 5 percent slopes	B	167.3	37.2%
Totals for Area of Interest			**449.6**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

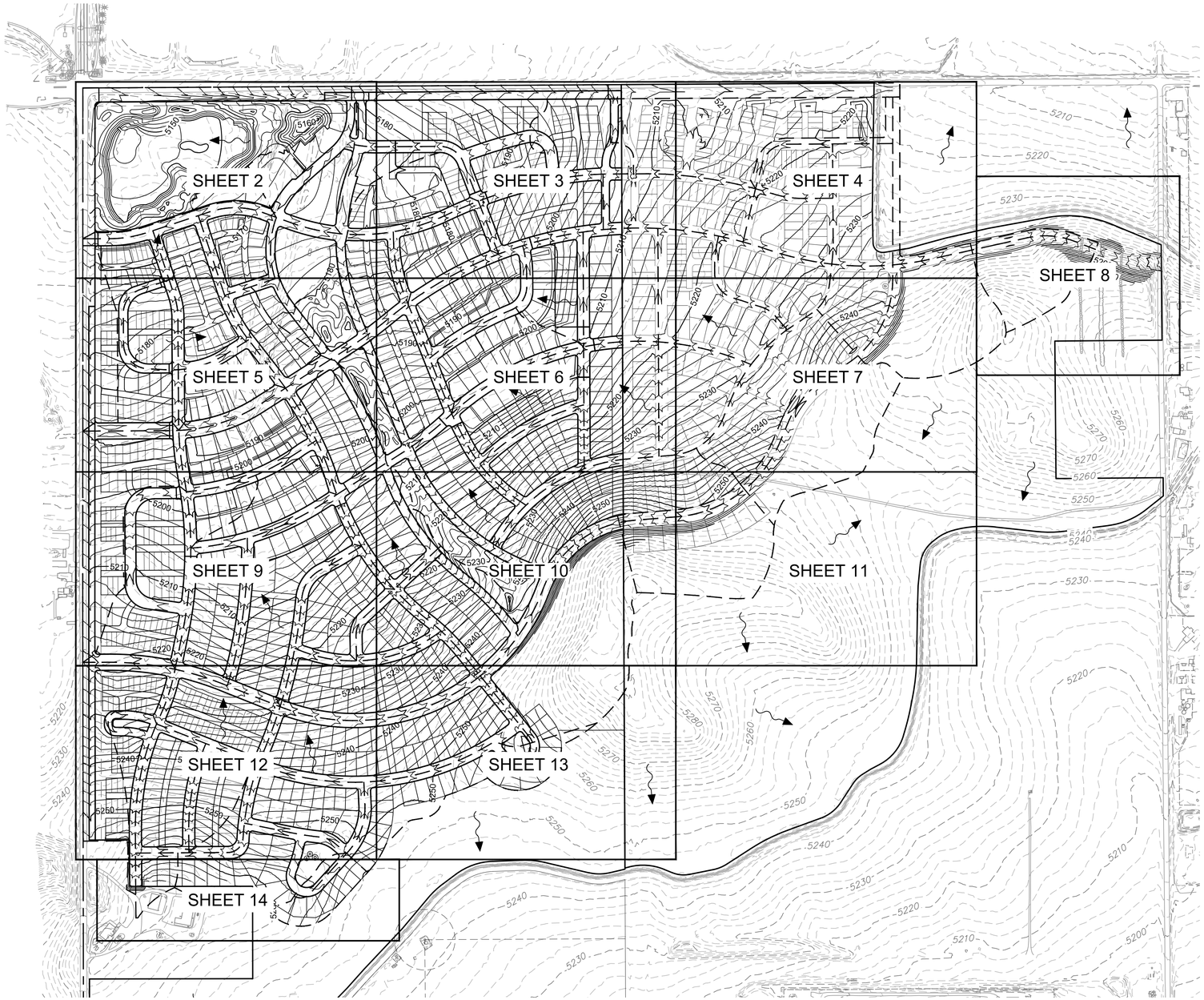
Point of Contact for
Matrix Design Group:

Patrick Chelin, PE
1601 Blake St, Suite 200
Denver, CO 80202
Office: 303-572-0200

Matrix DESIGN GROUP

Anniston, AL • Atlanta, GA • Colorado Springs, CO • Denver, CO • Niceville, FL • Parsons, KS • Phoenix, AZ
Pueblo, CO • Sacramento, CA • Tamuning, GU • Texarkana, TX • Washington, DC

RUNOFF				
BASIN	DESIGN POINT	AREA (AC)	2-YEAR RUNOFF (CFS)	100-YEAR RUNOFF (CFS)
1	1	4.11	0.2	3.6
2	2	0.51	0.6	2.9
3	3	6.90	0.5	13.0
4	4	0.96	1.3	5.7
5	5	4.10	2.6	19.0
6	6	2.59	2.1	11.6
7	7	2.07	2.4	12.6
8	8	9.12	5.0	32.4
9	9	0.73	1.0	4.4
10	10	2.82	2.3	14.4
11	11	4.52	4.5	24.8
12	12	5.57	5.3	29.7
13	13	3.71	3.3	17.8
14	14	6.69	0.5	14.6
15	15	0.48	0.3	2.3
16	16	4.07	3.9	22.0
17	17	6.70	2.0	15.3
18	18	0.52	0.7	3.1
19	19	7.03	4.2	24.3
20	20	4.96	2.9	19.6
21	21	4.77	3.3	22.7
22	22	2.04	3.4	14.1
23	23	6.71	4.1	25.2
24	24	3.74	4.4	22.5
25	25	3.10	3.0	16.7
26	26	11.31	1.2	15.1
27	27	3.92	1.7	14.1
28	28	3.51	3.6	21.0
29	29	3.34	3.8	21.0
30	30	4.33	3.3	18.4
31	31	0.49	0.8	3.5
32	32	3.39	2.2	12.9
33	33	3.84	3.0	16.4
34	34	0.33	0.6	2.4
35	35	5.85	3.6	22.4
36	36	3.02	3.1	17.5
37	37	3.67	3.3	15.9
38	38	1.88	3.0	11.9
39	39	0.95	1.0	5.2
40	40	0.26	0.1	0.5
41	41	5.34	3.1	19.2
42	42	4.57	2.8	16.4
43	43	3.87	2.6	15.1
44	44	4.07	4.3	23.9
45	45	2.20	2.5	13.2
46	46	2.73	3.2	16.9
47	47	1.57	1.2	7.0
48	48	0.36	0.4	2.1
49	49	0.78	1.0	4.6
50	50	0.91	1.2	5.7
51	51	3.81	3.6	20.1
52	52	8.70	6.8	39.2
53	53	6.15	4.4	28.0
54	54	1.80	2.1	11.0
55	55	1.99	2.0	11.4
56	56	3.47	3.6	20.9
57	57	0.65	1.1	4.7
58	58	4.83	2.2	16.3
59	59	1.09	0.8	5.3
60	60	2.23	2.3	13.1
61	61	3.65	4.0	22.2
62	62	5.14	3.8	26.0
63	63	3.77	3.6	19.9
64	64	0.40	0.5	2.6
65	65	4.25	4.2	23.6
66	66	6.46	4.2	24.8
67	67	6.62	7.1	40.9
68	68	6.45	4.2	26.7
69	69	2.71	2.8	11.4
70	70	1.90	1.3	7.2
71	71	0.29	0.5	1.4
72	72	3.27	3.3	13.9
73	73	0.49	1.0	2.5
74	74	2.82	2.8	12.0
75	75	2.39	2.6	9.9
76	76	4.47	4.5	19.4
77	77	5.55	5.9	23.1
78	78	4.10	3.6	17.4
79	79	2.36	2.5	10.2
80	80	4.23	3.9	18.0
81	81	12.41	0.5	35.4
82	82	0.65	1.0	3.1
83	83	2.32	3.0	11.6
84	84	1.53	1.7	6.6
85	85	0.51	0.8	2.5
86	86	0.40	0.7	2.0
87	87	3.45	2.9	14.5
88	88	3.05	4.5	14.9
89	89	3.07	2.4	12.8
90	90	2.60	1.8	9.6



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

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')

N

300 0 300 600

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

- X-994-BRDR
- X-994-DRAINAGE
- X-994-EX-MAP-SWINK
- X-994-EX-MAP
- X-994-PP-Plat-Swink
- X-994-PP-Plat
- X-994-Swink-Htch
- X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

COMPUTER FILE MANAGEMENT

FILE NAME: R:\18.994.001 (Dearmin Swink)\Dwg\Construction Plans\Storm\DR1-Proposed Drainage Map - Overall.dwg
CTB FILE: ----
PLOT DATE: 5/29/2019 11:03 AM
THIS DRAWING IS CURRENT AS OF PLOT DATE AND MAY BE SUBJECT TO CHANGE.

MUNICIPALITY: TOWN OF ERIE 1874

PREPARED FOR: WESTERLY ERIE · COLO

PREPARED BY: Matrix DESIGN GROUP AN EMPLOYEE-OWNED COMPANY

SEAL

PRELIMINARY
THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE

FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.
PROJECT No. 18.994.001

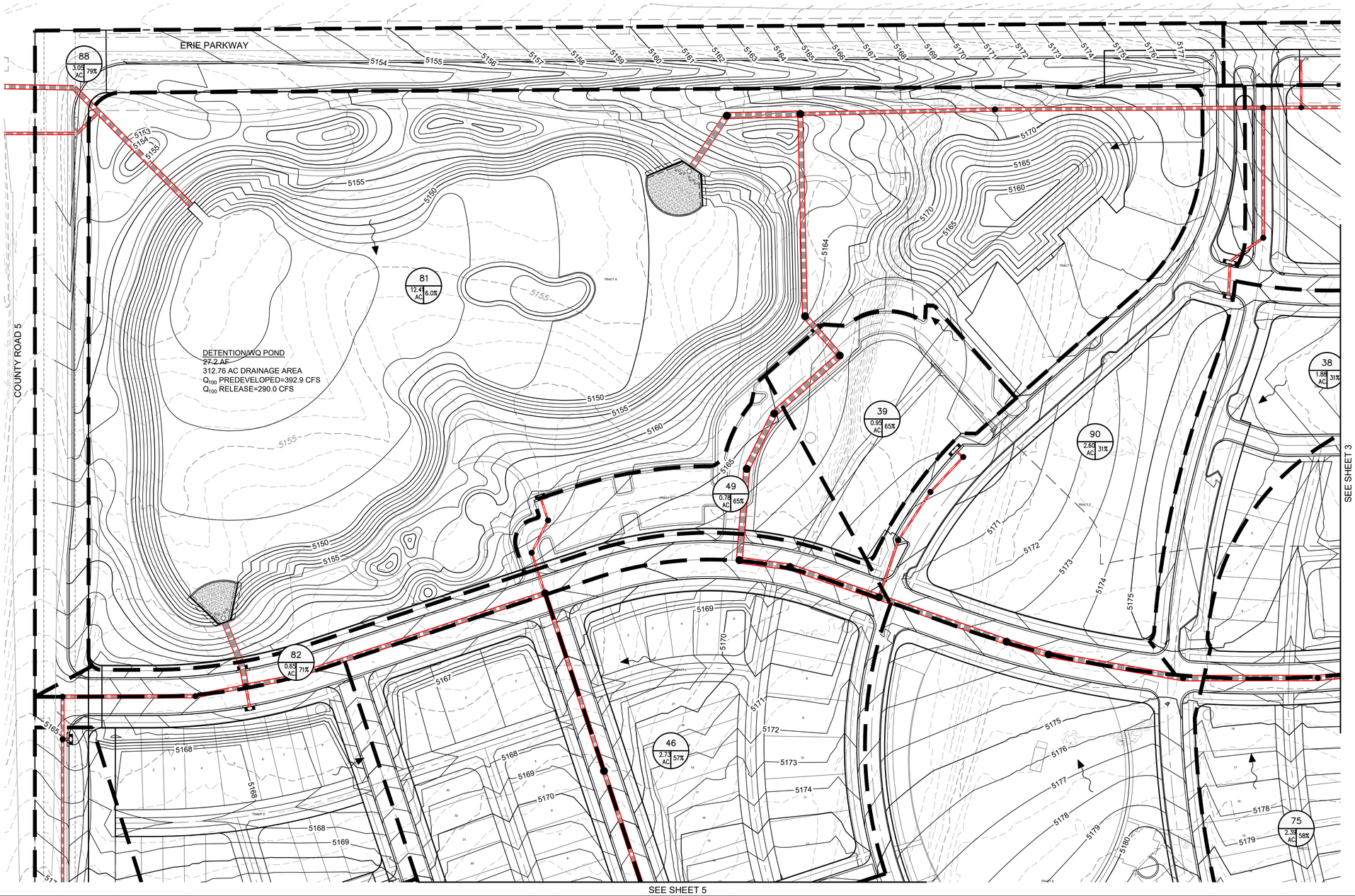
WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 300'	DRAWING No.	PRDR01
CHECKED BY:	PC	VERT.	1" = 300'	SHEET	1 OF 14

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



LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

- X-994-BRDR
- X-994-DRAINAGE
- X-994-Ex-Site(Dearmin)
- X-994-PP-Plat-Swink
- X-994-PP-Plat
- X-994-PP-Road
- X-994-PP-STRM
- X-994-EX-MAP
- x-994-ex-map-swink
- X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

COMPUTER FILE MANAGEMENT

FILE NAME: R:\18.994.001 (Dearmin Swink)\Dwg\Construction Plans\Storm\DR1-Proposed Drainage Map.dwg
CTB FILE: ----
PLOT DATE: 5/29/2019 11:04 AM
THIS DRAWING IS CURRENT AS OF PLOT DATE AND MAY BE SUBJECT TO CHANGE.

MUNICIPALITY: TOWN OF ERIE 1874

PREPARED FOR: WESTERLY ERIE · COLO

PREPARED BY: Matrix DESIGN GROUP AN EMPLOYEE-OWNED COMPANY

SEAL

PRELIMINARY
THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE

FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.
PROJECT No. 18.994.001

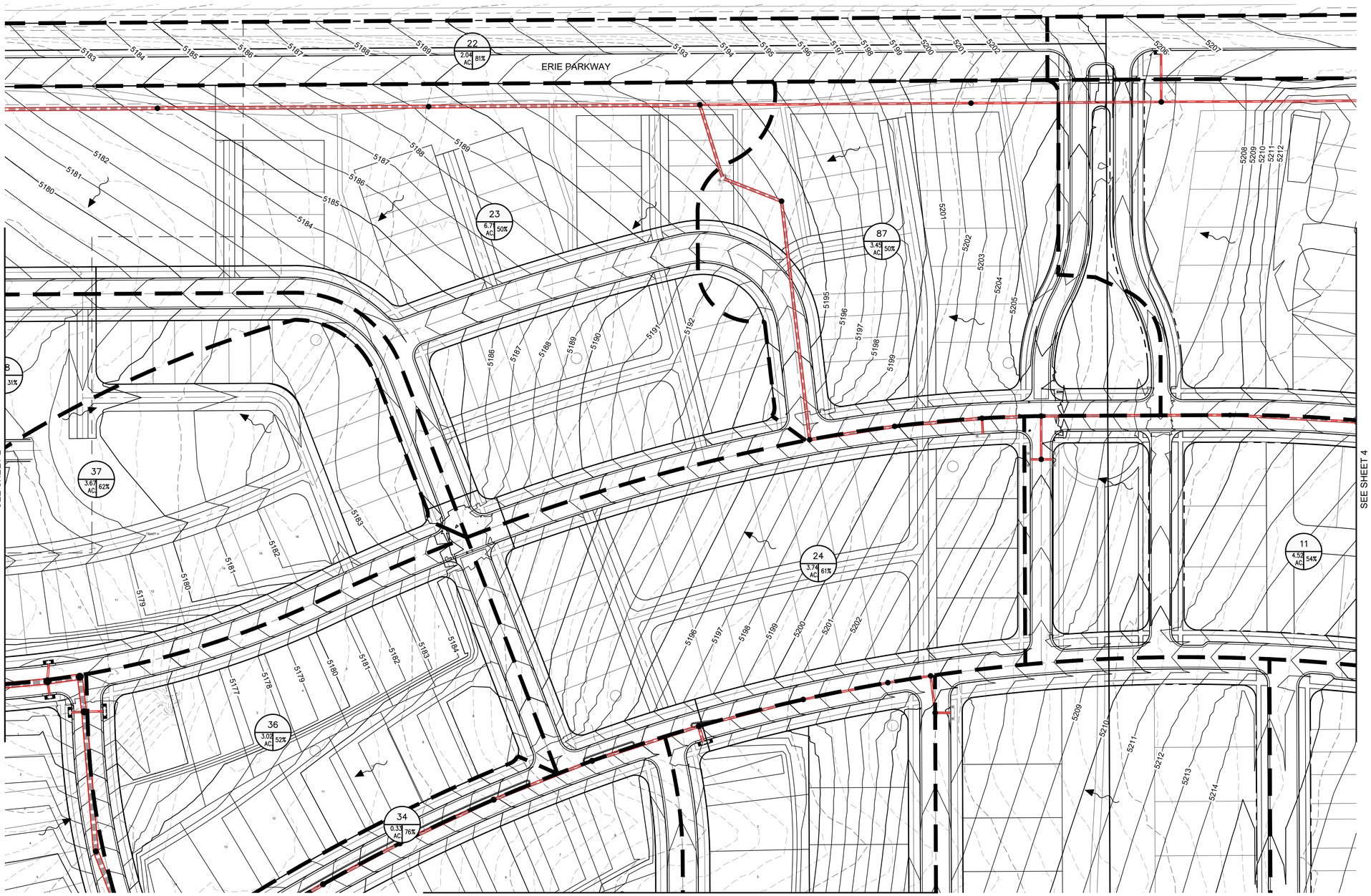
WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED: MAY 2019	DRAWING No.
DRAWN BY:	GV	HORIZ.	1" = 60'		
CHECKED BY:	PC	VERT.	1" = 60'	SHEET 2 OF 14	PRDR02

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



LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

- X-994-BRDR
- X-994-DRAINAGE
- X-994-Ex-Site(Dearmin)
- X-994-PP-Plat-Swink
- X-994-PP-Plat
- X-994-PP-Road
- X-994-PP-STRM
- X-994-EX-MAP
- x-994-ex-map-swink
- X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

COMPUTER FILE MANAGEMENT

FILE NAME: R:\18.994.001 (Dearmin Swink)\Dwg\Construction Plans\Storm\DR1-Proposed Drainage Map.dwg
CTB FILE: ----
PLOT DATE: 5/29/2019 11:04 AM
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MUNICIPALITY: TOWN OF ERIE 1874

PREPARED FOR: WESTERLY ERIE · COLO

PREPARED BY: Matrix DESIGN GROUP, AN EMPLOYEE-OWNED COMPANY

SEAL

PRELIMINARY
THIS DRAWING HAS NOT BEEN APPROVED BY GOVERNING AGENCIES AND IS SUBJECT TO CHANGE

FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.
PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'	SHEET	3 OF 14
CHECKED BY:	PC	VERT.	1" = 60'	DRAWING No.	PRDR03

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

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

X-994-BRDR
X-994-DRAINAGE
X-994-Ex-Site(Dearmin)
X-994-PP-Plat-Swink
X-994-PP-Plat
X-994-PP-Road
X-994-PP-STRM
X-994-EX-MAP
x-994-ex-map-swink
X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

COMPUTER FILE MANAGEMENT

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MUNICIPALITY: TOWN OF ERIE 1874

PREPARED FOR: WESTERLY ERIE · COLO

PREPARED BY: Matrix DESIGN GROUP AN EMPLOYEE-OWNED COMPANY

SEAL

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PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'		
CHECKED BY:	PC	VERT.	1" = 60'	SHEET	4 OF 14

DRAWING No. PRDR04

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

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

- X-994-BRDR
- X-994-DRAINAGE
- X-994-Ex-Site(Dearmin)
- X-994-PP-Platt-Swink
- X-994-PP-Plat
- X-994-PP-Road
- X-994-PP-STRM
- X-994-EX-MAP
- x-994-ex-map-swink
- X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

COMPUTER FILE MANAGEMENT

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PREPARED FOR: WESTERLY ERIE · COLO

PREPARED BY: Matrix DESIGN GROUP — AN EMPLOYEE-OWNED COMPANY

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PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'	DRAWING No.	PRDR05
CHECKED BY:	PC	VERT.	1" = 60'	SHEET	5 OF 14

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

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

X-994-BRDR
X-994-DRAINAGE
X-994-Ex-Site(Dearmin)
X-994-PP-Plat-Swink
X-994-PP-Plat
X-994-PP-Road
X-994-PP-STRM
X-994-EX-MAP
x-994-ex-map-swink
X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

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WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'		
CHECKED BY:	PC	VERT.	1" = 60'	SHEET	6 OF 14

DRAWING No. PRDR06

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

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

X-994-BRDR
X-994-DRAINAGE
X-994-Ex-Site(Dearmin)
X-994-PP-Plat-Swink
X-994-PP-Plat
X-994-PP-Road
X-994-PP-STRM
X-994-EX-MAP
x-994-ex-map-swink
X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

COMPUTER FILE MANAGEMENT

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PREPARED FOR: WESTERLY ERIE · COLO

PREPARED BY: Matrix DESIGN GROUP AN EMPLOYEE-OWNED COMPANY

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PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
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CHECKED BY:	PC	VERT.	1" = 60'	SHEET	7 OF 14

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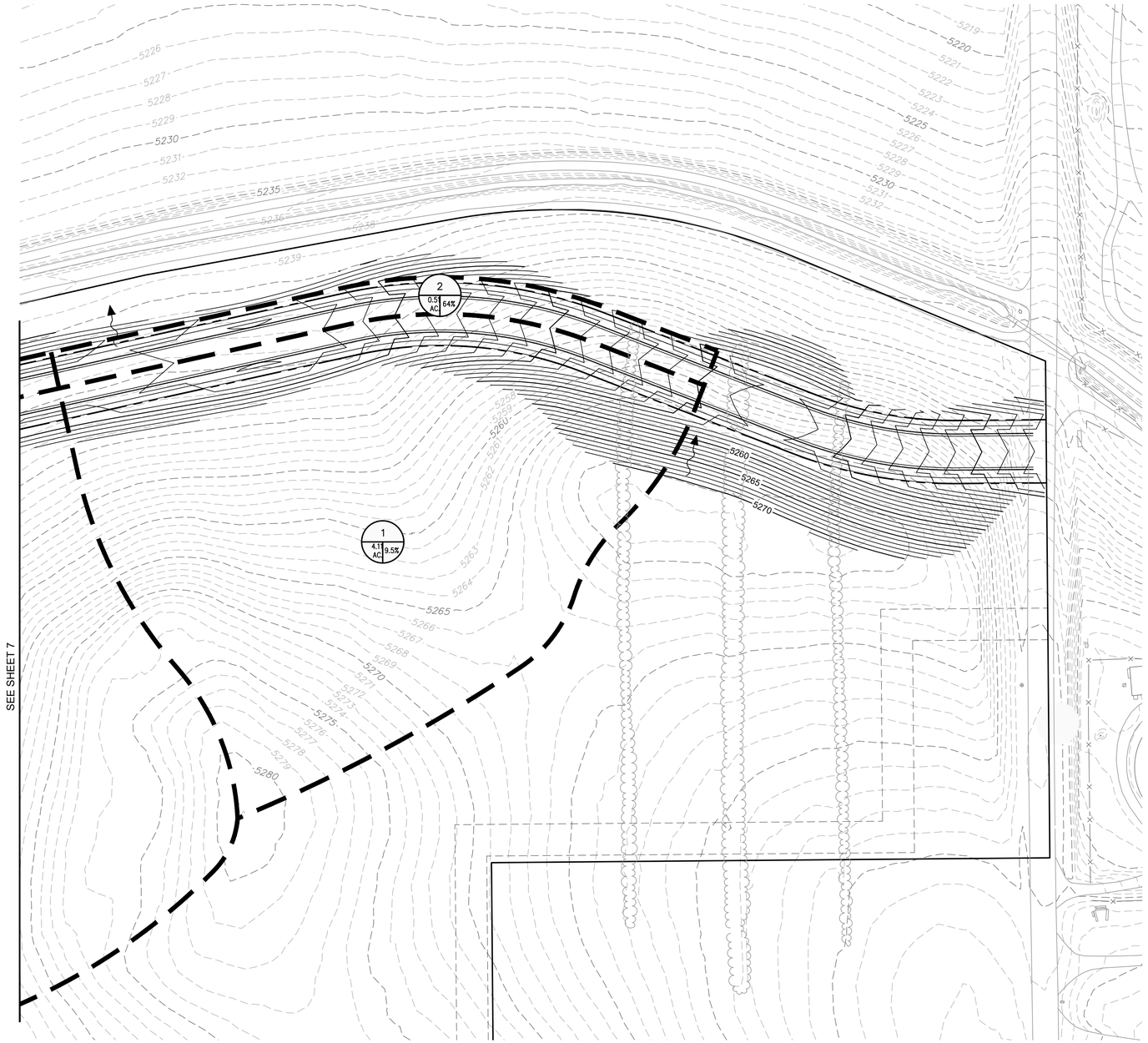

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

X-994-BRDR
X-994-DRAINAGE
X-994-Ex-Site(Dearmin)
X-994-PP-Platt-Swink
X-994-PP-Plat
X-994-PP-Road
X-994-PP-STRM
X-994-EX-MAP
x-994-ex-map-swink
X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

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PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'	DRAWING No.	PRDR08
CHECKED BY:	PC	VERT.	1" = 60'	SHEET	8 OF 14

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

SEE SHEET 5

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

X-994-BRDR
X-994-DRAINAGE
X-994-Ex-Site(Dearmin)
X-994-PP-Plat-Swink
X-994-PP-Plat
X-994-PP-Road
X-994-PP-STRM
X-994-EX-MAP
x-994-ex-map-swink
X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

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PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'	DRAWING No.	PRDR09
CHECKED BY:	PC	VERT.	1" = 60'	SHEET	9 OF 14

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

SEE SHEET 6

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120
SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

- X-994-BRDR
- X-994-DRAINAGE
- X-994-Ex-Site(Dearmin)
- X-994-PP-Plat-Swink
- X-994-PP-Plat
- X-994-PP-Road
- X-994-PP-STRM
- X-994-EX-MAP
- x-994-ex-map-swink
- X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

COMPUTER FILE MANAGEMENT

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PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'	SHEET	10 OF 14
CHECKED BY:	PC	VERT.	1" = 60'		

DRAWING No. PRDR10

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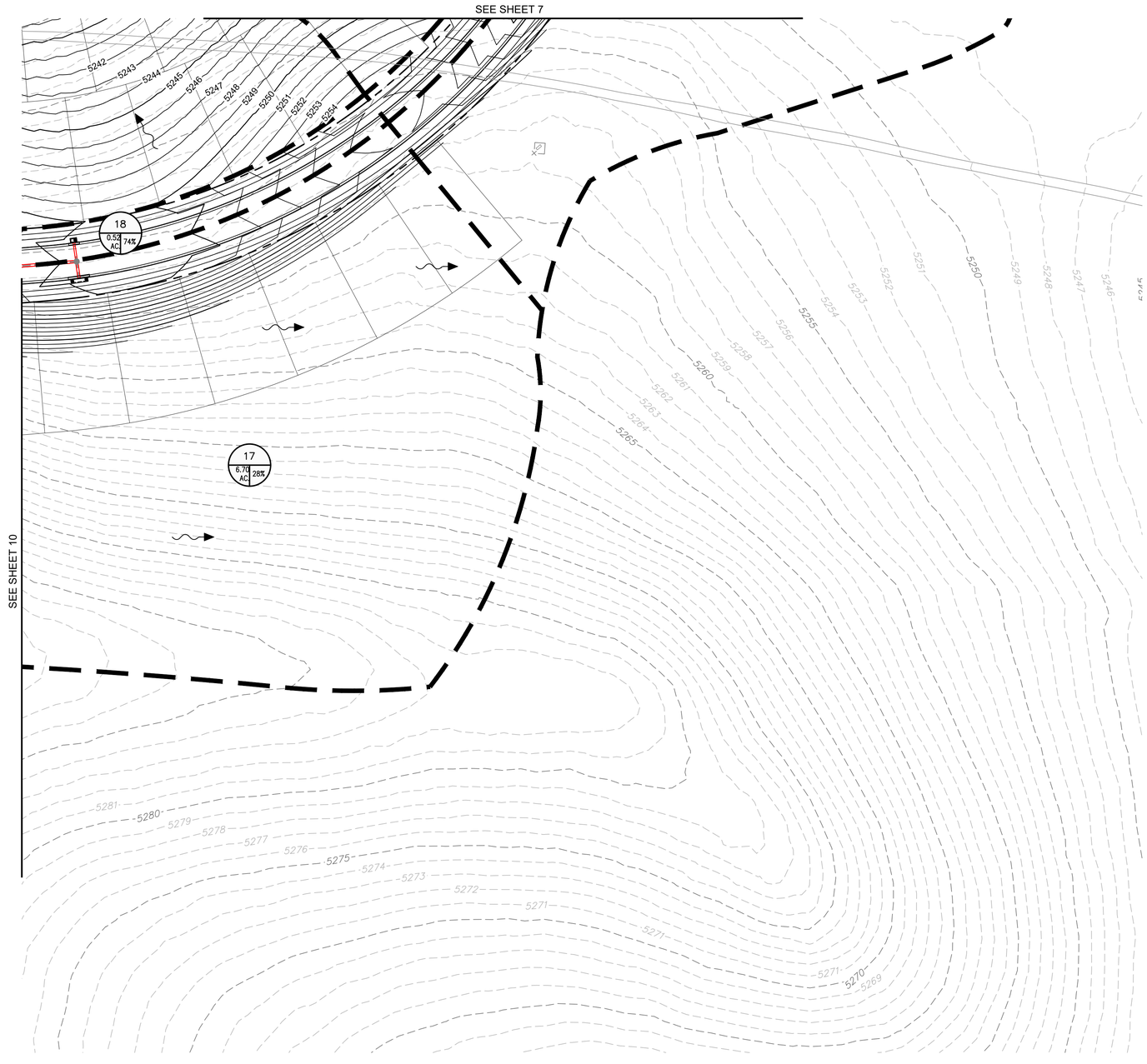

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

- X-994-BRDR
- X-994-DRAINAGE
- X-994-Ex-Site(Dearmin)
- X-994-PP-Platt-Swink
- X-994-PP-Plat
- X-994-PP-Road
- X-994-PP-STRM
- X-994-EX-MAP
- x-994-ex-map-swink
- X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

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PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

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DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'		
CHECKED BY:	PC	VERT.	1" = 60'	SHEET	11 OF 14

DRAWING No. PRDR11

Know what's below. Call before you dig.

SEE SHEET 9

SEE SHEET 14

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

X-994-BRDR
X-994-DRAINAGE
X-994-Ex-Site(Dearmin)
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X-994-PP-Plat
X-994-PP-Road
X-994-PP-STRM
X-994-EX-MAP
x-994-ex-map-swink
X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

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DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'	SHEET	12 OF 14
CHECKED BY:	PC	VERT.	1" = 60'	DRAWING No.	PRDR12

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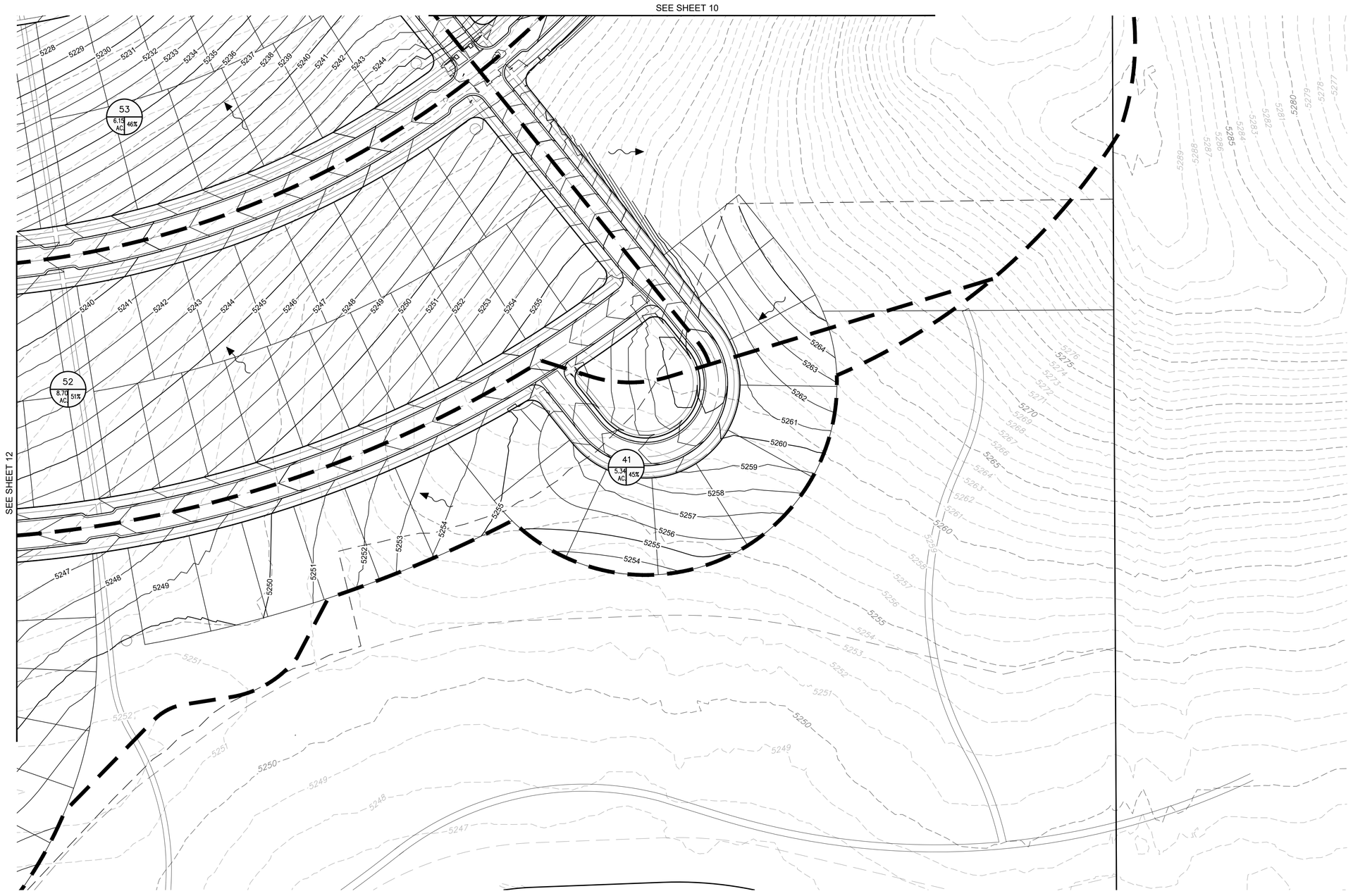

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER

N

60 0 60 120

SCALE IN FEET
ORIGINAL SCALE

REFERENCE DRAWINGS

X-994-BRDR
X-994-DRAINAGE
X-994-Ex-Site(Dearmin)
X-994-PP-Plat-Swink
X-994-PP-Plat
X-994-PP-Road
X-994-PP-STRM
X-994-EX-MAP
x-994-ex-map-swink
X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

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PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

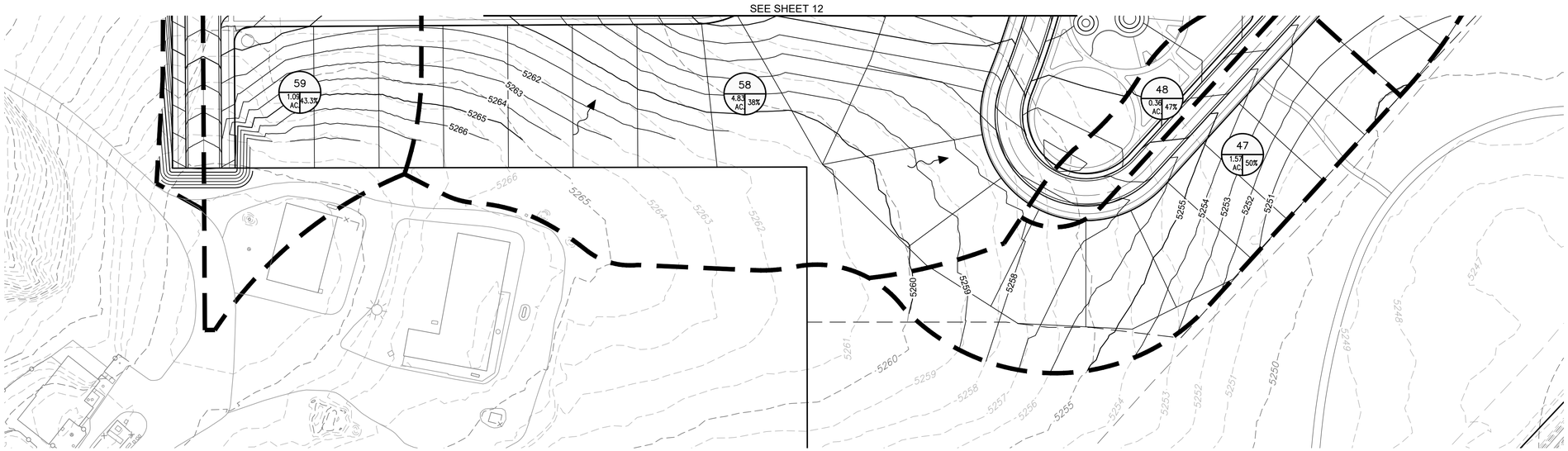
PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019
DRAWN BY:	GV	HORIZ.	1" = 60'	DRAWING No.	PRDR13
CHECKED BY:	PC	VERT.	1" = 60'	SHEET	13 OF 14

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

LEGEND

- FLOW DIRECTION
- BASIN BOUNDARY
- SITE BOUNDARY
- EXISTING CONTOUR MINOR
- EXISTING CONTOUR MAJOR (5')
- PROPOSED CONTOUR MINOR
- PROPOSED CONTOUR MAJOR (5')
- PROPOSED STORM SEWER



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- X-994-DRAINAGE
- X-994-Ex-Site(Dearmin)
- X-994-PP-Platt-Swink
- X-994-PP-Plat
- X-994-PP-Road
- X-994-PP-STRM
- X-994-EX-MAP
- x-994-ex-map-swink
- X-994-EX-SITE

No.	DATE	DESCRIPTION	BY

REVISIONS

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PREPARED BY: Matrix DESIGN GROUP, AN EMPLOYEE-OWNED COMPANY

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PROJECT No. 18.994.001

WESTERLY

ERIE LAND COMPANY, LLC
DRAINAGE STUDY

PROPOSED DRAINAGE MAP

DESIGNED BY:	GV	SCALE		DATE ISSUED:	MAY 2019	DRAWING No.
DRAWN BY:	GV	HORIZ.	1" = 60'			
CHECKED BY:	PC	VERT.	1" = 60'	SHEET	14 OF 14	PRDR14

Master Traffic Impact Study for:

Westerly

Prepared for:

Erie Land Company, LLC
1601 Blake Street, Suite 200
Denver, Colorado 80202

Prepared by:

Matrix DESIGN GROUP

WESTERLY
MASTER TRAFFIC IMPACT STUDY

Prepared for:

Town of Erie, CO

Prepared by:

1601 Blake Street, Suite 200
Denver, CO 80202

Contact: David Kline, PE, PTOE
(303)-572-0200

On Behalf of:

Erie Land Company, LLC
1601 Blake Street, Suite 200
Denver, CO 80202

May 24, 2019

Table of Contents

List of Figures

List of Tables

Introduction

A 418-acre residential development called Westerly is being planned on two contiguous parcels in the Town of Erie. The Dearmin parcel is 266.66 acres and the Swink parcel is 151.53 acres. Figure 1 illustrates the general location of the proposed development. As shown, the site is bounded by Erie Parkway on the north, Weld County Road 6 (WCR 6) on the south, Weld County Road (WCR 5) on the west, and Weld County 7 (WCR 7) on the east.

This report has been prepared to support the Westerly development as it goes through the Town of Erie's Annexation, Zoning, Preliminary Plat and PUD processes. The study process was tailored to meet Erie's requirements for a traffic impact study, which requires the analysis of current, site build-out and future conditions. The foundation for this study is the previously submitted Preliminary Traffic Impact Study.

This traffic study and subsequent Development Agreements will define the responsibilities of the Developer, limits of future improvements and the timing of when infrastructure will be constructed.

Matrix DESIGN GROUP

LEGEND

PROPOSED DEVELOPMENT

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 1

VICINITY MAP

Background Conditions

This section describes existing conditions in the vicinity of the proposed development and identifies how the area will likely change over time based on Erie's adopted plans.

Existing Land Use

The Westerly parcels are predominantly farmland. The land uses adjacent to the proposed development include:

- North of Erie Parkway – Mostly farmland with Erie High School located in the northeast quadrant of Erie Parkway and WCR 5.
- East of WCR 7 – Mostly farmland with miscellaneous agricultural and industrial uses lining the east side of WCR 7.
- North of WCR 6 – A Crestone petroleum facility is located in the southeast corner of the section.
- South of WCR 6 – Mostly farmland with a regional landfill located in the southeast quadrant of WCR 6 and WCR 5.
- West of WCR 5 – A new residential development is under construction to the west. Farmland and a couple of small businesses currently are directly adjacent to WCR 5. The northwest quadrant of WCR 5 and WCR 6 is part of the Town of Erie's open space system and contains a singletrack.

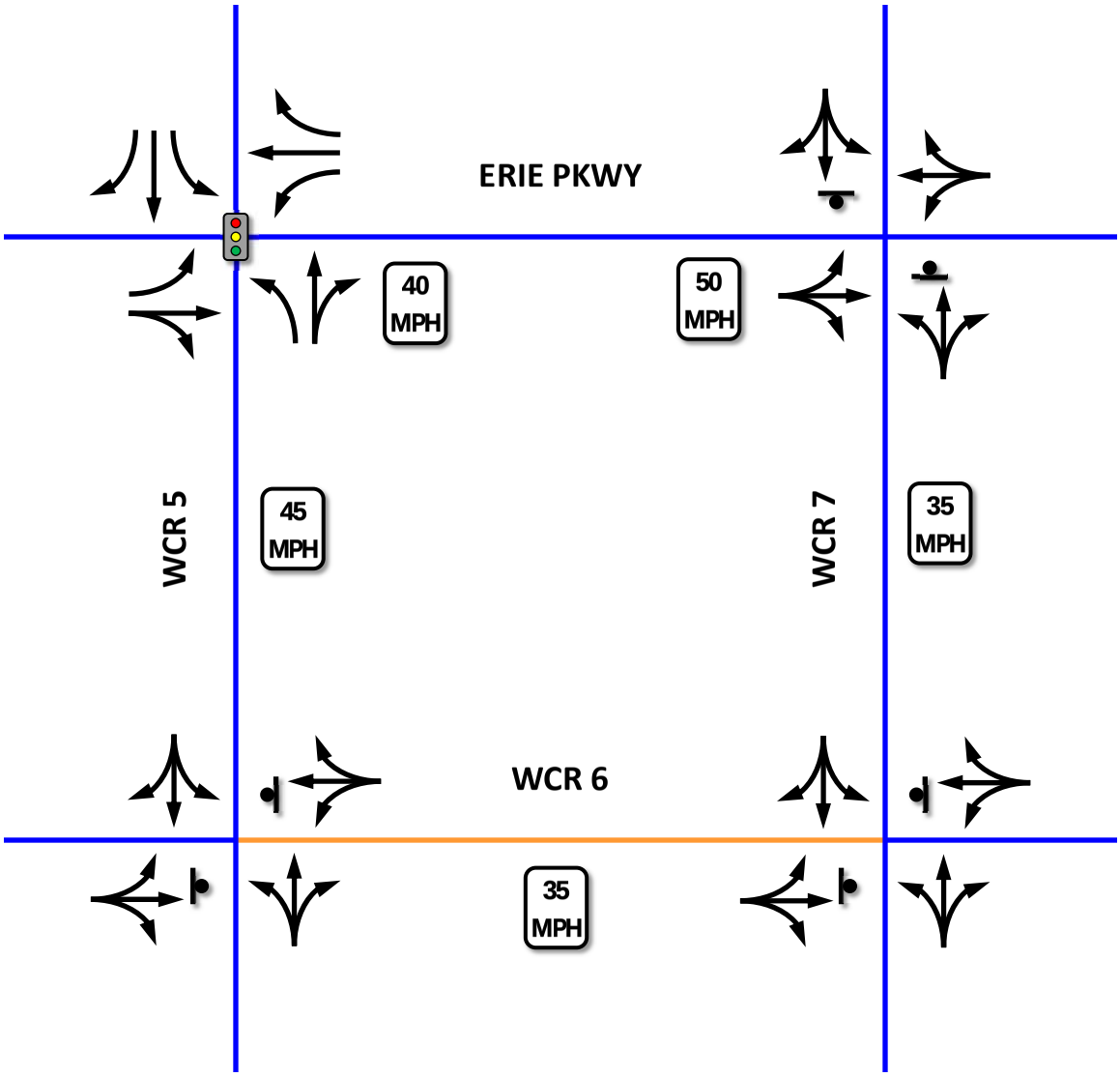
Existing Roadway Network

Figure 2 shows the existing roadway network adjacent to the Westerly parcels. Both Erie Parkway and WCR 7 are designated as Principal Arterials, WCR 5 is a Minor Arterial, and WCR 6 is a Collector. Principal Arterials are designed primarily for mobility and access points are limited and tightly controlled. For Minor Arterials, mobility is still given preference but a higher degree of land access can be permitted. Collectors represent a balance between mobility and land access.

Both Erie Parkway and WCR 5 have bicycle shoulders. None of the roadways adjacent to the proposed development have sidewalks.

Existing Traffic Operations

To determine how efficiently and effectively the perimeter street system accommodates the existing traffic volumes, the key intersections in the vicinity of the proposed development were analyzed using Synchro 10 software. The results are shown as Levels of Service (LOS). LOS is a qualitative measure used to describe the condition of traffic flow and delay, ranging from excellent conditions at LOS A to very poor conditions at LOS F. LOS D is commonly used as the minimum acceptable level of service for urbanized areas.



LEGEND

- 2 LANE PAVED
- 2 LANE UNPAVED
- STOP SIGN
- TRAFFIC SIGNAL
- 40 MPH — SPEED LIMIT
- APPROACH LANES

Matrix DESIGN GROUP

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WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 2

EXISTING ROADWAY NETWORK

Table 1 provides a description of conditions for each LOS at a signalized intersection.

Table 1: Signalized Intersection Level of Service Criteria

Level of Service	Average Stopped Delay*	Description
A	<10	Very low delay. Most vehicles do not stop.
B	>10 to 20	Generally good progression. Slight delays.
C	>20 to 35	Increased number of stopped vehicles.
D	>35 to 55	Noticeable congestion.
E	>55 to 80	High delays and frequent cycle failures.
F	>80	Forced flow. Extensive queuing.

*Seconds per vehicle.
Source: *HCM2010 Highway Capacity Manual* (Transportation Research Board, 2010)

For unsignalized (side street stop-controlled) intersections, Synchro 10 software was used again. The software applies the Transportation Research Board's 2010 *Highway Capacity Manual* (HCM) methodology for unsignalized intersections to determine average control delay per vehicle (measured in seconds) for each stop-controlled movement. The method incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. For side street stop-controlled intersections, delay is represented as the average delay per vehicle for the worst approach, not the overall intersection. Table 2 summarizes the relationship between delay and level of service.

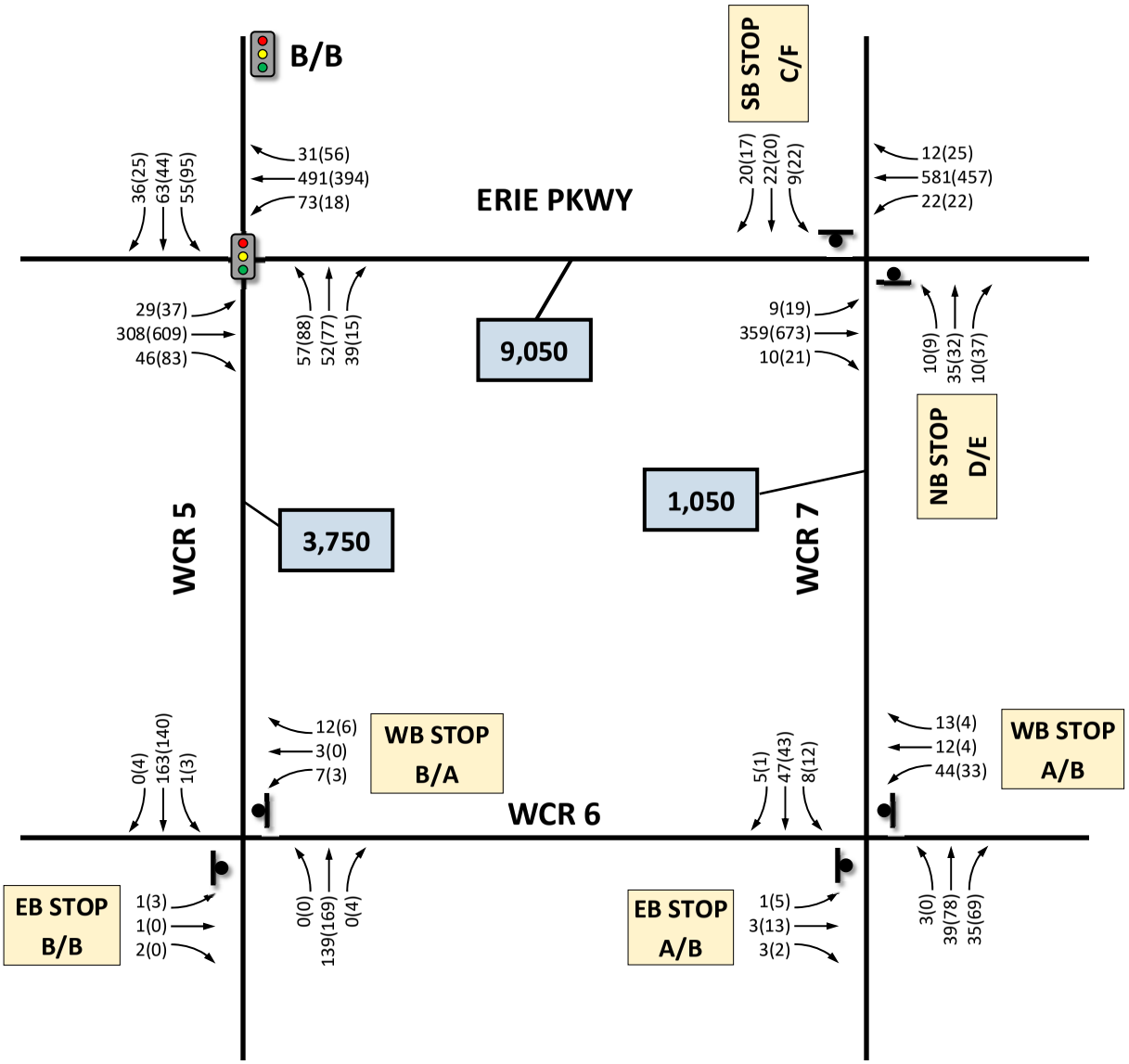
Table 2: Unsignalized Intersection Level of Service Criteria

Level of Service	Average Total Delay (seconds per vehicle)	Description
A	< 10	Little or no conflicting traffic for minor street approach.
B	>10 to 15	Minor street begins to notice absence of available gaps.
C	>15 to 25	Minor street begins experiencing delay for available gaps.
D	>25 to 35	Minor street starts to experience queuing.
E	>35 to 50	Extensive minor street queuing due to insufficient gaps.
F	> 50	Insufficient gaps to allow minor street traffic to cross safely through the major street traffic stream.

Source: *HCM2010 Highway Capacity Manual* (Transportation Research Board, 2010)

Figure 3 shows both the existing peak hour traffic counts and the level of service at the four intersections Erie staff wanted analyzed. Appendix A contains the raw count data for each intersection that was collected in June, 2018.

As shown in Figure 3, three of the four intersections operate very well in the peak hours. The fourth intersection, Erie Parkway and WCR 7, meets the minimum acceptable LOS in the AM peak hour but the WCR 7 approaches operate either at or over capacity in the PM peak hour. It should be noted the Town of Erie plans to improve this intersection and install a traffic signal within the next couple of years. With these upgrades, this intersection will operate at acceptable service levels. Appendix B contains the analysis output for each intersection and time period.



LEGEND

- 3,750 — DAILY TRAFFIC VOLUME
- 100(50) — AM(PM) PEAK HOUR TRAFFIC VOLUMES
- A/A — AM/PM PEAK HOUR LOS—SIGNALIZED INTERSECTION
- EB STOP B/B — AM/PM PEAK HOUR LOS—STOPPED MOVEMENTS
- STOP SIGN
- TRAFFIC SIGNAL

Matrix DESIGN GROUP

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WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 3

EXISTING TRAFFIC OPERATIONS

Future Plans

The Town of Erie recently completed two plans that are applicable to Westerly. The first is the *Erie Parkway Corridor Study.* This study was completed in 2017 and was intended to identify multimodal transportation improvements to enhance mobility and safety along the entire length of Erie Parkway. The second is the *Erie Transportation Plan.* This plan was completed in January of 2018 and represents an update to the 2008 Transportation Plan. The latest plan provides guidance on how to strategically plan for and accommodate Erie's expected growth over the next 20 plus years. The following key elements from both plans apply to Westerly.

Land Use

Future land use in the vicinity of Westerly consists of regional commercial and industrial east of WCR 7 and community commercial/residential mixed use west of WCR 7. In the *Erie Transportation Plan,* the traffic analysis zone (TAZ) that contains the parcels for the Westerly development showed a total of 330 households and 331 jobs for the entire TAZ.

Roadway

Figure 4 shows the proposed roadway network. As shown, WCR 5, Erie Parkway, and WCR 7 will have two travel lanes in each direction. These travel lanes will be separated by an 18-foot raised median that will accommodate an auxiliary left turn at all full movement intersections. WCR 6 has one travel lane in each direction, and it is not clear at this point if the through lanes will be separated by some type of median.

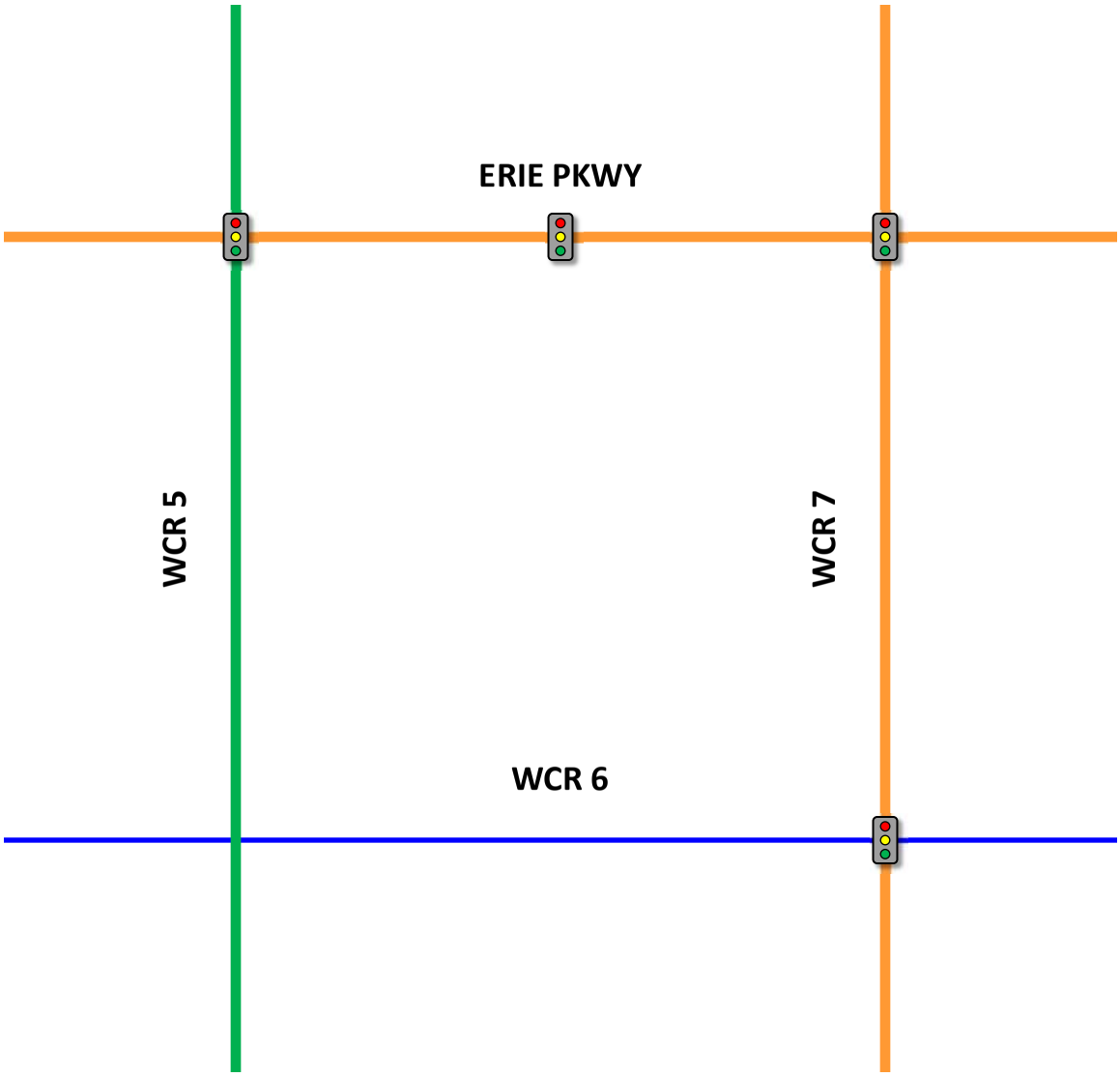
Pedestrians/Bicycles

For pedestrians, both Erie Parkway and WCR 7 will have a 10-foot detached path/bikeway on each side of the street. WCR 5 will have an 8-foot detached path/bikeway on each side and WCR 6 will have just a 5-foot detached path on both sides.

For bicycles, WCR 5, Erie Parkway, and WCR 7 will have a 5-foot striped bike lane in each direction. The *Erie Transportation Plan* does not show bike lanes on WCR 6, but the typical section for various collectors includes bike lanes. The bike lane decision will likely be made during the design process. Through Westerly, two regional bike facilities are shown. One is a north-south "low stress connector" and the second is a spine trail that will cross Erie Parkway in a new underpass that the Town of Erie has on their capital improvements list.

Transit

The *Erie Transportation Plan* shows the Jump bus route being extended from the west to I-25 along Erie Parkway. The plan also shows Micro-Mobility Hubs at both the WCR 5/Erie Parkway and the WRC 7/Erie Parkway intersections. These hubs are considered important multimodal connection points and activity centers.



LEGEND

- 4 LANE PRINCIPAL ARTERIAL
- 4 LANE MINOR ARTERIAL
- 2 LANE COLLECTOR
- TRAFFIC SIGNAL LOCATIONS

SOURCE: ERIE TRANSPORTATION PLAN (2018)

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Figure 4

PROPOSED ROADWAY NETWORK

Proposed Development

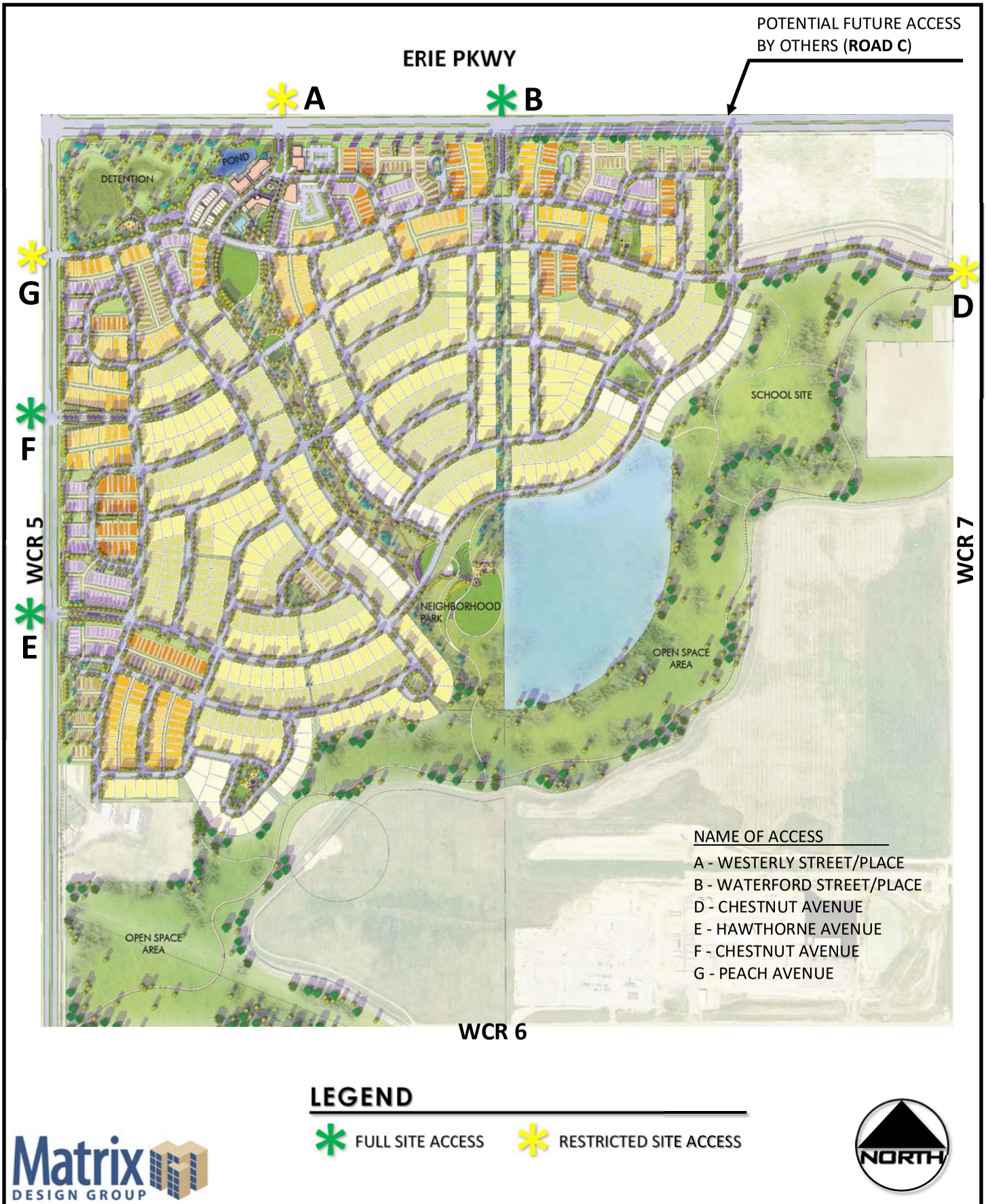
This section provides specific land use information for the proposed development and an assessment of how the proposed development relates to adopted transportation plans.

Project Description

Westerly is a 418-acre residential development being planned on two contiguous parcels in the Town of Erie. The Dearmin parcel is 266.66 acres and the Swink parcel is 151.53 acres. Figure 5 shows the site plan for the proposed development. It consists of 1,200 residential units in a variety of product types including 18 live/work units, 35,000 square feet of commercial space, 6,000 square feet of community space, and both dedicated open space and parks. In addition, the St. Vrain Valley School District is planning to build a middle school (grades six through eight) on 26 acres within the development. It is anticipated this school will have 750 students and 70 to 80 staff members.

As shown in Figure 5, six access points are planned. There are two access points to Erie Parkway, one to WCR 7, and three to WCR 5. There also is a potential future access to Erie Parkway that is not on the Westerly property and therefore would be completed by others. Since it will likely connect to the Westerly roadway network, it was included in the 2040 analysis.

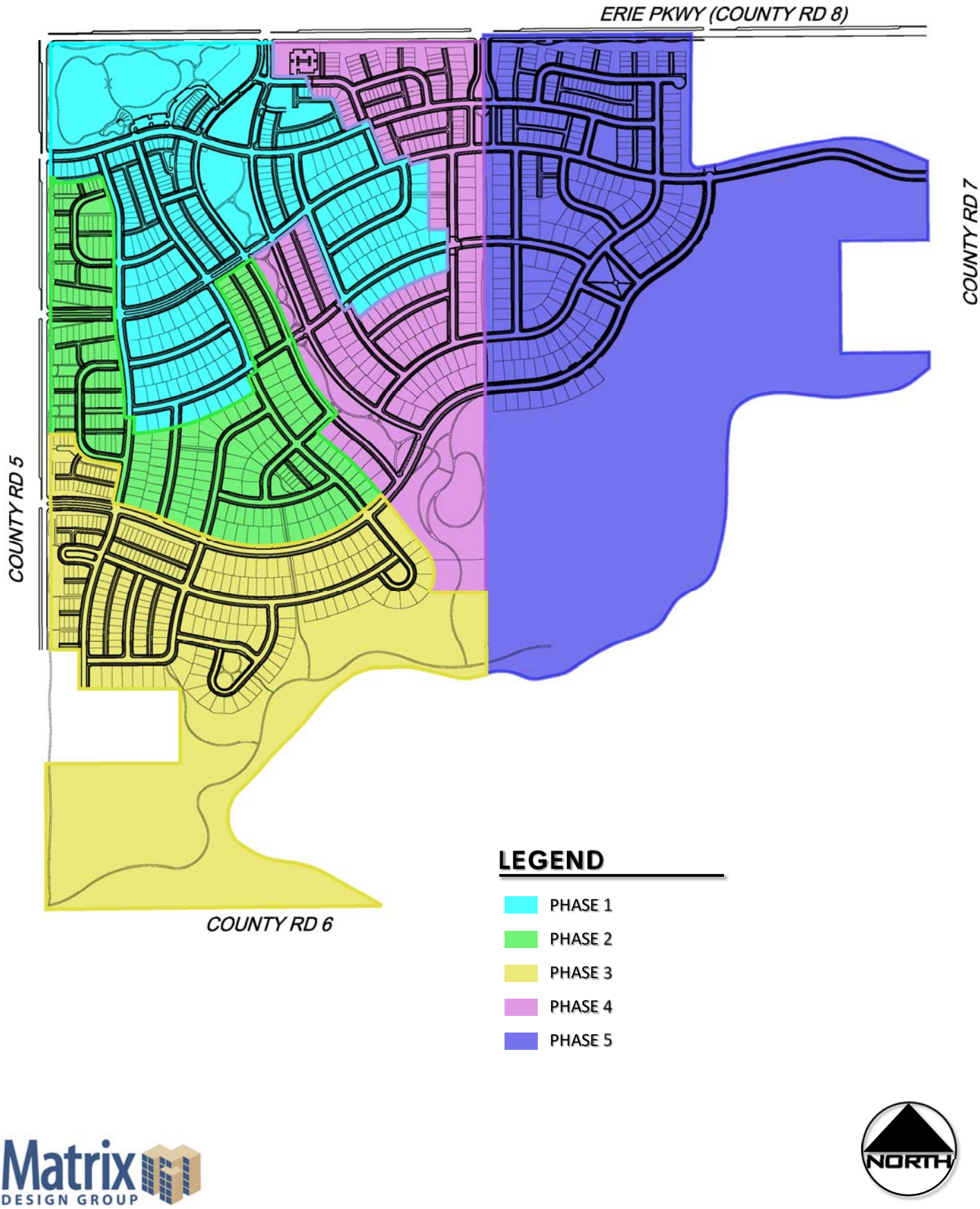
Westerly is planned to be built in five phases. Figure 6 shows the location of each phase. Phase 1 consists of 257 residential units and 25,000 square feet of commercial space. Access to Phase 1 is provided at Westerly Street/Place (right in/right out/left in) off of Erie Parkway and Peach Avenue (right in/right out/left in) off of WCR 5. This phase is expected to be complete in early 2021. Phase 2 consists of 243 residential units and 10,000 square feet of commercial space. The full movement Chestnut Avenue access to WCR 5 will be built as part of this phase. Phase 2 is expected to be complete in early 2022. Phase 3 consists of 241 residential units. The full movement Hawthorne Avenue access to WCR 5 will be built as part of this phase. Phase 3 is expected to be complete in early 2023. Phase 4 consists of 206 residential units. The full movement Waterford Street/Place access to Erie Parkway will be built as part of this phase. Phase 4 is expected to be complete in early 2024. Phase 5 consists of 253 residential units and the school site. The Chestnut Avenue access (right in/right out/left in) will connect to WCR 7 as part of this phase. The entire Westerly development is expected to be built-out in 2025.



Matrix DESIGN GROUP

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 5
SITE PLAN



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WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 6

PHASING PLAN

Conformance with Adopted Plans

After reviewing both the *Erie Corridor Study* and the *Erie Transportation Plan,* the conformance with adopted plans focuses on the connection of the proposed development to the arterial street network. The *Erie Parkway Corridor Study* showed three new major intersections between WCR 5 and WCR 7 at ¼ mile spacing with the intersection at the ½ mile mark being signalized. The site plan conforms to this recommendation. This new traffic signal is also consistent with the *Erie Transportation Plan.* The proposed access points to WCR 5 are .11, .32 and .54 miles south of Erie Parkway. The *Erie Transportation Plan* recommends ¼ mile spacing for all major intersections. While the Hawthorne Avenue and Chestnut Avenue intersections do not meet the exact spacing criteria, they are consistent with the spacing intent. The Peach Avenue intersection does not meet the spacing criteria but it is allowed in the *State Highway Access Code* if appropriate design standards can be met and movements are restricted to either right in/right out or right in/right out/left in. The Chestnut Avenue access point to WCR 7 is .17 miles south of Erie Parkway. The location of this intersection was dictated by land ownership and would preclude ¼ mile spacing in the future without restricting various movements.

The site plan is consistent with the two regional bicycle facilities shown in this area in the *Erie Transportation Plan.* All other components of both plans are on the perimeter of Westerly and are unaffected.

Site Generated Traffic

This section identifies the amount of traffic the proposed development is expected to generate and the likely routes that will be used for traffic entering and leaving the development.

Trip Generation

The vehicle trips associated with Westerly were calculated using the Institute of Transportation Engineers (ITE) *Trip Generation Manual, Tenth Edition.* This methodology consists of choosing an independent variable for the land use for a particular time of day. The independent variable correlates to the variation in trip ends and is related to the land use. The value of the independent variable is either multiplied by a weighted average or used in a regression equation to calculate the trips generated by the land use. The *ITE Trip Generation Manual* provides guidance on when to use the weighted average versus the regression equation. In most cases, the regression equations are recommended when there are adequate study data points.

The following ITE Land Use Codes were used in the analysis: Single Family – 210; Live-Work – 220; Commercial – 820; and School – 522. The single family code applies to all of the proposed housing types that are planned. There is no code for Live-Work so multifamily low rise was used. Since specific commercial uses are not known at this point, the Land Use Code that includes neighborhood shopping centers was used. The trip rate for this code is 37.75 per 1,000 square feet and is widely considered representative of generic retail uses. The school code is specific to a middle school.

Table 3 shows the trips that are expected to be generated by the Westerly land uses and middle school.

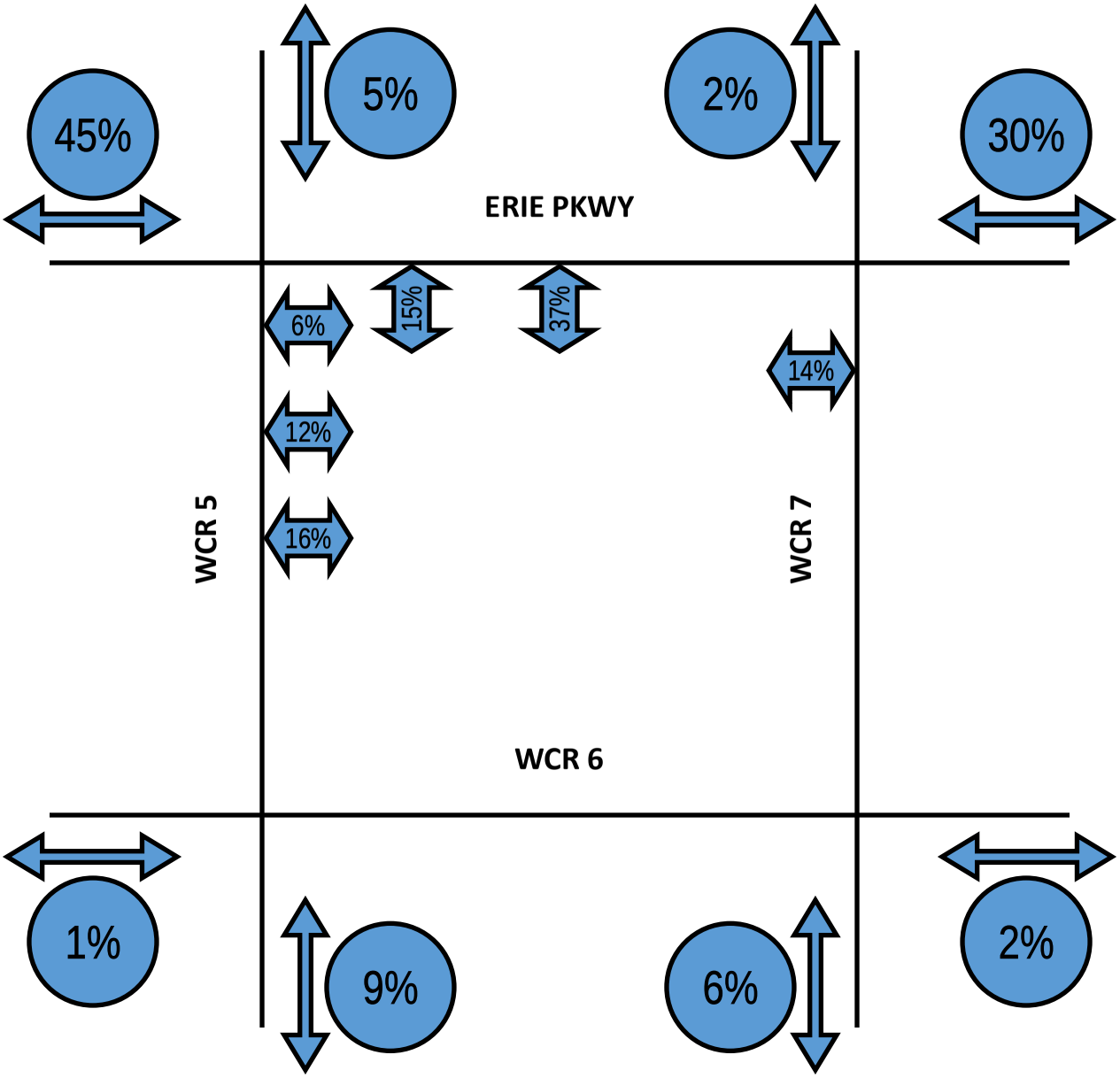
Table 3: Trip Generation

Land Use	Size	Daily	AM	In	Out	PM	In	Out
Phase 1								
Residential	239 units	2,318	174	43	131	234	147	87
Live-Work	18 units	395	27	6	21	34	21	13
Commercial	25,000 sq. ft.	944	24	15	9	95	45	50
Total Phase 1		**3,657**	**225**	**64**	**161**	**363**	**213**	**150**
Phase 2								
Residential	243 units	2,353	177	44	133	238	150	88
Commercial	10,000 sq. ft.	378	9	5	4	38	18	20
Total Phase 2		**2,731**	**186**	**49**	**137**	**276**	**168**	**108**
Phase 3								
Residential	241 units	2,336	176	44	132	236	149	87
Phase 3 Total		**2,336**	**176**	**44**	**132**	**236**	**149**	**87**
Phase 4								
Residential	206 units	2,022	151	38	113	203	128	75
Phase 4 Total		**2,002**	**151**	**38**	**113**	**203**	**128**	**75**
Phase 5								
Residential	253 units	2,442	184	46	138	248	156	92
School	750 students	1,598	425	225	200	128	63	65
Phase 5 Total		**4,040**	**609**	**271**	**338**	**376**	**219**	**157**
Grand Total		**14,786**	**1,347**	**466**	**881**	**1,454**	**877**	**577**

No reductions were applied to the trips shown in Table 3 so the totals should be considered conservative. Internal capture (trips that do not leave the development) was not applied because the land use mix does not meet the criteria contained in the National Cooperative Highway Research Program (NCHRP) Report 684, which is the definitive guide for determining internal capture. It is likely, however, the community uses will not generate any trips that either enter or leave the development. Consequently, the community land use was not included in Table 3.

Trip Distribution

Figure 7 illustrates the expected external distribution of travel for the site-generated trips. The distribution by cardinal direction was based on household and employment commuting characteristics contained in the *Erie Transportation Plan.* The trip distribution by access point was based primarily on directness of travel from each internal traffic analysis zone and the type of traffic control at each access point.



LEGEND

10% REGIONAL DISTRIBUTION

20% SITE ACCESS DISTRIBUTION

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Figure 7

TRIP DISTRIBUTION

Capacity Requirements by Phase

The Town of Erie requires detailed traffic operations analysis for existing conditions, site build-out and long term. The purpose of this planning level analysis is to help determine what changes to the base network are needed to support the site build-out analysis. The analysis focused on the adequacy of the capacity of the three arterial streets that abut Westerly.

Phase 1

The base roadway network for Phase 1 is the existing roadway network (refer to Figure 2) plus a new traffic signal at the Erie Parkway and WCR 7 intersection. As previously stated, the Town of Erie plans to improve this intersection and install a traffic signal within the next couple of years. Erie Parkway, WCR 5, WCR 6, and WCR 7 all are two lane roadways (one travel lane in each direction). WCR 6 is unpaved. In Phase 1, there are two site access points. The Westerly Street/Place access is right in/right out/left in and connects to Erie Parkway and the Peach Avenue access is right in/right out/left in and connects to WCR 5. For each access point, a left turn lane was added to the arterial roadway to accommodate left turning traffic entering the development. Both the Westerly Street/Place access and the Peach Avenue access have a right turn leaving the development. Each access is stop sign controlled.

The Phase 1 site generated traffic was assigned to the augmented base roadway network. Figure 8 shows the Phase 1 peak hour site traffic. For background traffic, the Denver Regional Council of Governments' (DRCOG) *2015 and 2040 All Day Focus 2.0 Model Assigned Traffic Volumes* were used to establish an annual growth rate. The annual growth for this area was determined to be 2.1 percent per year, which was then used to grow the existing volumes to 2021 volumes.

Table 4 shows the results of the volume to capacity ratio analysis for Phase 1. As shown, each street has adequate capacity to accommodate the total traffic.

Table 4: Phase 1 Volume to Capacity Ratios (Year 2021)

Street	Functional Classification*	Through Lanes	Background Volume	Site Traffic	Total Traffic	Capacity* (Veh./Day)	V/C Ratio
Erie Pkwy.	PA	2	9,630	1,320	10,950	16,000	.68
WCR 5	MA	2	3,990	1,650	5,640	12,000	.47
WCR 7	PA	2	1,120	290	1,410	16,000	.09

*PA – Principal Arterial (Capacity per lane 8,000 vehicles per day).
MA – Minor Arterial (Capacity per lane 6,000 vehicles per day).
Source: *Erie Transportation Plan* (Table 2)

Phase 2

The base roadway network for Phase 2 is identical to Phase 1. Phase 2 includes the Chestnut Avenue access. This access is a T-intersection and all movements are permitted. The access is stop sign controlled. Figure 9 shows the combined Phase 1 and 2 peak hour site traffic.

Table 5 shows the results of the volume to capacity ratio analysis for Phase 2. As shown, each street has adequate capacity to accommodate the total traffic.

Table 5: Phase 2 Volume to Capacity Ratios (Year 2022)

Street	Functional Classification*	Through Lanes	Background Volume	Site Traffic	Total Traffic	Capacity* (Veh./Day)	V/C Ratio
Erie Pkwy.	PA	2	9,830	2,040	11,870	16,000	.74
WCR 5	MA	2	4,080	2,880	6,960	12,000	.58
WCR 7	PA	2	1,140	510	1,650	16,000	,10

*PA – Principal Arterial (Capacity per lane 8,000 vehicles per day).
MA – Minor Arterial (Capacity per lane 6,000 vehicles per day).
Source: *Erie Transportation Plan* (Table 2)

Phase 3

The base roadway network for Phase 3 is identical to the previous phases. Phase 3 includes the Hawthorne Avenue access. This access is a T-intersection and all movements are permitted. The access is stop sign controlled. Figure 10 shows the combined Phase 1, 2 and 3 peak hour site traffic.

Table 6 shows the results of the volume to capacity ratio analysis for Phase 3. As shown, each street has adequate capacity to accommodate the total traffic.

Table 6: Phase 3 Volume to Capacity Ratios (Year 2023)

Street	Functional Classification*	Through Lanes	Background Volume	Site Traffic	Total Traffic	Capacity* (Veh./Day)	V/C Ratio
Erie Pkwy.	PA	2	10,040	2,790	12,830	16,000	.80
WCR 5	MA	2	4,170	3,930	8,100	12,000	.68
WCR 7	PA	2	1,170	700	1,870	16,000	.12

*PA – Principal Arterial (Capacity per lane 8,000 vehicles per day).
MA – Minor Arterial (Capacity per lane 6,000 vehicles per day).
Source: *Erie Transportation Plan* (Table 2)

Phase 4

The base roadway network for Phase 4 is identical to the previous phases. Phase 4 includes the Waterford Street/Place access. This access is shown as a T-intersection in the interim. The fourth leg will be added when the property to the north develops. All movements are permitted and the access will be signalized when warrants are met. Figure 11 shows the combined peak hour site traffic for all four phases.

Table 7 shows the results of the volume to capacity ratio analysis for Phase 4. As shown, each street has adequate capacity to accommodate the total traffic although Erie Parkway is approaching its capacity.

Table 7: Phase 4 Volume to Capacity Ratios (Year 2024)

Street	Functional Classification*	Through Lanes	Background Volume	Site Traffic	Total Traffic	Capacity* (Veh./Day)	V/C Ratio
Erie Pkwy.	PA	2	10,250	4,300	14,550	16,000	.91
WCR 5	MA	2	4,250	4,840	9,090	12,000	.76
WCR 7	PA	2	1,190	860	2,050	16,000	.13

*PA – Principal Arterial (Capacity per lane 8,000 vehicles per day).
MA – Minor Arterial (Capacity per lane 6,000 vehicles per day).
Source: *Erie Transportation Plan* (Table 2)

Phase 5

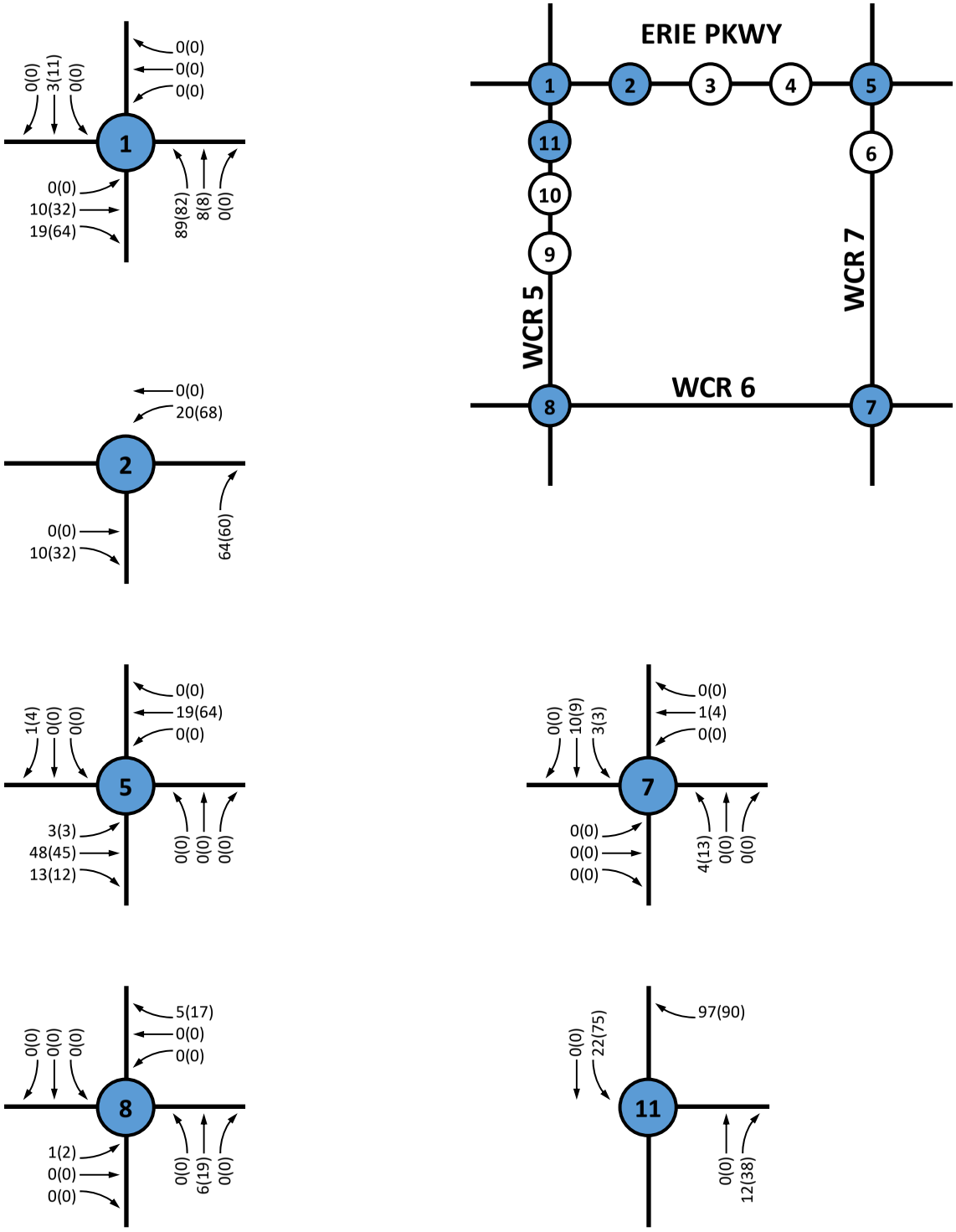
The base roadway network for Phase 5 is identical to the previous phases. Phase 5 includes the Chestnut Avenue access that connects to WCR 7. Because of its proximity to Erie Parkway, this access will operate as a right in/right out/left in intersection and will be stop sign controlled. Figure 12 shows the combined peak hour site traffic for all five phases.

Table 8 shows the results of the volume to capacity ratio analysis for Phase 5. As shown, Erie Parkway is expected to be over capacity in 2025, which will trigger the need for widening to provide four through lanes.WCR 5 is approaching capacity at Westerly build-out in 2025. The *Erie Transportation Plan* shows WCR 5 being widened to four through lanes in the Long Term (2031 – 2040), which should still be valid.

Table 8: Phase 5 Volume to Capacity Ratios (Year 2025)

Street	Functional Classification*	Through Lanes	Background Volume	Site Traffic	Total Traffic	Capacity* (Veh./Day)	V/C Ratio
Erie Pkwy.	PA	2	10,470	5,910	16,380	16,000	1.02
WCR 5	MA	2	4,340	6,650	10,990	12,000	.93
WCR 7	PA	2	1,210	1,180	2,390	16,000	.15

*PA – Principal Arterial (Capacity per lane 8,000 vehicles per day).
MA – Minor Arterial (Capacity per lane 6,000 vehicles per day).
Source: *Erie Transportation Plan* (Table 2)



LEGEND

100(50) → AM(PM) PEAK HOUR TRAFFIC VOLUMES

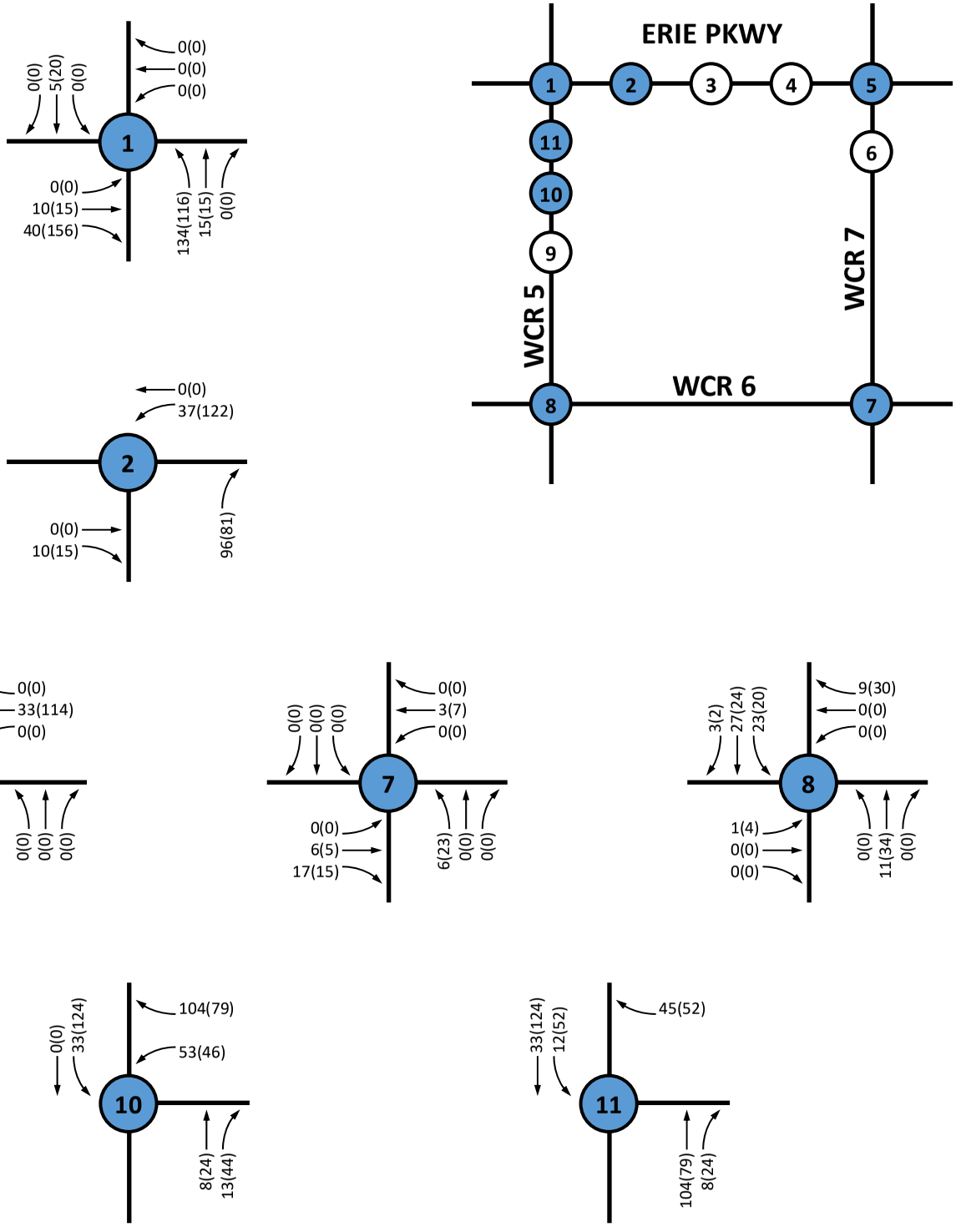
NORTH

Matrix DESIGN GROUP

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 8

PHASE 1 SITE-GENERATED TRAFFIC



LEGEND

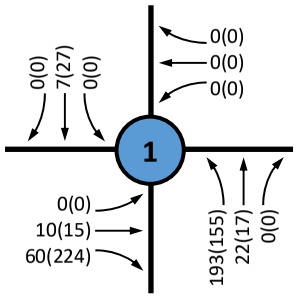
100(50) → AM(PM) PEAK HOUR TRAFFIC VOLUMES

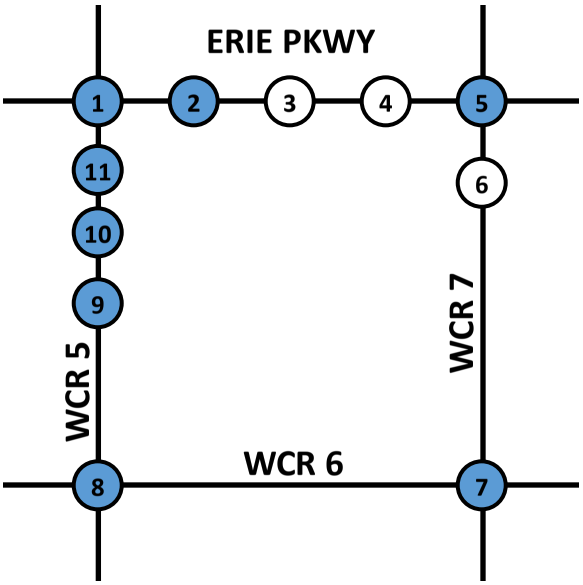
NORTH

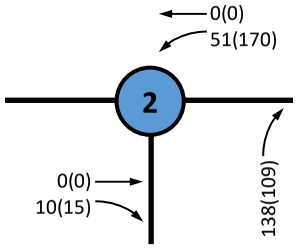
WESTERLY MASTER TRAFFIC IMPACT STUDY

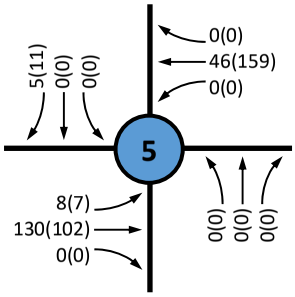
Figure 9

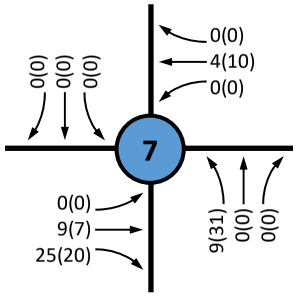
PHASE 2 SITE-GENERATED TRAFFIC

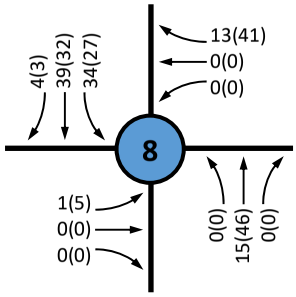


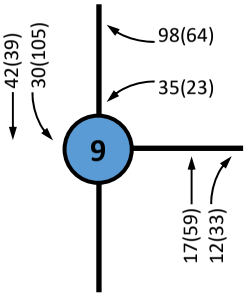


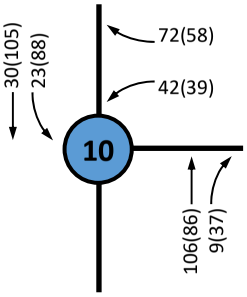


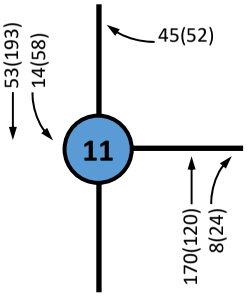












LEGEND

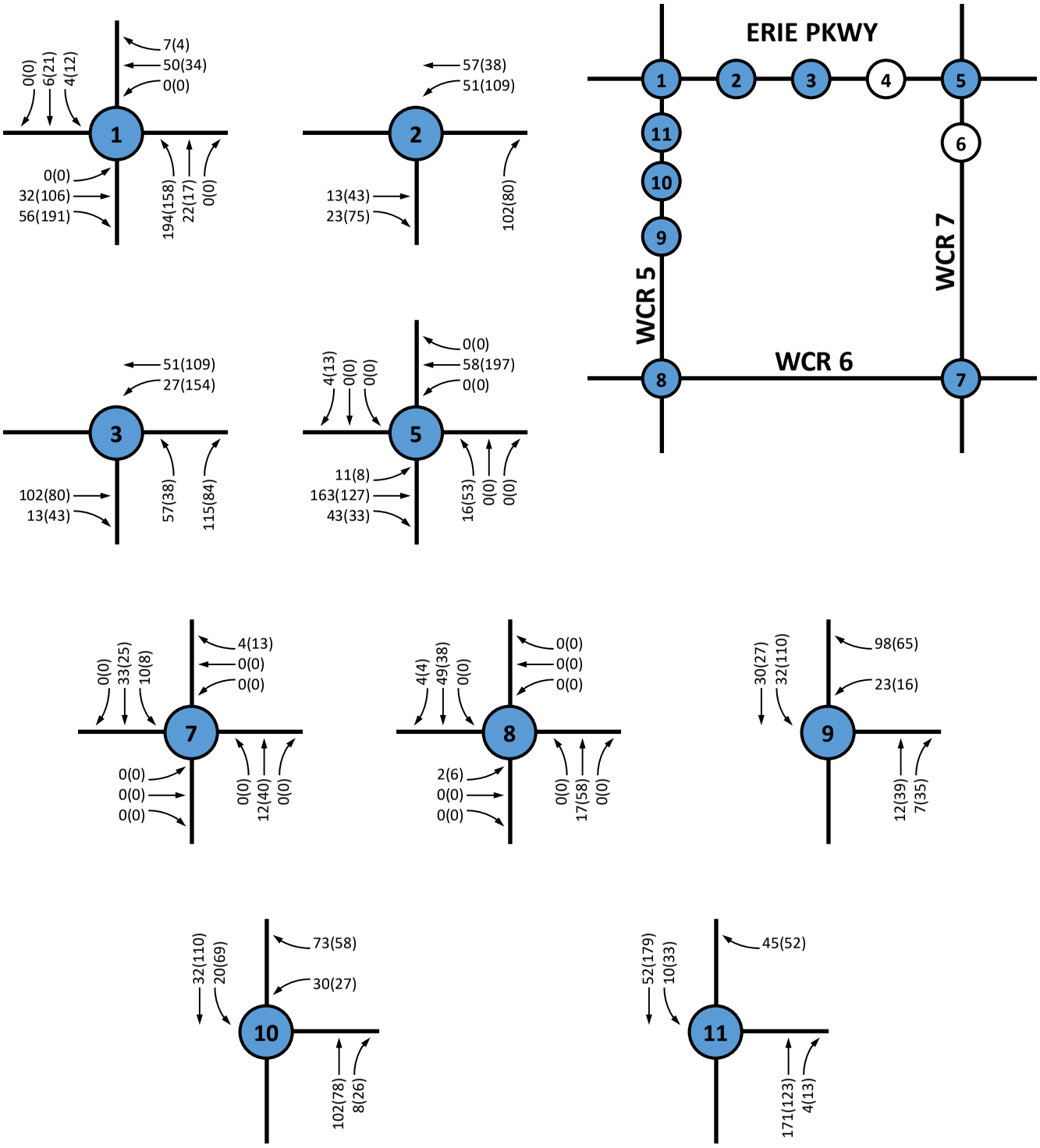
100(50) AM(PM) PEAK HOUR TRAFFIC VOLUMES

NORTH

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 10

PHASE 3 SITE-GENERATED TRAFFIC



LEGEND

100(50) → AM(PM) PEAK HOUR TRAFFIC VOLUMES

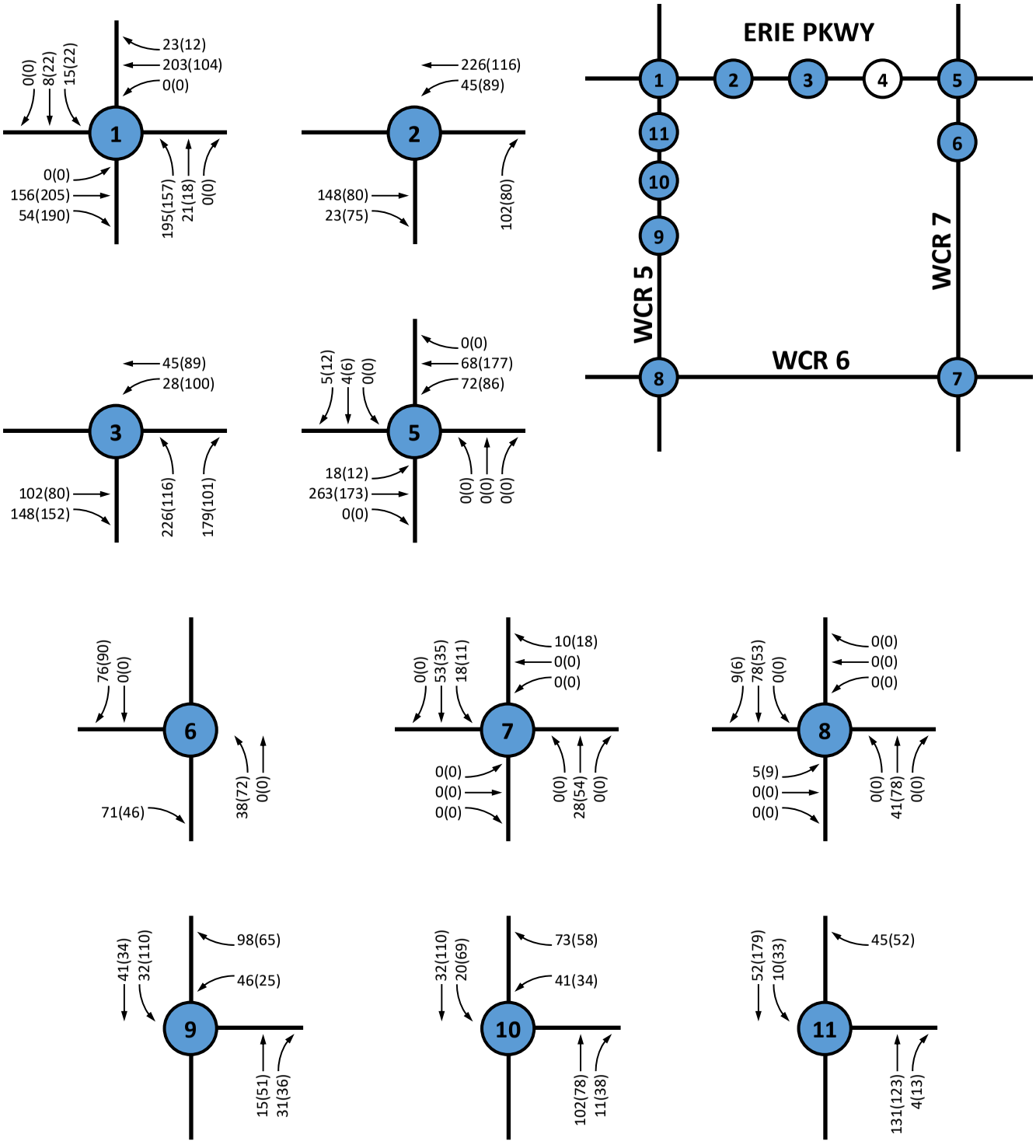
NORTH

Matrix DESIGN GROUP

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 11

PHASE 4 SITE-GENERATED TRAFFIC



LEGEND

100(50) → AM(PM) PEAK HOUR TRAFFIC VOLUMES

NORTH

Matrix DESIGN GROUP

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 12

BUILD-OUT (2025) SITE-GENERATED TRAFFIC

Site Build-out (2025) Analysis

This section identifies the roadway network that will be required to safely and efficiently meet the Westerly build-out travel demand in 2025.

Roadway Network

The external roadway network for purposes of this analysis consists of the following:

- Erie Parkway: 4 lanes with an 18 foot raised median. A left turn lane is provided at both Westerly Street/Place and Waterford Street/Place to accommodate the westbound to southbound movements.
- WCR 5: 2 lanes with a southbound to eastbound left turn lane at the Peach Avenue, Chestnut Avenue, and Hawthorne Avenue intersections.
- WCR 7: 2 lanes with a northbound to westbound left turn lane at the Chestnut Avenue intersection.
- WCR 6: 2 unpaved lanes.
- Erie Parkway/WCR 5 intersection: Signalized with one left turn lane in each approach.
- Erie Parkway/WCR 7 intersection: Signalized with one left turn lane in each approach.
- WCR 5/WCR 6 intersection: No change to the existing condition.
- WCR 7/WCR 6 intersection: No change to the existing condition.
- Site Access:
  - Westerly Street/Place is stop sign controlled with a right turn lane in the northbound approach.
  - Waterford Street/Place is signalized with a left turn lane and a right turn lane in the northbound approach.
  - Chestnut Avenue at WCR 7 is stop sign controlled with a right turn lane in the eastbound approach.
  - Hawthorne Avenue is stop sign controlled with a left turn lane and a right turn lane in the westbound approach.
  - Chestnut Avenue at WCR 5 is stop sign controlled with a left turn lane and a right turn lane in the westbound approach.
  - Peach Avenue is stop sign controlled with a right turn lane in the westbound approach.

Future Traffic

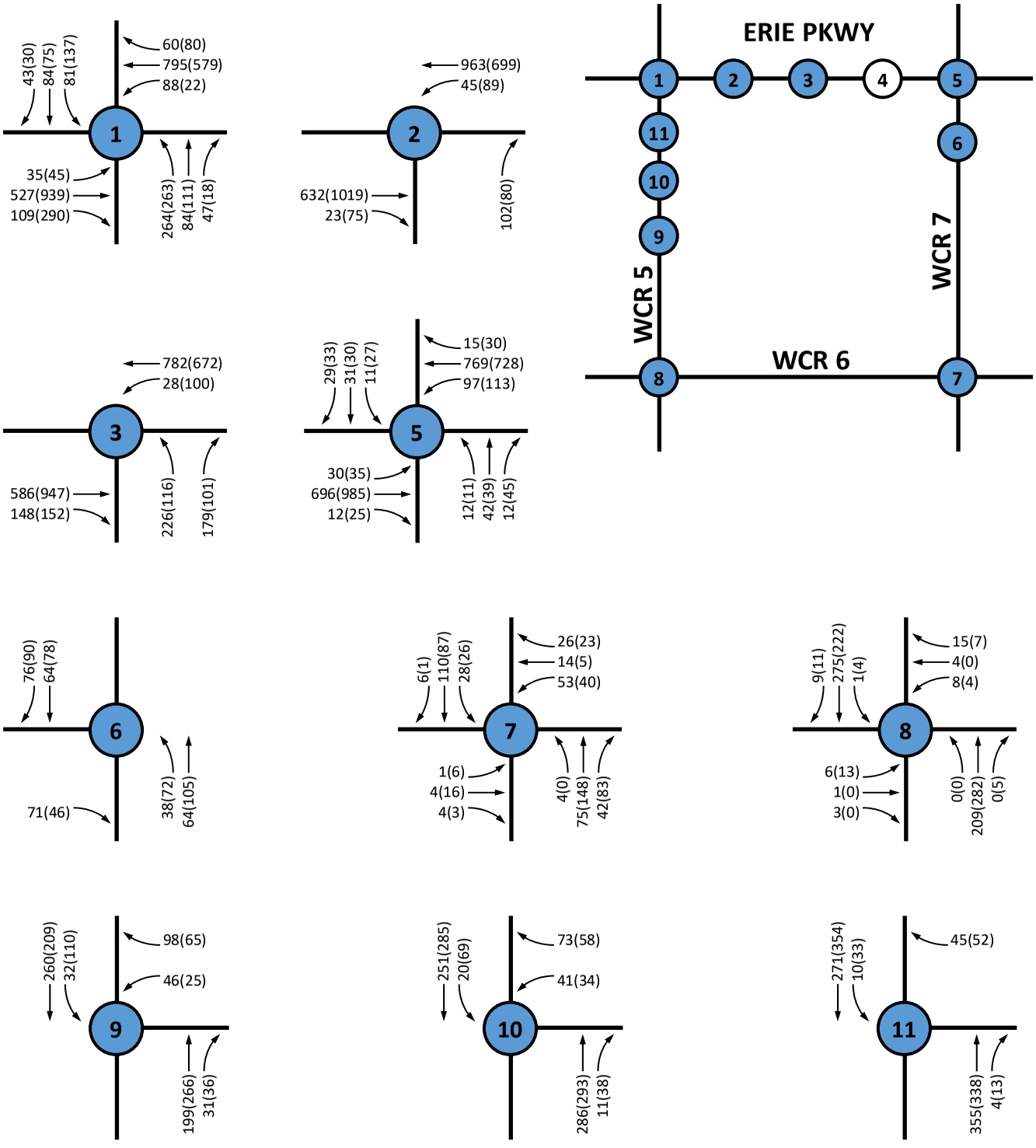
The Build-out site generated traffic was assigned to the above roadway network. (Refer to Figure 12 for the peak hour site traffic in 2025). For background traffic, the same 2.1 percent annual growth was used to grow the existing volumes to 2025 volumes. Figure 13 shows the 2025 total peak hour traffic volumes. The site traffic was added to the background volume with no adjustments to account for potential double counting.

Figure 14 shows the daily volumes internal to the site. These were derived by dividing the development into nine traffic analysis zones (TAZ). The likely travel routes from each TAZ to the regional distribution points were determined based on directness of travel and assumed

traffic control at each access point. Traffic from each TAZ was then assigned to the internal network and the individual link volumes were added together. As shown, all of the internal streets will not exceed the Town's local residential threshold of 1,000 vehicles per day. The streets that do exceed the threshold are at the access points and are highlighted in green. It should be noted, however, these volumes do not exceed the capacity of a two-lane street.

Traffic Operations Analysis

Figure 15 shows the assumed intersection laneage, traffic control and LOS at build-out. Appendix C contains the analysis output for each intersection and time period. In all cases, the network accommodates the peak hour volumes at acceptable levels of service.



LEGEND

100(50) → AM(PM) PEAK HOUR TRAFFIC VOLUMES

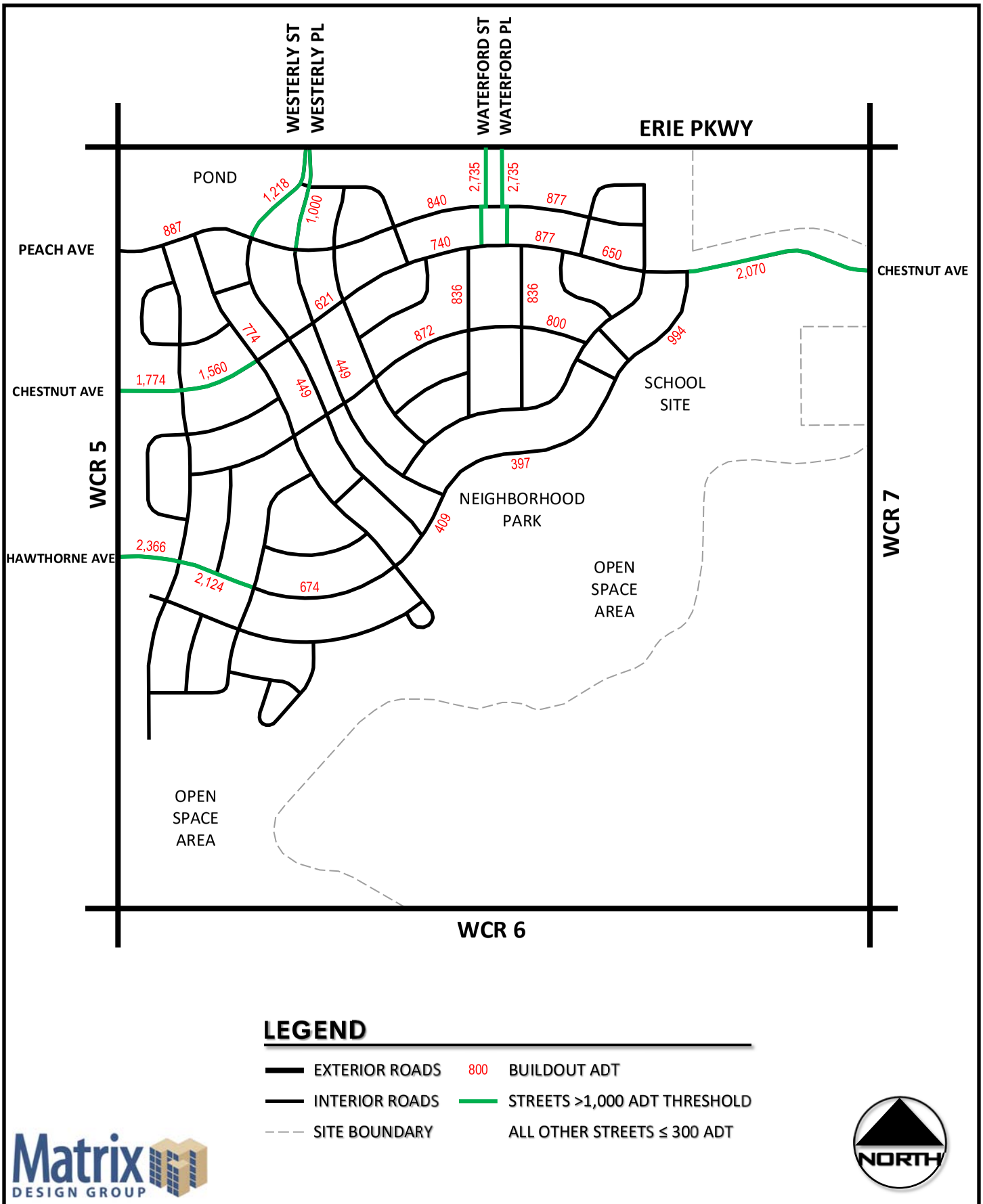
Matrix DESIGN GROUP

NORTH

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 13

2025 TOTAL TRAFFIC

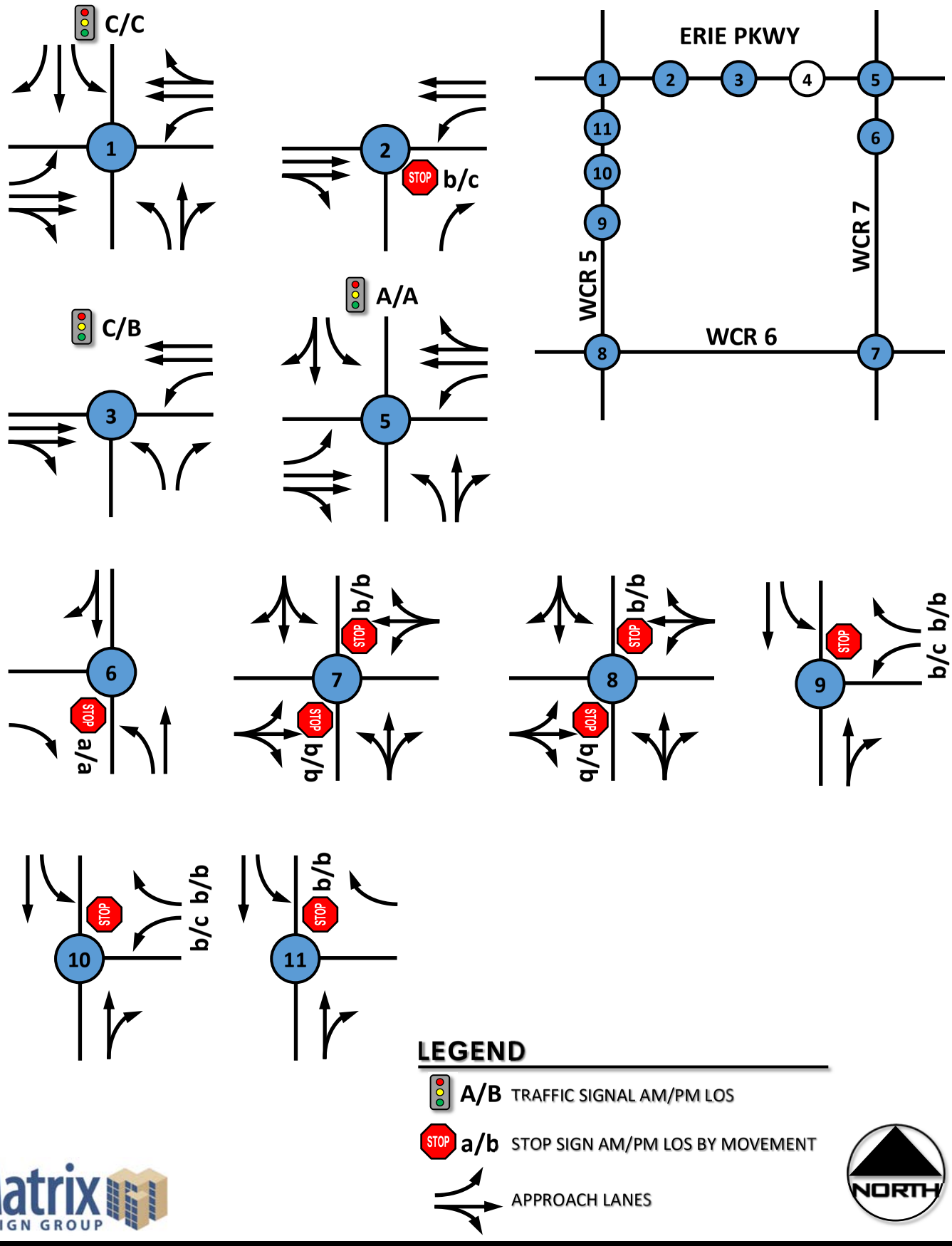


Matrix DESIGN GROUP

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 14

BUILD OUT DAILY SITE VOLUMES



Matrix DESIGN GROUP

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 15

2025 LEVEL OF SERVICE

Long Term (2040) Analysis

This section identifies how the future roadway network will perform in 2040.

Future Traffic

Figure 16 shows the total 2040 peak hour volumes. The peak hour background volumes represent eight percent of the daily volumes, which came directly from the *Erie Transportation Plan.* Eight percent is typical for a high volume urban area. The individual turning movements were calculated using the link volumes and the procedures contained in NCHRP 765. It should be noted the background volumes include traffic from TAZ 2759, which includes the Westerly development. Since the number of households in the proposed development is 3.4 times higher than what was assumed in the *Erie Transportation Plan,* no adjustments were made. There is, however, a small amount of double counting when the site traffic is added to the background traffic, resulting in a conservation approach. The site traffic represents the build-out volumes shown in Figure 12 with adjustments made to account for the addition of Road C.

Roadway Network

Figure 17 shows the proposed number of lanes for each intersection approach. The number of through lanes is from the *Erie Transportation Plan.* In addition, the *Erie Transportation Plan* shows a traffic signal at the intersection of WCR 6 and WCR 7 so it was assumed for this analysis. The number of left turn lanes is based on the 2040 peak hour volumes. For any volume over 300, it was assumed two left turn lanes would be needed. Right turn lanes were added because of the high overall through volumes.

Traffic Operations Analysis

Figure 17 also shows the level of service for each intersection in 2040. Appendix D contains the analysis output for each intersection and time period. The results are summarized below.

External Arterial Intersections

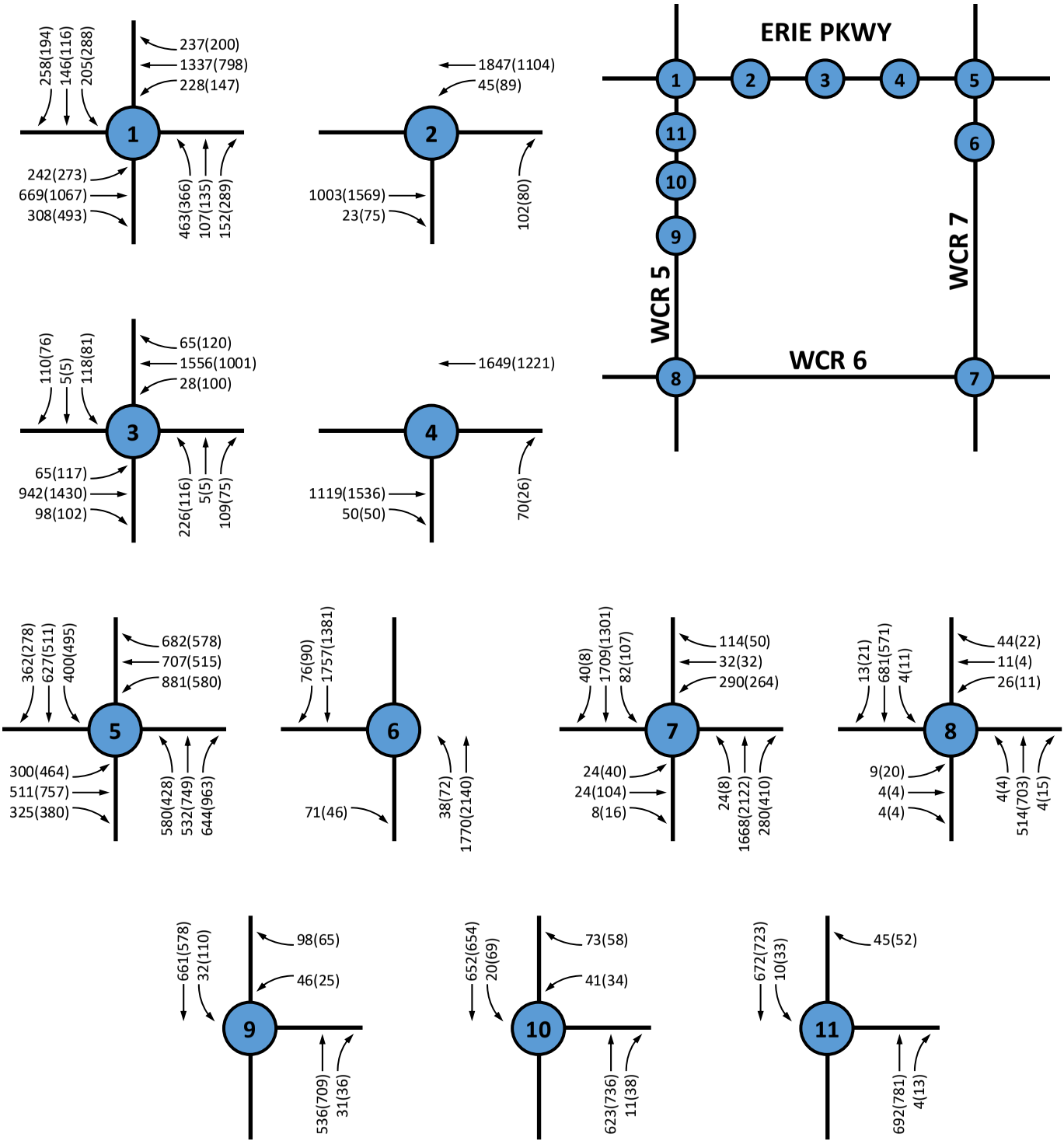
- Erie Parkway and WCR 5 – Acceptable service levels can be achieved with a double left turn lane in the northbound approach.
- Erie Parkway and WCR 7 – This intersection is expected to operate over capacity in both peak hours. The daily volumes on Erie Parkway east of WRC 7 and on WCR 7 south of Erie Parkway exceed the capacity of a four lane arterial. Six through lanes are required for both of these segments. In addition, the high turning movements in each approach to the intersection will likely require a high capacity solution such as a continuous flow intersection.
- WCR 7 and WCR 6 – This intersection is expected to operate at acceptable service levels.
- WCR 5 and WCR 6 – The minor movements at this intersection are expected to operate at acceptable service levels.

Development Access Points

- Erie Parkway and Westerly Street/Place – This intersection will operate at acceptable service levels in both the AM and PM peak hours if it is restricted to right in/right out/left in movements.
- Erie Parkway and Waterford Street/Place – This intersection will operate at acceptable service levels in both the AM and PM peak hours.
- Erie Parkway and Road C (not part of development and will be done by others) – This intersection will operate at acceptable service levels in both the AM and PM peak hours if it is restricted to right in/right out/left in movements.
- WCR 7 and Chestnut Avenue – This intersection will operate at acceptable service levels in both the AM and PM peak hours if it is restricted to right in/right out/left in moments.
- WCR 5 and Hawthorne Avenue – This intersection will operate at acceptable service levels in the AM peak hour. In the PM peak hour, the westbound to southbound left turn (25 vehicles) is expected to operate at LOS E.
- WCR 5 and Chestnut Avenue – This intersection will operate at acceptable service levels in the AM peak hour. In the PM peak hour, the westbound to southbound left turn (34 vehicles) is expected to operate at LOS E.
- WCR 5 and Peach Avenue – This intersection will operate at acceptable service levels in both the AM and PM peak hours if it is restricted to right in/right out/left in movements.

As noted above, the Westerly Street/Place, Road C, Chestnut Avenue (at WCR 7), and Peach Avenue intersections do not allow left turns out of the development. These left turn movements will experience long delays in the AM and PM peak hours (LOS F) because of high volumes on the arterial streets. In accordance with the *Manual on Unified Traffic Control Devices* (MUTCD), a traffic signal is not warranted at these locations because the approach volume is less than 100 vehicles per hour and the stop delay is less than 5 vehicle hours in the peak hour.

For the WCR 5/Hawthorne Avenue and the WCR 5/Chestnut Avenue intersections, the left turns out of the development also are expected to experience delay but it is limited to just the PM peak hour. These left turns are needed to minimize out of direction travel through the Erie Parkway and WCR 5 intersection. If warranted, a traffic signal would mitigate any operational and safety issues. The likely location for a traffic signal would be at the Hawthorne Avenue access. This location meets signal spacing criteria and would provide an opportunity for any development to the west to connect to WCR 5. It also would provide a protected crossing for pedestrians and bicyclists.



LEGEND

100(50) → AM(PM) PEAK HOUR TRAFFIC VOLUMES

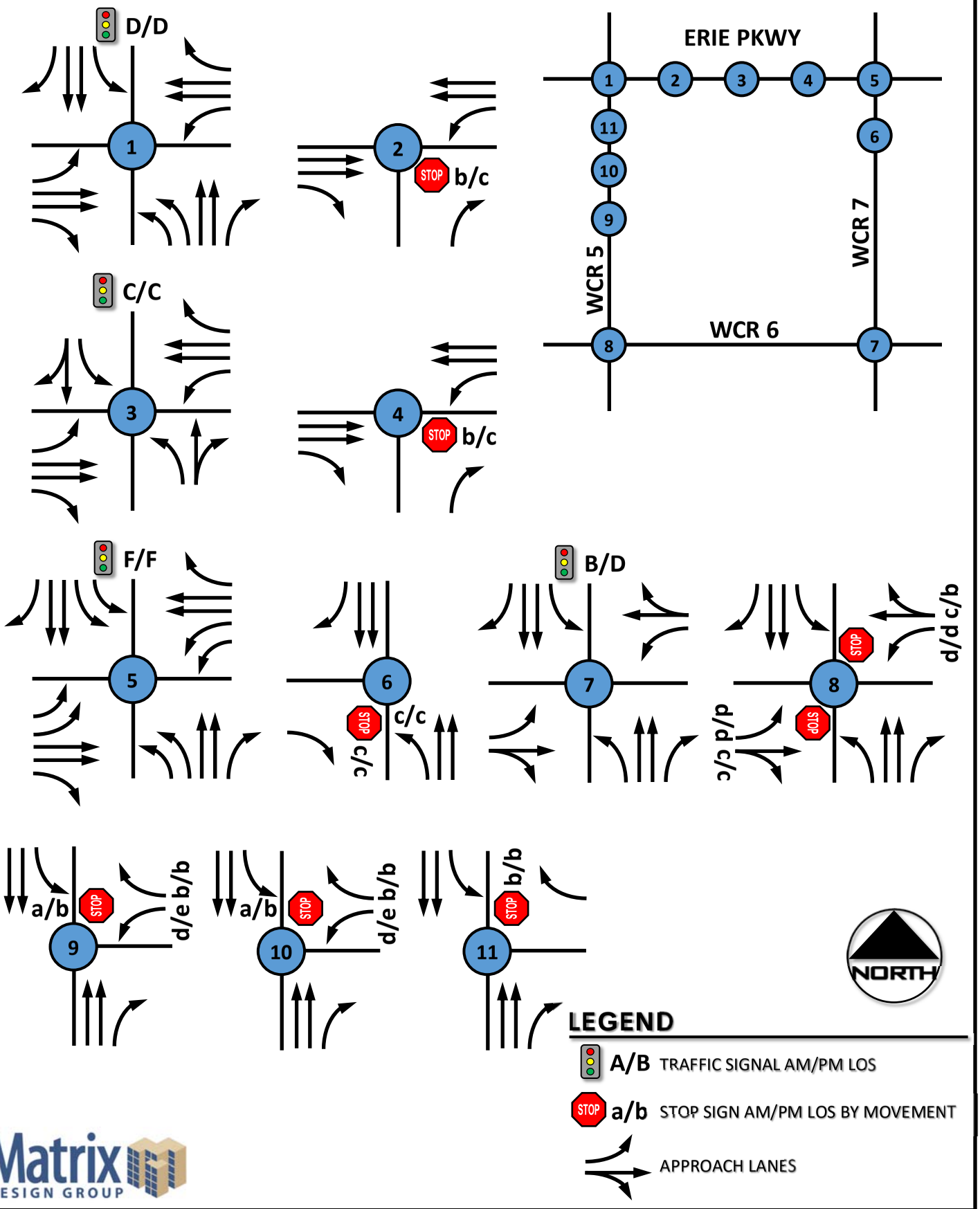
NORTH

Matrix DESIGN GROUP

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 16

2040 TOTAL TRAFFIC



Matrix DESIGN GROUP

WESTERLY MASTER TRAFFIC IMPACT STUDY

Figure 17

2040 LEVEL OF SERVICE

Conclusions

The Town of Erie recently completed two plans that are applicable to Westerly. The first is the *Erie Parkway Corridor Study.* This study was completed in 2017 and was intended to identify multimodal transportation improvements to enhance mobility and safety along the entire length of Erie Parkway. The second is the *Erie Transportation Plan.* This plan was completed in January of 2018 and represents an update to the 2008 Transportation Plan. The latest plan provides guidance on how to strategically plan for and accommodate Erie's expected growth over the next 20 plus years. Based on this traffic impact study, Westerly is in compliance with both plans.

The *Erie Transportation Plan* contains an Implementation Section that shows how the transition from the existing to the future arterial roadway network will occur. The key projects from the *Erie Transportation Plan* that apply to Westerly are listed below:

- Short-Term (2017 – 2021)
  - Signalize the Erie Parkway/WCR 7 intersection
- Mid-Term (2022 – 2030)
  - Signalize the WCR 7/WCR 6 intersection
- Long-Term (2031 – 2040)
  - Widen Erie Parkway to four lanes with an 18 foot raised median
  - Widen WCR 5 to four lanes with an 18 foot raised median
  - Widen WCR 7 south of Erie Parkway to four lanes with an 18 foot raised median
  - Pave WCR 6

Based on this traffic impact study, Erie Parkway will have to be widened to four lanes by 2025. With this change, the 2025 roadway network has adequate capacity to accommodate the travel demand associated with the build-out of Westerly. The other Long-Term projects listed above (widened both WCR 5 and WCR 7 and pave WCR 6) can remain in the 2031 to 2040 timeframe.

It appears that it is the Town's policy to require adjacent development to design and construct adjacent roadways. Development Agreements will define the responsibilities of the Developer, limits of future improvements, and the timing of when infrastructure will be constructed.

Based on the results of the traffic study, all of the internal streets within Westerly can be two lanes. The functional classification and design features of each street will be negotiated between the Developer and the Town of Erie during the development approval process.

Six access points are proposed to serve Westerly. The requirements for each to achieve acceptable operating conditions are described below:

- Westerly Street/Place at Erie Parkway is stop sign controlled with a right turn lane in the northbound approach.
- Waterford Street/Place at Erie Parkway is signalized with a left turn lane and a right turn lane in the northbound approach.

- Chestnut Avenue at WCR 7 is stop sign controlled with a right turn lane in the eastbound approach.
- Hawthorne Avenue at WCR 5 is stop sign controlled with a left turn lane and a right turn lane in the westbound approach.
- Chestnut Avenue at WCR 5 is stop sign controlled with a left turn lane and a right turn lane in the westbound approach.
- Peach Avenue at WCR 5 is stop sign controlled with a right turn lane in the westbound approach.

Each intersection also has both a left turn lane and a right turn lane on the arterial street for traffic entering the development. The left turn lane should be included in the design and construction of each access point. The right turn lanes should be added when each arterial street is widened to four lanes. It should be noted only the access points on Erie Parkway and WCR 7 exceed the threshold criteria for an auxiliary right turn lane. While this study showed right turn lanes on WCR 5, the need for them should be assessed during the WCR 5 improvement design process.

As shown in the 2040 capacity analysis, the left turns out of the development at the WCR 5/Hawthorne Avenue and WCR 5/Chestnut Avenue intersections are expected to operate at LOS E in the PM peak hour. These future conditions should be monitored and a traffic signal may be needed to mitigate any operational or safety issues. The ideal location for a traffic signal would be at Hawthorne Avenue because it meets established spacing criteria but it could work at Chestnut Avenue if this provides a better connection to the development west of WCR 5.

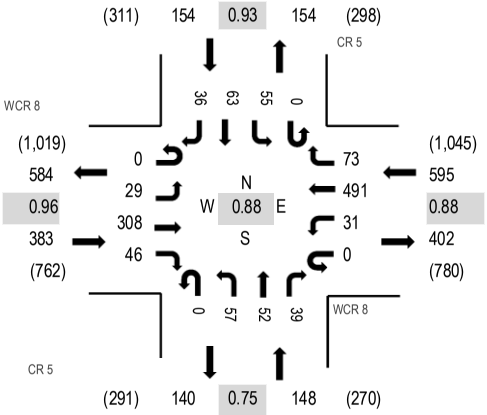
Appendix A: Existing Traffic Counts

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

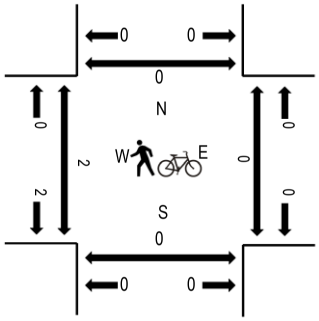
Location: 1 CR 5 & WCR 8 AM
Date and Start Time: Thursday, June 14, 2018
Peak Hour: 07:15 AM - 08:15 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



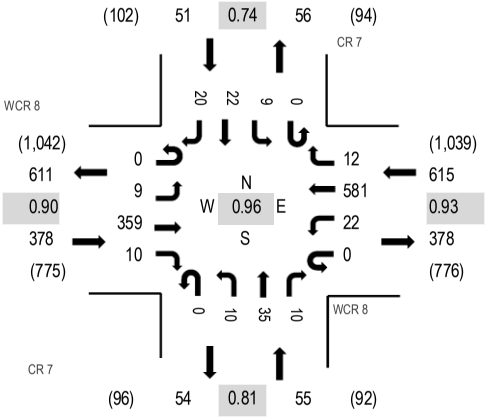
Traffic Counts

Interval Start Time	WCR 8 Eastbound				WCR 8 Westbound				CR 5 Northbound				CR 5 Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	5	62	9	0	7	104	23	0	5	6	9	0	12	13	6	261	1,247	0	0	0	0
7:15 AM	0	3	78	8	0	3	134	24	0	8	10	11	0	17	9	3	308	1,280	0	0	0	0
7:30 AM	0	5	84	7	0	5	128	11	0	15	13	5	0	14	16	12	315	1,258	1	0	0	0
7:45 AM	0	16	63	13	0	12	139	22	0	24	18	11	0	11	22	12	363	1,227	0	0	0	0
8:00 AM	0	5	83	18	0	11	90	16	0	10	11	12	0	13	16	9	294	1,141	0	0	0	0
8:15 AM	0	6	83	11	0	4	94	11	0	13	11	10	0	14	19	10	286		0	0	0	0
8:30 AM	0	9	75	18	0	11	72	25	0	13	12	13	0	10	15	11	284		0	0	0	0
8:45 AM	0	11	75	15	0	9	76	14	0	17	11	2	0	13	20	14	277		0	0	0	0
Count Total	0	60	603	99	0	62	837	146	0	105	92	73	0	104	130	77	2,388		1	0	0	0
Peak Hour	0	29	308	46	0	31	491	73	0	57	52	39	0	55	63	36	1,280		1	0	0	0

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

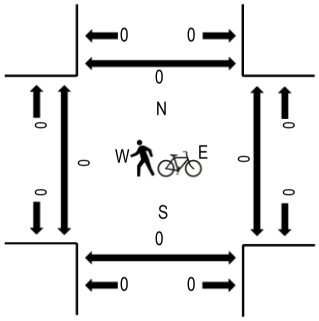
Location: 2 CR 7 & WCR 8 AM
Date and Start Time: Thursday, June 14, 2018
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



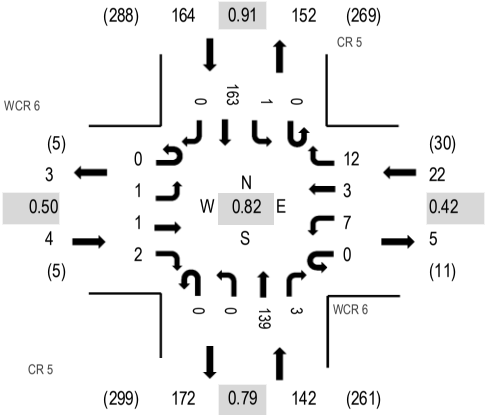
Traffic Counts

Interval Start Time	WCR 8 Eastbound				WCR 8 Westbound				CR 7 Northbound				CR 7 Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	1	89	2	0	5	132	3	0	2	8	3	0	1	4	4	254	1,099	0	0	0	0
7:15 AM	0	1	94	1	0	9	148	4	0	4	8	1	0	2	4	5	281	1,083	0	0	0	0
7:30 AM	0	4	100	3	0	3	141	5	0	2	12	3	0	3	6	3	285	1,044	0	0	0	0
7:45 AM	0	3	76	4	0	5	160	0	0	2	7	3	0	3	8	8	279	989	0	0	0	0
8:00 AM	0	0	101	1	0	4	109	5	0	4	4	1	0	2	5	2	238	909	0	0	0	0
8:15 AM	0	5	108	0	0	1	103	4	0	3	2	5	0	0	2	9	242		0	0	0	0
8:30 AM	0	0	91	4	0	3	97	3	0	5	5	5	1	2	6	8	230		0	0	0	0
8:45 AM	0	2	83	2	0	5	86	4	0	0	3	0	0	0	9	5	199		0	0	0	0
Count Total	0	16	742	17	0	35	976	28	0	22	49	21	1	13	44	44	2,008		0	0	0	0
Peak Hour	0	9	359	10	0	22	581	12	0	10	35	10	0	9	22	20	1,099		0	0	0	0

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

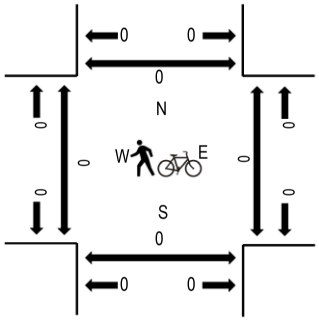
Location: 3 CR 5 & WCR 6 AM
Date and Start Time: Thursday, June 14, 2018
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

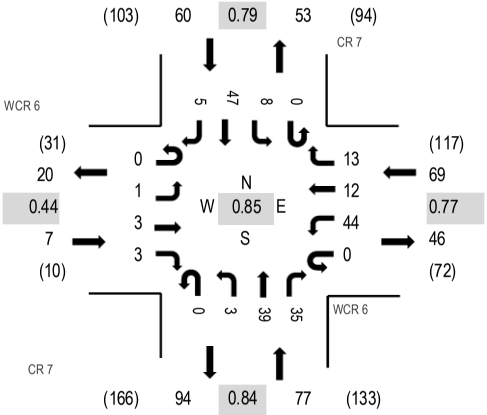
Interval Start Time	WCR 6 Eastbound				WCR 6 Westbound				CR 5 Northbound				CR 5 Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	0	0	0	0	1	0	0	0	0	20	3	0	1	26	0	51	271	0	0	0	0
7:15 AM	0	0	0	0	0	2	1	1	0	0	32	0	0	0	22	0	58	299	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	1	0	0	31	0	0	0	29	0	61	314	0	0	0	0
7:45 AM	0	0	1	0	0	3	1	9	0	0	42	3	0	0	42	0	101	332	0	0	0	0
8:00 AM	0	1	0	1	0	1	2	1	0	0	27	0	0	0	46	0	79	313	0	0	0	0
8:15 AM	0	0	0	1	0	2	0	1	0	0	34	0	0	1	34	0	73		0	0	0	0
8:30 AM	0	0	0	0	0	1	0	1	0	0	36	0	0	0	41	0	79		0	0	0	0
8:45 AM	0	0	0	1	0	1	0	1	0	0	31	2	0	0	45	1	82		0	0	0	0
Count Total	0	1	1	3	0	11	4	15	0	0	253	8	0	2	285	1	584		0	0	0	0
Peak Hour	0	1	1	2	0	7	3	12	0	0	139	3	0	1	163	0	332		0	0	0	0

All Traffic Data Services Inc.

(303) 216-2439
www.alltrafficdata.net

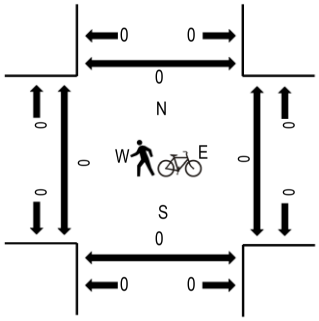
Location: 4 CR 7 & WCR 6 AM
Date and Start Time: Thursday, June 14, 2018
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	WCR 6 Eastbound				WCR 6 Westbound				CR 7 Northbound				CR 7 Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	0	1	3	0	12	2	5	0	0	6	7	0	2	6	1	45	213	0	0	0	0
7:15 AM	0	0	1	0	0	2	0	1	0	1	10	13	0	1	16	1	46	212	0	0	0	0
7:30 AM	0	0	0	0	0	20	2	4	0	1	13	5	0	2	12	0	59	197	0	0	0	0
7:45 AM	0	1	1	0	0	10	8	3	0	1	10	10	0	3	13	3	63	177	0	0	0	0
8:00 AM	0	0	1	0	0	11	4	3	0	0	10	7	0	2	6	0	44	150	0	0	0	0
8:15 AM	0	0	0	0	0	13	1	1	0	0	7	3	0	0	5	1	31		0	0	0	0
8:30 AM	0	0	0	0	0	6	1	3	0	1	10	6	0	0	12	0	39		0	0	0	0
8:45 AM	0	0	1	1	0	2	2	1	0	0	6	6	0	0	16	1	36		0	0	0	0
Count Total	0	1	5	4	0	76	20	21	0	4	72	57	0	10	86	7	363		0	0	0	0
Peak Hour	0	1	3	3	0	44	12	13	0	3	39	35	0	8	47	5	213		0	0	0	0

All Traffic Data Services Inc.
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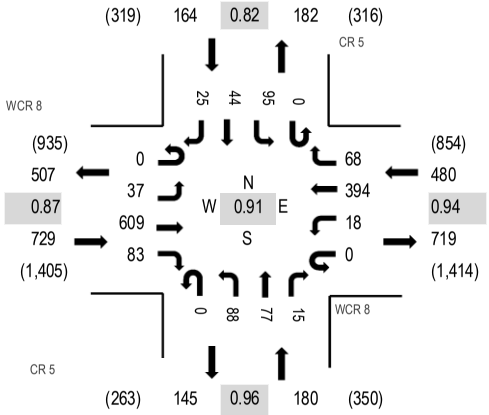
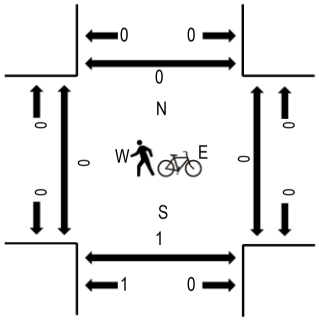
Location: 1 CR 5 & WCR 8 PM
Date and Start Time: Thursday, June 14, 2018
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	WCR 8 Eastbound				WCR 8 Westbound				CR 5 Northbound				CR 5 Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	7	136	9	0	6	61	15	0	20	17	10	0	24	10	4	319	1,394	0	0	0	0
4:15 PM	1	10	165	15	0	4	79	15	0	24	18	7	0	22	5	10	375	1,465	0	0	0	0
4:30 PM	0	5	152	19	0	3	84	6	0	19	10	6	0	17	11	10	342	1,515	0	0	0	0
4:45 PM	0	7	121	18	0	7	103	16	0	27	16	3	0	19	13	8	358	1,553	0	0	0	0
5:00 PM	0	8	159	21	0	0	94	20	0	18	23	5	0	24	12	6	390	1,534	0	0	0	0
5:15 PM	0	9	178	25	0	3	98	12	0	21	21	5	0	36	11	6	425		0	0	0	0
5:30 PM	0	13	151	19	0	8	99	20	0	22	17	2	0	16	8	5	380		0	0	0	0
5:45 PM	0	9	127	21	0	2	86	13	0	23	9	7	0	22	13	7	339		0	0	0	0
Count Total	1	68	1,189	147	0	33	704	117	0	174	131	45	0	180	83	56	2,928		0	0	0	0
Peak Hour	0	37	609	83	0	18	394	68	0	88	77	15	0	95	44	25	1,553		0	0	0	0

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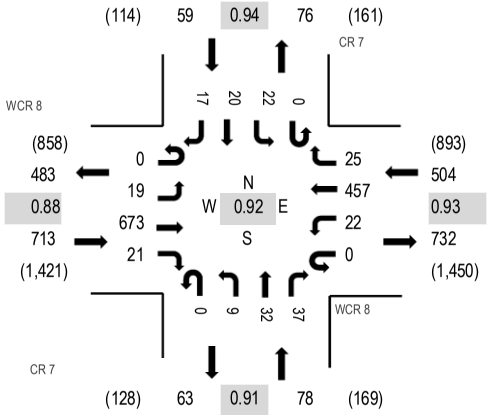
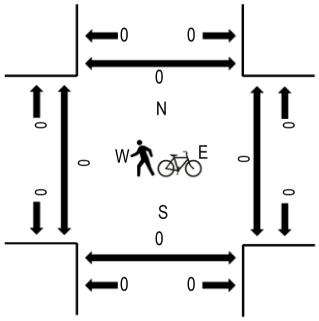
Location: 2 CR 7 & WCR 8 PM
Date and Start Time: Thursday, June 14, 2018
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	WCR 8 Eastbound				WCR 8 Westbound				CR 7 Northbound				CR 7 Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	6	153	5	0	3	80	3	0	3	13	10	0	2	8	2	288	1,247	0	0	0	0
4:15 PM	0	8	186	4	0	2	86	3	0	1	9	10	0	3	6	5	323	1,290	0	0	0	0
4:30 PM	0	5	176	6	0	6	91	9	0	3	11	11	0	4	6	2	330	1,335	0	0	0	0
4:45 PM	0	3	133	3	0	4	119	8	0	3	12	9	0	4	5	3	306	1,354	0	0	0	0
5:00 PM	0	4	180	5	0	4	102	5	0	1	5	8	0	6	6	5	331	1,350	0	0	0	0
5:15 PM	0	7	194	7	0	7	116	4	0	3	4	10	0	5	5	6	368		0	0	0	0
5:30 PM	0	5	166	6	0	7	120	8	0	2	11	10	0	7	4	3	349		0	0	0	0
5:45 PM	0	4	149	6	0	3	97	6	0	2	8	10	0	4	10	3	302		0	0	0	0
Count Total	0	42	1,337	42	0	36	811	46	0	18	73	78	0	35	50	29	2,597		0	0	0	0
Peak Hour	0	19	673	21	0	22	457	25	0	9	32	37	0	22	20	17	1,354		0	0	0	0

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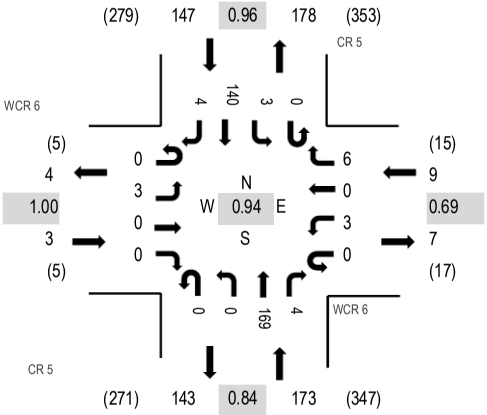
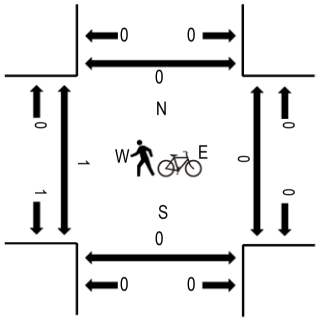
Location: 3 CR 5 & WCR 6 PM
Date and Start Time: Thursday, June 14, 2018
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	WCR 6 Eastbound				WCR 6 Westbound				CR 5 Northbound				CR 5 Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	0	0	0	0	1	0	0	0	0	46	0	0	3	26	0	76	319	0	0	0	0
4:15 PM	0	0	0	0	0	1	0	1	0	0	53	3	0	0	25	0	83	327	0	0	0	0
4:30 PM	0	0	0	0	0	1	0	0	0	0	39	3	0	1	32	1	77	332	0	0	0	0
4:45 PM	0	1	0	0	0	0	0	1	0	0	43	1	0	1	35	1	83	331	0	0	0	0
5:00 PM	0	1	0	0	0	1	0	2	0	0	44	0	0	0	35	1	84	327	0	0	0	0
5:15 PM	0	1	0	0	0	1	0	3	0	0	43	0	0	1	38	1	88		0	0	0	0
5:30 PM	0	1	0	0	0	1	0	2	0	0	33	1	0	1	36	1	76		0	0	0	0
5:45 PM	0	1	0	0	0	0	0	0	0	0	38	0	0	2	38	0	79		0	0	0	0
Count Total	0	5	0	0	0	6	0	9	0	0	339	8	0	9	265	5	646		0	0	0	0
Peak Hour	0	3	0	0	0	3	0	6	0	0	169	4	0	3	140	4	332		0	0	0	0

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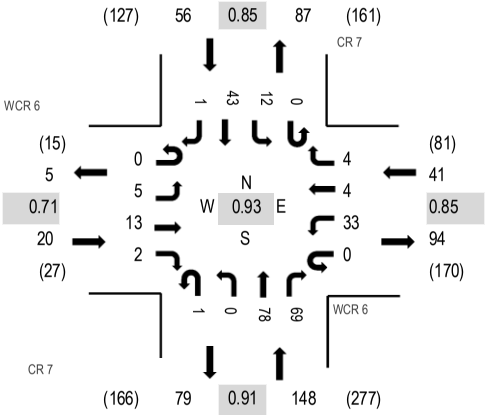
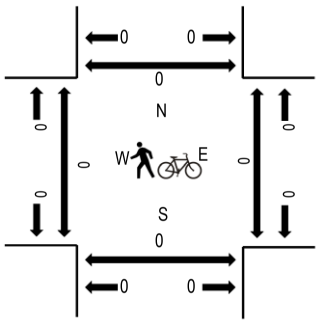
Location: 4 CR 7 & WCR 6 PM
Date and Start Time: Thursday, June 14, 2018
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:00 PM - 04:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

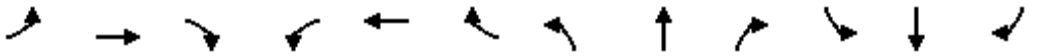
Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	WCR 6 Eastbound				WCR 6 Westbound				CR 7 Northbound				CR 7 Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	1	6	0	0	9	0	1	0	0	17	19	0	4	13	1	71	265	0	0	0	0
4:15 PM	0	1	1	2	0	8	2	2	0	0	19	22	0	3	8	0	68	261	0	0	0	0
4:30 PM	0	2	4	0	0	11	1	0	1	0	22	15	0	2	12	0	70	250	0	0	0	0
4:45 PM	0	1	2	0	0	5	1	1	0	0	20	13	0	3	10	0	56	243	0	0	0	0
5:00 PM	0	1	1	1	0	8	2	0	0	0	17	21	0	4	12	0	67	247	0	0	0	0
5:15 PM	0	2	0	0	0	7	3	0	0	0	8	16	0	2	19	0	57		0	0	0	0
5:30 PM	0	1	1	0	0	8	2	2	0	2	21	10	0	3	13	0	63		0	0	0	0
5:45 PM	0	0	0	0	1	3	1	3	0	0	19	15	0	2	16	0	60		0	0	0	0
Count Total	0	9	15	3	1	59	12	9	1	2	143	131	0	23	103	1	512		0	0	0	0
Peak Hour	0	5	13	2	0	33	4	4	1	0	78	69	0	12	43	1	265		0	0	0	0

Appendix B: Existing Traffic Level of Service Output



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	308	46	31	491	73	57	52	39	55	63	36
Future Volume (veh/h)	29	308	46	31	491	73	57	52	39	55	63	36
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	32	335	50	34	534	79	62	57	42	60	68	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	468	998	149	608	1174	995	395	272	201	376	509	431
Arrive On Green	0.63	0.63	0.63	0.63	0.63	0.63	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	809	1590	237	998	1870	1585	1287	1000	737	1296	1870	1585
Grp Volume(v), veh/h	32	0	385	34	534	79	62	0	99	60	68	39
Grp Sat Flow(s),veh/h/ln	809	0	1828	998	1870	1585	1287	0	1738	1296	1870	1585
Q Serve(g_s), s	1.9	0.0	8.9	1.5	13.4	1.8	3.4	0.0	4.0	3.4	2.5	1.7
Cycle Q Clear(g_c), s	15.3	0.0	8.9	10.4	13.4	1.8	5.9	0.0	4.0	7.3	2.5	1.7
Prop In Lane	1.00		0.13	1.00		1.00	1.00		0.42	1.00		1.00
Lane Grp Cap(c), veh/h	468	0	1147	608	1174	995	395	0	473	376	509	431
V/C Ratio(X)	0.07	0.00	0.34	0.06	0.45	0.08	0.16	0.00	0.21	0.16	0.13	0.09
Avail Cap(c_a), veh/h	468	0	1147	608	1174	995	395	0	473	376	509	431
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	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.7	0.0	7.9	10.4	8.7	6.6	27.0	0.0	25.3	28.1	24.7	24.4
Incr Delay (d2), s/veh	0.3	0.0	0.8	0.2	1.3	0.2	0.8	0.0	1.0	0.9	0.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	3.4	0.3	5.2	0.6	1.1	0.0	1.7	1.1	1.2	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.0	0.0	8.7	10.5	10.0	6.7	27.8	0.0	26.3	29.0	25.3	24.9
LnGrp LOS	B	A	A	B	A	A	C	A	C	C	C	C
Approach Vol, veh/h		417			647			161			167	
Approach Delay, s/veh		9.0			9.6			26.9			26.5	
Approach LOS		A			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		61.0		29.0		61.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		24.5		56.5		24.5		56.5				
Max Q Clear Time (g_c+I1), s		7.9		17.3		9.3		15.4				
Green Ext Time (p_c), s		0.6		2.9		0.5		4.4				

Intersection Summary												
HCM 6th Ctrl Delay			13.5									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	9	359	10	22	581	12	10	35	10	9	22	20
Future Vol, veh/h	9	359	10	22	581	12	10	35	10	9	22	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	390	11	24	632	13	11	38	11	10	24	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	645	0	0	401	0	0	1126	1109	396	1127	1108	639
Stage 1	-	-	-	-	-	-	416	416	-	687	687	-
Stage 2	-	-	-	-	-	-	710	693	-	440	421	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	940	-	-	1158	-	-	182	210	653	182	210	476
Stage 1	-	-	-	-	-	-	614	592	-	437	447	-
Stage 2	-	-	-	-	-	-	424	445	-	596	589	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	940	-	-	1158	-	-	152	200	653	148	200	476
Mov Cap-2 Maneuver	-	-	-	-	-	-	152	200	-	148	200	-
Stage 1	-	-	-	-	-	-	605	584	-	431	433	-
Stage 2	-	-	-	-	-	-	370	431	-	540	581	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.3	28.1	24.4
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	215	940	-	-	1158	-	-	240
HCM Lane V/C Ratio	0.278	0.01	-	-	0.021	-	-	0.231
HCM Control Delay (s)	28.1	8.9	0	-	8.2	0	-	24.4
HCM Lane LOS	D	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.1	0	-	-	0.1	-	-	0.9

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	1	3	3	44	12	13	3	39	35	8	47	5
Future Vol, veh/h	1	3	3	44	12	13	3	39	35	8	47	5
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	3	3	48	13	14	3	42	38	9	51	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	153	158	54	142	141	61	56	0	0	80	0	0
Stage 1	72	72	-	67	67	-	-	-	-	-	-	-
Stage 2	81	86	-	75	74	-	-	-	-	-	-	-
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	814	734	1013	828	750	1004	1549	-	-	1518	-	-
Stage 1	938	835	-	943	839	-	-	-	-	-	-	-
Stage 2	927	824	-	934	833	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	787	728	1013	817	744	1004	1549	-	-	1518	-	-
Mov Cap-2 Maneuver	787	728	-	817	744	-	-	-	-	-	-	-
Stage 1	936	830	-	941	837	-	-	-	-	-	-	-
Stage 2	898	822	-	922	828	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.3	9.8	0.3	1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1549	-	-	838	832	1518	-	-
HCM Lane V/C Ratio	0.002	-	-	0.009	0.09	0.006	-	-
HCM Control Delay (s)	7.3	0	-	9.3	9.8	7.4	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	1	2	7	3	12	0	139	3	1	163	0
Future Vol, veh/h	1	1	2	7	3	12	0	139	3	1	163	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1	2	8	3	13	0	151	3	1	177	0

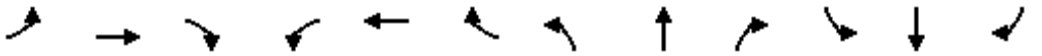
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	340	333	177	334	332	153	177	0	0	154	0	0
Stage 1	179	179	-	153	153	-	-	-	-	-	-	-
Stage 2	161	154	-	181	179	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
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	614	587	866	620	588	893	1399	-	-	1426	-	-
Stage 1	823	751	-	849	771	-	-	-	-	-	-	-
Stage 2	841	770	-	821	751	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	602	586	866	617	587	893	1399	-	-	1426	-	-
Mov Cap-2 Maneuver	602	586	-	617	587	-	-	-	-	-	-	-
Stage 1	823	750	-	849	771	-	-	-	-	-	-	-
Stage 2	825	770	-	817	750	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	10.1	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1399	-	-	705	736	1426	-	-
HCM Lane V/C Ratio	-	-	-	0.006	0.032	0.001	-	-
HCM Control Delay (s)	0	-	-	10.1	10.1	7.5	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-

HCM 6th Signalized Intersection Summary
1: WCR 5 & Erie Pkwy

05/07/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	609	83	18	394	68	88	77	15	95	44	25
Future Volume (veh/h)	37	609	83	18	394	68	88	77	15	95	44	25
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	40	662	90	20	428	74	96	84	16	103	48	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	544	1012	138	342	1174	995	415	416	79	378	509	431
Arrive On Green	0.63	0.63	0.63	0.63	0.63	0.63	0.27	0.27	0.27	0.27	0.27	0.27
Sat Flow, veh/h	896	1612	219	711	1870	1585	1325	1527	291	1295	1870	1585
Grp Volume(v), veh/h	40	0	752	20	428	74	96	0	100	103	48	27
Grp Sat Flow(s),veh/h/ln	896	0	1831	711	1870	1585	1325	0	1818	1295	1870	1585
Q Serve(g_s), s	2.0	0.0	23.3	1.6	9.9	1.6	5.3	0.0	3.8	6.0	1.7	1.1
Cycle Q Clear(g_c), s	12.0	0.0	23.3	25.0	9.9	1.6	7.0	0.0	3.8	9.8	1.7	1.1
Prop In Lane	1.00		0.12	1.00		1.00	1.00		0.16	1.00		1.00
Lane Grp Cap(c), veh/h	544	0	1149	342	1174	995	415	0	495	378	509	431
V/C Ratio(X)	0.07	0.00	0.65	0.06	0.36	0.07	0.23	0.00	0.20	0.27	0.09	0.06
Avail Cap(c_a), veh/h	544	0	1149	342	1174	995	415	0	495	378	509	431
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	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	0.0	10.6	18.5	8.1	6.5	27.1	0.0	25.2	29.0	24.5	24.2
Incr Delay (d2), s/veh	0.3	0.0	2.9	0.3	0.9	0.1	1.3	0.0	0.9	1.8	0.4	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	8.5	0.3	3.6	0.5	1.7	0.0	1.7	1.9	0.8	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.2	0.0	13.5	18.8	9.0	6.7	28.4	0.0	26.1	30.8	24.8	24.5
LnGrp LOS	B	A	B	B	A	A	C	A	C	C	C	C
Approach Vol, veh/h		792			522			196			178	
Approach Delay, s/veh		13.4			9.0			27.2			28.2	
Approach LOS		B			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		61.0		29.0		61.0				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		24.5		56.5		24.5		56.5				
Max Q Clear Time (g_c+I1), s		9.0		25.3		11.8		27.0				
Green Ext Time (p_c), s		0.6		6.0		0.4		3.0				

Intersection Summary												
HCM 6th Ctrl Delay			15.2									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	19	673	21	22	457	25	9	32	37	22	20	17
Future Vol, veh/h	19	673	21	22	457	25	9	32	37	22	20	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	21	732	23	24	497	27	10	35	40	24	22	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	524	0	0	755	0	0	1365	1358	744	1382	1356	511
Stage 1	-	-	-	-	-	-	786	786	-	559	559	-
Stage 2	-	-	-	-	-	-	579	572	-	823	797	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1043	-	-	855	-	-	125	149	415	121	149	563
Stage 1	-	-	-	-	-	-	385	403	-	513	511	-
Stage 2	-	-	-	-	-	-	501	504	-	368	399	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1043	-	-	855	-	-	101	138	415	83	138	563
Mov Cap-2 Maneuver	-	-	-	-	-	-	101	138	-	83	138	-
Stage 1	-	-	-	-	-	-	372	389	-	495	491	-
Stage 2	-	-	-	-	-	-	445	484	-	292	385	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.4	38.4	54.4
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	190	1043	-	-	855	-	-	134
HCM Lane V/C Ratio	0.446	0.02	-	-	0.028	-	-	0.479
HCM Control Delay (s)	38.4	8.5	0	-	9.3	0	-	54.4
HCM Lane LOS	E	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	2.1	0.1	-	-	0.1	-	-	2.2

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	5	13	2	33	4	4	0	78	69	12	43	1
Future Vol, veh/h	5	13	2	33	4	4	0	78	69	12	43	1
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	14	2	36	4	4	0	85	75	13	47	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	201	234	48	205	197	123	48	0	0	160	0	0
Stage 1	74	74	-	123	123	-	-	-	-	-	-	-
Stage 2	127	160	-	82	74	-	-	-	-	-	-	-
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	757	666	1021	753	699	928	1559	-	-	1419	-	-
Stage 1	935	833	-	881	794	-	-	-	-	-	-	-
Stage 2	877	766	-	926	833	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	745	660	1021	734	693	928	1559	-	-	1419	-	-
Mov Cap-2 Maneuver	745	660	-	734	693	-	-	-	-	-	-	-
Stage 1	935	826	-	881	794	-	-	-	-	-	-	-
Stage 2	868	766	-	900	826	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.3	10.1	0	1.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1559	-	-	705	745	1419	-	-
HCM Lane V/C Ratio	-	-	-	0.031	0.06	0.009	-	-
HCM Control Delay (s)	0	-	-	10.3	10.1	7.6	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	3	0	0	3	0	6	0	169	4	3	140	4
Future Vol, veh/h	3	0	0	3	0	6	0	169	4	3	140	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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	0	0	3	0	7	0	184	4	3	152	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	350	348	154	346	348	186	156	0	0	188	0	0
Stage 1	160	160	-	186	186	-	-	-	-	-	-	-
Stage 2	190	188	-	160	162	-	-	-	-	-	-	-
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	605	576	892	608	576	856	1424	-	-	1386	-	-
Stage 1	842	766	-	816	746	-	-	-	-	-	-	-
Stage 2	812	745	-	842	764	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	600	575	892	607	575	856	1424	-	-	1386	-	-
Mov Cap-2 Maneuver	600	575	-	607	575	-	-	-	-	-	-	-
Stage 1	842	764	-	816	746	-	-	-	-	-	-	-
Stage 2	806	745	-	840	762	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11	9.8	0	0.2
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1424	-	-	600	753	1386	-	-
HCM Lane V/C Ratio	-	-	-	0.005	0.013	0.002	-	-
HCM Control Delay (s)	0	-	-	11	9.8	7.6	0	-
HCM Lane LOS	A	-	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Appendix C: Site Build-out Level of Service Output – Total Traffic

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	527	109	88	795	60	264	84	47	81	84	43
Future Volume (veh/h)	35	527	109	88	795	60	264	84	47	81	84	43
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	573	118	96	864	65	287	91	51	88	91	47
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	155	1058	217	225	1207	91	731	620	347	708	1029	872
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.55	0.55	0.55	0.55	0.55	0.55
Sat Flow, veh/h	602	2936	603	752	3350	252	1251	1126	631	1246	1870	1585
Grp Volume(v), veh/h	38	346	345	96	458	471	287	0	142	88	91	47
Grp Sat Flow(s),veh/h/ln	602	1777	1762	752	1777	1825	1251	0	1757	1246	1870	1585
Q Serve(g_s), s	5.9	15.6	15.7	11.7	22.4	22.4	14.2	0.0	4.0	3.7	2.3	1.4
Cycle Q Clear(g_c), s	28.3	15.6	15.7	27.4	22.4	22.4	16.5	0.0	4.0	7.7	2.3	1.4
Prop In Lane	1.00		0.34	1.00		0.14	1.00		0.36	1.00		1.00
Lane Grp Cap(c), veh/h	155	640	635	225	640	658	731	0	967	708	1029	872
V/C Ratio(X)	0.25	0.54	0.54	0.43	0.72	0.72	0.39	0.00	0.15	0.12	0.09	0.05
Avail Cap(c_a), veh/h	269	978	970	368	978	1004	731	0	967	708	1029	872
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.0	25.6	25.6	36.6	27.8	27.8	14.6	0.0	11.1	13.0	10.7	10.5
Incr Delay (d2), s/veh	0.8	0.7	0.7	1.3	1.5	1.5	1.6	0.0	0.3	0.4	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	6.4	6.4	2.2	9.3	9.5	3.9	0.0	1.5	1.0	0.9	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.8	26.3	26.4	37.8	29.3	29.3	16.2	0.0	11.4	13.3	10.9	10.6
LnGrp LOS	D	C	C	D	C	C	B	A	B	B	B	B
Approach Vol, veh/h		729			1025			429			226	
Approach Delay, s/veh		27.1			30.1			14.6			11.8	
Approach LOS		C			C			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		60.0		40.8		60.0		40.8				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		55.5		55.5		55.5		55.5				
Max Q Clear Time (g_c+I1), s		18.5		30.3		9.7		29.4				
Green Ext Time (p_c), s		1.8		4.6		0.9		6.9				

Intersection Summary												
HCM 6th Ctrl Delay			24.7									
HCM 6th LOS			C									

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	632	23	45	963	0	102
Future Vol, veh/h	632	23	45	963	0	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	687	25	49	1047	0	111

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	712	0	-	356
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	884	-	0	640
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	884	-	-	640
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	640	-	-	884	-
HCM Lane V/C Ratio	0.173	-	-	0.055	-
HCM Control Delay (s)	11.8	-	-	9.3	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	586	148	28	782	226	179
Future Volume (veh/h)	586	148	28	782	226	179
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	637	161	30	850	246	195
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	956	241	185	1208	985	876
Arrive On Green	0.34	0.34	0.34	0.34	0.55	0.55
Sat Flow, veh/h	2904	709	681	3647	1781	1585
Grp Volume(v), veh/h	402	396	30	850	246	195
Grp Sat Flow(s),veh/h/ln	1777	1743	681	1777	1781	1585
Q Serve(g_s), s	16.3	16.3	3.3	17.4	6.0	5.3
Cycle Q Clear(g_c), s	16.3	16.3	19.6	17.4	6.0	5.3
Prop In Lane		0.41	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	604	593	185	1208	985	876
V/C Ratio(X)	0.67	0.67	0.16	0.70	0.25	0.22
Avail Cap(c_a), veh/h	1363	1337	476	2726	985	876
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	23.7	23.7	32.1	24.1	9.8	9.6
Incr Delay (d2), s/veh	1.3	1.3	0.4	0.8	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	6.4	0.5	6.9	2.3	1.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	24.9	25.0	32.5	24.8	10.4	10.2
LnGrp LOS	C	C	C	C	B	B
Approach Vol, veh/h	798			880	441	
Approach Delay, s/veh	25.0			25.1	10.3	
Approach LOS	C			C	B	

Timer - Assigned Phs	2	4	8
Phs Duration (G+Y+Rc), s	51.0	33.1	33.1
Change Period (Y+Rc), s	4.5	4.5	4.5
Max Green Setting (Gmax), s	46.5	64.5	64.5
Max Q Clear Time (g_c+I1), s	8.0	18.3	21.6
Green Ext Time (p_c), s	1.4	5.5	7.0

Intersection Summary	
HCM 6th Ctrl Delay	22.0
HCM 6th LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	696	12	97	769	15	12	42	12	11	31	29
Future Volume (veh/h)	30	696	12	97	769	15	12	42	12	11	31	29
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	757	13	105	836	16	13	46	13	12	34	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	493	1910	33	525	1905	36	417	233	66	425	147	139
Arrive On Green	0.53	0.53	0.53	0.53	0.53	0.53	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	647	3575	61	699	3567	68	1335	1403	396	1344	886	834
Grp Volume(v), veh/h	33	376	394	105	416	436	13	0	59	12	0	66
Grp Sat Flow(s),veh/h/ln	647	1777	1859	699	1777	1858	1335	0	1799	1344	0	1720
Q Serve(g_s), s	1.0	3.8	3.8	3.1	4.3	4.3	0.3	0.0	0.8	0.2	0.0	1.0
Cycle Q Clear(g_c), s	5.3	3.8	3.8	6.9	4.3	4.3	1.3	0.0	0.8	1.1	0.0	1.0
Prop In Lane	1.00		0.03	1.00		0.04	1.00		0.22	1.00		0.48
Lane Grp Cap(c), veh/h	493	949	993	525	949	993	417	0	299	425	0	286
V/C Ratio(X)	0.07	0.40	0.40	0.20	0.44	0.44	0.03	0.00	0.20	0.03	0.00	0.23
Avail Cap(c_a), veh/h	1903	4818	5042	2047	4818	5038	1506	0	1766	1521	0	1688
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	5.9	4.1	4.1	6.2	4.3	4.3	11.4	0.0	10.8	11.3	0.0	10.9
Incr Delay (d2), s/veh	0.1	0.3	0.3	0.2	0.3	0.3	0.0	0.0	0.3	0.0	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.3	0.3	0.2	0.4	0.4	0.1	0.0	0.3	0.1	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	5.9	4.4	4.4	6.4	4.6	4.6	11.4	0.0	11.1	11.3	0.0	11.3
LnGrp LOS	A	A	A	A	A	A	B	A	B	B	A	B
Approach Vol, veh/h		803			957			72			78	
Approach Delay, s/veh		4.5			4.8			11.2			11.3	
Approach LOS		A			A			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	9.5	20.6	9.5	20.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	29.5	81.5	29.5	81.5
Max Q Clear Time (g_c+I1), s	3.3	7.3	3.1	8.9
Green Ext Time (p_c), s	0.3	5.5	0.3	7.2

Intersection Summary	
HCM 6th Ctrl Delay	5.1
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	71	38	64	64	76
Future Vol, veh/h	0	71	38	64	64	76
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	77	41	70	70	83

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	112	153	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	4.12	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	0	941	1428	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	941	1428	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	2.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1428	-	941	-	-
HCM Lane V/C Ratio	0.029	-	0.082	-	-
HCM Control Delay (s)	7.6	-	9.2	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	1	4	4	53	14	26	4	75	42	28	110	6
Future Vol, veh/h	1	4	4	53	14	26	4	75	42	28	110	6
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	4	4	58	15	28	4	82	46	30	120	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	319	320	124	301	300	105	127	0	0	128	0	0
Stage 1	184	184	-	113	113	-	-	-	-	-	-	-
Stage 2	135	136	-	188	187	-	-	-	-	-	-	-
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	634	597	927	651	612	949	1459	-	-	1458	-	-
Stage 1	818	747	-	892	802	-	-	-	-	-	-	-
Stage 2	868	784	-	814	745	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	592	582	927	632	597	949	1459	-	-	1458	-	-
Mov Cap-2 Maneuver	592	582	-	632	597	-	-	-	-	-	-	-
Stage 1	816	731	-	889	800	-	-	-	-	-	-	-
Stage 2	824	782	-	788	729	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	11.1	0.2	1.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1459	-	-	699	690	1458	-	-
HCM Lane V/C Ratio	0.003	-	-	0.014	0.147	0.021	-	-
HCM Control Delay (s)	7.5	0	-	10.2	11.1	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.5	0.1	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	6	1	3	8	4	15	0	209	0	1	275	9
Future Vol, veh/h	6	1	3	8	4	15	0	209	0	1	275	9
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	1	3	9	4	16	0	227	0	1	299	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	543	533	304	535	538	227	309	0	0	227	0	0
Stage 1	306	306	-	227	227	-	-	-	-	-	-	-
Stage 2	237	227	-	308	311	-	-	-	-	-	-	-
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	451	453	736	456	450	812	1252	-	-	1341	-	-
Stage 1	704	662	-	776	716	-	-	-	-	-	-	-
Stage 2	766	716	-	702	658	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	438	453	736	453	450	812	1252	-	-	1341	-	-
Mov Cap-2 Maneuver	438	453	-	453	450	-	-	-	-	-	-	-
Stage 1	704	661	-	776	716	-	-	-	-	-	-	-
Stage 2	746	716	-	697	657	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.4	11.3	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1252	-	-	500	600	1341	-	-
HCM Lane V/C Ratio	-	-	-	0.022	0.049	0.001	-	-
HCM Control Delay (s)	0	-	-	12.4	11.3	7.7	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.2	0	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	46	98	199	31	32	260
Future Vol, veh/h	46	98	199	31	32	260
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	200	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	50	107	216	34	35	283

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	586	233	0	0	250	0
Stage 1	233	-	-	-	-	-
Stage 2	353	-	-	-	-	-
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	473	806	-	-	1316	-
Stage 1	806	-	-	-	-	-
Stage 2	711	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	460	806	-	-	1316	-
Mov Cap-2 Maneuver	460	-	-	-	-	-
Stage 1	806	-	-	-	-	-
Stage 2	692	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	460	806	1316	-
HCM Lane V/C Ratio	-	-	0.109	0.132	0.026	-
HCM Control Delay (s)	-	-	13.8	10.1	7.8	-
HCM Lane LOS	-	-	B	B	A	-
HCM 95th %tile Q(veh)	-	-	0.4	0.5	0.1	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	41	73	286	11	20	251
Future Vol, veh/h	41	73	286	11	20	251
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	200	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	79	311	12	22	273

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	634	317	0	0	323	0
Stage 1	317	-	-	-	-	-
Stage 2	317	-	-	-	-	-
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	443	724	-	-	1237	-
Stage 1	738	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	435	724	-	-	1237	-
Mov Cap-2 Maneuver	435	-	-	-	-	-
Stage 1	738	-	-	-	-	-
Stage 2	725	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	435	724	1237	-
HCM Lane V/C Ratio	-	-	0.102	0.11	0.018	-
HCM Control Delay (s)	-	-	14.2	10.6	8	-
HCM Lane LOS	-	-	B	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.4	0.1	-

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	45	355	4	10	271
Future Vol, veh/h	0	45	355	4	10	271
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	100	-
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	49	386	4	11	295

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	388	0	0	390	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	660	-	-	1169	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	660	-	-	1169	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	660	1169	-
HCM Lane V/C Ratio	-	-	0.074	0.009	-
HCM Control Delay (s)	-	-	10.9	8.1	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	939	290	22	579	80	263	111	18	137	75	30
Future Volume (veh/h)	45	939	290	22	579	80	263	111	18	137	75	30
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	49	1021	315	24	629	87	286	121	20	149	82	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	303	1223	375	116	1432	198	606	717	119	583	581	234
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Sat Flow, veh/h	735	2679	821	410	3136	433	1277	1565	259	1248	1268	510
Grp Volume(v), veh/h	49	675	661	24	356	360	286	0	141	149	0	115
Grp Sat Flow(s),veh/h/ln	735	1777	1723	410	1777	1792	1277	0	1824	1248	0	1778
Q Serve(g_s), s	5.1	35.2	35.8	5.8	14.4	14.5	17.7	0.0	4.8	8.4	0.0	4.0
Cycle Q Clear(g_c), s	19.6	35.2	35.8	41.6	14.4	14.5	21.6	0.0	4.8	13.2	0.0	4.0
Prop In Lane	1.00		0.48	1.00		0.24	1.00		0.14	1.00		0.29
Lane Grp Cap(c), veh/h	303	811	786	116	811	818	606	0	836	583	0	815
V/C Ratio(X)	0.16	0.83	0.84	0.21	0.44	0.44	0.47	0.00	0.17	0.26	0.00	0.14
Avail Cap(c_a), veh/h	402	1050	1018	171	1050	1059	606	0	836	583	0	815
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.2	25.2	25.4	43.7	19.5	19.6	22.9	0.0	16.8	20.7	0.0	16.6
Incr Delay (d2), s/veh	0.2	4.6	5.1	0.9	0.4	0.4	2.6	0.0	0.4	1.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	14.8	14.7	0.6	5.7	5.8	5.4	0.0	2.0	2.5	0.0	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.5	29.7	30.5	44.6	19.9	19.9	25.5	0.0	17.3	21.8	0.0	16.9
LnGrp LOS	C	C	C	D	B	B	C	A	B	C	A	B
Approach Vol, veh/h		1385			740			427			264	
Approach Delay, s/veh		30.0			20.7			22.8			19.7	
Approach LOS		C			C			C			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		53.0		52.8		53.0		52.8				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		48.5		62.5		48.5		62.5				
Max Q Clear Time (g_c+I1), s		23.6		37.8		15.2		43.6				
Green Ext Time (p_c), s		1.6		10.5		1.1		4.4				

Intersection Summary												
HCM 6th Ctrl Delay			25.5									
HCM 6th LOS			C									

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1019	75	89	699	0	80
Future Vol, veh/h	1019	75	89	699	0	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
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	1108	82	97	760	0	87

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1190	0	-	595
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	582	-	0	447
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	582	-	-	447
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	15
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	447	-	-	582	-
HCM Lane V/C Ratio	0.195	-	-	0.166	-
HCM Control Delay (s)	15	-	-	12.4	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.7	-	-	0.6	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	947	152	100	672	116	101
Future Volume (veh/h)	947	152	100	672	116	101
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
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	1029	165	109	730	126	110
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1346	216	288	2010	559	498
Arrive On Green	0.44	0.44	0.07	0.57	0.31	0.31
Sat Flow, veh/h	3161	491	1781	3647	1781	1585
Grp Volume(v), veh/h	595	599	109	730	126	110
Grp Sat Flow(s),veh/h/ln	1777	1782	1781	1777	1781	1585
Q Serve(g_s), s	21.2	21.2	2.3	8.4	3.9	3.8
Cycle Q Clear(g_c), s	21.2	21.2	2.3	8.4	3.9	3.8
Prop In Lane		0.28	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	780	782	288	2010	559	498
V/C Ratio(X)	0.76	0.77	0.38	0.36	0.23	0.22
Avail Cap(c_a), veh/h	1484	1488	657	4155	559	498
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	17.7	17.7	13.4	8.9	18.9	18.9
Incr Delay (d2), s/veh	1.6	1.6	0.8	0.1	0.9	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.8	7.8	0.8	2.6	1.7	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.3	19.3	14.2	9.0	19.9	19.9
LnGrp LOS	B	B	B	A	B	B
Approach Vol, veh/h	1194			839	236	
Approach Delay, s/veh	19.3			9.7	19.9	
Approach LOS	B			A	B	

Timer - Assigned Phs	2	3	4	8
Phs Duration (G+Y+Rc), s	28.0	9.5	37.3	46.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	23.5	20.5	62.5	87.5
Max Q Clear Time (g_c+I1), s	5.9	4.3	23.2	10.4
Green Ext Time (p_c), s	0.6	0.2	9.6	5.5

Intersection Summary	
HCM 6th Ctrl Delay	15.8
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	985	25	113	728	30	11	39	45	27	30	33
Future Volume (veh/h)	35	985	25	113	728	30	11	39	45	27	30	33
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	1071	27	123	791	33	12	42	49	29	33	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	483	1699	43	452	2331	97	280	98	114	262	102	111
Arrive On Green	0.48	0.48	0.48	0.09	0.67	0.67	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	665	3542	89	1781	3476	145	1332	787	918	1306	818	892
Grp Volume(v), veh/h	38	537	561	123	404	420	12	0	91	29	0	69
Grp Sat Flow(s),veh/h/ln	665	1777	1854	1781	1777	1844	1332	0	1705	1306	0	1710
Q Serve(g_s), s	1.4	9.9	9.9	1.3	4.3	4.3	0.4	0.0	2.2	0.9	0.0	1.6
Cycle Q Clear(g_c), s	1.4	9.9	9.9	1.3	4.3	4.3	2.0	0.0	2.2	3.1	0.0	1.6
Prop In Lane	1.00		0.05	1.00		0.08	1.00		0.54	1.00		0.52
Lane Grp Cap(c), veh/h	483	852	889	452	1192	1237	280	0	212	262	0	212
V/C Ratio(X)	0.08	0.63	0.63	0.27	0.34	0.34	0.04	0.00	0.43	0.11	0.00	0.32
Avail Cap(c_a), veh/h	1277	2975	3105	964	3826	3971	904	0	1010	873	0	1013
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	6.3	8.5	8.5	5.6	3.1	3.1	18.4	0.0	17.8	19.2	0.0	17.5
Incr Delay (d2), s/veh	0.1	0.8	0.7	0.3	0.2	0.2	0.1	0.0	1.4	0.2	0.0	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	0.1	2.5	2.6	0.2	0.4	0.4	0.1	0.0	0.8	0.3	0.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.4	9.3	9.3	6.0	3.2	3.2	18.5	0.0	19.2	19.4	0.0	18.4
LnGrp LOS	A	A	A	A	A	A	B	A	B	B	A	B
Approach Vol, veh/h		1136			947			103			98	
Approach Delay, s/veh		9.2			3.6			19.1			18.7	
Approach LOS		A			A			B			B	

Timer - Assigned Phs	2	3	4	6	8
Phs Duration (G+Y+Rc), s	10.0	8.4	25.6	10.0	33.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	26.0	16.5	73.5	26.0	94.5
Max Q Clear Time (g_c+I1), s	4.2	3.3	11.9	5.1	6.3
Green Ext Time (p_c), s	0.4	0.2	9.2	0.4	5.6

Intersection Summary	
HCM 6th Ctrl Delay	7.7
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	46	72	105	78	90
Future Vol, veh/h	0	46	72	105	78	90
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	50	78	114	85	98

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	134	183	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	4.12	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	0	915	1392	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	915	1392	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	3.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1392	-	915	-	-
HCM Lane V/C Ratio	0.056	-	0.055	-	-
HCM Control Delay (s)	7.7	-	9.2	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	16	3	40	5	23	0	148	83	26	87	1
Future Vol, veh/h	6	16	3	40	5	23	0	148	83	26	87	1
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	17	3	43	5	25	0	161	90	28	95	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	373	403	96	368	358	206	96	0	0	251	0	0
Stage 1	152	152	-	206	206	-	-	-	-	-	-	-
Stage 2	221	251	-	162	152	-	-	-	-	-	-	-
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	584	536	960	588	568	835	1498	-	-	1314	-	-
Stage 1	850	772	-	796	731	-	-	-	-	-	-	-
Stage 2	781	699	-	840	772	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	552	524	960	561	555	835	1498	-	-	1314	-	-
Mov Cap-2 Maneuver	552	524	-	561	555	-	-	-	-	-	-	-
Stage 1	850	754	-	796	731	-	-	-	-	-	-	-
Stage 2	752	699	-	799	754	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.7	11.5	0	1.8
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1498	-	-	561	630	1314	-	-
HCM Lane V/C Ratio	-	-	-	0.048	0.117	0.022	-	-
HCM Control Delay (s)	0	-	-	11.7	11.5	7.8	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.4	0.1	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	13	0	0	4	0	7	0	282	5	4	222	11
Future Vol, veh/h	13	0	0	4	0	7	0	282	5	4	222	11
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	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	0	0	4	0	8	0	307	5	4	241	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	569	567	247	565	571	310	253	0	0	312	0	0
Stage 1	255	255	-	310	310	-	-	-	-	-	-	-
Stage 2	314	312	-	255	261	-	-	-	-	-	-	-
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	433	433	792	436	431	730	1312	-	-	1248	-	-
Stage 1	749	696	-	700	659	-	-	-	-	-	-	-
Stage 2	697	658	-	749	692	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	427	431	792	435	429	730	1312	-	-	1248	-	-
Mov Cap-2 Maneuver	427	431	-	435	429	-	-	-	-	-	-	-
Stage 1	749	693	-	700	659	-	-	-	-	-	-	-
Stage 2	690	658	-	746	689	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.7	11.3	0	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1312	-	-	427	586	1248	-	-
HCM Lane V/C Ratio	-	-	-	0.033	0.02	0.003	-	-
HCM Control Delay (s)	0	-	-	13.7	11.3	7.9	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	65	266	36	110	209
Future Vol, veh/h	25	65	266	36	110	209
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	200	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	71	289	39	120	227

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	776	309	0	0	328	0
Stage 1	309	-	-	-	-	-
Stage 2	467	-	-	-	-	-
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	366	731	-	-	1232	-
Stage 1	745	-	-	-	-	-
Stage 2	631	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	330	731	-	-	1232	-
Mov Cap-2 Maneuver	330	-	-	-	-	-
Stage 1	745	-	-	-	-	-
Stage 2	570	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.3	0	2.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	330	731	1232	-
HCM Lane V/C Ratio	-	-	0.082	0.097	0.097	-
HCM Control Delay (s)	-	-	16.9	10.5	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.3	0.3	-

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	34	58	293	38	69	285
Future Vol, veh/h	34	58	293	38	69	285
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	200	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	63	318	41	75	310

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	799	339	0	0	359	0
Stage 1	339	-	-	-	-	-
Stage 2	460	-	-	-	-	-
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	355	703	-	-	1200	-
Stage 1	722	-	-	-	-	-
Stage 2	636	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	333	703	-	-	1200	-
Mov Cap-2 Maneuver	333	-	-	-	-	-
Stage 1	722	-	-	-	-	-
Stage 2	597	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13	0	1.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	333	703	1200	-
HCM Lane V/C Ratio	-	-	0.111	0.09	0.063	-
HCM Control Delay (s)	-	-	17.2	10.6	8.2	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.4	0.3	0.2	-

Intersection	
Int Delay, s/veh	1.1

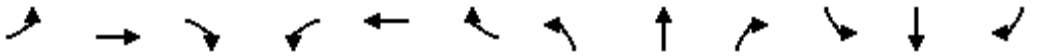
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	52	338	13	33	354
Future Vol, veh/h	0	52	338	13	33	354
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	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	57	367	14	36	385

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	374	0	0	381	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	0	672	-	-	1177	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	672	-	-	1177	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	0.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	672	1177	-
HCM Lane V/C Ratio	-	-	0.084	0.03	-
HCM Control Delay (s)	-	-	10.8	8.2	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Appendix D: 2040 Level of Service Output – Total Traffic



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	669	308	228	1337	237	463	107	152	205	146	258
Future Volume (veh/h)	242	669	308	228	1337	237	463	107	152	205	146	258
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	263	727	335	248	1453	258	503	116	165	223	159	280
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	272	1558	695	391	1494	667	533	686	306	450	566	252
Arrive On Green	0.12	0.44	0.44	0.10	0.42	0.42	0.15	0.19	0.19	0.12	0.16	0.16
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	263	727	335	248	1453	258	503	116	165	223	159	280
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1777	1585	1781	1777	1585
Q Serve(g_s), s	13.2	17.3	18.0	9.3	48.1	13.5	17.3	3.3	11.2	12.4	4.7	19.1
Cycle Q Clear(g_c), s	13.2	17.3	18.0	9.3	48.1	13.5	17.3	3.3	11.2	12.4	4.7	19.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	272	1558	695	391	1494	667	533	686	306	450	566	252
V/C Ratio(X)	0.97	0.47	0.48	0.63	0.97	0.39	0.94	0.17	0.54	0.50	0.28	1.11
Avail Cap(c_a), veh/h	272	1558	695	494	1496	667	533	686	306	471	566	252
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	37.1	23.8	24.0	18.0	34.1	24.1	50.2	40.4	43.6	35.6	44.4	50.4
Incr Delay (d2), s/veh	45.2	0.2	0.5	1.7	17.0	0.4	25.6	0.5	6.7	0.8	1.2	89.1
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	11.1	7.1	6.6	3.8	23.1	5.0	9.1	1.4	4.9	5.3	2.1	13.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	82.4	24.0	24.5	19.7	51.1	24.4	75.8	40.9	50.3	36.4	45.6	139.5
LnGrp LOS	F	C	C	B	D	C	E	D	D	D	D	F
Approach Vol, veh/h		1325			1959			784			662	
Approach Delay, s/veh		35.7			43.6			65.3			82.2	
Approach LOS		D			D			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.9	27.7	16.2	57.1	23.0	23.6	18.4	54.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	15.9	21.7	18.7	45.7	18.5	19.1	13.9	50.5
Max Q Clear Time (g_c+I1), s	14.4	13.2	11.3	20.0	19.3	21.1	15.2	50.1
Green Ext Time (p_c), s	0.1	0.7	0.4	6.4	0.0	0.0	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	50.4
HCM 6th LOS	D

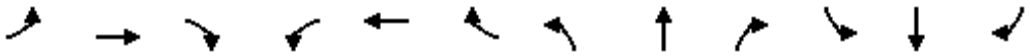
Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1003	23	45	1847	0	102
Future Vol, veh/h	1003	23	45	1847	0	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	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	1090	25	49	2008	0	111

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1115	0	-	545
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	622	-	0	482
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	622	-	-	482
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	14.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	482	-	-	622	-
HCM Lane V/C Ratio	0.23	-	-	0.079	-
HCM Control Delay (s)	14.7	-	-	11.3	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.9	-	-	0.3	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	942	98	28	1556	65	226	5	109	118	5	110
Future Volume (veh/h)	65	942	98	28	1556	65	226	5	109	118	5	110
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	71	1024	107	30	1691	71	246	5	118	128	5	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	153	1848	824	292	1848	824	414	10	228	416	10	229
Arrive On Green	0.04	0.52	0.52	0.04	0.52	0.52	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	65	1530	1781	64	1531
Grp Volume(v), veh/h	71	1024	107	30	1691	71	246	0	123	128	0	125
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	0	1595	1781	0	1595
Q Serve(g_s), s	2.3	24.1	4.3	0.9	54.0	2.8	14.0	0.0	8.8	6.8	0.0	9.0
Cycle Q Clear(g_c), s	2.3	24.1	4.3	0.9	54.0	2.8	14.0	0.0	8.8	6.8	0.0	9.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.96	1.00		0.96
Lane Grp Cap(c), veh/h	153	1848	824	292	1848	824	414	0	238	416	0	238
V/C Ratio(X)	0.46	0.55	0.13	0.10	0.92	0.09	0.59	0.00	0.52	0.31	0.00	0.53
Avail Cap(c_a), veh/h	340	1936	863	479	1936	863	414	0	238	416	0	238
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.6	20.1	15.3	14.7	27.3	15.0	36.2	0.0	48.6	33.6	0.0	48.7
Incr Delay (d2), s/veh	2.2	0.3	0.1	0.2	7.1	0.0	6.1	0.0	7.8	1.9	0.0	8.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	9.6	1.5	0.4	23.1	1.0	6.8	0.0	4.0	3.2	0.0	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.7	20.4	15.4	14.8	34.4	15.0	42.3	0.0	56.4	35.5	0.0	56.7
LnGrp LOS	C	C	B	B	C	B	D	A	E	D	A	E
Approach Vol, veh/h		1202			1792			369			253	
Approach Delay, s/veh		20.5			33.3			47.0			46.0	
Approach LOS		C			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.5	23.0	9.5	68.9	22.5	23.0	9.5	68.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	18.0	18.5	18.0	67.5	18.0	18.5	18.0	67.5
Max Q Clear Time (g_c+I1), s	8.8	10.8	2.9	26.1	16.0	11.0	4.3	56.0
Green Ext Time (p_c), s	0.2	0.3	0.0	9.1	0.1	0.3	0.1	8.4

Intersection Summary	
HCM 6th Ctrl Delay	31.3
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1119	50	0	1649	0	70
Future Vol, veh/h	1119	50	0	1649	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	-	-	-	-
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	1216	54	0	1792	0	76

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	608
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	439
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	439
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	439	-	-	-
HCM Lane V/C Ratio	0.173	-	-	-
HCM Control Delay (s)	14.9	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.6	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	300	511	325	881	707	682	580	532	644	400	627	362
Future Volume (veh/h)	300	511	325	881	707	682	580	532	644	400	627	362
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	326	555	353	958	768	741	630	578	700	435	682	393
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	371	577	258	994	1217	543	651	927	413	481	752	336
Arrive On Green	0.11	0.16	0.16	0.29	0.34	0.34	0.19	0.26	0.26	0.14	0.21	0.21
Sat Flow, veh/h	3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	326	555	353	958	768	741	630	578	700	435	682	393
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	11.2	18.6	19.5	32.8	21.8	41.1	21.7	17.2	31.3	14.9	22.5	25.4
Cycle Q Clear(g_c), s	11.2	18.6	19.5	32.8	21.8	41.1	21.7	17.2	31.3	14.9	22.5	25.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	371	577	258	994	1217	543	651	927	413	481	752	336
V/C Ratio(X)	0.88	0.96	1.37	0.96	0.63	1.36	0.97	0.62	1.69	0.90	0.91	1.17
Avail Cap(c_a), veh/h	371	577	258	994	1217	543	651	927	413	481	752	336
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	52.8	49.9	50.3	42.1	33.1	39.4	48.3	39.1	44.4	50.9	46.1	47.3
Incr Delay (d2), s/veh	20.5	27.9	189.5	20.4	1.1	175.8	27.4	1.3	322.2	20.4	14.7	104.2
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	5.8	10.3	21.1	16.3	9.3	41.8	11.7	7.6	48.9	7.7	11.3	19.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	73.2	77.8	239.7	62.5	34.1	215.3	75.7	40.5	366.6	71.3	60.8	151.5
LnGrp LOS	E	E	F	E	C	F	E	D	F	E	E	F
Approach Vol, veh/h		1234			2467			1908			1510	
Approach Delay, s/veh		122.9			99.6			171.7			87.5	
Approach LOS		F			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.2	35.8	39.0	24.0	27.1	29.9	17.4	45.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	16.7	31.3	34.5	19.5	22.6	25.4	12.9	41.1
Max Q Clear Time (g_c+I1), s	16.9	33.3	34.8	21.5	23.7	27.4	13.2	43.1
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	120.4
HCM 6th LOS	F

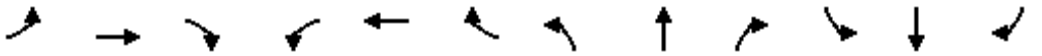
Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	71	38	1770	1757	76
Future Vol, veh/h	0	71	38	1770	1757	76
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	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	77	41	1924	1910	83

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	955	1993	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	259	285	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	259	285	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	24.7	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	285	-	259	-	-
HCM Lane V/C Ratio	0.145	-	0.298	-	-
HCM Control Delay (s)	19.8	-	24.7	-	-
HCM Lane LOS	C	-	C	-	-
HCM 95th %tile Q(veh)	0.5	-	1.2	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	24	8	290	32	114	24	1668	280	82	1709	40
Future Volume (veh/h)	24	24	8	290	32	114	24	1668	280	82	1709	40
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	26	26	9	315	35	124	26	1813	304	89	1858	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	315	365	126	430	99	351	128	2253	1005	122	2253	1005
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.63	0.63	0.63	0.63	0.63	0.63
Sat Flow, veh/h	1227	1328	460	1373	361	1279	237	3554	1585	192	3554	1585
Grp Volume(v), veh/h	26	0	35	315	0	159	26	1813	304	89	1858	43
Grp Sat Flow(s),veh/h/ln	1227	0	1788	1373	0	1640	237	1777	1585	192	1777	1585
Q Serve(g_s), s	1.7	0.0	1.4	21.7	0.0	7.7	9.3	37.6	8.6	24.9	39.5	1.0
Cycle Q Clear(g_c), s	9.4	0.0	1.4	23.1	0.0	7.7	48.9	37.6	8.6	62.5	39.5	1.0
Prop In Lane	1.00		0.26	1.00		0.78	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	315	0	491	430	0	451	128	2253	1005	122	2253	1005
V/C Ratio(X)	0.08	0.00	0.07	0.73	0.00	0.35	0.20	0.80	0.30	0.73	0.82	0.04
Avail Cap(c_a), veh/h	581	0	879	729	0	807	128	2253	1005	122	2253	1005
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	32.5	0.0	26.4	35.0	0.0	28.7	32.6	13.5	8.2	42.5	13.8	6.8
Incr Delay (d2), s/veh	0.1	0.0	0.1	2.4	0.0	0.5	0.8	2.2	0.2	20.1	2.6	0.0
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	0.5	0.0	0.6	7.4	0.0	3.0	0.6	13.5	2.6	2.8	14.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.6	0.0	26.5	37.4	0.0	29.2	33.3	15.7	8.3	62.7	16.5	6.8
LnGrp LOS	C	A	C	D	A	C	C	B	A	E	B	A
Approach Vol, veh/h		61			474			2143			1990	
Approach Delay, s/veh		29.1			34.7			14.9			18.3	
Approach LOS		C			C			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		67.0		31.6		67.0		31.6				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		62.5		48.5		62.5		48.5				
Max Q Clear Time (g_c+I1), s		50.9		11.4		64.5		25.1				
Green Ext Time (p_c), s		9.7		0.2		0.0		2.0				

Intersection Summary												
HCM 6th Ctrl Delay			18.5									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	4	4	26	11	44	4	514	4	4	681	13
Future Vol, veh/h	9	4	4	26	11	44	4	514	4	4	681	13
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	-	-	200	-	-	200	-	200	200	-	200
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	4	4	28	12	48	4	559	4	4	740	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1042	1319	370	947	1329	280	754	0	0	563	0	0
Stage 1	748	748	-	567	567	-	-	-	-	-	-	-
Stage 2	294	571	-	380	762	-	-	-	-	-	-	-
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	184	156	627	216	154	717	852	-	-	1005	-	-
Stage 1	371	418	-	476	505	-	-	-	-	-	-	-
Stage 2	690	503	-	614	412	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	160	155	627	208	153	717	852	-	-	1005	-	-
Mov Cap-2 Maneuver	160	155	-	208	153	-	-	-	-	-	-	-
Stage 1	369	416	-	474	502	-	-	-	-	-	-	-
Stage 2	626	500	-	601	410	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.8	18.3	0.1	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	852	-	-	160	249	208	413	1005	-	-
HCM Lane V/C Ratio	0.005	-	-	0.061	0.035	0.136	0.145	0.004	-	-
HCM Control Delay (s)	9.2	-	-	29	20	25	15.2	8.6	-	-
HCM Lane LOS	A	-	-	D	C	D	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0.5	0.5	0	-	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	46	98	536	31	32	661
Future Vol, veh/h	46	98	536	31	32	661
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	200	-	200	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	50	107	583	34	35	718

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1012	292	0	0	617	0
Stage 1	583	-	-	-	-	-
Stage 2	429	-	-	-	-	-
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	236	704	-	-	959	-
Stage 1	521	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	228	704	-	-	959	-
Mov Cap-2 Maneuver	228	-	-	-	-	-
Stage 1	521	-	-	-	-	-
Stage 2	602	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.5	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	228	704	959	-
HCM Lane V/C Ratio	-	-	0.219	0.151	0.036	-
HCM Control Delay (s)	-	-	25.2	11	8.9	-
HCM Lane LOS	-	-	D	B	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0.5	0.1	-

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	41	73	623	11	20	652
Future Vol, veh/h	41	73	623	11	20	652
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	200	-	200	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	79	677	12	22	709

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1076	339	0	0	689	0
Stage 1	677	-	-	-	-	-
Stage 2	399	-	-	-	-	-
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	214	657	-	-	901	-
Stage 1	466	-	-	-	-	-
Stage 2	647	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	209	657	-	-	901	-
Mov Cap-2 Maneuver	209	-	-	-	-	-
Stage 1	466	-	-	-	-	-
Stage 2	631	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.8	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	209	657	901	-
HCM Lane V/C Ratio	-	-	0.213	0.121	0.024	-
HCM Control Delay (s)	-	-	26.8	11.2	9.1	-
HCM Lane LOS	-	-	D	B	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0.4	0.1	-

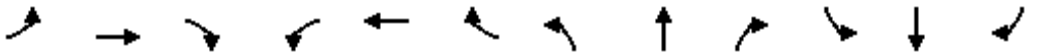
Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	45	692	4	10	672
Future Vol, veh/h	0	45	692	4	10	672
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	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	49	752	4	11	730

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	376	0	0	756	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	4.14	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	0	622	-	-	851	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	622	-	-	851	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	622	851	-
HCM Lane V/C Ratio	-	-	0.079	0.013	-
HCM Control Delay (s)	-	-	11.3	9.3	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	273	1067	493	147	798	200	366	135	289	288	116	194
Future Volume (veh/h)	273	1067	493	147	798	200	366	135	289	288	116	194
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	297	1160	536	160	867	217	398	147	314	313	126	211
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	262	1910	852	151	1910	852	331	1377	614	297	903	403
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.10	0.39	0.39	0.25	0.25	0.25
Sat Flow, veh/h	520	3554	1585	290	3554	1585	3456	3554	1585	931	3554	1585
Grp Volume(v), veh/h	297	1160	536	160	867	217	398	147	314	313	126	211
Grp Sat Flow(s),veh/h/ln	520	1777	1585	290	1777	1585	1728	1777	1585	931	1777	1585
Q Serve(g_s), s	46.6	26.9	28.4	37.6	17.9	8.8	11.5	3.2	18.2	30.5	3.3	13.7
Cycle Q Clear(g_c), s	64.5	26.9	28.4	64.5	17.9	8.8	11.5	3.2	18.2	30.5	3.3	13.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	262	1910	852	151	1910	852	331	1377	614	297	903	403
V/C Ratio(X)	1.13	0.61	0.63	1.06	0.45	0.25	1.20	0.11	0.51	1.06	0.14	0.52
Avail Cap(c_a), veh/h	262	1910	852	151	1910	852	331	1377	614	297	903	403
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	42.0	19.1	19.4	48.7	17.0	14.9	54.3	23.5	28.1	47.8	34.6	38.5
Incr Delay (d2), s/veh	96.4	0.6	1.5	90.6	0.2	0.2	116.1	0.2	3.0	67.5	0.3	4.8
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	14.9	10.5	10.1	8.3	7.0	3.1	10.2	1.3	7.1	14.4	1.4	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	138.4	19.6	20.9	139.3	17.1	15.0	170.4	23.6	31.1	115.4	34.9	43.3
LnGrp LOS	F	B	C	F	B	B	F	C	C	F	C	D
Approach Vol, veh/h		1993			1244			859			650	
Approach Delay, s/veh		37.7			32.5			94.3			76.4	
Approach LOS		D			C			F			E	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		51.0		69.0	16.0	35.0		69.0				
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s		46.5		64.5	11.5	30.5		64.5				
Max Q Clear Time (g_c+I1), s		20.2		66.5	13.5	32.5		66.5				
Green Ext Time (p_c), s		1.9		0.0	0.0	0.0		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			51.9									
HCM 6th LOS			D									

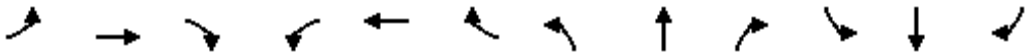
Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1569	75	89	1104	0	80
Future Vol, veh/h	1569	75	89	1104	0	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	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	1705	82	97	1200	0	87

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1787	0	-	853
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	343	-	0	302
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	343	-	-	302
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	21.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	302	-	-	343	-
HCM Lane V/C Ratio	0.288	-	-	0.282	-
HCM Control Delay (s)	21.7	-	-	19.6	-
HCM Lane LOS	C	-	-	C	-
HCM 95th %tile Q(veh)	1.2	-	-	1.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	1430	102	100	1001	120	116	5	75	81	5	76
Future Volume (veh/h)	117	1430	102	100	1001	120	116	5	75	81	5	76
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	127	1554	111	109	1088	130	126	5	82	88	5	83
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	311	1846	824	208	1830	816	358	18	291	359	18	291
Arrive On Green	0.06	0.52	0.52	0.05	0.51	0.51	0.05	0.19	0.19	0.05	0.19	0.19
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	92	1507	1781	91	1508
Grp Volume(v), veh/h	127	1554	111	109	1088	130	126	0	87	88	0	88
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	0	1599	1781	0	1599
Q Serve(g_s), s	3.2	36.5	3.5	2.8	20.9	4.2	5.1	0.0	4.5	3.8	0.0	4.6
Cycle Q Clear(g_c), s	3.2	36.5	3.5	2.8	20.9	4.2	5.1	0.0	4.5	3.8	0.0	4.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.94	1.00		0.94
Lane Grp Cap(c), veh/h	311	1846	824	208	1830	816	358	0	309	359	0	309
V/C Ratio(X)	0.41	0.84	0.13	0.52	0.59	0.16	0.35	0.00	0.28	0.25	0.00	0.28
Avail Cap(c_a), veh/h	539	2179	972	445	2179	972	358	0	309	359	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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.8	20.1	12.1	19.9	16.6	12.5	30.5	0.0	33.7	29.4	0.0	33.7
Incr Delay (d2), s/veh	0.9	2.7	0.1	2.0	0.3	0.1	0.6	0.0	2.3	0.4	0.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	14.1	1.2	1.3	7.8	1.4	2.4	0.0	1.9	1.7	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.7	22.8	12.2	21.9	16.9	12.6	31.1	0.0	35.9	29.8	0.0	36.0
LnGrp LOS	B	C	B	C	B	B	C	A	D	C	A	D
Approach Vol, veh/h		1792			1327			213			176	
Approach Delay, s/veh		21.5			16.9			33.0			32.9	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	23.4	9.5	55.3	9.6	23.4	10.0	54.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.1	18.9	18.0	60.0	5.1	18.9	18.0	60.0
Max Q Clear Time (g_c+I1), s	5.8	6.5	4.8	38.5	7.1	6.6	5.2	22.9
Green Ext Time (p_c), s	0.0	0.3	0.2	12.3	0.0	0.3	0.2	9.8

Intersection Summary	
HCM 6th Ctrl Delay	21.0
HCM 6th LOS	C

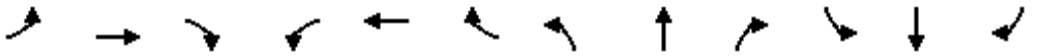
Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1536	50	0	1221	0	26
Future Vol, veh/h	1536	50	0	1221	0	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	200	-	-	-	-
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	1670	54	0	1327	0	28

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	835
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	311
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	311
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	311	-	-	-
HCM Lane V/C Ratio	0.091	-	-	-
HCM Control Delay (s)	17.7	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	464	757	380	580	515	578	428	749	963	495	511	278
Future Volume (veh/h)	464	757	380	580	515	578	428	749	963	495	511	278
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	504	823	413	630	560	628	465	814	1047	538	555	302
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	389	696	310	475	785	350	540	1407	627	418	1280	571
Arrive On Green	0.11	0.20	0.20	0.14	0.22	0.22	0.16	0.40	0.40	0.12	0.36	0.36
Sat Flow, veh/h	3456	3554	1585	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	504	823	413	630	560	628	465	814	1047	538	555	302
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	13.5	23.5	23.5	16.5	17.5	26.5	15.7	21.5	47.5	14.5	14.2	18.1
Cycle Q Clear(g_c), s	13.5	23.5	23.5	16.5	17.5	26.5	15.7	21.5	47.5	14.5	14.2	18.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	389	696	310	475	785	350	540	1407	627	418	1280	571
V/C Ratio(X)	1.30	1.18	1.33	1.33	0.71	1.79	0.86	0.58	1.67	1.29	0.43	0.53
Avail Cap(c_a), veh/h	389	696	310	475	785	350	714	1407	627	418	1280	571
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	53.3	48.3	48.2	51.8	43.2	46.8	49.3	28.4	36.2	52.8	29.1	30.3
Incr Delay (d2), s/veh	151.2	96.4	169.2	160.7	3.1	368.6	8.2	0.6	307.9	146.8	0.2	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	13.9	19.5	23.6	17.6	7.9	46.0	7.3	9.1	71.1	14.7	6.0	6.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	204.5	144.7	217.5	212.5	46.3	415.4	57.6	29.0	344.2	199.6	29.3	31.3
LnGrp LOS	F	F	F	F	D	F	E	C	F	F	C	C
Approach Vol, veh/h		1740			1818			2326			1395	
Approach Delay, s/veh		179.3			231.4			176.6			95.4	
Approach LOS		F			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	19.0	52.0	21.0	28.0	23.3	47.7	18.0	31.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	14.5	47.5	16.5	23.5	24.8	37.2	13.5	26.5
Max Q Clear Time (g_c+I1), s	16.5	49.5	18.5	25.5	17.7	20.1	15.5	28.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	1.0	4.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	175.4
HCM 6th LOS	F

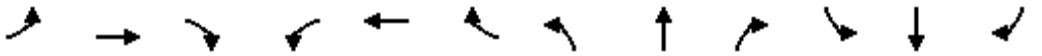
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	46	72	2140	1381	90
Future Vol, veh/h	0	46	72	2140	1381	90
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	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	50	78	2326	1501	98

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	751	1599	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	4.14	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	0	353	406	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	353	406	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.9	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	406	-	353	-	-
HCM Lane V/C Ratio	0.193	-	0.142	-	-
HCM Control Delay (s)	16	-	16.9	-	-
HCM Lane LOS	C	-	C	-	-
HCM 95th %tile Q(veh)	0.7	-	0.5	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	104	16	264	32	50	8	2122	410	107	1301	8
Future Volume (veh/h)	40	104	16	264	32	50	8	2122	410	107	1301	8
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	113	17	287	35	54	9	2307	446	116	1414	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	304	364	55	274	152	234	235	2191	977	134	2301	1026
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.01	0.62	0.62	0.04	0.65	0.65
Sat Flow, veh/h	1308	1588	239	1260	663	1023	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	43	0	130	287	0	89	9	2307	446	116	1414	9
Grp Sat Flow(s),veh/h/ln	1308	0	1827	1260	0	1686	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	3.3	0.0	7.1	20.4	0.0	5.2	0.2	74.0	18.0	3.7	28.0	0.2
Cycle Q Clear(g_c), s	8.5	0.0	7.1	27.5	0.0	5.2	0.2	74.0	18.0	3.7	28.0	0.2
Prop In Lane	1.00		0.13	1.00		0.61	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	304	0	419	274	0	386	235	2191	977	134	2301	1026
V/C Ratio(X)	0.14	0.00	0.31	1.05	0.00	0.23	0.04	1.05	0.46	0.86	0.61	0.01
Avail Cap(c_a), veh/h	304	0	419	274	0	386	290	2191	977	134	2301	1026
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	41.1	0.0	38.4	52.0	0.0	37.6	10.9	23.0	12.3	35.3	12.4	7.5
Incr Delay (d2), s/veh	0.2	0.0	0.4	66.9	0.0	0.3	0.1	34.9	0.3	40.4	0.5	0.0
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	1.1	0.0	3.2	13.4	0.0	2.2	0.1	38.2	6.1	4.9	10.3	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.3	0.0	38.8	118.9	0.0	37.9	10.9	57.9	12.6	75.8	12.9	7.5
LnGrp LOS	D	A	D	F	A	D	B	F	B	E	B	A
Approach Vol, veh/h		173			376			2762			1539	
Approach Delay, s/veh		39.4			99.7			50.4			17.6	
Approach LOS		D			F			D			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.5	78.5		32.0	5.8	82.2		32.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.0	74.0		27.5	5.0	74.0		27.5				
Max Q Clear Time (g_c+I1), s	5.7	76.0		10.5	2.2	30.0		29.5				
Green Ext Time (p_c), s	0.0	0.0		0.7	0.0	15.0		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			43.4									
HCM 6th LOS			D									

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	4	4	11	4	22	4	703	15	11	571	21
Future Vol, veh/h	20	4	4	11	4	22	4	703	15	11	571	21
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	-	-	200	-	-	200	-	200	200	-	200
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	4	4	12	4	24	4	764	16	12	621	23

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1037	1433	311	1109	1440	382	644	0	0	780	0	0
Stage 1	645	645	-	772	772	-	-	-	-	-	-	-
Stage 2	392	788	-	337	668	-	-	-	-	-	-	-
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	185	133	685	164	132	616	937	-	-	833	-	-
Stage 1	427	466	-	358	407	-	-	-	-	-	-	-
Stage 2	604	400	-	651	455	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	171	131	685	157	130	616	937	-	-	833	-	-
Mov Cap-2 Maneuver	171	131	-	157	130	-	-	-	-	-	-	-
Stage 1	425	459	-	357	405	-	-	-	-	-	-	-
Stage 2	572	398	-	632	449	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27.1	19.3	0	0.2
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	937	-	-	171	220	157	391	833	-	-
HCM Lane V/C Ratio	0.005	-	-	0.127	0.04	0.076	0.072	0.014	-	-
HCM Control Delay (s)	8.9	-	-	29.1	22	29.8	14.9	9.4	-	-
HCM Lane LOS	A	-	-	D	C	D	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0.2	0.2	0	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	65	709	36	110	578
Future Vol, veh/h	25	65	709	36	110	578
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	200	-	200	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	71	771	39	120	628

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1325	386	0	0	810	0
Stage 1	771	-	-	-	-	-
Stage 2	554	-	-	-	-	-
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	147	612	-	-	812	-
Stage 1	417	-	-	-	-	-
Stage 2	539	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	125	612	-	-	812	-
Mov Cap-2 Maneuver	125	-	-	-	-	-
Stage 1	417	-	-	-	-	-
Stage 2	459	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.9	0	1.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	125	612	812	-
HCM Lane V/C Ratio	-	-	0.217	0.115	0.147	-
HCM Control Delay (s)	-	-	41.6	11.6	10.2	-
HCM Lane LOS	-	-	E	B	B	-
HCM 95th %tile Q(veh)	-	-	0.8	0.4	0.5	-

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	34	58	736	38	69	654
Future Vol, veh/h	34	58	736	38	69	654
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	-	-	200	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	63	800	41	75	711

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1306	400	0	0	841	0
Stage 1	800	-	-	-	-	-
Stage 2	506	-	-	-	-	-
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	151	600	-	-	790	-
Stage 1	403	-	-	-	-	-
Stage 2	571	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	137	600	-	-	790	-
Mov Cap-2 Maneuver	137	-	-	-	-	-
Stage 1	403	-	-	-	-	-
Stage 2	517	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.4	0	1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	137	600	790	-
HCM Lane V/C Ratio	-	-	0.27	0.105	0.095	-
HCM Control Delay (s)	-	-	40.7	11.7	10	-
HCM Lane LOS	-	-	E	B	B	-
HCM 95th %tile Q(veh)	-	-	1	0.3	0.3	-

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	52	781	13	33	723
Future Vol, veh/h	0	52	781	13	33	723
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	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	57	849	14	36	786

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	425	0	0	863	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	4.14	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	0	578	-	-	775	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	578	-	-	775	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	578	775	-
HCM Lane V/C Ratio	-	-	0.098	0.046	-
HCM Control Delay (s)	-	-	11.9	9.9	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

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