



**Garden
Spot of
Colorado**

**TOWN OF BERTHOUD PLANNING COMMISSION
TOWN HALL
807 Mountain Avenue
THURSDAY, March 9, 2023
6:00 P.M.**

1. Call Meeting To Order

2. Roll Call

3. Approval Of Minutes

3.I. 2023.02.23 Planning Commission Meeting Minutes

Documents:

[2023.02.23 PLANNING COMMISSION MEETING MINUTES DRAFT.PDF](#)

4. Public Hearing: Farmstead Acres, Minor Subdivision

Documents:

[BD-22-05-01 FARMSTEAD ACRES MINOR SUBDIVISION STAFF REPORT.PDF](#)
[BD-22-05-01 FARMSTEAD ACRES MINOR SUBDIVISION COMBINED
ATTACHMENTS.PDF](#)

5. Public Hearing: Heron Lakes 17th Filing Preliminary Plat

Documents:

[BD-19-01-08 HERON LAKES 17TH FILING PC PRELIMINARY PLAT STAFF
REPORT.PDF](#)
[HERON LAKES 17TH FILING COMBINED.PDF](#)

6. Public Hearing: Ludlow, Rezoning

Documents:

[BD-22-13-01 LUDLOW FARMS PC NMP AND REZONE STAFF REPORT.PDF](#)
[LUDLOW COMBINED ATTACHMENTSBOOKED MARKED.PDF](#)

7. Public Hearing: Ludlow, Neighborhood Master Plan

Documents:

[BD-22-13-01 LUDLOW FARMS PC NMP AND REZONE STAFF REPORT.PDF](#)

8. Reports

1. Commissioners-Chris Kurtz, Melissa Feldbush, Abigail Smith, Jon Van Benthem, Brett Wing

2. Vice Chair-Karen Anderson

3. Chair-Jan Dowker

4. Staff

9. Adjourn

The Zoom portion of the meeting can be accessed by the following link

<https://us02web.zoom.us/j/86464000259>, or by calling 1 (669) 900-6833 and inputting the following Meeting ID number: 864-6400-0259.



Planning Commission Minutes – February 23, 2023

- 1. Call to Order** – The Planning Commission convened a regular meeting on February 23, 2023.
Chairwoman Dowker called the meeting to order at 6:00 p.m.

- 2. Roll Call** – Members present:
- | | |
|-----------------|-----------------------------|
| Jan Dowker | (Chairwoman) |
| Karen Anderson | (Vice Chairwoman) |
| Chris Kurtz | (Secretary) <i>via ZOOM</i> |
| Jon Van Benthem | (Commissioner) |
| Abigail Smith | (Commissioner) |
| Brett Wing | (Commissioner) |
- Staff present:
- | | |
|-------------------|--|
| Anne Johnson | (Community Development Director) |
| Will Charles | (Baseline Engineering – Principal Planner) |
| Michelle Tovar | (Deputy Town Clerk) |
| Jonathan Mitchell | (Permit Technician) |

- 3. Consent Agenda** – Minutes from the February 09, 2023 Planning Commission Meeting.

MOTION made by Commissioner Van Benthem to APPROVE the Minutes for February 09, 2022.

SECONDED by Commissioner Anderson.

Abstained by Commissioner Dowker due to not attending the meeting.

With those all in favor, THE MOTION CARRIED.

- 4. Farmstead Acres Minor Subdivision (Terra Forma Solutions, Todd Johnson agent)**

Director Johnson introduced the Applicant's request for a minor subdivision to separate the existing parcel into four (4) lots.

Presented by Will Charles of Baseline Engineering.

MOTION made by Commissioner Van Benthem to RECOMMEND APPROVAL of the Minor Subdivision to the Town Board, with the following condition:

- 01. The Applicant shall provide an updated title commitment dated no more than 30 days from the date of conditional approval.**

SECONDED by Commissioner Wing.

With all in favor, THE MOTION CARRIED.

Commissioner Anderson recused herself at 6:09 p.m.

- 5. Public Hearing: Farmstead 2nd Filing Final Plat (Schroyer Resources, Steve Schroyer agent)**

Director Johnson introduced the request for a final plat to subdivide into 285 lots and 30 tracts.

Presented by Will Charles of Baseline Engineering.

Public Comment was opened at 6:23 p.m.

Michael Cook was concerned about impacts to his property, the impacts of the roundabout affecting his driveway. He was concerned about the sewer line implementation. He was supportive of this project moving forward.

Public Comment was closed at 6:27 p.m.

MOTION made by Commissioner Van Benthem to RECOMMEND APPROVAL of the Final Plat to the Town Board with the following conditions:

- 01. The Applicant shall continue to work with staff to complete a non-potable water agreement.**
- 02. The Applicant shall continue to work with staff to address all remaining review comments.**

MOTION made by Commissioner Van Benthem to AMEND his motion to RECOMMEND APPROVAL of the Final Plat to the Town Board with the following condition:

- 01. The Applicant will address all outstanding staff comments including a non-potable water agreement, roundabout designs, and a reimbursement agreement.**

SECONDED by Commissioner Smith.

With all in favor, THE MOTION CARRIED.

Kathryn Browning (219 Ole Bessie Drive) could not join the ZOOM meeting via the link on the mailing notice.

6. Reports –

Director Johnson has completed her first week as the new Community Development Director with the Town.

Two new annexation applications have been submitted.

Deputy Town Clerk Tovar gave a brief tour of the new Town of Berthoud website.

7. Adjourn –

The meeting was adjourned at 7:17 p.m.



STAFF REPORT: FARMSTEAD ACRES MINOR SUBDIVISION

DATE: March 9, 2023

GENERAL INFORMATION

Applicant:	Terra Forma Solutions, Todd Johnson agent	Size: 9.015 acres
Site Location:	This property is located north and west of the Farmstead subdivision, south of Hwy 56, and east of Fickel Farm and a rural Larimer County property.	
Applicant's Request:	The Applicant is requesting a minor subdivision to separate the existing parcel into 4 lots.	
Current Zoning:	Sommers PUD: Light Industrial uses to the north, undefined mixed use to be determined at FDP to the south. A rezoning request to change the parcel to portions of UR, SR, M-1, and C-1 will go before the Town Board on February 28, 2023	

ZONING DISTRICT INFORMATION

	<u>PUD</u>	<u>UR</u>	<u>SR</u>	<u>M-1</u>	<u>C-1</u>
Max Density	Set at FDP	N/A	N/A	N/A	24 units per acre
Min. Lot Size	Set at FDP	2,000 sq.ft. for Duplex 2,500 sq.ft. for SFR	3,000 sq.ft.	N/A	N/A
Min. Lot Width	Set at FDP	N/A	20'	50'	25'
Front Setback	Set at FDP	8'-12' build-to line	10' rear loaded	25'	0'
Side Setback	Set at FDP	0' attached side, 5' unattached side, 10' corner side	5'	20'	20'
Rear Setback	Set at FDP	5'	5'	20'	20'
Building Height:	Set at FDP	30'	30'	40'	50'

SURROUNDING ZONING, LAND USE AND REQUIRED BUFFERS

<u>Adjacent Zoning</u>		<u>Adjacent Land Uses</u>	<u>Setbacks for Adjacent Zoning/ Buffer required if rezoned</u>
North:	C-2, RR-2	General Commercial, Agricultural	150' to Hillsdale Park
South:	R-2	Single-Family Residential	N/A
East:	C-1, R-1	Event Center, Single-Family Residential	N/A
West:	RR-2 (Larimer County)	Agricultural	N/A

Proposal

The applicant proposes to subdivide the existing parcel into 4 lots. This minor subdivision is in conjunction with a Neighborhood Master Plan and Rezoning request that were recommended for approval by the Planning Commission at the February 9, 2023 regular meeting. If the rezoning is approved by the Board of Trustees at their February 28, 2023 meeting, this minor subdivision would subdivide the parcel along the newly created zone district lines. This would result in a 4.82-acre Urban Residential lot, a 1.10-acre Suburban Residential lot, a 2.77-acre M-1 Industrial lot, and a 0.32-acre C-1 Commercial lot.

Background

This property is currently zoned as the Sommers PUD. The PUD was approved in 2008, in conjunction with an annexation of a nonconforming industrial building. The PUD approved the nonconforming industrial building with light industrial uses on three acres, and then set future mixed use residential on the southern six acres. The prior PUD process set development standards at the FDP stage, and no submittal was made on the southern mixed-use portion. The project has had six rounds of review, with five of the reviews sent to the public notice area for public comment. A Neighborhood Master Plan and Rezoning request were recommended for approval by the Planning Commission on February 9, 2023.

Minor Subdivision Process

The minor subdivision process is intended to divide land consistent with Town of Berthoud standards when the following conditions exist:

30-6-109(A) Required Elements	Finding	Rationale
1. The property has previously been platted within the Town	Yes	The property is a previously platted parcel.
2. The resulting subdivision will produce six or fewer lots.	Yes	The proposed subdivision will create 4 lots.

Minor Subdivision Plat Review Criteria

Section 30-6-109(C) states that the town shall use the following criteria to evaluate a minor subdivision request:

30-6-109(C) Review Criteria	Finding	Rationale
1. The minor subdivision is in compliance with this Code, The Town Comprehensive Plan, and the PORT Plan.	Yes	The minor subdivision is in compliance with the code, and the overall plans show trail access points. Additionally, the minor subdivision in conjunction with the rezoning will allow for more standardized development where zone district boundaries coincide with property lines.
2. The Planning Commission shall also consider how the Applicant has addressed comments received from the public, during the Public Comment portion of the process when considering the request.	Yes	The Town has not received any public comments specifically related to the Minor Subdivision. The applicant has addressed public comments related to other portions of the overall project when designing the minor subdivision.

PUBLIC NOTICE AND COMMENT

Notice of the Planning Commission Public Hearing has been mailed to property owners within 300 feet of the subject property, a legal ad published, and the property was posted as required by the Development Code. In addition, the

application was sent out to all property owners within 300 feet, with an invitation to comment on the request within three weeks of receipt. No comments were received specifically related to the minor subdivision application.

FINDINGS AND RECOMMENDATIONS

Staff recommends Planning Commission make a motion to vacate the Minor Subdivision approval on February 23, 2023 relating to this case because a public hearing was not held prior to the motion and vote.

Staff recommends Planning Commission approve the Minor Subdivision with the following conditions:

- 1. The applicant shall provide an updated title commitment dated no more than 30 days from the date of conditional approval.**

Attachments

1. Application form
2. Minor Subdivision
3. Staff Powerpoint



Town of Berthoud
807 Mountain Ave.
P.O. Box 1229
Berthoud, CO 80513
970.532.2643

DEVELOPMENT REVIEW APPLICATION

All required information must be provided before submittal will be accepted and deemed complete.
To be complete, the application must include all items identified on the submittal checklist.
Please complete both sides of application form.

Parcel Number(s): 9424000008		
Site Address: 533 East County Road 8, Berthoud, CO 80513		
Project Name: TBD using property address for initial applications		
Brief description of project: Rezone property from PUD to commercial/industrial/residential uses. Minor Subdivision. Neighborhood Plan.		
APPLICATION TYPE (Check as appropriate):		
☐ Annexation	☐ Preliminary Subdivision Plat	☐ Final Site Plan
☒ Rezoning	☐ Final Subdivision Plat	☐ PUD Amendment
☐ Concept Plan	☐ Plat Amendment	☐ PUD Preliminary Development Plan
☒ Minor Subdivision	☐ Oil and Gas	☐ PUD Final Development Plan
☐ Special Use Review	☐ ROW Vacation	☒ Other <u>Neighborhood Plan</u>
APPLICANT		
Name: Todd Johnson - Terra Forma Solutions, Inc.		
E-mail: todd@terraformas.com	Mailing Address: 3465 South Gaylord Court, A304	
Phone: 303-257-7653	City/State/Zip: Englewood, CO 80113	
CONTACT PERSON (will receive correspondence from Town Staff/Referral Agencies)		
Name: Same as applicant		
E-mail:	Mailing Address:	
Phone:	City/State/Zip:	
OWNER(S) (If different than applicant)		
Name: 533 Highway 56 LLC, c/o Ryan Bond, Manager		
E-mail: ryan.bond@firehook.co	Mailing Address: 1540 Main St. STE 218-165, Windsor, CO 80550	
Phone: 970-222-9923	City/State/Zip: 1540 Main St. STE 218-165, Windsor, CO 80550	
CONSULTANT (Engineer, Surveyor, or Planner)		
Name: Same as applicant		
E-mail:	Mailing Address:	
Phone:	City/State/Zip:	

LAND USE INFORMATION								
Existing Use: House, Industrial Building and Farming/Ranching								
Proposed Use: Ind./Comc./Office/Resd.								
Existing Zoning: PUD Proposed Zoning: (if applicable): C1/M1/Urban Residential Number of acres: 9.015 Proposed Access: CR8, Remuda & Tender	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #d9e1f2;"> <th colspan="2" style="text-align: center; padding: 5px;">Adjacent zoning / land use:</th> </tr> </thead> <tbody> <tr> <td style="width: 50%; padding: 5px;">East Side: C1 & R1</td> <td style="width: 50%; padding: 5px;">North Side: C2 & County RR1</td> </tr> <tr> <td style="padding: 5px;">West Side: County RR1</td> <td style="padding: 5px;">South Side: R2</td> </tr> </tbody> </table>		Adjacent zoning / land use:		East Side: C1 & R1	North Side: C2 & County RR1	West Side: County RR1	South Side: R2
Adjacent zoning / land use:								
East Side: C1 & R1	North Side: C2 & County RR1							
West Side: County RR1	South Side: R2							
UTILITY SERVICE INFORMATION								
Water: Berthoud	Sewer: Septic							
PROJECT INFORMATION								
Number of proposed units: TBD 80+/- (Varies with final type) Number of phases: 1 to 2 Number of Units per phase: 40-60% Number of lots proposed: Same as above Lot size minimum: 1200 SF Lot size maximum: 2500 SF Lot size average: TBD Gross density (units/acre): TBD 10-14 Net density (units/acre): TBD 10-14 Area and percent open space: 15-20% Depends on overall areas	Non-Residential Building Area (Sq. Ft.) Proposed: Multiple +/- 22,000 SF Non-Residential Construction Floor Area Ratio Proposed: 0.20-0.25 Total Number of Parking Spaces: 30+/- <u>Acreage of Site:</u> a. Gross: 9.015 Acres b. Right-of-Way: TBD c. Net (a-b) TBD							
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #d9e1f2;"> <th colspan="2" style="text-align: center; padding: 5px;">Type of Housing Proposed (<i>please check</i>):</th> </tr> </thead> <tbody> <tr> <td style="width: 50%; padding: 5px; vertical-align: top;"> ☒ Future Single Family ☒ Duplex ☒ Multi-family (# of units: 80+/-) </td> <td style="width: 50%; padding: 5px; vertical-align: top;"> ☒ Townhouse ☒ Condominium </td> </tr> </tbody> </table>		Type of Housing Proposed (<i>please check</i>):		☒ Future Single Family ☒ Duplex ☒ Multi-family (# of units: 80+/-)	☒ Townhouse ☒ Condominium		
Type of Housing Proposed (<i>please check</i>):								
☒ Future Single Family ☒ Duplex ☒ Multi-family (# of units: 80+/-)	☒ Townhouse ☒ Condominium							

Signatures are required for ALL Property Owners and the Applicant

I hereby certify that I am the lawful owner of the parcel(s) of land that this application concerns and consent to the action. I hereby permit Town of Berthoud staff to enter upon the property for the purposes of inspection relating to the application. Building Permits will not be accepted while this application is in process.

Property Owner(s): 533 Highway 56 LLC by _____ Date: 01 / 16 / 2022

Property Owner(s): Ryan Bond Manager _____ Date: _____

In submitting the application materials and signing this application agreement, I acknowledge and agree that the application is subject to the applicable processing and public hearing requirements set forth in the Development Code.

Applicant: _____ Date: _____

FOR OFFICE USE ONLY	Received By:	Date:
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FARMSTEAD ACRES SUBDIVISION

SITUATE IN THE NORTHWEST QUARTER OF SECTION 24, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M.

TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

LEGAL DESCRIPTION AND DEDICATION:

KNOW ALL MEN BY THESE PRESENTS: That the undersigned, being the owners of the herein described parcel situate in the Northwest Quarter (NW1/4) of Section Twenty-four (24), Township Four (4) North, Range Sixty-nine West of the 6th Principal Meridian, Town of Berthoud, County of Larimer, State of Colorado, more particularly described as follows:

Commencing at the NE corner of the NW 1/4 of Section 24, Township 4 North, Range 69 West of the 6th P.M., running thence West 327.5 feet; thence South 1,330 feet; thence East 327.5 feet; thence North 1,330 feet to the Point of Beginning.

EXCEPT that portion conveyed in deed recorded September 17, 1962 in Book 1182 at Page 506.

and EXCEPT that portion conveyed in deed recorded July 2, 1963 in Book 1213 at Page 46

and in deed recorded March 2, 1995 under Reception No. 95012284.

and EXCEPT that portion in Outlot B, The Farmstead recorded April 1, 2019 at Reception No. 20190016179

Said parcel contains 392,673 Square Feet or 9.015 Acres more or less by this survey.

Have laid out, platted, and subdivided the above described land, under the name and style of FARMSTEAD ACRES SUBDIVISION, and by these presents do dedicate to the Town of Berthoud in fee simple the street and public rights-of-way as shown on the plat, and grants to the Town of Berthoud such easements as are created hereby and depicted or, by note, referenced hereon, along with the right to install, maintain, and operate mains, transmission lines, service lines, and appurtenances, either directly or through the various public utilities, as may be necessary to provide such utility, cable television, and sanitary services within this subdivision or property contiguous thereto, through, over, under, and across streets, utility and other easements, and other public places as shown on the plat.

OWNER: 533 Highway 56, LLC, a Colorado limited liability company

BY: Ryan Bond AS: Member

NOTARIAL CERTIFICATE

STATE OF COLORADO)
ss
COUNTY OF LARIMER)
The foregoing instrument was acknowledged before me by _____ as _____ this _____ day of _____, 20____.

Witness my Hand and Official Seal.

Notary Public
My commission expires: _____.

DEED OF TRUST'S DEDICATION:

The undersigned mortgagee, for good and valuable consideration does by these presents, hereby subordinate all of its rights to such fee simple dedications and grants of easements to the Town of Berthoud as are depicted and referenced hereon and to the terms and conditions of the development agreement and this final plat and agrees that the development agreement and this final plat shall constitute a first and prior lien upon the Farmstead Acres Subdivision to the same extent as though it were actually executed and recorded prior to said deed of trust.

Lienholder: High Plains Bank

BY: AS:

NOTARIAL CERTIFICATE

STATE OF COLORADO)
ss
COUNTY OF LARIMER)
The foregoing instrument was acknowledged before me by _____ as _____ this _____ day of _____, 20____.

Witness my Hand and Official Seal.

Notary Public
My commission expires: _____.

BASIS OF BEARINGS AND LINEAL UNIT DEFINITION

Assuming the North line of the Northwest Quarter of Section 24, Township, 4 North, Range 69 West of the 6th P.M., monumented as shown on this drawing, as bearing North 89°20'37" East, being a Grid Bearing of the Colorado State Plane, North Zone, North American Datum 1983/2011, a distance of 2660.67 feet and with all other bearings contained herein relative thereto.

The lineal dimensions as contained herein are based upon the "U.S. Survey Foot".

TITLE COMMITMENT NOTE

For all information regarding easements, rights-of-way and title of records, Majestic Surveying, LLC relied upon Title Commitment Number FCC25194265, dated January 4, 2022, as prepared by Land Title Guarantee Company to delineate the aforesaid information.

This survey does not constitute a title search by Majestic Surveying, LLC to determine ownership or easements of record.

SURVEYOR'S CERTIFICATE

I, Steven Parks, a Licensed Land Surveyor in the State of Colorado, do hereby certify that the survey of FARMSTEAD ACRES SUBDIVISION was made under my supervision and the accompanying plat accurately and properly shows said subdivision.

RIGHT TO FARM STATEMENT

The Town of Berthoud has adopted a "Right to Farm" policy. All new and existing residents are expected to read and understand the policy. For a copy of the policy, please contact the Town of Berthoud.

SITE SPECIFIC DEVELOPMENT PLAN

This plan constitutes a site specific development plan as defined in Article 68 of Title 24, C.R.S., as amended, and Chapter 30 of the Berthoud Development Code available at the Berthoud Town Hall, 807 Mountain Avenue, Berthoud, Colorado 80513.

TOWN APPROVAL

Approved by the Planning Commission of the Town of Berthoud, Colorado, this _____ day of _____, 20____.

Chairman

The foregoing plat is approved for filing and accepted by the Town of Berthoud, Colorado, this _____ day of _____, 20____.

Attest: Town Clerk

NOTICE

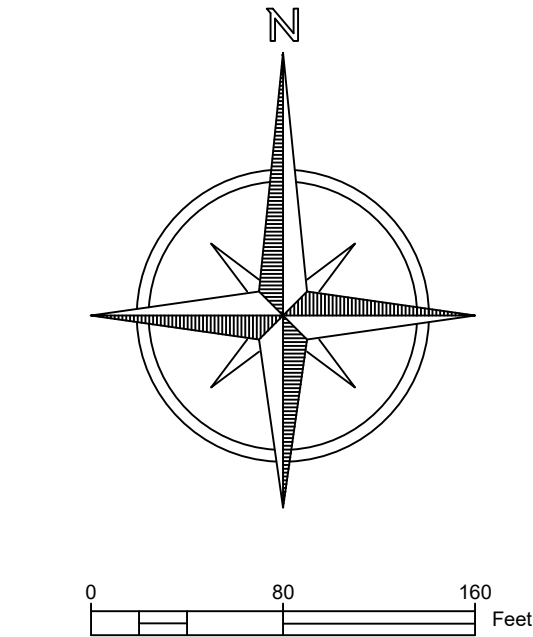
According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon. (13-80-105 C.R.S. 2012)

FLOOD PLAIN NOTE

The Subject Property is in flood zone X, "area of minimal flood hazard" per FEMA flood map 08069C387H, effective January 15, 2021.

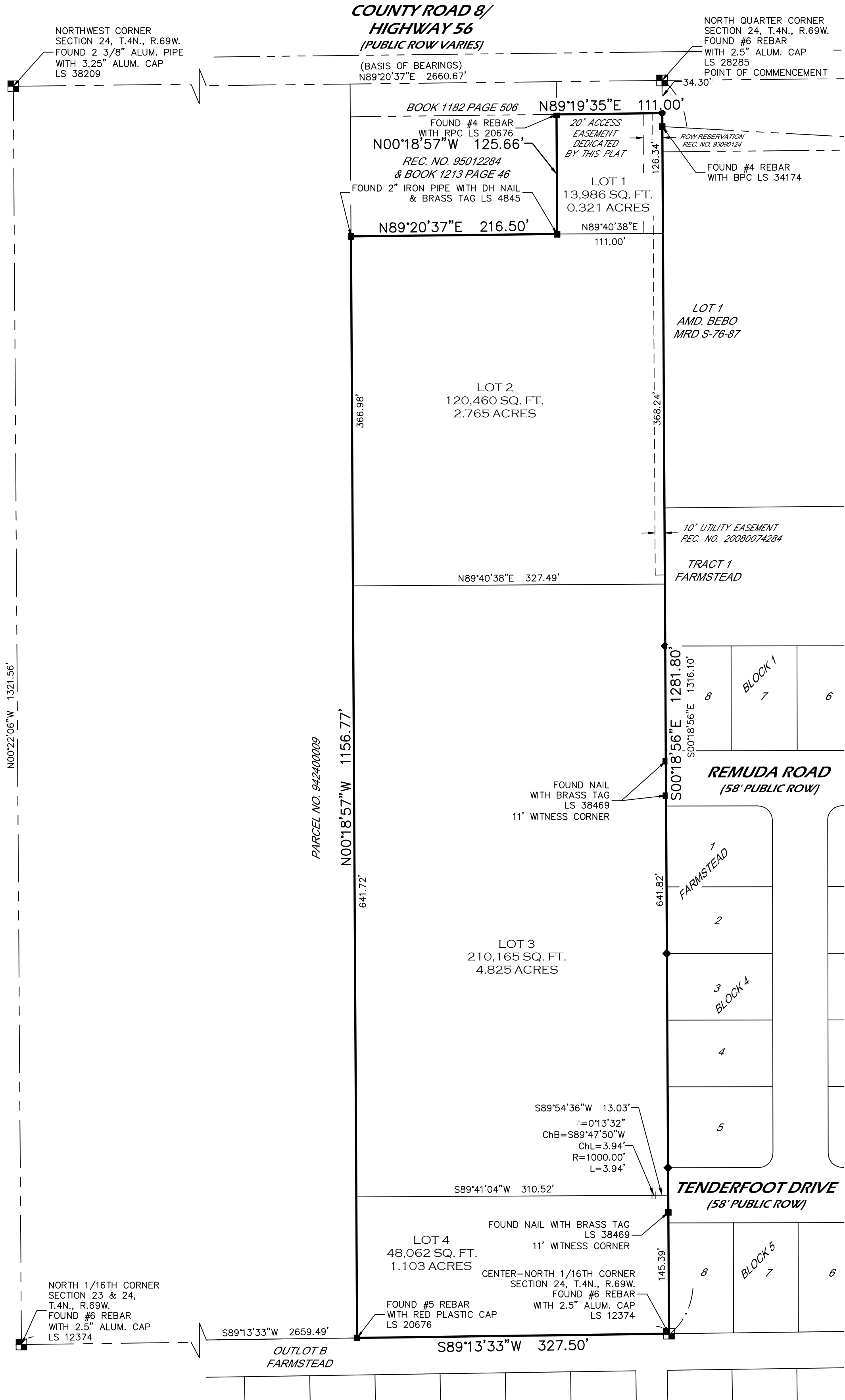
Owner: 533 East County Road 8, LLC
125 South Howes Street Suite 500
Fort Collins, CO

Surveyor: Majestic Surveying, LLC
C/O Steven Parks, PLS
1111 Diamond Valley Drive, Suite 104
Windsor, CO 80550
970-833-5698



LEGEND

- BOUNDARY LINE
- EASEMENT LINE
- RIGHT OF WAY LINE
- SECTION LINE
- ALIQUOT CORNER AS DESCRIBED
- FOUND MONUMENT AS DESCRIBED
- FOUND #4 REBAR WITH ORANGE PLASTIC CAP LS 38469
- CALCULATED POSITION
- FOUND #4 REBAR WITH RED PLASTIC CAP LS 38348



PRELIMINARY

Steven Parks - On Behalf of Majestic Surveying, LLC
Colorado Licensed Professional Land Surveyor #38348



PROJECT NO: 2021059	PROJECT NAME: 533 CR8	REVISIONS:	DATE:
DATE: 1-19-2022	CLIENT: WAYPOINT	REDLINES	5-31-22
DRAWN BY: SIP	FILE NAME: 2021059	REDLINES	7-26-22
CHECKED BY: SIP	SCALE: 1" = 80'	REVISED SIGNATURE BLOCKS	7-26-22
		ADD LOT 4	2-14-23



STAFF REPORT: HERON LAKES 17TH FILING PRELIMINARY PLAT

DATE: March 9, 2023

GENERAL INFORMATION

Applicant:	Three Lakes Development Inc.	Size: 128.5 acres
Site Location:	The property is located near the intersection of County Road 14 and Heron Lakes Parkway.	
Applicant's Request:	The Applicant is requesting a preliminary plat for the creation of 132 lots intended for single family residential. Additionally, as part of the preliminary plat, the applicant is requesting a waiver to curb and gutter requirements along County Road 14.	
Current Zoning:	R2 Limited Multi-Family and Agriculture.	

ZONING DISTRICT INFORMATION

	<u>R2</u>	<u>AG</u>
Max Density	16 per acre	1 per acre (unless on septic)
Min. Lot Area	3,500 sq.ft.	1 acre
Min. Lot Width	30'	150'
Front Setback	20' Front Loaded/ 15' Rear Loaded	25'
Side Setback	5' side/ 10' corner side	15'
Rear Setback	20' front loaded/ 5-8' rear loaded	25'
Building Height:	40'	40'

SURROUNDING ZONING, LAND USE AND REQUIRED BUFFERS

	<u>Adjacent Zoning</u>	<u>Adjacent Land Uses</u>	<u>Setbacks for Adjacent Zoning/ Buffer required if rezoned</u>
North	R2/R1	Single-Family/ Limited Multi-Family	N/A
South	R1/Ag	Single-Family/ Agriculture	N/A
East	RR-2 (Larimer County)	Agriculture	N/A
West	R1	Single-Family	N/A

Proposal

The applicant proposes to subdivide the existing parcels into 132 lots. The preliminary plat, if approved, would allow the applicant to apply for a final plat that would formally subdivide the lots. As part of the preliminary plat, the applicant is also requesting a waiver to curb and gutter requirements along County Road 14.

Background

This property is part of the overall Heron Lakes development. Heron Lakes development received approval for the Overall Final Development Plan in 2008 (approximately). In 2015, an amended Concept Plan (precursor to the current neighborhood master plan process) was approved. The concept plan envisioned this area as R-2 single family homes consistent with the current proposal. A small portion of the proposed development, along the western boundary that abuts the golf course, is currently zoned Agriculture. If the preliminary plat is approved, the applicant would be required to submit a rezoning application to clean up the R2 and AG zoning along the western boundary prior to approval of a final plat.

Preliminary Plat Review Criteria

In addition to all provisions of this Code, the Town shall use the following criteria to evaluate the applicant's request:

30-6-107(B) Review Criteria	Finding	Rationale
1. The preliminary plat represents a functional system of land use and is consistent with the rationale and criteria set forth in this Code.	Yes	The preliminary plat is a functional system of land use that connects with the existing portions of the Heron Lakes development. Additionally, it is consistent with the standards of the code.
2. The application is consistent with the approved concept plan and incorporates the Town's recommendations and any conditions of approval.	Yes	The plan is consistent with the approved concept plan. The concept plan calls out single family residential in this area consistent with what is shown.
3. The land use mix within the project conforms to Berthoud's Zoning District Map and Preferred Land Use Map and furthers the goals and policies of the Comprehensive Plan and PORT Plan.	Yes	The land use mix is consistent with the current R-2 Zone District. The future land use map lists this area as Suburban Residential (SR) which allows for developments similar to this one. The project is also consistent with the Comprehensive Plan and PORT Plan. As stated previously, the applicant will be required to clean up the R2 and AG zone district boundaries along the western edge of the development prior to approval of a final plat.
4. The utility and transportation design is adequate, given existing and planned capacities of those systems.	Yes	Plans were reviewed by Town Staff as well as outside referral agencies. The applicant has provided adequate plans for utilities and most of the transportation system. The applicant has however requested a waiver in conjunction with this application to not construct curb and gutter along County Road 14.
5. Negative impacts on adjacent land uses including, but not limited to: solar access, heat, dust, glare, traffic and noise have been identified and satisfactorily mitigated.	Yes	The application is consistent with the overall plan for the area. The plat would allow for similar densities to what has already been constructed in the area.

30-6-107(B) Review Criteria	Finding	Rationale
6. There is a need or desirability within the community for the applicant's development and the development will help achieve a balance of land use and/or housing types within Berthoud.	Yes	The future land use map anticipates this area to be developed as suburban residential. This development is consistent with the goals of the Comprehensive Plan.
7. How the applicant has addressed comments received from the public, during the Public Comment portion of the process.	Yes	All comments received were provided to the applicant and are attached. Public comments have been satisfactorily addressed during the public comment process.

WAIVER

Section 30-3-109 authorizes Planning Commission to grant waivers to requirements of Section 30-2 Design Standards, when done in conjunction with a Preliminary Plat. The applicant has requested a waiver to not construct curb and gutter along County Road 14 and a letter explaining their reasoning is attached. Staff is not in favor of the proposed waiver, and a letter from the Town's contract engineer is attached. The Planning Commission may grant a waiver if it meets one of the following criteria:

1. The waiver, if granted, will not alter the essential character of the neighborhood or district in which the property is located, nor diminish the value, use or enjoyment of adjacent property.
2. The waiver, if granted, is the minimum waiver of applicable Code provision that will afford relief and is the least modification possible of the Code provisions which are in question.
3. That such practical difficulties or unnecessary hardship has not been created by the applicant.
4. The waiver would substantially alleviate an existing, defined and described problem of Town-wide concern or would result in a substantial benefit to the Town by reason of the fact that the proposed project would address an important community need.
5. The plan as submitted will promote the general purpose of the standard for which the modification is requested, equally well or better than a plan which complies with the standard for which a modification is requested.

PUBLIC NOTICE AND COMMENT

Notice of the Planning Commission Public Hearing has been mailed to property owners within 500 feet of the subject property, a legal ad published, and the property was posted as required by the Development Code on February 23, 2023. In addition, the application was sent out to all property owners within 500 feet, with an invitation to comment on the request within three weeks of receipt. Comments received are attached to this submittal.

FINDINGS AND RECOMMENDATIONS

- Staff recommends Planning Commission make a motion to deny the waiver to not construct curb and gutter along County Road 14 for the reasons stated in the attached memo from the Town's Development Review Engineer dated February 28, 2023.
- Staff recommends Planning Commission make a motion to recommend approval of the Preliminary Plat to the Board of Trustees, subject to the following condition:
 1. The applicant shall revise their plans to include curb and gutter along County Road 14.
 2. The applicant shall apply for and receive approval of a rezoning prior to approval of a final plat.

(Note: If the Planning Commission approves the waiver request, then staff's proposed condition of approval regarding County Road 14 is not needed.)

-
1. Application form
 2. Preliminary Plat
 3. Public Comment
 4. Waiver request letter from applicant
 5. Waiver letter from Town Contract Engineer
 6. Presentation from Staff
 7. Presentation from Applicant



Town of Berthoud
807 Mountain Ave.
P.O. Box 1229
Berthoud, CO 80513
970.532.2643

DEVELOPMENT REVIEW APPLICATION

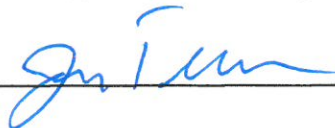
All required information must be provided before submittal will be accepted and deemed complete.
To be complete, the application must include all items identified on the submittal checklist.
Please complete both sides of application form.

Parcel Number(s): 9403228002		
Site Address: East of Newfound Lake Road/ South of CR 14		
Project Name: Heron Lakes 17th Filing		
Brief description of project: Single-family residential development.		
APPLICATION TYPE (Check as appropriate):		
☐ Annexation	☒ Preliminary Subdivision Plat	☐ Final Site Plan
☒ Rezoning	☐ Final Subdivision Plat	☐ PUD Amendment
☐ Concept Plan	☐ Plat Amendment	☐ PUD Preliminary Development Plan
☐ Minor Subdivision	☐ Oil and Gas	☐ PUD Final Development Plan
☐ Special Use Review	☐ ROW Vacation	☐ Other _____
APPLICANT		
Name: Three Lakes Development, Inc.		
E-mail: jon@hillsidecommercialgroup.com	Mailing Address: 355 N Fairgrounds Ave Suite 300	
Phone: (970) 204-9393	City/State/Zip: Windsor, CO 80550	
CONTACT PERSON (will receive correspondence from Town Staff/Referral Agencies)		
Name: Kristin Turner		
E-mail: kristin@tbgroup.us	Mailing Address: 444 Mountain Ave	
Phone: 970.532.5891	City/State/Zip: Berthoud, CO 80513	
OWNER(S) (If different than applicant)		
Name:		
E-mail:	Mailing Address:	
Phone:	City/State/Zip:	
CONSULTANT (Engineer, Surveyor, or Planner)		
Name: Kristin Turner		
E-mail: kristin@tbgroup.us	Mailing Address: 444 Mountain Ave	
Phone: 970.532.5891	City/State/Zip: Berthoud, CO 80513	

LAND USE INFORMATION							
Existing Use: AG Proposed Use: Residential Existing Zoning: R2 Proposed Zoning: (if applicable): N/A Number of acres: 12.39 Proposed Access:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center; background-color: #e0f2f1;">Adjacent zoning / land use:</th> </tr> </thead> <tbody> <tr> <td style="width: 50%;">East Side: County</td> <td style="width: 50%;">North Side: R2</td> </tr> <tr> <td>West Side: AG (Golf)</td> <td>South Side: R2</td> </tr> </tbody> </table>	Adjacent zoning / land use:		East Side: County	North Side: R2	West Side: AG (Golf)	South Side: R2
Adjacent zoning / land use:							
East Side: County	North Side: R2						
West Side: AG (Golf)	South Side: R2						
UTILITY SERVICE INFORMATION							
Water: Town of Berthoud	Sewer: Town of Berthoud						
PROJECT INFORMATION							
Number of proposed units: 32 Number of phases: 1 Number of Units per phase: 32 Number of lots proposed: 32 Lot size minimum: 7700 SF Lot size maximum: 25122 SF Lot size average: 7700 SF Gross density (units/acre): 2.5 Net density (units/acre): 3.1 Area and percent open space: 4.5 AC / 36%	Non-Residential Building Area (Sq. Ft.) Proposed: N/A Non-Residential Construction Floor Area Ratio Proposed: N/A Total Number of Parking Spaces: N/A <u>Acreage of Site:</u> a. Gross: 12.39 b. Right-of-Way: 2.14 c. Net (a-b) 10.25 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center; background-color: #e0f2f1;">Type of Housing Proposed (please check):</th> </tr> </thead> <tbody> <tr> <td style="width: 50%; vertical-align: top;"> ☐ Future Single Family ☐ Duplex ☐ Multi-family (# of units:) </td> <td style="width: 50%; vertical-align: top;"> ☐ Townhouse ☐ Condominium </td> </tr> </tbody></table>	Type of Housing Proposed (please check):		☐ Future Single Family ☐ Duplex ☐ Multi-family (# of units:)	☐ Townhouse ☐ Condominium		
Type of Housing Proposed (please check):							
☐ Future Single Family ☐ Duplex ☐ Multi-family (# of units:)	☐ Townhouse ☐ Condominium						

Signatures are required for ALL Property Owners and the Applicant

I hereby certify that I am the lawful owner of the parcel(s) of land that this application concerns and consent to the action. I hereby permit Town of Berthoud staff to enter upon the property for the purposes of inspection relating to the application. Building Permits will not be accepted while this application is in process.

Property Owner(s):  Date: 1/7/2021

Property Owner(s): _____ Date: _____

In submitting the application materials and signing this application agreement, I acknowledge and agree that the application is subject to the applicable processing and public hearing requirements set forth in the Development Code.

Applicant: _____ Date: _____

FOR OFFICE USE ONLY

Received By:

Date:

HERON LAKES SEVENTEENTH FILING

A REPLAT OF TRACTS B AND D, HERON LAKES TENTH FILING; TRACT C, HERON LAKES TWELFTH FILING, LOCATED IN SECTIONS 3 AND 4; AND A TRACT OF LAND LOCATED IN SECTION 3, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M., TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

LEGAL DESCRIPTION AND DEDICATION:

KNOW ALL MEN BY THESE PRESENTS: That the undersigned, being the owner of HERON LAKES SEVENTEENTH FILING, located in Sections 3 and 4, Township 4 North, Range 69 West of the 6th Principal Meridian, Town of Berthoud, County of Larimer, State of Colorado, more particularly described as follows:

Tracts B and D, Heron Lakes Tenth Filing and
Tract C, Heron Lakes Twelfth Filing

TOGETHER WITH:

That portion of the West Half of the East Half of the Northwest Quarter of Section 3, Township 4 North, Range 69 West of the 6th Principal Meridian, County of Larimer, State of Colorado, excluding public right-of-way per Larimer County Road Book R, Page 170-2 and Book 1666, Page 884, being more particularly described as follows:

Considering the North line of the Northwest Quarter of Section 3 as bearing North 89° 39' 59" East and with all bearings contained herein relative thereto:

COMMENCING at the Northwest corner of the West Half of the East Half of the Northwest Quarter of Section 3;
THENCE South 00° 00' 44" East, 30.00 feet to the POINT OF BEGINNING;
THENCE North 89° 39' 59" East, 645.40 feet;
THENCE South 00° 20' 44" East, 2755.25 feet to the North line of Heron Lakes Eighth Filing;
thence along said North line, South 89° 52' 27" West, 662.72 feet to the Easterly line of Heron Lakes Twelfth Filing;
thence along said Easterly line and the East line of Heron Lakes Tenth Filing, North 00° 00' 44" East, 2772.90 feet to the POINT OF BEGINNING,

containing 5,598,981 square feet or 128.535 acres more or less.

Have laid out, platted, and subdivided the above described land, under the name and style of HERON LAKES SEVENTEENTH FILING, and by these presents do dedicate to the Town of Berthoud in fee simple the street and public "rights-of-way" as shown on the plats, and grant to the Town of Berthoud such easements and rights-of-way, and all right, title and interest in real property to the above described lands, including all surface interests and all minerals within or underlying said lands, as are created hereby and depicted or, by note, referenced hereon, along with the right to install, maintain, replace and operate mains, transmission lines, service lines, and appurtenances, either directly or through the various public utilities, as may be necessary to provide such utility, cable television, water, electric, natural gas and sanitary services within this subdivision or property contiguous thereto, through, over, under, and across streets, utility and other easements, and other public places shown on the plat.

OWNER: Heron Lakes Investments, LLC

BY: _____
James Birdsall, Manager

STATE OF COLORADO)
)SS
COUNTY OF LARIMER)

The foregoing instrument was acknowledged before me this ____ day of _____, 20____, by

James Birdsall as Manager of Heron Lakes Investments, LLC.

Witness my hand and official seal

My commission expires: _____

Notary Public

OWNER: Berthoud-Heritage Metropolitan District No. 9

BY: _____

STATE OF COLORADO)
)SS
COUNTY OF LARIMER)

The foregoing instrument was acknowledged before me this ____ day of _____, 20____, by

_____ as _____ of Berthoud-Heritage Metropolitan District No. 9.

Witness my hand and official seal

My commission expires: _____

Notary Public

LIENHOLDER: Great Western Bank

BY: _____

STATE OF COLORADO)
)SS
COUNTY OF LARIMER)

The foregoing instrument was acknowledged before me this ____ day of _____, 20____, by

_____ as _____ of Great Western Bank.

Witness my hand and official seal

My commission expires: _____

Notary Public

RIGHT TO FARM STATEMENT

The Town of Berthoud has adopted a "Right to Farm" policy. All new and existing residents are expected to read and understand the policy. For a copy of the policy, please contact the Town of Berthoud.

APPROVAL CERTIFICATES:

Approved by the Town of Berthoud, Colorado this ____ day of _____, 20____.

Mayor

The foregoing plat is approved for filing and accepted by the Town of Berthoud, Colorado this ____ day of _____, 20____.

ATTEST: _____
Town Clerk

NOTES:

- The Basis of Bearings is the North line of the Northwest Quarter of Section 3 as bearing North 89° 39' 59" East (assumed), with the Northwest corner of the West $\frac{1}{4}$ of the East $\frac{1}{4}$ of the Northwest $\frac{1}{4}$ of Section 3 being a 3 $\frac{1}{4}$ " aluminum cap on #6 rebar, stamped PLS 38470 and the North $\frac{1}{4}$ corner of Section 3 being a 2" aluminum cap on #6 rebar, stamped PLS 23500 as monumented on drawing.
- All information regarding easements, right-of-way or title of record, Northern Engineering relied upon Order Number _____ TBD _____, dated _____ TBD _____, prepared by _____ TBD _____.
- The lineal unit of measurement for this plat is U. S. Survey Feet.
- Northern Engineering or the Professional Land Surveyor listed hereon, does not have the expertise to address mineral rights, and recommends the owner retain an expert to address these matters. Northern Engineering or the Professional Land Surveyor listed hereon assumes no responsibility for the mineral rights upon the subject property.
- Any easements created by separate document and shown hereon are for reference purposes only. Refer to recorded document for specific location and terms.
- Not all documents listed in the title commitment are plottable or definable. Owner, Client and others should refer to the title commitment and those documents listed therein for a true understanding of all rights of way, easements, encumbrances, interests and title of record concerning the subject property.
- A copy of the title commitment and the documents contained therein were provided to the owner and client for their use and review. It is the surveyor's understanding that said owner and client have reviewed said documents and understand their impact, if any, on the subject property.
- The word "certify" or "certification" as shown and used hereon is an expression of professional opinion regarding the facts of the survey, and does not constitute a warranty or guaranty, expressed or implied. DORA Bylaws and Rules (4 CCR 730-1).
- It is unlawful under Colorado State Statute to knowingly disturb, deface, remove, or destroy a land survey monument.
- This survey is a draft only. Monuments have not been set or upgraded. Monuments will be set and or upgraded prior to plat finalizing and recording. *This note will be removed prior to finalizing survey.
- Per Town of Berthoud Development Code 30-6-108, the owner or client is responsible for providing the surveyor a current title commitment prior to final submittal. The title commitment must be current and dated no more than thirty days from the date of final plat application submittal per The Town of Berthoud Development Code. A current title commitment will be provided to the surveyor prior to final submittal. This note will be removed prior to finalizing survey.

LAND USE TABLE					
PARCEL	AREA		PERCENT	USE	OWNED & MAINTAINED BY
TRACT A	331,138 S.F.	7.60 AC.	5.91%	Drainage & Utility Easement	Metro District
TRACT B	31,330 S.F.	0.72 AC.	0.56%	Drainage & Utility Easement	Metro District
TRACT C	3,257,560 S.F.	74.78 AC.	58.18%	Drainage & Utility Easement	Metro District
TRACT D	71,278 S.F.	1.64 AC.	1.27%	Drainage & Utility Easement	Metro District
TRACT E	54,814 S.F.	1.26 AC.	0.98%	Drainage & Utility Easement	Metro District
TRACT F	200,592 S.F.	4.60 AC.	3.58%	Drainage & Utility Easement	Metro District
TRACT G	1,832 S.F.	0.04 AC.	0.03%	Drainage & Utility Easement	Metro District
TRACT H	3,243 S.F.	0.07 AC.	0.06%	Drainage & Utility Easement	Metro District
TRACT I	56,311 S.F.	1.29 AC.	1.01%	Drainage & Utility Easement	Metro District
TRACT J	1,037 S.F.	0.02 AC.	0.02%	Drainage & Utility Easement	Metro District
LOTS (132)	1,147,568 S.F.	26.34 AC.	20.50%	Single-Family Residential	Property Owner
ROW	442,482 S.F.	10.16 AC.	7.90%		Town of Berthoud
TOTAL	5,598,981 S.F.	128.53 AC.	100.00%		

OWNER/APPLICANT

Heron Lakes Investment LLC
James Birdsall, Manager
444 Mountain Avenue
Berthoud, CO 80513
(970) 532-5891

PLANNER/LANDSCAPE ARCHITECT

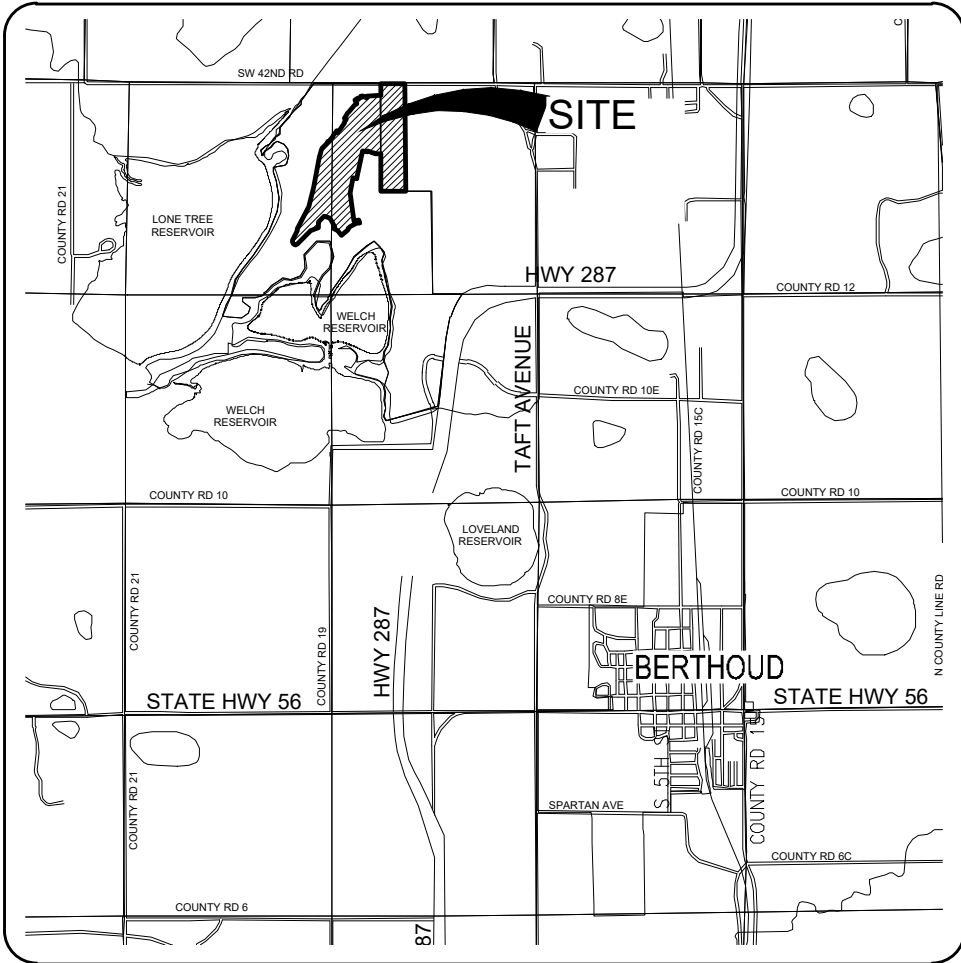
Jim Birdsall, ASLA
The Birdsall Group
444 Mountain Avenue
Berthoud, CO 80513
(970) 532-5891

SITE ENGINEER

Andy Reese
Northern Engineering Services, Inc.
301 North Howes St. Suite 100
Fort Collins, CO 80521
(970) 221-4158

SURVEYOR

Robert C. Tessely, PLS
Northern Engineering Services, Inc.
301 North Howes St. Suite 100
Fort Collins, CO 80521
(970) 221-4158

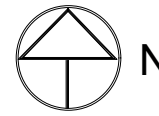


NORTH

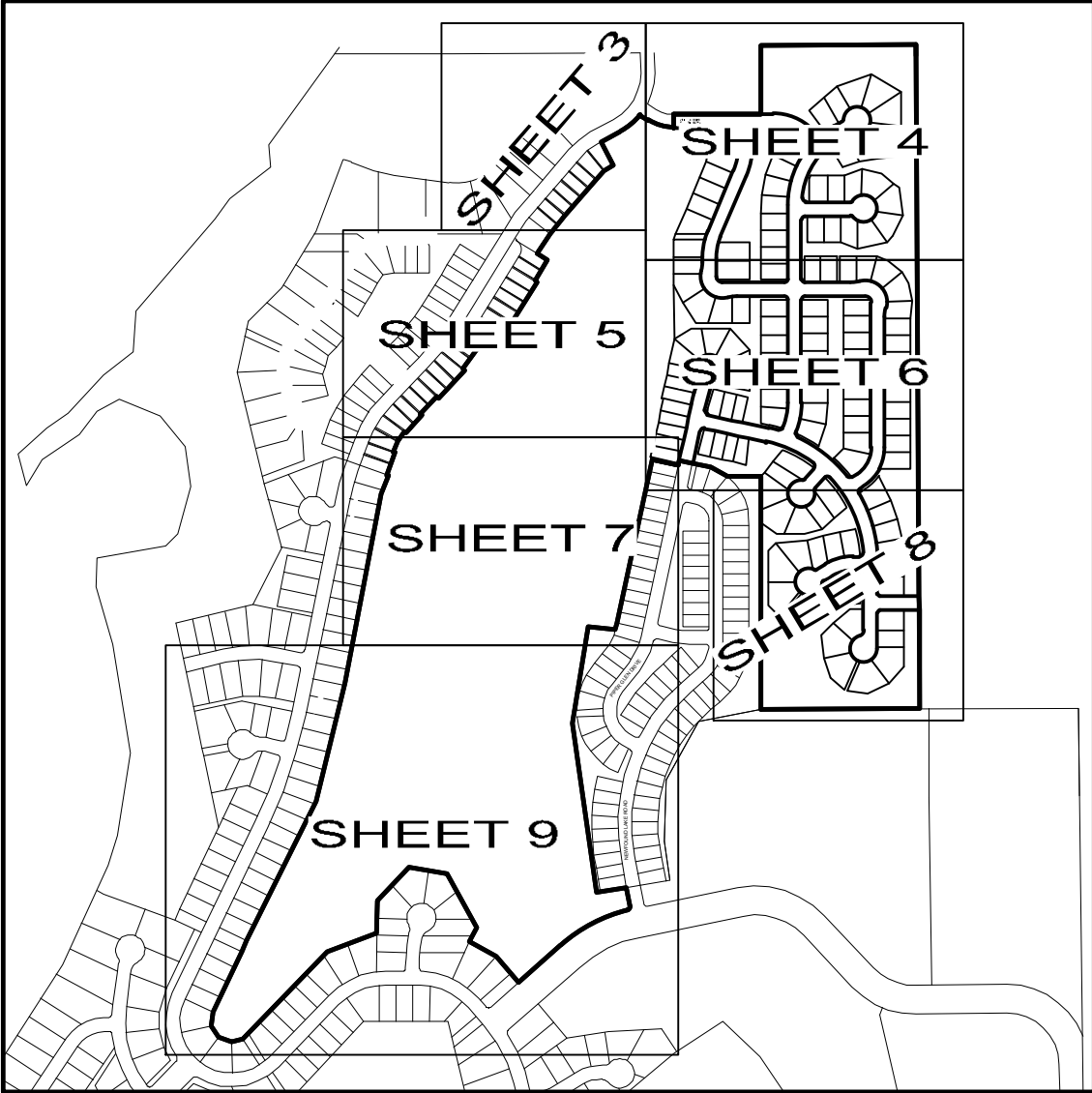
VICINITY MAP

1"=5000'

SHEET INDEX



NORTH



SURVEYOR'S STATEMENT

I, Robert C. Tessely, a Registered Professional Land Surveyor in the State of Colorado, do hereby certify that the survey of HERON LAKES SEVENTEENTH FILING was made under my supervision and the accompanying plat accurately and properly shows said subdivision and is in compliance with the Subdivision Regulations of the Town of Berthoud.

For and on Behalf of Northern Engineering Services
Robert C. Tessely
Colorado Registered Professional
Land Surveyor No. 38470

NOTICE:

According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years after the date of the certificate shown hereon.

SECTION:
3 & 4

TOWNSHIP:
4N

RANGE:
69 W of the 6th PM

NORTHERN
ENGINEERING
SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.221.4158 NORTHERNENGINEERING.COM

PROJECT:
103-007

CLIENT: Hillside Commercial Group

DRAWN BY:
L. Smith

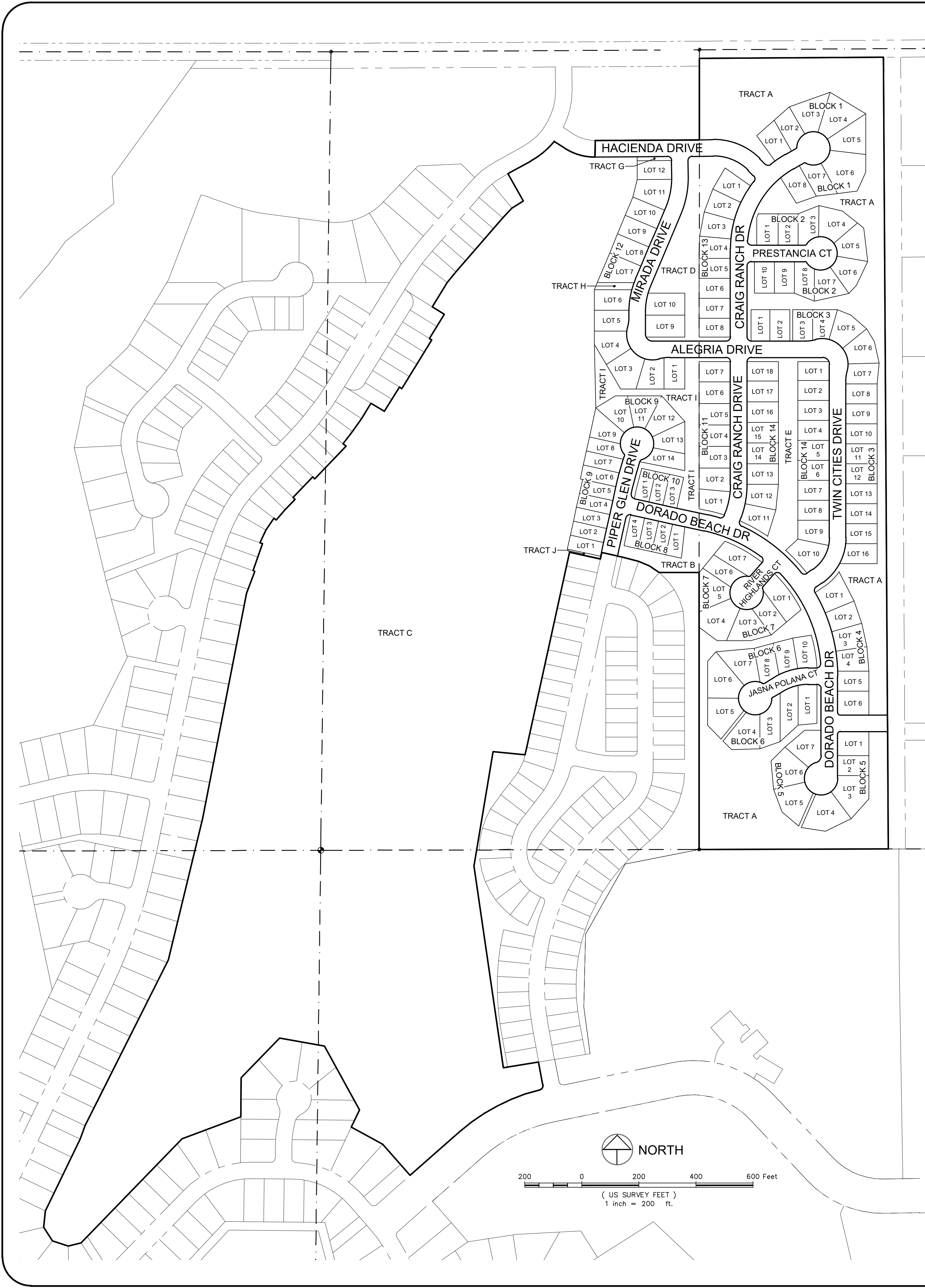
HERON LAKES SEVENTEENTH FILING

TOWN OF BERTHOUD
STATE OF COLORADO

Sheet

1

Of 9 Sheets



HERON LAKES SEVENTEENTH FILING

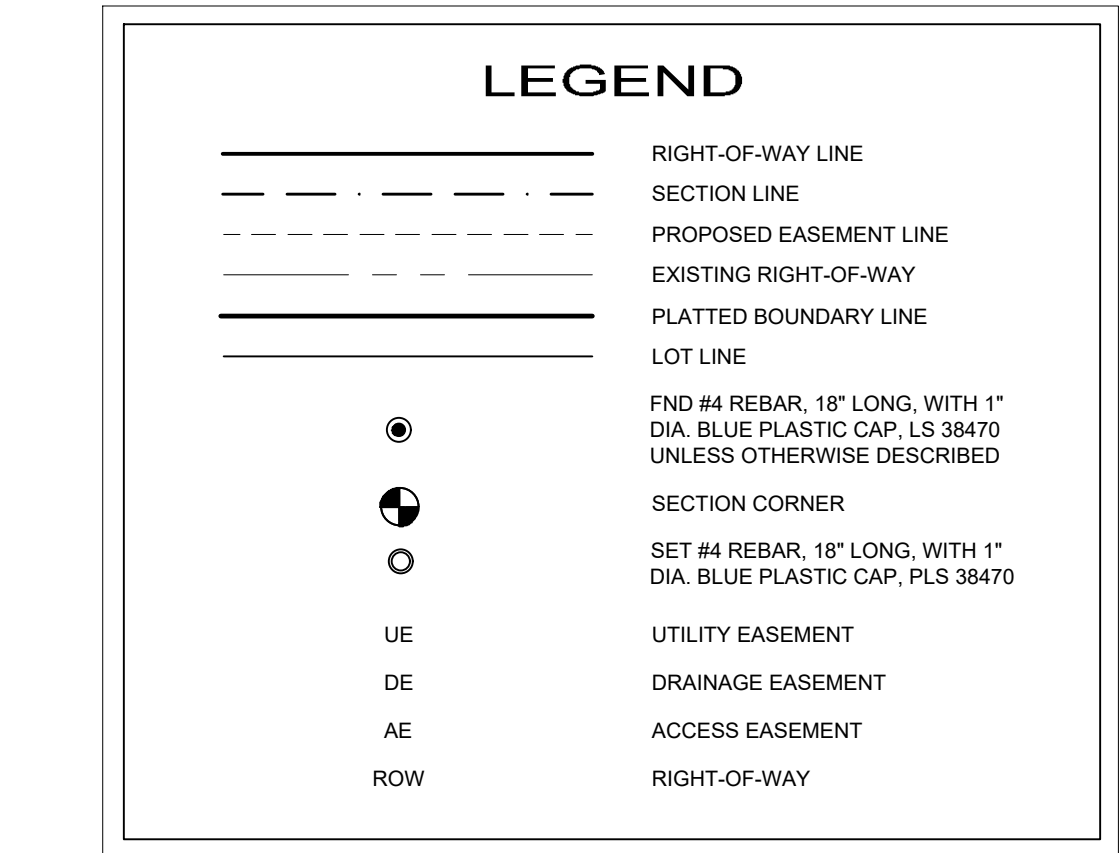
A REPLAT OF TRACTS B AND D, HERON LAKES TENTH FILING; TRACT C, HERON LAKES TWELFTH FILING, LOCATED IN SECTIONS 3 AND 4; AND A TRACT OF LAND LOCATED IN SECTION 3, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M., TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

CURVE TABLE				
CURVE	DELTA	RADIUS	LENGTH	BEARING
C1	45°08'33"	200.00'	157.58'	S67°45'15"E
C2	23°13'13"	300.00'	121.58'	N11°17'06"E
C3	22°53'21"	260.00'	103.87'	N11°27'02"E
C4	89°53'10"	53.00'	83.15'	N45°03'25"W
C5	15°50'20"	350.00'	96.75'	S52°44'27"W
C6	44°49'16"	350.00'	273.80'	S22°24'39"W
C7	89°59'46"	53.00'	83.25'	N45°00'07"W
C8	55°21'05"	165.00'	159.40'	N27°40'19"E
C9	20°39'36"	300.00'	108.18'	S10°19'48"W
C10	5°06'24"	1014.12'	90.39'	S15°34'12"W
C11	8°18'08"	550.00'	79.69'	S73°29'28"E
C12	20°50'48"	550.00'	200.11'	S58°55'00"E
C13	13°50'28"	550.00'	132.86'	S41°34'22"E
C14	34°39'08"	550.00'	332.64'	S17°19'34"E
C15	30°30'37"	200.00'	106.50'	S74°44'41"W
C16	45°08'33"	229.00'	180.43'	N67°45'15"W
C17	83°35'17"	15.00'	21.88'	N86°58'37"W
C18	9°25'52"	379.00'	62.39'	S55°56'41"W
C19	55°54'08"	8.00'	7.81'	S32°42'33"W
C20	291°48'16"	58.00'	295.39'	N29°20'23"W
C21	55°54'08"	8.00'	7.81'	N88°36'41"E
C22	55°32'11"	320.88'	311.03'	N32°54'11"E
C23	95°08'45"	15.00'	24.91'	N42°25'37"W
C24	55°54'08"	8.00'	7.81'	S62°02'56"W
C25	291°48'16"	58.00'	295.39'	N00°00'00"E
C26	55°54'08"	8.00'	7.81'	S62°02'56"E
C27	90°00'00"	15.00'	23.56'	N45°00'00"E
C28	90°00'00"	15.00'	23.56'	N45°00'00"E
C29	14°51'59"	149.00'	38.66'	S82°34'01"W
C30	119°35'30"	90.00'	187.85'	N45°04'13"W
C31	17°21'41"	126.47'	38.32'	N07°24'30"E
C32	55°21'05"	194.00'	187.42'	N27°40'19"E
C33	85°45'07"	15.00'	22.45'	N12°28'18"E
C34	30°24'16"	579.00'	307.25'	N15°12'08"W
C35	56°37'24"	58.00'	57.32'	N82°52'24"E
C36	90°00'00"	10.00'	15.71'	N45°00'00"W
C37	89°59'58"	10.00'	15.71'	N45°00'01"E
C38	90°00'00"	15.00'	23.56'	N45°00'00"E
C39	90°00'00"	15.00'	23.56'	N45°00'00"E
C40	90°00'00"	15.00'	23.56'	N45°00'00"W
C41	90°00'00"	15.00'	23.56'	N45°00'00"W
C42	53°08'27"	58.00'	53.79'	N26°34'14"E
C43	55°20'33"	58.00'	56.02'	N80°48'44"E
C44	9°53'27"	58.00'	10.01'	S66°34'16"E
C45	48°49'44"	58.00'	49.43'	S37°12'41"E
C46	53°57'31"	58.00'	54.62'	S14°10'57"W
C47	30°48'28"	58.00'	31.19'	S56°33'56"W
C48	71°58'10"	26.00'	32.66'	S35°59'05"W
C49	94°32'37"	15.00'	24.75'	S06°10'23"E
C50	24°12'21"	521.00'	220.03'	S65°32'37"E
C51	90°00'00"	15.00'	23.56'	N57°21'28"E
C52	6°03'35"	1029.00'	108.63'	S15°23'16"W
C53	55°33'08"	8.00'	7.84'	S09°40'36"E
C54	291°48'13"	58.00'	295.39'	N71°52'10"W
C55	53°27'16"	8.30'	7.74'	N46°14'10"E
C56	6°04'55"	971.00'	103.07'	N15°23'56"E
C57	90°04'05"	15.00'	23.56'	N32°36'32"W
C58	4°04'17"	579.00'	40.97'	N75°36'55"W
C59	85°45'07"	15.00'	22.45'	S63°32'09"W
C60	20°39'36"	271.00'	97.72'	S10°19'48"W
C61	90°00'00"	15.00'	23.56'	S45°00'00"E
C62	14°51'59"	149.00'	38.66'	N82°34'01"E
C63	119°35'30"	90.00'	187.85'	S45°04'13"E
C64	17°20'57"	126.47'	38.30'	S07°24'51"W
C65	22°53'43"	289.00'	115.48'	S11°26'51"W
C66	23°13'13"	271.00'	109.83'	S11°17'06"W
C67	90°00'00"	15.00'	23.56'	S45°19'31"E
C68	90°00'00"	15.00'	23.56'	N44°40'29"E
C69	45°08'33"	171.00'	134.73'	S67°45'15"E
C70	83°35'17"	15.00'	21.88'	S03°23'20"E
C71	38°24'19"	379.00'	254.04'	S19°12'10"W
C72	89°59'59"	15.00'	23.56'	S45°00'01"W
C73	89°53'10"	24.00'	37.65'	N45°03'25"W
C74	22°52'54"	231.00'	92.25'	N11°27'15"E
C75	23°13'13"	329.00'	133.33'	N11°17'06"E
C76	90°00'00"	15.00'	23.56'	N45°00'00"E
C77	89°59'46"	24.00'	37.70'	S45°00'07"E

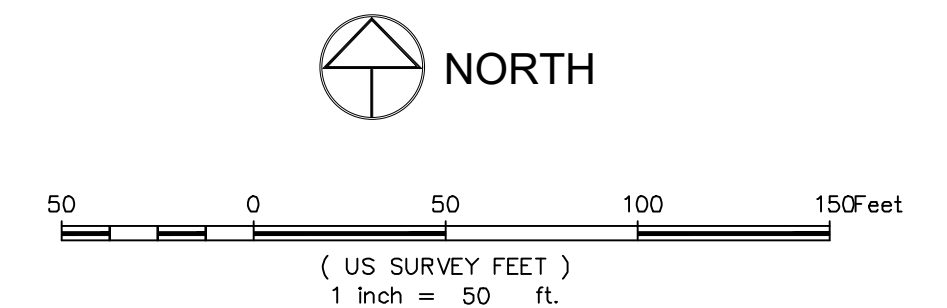
CURVE TABLE				
CURVE	DELTA	RADIUS	LENGTH	BEARING
C78	55°21'05"	136.00'	131.38'	S27°40'19"W
C79	85°45'07"	15.00'	22.45'	N81°46'35"W
C80	26°11'30"	579.00'	264.68'	N51°59'46"W
C81	85°45'07"	15.00'	22.45'	N22°12'58"W
C82	20°39'36"	329.00'	118.63'	N10°19'48"E
C83	6°33'49"	379.00'	43.42'	S57°22'43"W
C84	55°24'13"	58.00'	56.08'	S32°27'35"W
C85	39°50'32"	58.00'	40.33'	N53°24'02"W
C86	39°53'37"	58.00'	40.38'	N13°31'57"W
C87	55°16'30"	58.00'	55.95'	N34°03'06"E
C88	54°52'24"	58.00'	55.55'	N89°07'33"E
C89	9°50'32"	320.88'	55.12'	N55°45'01"E
C90	49°33'30"	58.00'	50.17'	S58°52'37"W
C91	59°16'22"	58.00'	60.00'	N66°42'28"W
C92	45°03'45"	58.00'	45.62'	N32°01'50"E
C93	86°10'39"	15.00'	22.56'	S43°05'19"E
C94	34°43'02"	58.00'	35.14'	S51°27'23"E
C95	3°49'21"	15.00'	1.00'	N88°05'19"W
C96	10°39'31"	149.00'	27.72'	S84°40'15"W
C97	4°12'28"	149.00'	10.94'	S77°14'15"W
C98	30°21'49"	90.00'	47.70'	N89°41'04"W
C99	35°44'26"	90.00'	56.14'	N56°37'57"W
C100	37°21'15"	90.00'	58.68'	N20°05'07"W
C101	16°08'01"	90.00'	25.34'	N06°39'31"E
C102	6°13'04"	194.00'	21.05'	N03°06'18"E
C103	21°45'35"	194.00'	73.68'	N17°05'38"E
C104	0°00'40"	579.00'	0.11'	N30°23'56"W
C105	7°50'46"	579.00'	79.29'	N26°28'13"W
C106	6°55'37"	579.00'	70.00'	N19°05'01"W
C107	6°55'40"	579.00'	70.01'	N12°09'23"W
C108	6°55'37"	579.00'	70.00'	N05°13'44"W
C109	1°45'56"	579.00'	17.84'	N00°52'58"W
C110	3°49'21"	15.00'	1.00'	S88°05'19"E
C111	11°46'56"	171.00'	35.16'	N84°06'32"E
C112	18°43'41"	171.00'	55.89'	N68°51'14"E
C113	55°54'08"	8.00'	7.81'	N31°32'19"E
C114	69°14'06"	58.00'	70.09'	N38°12'18"E
C115	50°08'30"	58.00'	50.76'	S82°06'24"E
C117	9°53'30"	58.00'	10.01'	S52°05'24"E
C118	47°34'57"	58.00'	48.17'	S23°21'11"E
C119	49°32'15"	58.00'	50.15'	S25°12'25"W
C120	58°03'59"	58.00'	58.78'	S79°00'32"W
C121	7°21'00"	58.00'	7.44'	N68°16'59"W
C122	55°54'08"	8.00'	7.81'	S87°26'27"W
C123	3°53'28"	229.00'	15.55'	S61°26'07"W
C124	17°37'36"	229.00'	70.45'	S72°11'39"W
C125	8°59'33"	229.00'	35.94'	S85°30'14"W
C126	7°57'51"	15.00'	2.09'	S86°01'05"W
C127	87°01'28"	15.00'	22.78'	S38°31'25"W
C128	36°28'44"	521.00'	349.90'	S24°13'41"E
C129	87°01'28"	15.00'	22.78'	S86°58'47"E
C130	8°24'33"	15.00'	2.20'	N45°18'12"E
C131	55°54'08"	8.00'	7.81'	N13°08'51"E
C132	35°44'26"	90.00'	56.14'	N56°37'57"W
C133	3°34'55"	58.00'	3.63'	N13°00'45"W
C134	82°25'18"	58.00'	83.43'	N29°59'21"E
C135	41°28'20"	58.00'	41.98'	S88°03'49"E
C136	47°53'56"	58.00'	48.49'	S43°22'41"E
C137	7°31'09"	15.00'	1.97'	S37°20'21"W
C138	3°49'21"	15.00'	1.00'	S79°33'13"E
C139	2°39'19"	1029.00'	47.69'	S13°41'08"W
C140	2°47'29"	1029.00'	50.13'	S16°24'32"W
C141	0°36'48"	1029.00'	11.01'	S18°06'40"W
C142	37°43'37"	58.00'	38.19'	S18°54'28"E
C143	41°10'26"	58.00'	41.68'	S20°32'34"W
C144	37°47'44"	58.00'	38.26'	S60°01'39"W
C145	36°25'19"	58.00'	38.89'	N81°51'49"W
C146	37°39'39"	58.00'	38.12'	N43°49'20"W
C147	38°39'12"	58.00'	39.13'	N05°39'55"W
C148	60°22'15"	58.00'	61.11'	N43°50°49"E
C149	2°16'27"	289.00'	11.47'	S21°45'29"W
C150	15°41'00"	271.00'	74.18'	S12°49'06"W
C151	4°58'36"	271.00'	23.54'	S02°29'18"W
C152	3°49'21"	15.00'	1.00'	S01°54'41"E
C153	7°37'55"	149.00'	19.85'	N86°11'02"E

CURVE TABLE					
CURVE	DELTA	RADIUS	LENGTH	BEARING	CHORD
C154	7°14'04"	149.00'	18.81'	N78°45'03"E	18.80'
C155	31°22'52"	90.00'	49.29'	S89°10'33"E	48.68'
C156	40°02'32"	90.00'	62.90'	S53°27'51"E	61.63'
C157	40°43'29"	90.00'	63.97'	S13°04'50"E	62.63'
C158	7°26'38"	90.00'	11.69'	S11°00'13"W	11.68'
C159	0°55'15"	289.00'	4.64'	S00°27'37"W	4.64'
C160	14°29'12"	289.00'	73.07'	S08°09'50"W	72.88'
C161	5°12'49"	289.00'	26.30'	S18°00'51"W	26.29'
C162	21°52'05"	271.00'	103.43'	S11°31'39"W	102.81'
C163	1°21'08"	271.00'	6.40'	S00°21'03"W	6.40'
C164	3°49'38"	15.00'	1.00'	N75°44'00"W	1.00'
C165	24°30'38"	24.00'	10.27'	N12°22'09"W	10.19'
C166	16°10'00"	231.00'	65.18'	N08°05'48"E	64.96'
C167	3°49'20"	15.00'	1.00'	S01°54'41"W	1.00'
C168	5°13'30"	379.00'	34.56'	S02°36'45"W	34.55'
C169	10°06'15"	379.00'	66.84'	S10°16'38"W	66.75'
C170	10°06'15"	379.00'	66.84'	S20°22'53"W	66.75'
C171	10°06'15"	379.00'	66.84'	S30°29'08"W	66.75'
C172	85°27'19"	15.00'	22.37'	N22°21'52"W	20.36'
C173	65°22'32"	24.00'	27.38'	N57°18'44"W	25.92'
C174	9°04'45"	329.00'	52.13'	N16°07'13"E	52.08'
C175	11°34'51"	329.00'	66.50'	N05°47'25"E	66.39'
C176	3°49'21"	15.00'	1.00'	N01°54'41"E	1.00'
C177	86°10'39"	15.00'	22.56'	N46°54'41"E	20.49'
C178	65°22'32"	24.00'	27.38'	S57°18'44"E	25.92'
C179	24°37'14"	24.00'	10.31'	S12°18'51"E	10.23'
C180	11°45'25"	136.00'	27.91'	S05°52'29"W	27.86'
C181	43°35'41"	136.00'	103.48'	S33°33'01"W	101.00'
C182	86°10'39"	15.00'	22.56'	S46°54'41"W	20.49'
C183	85°27'19"	15.00'	22.37'	N81°37'41"W	20.36'
C184	46°31'00"	58.00'	47.09'	S83°25'12"W	45.81'
C185	2°52'04"	379.00'	18.97'	S52°39'46"W	18.89'
C186	45°41'39"	320.88'	255.91'	N27°58'55"E	249.18'
C187	46°34'15"	58.00'	47.14'	N13°47'10"W	45.86'
C188	39°24'09"	58.00'	39.89'	S00°16'21"W	39.11'
C189	20°23'37"	208.00'	74.03'	N45°09'03"E	73.64'
C190	27°22'26"	194.00'	92.69'	N41°39'39"E	91.81'
C191	13°14'04"	507.00'	117.11'	S09°54'45"E	116.85'
C192	77°01'38"	58.00'	77.97'	S58°29'14"W	72.23'
C193	1°18'38"	8.00'	0.18'	N83°39'16"W	0.18'
C194	54°35'30"	8.00'	7.62'	S68°23'40"W	7.34'
C195	17°48'20"	507.00'	157.56'	S36°15'28"E	156.93'
C196	251°58'10"	58.00'	255.07'	N54°00'55"W	93.86'
C197	90°00'00"	15.00'	23.56'	N45°00'00"W	21.21'
C198	87°01'28"	15.00'	22.78'	S09°55'58"E	20.66'
C199	86°10'39"	15.00'	22.56'	N55°26'47"E	20.49'
C200	86°10'39"	15.00'	22.56'	S47°14'12"E	20.49'
C201	2°52'04"	379.00'	18.97'	S36°58'17"W	18.97'
C202	86°10'39"	15.00'	22.56'	S46°54'41"E	20.49'
C203	85°27'19"	15.00'	22.37'	S63°41'03"W	20.36'
C204	2°20'37"	306.89'	12.55'	N22°19'45"E	12.55'
C205	10°17'51"	150.00'	150.70'	S60°16'02"E	150.15'
C206	0°17'48"	15.00'	0.80'	S55°29'46"W	0.08'
C207	10°35'27"	593.00'	109.81'	N42°45'03"W	109.46'
C208	0°17'48"	15.00'	0.80'	N20°30'42"E	0.08'
C209	10°46'52"	593.00'	111.58'	N61°08'47"W	111.42'
C210	0°17'48"	15.00'	0.80'	S20°48'30"W	0.08'
C211	6°42'55"	231.00'	27.07'	N19°32'15"E	27.06'
C212	4°47'29"	957.00'	80.03'	N14°45'13"E	80.01'
C213	0°05'54"	971.00'	1.67'	N18°23'26"E	1.67'
C214	3°49'21"	15.00'	1.00'	S02°14'12"E	1.00'
C215	5°29'58"	593.00'	56.91'	N74°53'34"W	56.89'
C216	291°48'18"	58.00'	295.39'	N30°30'17"W	65.03'
C217	94°59'19"	15.00'	24.87'	N42°30'21"E	22.12'
C218	291°48'18"	58.00'	295.39'	N48°44'05"W	65.03'
C219	55°54'08"	8.00'	7.81'	N69°03"E	0.50'
C220	95°26'01"	15.00'	98.00'	N55°54'54"E	21.89'

A REPLAT OF TRACTS B AND D, HERON LAKES TENTH FILING; TRACT C, HERON LAKES TWELFTH FILING, LOCATED IN SECTIONS 3 AND 4; AND A TRACT OF LAND LOCATED IN SECTION 3, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M., TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO



SEE SHEET 4



DRAFT
1-20-23
**PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION**

PRELIMINARY
For and on behalf of Northern Engineering Services, Inc.
Robert C. Tossely
Colorado Registered Professional Land Surveyor No. 38470

According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years after the date of the certificate shown hereon.

3 & 4

TOWNSHIP:
4N

RANGE:
69 W of the 6th PM

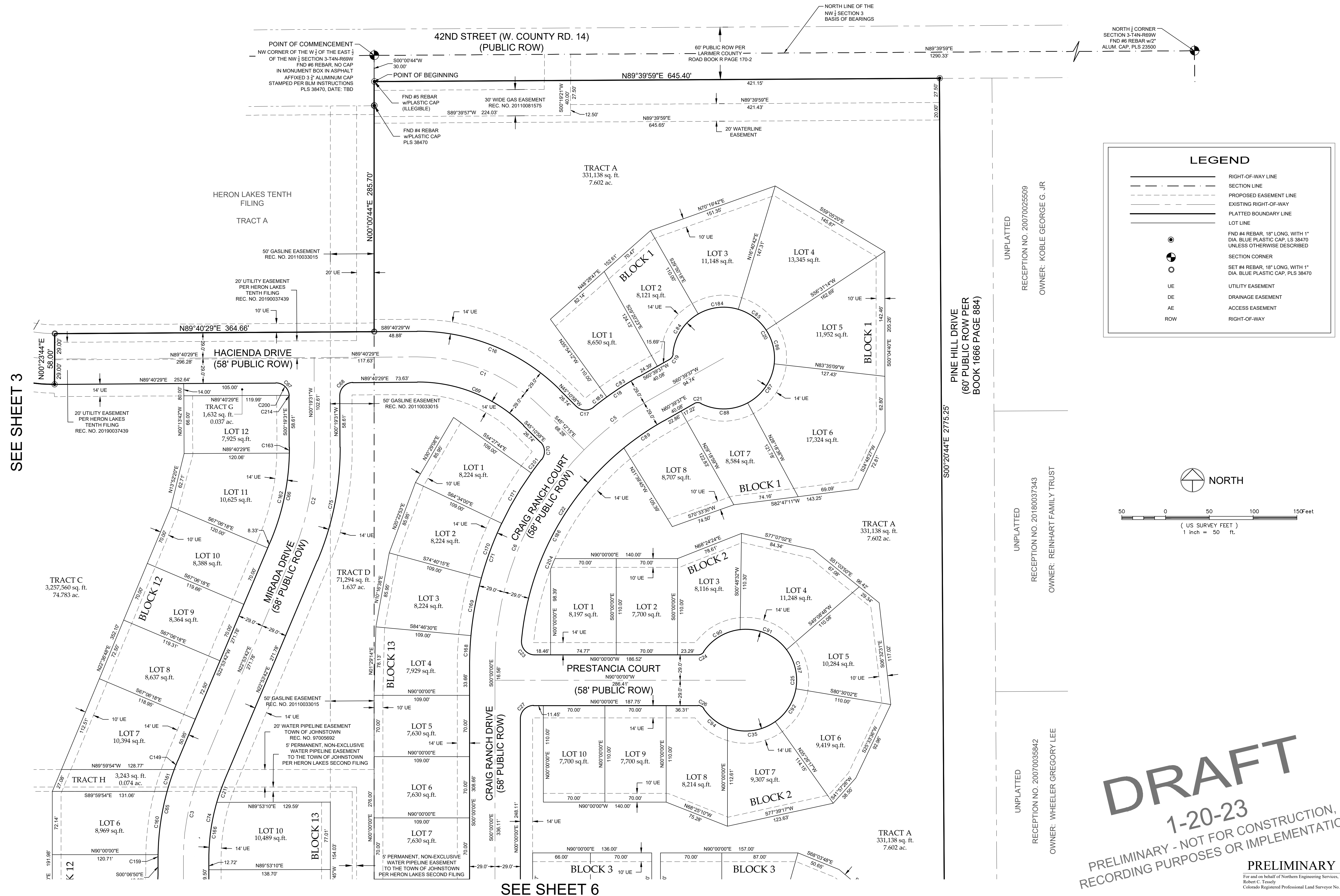
NE | **NORTHERN
ENGINEERING**
SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.221.4158
NORTHERNENGINEERING.COM

CLIENT: Hillside Commercial Group	SCALE: 1"=50'	REVIEWED BY: R. Tessely
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TOWN OF BERTHOUD
STATE OF COLORADO

Sheet
3
Of 9 Sheets

A REPLAT OF TRACTS B AND D, HERON LAKES TENTH FILING; TRACT C, HERON LAKES TWELFTH FILING, LOCATED IN SECTIONS 3 AND 4; AND A TRACT OF LAND LOCATED IN SECTION 3, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M., TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO



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3 & 4

TOWNSHIP:
4N

RANGE:
69 W of the 6th PM

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ENGINEERING**
SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.221.4158
NORTHERNENGINEERING.COM

CLIENT: Hillside Commercial Group	SCALE: 1"=50'	REVIEWED BY: R. Tessely
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TOWN OF BERTHOUD
STATE OF COLORADO

Sheet
4
Of 9 Sheets

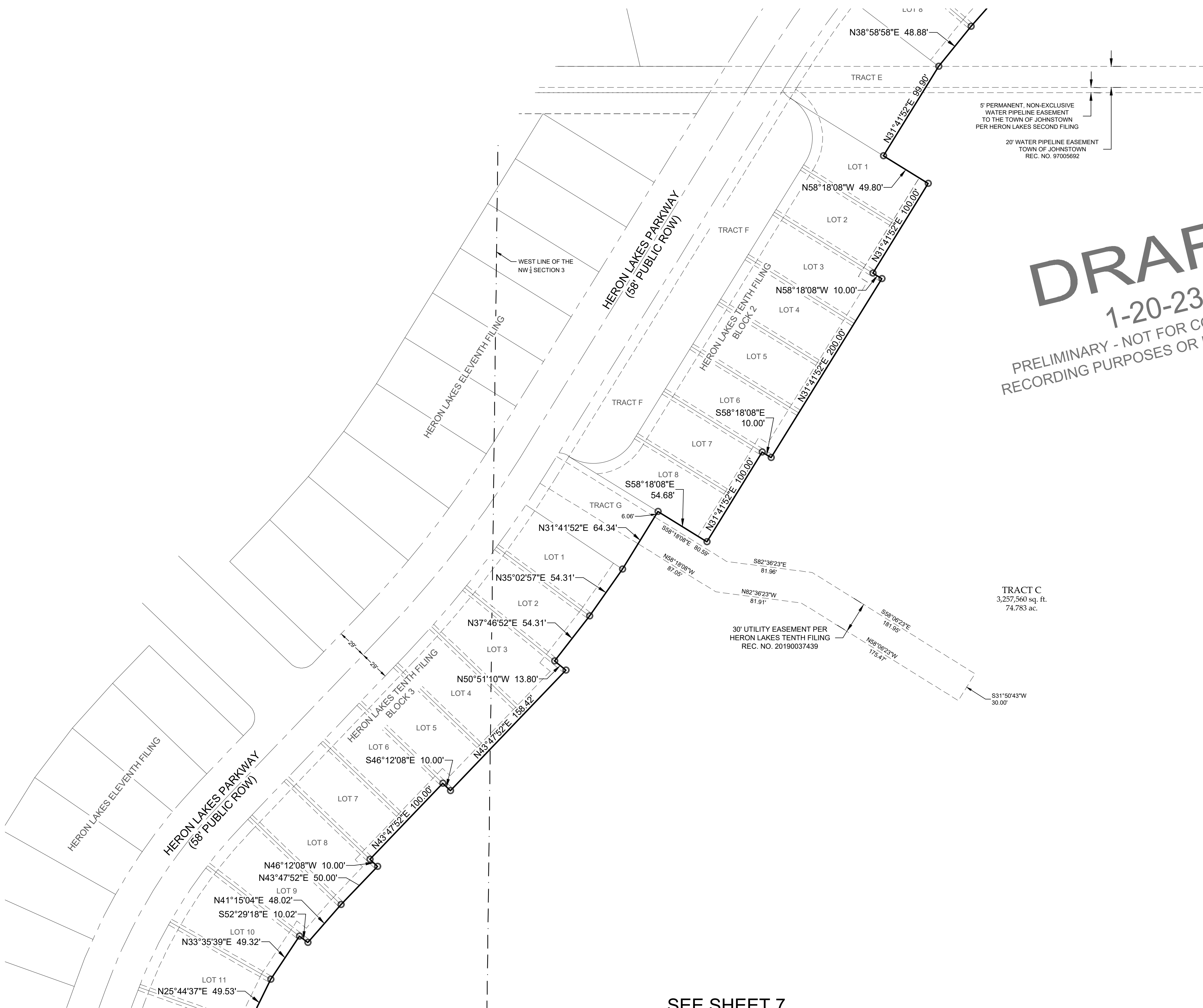
DRAFT
1-20-23
PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION

PRELIMINARY
For and on behalf of Northern Engineering Services, Inc.
Robert C. Tessely
Colorado Registered Professional Land Surveyor No. 38470

HERON LAKES SEVENTEENTH FILING

A REPLAT OF TRACTS B AND D, HERON LAKES TENTH FILING; TRACT C, HERON LAKES TWELFTH FILING, LOCATED IN SECTIONS 3 AND 4; AND A TRACT OF LAND LOCATED IN SECTION 3, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M., TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

SEE SHEET 3



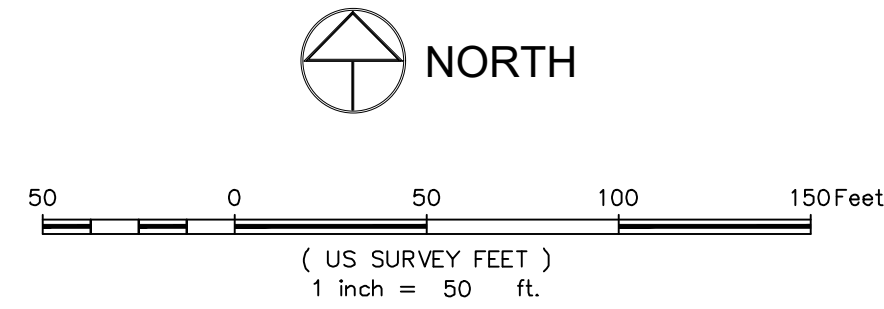
5' PERMANENT, NON-EXCLUSIVE
WATER PIPELINE EASEMENT
TO THE TOWN OF JOHNSTOWN
PER HERON LAKES SECOND FILING

20' WATER PIPELINE EASEMENT
TOWN OF JOHNSTOWN
REC. NO. 97005692

DRAFT
1-20-23
PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION

LEGEND	
	RIGHT-OF-WAY LINE
	SECTION LINE
	PROPOSED EASEMENT LINE
	EXISTING RIGHT-OF-WAY
	PLATTED BOUNDARY LINE
	LOT LINE
	FND #4 REBAR, 18" LONG, WITH 1" DIA. BLUE PLASTIC CAP, LS 38470 UNLESS OTHERWISE DESCRIBED
	SET #4 REBAR, 18" LONG, WITH 1" DIA. BLUE PLASTIC CAP, PLS 38470
	UTILITY EASEMENT
	DRAINAGE EASEMENT
	ACCESS EASEMENT
	RIGHT-OF-WAY

SEE SHEET 6



SEE SHEET 7

PRELIMINARY

For and on behalf of Northern Engineering Services, Inc.
Robert C. Towley
Colorado Registered Professional Land Surveyor No. 38470

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SECTION:
3 & 4
TOWNSHIP:
4N
RANGE:
69 W of the 6th PM

NORTHERN ENGINEERING
SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.221.4188 NORTHERNENGINEERING.COM

PROJECT:
103-007
CLIENT: Hillside Commercial Group
DATE:
1/20/23
SCALE:
1"=50'
DRAWN BY:
L. Smith
REVIEWED BY:
R. Towley

HERON LAKES SEVENTEENTH FILING
TOWN OF BERTHOUD
STATE OF COLORADO

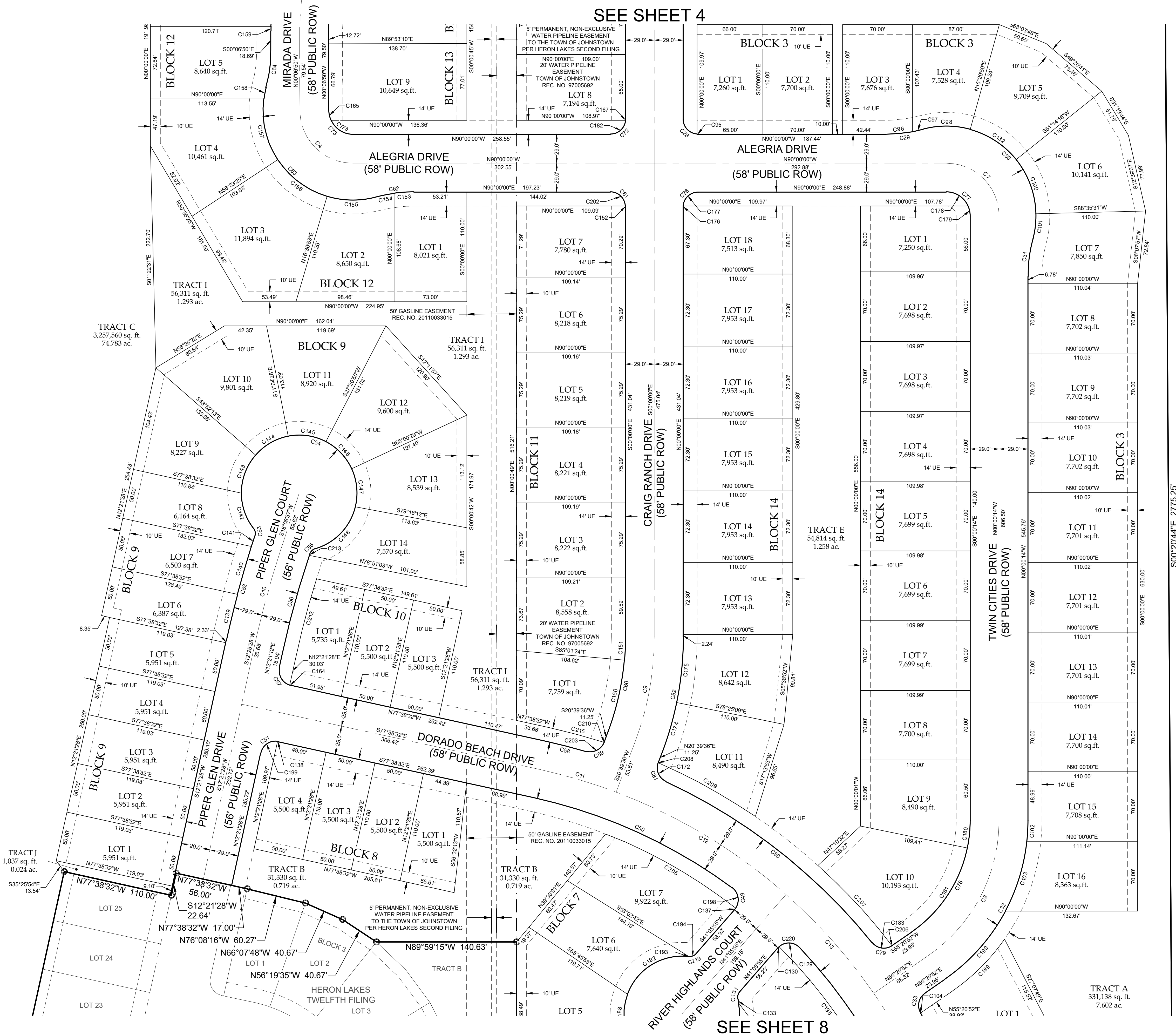
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SEE SHEET 5

SEE SHEET 4

SEE SHEET 8



UNPLATTED
RECEPTION NO. 20170066589
OWNER: DREITH BILLY

UNPLATTED
RECEPTION NO. NOT AVAILABLE
OWNER: RIOS HENRY

PINE HILL DRIVE
(60' PUBLIC ROW PER
BOOK 1666 PAGE 884)

DRAFT
1-20-23
PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION

PRELIMINARY
For and on behalf of Northern Engineering Services, Inc.
Robert C. Towley
Colorado Registered Professional Land Surveyor No. 38470

HERON LAKES SEVENTEENTH FILING
TOWN OF BERTHOUD
STATE OF COLORADO

Sheet
6
Of 9 Sheets

PROJECT: 103-007
CLIENT: Hillside Commercial Group
DATE: 1/20/23
SCALE: 1"=50'
DRAWN BY: L. Smith
REVIEWED BY: R. Towsley

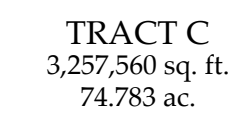
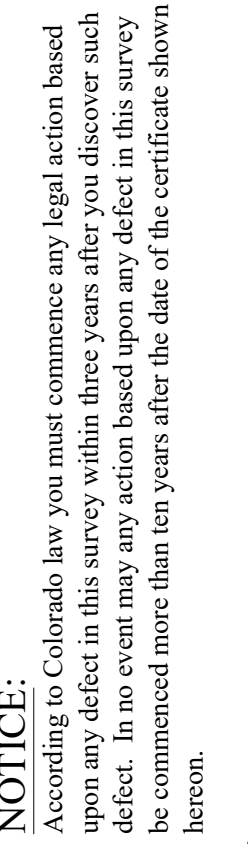
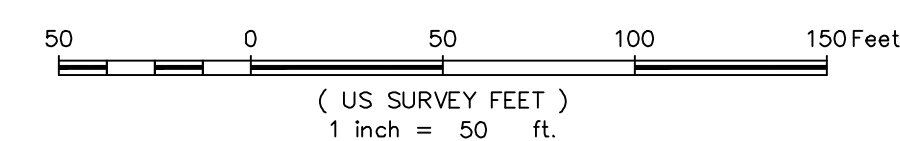
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SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.221.4188 NORTHERNENGINEERING.COM

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SECTION: 3 & 4
TOWNSHIP: 4N
RANGE: 69 W of the 6th PM

A REPLAT OF TRACTS B AND D, HERON LAKES TENTH FILING; TRACT C, HERON LAKES TWELFTH FILING, LOCATED IN SECTIONS 3 AND 4; AND A TRACT OF LAND LOCATED IN SECTION 3, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M., TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

DRAFT
1-20-23
PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION

 NORTH

SECTION:
3 & 4

TOWNSHIP:
4N

RANGE:
69 W of the 6th PM

NE | **NORTHERN
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SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.221.4158 NORTHERNENGINEERING.COM

103-097	1/20/23
CLIENT: Hillside Commercial Group	SCALE: 1"=50'
DRAWN BY: L. Smith	REVIEWED BY: R. Tessely

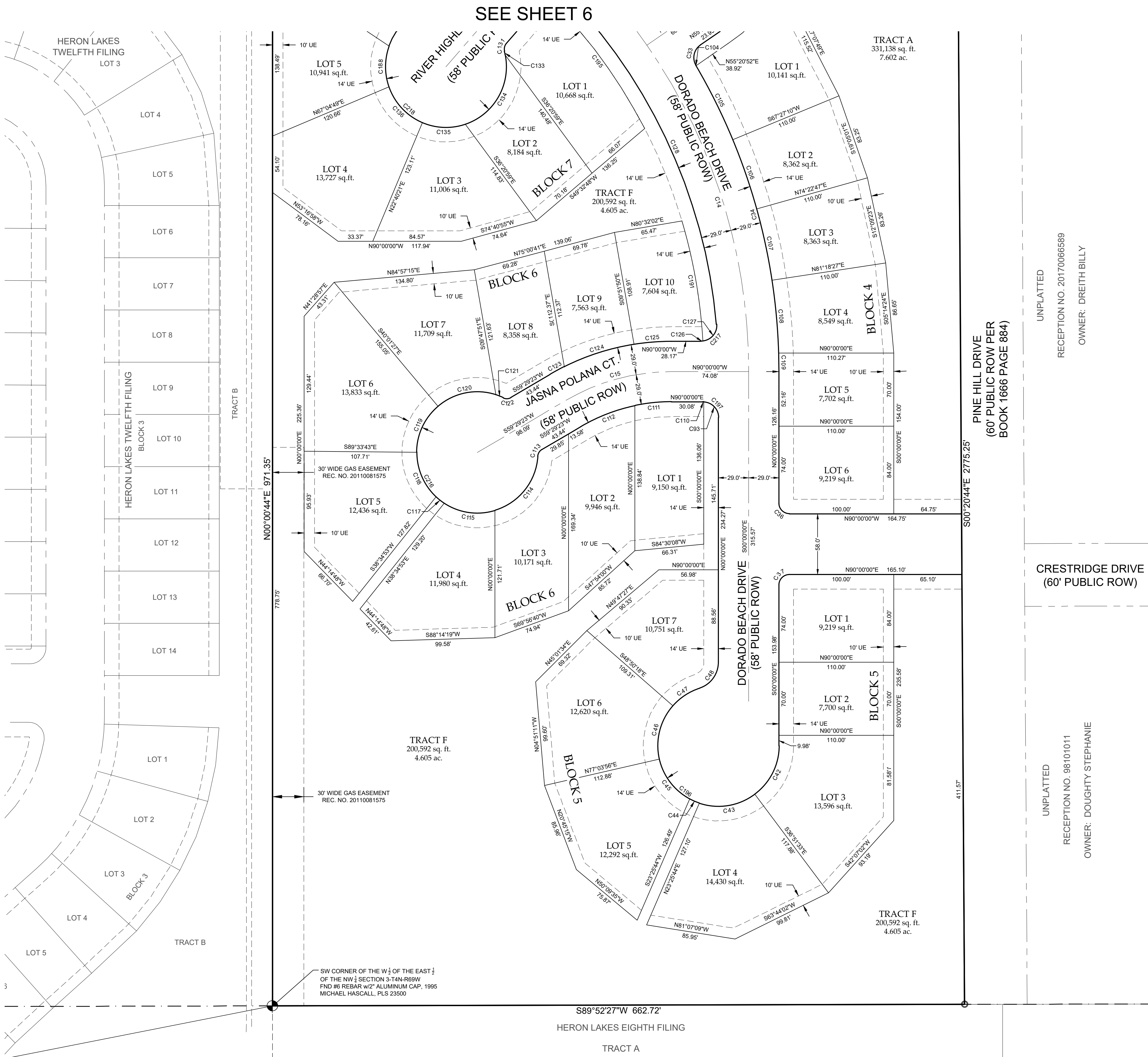
TOWN OF BERTHOUD
STATE OF COLORADO

Sheet
7
Of 9 Sheets

PRELIMINARY
For and on behalf of Northern Engineering Services, Inc.
Robert C. Tessely
Colorado Registered Professional Land Surveyor No. 38470

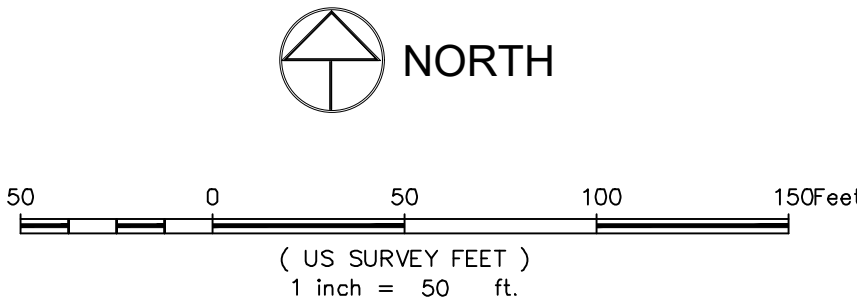
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LEGEND

---	RIGHT-OF-WAY LINE
---	SECTION LINE
---	PROPOSED EASEMENT LINE
---	EXISTING RIGHT-OF-WAY
---	PLATTED BOUNDARY LINE
---	LOT LINE
●	FIND #4 REBAR, 18" LONG, WITH 1" DIA. BLUE PLASTIC CAP, LS 38470 UNLESS OTHERWISE DESCRIBED
○	SECTION CORNER
○	SET #4 REBAR, 18" LONG, WITH 1" DIA. BLUE PLASTIC CAP, PLS 38470
UE	UTILITY EASEMENT
DE	DRAINAGE EASEMENT
AE	ACCESS EASEMENT
ROW	RIGHT-OF-WAY



DRAFT

1-20-23

PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION

PRELIMINARY

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Robert C. Towley
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RANGE:
69 W of the 6th PM

NORTHERN ENGINEERING

SURVEY | MUNICIPAL | LAND DEVELOPMENT

FORT COLLINS | GREELEY 970.221.4158 NORTHERNENGINEERING.COM

PROJECT:
103-007

CLIENT: Hillside Commercial Group

DATE:
1/20/23

SCALE:
1"=50'

DRAWN BY:
L. Smith

REVIEWED BY:
R. Towsley

HERON LAKES SEVENTEENTH FILING

TOWN OF BERTHOUD

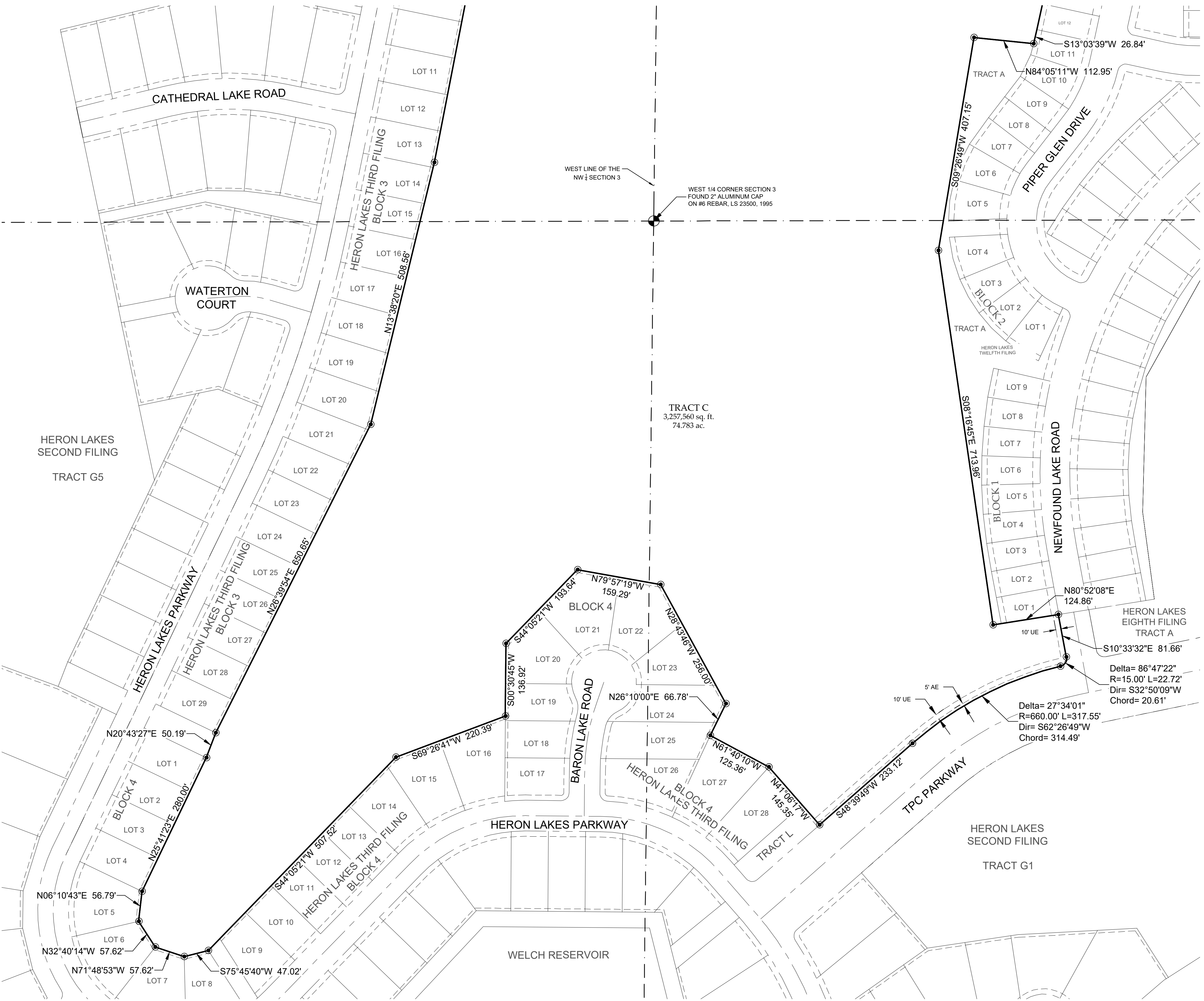
STATE OF COLORADO

Sheet
8
Of 9 Sheets

HERON LAKES SEVENTEENTH FILING

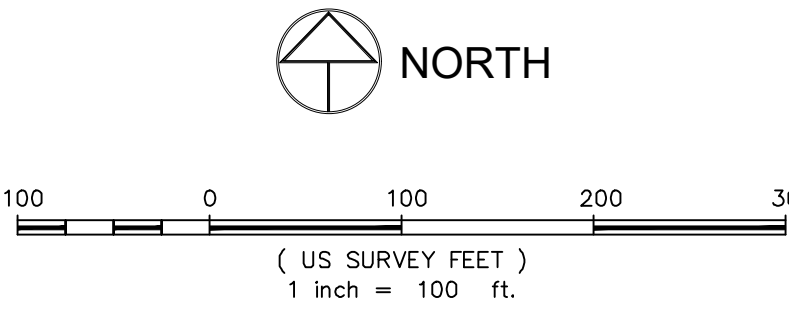
A REPLAT OF TRACTS B AND D, HERON LAKES TENTH FILING; TRACT C, HERON LAKES TWELFTH FILING, LOCATED IN SECTIONS 3 AND 4; AND A TRACT OF LAND LOCATED IN SECTION 3, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M., TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

SEE SHEET 7



LEGEND

---	RIGHT-OF-WAY LINE
---	SECTION LINE
---	PROPOSED EASEMENT LINE
---	EXISTING RIGHT-OF-WAY
---	PLATTED BOUNDARY LINE
---	LOT LINE
●	FND #4 REBAR, 18" LONG, WITH 1" DIA. BLUE PLASTIC CAP, L.S. 38470 UNLESS OTHERWISE DESCRIBED
○	SECTION CORNER
○	SET #4 REBAR, 18" LONG, WITH 1" DIA. BLUE PLASTIC CAP, L.S. 38470
UE	UTILITY EASEMENT
DE	DRAINAGE EASEMENT
AE	ACCESS EASEMENT
ROW	RIGHT-OF-WAY



DRAFT
1-20-23
PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION

PRELIMINARY
For and on behalf of Northern Engineering Services, Inc.
Robert C. Towley
Colorado Registered Professional Land Surveyor No. 38470

NOTICE:
According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years after the date of the certificate shown herein.

SECTION:
3 & 4
TOWNSHIP:
4N
RANGE:
69 W of the 6th PM

NORTHERN ENGINEERING
SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.221.4188 NORTHERNENGINEERING.COM

PROJECT:
103-007
DATE:
1/20/23
CLIENT: Hillside Commercial Group
SCALE:
1"=100'
DRAWN BY:
L. Smith
REVIEWED BY:
R. Tressely

HERON LAKES SEVENTEENTH FILING
TOWN OF BERTHOUD
STATE OF COLORADO

From: [Ann Baker](#)
To: [Curt Freese](#); [Adam Olinger](#)
Subject: Heron Lakes 17th Filing public comment
Date: Thursday, February 11, 2021 1:00:37 PM

Hello,

Thank you for the opportunity to comment on the Heron Lakes 17th Filing.

This development is roughly 1/3 mile to the west of Heron Pointe along West County Road 14. Despite being 1,700 feet apart, there is no sidewalk connecting the two neighborhoods. That's becoming a problem as more people move to the area, and the narrow County Road 14 becomes busier and busier. Every single day, I notice pedestrians – myself included – who have to jump into the ditch to get out of a car's way. And along that stretch of road, the speed limit is a dangerous 45 miles per hour.

Heron Lakes has plans for more than 1,200 housing units, which means all of the children in that community are unable to safely walk or bike to their neighborhood school, Carrie Martin Elementary, which is only a 5-minute bike ride away.

Berthoud's municipal code calls for sidewalks, walkways and trails "to assure a safe, convenient, and attractive pedestrian/bicycle system that minimizes conflicts between vehicles, bicycles and pedestrians." Right now, the town's code is not being upheld.

In 2018, a 13-year-old boy was struck and killed on Wilson Avenue in Loveland on a portion of road in which there was no sidewalk. Please don't wait until something tragic like that happens in Berthoud. Please do not allow more homes to be built in Heron Lakes until a sidewalk can connect the development to Heron Pointe.

Thank you for your time,
Ann Baker

February 23, 2023
Town of Berthoud
Development Review
807 Mountain Ave.
Berthoud, CO 80513

RE: HERON-CRAN SUBDIVISION
STREETS VARIANCE REQUEST – STANDARD STREET SECTION
NORTHERN PROJECT #109-097

To whom it may concern:

Northern Engineering would like to present this variance request for the Heron-Cran Subdivision project. General information about the project is presented below, and detailed information about the nature of this request follows.

General Information

The project site is located at the northeast corner of the Heron Lakes development in Berthoud, Colorado. The site lies south of Larimer County Road 14 (CR 14), east of Heron Lakes Parkway, north of TPC Parkway, and west of Pine Hill Drive. The site currently is open space; this project is slated to develop the property as low-density, single family home sites, as with the rest of the Heron Lakes development.

County Road 14

Part of this project includes widening CR 14 at the north frontage of the property, at the intersection with Heron Lakes Parkway. CR 14 is classified in the 2021 Berthoud Transportation Plan Map as a major collector road. Part of this project will include widening CR 14 along the frontage of the property (on the south side of CR 14) to incorporate the lanes and striping required of a major collector road and those elements called for in the TIS.

The full major collector street section includes curb and gutter at the outside edge of the drive lanes. We would like to request a variance to the requirement for curb and gutter that would be part of the CR 14 improvements that are part of this project.

Curb and gutter on the south side of CR 14 currently ends at the western edge of the Heron Pointe subdivision, approximately 700-feet to the west of Pine Hill Drive. There is no curb and gutter on the north side of CR 14 extending east all the way to Berthoud Parkway. There is very little additional development potential on either side of CR 14 within the stretch that has been identified as a major collector road in the Transportation Plan; all of these areas are either already subdivided or are governed by a Conservation Easement that does not allow any future development.

Further, the Heron Lakes development, from the beginning of the project, has been requested to be rural in character and has had the density limited with the idea of “feathering” the development to a rural character on CR 14. We are simply requesting that the road design reflects this requested aesthetic, and feel that maintaining this aesthetic is beneficial to the public good, particularly the existing residents along that corridor. Drainage patterns will still function the same as originally intended so there is no detriment to function or design, and the requested variance creates no conflicts with the ultimate drive lane design or functionality of a major collector street.

If you have any questions, please feel free to contact me directly.

Sincerely,
NORTHERN ENGINEERING SERVICES, INC.



AUSTIN SNOW, PE
Project Engineer

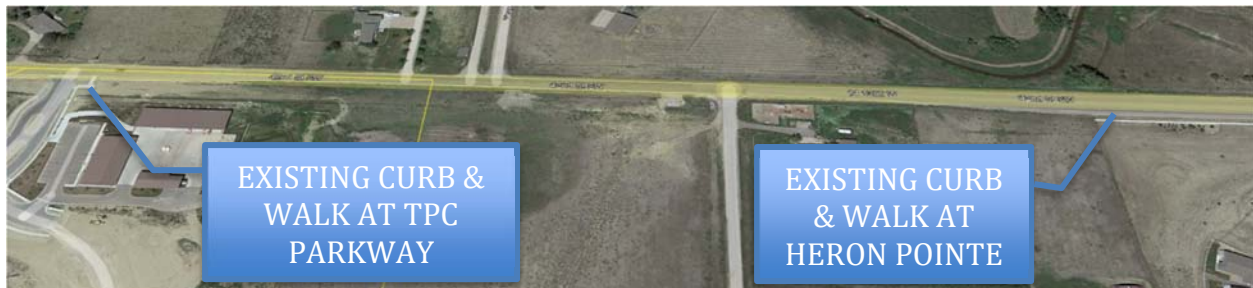


Town of Berthoud
807 Mountain Ave.
P.O. Box 1229
Berthoud, CO 80513
970.532.2643

February 28, 2023

**RE: HERON-CRAN SUBDIVISION STREETS VARIANCE REQUEST – STANDARD STREET SECTION
NORTHERN PROJECT #109-097**

Baseline has received and reviewed the waiver request from Northern Engineering dated February 23, 2023. The project requires widening CR 14 at the north frontage of the property. CR 14 is classified as a major collector road. Part of this project will include widening CR 14 along the frontage of the property (on the south side of CR 14) to incorporate the lanes and striping required of a major collector road and those elements called for in the TIS and as required by Section 305 of the Engineering and Infrastructure Standards. The typical section for a major collector street section includes curb and gutter. The applicant is requesting a variance to the requirement for curb and gutter and is proposing a rural road section.



Waiver criteria for approval. The condition of any waiver authorized shall be stated in writing in the minutes of the Board with the justifications set forth. Per Section 30-3-109 of the code Waivers may be granted only if they meet one of the following criteria:

1. The waiver, if granted, will not alter the essential character of the neighborhood or district in which the property is located, nor diminish the value, use or enjoyment of adjacent property.

Granting the waiver would allow a rural character rather than the intended urban street section continuation from Heron Point.

2. The waiver, if granted, is the minimum waiver of applicable Code provision that will afford relief and is the least modification possible of the Code provisions which are in question.

Granting the waiver would be a minor modification as the rural section does exist currently. This is however a major collector and the standards for the road section do reflect curb and gutter as a standard requirement.

3. That such practical difficulties or unnecessary hardship has not been created by the applicant.

The applicant has not demonstrated an unnecessary hardship from the standard.

4. The waiver would substantially alleviate an existing, defined and described problem of Town-wide concern or would result in a substantial benefit to the Town by reason of the fact that the proposed project would address an important community need.

Granting the waiver would not address an important community need. As seen with Heron Pointe, the ultimate build out of County Road 14 will have curb and gutter. Eliminating the requirement of the



Town of Berthoud
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applicant to construct County Road 14 will likely require the Town to handle the cost and construction of the curb and gutter in the future.

5. The plan as submitted will promote the general purpose of the standard for which the modification is requested, equally well or better than a plan which complies with the standard for which a modification is requested.

Staff finds that the general purpose of the roadway standards is to promote the construction of an urban roadway network as Berthoud develops. Deferring curb and gutter in this location does not support this purpose. The applicant would need to continue to prove that the drainage performs in an equal or better manner.

Staff does not recommend approval of the waiver, and we believe that the curb and gutter for County Road 14 should be constructed with this project.

Sincerely,

Noah J Nemmers, PE

For and on Behalf of the Town of Berthoud



Planning Commission Meeting March 9, 2023



Planning Commission Meeting March 9, 2023



Public Hearing Information Guide



1. STAFF PRESENTATION

- The agenda item is introduced by Town Staff, including details of the official request, location, and how the project satisfies the Development Code and Comprehensive Plan.

2. APPLICANT PRESENTATION

- The applicant presents their proposal and makes their case for approval.



3. PUBLIC HEARING

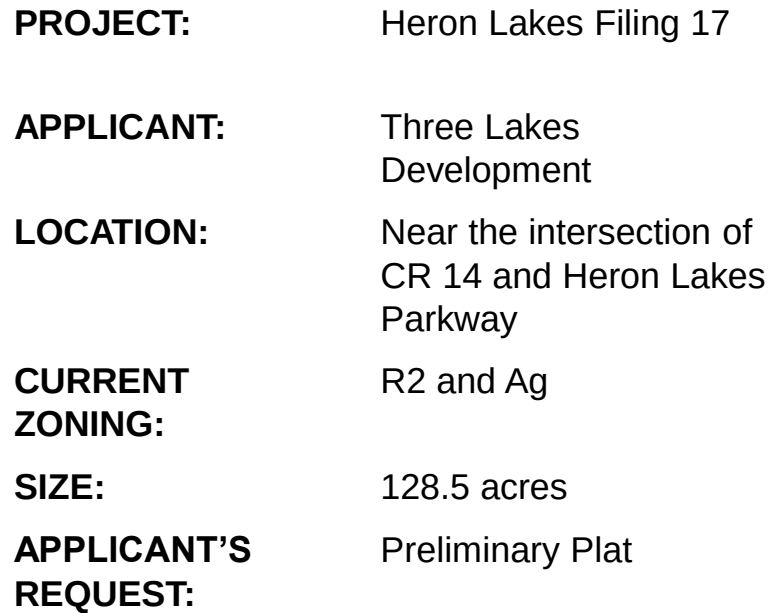
- The Mayor or Chairperson opens the public hearing for citizen testimony.
- One at a time, citizens have an opportunity to speak up for up to three minutes about the project. This time is usually used to ask questions, provide concerns, and offer approval or disapproval of the project.
 - Because the project is being heard as a hearing, public comments are treated as testimony and not as conversation. The Applicant, Staff, and Trustees/Commissioners will not respond to any of the comments until the public hearing is closed.
- Once there are no more citizens wishing to speak, the Mayor/Chairperson will officially close the Public Hearing, which ends the public testimony period.

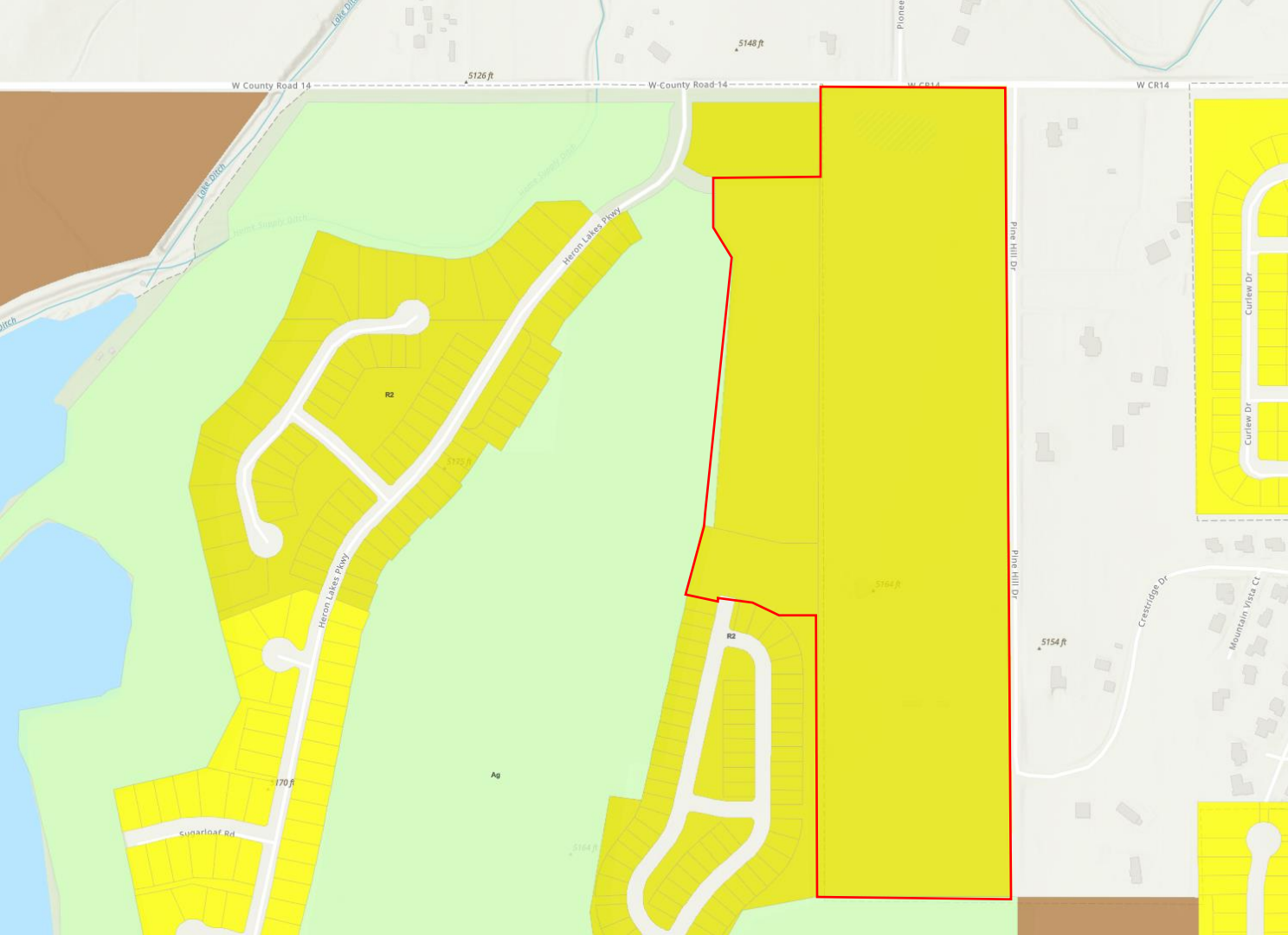


4. DISCUSSION AND VOTE

- The Trustees/Commissioners confer and have an opportunity to ask the applicant or staff questions that arose during the public hearing period or questions of their own.
- A motion must be made on an item, and if a motion is seconded, a vote is called; a majority must be found for any issue to pass (tie votes do not result in the passage of the item).
- If any citizen disagrees with the decision, they have thirty days to file an appeal with the Town.



[illegible]



Heron Lakes 17th Filing Preliminary Plat Criteria



30-6-109.C REVIEW CRITERIA	FINDINGS
1. The preliminary plat represents a functional system of land use and is consistent with the rationale and criteria set forth in this Code.	YES
2. The application is consistent with the approved concept plan and incorporates the Town's recommendations and any conditions of approval.	YES
3. The land use mix within the project conforms to Berthoud's Zoning District Map and Preferred Land Use Map and furthers the goals and policies of the Comprehensive Plan and PORT Plan.	YES
4. The utility and transportation design is adequate, given existing and planned capacities of those systems.	YES
5. Negative impacts on adjacent land uses including, but not limited to: solar access, heat, dust, glare, traffic and noise have been identified and satisfactorily mitigated.	YES
6. There is a need or desirability within the community for the applicant's development and the development will help achieve a balance of land use and/or housing types within Berthoud.	YES
7. How the applicant has addressed comments received from the public, during the Public Comment portion of the process.	YES

Heron Lakes 17th Filing Preliminary Plat Recommendation



Findings and Recommendations

WAIVER

- Staff recommends Planning Commission make a motion to deny the waiver to not construct curb and gutter along County Road 14 for the reasons stated in the attached memo from the Town's Development Review Engineer dated February 28, 2023.

PRELIMINARY PLAT

- Staff recommends Planning Commission make a motion to recommend approval of the Preliminary Plat to the Board of Trustees, subject to the following condition:
 1. The applicant shall revise their plans to include curb and gutter along County Road 14.
 2. The applicant shall apply for and receive approval of a rezoning prior to approval of a final plat.

(Note: If the Planning Commission approves the waiver request, then staff's proposed condition of approval regarding County Road 14 is not needed.)

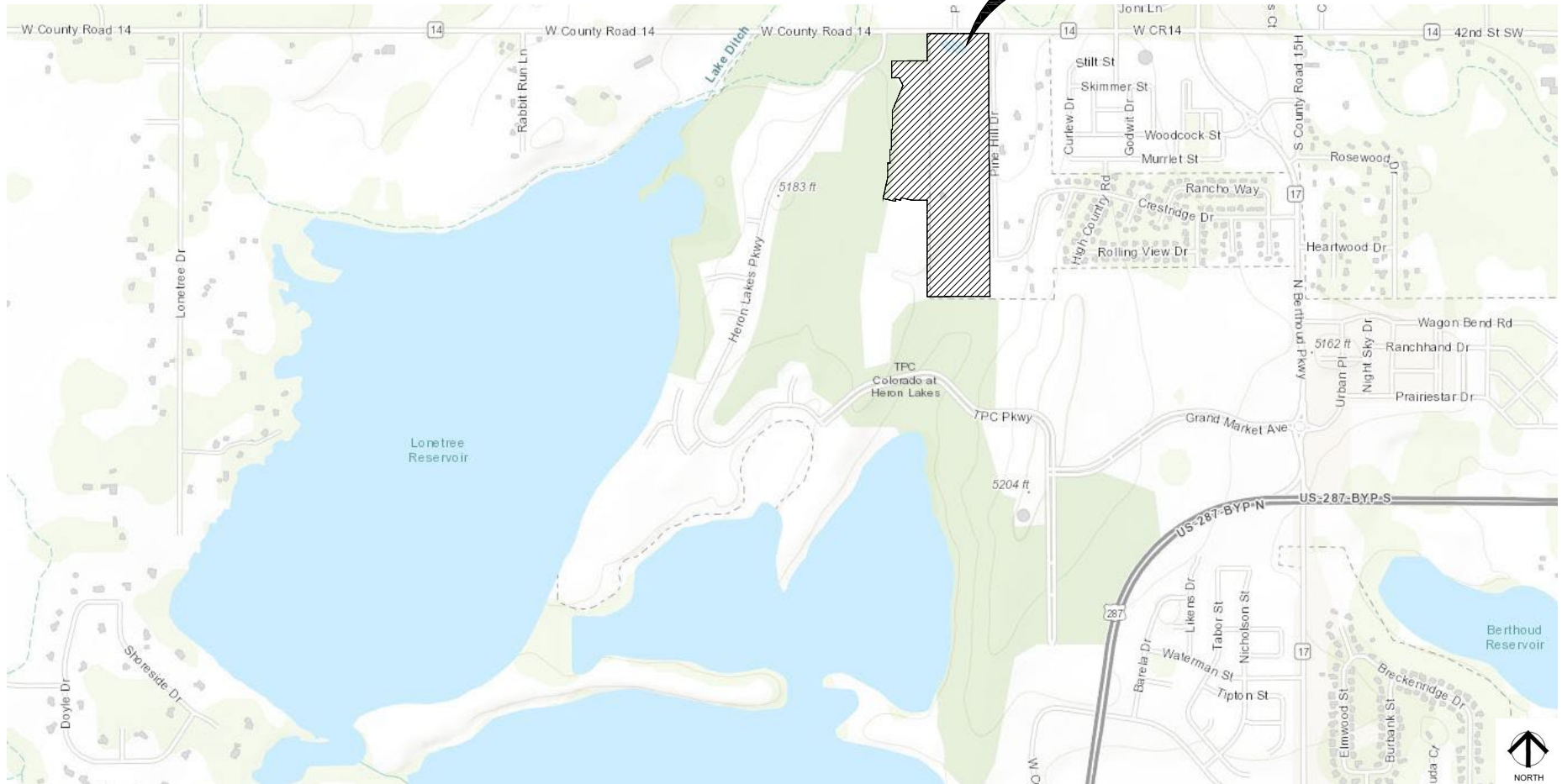


Planning Commission Meeting March 9, 2023

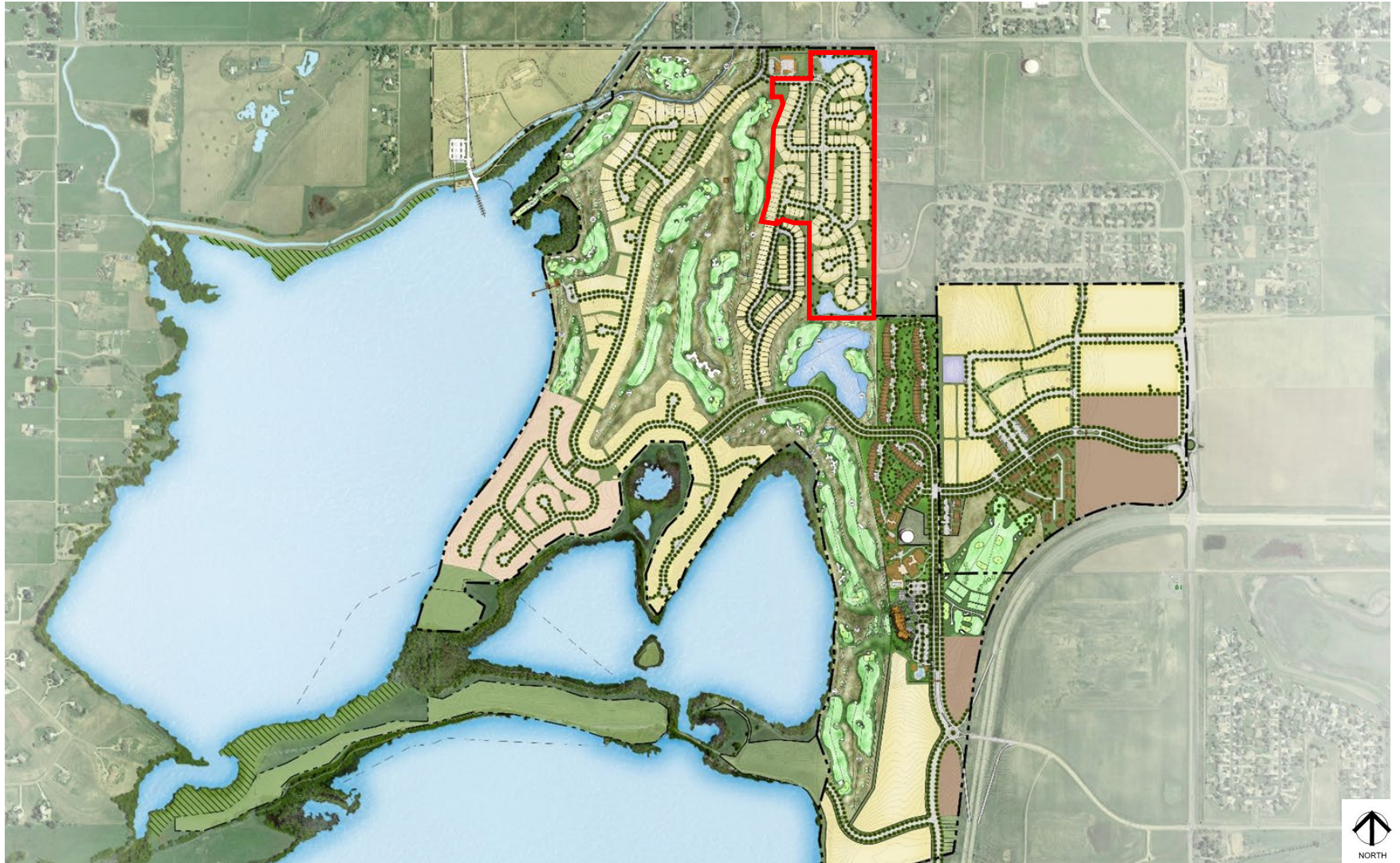


Heron Lakes – 17th Filing

HL 17th FILING SITE



Heron Lakes – 17th Filing







STAFF REPORT: LUDLOW FARMS NEIGHBORHOOD MASTER PLAN AND REZONING

DATE: March 9, 2023

GENERAL INFORMATION

Applicant:	Ludlow Farms, LLC – Jim Hinson, Manager	Size: 306.4 acres
Site Location:	This property is located between Highway 287 and Berthoud Parkway, and south of Mountain Avenue.	
Applicant's Request:	The Applicant is requesting a rezoning to Suburban Residential (SR) and Urban Residential (UR) from the Ludlow Farms Planned Unit Development (PUD) and a Neighborhood Master Plan.	
Current Zoning:	Sommers PUD: Light Industrial uses to the north, undefined mixed use to be determined at FDP to the south.	

ZONING DISTRICT INFORMATION

	<u>PUD</u>	<u>UR</u>	<u>SR</u>
Max Density	Set at FDP	N/A	N/A
Min. Lot Size	Set at FDP	2,000 sq.ft. for Duplex 2,500 sq.ft. for SFR	3,000 sq.ft.
Min. Lot Width	Set at FDP	N/A	20'
Front Setback	Set at FDP	8'-12' build-to line	10' rear loaded
Side Setback	Set at FDP	0' attached side, 5' unattached side, 10' corner side	5'
Rear Setback	Set at FDP	5'	5'
Building Height:	Set at FDP	30'	30'

SURROUNDING ZONING, LAND USE AND REQUIRED BUFFERS

	<u>Adjacent Zoning</u>	<u>Adjacent Land Uses</u>	<u>Setbacks for Adjacent Zoning/ Buffer required if rezoned</u>
North	PUD	Vacant (Planned for future commercial spaces)	N/A
South	R-1	Single-Family Residential	N/A
East	R-1	Single-Family Residential	N/A
West	PUD and C2	Religious Assembly and Commercial	N/A

Proposal

This is a two-part request for a Neighborhood Master Plan and a rezoning to UR (Urban Residential) and SR (Suburban Residential) for the Ludlow Farms development. The Neighborhood Master Plan shows commercial and higher density uses along the north and west portions of the site along Highway 287 and Mountain Avenue, and tapers into lower density residential uses along the south and east portions of the project. The rezoning map similarly shows UR along the northwestern portions of the project, and SR for the southeastern portions.

Background

This project is currently zoned as the Ludlow Farms PUD. The PUD was approved in 2011, in conjunction with an annexation request in 2010. The PUD proposed a similar layout of uses to what is being considered with this NMP and Rezoning, with a slightly larger area proposed for commercial uses. The prior PUD process set development standards at the FDP stage, and no submittal was made for the project. The town has strongly encouraged PUD property owners to transition their projects to the newly created zone districts rather than continuing the PUD/FDP process. The project has had two rounds of review, and two notices have been sent to neighboring property owners.

Neighborhood Master Plan

The Neighborhood Master Plan is a conceptual design of the development, submitted with a rezoning or major subdivision application, that depicts the applicant's vision for the overall development, including zoning, transportation, pedestrian network, parks, open space, subdivision identity standards and other amenities. The Neighborhood Master Plan is binding on a development, and all platting/zoning actions must follow the approved plan or apply for an amendment of said plan. Section 30-6-106 of the municipal code states that a Neighborhood Master Plan must consist of the following required elements:

30-6-106(C) Required Elements	Finding	Rationale
1. <u>Traffic Plan</u>: The applicant shall provide a preliminary traffic plan that addresses the following elements: i. The proposed street network connectivity to the existing road network, including all proposed access points. ii. The location and layout of all arterial and collector roads within the development. Local streets and alleys do not need to be depicted. iii. A preliminary traffic impact study prepared by a licensed traffic engineer which evaluates proposed access points, the existing street system, and any need for any road improvements (including off-site improvements) created by the proposed development.	Yes	i. The proposed development would connect to the existing road network via connections to Highway 287, Mountain Avenue, Berthoud Parkway, and Art (within the Harvest Ridge Subdivision to the south) ii. Minor Collectors are depicted throughout the site to provide adequate traffic flow. Additionally, Spartan Avenue would be extended through the project and provide a new access point to Highway 287. iii. A preliminary traffic impact study/analysis was provided with the submittal.

30-6-106(C) Required Elements	Finding	Rationale
2. <u>Open Space Plan:</u> The applicant shall provide a preliminary open space plan that addresses the following elements: i. Proposed open space distribution and location, including percentage of open space. ii. Compliance with 30-2-109(D)(4) open space elements. iii. Required buffer areas as per 30-2-109(C)(2)	Yes	i. An open space plan was provided as part of the Neighborhood Master Plan. The plan includes more than 10% open space. ii. By code the applicant would need to provide four open space elements. The applicant has chosen to meet these requirements through a habitat area, two Green Areas (counts as two elements), and a trailhead location. iii. A wetland is identified near the southern end of the site, and a 150' buffer is provided.
3. <u>Park(s) Plan:</u> i. Proposed park locations and types of parks as per Section 30-2-109(B)(2) and (3) ii. Proposed park acreage as per Section 30-2-109(B)(2)	Yes	(i.-ii.) Parks are provided in accordance with 30-2-109(B)(2) and (3). A full list of how the project meets these requirements can be found on page 4 of the NMP.
4. <u>Pedestrian Network:</u> i. Location of all trails within development, and connection to existing trail network. ii. Connectivity of sidewalks to the existing pedestrian system, including any off-site sidewalk improvements. iii. Depiction of any bike lanes or any other multi-modal features.	Yes	i. Locations of all trails are depicted on the NMP. Connections are provided to the existing trail network, and additional trails are provided throughout the project. ii. Sidewalks will be constructed along the frontages of all properties, and will then connect to the existing pedestrian system. iii. No bike lanes are proposed. However, the project does offer a large number of trail connections with bike racks identified.
5. <u>Zoning:</u> i. The location of zoning boundaries shall be provided with the application and depicted on the Neighborhood Master Plan. ii. The plan should show how lot diversity standards of Section 30-2-116(D)(1)(c), are met and create a mix of zoning which is harmonious with the surrounding area, and within the property itself. iii. Density and lot diversity shall be distributed throughout the project and shall not be located in only one area.	Yes	i. In addition to the Neighborhood Master Plan, this project also includes a rezoning request. The Master Plan identifies the project showing the proposed zoning changes. ii. The proposed zoning districts will be consistent with the neighboring residential districts to the south and east. By utilizing the new Urban Residential (UR) and Suburban Residential (SR) zoning districts, the applicant is proposing a slightly denser development than the existing neighborhoods. This area provides a good transition between the existing residences and the commercial uses to the north and west. iii. Density and diversity are distributed throughout the residential portions of the project.

30-6-106(C) Required Elements	Finding	Rationale
6. <u>Overall Utility Plan:</u> i. A preliminary utility plan depicting the existing capacity of the utility system for both the proposal and any potential future development. ii. Proposed connections to the existing utility system. iii. The location of any proposed or required lift stations. iv. Utility plans for the interior of the development (such as water and sewer service lines) are not required as part of this process.	Yes	(i. – iv.) A preliminary utility plan has been provided showing the water line and sewer line connections capacity and demand, and where the lines would be located to verify the project can served by utilities. The project will connect to existing Town of Berthoud utilities through one connection to the north, one to the west, and three to the east.
7. <u>Subdivision Identity Standards:</u> i. The applicant shall provide compliance with subdivision identity standards found in Section 30-2-131.	Yes	i. Code requires the proposed development to provide eight subdivision identity and place elements. The applicant has chosen to provide: a pocket park(1), trails(1), playground(1), pool(2), pollinator plant palette(1), community building(2), and alley loaded streets(2).

Neighborhood Master Plan Review Criteria

Section 30-6-106(G) states that the town shall use the following criteria in addition to other applicable provisions of the code to evaluate the application.

30-6-106(G) Review Criteria	Finding	Rationale
1. The land use mix within the project conforms to Berthoud's Zoning District Map and Comprehensive Plan Preferred Land Use Map and furthers the goals and policies of the Comprehensive Plan.	Yes	The Preferred Land Use plan envisions this area as Suburban business, Urban Residential, and Suburban Residential transitioning from the higher intensity uses to the northwest, and lower intensity to the south east. Additionally, the Comprehensive Plan was developed to encourage form based transect zoning from open space/ rural areas to alley-loaded urban residential lots which allow for a variety of dense, affordable residential uses such as those included in this project.
2. The Neighborhood Master plan represents a functional system of land use and is consistent with the rationale and criteria set forth in this Chapter, the Town Comprehensive Plan, and the Parks, Open Space and Recreation (PORT) Plan as amended.	Yes	The proposed plan is consistent with this criterion. The project will extend existing roadways to service the property allowing for a more connected neighborhood design. Additionally, the trail system proposed will allow connections throughout the project and into neighboring areas.

30-6-106(G) Review Criteria	Finding	Rationale
3. The preliminary traffic, open space, park utility and pedestrian design is adequate and functional given the existing and planned capacities of each system, and meets the standards found in this Code.	Yes	Plans were reviewed by Town staff as well as outside referral agencies. No deficient capacity issues were identified.
4. Negative impacts on adjacent land uses have been identified and satisfactorily mitigated.	Yes	Impacts to neighboring properties have been mitigated through multiple access points as to not create congested roadways, as well as placing the lower intensity uses closer to existing residential, and higher intensity uses closer to existing commercial.
5. There is a need or desirability within the community for the development and the development will help achieve a balance of land use and/or housing types within Berthoud according to town goals.	Yes	This project is substantially similar to what was originally proposed when the property was annexed into the Town. Additionally, the project offers a mix of uses that is consistent with the future land use map in the comprehensive plan.

Rezoning

The site is currently zoned PUD as part of the Ludlow Farms Planned Unit Development. This PUD was approved in 2011 in conjunction with an annexation approved in 2010. The approved PUD plan shares a similar vision for the area to what is proposed in the rezoning. An FDP plan is still required for the PUD, and rather than continuing through the now removed PUD process, staff has recommended the applicant instead rezone the property. The applicant has requested to rezone the property from PUD to UR (Urban Residential) and SR (Suburban Residential). If approved the rezoning would result in properties to the north and west zoned UR, and properties to the south and east zoned SR. The commercial and higher density areas would be focused in the UR areas, while the lower density residential uses would be rezoned SR.

Rezoning is addressed through an official zoning map amendment. Section 30-3-110(D) states for the purpose of establishing and maintaining sound stable and desirable development within the Town, the Zoning Map shall not be amended except when it addresses one or more of the criteria in the following table.

30-3-110(D) Zoning Map Amendment Criteria	Finding	Rationale
1. To correct a manifest error in an ordinance establishing the zoning for a specific property; or 2. To rezone an area or extend the boundary of an existing district because of changed or changing conditions in a particular area or in the Town generally; or 3. The land to be rezoned was zoned in error and as presently zoned is inconsistent with the policies and goals of the Town Comprehensive Plan; or 4. The proposed rezoning is necessary to provide land for a community-related use that was not anticipated at the time of the adoption of the Town Comprehensive Plan, and the rezoning will be consistent with the policies and goals of the Comprehensive Plan; or 5. The area requested for rezoning has changed or is changing to such a degree that it is in the public interest to encourage development or redevelopment of the area	Yes	Staff finds that the proposed rezoning meets criterion 2. The town has shifted away from Planned Unit Developments, and the proposed rezoning will help create more consistency between the project and what is intended in the Future Land Use map in the Comprehensive Plan.

PUBLIC NOTICE AND COMMENT

Notice of the Planning Commission Public Hearing has been mailed to property owners within 1,000 feet of the subject property, a legal ad published, and the property was posted as required by the Development Code on February 23, 2023. In addition, the application was sent out to all property owners within 1,000 feet, with an invitation to comment on the request within three weeks of receipt. All comments received can be found in this packet.

FINDINGS AND RECOMMENDATIONS

Neighborhood Master Plan

Staff recommends Planning Commission make a motion to recommend approval of the Neighborhood Master Plan to the Board of Trustees.

Rezoning

Staff recommends Planning Commission make a motion to recommend approval of the Rezoning to the Town Board.

Attachments

1. Application form
2. Neighborhood master plan

-
3. Rezoning map
 4. Preliminary traffic impact study/analysis
 5. Public Comments
 6. Staff Presentation
 7. Applicant Presentation



Town of Berthoud
807 Mountain Ave.
P.O. Box 1229
Berthoud, CO 80513
970.532.2643

DEVELOPMENT REVIEW APPLICATION

All required information must be provided before submittal will be accepted and deemed complete.
To be complete, the application must include all items identified on the submittal checklist.
Please complete both sides of application form.

Parcel Number(s): 9422105001 - 9422405009		
Site Address: SW Corner of Mountain Avenue & Berthoud Parkway		
Project Name: Ludlow Farms		
Brief description of project: Residential and mixed-use subdivision.		
APPLICATION TYPE (Check as appropriate):		
☐ Annexation	☐ Preliminary Subdivision Plat	☐ Final Site Plan
☒ Rezoning	☐ Final Subdivision Plat	☐ PUD Amendment
☒ Concept Plan	☐ Plat Amendment	☐ PUD Preliminary Development Plan
☐ Minor Subdivision	☐ Oil and Gas	☐ PUD Final Development Plan
☐ Special Use Review	☐ ROW Vacation	☐ Other _____
APPLICANT		
Name: Ludlow Farms, LLC - JM Hinson, Manager		
E-mail: jmhinson@me.com	Mailing Address: 700 Ken Pratt Blvd Suite 113	
Phone: 1-904-945-8636	City/State/Zip: Longmont, CO 80501	
CONTACT PERSON (will receive correspondence from Town Staff/Referral Agencies)		
Name: Kristin Turner - TB Group		
E-mail: kristin@tbgroup.us	Mailing Address: 444 Mountain Avenue	
Phone: 970.532.5891	City/State/Zip: Berthoud, CO 80513	
OWNER(S) (If different than applicant)		
Name: Greg Ludlow		
E-mail: greg.ludlow5@gmail.com	Mailing Address: 1909 Sundance Drive	
Phone: (970) 302-9332	City/State/Zip: Longmont, Colorado 80504	
CONSULTANT (Engineer, Surveyor, or Planner)		
Name:		
E-mail:	Mailing Address:	
Phone:	City/State/Zip:	

LAND USE INFORMATION							
Existing Use: Vacant Proposed Use: Residential, Commercial, Mi Existing Zoning: PUD Proposed Zoning: (if applicable): SR, UR Number of acres: ~306.4 AC Proposed Access: Berthoud Parkway & Mc	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #d9e1f2;"> <th colspan="2" style="text-align: center; padding: 5px;">Adjacent zoning / land use:</th> </tr> </thead> <tbody> <tr> <td style="width: 50%; padding: 5px;">East Side: BERTHOUD PARKWAY</td> <td style="width: 50%; padding: 5px;">North Side: MOUNTAIN AVENUE</td> </tr> <tr> <td style="padding: 5px;">West Side: HWY 287</td> <td style="padding: 5px;">South Side: R1 AND LARIMER COUNTY</td> </tr> </tbody> </table>	Adjacent zoning / land use:		East Side: BERTHOUD PARKWAY	North Side: MOUNTAIN AVENUE	West Side: HWY 287	South Side: R1 AND LARIMER COUNTY
Adjacent zoning / land use:							
East Side: BERTHOUD PARKWAY	North Side: MOUNTAIN AVENUE						
West Side: HWY 287	South Side: R1 AND LARIMER COUNTY						
UTILITY SERVICE INFORMATION							
Water: Town of Berthoud	Sewer: Town of Berthoud						
PROJECT INFORMATION							
Number of proposed units: estimated 1500-1800 Number of phases: TBD - multiple Number of Units per phase: TBD Number of lots proposed: estimated 1500-1800 Lot size minimum: 4,400 sf Lot size maximum: 6,600 sf Lot size average: 5,500 sf Gross density (units/acre): 4.8-5.8 Net density (units/acre): 5.9-7.1 Area and percent open space: 67.4 AC/ 22%	Non-Residential Building Area (Sq. Ft.) Proposed: TBD - 31.2 ac estimated Non-Residential Construction Floor Area Ratio Proposed: TBD Total Number of Parking Spaces: TBD <u>Acreage of Site:</u> a. Gross: 306.4 b. Right-of-Way: 54.0 c. Net (a-b) 252.4 <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr style="background-color: #d9e1f2;"> <th colspan="2" style="text-align: center; padding: 5px;">Type of Housing Proposed (<i>please check</i>):</th> </tr> </thead> <tbody> <tr> <td style="width: 50%; padding: 5px;"> ☒ Future Single Family ☒ Duplex ☒ Multi-family (# of units: TBD) </td> <td style="width: 50%; padding: 5px;"> ☒ Townhouse ☐ Condominium </td> </tr> </tbody> </table>	Type of Housing Proposed (<i>please check</i>):		☒ Future Single Family ☒ Duplex ☒ Multi-family (# of units: TBD)	☒ Townhouse ☐ Condominium		
Type of Housing Proposed (<i>please check</i>):							
☒ Future Single Family ☒ Duplex ☒ Multi-family (# of units: TBD)	☒ Townhouse ☐ Condominium						

Signatures are required for ALL Property Owners and the Applicant

I hereby certify that I am the lawful owner of the parcel(s) of land that this application concerns and consent to the action. I hereby permit Town of Berthoud staff to enter upon the property for the purposes of inspection relating to the application. Building Permits will not be accepted while this application is in process.

Property Owner(s): DocuSigned by:
Greg Ludlow
D8BEF5D68CD544C... Date: 9/15/2022

Property Owner(s): _____ Date: _____

In submitting the application materials and signing this application agreement, I acknowledge and agree that the application is subject to the applicable processing and public hearing requirements set forth in the Development Code.

Applicant: DocuSigned by:
M. Hinson
55A1B323E8844C3... Date: 9/15/2022

FOR OFFICE USE ONLY
Received By:
Date:

PROPERTY 1:
TRACT A AND LOTS 1 THROUGH 9, INCLUSIVE, LUDLOW FARMS
ACCORDING TO THE RECORDED CONVEYANCE PLAT, COUNTY OF
LARIMER, STATE OF COLORADO

A TRACT OF LAND SITUATED IN THE NORTHWEST CORNER OF THE
NORTHEAST QUARTER OF SECTION 22, TOWNSHIP 4 NORTH OF
RANGE 69 WEST OF THE 6TH PM, MORE PARTICULARLY DESCRIBED
AS FOLLOWS:

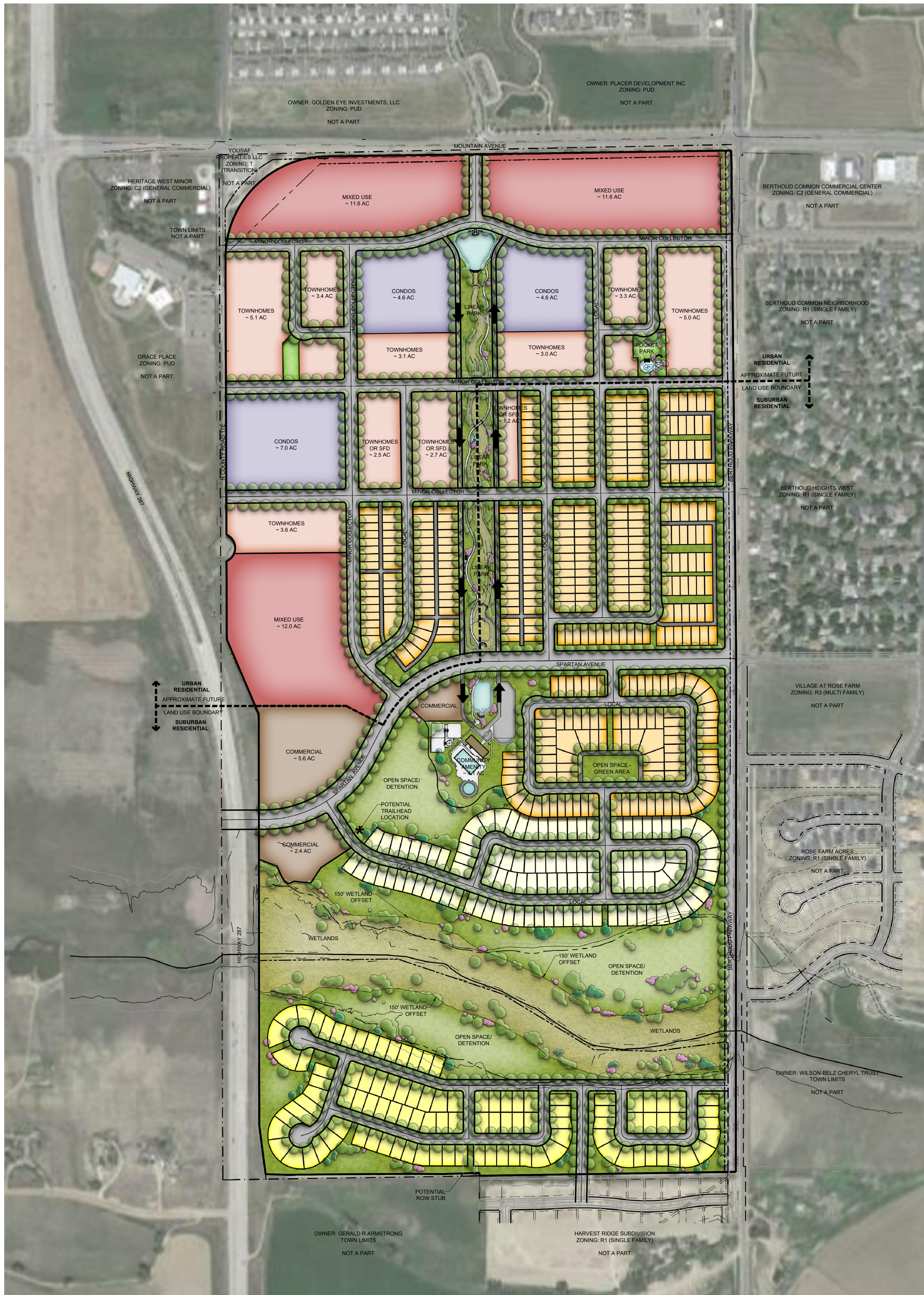
SUBDIVISION IDENTITY & RESIDENTIAL STANDARDS

SUBDIVISION IDENTITY ELEMENTS POINTS REQUIRED: 8

1. POCKET PARK	1
2. TRAILS	1
3. PLAYGROUND	1
4. POOL	2
5. POLLINATOR PLANT PALETTE	1
6. COMMUNITY BUILDING	2
7. ALLEY LOADED STREETS	2

TOTAL : 10

1. PROPOSED LOT COUNT AND LOT SIZES ARE CONCEPTUAL AND MAY CHANGE AT TIME OF PLAT, DEPENDING ON MARKET CONDITIONS.
2. COMMERCIAL AREAS ALONG HIGHWAY 287 ARE CONCEPTUAL IN SIZE AND MAY ADJUST, DEPENDING ON MARKET CONDITIONS.
3. RESIDENTIAL PRODUCT TYPES DEPICTED ARE CONCEPTUAL AND MAY BE ADJUSTED AT PLATTING. PER THE MUNICIPAL CODE, A MINIMUM OF FOUR (4) PRODUCT TYPES WILL BE INCLUDED IN THE SUBDIVISION. RESIDENTIAL PRODUCT TYPES COULD INCLUDE, BUT ARE NOT LIMITED TO: SINGLE FAMILY DETACHED, TOWNHOMES, DUPLEXES, CONDOMINIUMS, APARTMENTS AND/OR OTHER RESIDENTIAL PRODUCT TYPES AS SPECIFIED IN THE MUNICIPAL CODE, PER ZONE DISTRICT.



SINGLE FAMILY DETACHED (40' X 110')*.....	
SINGLE FAMILY DETACHED (50' X 110')*.....	
SINGLE FAMILY DETACHED (60' X 110')*.....	
TOWNHOMES OR SFD.....	
CONDOS.....	
MIXED USE.....	
COMMERCIAL.....	

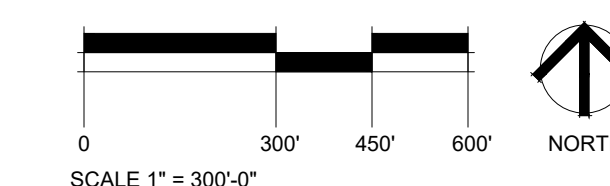
***NOTE:** LOT SIZES ARE CONCEPTUAL AND SUBJECT TO CHANGE AT PLAT.

<u>TOTAL ACREAGE</u>	~306.4 ACRES
<u>ROW/PRIVATE DRIVE/PARKING</u>	~ 54.0 ACRES
% OF SITE AS ROW/DRIVE/PARKING	17.6%
<u>OPEN SPACE ACREAGE</u>	~67.4 ACRES
% OF SITE AS OPEN SPACE	22.0%

1. REFER TO PLAN FOR PROPOSED STREET NETWORK AND EXISTING ROAD NETWORK INCLUDING ALL ACCESS POINTS.

2. UNLESS OTHERWISE NOTED ON THE PLAN, ALL
STREETS ARE LOCAL STREETS AND/OR ALLEYS.

SHEET 1 - OVERALL NEIGHBORHOOD MASTER PLAN
SHEETS 2-3 - OPEN SPACE, CIRCULATION, & PARKS
SHEET 4 - PARKS ENLARGEMENT



PARK STATISTICS:

ESTIMATED PARK SPACE REQUIRED
(APPROX. 1500-1800 UNITS) 15-18 ACRES

PARK SPACE PROVIDED 13.54 ACRES
4.4% OF SITE

NOTE: FINAL PARK SPACE REQUIREMENT WILL BE BASED ON ACTUAL UNIT COUNT.
TO BE DETERMINED WITH FINAL PLATS.

OPEN SPACE CALCULATIONS:

TOTAL OPEN SPACE REQUIRED= 30.6 AC 10.0%
TOTAL OPEN SPACE PROVIDED= 76.7 AC 25.0%

TOTAL SITE ACREAGE = ~306.4 AC

COMMUNITY PARK ELEMENTS:

LIST B: 3 ELEMENTS REQUIRED

- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

LIST D: 2 ELEMENTS REQUIRED

- AMPHITHEATER
- PLAYGROUND
- SPLASH PARK
- COMMUNITY BUILDING
- POOL

LIST E: 4 ELEMENTS, + 1 RESTROOM BUILDING REQUIRED

- BBQ GRILLS (MIN. 1 PER EVERY 2 TABLES)
- BENCHES (MIN. ONE PER HALF ACRE)
- DRINKING FOUNTAINS (MIN. 1 PER EVERY 4 ACRES)
- SHADE STRUCTURES FOR COMPONENTS FROM LIST C (AT SPLASH PARK)

POCKET PARK ELEMENTS:

LIST A: ALL ELEMENTS REQUIRED

- ELECTRICITY
- IRRIGATION
- SECURITY LIGHTING
- TRASH RECEPTACLES (MIN. 2 PER AC)
- WATER SERVICE
- BIKE RACKS
- LANDSCAPING

LIST B: 3 ELEMENTS REQUIRED

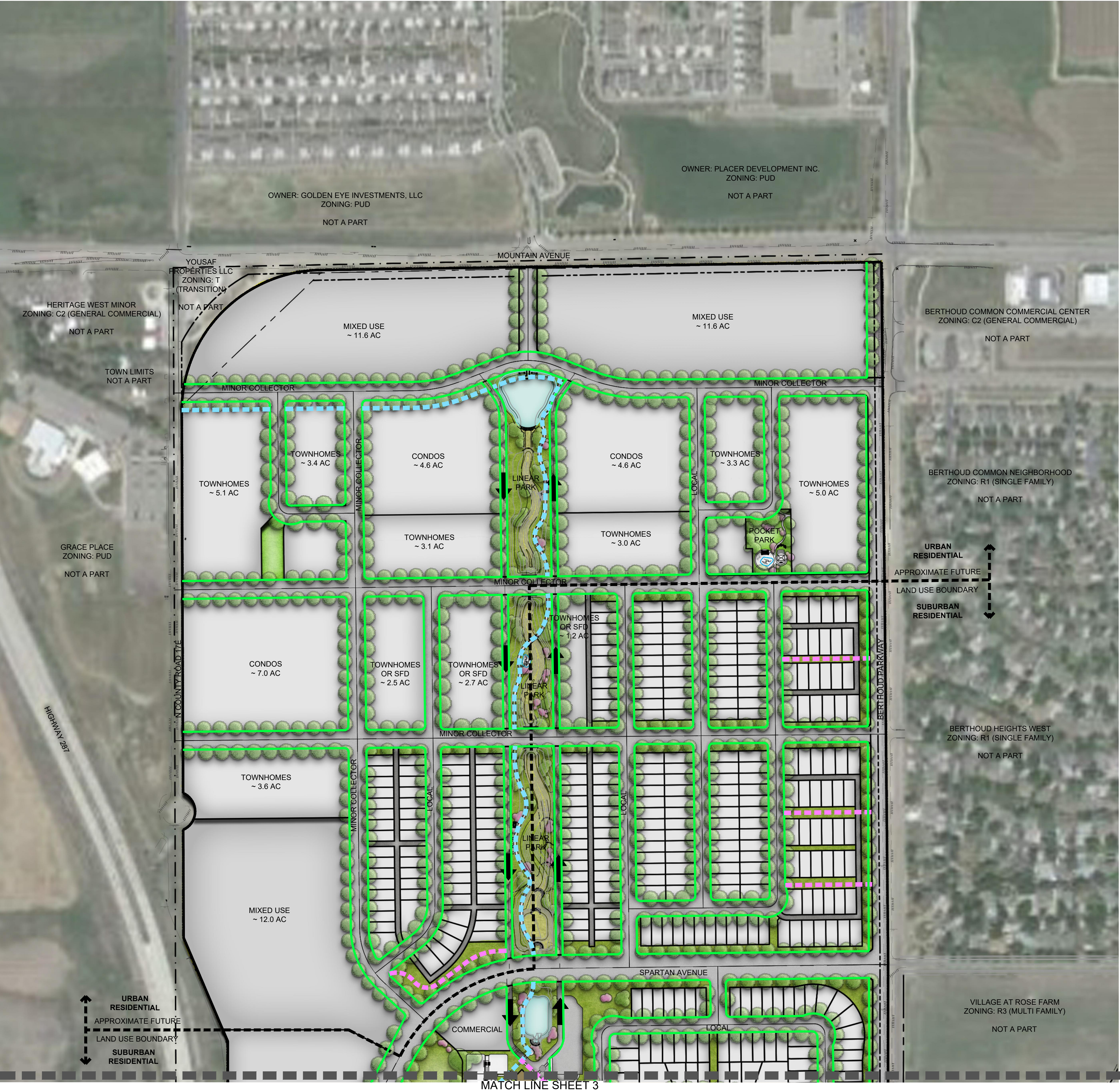
- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

LIST D: 2 ELEMENTS REQUIRED

- COMMERCIAL-GRADE PLAYGROUND
- AMPHITHEATER

LIST E: RESTROOMS + 3 ELEMENTS REQUIRED

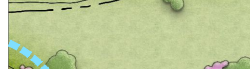
- PORTABLE RESTROOMS
- SHADE STRUCTURE FOR PLAYGROUND
- BENCHES (1 PER ½ ACRE)
- BBQS (1 PER 2 TABLES)



OPEN SPACE ELEMENTS

OPEN SPACE ELEMENTS	4 ELEMENTS REQUIRED
OPEN SPACE ELEMENTS	4 ELEMENTS PROVIDED
HABITAT AREA	1 ELEMENT
GREEN AREA	2 ELEMENTS
TRAILHEAD	1 ELEMENT

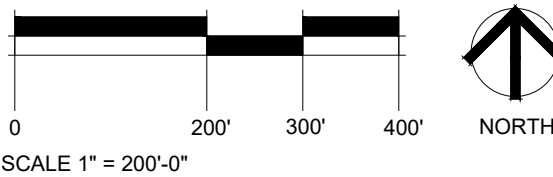
OPEN SPACE SUMMARY

	PARK SPACE	13.5 ACRES
	OPEN SPACE	67.4 ACRES
TOTAL		80.9 ACRES

WALKS/TRAILS SUMMARY*

	DETACHED CONCRETE SIDEWALK - 74,976 feet
	PROPOSED TRAIL/TRAIL CONNECTION PER TOWN PORT PLAN, MATERIAL TBD - 5,383 feet
	TRAIL CONNECTION PER TOWN PLAN - 9,415 feet

*NOTE: TRAIL LOCATIONS ARE CONCEPTUAL. FINAL LOCATION
TO BE DETERMINED AT PLAT.



SEAL

PROJECT TITLE

LUDLOW FARMS
NEIGHBORHOOD
MASTER PLAN
BERTHOUD, CO

PREPARED FOR

OWNER:
LUDLOW FARMS, LLC

700 KEN PRATT BLVD,
STE. 113
LONGMONT, CO 80501

REVISIONS

REVISIONS	DATE
1	1.20.23

DATE

SEPTEMBER 15, 2022

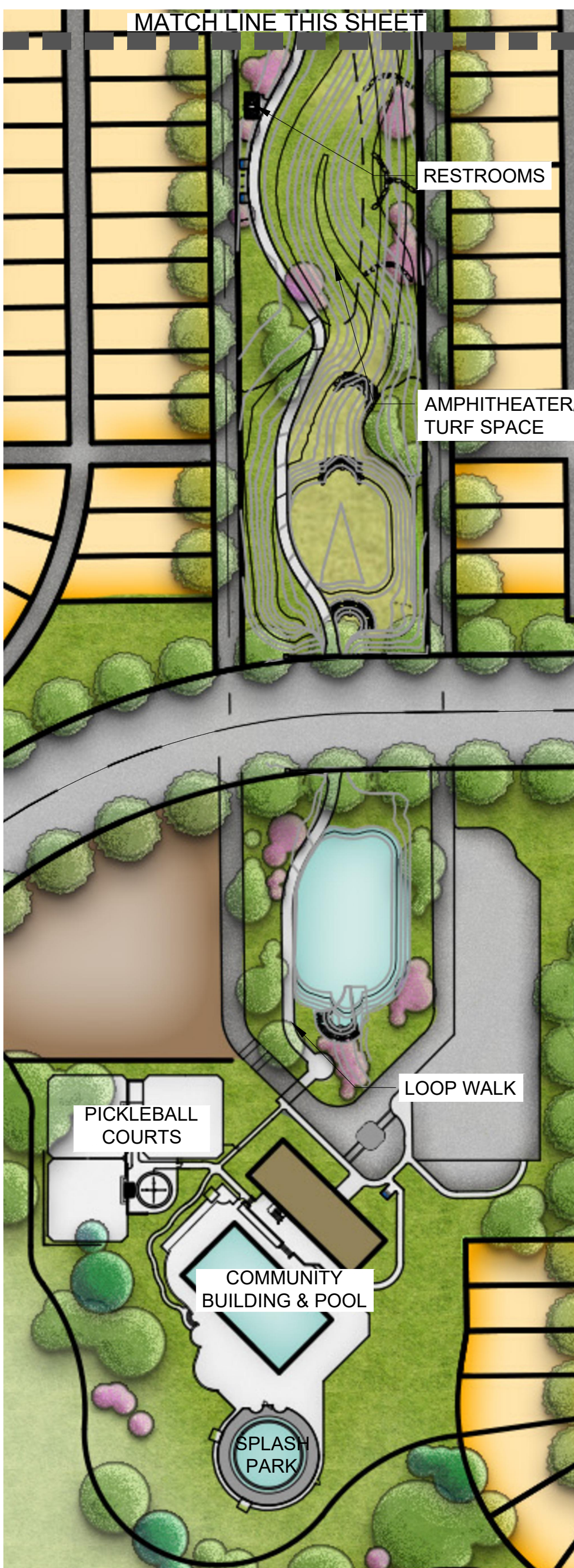
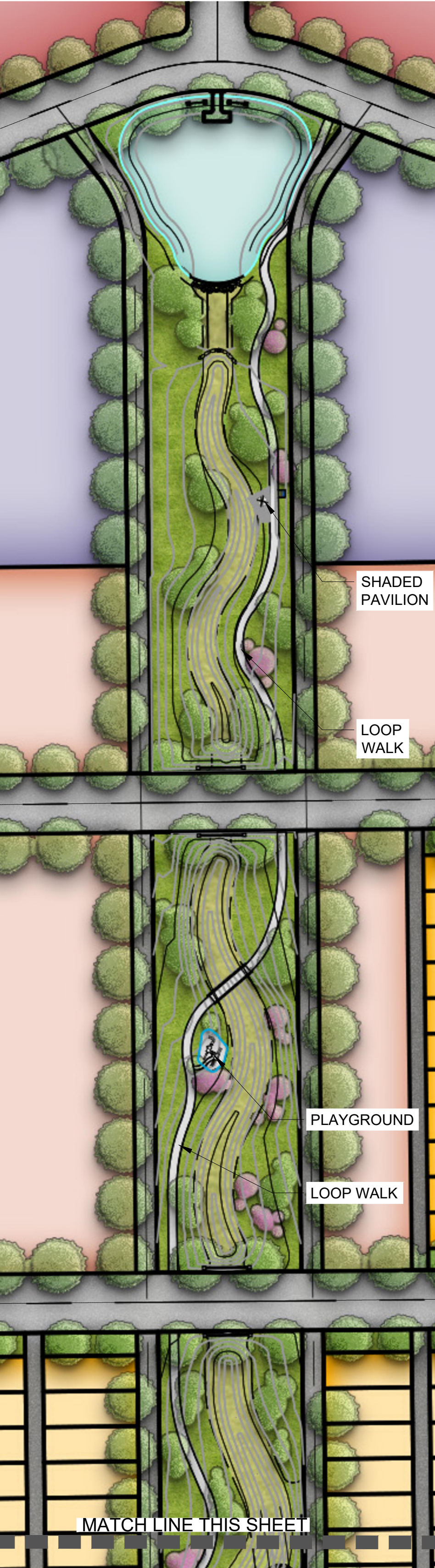
SHEET TITLE

OPEN SPACE,
CIRCULATION AND PARKS

SHEET INFORMATION

Sheet Number: **3**
Of: **4**

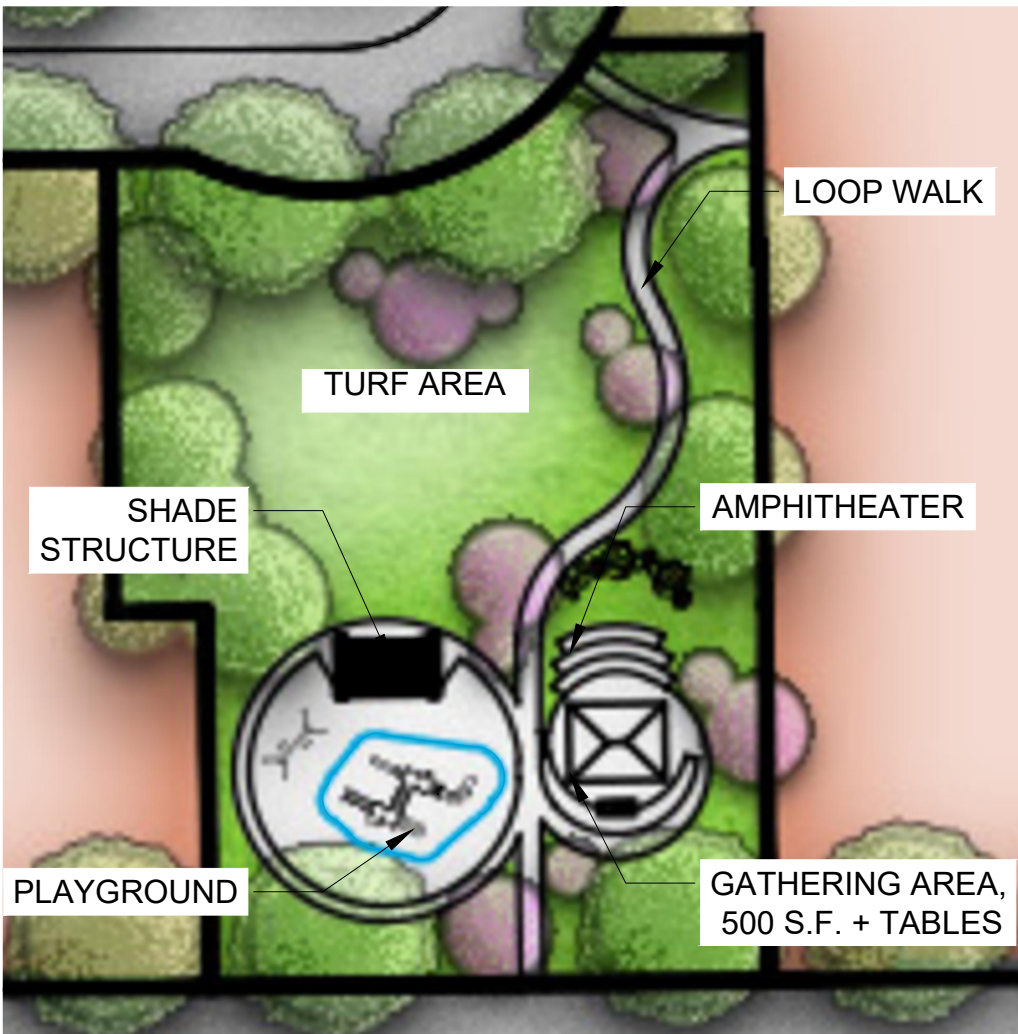
COMMUNITY PARK - A



COMMUNITY PARK ELEMENTS:

- LIST A: ALL ELEMENTS REQUIRED**
- ELECTRICITY
 - IRRIGATION
 - SECURITY LIGHTING
 - TRASH RECEPTACLES (MIN. 2 PER AC)
 - WATER SERVICE
 - BIKE RACKS
 - LANDSCAPING
- LIST B: 3 ELEMENTS REQUIRED**
- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
 - MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
 - LOOP WALK (MIN. 2,000 L.F.)
- LIST D: 2 ELEMENTS REQUIRED**
- AMPHITHEATER
 - PLAYGROUND
 - SPLASH PARK
 - COMMUNITY BUILDING
 - POOL
- LIST E: 4 ELEMENTS, + 1 RESTROOM BUILDING REQUIRED**
- BBQ GRILLS (MIN. 1 PER EVERY 2 TABLES)
 - BENCHES (MIN. ONE PER HALF ACRE)
 - DRINKING FOUNTAINS (MIN. 1 PER EVERY 4 ACRES)
 - SHADE STRUCTURES FOR COMPONENTS FROM LIST C (AT SPLASH PARK)

POCKET PARK - B



POCKET PARK ELEMENTS:

- LIST A: ALL ELEMENTS REQUIRED**
- ELECTRICITY
 - IRRIGATION
 - SECURITY LIGHTING
 - TRASH RECEPTACLES (MIN. 2 PER AC)
 - WATER SERVICE
 - BIKE RACKS
 - LANDSCAPING
- LIST B: 3 ELEMENTS REQUIRED**
- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
 - MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
 - LOOP WALK (MIN. 2,000 L.F.)
- LIST D: 2 ELEMENTS REQUIRED**
- COMMERCIAL-GRADE PLAYGROUND
 - AMPHITHEATER
- LIST E: RESTROOMS + 3 ELEMENTS REQUIRED**
- PORTABLE RESTROOMS
 - SHADE STRUCTURE FOR PLAYGROUND
 - BENCHES (1 PER ½ ACRE)
 - BBQS (1 PER 2 TABLES)



REVISIONS	DATE
REVISIONS	1.20.23

LUDLOW FARMS REZONE MAP

LOCATED IN THE EAST HALF OF SECTION 22, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M.,
TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

DESCRIPTION OF REZONING AREA PUD & T TO URBAN RESIDENTIAL & SUBURBAN RESIDENTIAL:

Parcel 1:
Tract A, and Lots 1 through 9, inclusive, Ludlow Farms according to the recorded Conveyance Plat, County of Larimer, State of Colorado

Parcel 2:
A tract of land situated in the Northwest Corner of the Northeast Quarter of Section 22, Township 4 North of Range 69 West of the 6th PM, more particularly described as follows:
Beginning at the Northwest corner of this tract from whence the North Quarter of said Section 22 bears North 46°17' West 42.4 feet distant; thence South 0°20' East along a line which is 30 feet East of and parallel to quarter section line a distance of 486.4 feet to the TRUE POINT OF BEGINNING; thence North 43°54' East 718.4 feet to a point 30 feet South of the North line of said Section 22; thence along a curve to the left, said curve having a central angle of 87°12'34", a radius of 543.00 feet, an arc length of 826.50 feet, a chord bearing South 44°04'22" West, a distance of 748.99 feet to the TRUE POINT OF BEGINNING,
County of Larimer, State of Colorado

NOTES:

- 1) First National Title Insurance Company, Commitment No. 830003001-SE, dated 08/30/2022 at 8:00 a.m. was used in the preparation of this document.
- 2) The Basis of Bearings is the North line of Ludlow Farms - Conveyance Plat as bearing North 88°51'55" East, and monumented as shown on drawing.
- 3) Northern Engineering relied upon the plat of Ludlow Farms Conveyance Plat recorded at Reception Number 20110018205 Larimer County Clerk and Recorder.
- 4) This is not a statutory boundary survey, lines ran or shown have not been evaluated for title rights either written or unwritten.
- 5) This map is not a land survey plat or improvement survey plat, and it is not to be relied upon for the establishment of fence, building, or other future improvement lines.
- 6) Adjacent property owner information per the Larimer County Land information Locator.
- 7) Zoning information per the Official Zoning map, Town of Berthoud, dated October, 2021 .
- 8) Parcel 1 of Subject Property contains 13,067,650 square feet or 299.99 acres, more or less.
Parcel 2 of Subject Property contains 66,183 square feet or 1.52 acres, more or less.
- 9) Proposed Zone UR (Urban Residential) contains 5,069,393 square feet or 116.380 acres, more or less.
Proposed Zone SR (Suburban Residential) contains 8,064,440 square feet or 185.131 acres, more or less.

OWNER:

BY: _____

STATE OF COLORADO)
)SS
COUNTY OF LARIMER)

The foregoing instrument was acknowledged before me this ____ day of _____, 2022, by
_____ as _____ of .

Witness my hand and official seal

My commission expires: _____

Notary Public

LIENHOLDER:

BY: _____

STATE OF COLORADO)
)SS
COUNTY OF LARIMER)

The foregoing instrument was acknowledged before me this ____ day of _____, 2022, by
_____ as _____ of .

Witness my hand and official seal

My commission expires: _____

Notary Public

APPROVAL CERTIFICATES:

This is to certify that the rezoning of the above described property was approved by Ordinance No. _____ of the Town of Berthoud, passed and adopted on the ____ day of _____, 2022, and that the Mayor of the Town of Berthoud as authorized by said ordinance on behalf of the Town of Berthoud hereby for all acknowledges and adopts the said annexation upon which the certificate is endorsed for all purposes indicated hereon.

Approved by the Board of Trustees of the Town of Berthoud, Colorado this ____ day of _____, 2022.

Mayor

The foregoing map is approved for filing and accepted by the Town of Berthoud, Colorado this ____ day of _____, 2022.

ATTEST: _____
Town Clerk

APPROVAL CERTIFICATES:

Approved by the Planning Commission of the Town of Berthoud, Colorado this ____ day of _____, 2022.

Chairman

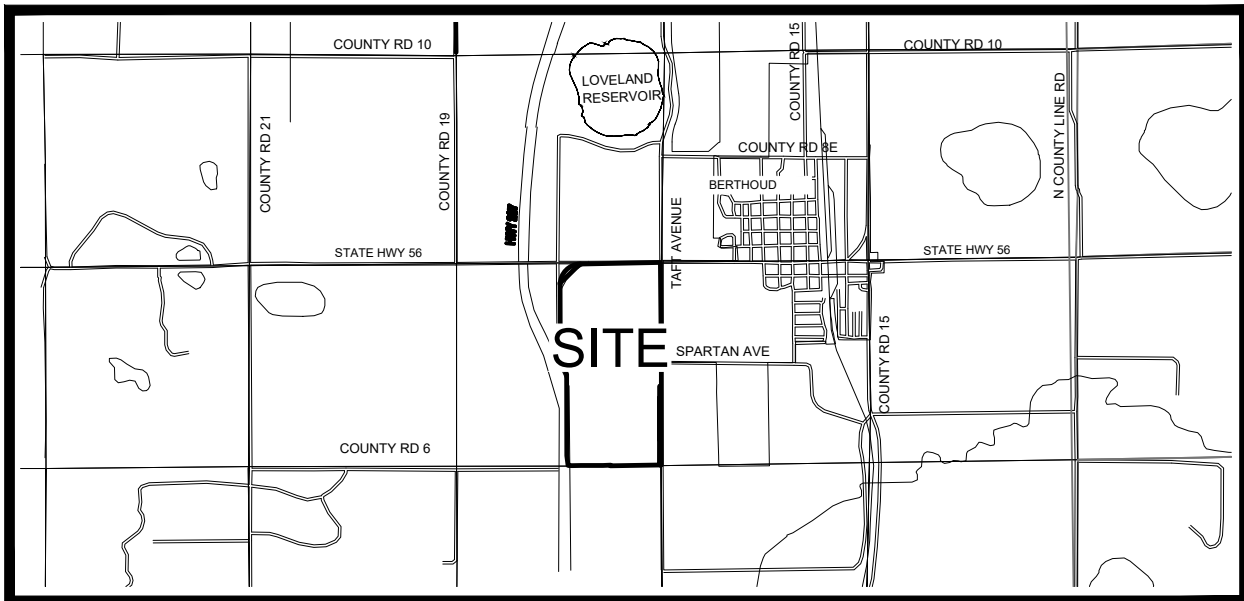
The foregoing map is approved for filing and accepted by the Town of Berthoud, Colorado this ____ day of _____, 2022.

ATTEST: _____
Planning Technician

LARIMER COUNTY CLERK & RECORDER CERTIFICATE:

This Rezoning Map was accepted for filing in the Office of the Larimer County Clerk & Recorder on this ____ day of _____, 2022, A.D. at _____ M. in Book _____, Page _____, Reception No. _____

By: _____
Larimer County Clerk and Recorder



 **VICINITY MAP**
1" = 2000'

SURVEYOR'S STATEMENT

I, Robert C. Tessely, a Colorado Registered Professional Land Surveyor, do hereby state that this map of land proposed to be rezoned in the County of Larimer, State of Colorado was prepared under my direct supervision from existing documents of record and that the same is true and correct to the best of my knowledge, information and belief.

For and on behalf of Northern Engineering Services, Inc.
Robert C. Tessely
Colorado Registered Professional Land Surveyor No. 38470

DRAFT
03-01-23
PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION

NOTICE:
According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years after the date of the certificate shown herein.

SECTION: 22	TOWNSHIP: 4 N	RANGE: 69 W of the 6th PM
----------------	------------------	------------------------------

**NORTHERN
ENGINEERING**

SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.231.1188
NORTHERNENGINEERING.COM

PROJECT: 1659-001	DATE: 03/01/23	SCALE: As shown	REVIEWED BY: R. Tessely
CLIENT: LUDLOW FARMS LLC	DRAWN BY: M. Kinode		

LUDLOW FARMS REZONE MAP
TOWN OF BERTHOUD
LARIMER COUNTY, COLORADO

LOCATED IN THE EAST HALF OF SECTION 22, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M.,
TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

[illegible]

	PROPOSED REZONING BOUNDARY SR
	PROPOSED REZONING BOUNDARY UR
	SECTION LINE
	PROPERTY BOUNDARY
	SECTION CORNER MONUMENT



For and on behalf of Northern Engineering Services, Inc.
Robert C. Tessely
Colorado Registered Professional Land Surveyor No. 38470

NOTICE: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years after the date of the certificate shown herein.

TOWNSHIP:
4 N

SCALE: 1" = 200'

CLIENT: JUDLOW FARM

Of 3 Sheets

Transportation Impact Study Town of Berthoud

January 3, 2023
Original September 15, 2022

Prepared for:
Ludlow Farms LLC

Rollins Consult LLC

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1 INTRODUCTION

This report documents the results of a study to evaluate the potential traffic impacts of the proposed Ludlow Farm Neighborhood Master Plan (NMP) in the Town of Berthoud. Rollins Consult LLC conducted the study as required for the project's development application. This study will focus on long range transportation conditions. As each phase of the proposed project is submitted, a transportation study will be performed.

PROJECT DESCRIPTION

The proposed Ludlow Farm project is located to the west of downtown Berthoud. The project site is located to the south of Mountain Avenue and east of the intersection of US 287. Figure 1 illustrates the project location and the study area. The site is currently undeveloped.

A potential project site is depicted on Figure 2. The site will be developed in numerous phases. The project was modeled with the following land uses and transportation elements:

- The potential for 526 single family homes and 1,353 multi-family dwelling units, dispersed throughout the site.
- 165,700 square feet of commercial located south of Mountain Avenue and at the intersection of US 287 and Spartan Avenue.
- A daycare center is located central to the site.
- 30,000 square feet of office use.
- The extension of Spartan Avenue from Berthoud Parkway to the west with a connection to US 287.

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Figure 1 – Project Location

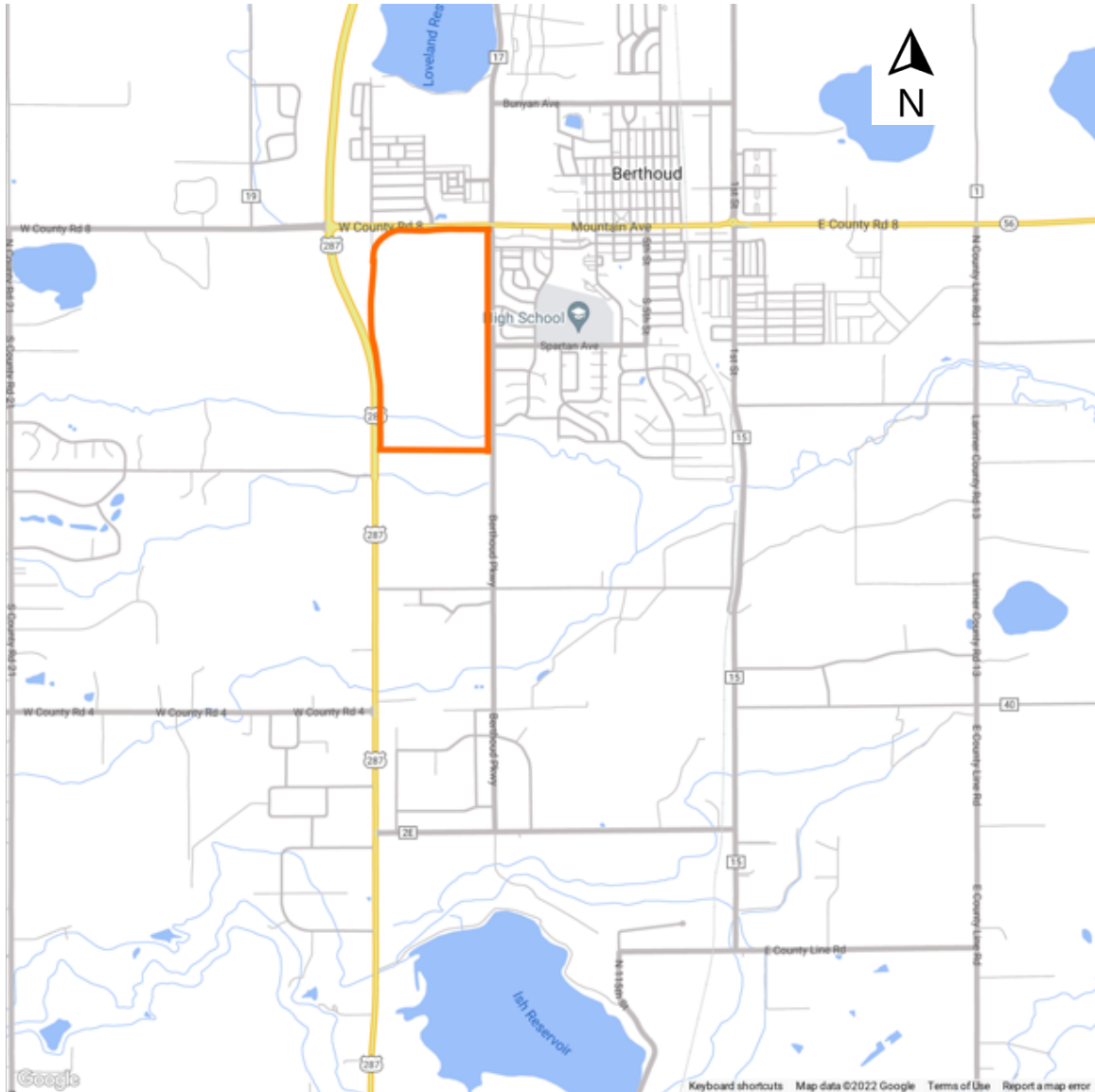
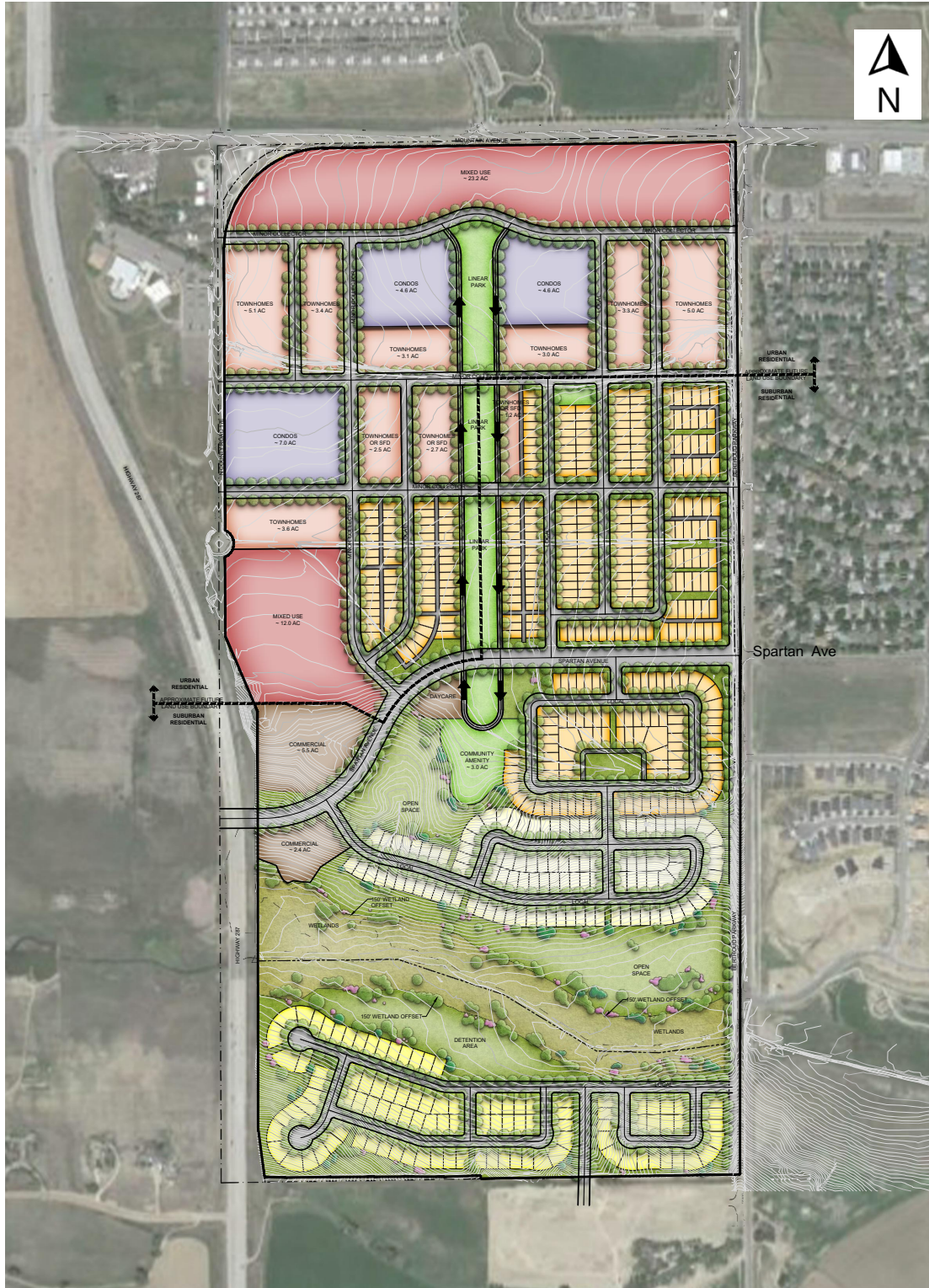


Figure 2 – Site Plan



STUDY SCOPE

The scope of work for this study was developed in conjunction with the Town of Berthoud's traffic engineering consultant. The base assumptions, technical methodologies, and geographic coverage of the study were all identified as part of the study approach. The study analyzes the potential project-generated traffic impacts on the adjacent street system.

The study evaluates the transportation system after the completion of the proposed Ludlow Farm development for the year 2042. The following transportation scenarios were analyzed for the AM and PM peak hours:

- **Existing Conditions** – The analysis of existing traffic conditions provides a basis for the remainder of the study. The existing transportation system is described. Peak hour intersection operations are evaluated.
- **Project Travel Demand** – The traffic generated by the Project will be estimated, distributed, and assigned to the transportation network.
- **2042 Background Conditions** – Future traffic conditions are projected without the proposed Project for the buildout year 2042. The background traffic will include overall growth in traffic within the area and traffic from proposed development projects near the site.
- **Total Future Conditions** – The traffic associated with the Project will be added to the Background traffic. The intersection operations will be determined.
- **Auxiliary Lanes** – The need for left-turn and right-turn lanes at the project access point will be evaluated.

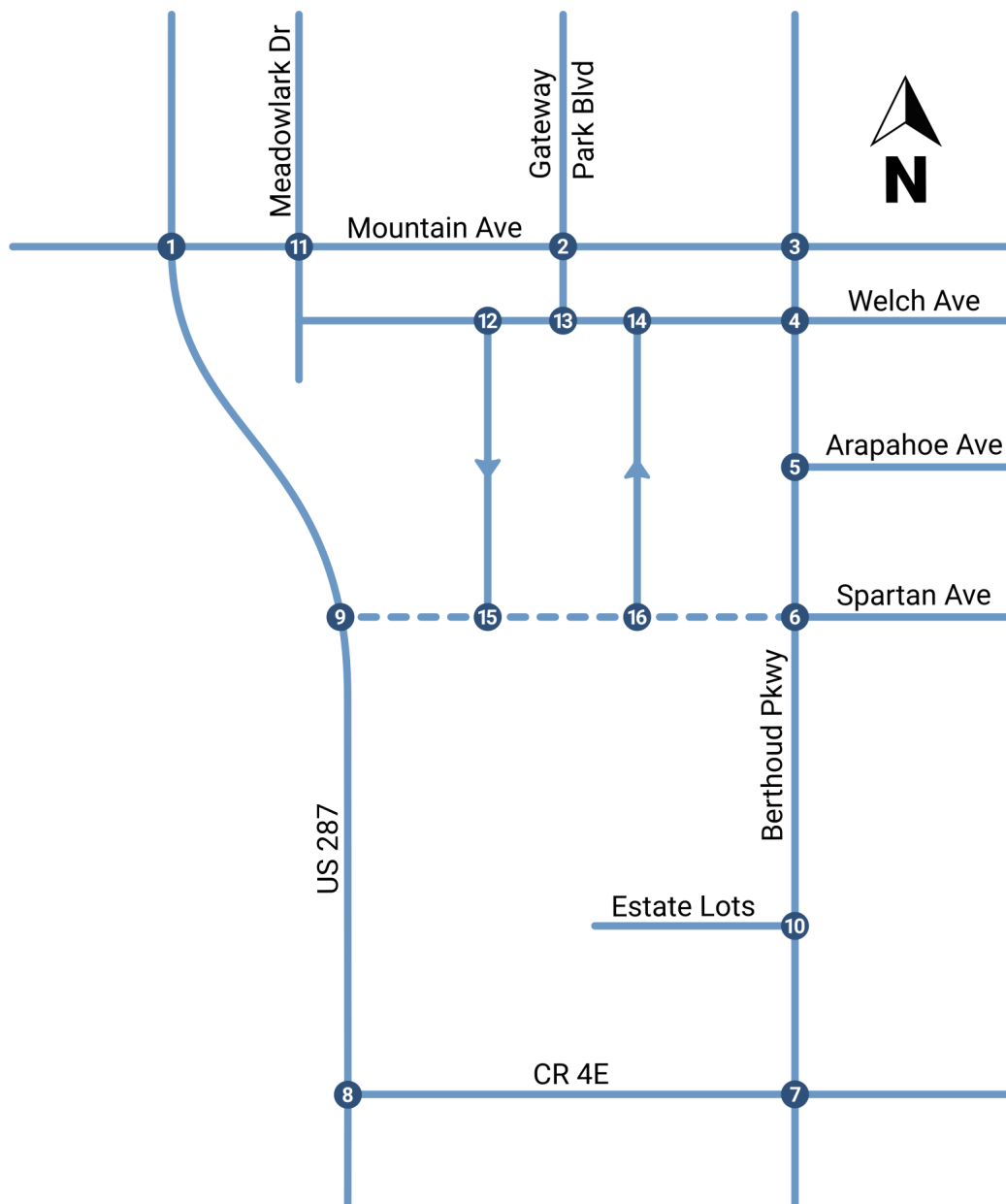
The study examined nine existing intersections, two planned project access streets, and five internal intersections along the proposed one-way streets. The study intersections are depicted on Figure 3. These were identified by the Town for inclusion in the study. The study intersections are listed below.

1. US 287 at Mountain Avenue
2. Gateway Park Boulevard at Mountain Avenue
3. Berthoud Parkway at Mountain Avenue
4. Berthoud Parkway at Welch Avenue
5. Berthoud Parkway at Arapahoe Avenue
6. Berthoud Parkway at Spartan Avenue
7. Berthoud Parkway at CR 4E
8. US 287 at CR 4E
9. US 287 at Spartan Avenue (future)
10. Berthoud Parkway at Estate Lot Access (future)

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

11. Meadowlark Drive at Mountain Avenue
12. Southbound One-Way at Welch Avenue (future)
13. Gateway Park Boulevard at Welch Avenue (future)
14. Northbound One-Way at Welch Avenue (future)
15. Southbound One-Way at Spartan Avenue (future)
16. Northbound One-Way at Spartan Avenue (future)

Figure 3 – Study Intersections



2 EXISTING CONDITIONS

The transportation system has numerous elements that are described in this chapter. The roadway network is described, and traffic volume information is presented for the study intersections.

ADJACENT LANDUSE

The Project site is located east of US 287 and south of Mountain Avenue. East of the project site is commercial use and residential. To the west is rural undeveloped land. South of the future Ludlow Farm is residential uses. North of the site is residential and proposed commercial.

TRANSPORTATION NETWORK

The primary roadways that serve the Project site are described below. Roadway designations were provided in the Town of Berthoud *Transportation Plan Map*, 2021.

Roadway Network

US 287 is a north-south state highway that connects cities within northern Colorado from Fort Collins south to Longmont. US 287 is a four-lane highway with paved shoulders and room for a center left-turn lane. The speed limit in the study area is 65 mph.

Meadowlark Drive is a north-south two-lane local street. There is a striped shoulder and no sidewalks. North of Mountain Avenue, where development has occurred there are sidewalks.

Gateway Park Boulevard is a two-lane north-south local street. There are bike lanes and sidewalks on both sides of Gateway Park Boulevard north of Tundra Avenue. Near Mountain Avenue, there are sidewalks on the east side of the street.

Berthoud Parkway is a north-south two-lane roadway. This major collector is currently posted with a 35 to 40 mph speed limit. There are no auxiliary lanes on the road currently. Berthoud Parkway is classified as a two-lane Arterial north of Mountain Avenue and a Major Collector south of Mountain Avenue. There is a pedestrian/bike trail north of Mountain Avenue on the east side of Berthoud Parkway. To the south of Mountain Avenue, there is a paved shoulder. There are sidewalks adjacent to developed sections.

Mountain Avenue is a two-lane east-west roadway that runs through downtown Berthoud. This road is also SH 56. It is classified as a two-lane Arterial. There are paved shoulders and a sidewalk on the north side adjacent to existing residential areas. The speed limit is posted at 45 mph adjacent to the project site and 50 mph west of US 287.

Welch Avenue is a two-lane east-west road that provides access to commercial areas along Mountain Avenue and adjacent residential areas. The speed limit is posted at

25 mph. There are sidewalks on both sides of the street. Welch Avenue is classified as a local street.

Arapahoe Avenue is a two-lane east-west local street. It has sidewalks on both sides of the street. The speed limit is 25 mph.

Spartan Avenue is a two-lane east-west roadway. It provides access to adjacent residential uses and the Berthoud High School. Spartan is classified as a minor collector east of Berthoud Parkway. The Town has identified Spartan to extend to the west and connect to US 287. The speed limit is 30 mph.

CR 4E is a two-lane east-west road that borders the south of the Project site. It is identified as a major collector. The speed limit is posted at 45 mph.

Pedestrian, Bicycle, and Transit Network

The location of pedestrian and bicycle lanes adjacent to the roads is described above. As areas develop they will include bike lanes and sidewalks within their public rights-of-way. Berthoud has identified two pedestrian/bike trails within the Ludlow project. These are identified in the Town's *Berthoud Unified Trail Master Plan*, June 2018. One is an east/west trail to be located in the southern area of the site and the other is a north/south trail on the western edge of the site.

Berthoud is served by Transfort's Flex service. This is a regional bus that serves the communities of Fort Collins, Loveland, Berthoud, Longmont, and Boulder. There are stops on Mountain Avenue at 2nd and 3rd Streets. Berthoud also operates the Berthoud Area Transportation Service (BATS). It offers door-to-door service within Berthoud and offers service to Loveland and Longmont.

EXISTING TRAFFIC CONDITIONS

Existing intersection operations were evaluated for both the morning and evening peak hours. Intersection count data was collected in June of 2022. These counts were performed at eight of the existing study intersections. Peak hour traffic data on Meadowlark Avenue at Mountain Avenue was obtained from the Traffic Impact Study for Gateway (northeast corner of us 287 and mountain avenue), Aldridge Transportation Consultants, LLC, October 24, 2019.

Appendix A includes the intersection turning movement count data. The counts were compared to peak hour counts conducted when school was in session and the volumes were modified upward to reflect school time conditions. The resulting peak hour turning movement is provided on Figure 4. The current lane configurations of the study intersections are shown on Figure 5.

Figure 4 – Existing Peak Hour Traffic Volumes

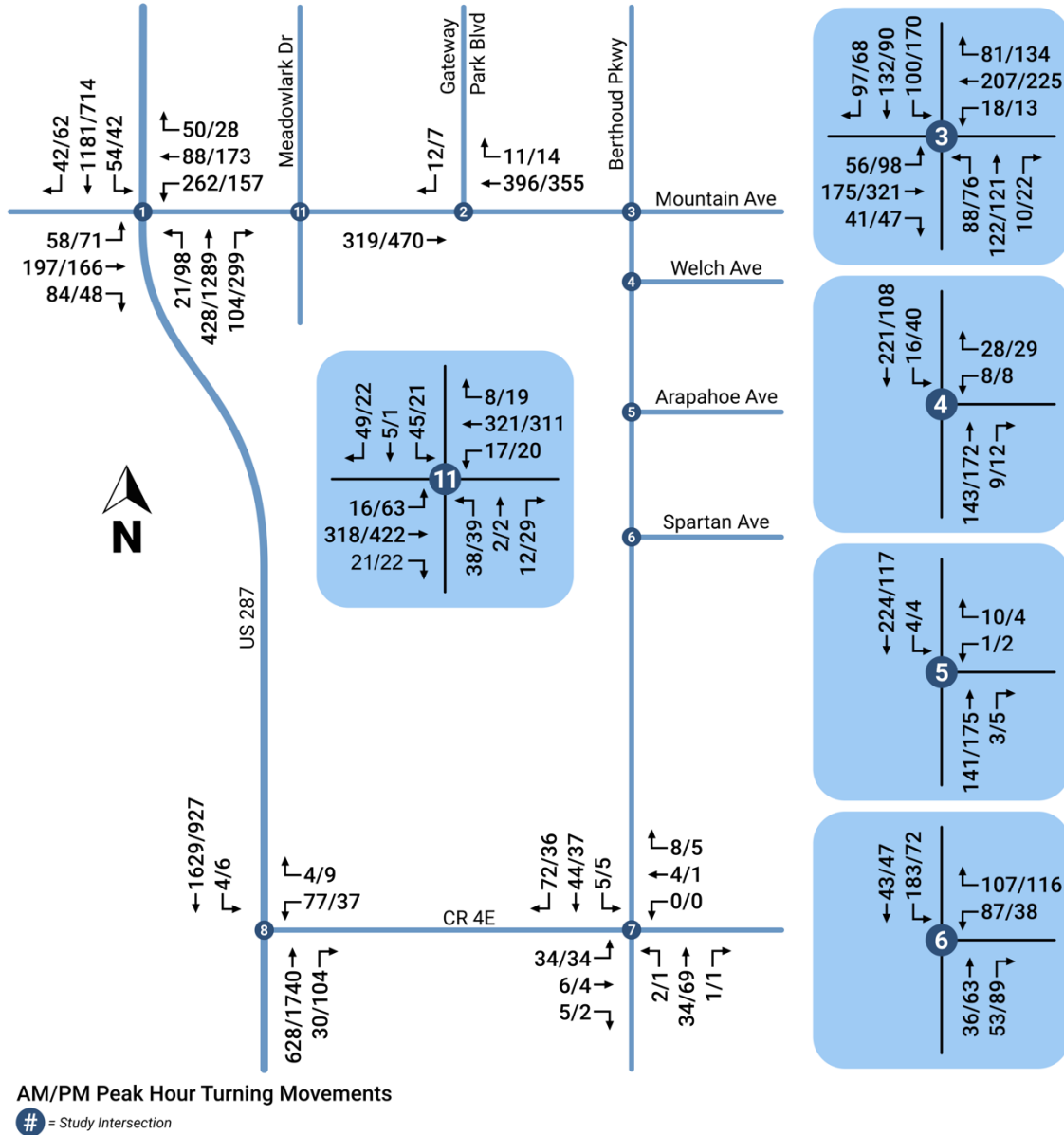
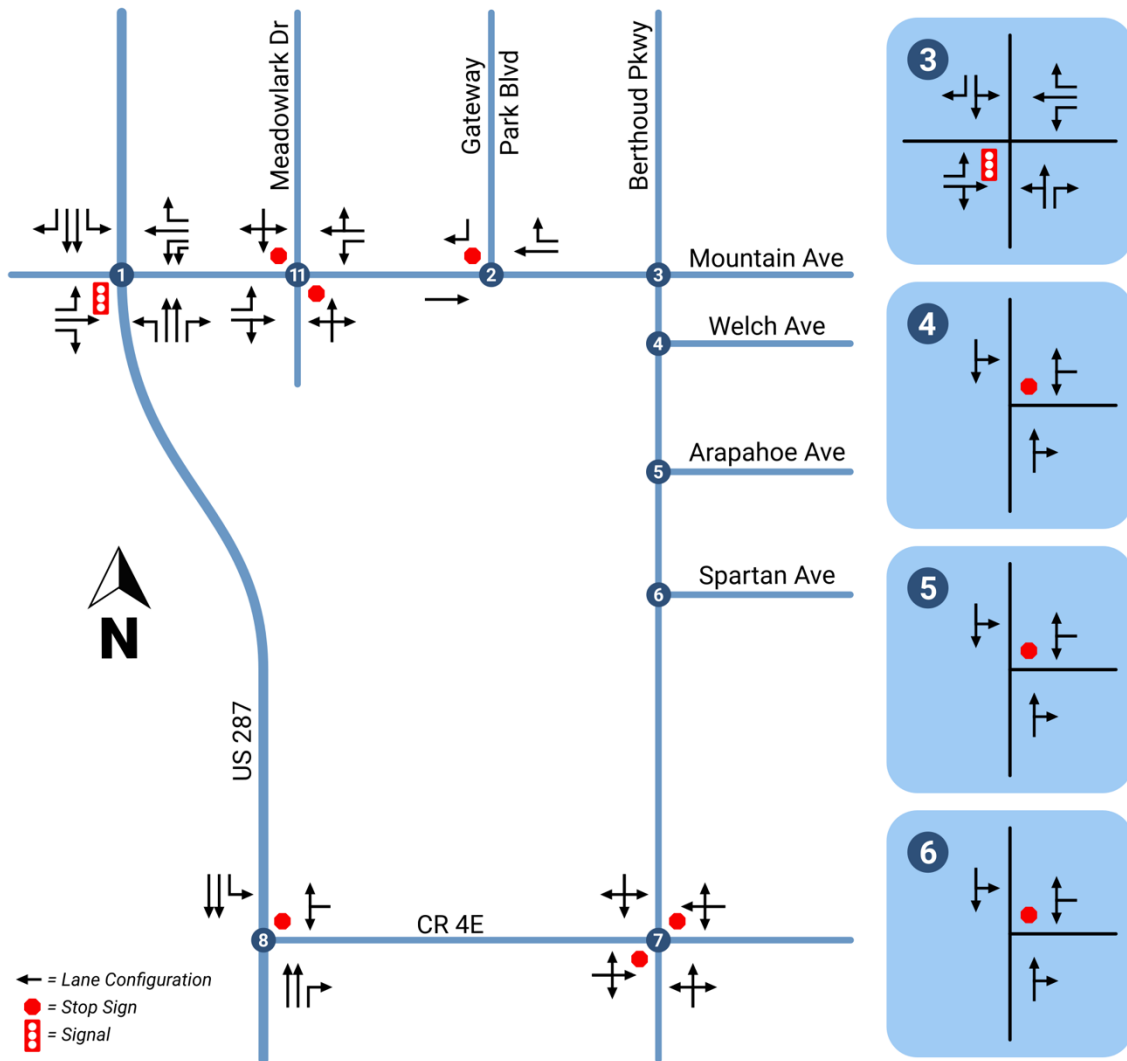


Figure 5 – Existing Lane Configurations



Intersection Level of Service Analysis Methodologies

Transportation professionals evaluate intersections to determine how they are currently operating and will operate in the future. The methods employed can be found in the Transportation Research Board's, 6th Edition, 2016 *Highway Capacity Manual* (HCM). Level of service (LOS) is based on a "graded" system from LOS A, with very little to no delays to LOS F which represents excessive delays and congestion. Table 1 provides the thresholds for acceptable levels of service. The table is from the *Larimer County Urban Area Street Standards* (LCUASS), August 1, 2021.

Table 1
Intersection Level of Service Thresholds

Intersection Component	Major Intersection ¹	Minor Intersection ²	Driveway
Overall (City Limits)	LOS C	LOS C	No Limit
Overall (GMAs)	LOS D	LOS D	No Limit
Any Leg	LOS D	LOS E	No Limit
Any Movement	LOS E	LOS F	No Limit
¹ Includes all signalized and unsignalized arterial/arterial and arterial/ major collector intersections. ² Includes all unsignalized intersections (except major intersections) and high volume driveways ³ There are no LOS standards for I-25 Interchanges. ⁴ On State Highways, overall LOS D is acceptable.			

Signalized Intersection

Peak hour levels of motor vehicle delay at signalized intersections were estimated using methods provided in the HCM. This operations analysis method uses various intersection characteristics (such as traffic volumes, lane geometry, and signal phasing) to estimate the average control delay experienced by motorists traveling through an intersection. Table 2 summarizes the relationship between the average control delay per vehicle and LOS for signalized intersections.

Table 2
Signalized Intersection Level of Service Definitions

Level of Service	Average Control Delay Per Vehicle (Seconds)	Description
A	≤ 10.0	Free Flow or Insignificant Delays: Operations with very low delay, when signal progression is extremely favorable and most vehicles arrive during the green light phase. Most vehicles do not stop at all.
B	> 10.0 and ≤ 20.0	Stable Operation or Minimal Delays: Generally, occurs with good signal progression and/or short cycle lengths. More vehicles stop than with LOS A, causing higher levels of average delay. An occasional approach phase is fully utilized.
C	> 20.0 and ≤ 35.0	Stable Operation or Acceptable Delays: Higher delays resulting from fair signal progression and/or longer cycle lengths. Drivers begin having to wait through more than one red light. Most drivers feel somewhat restricted.
D	> 35.0 and ≤ 55.0	Approaching Unstable or Tolerable Delays: Influence of congestion becomes more noticeable. Longer delays result from unfavorable signal progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop. Drivers may have to wait through more than one red light. Queues may develop, but dissipate rapidly, without excessive delays.
E	> 55.0 and ≤ 80.0	Unstable Operation or Significant Delays: Considered to be the limit of acceptable delay. High delays indicate poor signal progression, long cycle lengths, and high volume to capacity ratios. Individual cycle failures are frequent occurrences. Vehicles may wait through several signal cycles. Long queues form upstream from intersection.
F	> 80.0	Forced Flow or Excessive Delays: Occurs with oversaturation when flows exceed the intersection capacity. Represents jammed conditions. Many cycle failures. Queues may block upstream intersections.

Source: Transportation Research Board, Highway Capacity Manual, 2016.

Unsignalized Intersection

Peak hour levels of motor vehicle delay at unsignalized intersections were estimated using the method from Chapter 17 of the 2016 *Highway Capacity Manual*. The delays for the entire intersection and the movement and/or approach are determined. Table 3 summarizes the relationship between the average control delay per vehicle and LOS for unsignalized intersections.

Table 3
Unsignalized Intersection Level of Service Definitions

Level of Service	Average Control Delay Per Vehicle (Seconds)	Description
A	≤ 10.0	No delay for stop-controlled approaches.
B	10.0 and ≤ 15.0	Operations with minor delay.
C	> 15.0 and ≤ 25.0	Operations with moderate delays.
D	> 25.0 and ≤ 35.0	Operations with increasingly unacceptable delays.
E	> 35.0 and ≤ 50.0	Operations with high delays, and long queues.
F	> 50.0	Operations with extreme congestion, and with very high delays and long queues unacceptable to most drivers.

Source: Transportation Research Board, Highway Capacity Manual, 2016

Existing Intersection Conditions

Using the HCM methodology, the weekday AM, and PM peak hour intersection operations were determined. The results are provided in Table 4. The Town's LOS thresholds, provided in Table 1, were utilized to evaluate existing operations. As indicated in Table 4, the study intersections are currently operating at acceptable levels of service. The detailed analysis worksheets are provided in Appendix B. It should be noted that at US 287/CR 4E the westbound direction operates at LOS F, this is a minor intersection, and a LOS F is considered acceptable.

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Table 4
Existing Weekday Peak-Hour Intersection Level of Service

#	Intersection	Overall Movement	Level of Service	
			AM Peak Hr	PM Peak Hr
1	US 287 & Berthoud Parkway Signal	Overall	C	C
		EB LT	D	E
		EB T	E	E
		EB RT	A	A
		WB LT	E	E
		WB T	C	D
		WB RT	A	A
		NB LT	B	B
		NB T	B	C
		NB RT	A	A
		SB LT	B	B
		SB T	C	B
		SB RT	A	A
2	Gateway PK Blvd & Mountain Ave Right-In-Right-Out	Overall	A	A
		SB RT	B	B
3	Berthoud Pkwy & Mountain Ave Signal	Overall	B	B
		EB LT	A	B
		EB T/RT	B	B
		WB LT	A	A
		WB T	B	C
		WB RT	A	A
		NB LT/T	B	B
		NB RT	A	A
		SB LT/T	B	B
		SB RT	A	A

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

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Table 4 (continued)
Existing Weekday Peak-Hour Intersection Level of Service

#	Intersection	Overall Movement	Level of Service	
			AM Peak Hr	PM Peak Hr
4	Berthoud Pkwy & Welch Ave T-Stop	Overall	A	A
		WB LT/RT	B	B
		SB LT	A	A
5	Berthoud Pkwy & Arapahoe Ave T-Stop	Overall	A	A
		WB LT/RT	A	A
		SB LT	A	A
6	Berthoud Pkwy & Spartan Ave T-Stop	Overall	A	A
		WB LT/RT	C	B
		SB LT	A	A
7	Berthoud Pkwy & CR 4E Two-Way Stop	Overall	A	A
		NB LT	A	A
		EB Approach	A	A
		WB Approach	A	A
		SB LT	A	A
8	US 287 & CR 4E T-Stop	Overall	A	A
		WB Approach	F	F
		SB LT	A	C
11	Meadowlark Dr & Mountain Ave Two-Way Stop	Overall	A	A
		NB Approach	C	C
		EB LT	A	A
		WB LT	A	A
		SB Approach	C	C

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

3 PROJECT TRAVEL DEMAND

This chapter provides an overview of the project and a description of the travel demand methodology to estimate vehicle trip generation, distribution, and assignment of project-generated traffic along area roadways and intersections.

PROJECT CHARACTERISTICS

The proposed Ludlow Farm project will include various uses. The project is envisioned to be phased. The project site plan is depicted on Figure 2. As shown on the figure, vehicular access to the project will be from locations along Mountain Avenue, Berthoud Parkway, and US 287.

PROJECT TRIP GENERATION

The trip generation characteristics of the project were estimated using data from the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 11th Edition. Table 5 provides the trip generation estimated for the Ludlow Farm project. As indicated in the table, the full buildout of the project will result in an estimated net of 18,835 daily, 815 morning, and 1,445 evening peak hour trips.

The net trips take into account an internal capture (trips that happen within the Ludlow project site) based on the mixture of residential/office/commercial. This estimate was determined based on data from National Cooperative Highway Research Program (NCHRP) Report 285, Enhancing Internal Trip Capture Estimation for Mixed-Use Developments, 2011. Appendix C provides the internal trip calculation worksheets. A 15 percent internal capture was applied to the PM peak hour and relevant daily volumes. The net trips also account for pass by trips on both Mountain Avenue and US 287. Based on data from the ITE *Trip Generation Handbook*, 3rd Edition, 2017. For commercial uses, the pass by trips range from 16% up to 66% and is dependent on the size of the commercial site and its location. A pass by trip is already present on the road. It is therefore not a new trip. Note that at the project's access points, all the trips should be present and no pass by discount is taken.

Table 5
Estimated Trip Generation

ITE Land Use Code & Rates		Project	Project Trip Generation						
Land Use	Land Use Code	Dwelling Units KSF	Daily	AM			PM		
				IN	Out	Total	IN	Out	Total
Single-Family Detached	210	526	4,647	88	250	337	298	175	473
Multi-Family Low Rise	220	1353	8,748	106	336	442	379	223	602
Shop Ctr > 150 KSF	820	165.7	6,133	86	53	139	270	293	563
Day Care Center	565	15	714	87	78	165	78	88	167
General Office	710	30	407	52	7	59	10	51	61
INITIAL TOTAL			20,649	420	723	1,143	1,037	830	1,867
Internal Capture - PM 15%			(280)				(156)	(125)	(280)
Pass-By Trip Reduction Commercial 25%			(1533)				(68)	(73)	(141)
Total Reductions				0	0	0	(224)	(198)	(421)
TOTAL			18,836	420	723	1,143	813	632	1,446

Based on ITE Trip Generation 11th Edition

PROJECT TRIP DISTRIBUTION | ASSIGNMENT

The distribution of the project traffic onto the roadway system was based on the location of the project within Berthoud and northern Colorado, the roadway system, and existing traffic data. The project trip distribution is depicted on Figure 6 and indicates the distribution for residential and commercial/office uses. The resulting peak hour traffic associated with the buildout of Ludlow Farm is shown on Figure 7.

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Figure 6 – Trip Distribution

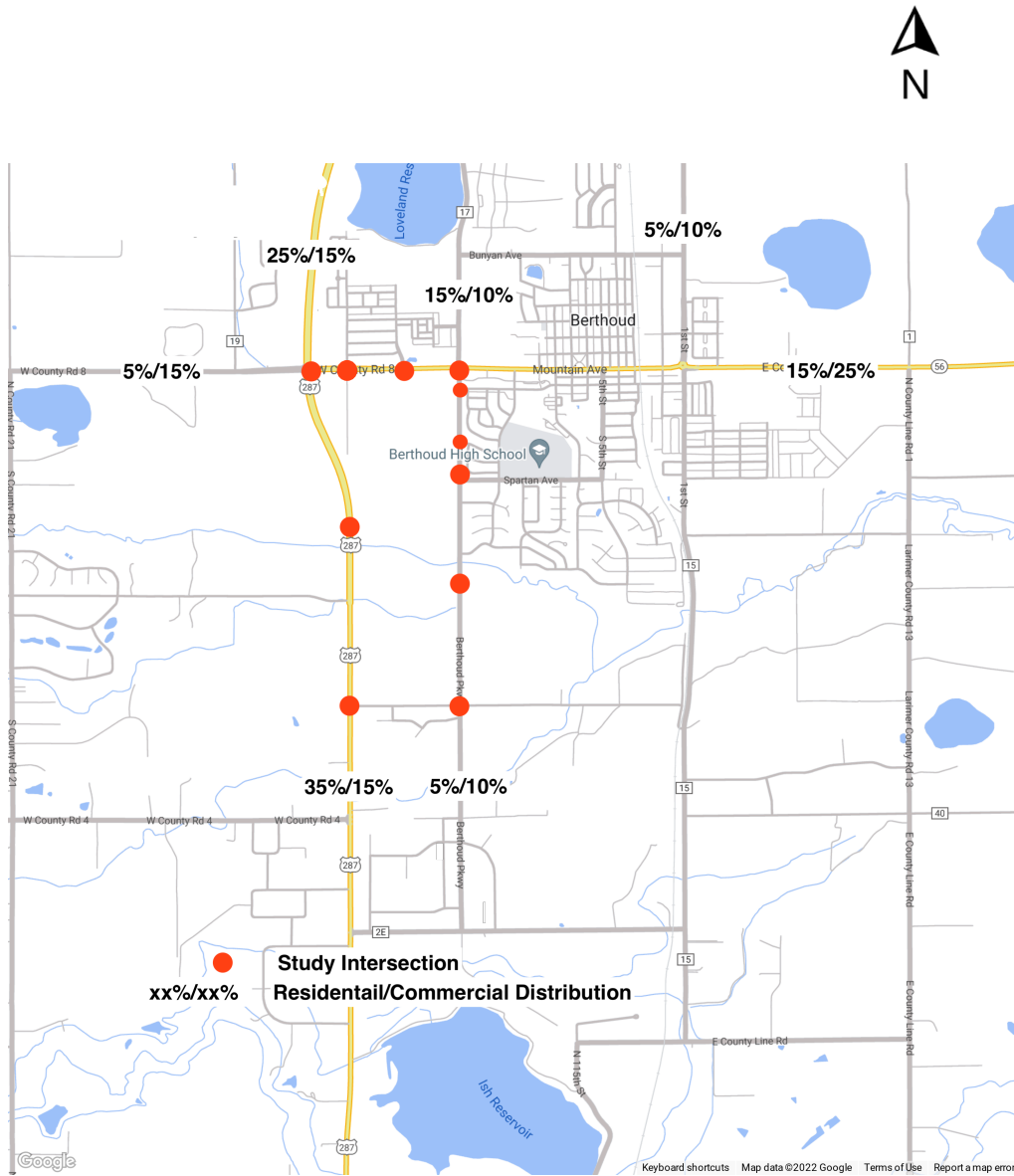
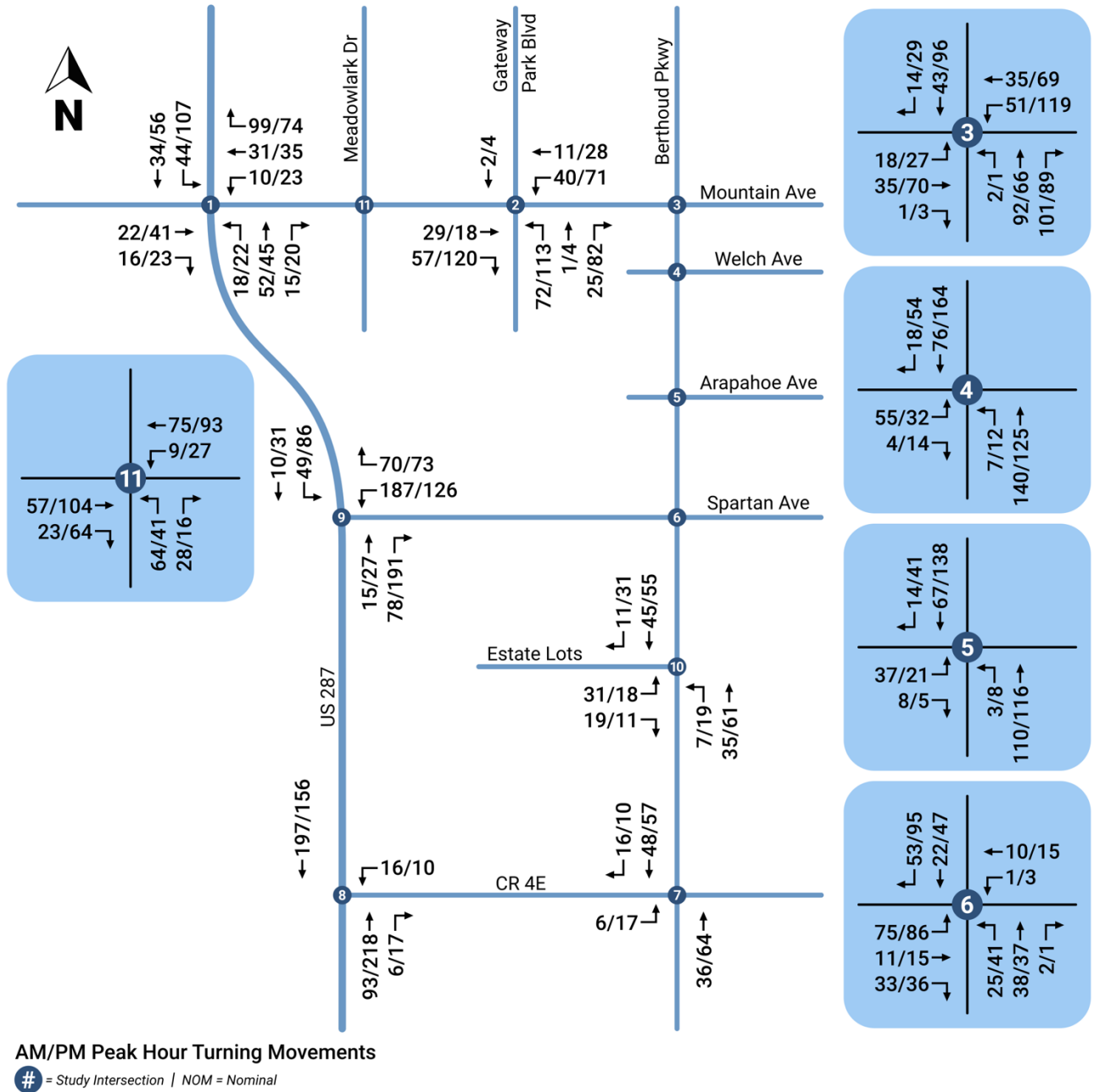


Figure 7 – Project Traffic



4 FUTURE TRAFFIC PROJECTIONS

Estimates of future traffic conditions both with and without the proposed Project were necessary to evaluate the potential impact of the Project on the local street system. The background base traffic scenario represents future traffic conditions without the addition of the Project, while the total scenario represents future traffic conditions with the completion of the proposed Project. These projections were developed for Year 2042. The development of these future traffic scenarios is described in this chapter.

BACKGROUND 2042 TRAFFIC PROJECTIONS

The background traffic projections reflect growth in traffic from two primary sources: ambient growth in the existing traffic volumes due to regional growth both in and outside of the study area, and consideration of traffic generated by nearby planned projects. Each of these elements is described below.

- The **areawide/ambient growth** in traffic was determined based on the direction from the Colorado Department of Transportation (CDOT). The 20 year growth factors were from 1.18 to 1.39. Because numerous other projects' traffic will also be included, a 20 year growth factor of 1.10 was applied.
- The future connection of Spartan Avenue between Berthoud Parkway and US 287 was assumed. Traffic was modified by shifting traffic to this future connection.
- The future traffic related to the **other proposed projects** was added to the background traffic. Three proposed projects were included as follows.
 - Traffic Impact Study for Gateway (northeast corner of US 287 and Mountain Avenue), Aldridge Transportation Consultants, LLC, October 24, 2019
 - Trails at Creekview (northeast corner Berthoud Parkway and CR 4E) Rollins Consult LLC, January 27, 2022.
 - The upcoming Revere project (northwest corner of US 287 and Mountain Avenue) is being prepared by Rollins Consult LLC

The resulting Background 2042 traffic projections for the study intersections are provided on Figure 8.

TOTAL TRAFFIC PROJECTIONS

The total traffic projections include both the background plus project traffic. The project-generated traffic volumes from Figure 7 were added to the Year 2042 background traffic volumes illustrated on Figure 8 to develop background plus project peak hour traffic volumes. The resulting Year 2042 total traffic is depicted on Figure 9.

Figure 8 – Background Traffic 2042

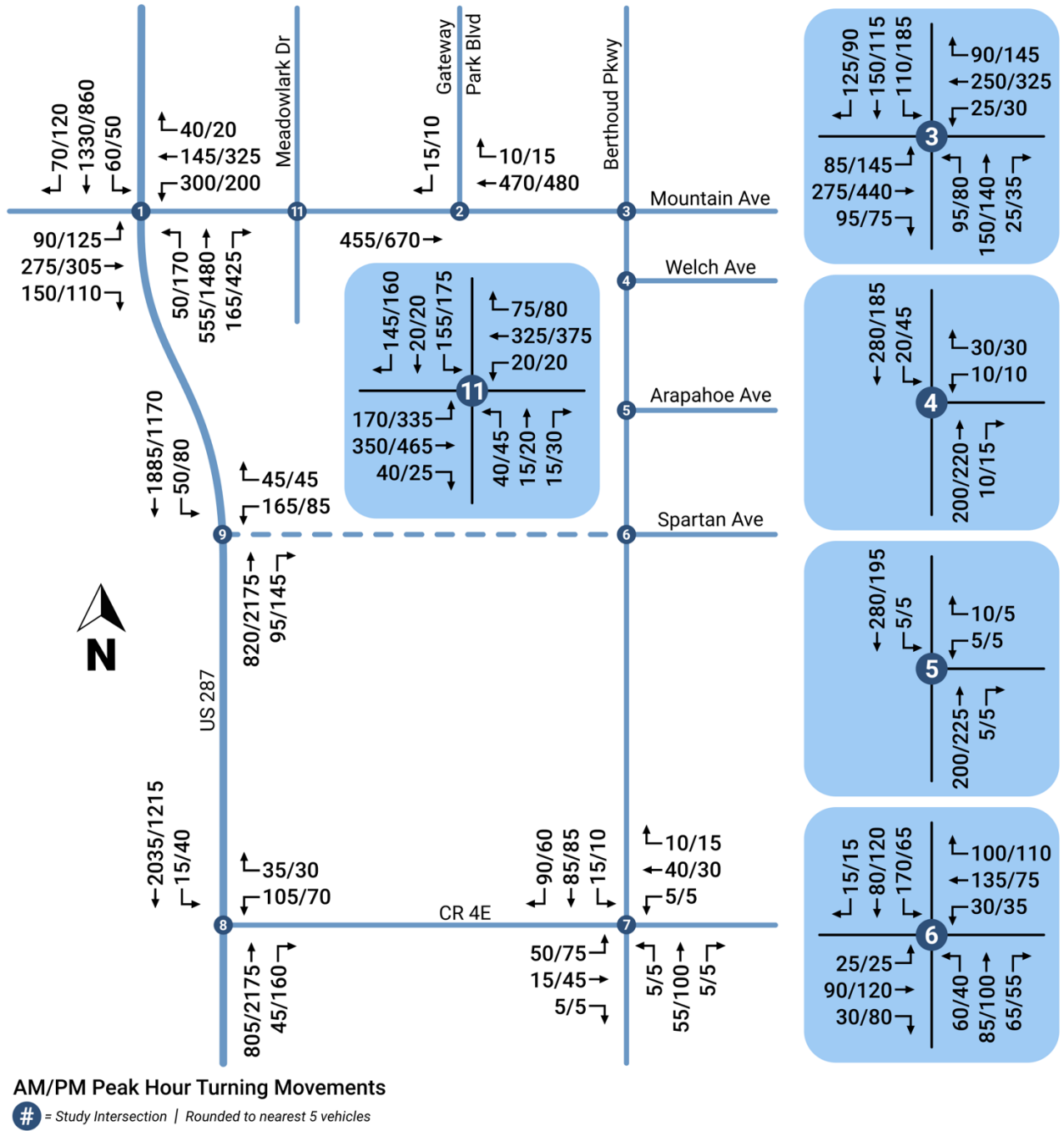
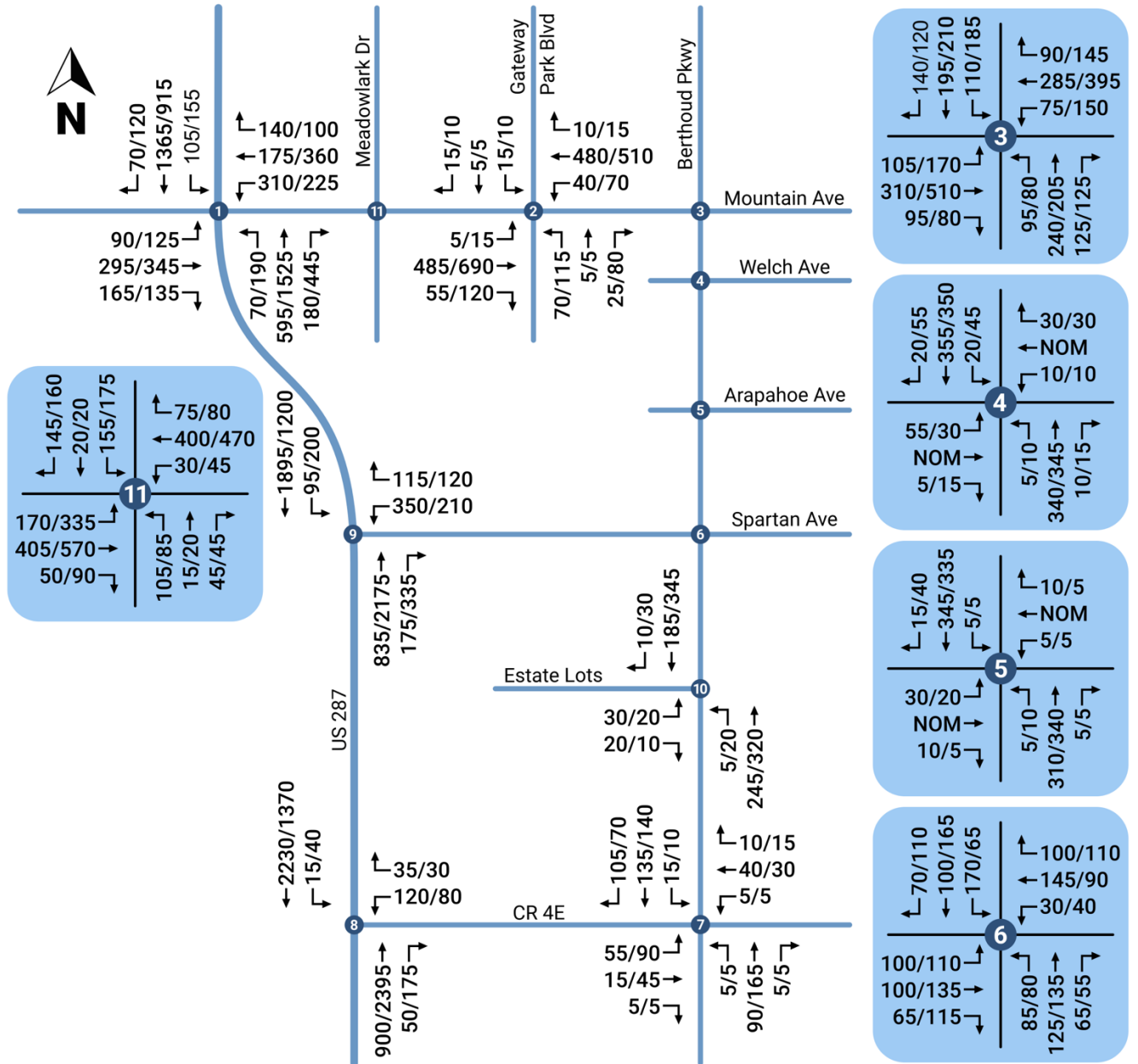


Figure 9 – Total Traffic 2042



5 AUXILIARY LANE ANALYSIS

An analysis was conducted to determine the need for auxiliary turn lanes to the project site from US 287, Mountain Avenue, and Berthoud Parkway.

The guidelines from Figure 8-4 in LCUASS (provided in Appendix D) were applied to the total future projected volumes depicted on Figure 9 for 2042 total traffic conditions. Using the LCUASS criteria, it was determined that several auxiliary lanes satisfy the turn lane criteria. The following lanes are required under 2042 Total conditions.

US 287

- A northbound right-turn lane at Spartan Avenue

Mountain Avenue

- An eastbound right-turn lane at Gateway Park Boulevard

Berthoud Parkway

- A southbound right-turn lane at both Welch and Arapahoe Avenues
- A southbound right-turn lane at Spartan Avenue

These lanes will be assumed for the analysis of the study intersection operations for 2042 conditions. However, for the future roundabout at Berthoud Parkway and Spartan Avenue, it will be assumed that each leg is a single lane.

6 TRAFFIC IMPACT ANALYSIS

This chapter presents an analysis of the potential impacts of the traffic generated by the proposed Ludlow Farm project on the local street system. The analysis compares the projected levels of service at each study intersection under future background and total conditions to estimate the incremental increase in the level of service caused by the proposed Project. This provides the information needed to assess the potential impact of the Project using the acceptable operations criteria.

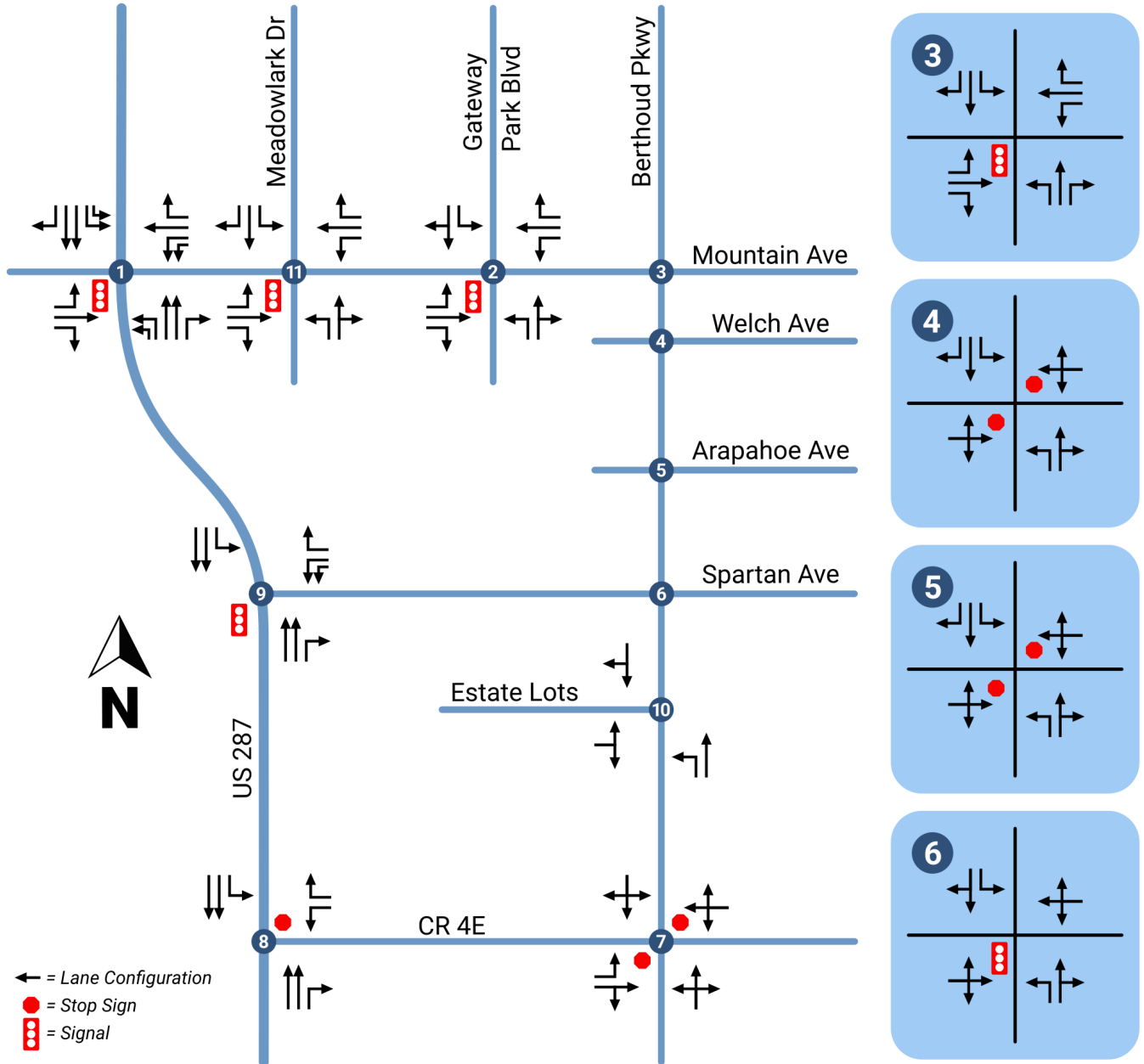
The extension of Spartan Avenue from Berthoud Parkway to US 287 is proposed as part of the project. It should be noted that without this future roadway extension, the future traffic conditions on Mountain Avenue would be over capacity. This is critical for the intersections along Mountain Avenue at US 287 and Berthoud Parkway. This improvement is part of the Ludlow ODP.

FUTURE INTERSECTION TRAFFIC CONDITIONS

The future traffic projections at the eleven external study intersections were analyzed to determine their operating conditions. An analysis of the proposed one-way internal streets is provided in the following section of the report. The analysis of future conditions was performed with both signalized intersections and roundabouts at Berthoud Parkway/Mountain Avenue, Berthoud Parkway/Spartan Avenue, and Gateway Park Boulevard/ Mountain Avenue. The intersection configurations under background 2042 conditions are provided on Figure 10. The analysis results are provided in Table 6 for both background and total conditions (signalized intersection) and in Table 7 for the three potential roundabout intersections. As indicated in Table 6, the intersections are projected to operate within the acceptable limits established by the Town of Berthoud with the following exceptions:

- At the intersection of US 287 and Mountain Avenue, the westbound left-turn and eastbound through movements are projected to experience long delays under both background and total traffic conditions. As traffic volumes on US 287 increase, the cross streets are expected to experience longer delays. Overall, the intersection will operate at an acceptable level of service.
- The intersection of US 287 and CR 4E will operate with high delays and LOS F under background and total traffic conditions. This location may require signalization. The operations with a signal are provided in Table 8 and indicate the intersection would operate at acceptable levels.

Figure 10
2042 Intersection Configurations



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Table 6
2042 Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
1	US 287 & Berthoud Parkway Signal	Overall	C	C	C	D
		EB LT	D	E	D	E
		EB T	E	F	E	F
		EB RT	A	A	A	A
		WB LT	E	F	E	F
		WB T	C	E	C	E
		WB RT	A	A	B	A
		NB LT	D	D	D	D
		NB T	B	C	B	D
		NB RT	A	A	A	A
		SB LT	D	E	D	E
		SB T	C	C	D	C
		SB RT	A	A	A	A
2	Gateway PK Blvd & Mountain Ave Signal	Overall	A	A	B	B
		EB LT	-	-	A	A
		EB T	-	-	B	C
		EB RT	-	-	A	A
		WB LT	-	-	B	C
		WB T	-	-	C	B
		WB RT	-	-	A	A
		NB LT/T	-	-	B	B
		NB RT	-	-	A	A
		SB LT/T	-	-	B	B
		SB RT	B	B	A	B
3	Berthoud Pkwy & Mountain Ave Signal	Overall	B	B	B	B
		EB LT	B	B	B	B
		EB T	C	C	C	C
		EB RT	A	A	A	A
		WB LT	A	A	A	B
		WB T	C	C	C	C
		WB RT	A	A	A	A
		NB LT	B	B	B	B
		NB T	B	B	B	B
		NB RT	A	A	A	A
		SB LT	B	B	B	C
		SB T	B	B	B	B
		SB RT	A	A	A	A

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

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Table 6 (continued)
2042 Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
4	Berthoud Pkwy & Welch Ave T-Stop	Overall	A	A	A	A
		NB LT	-	-	A	A
		EB LT/T/RT	-	-	C	C
		WB LT/T/RT	B	B	B	B
		SB LT	A	A	A	A
5	Berthoud Pkwy & Arapahoe Ave T-Stop	Overall	A	A	A	A
			-	-	A	A
			-	-	C	C
		WB LT/RT	B	B	B	B
		SB LT	A	A	A	A
6	Berthoud Pkwy & Spartan Ave All-Way Stop (Background) Signal (Total)	Overall	B	B	B	B
		EB LT/T/RT	B	B	C	C
		WB LT/T/RT	B	B	B	B
		NB LT	B	B	A	B
		NB T/RT	B	B	A	A
		SB LT	B	B	A	A
		SB T/RT	B	B	A	A
7	Berthoud Pkwy & CR 4E Two-Way Stop	Overall	A	A	A	A
		NB LT	A	A	A	A
		EB LT	B	B	B	B
		EB T/RT	B	B	B	B
		WB Approach	B	B	B	B
		SB LT	A	A	A	A
8	US 287 & CR 4E T-Stop	Overall	D	F	F	F
		WB LT	F	F	F	F
		WB RT	B	D	B	E
		SB LT	B	D	B	E

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

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Table 6 (continued)
2042 Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
9	US 287 & Spartan Ave Signal	Overall	B	C	B	D
		WB LT	D	D	D	D
		WB RT	B	B	A	B
		NB T	A	D	B	D
		NB RT	A	A	A	A
		SB LT	A	C	A	D
		SB T	B	A	C	B
10	Berthoud Pkwy & Estate Lot Access T-Stop	Overall	-	-	A	A
		NB LT	-	-	A	A
		EB LT/RT	-	-	B	B
11	Meadowlark Dr & Mountain Ave Signal	Overall	B	B	B	B
		EB LT	B	B	B	B
		EB T/RT	B	B	-	-
		EB T	-	-	B	B
		EB RT	-	-	A	A
		WB LT	B	A	B	B
		WB T	B	B	C	B
		WB RT	A	A	A	A
		NB L/T/R	B	C	-	-
		NB LT	-	-	C	D
		NB T/RT	-	-	A	B
		SB LT	C	D	C	D
		SB T	B	C	B	D
		SB RT	A	A	A	A

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement

Table 7 - Roundabout
2042 Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
2	Gateway Park Blvd & Mountain Ave Roundabout	Overall	-	-	A	B
		EB LT/T	-	-	A	A
		EB RT	-	-	A	A
		WB LT/T/RT	-	-	A	A
		NB LT/T/RT	-	-	A	A
		SB LT/T/RT	-	-	A	A
3	Berthoud Pkwy & Mountain Ave Roundabout	Overall	B	C	A	C
		EB LT/T	B	D	A	E
		EB RT	A	A	A	A
		WB LT/T/RT	B	C	-	-
		WB LT/T	-	-	A	C
		WB RT	-	-	A	A
		NB LT/T/R	B	C	-	-
		NB LT/T	-	-	B	C
		NB RT	-	-	A	A
		SB LT/T/RT	B	C	-	-
		SB LT/T	-	-	A	C
		SB RT	-	-	A	A
6	Berthoud Pkwy & Spartan Ave Roundabout	Overall	A	A	A	A
		EB Entry	A	A	A	A
		WB Entry	A	A	A	A
		NB Entry	A	A	A	A
		SB Entry	A	A	A	A

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach

As indicated in Table 7, the intersections are projected to operate within the acceptable limits established by the Town of Berthoud with the following noted operations, at the intersection of Berthoud Parkway and Mountain Avenue the potential roundabout will require two lanes on Mountain Avenue and single lanes with exclusive right-turn lanes on Berthoud Parkway. The eastbound direction has an estimated queue length of 15 vehicles. Pedestrian crossings at this roundabout will be challenging especially for vulnerable users such as youth and older adults.

Table 8
2042 Peak Hour Intersection Level of Service With Improvements

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
8	US 287 & CR 4E Signal	Overall	A	A	B	B
		WB LT	D	C	C	C
		WB RT	B	C	C	C
		NB T	A	B	A	B
		NB RT	A	A	A	A
		SB LT	A	A	A	C
		SB T	A	A	B	A

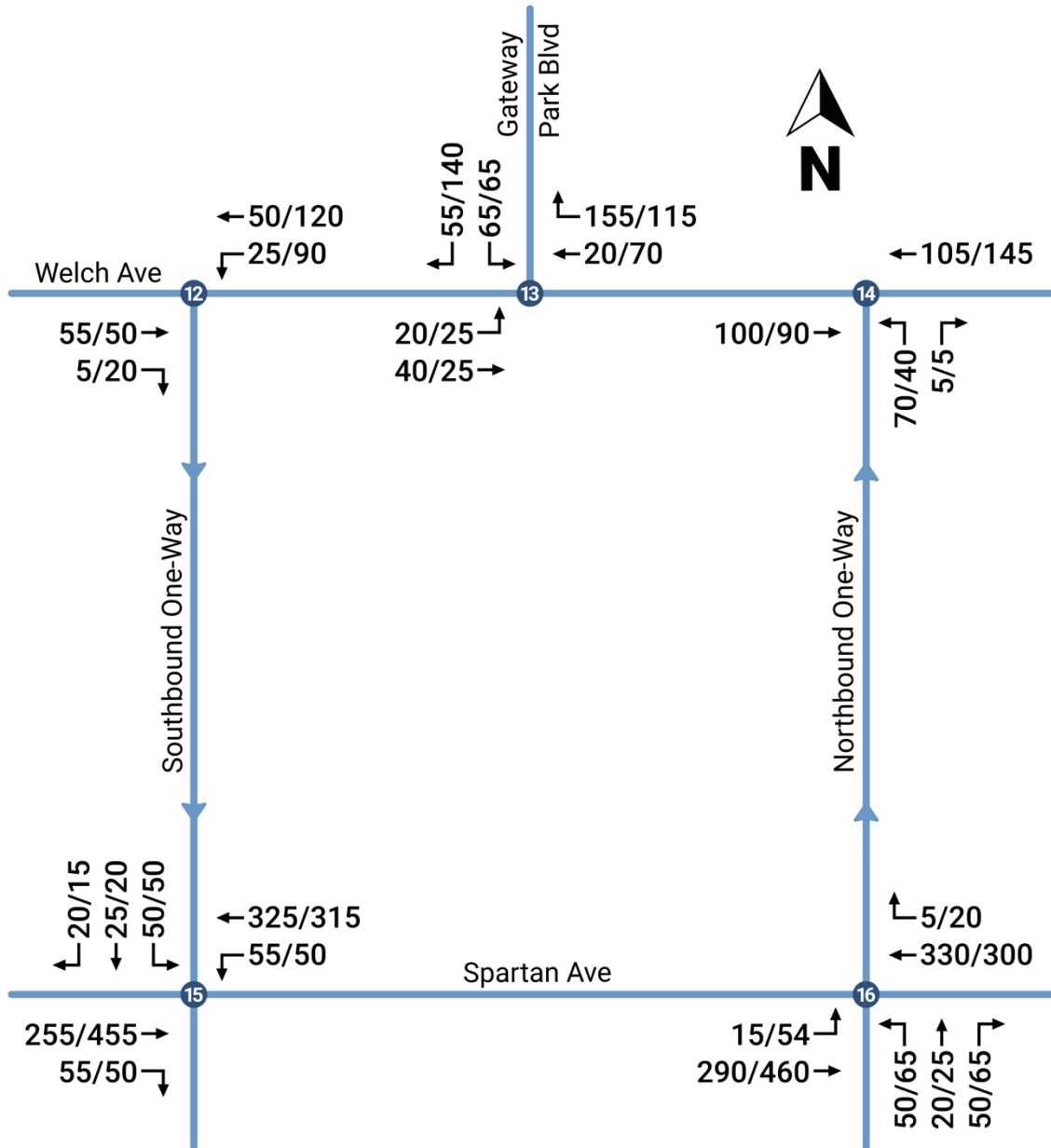
1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach

INTERNAL ONE-WAY STREETS

The core of the Ludlow ODP includes a central park area framed by one-way streets. The intersection of the one-way streets was analyzed on both the north and south ends. The projected traffic volumes are depicted on Figure 11. The expected peak hour volumes were factored upward by 25% to ensure that the intersection spacing and configurations would operate well. The spacing between the one-way pairs along Spartan Avenue is approximately 177 feet (flow line to flow line). Along Welch Avenue between Gateway Park Boulevard and the one-way street the intersection spacing is between approximately 160 and 165 feet (flow line to flow line).

The results of the intersection level of service analysis and queue lengths are provided in Table 9. As indicated in the table, each of the intersections along both Welch Avenue and Spartan Avenue are expected to operate acceptably with the full buildout of the Ludlow ODP. The intersection configurations are provided on Figure 12, no left-turn lanes will be necessary on either Welch or Spartan Avenues. The access spacing as proposed is anticipated to operate with minimal delays and minor vehicular stacking.

Figure 11
2042 One-Way Peak Hour Traffic Volumes



AM/PM Peak Hour Turning Movements

= Study Intersection | Rounded to nearest 5 vehicles

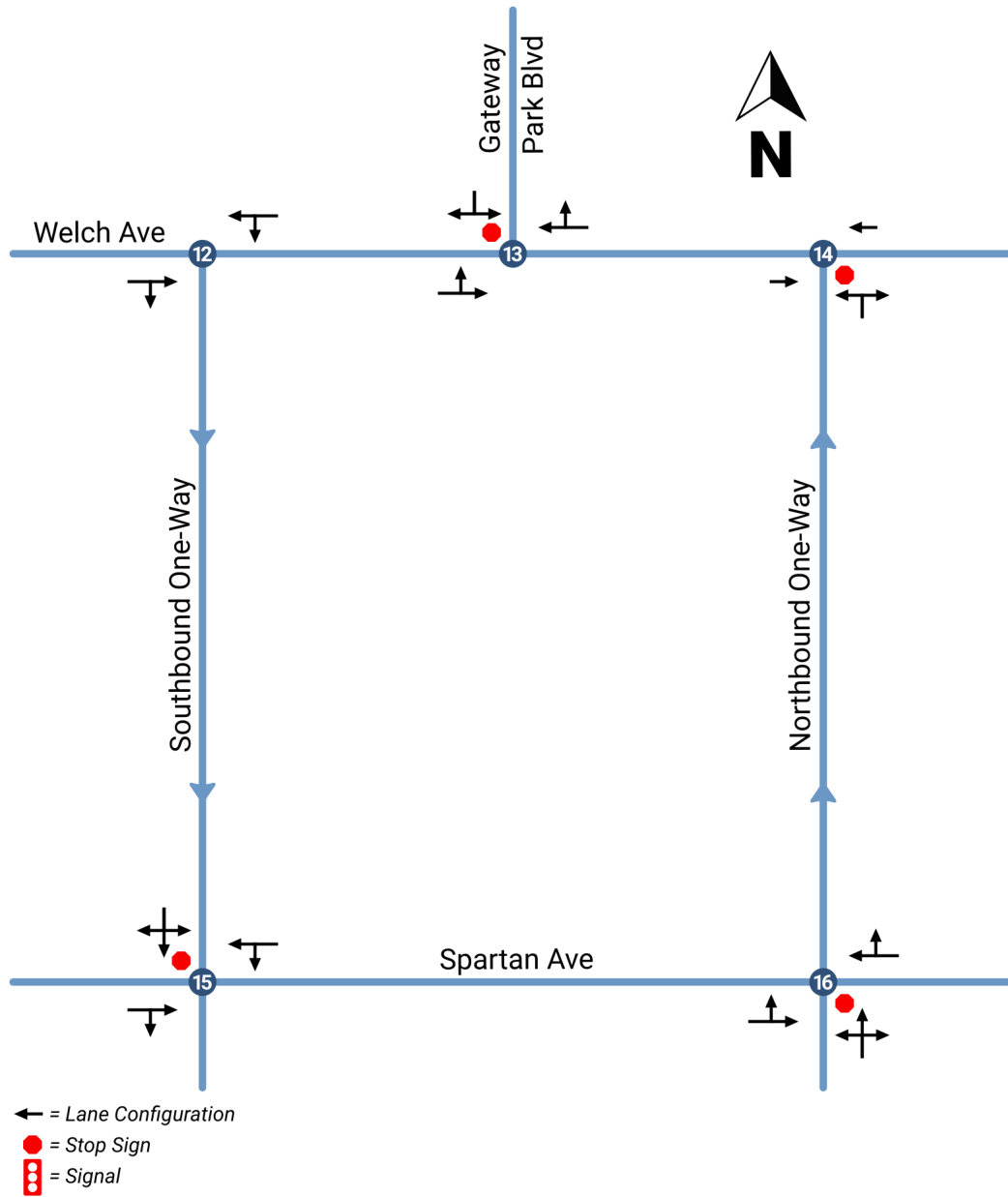
LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Table 9
2042 One-Way Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Level of Service/ Queue(veh)	
			AM Peak Hr	PM Peak Hr
12	SB One-Way & Welch Ave T-Stop	Overall	A	A
		WB LT/T	A / 0.1	A / 0.2
13	Gateway PK Blvd & Welch Ave T-Stop	Overall	A	A
		EB LT/T	A / 0.1	A / 0.1
		SB LT/RT	B / 0.6	B / 1.2
14	NB One-Way & Welch Ave T-Stop	Overall	A	A
		NB LT/RT	B / 0.4	B / 0.2
15	SB One-Way & Spartan Ave T-Stop	Overall	A	A
		WB LT/T	A / 0.2	A / 0.2
		SB LT/T/RT	C / 1.0	C / 1.2
16	NB One-Way & Spartan Ave T-Stop	Overall	A	A
		NB LT/T/RT	B / 1.0	C / 2.3
		EB LT/T	A / 0	A / 0.1

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

Figure 12
2042 One-Way Intersection Configurations



7 CONCLUSIONS

This study was undertaken to analyze the potential long range traffic impacts of the proposed Ludlow Farm property in the Town of Berthoud. The following summarizes the results of this analysis:

- The proposed Ludlow Farm project is located south of Mountain Avenue and east of US 287. The site is currently undeveloped.
- The traffic study analyzed the long range 2042 traffic conditions with the full buildout of the project.
- The proposed project includes the extension of Spartan Avenue from Berthoud Parkway to US 287. This future connection will benefit the transportation network and relieve the potential for Mountain Avenue to exceed capacity in the long range future.
- The project was modeled with 526 single family homes and 1,353 multi-family dwellings that are located throughout the site. A total of 165,700 square feet of commercial located adjacent to Mountain Avenue and at US 287/Spartan Avenue. Office uses are proposed at 30,000 square feet. A 15,000 square foot daycare center is also proposed
- The full buildout of the project is anticipated to result in an estimated 18,835 daily, 1,145 morning, and 1,445 evening peak hour trips.
- Currently, the study intersections are at acceptable levels.
- Several right-turn lanes are required to access the project site. These are in the eastbound direction at Gateway Park/Mountain, northbound at US 287/Spartan, and southbound along Berthoud Parkway at Welch, Arapahoe, and Spartan Avenues (unless Spartan Avenue at Berthoud Parkway is a roundabout).
- The study intersections are projected to operate acceptably under the 2042 background and total traffic conditions with the noted exceptions listed below.
- At the intersection of US 287 and Mountain Avenue, the westbound left-turn and eastbound through movements are projected to experience long delays under both background and total traffic conditions. As traffic volumes on US 287 increase, the cross streets are expected to experience longer delays. Overall, the intersection will operate at an acceptable level of service.
- The intersection of Gateway Park Boulevard and Mountain Avenue works both as signalized and a single-lane roundabout with an eastbound right-turn lane.
- The signalized intersection of Berthoud Parkway and Mountain Avenue will operate acceptably. A roundabout will require a thorough/left-turn lane and exclusive free flow right-turn lanes. The free flow right-turn lanes would be similar to the northbound approach at the existing roundabout of 1st Street and Mountain Avenue. Under background conditions, this is required in the

eastbound direction. Under total traffic conditions, each approach requires right turns.

- The intersection of Berthoud Parkway and Spartan Avenue works as both a signalized intersection and a single lane roundabout.
- The intersection of US 287 and CR 4E will operate with high delays and LOS F under background and total traffic conditions. This location may require signalization. The operations with a signal at the intersection would operate at acceptable levels.
- The internal one-way streets that frame the central park will operate at good levels of service at the proposed spacing. No left-turn lanes are required on Welch Avenue and Spartan Avenue where they intersect the one-way street.

APPENDICIES

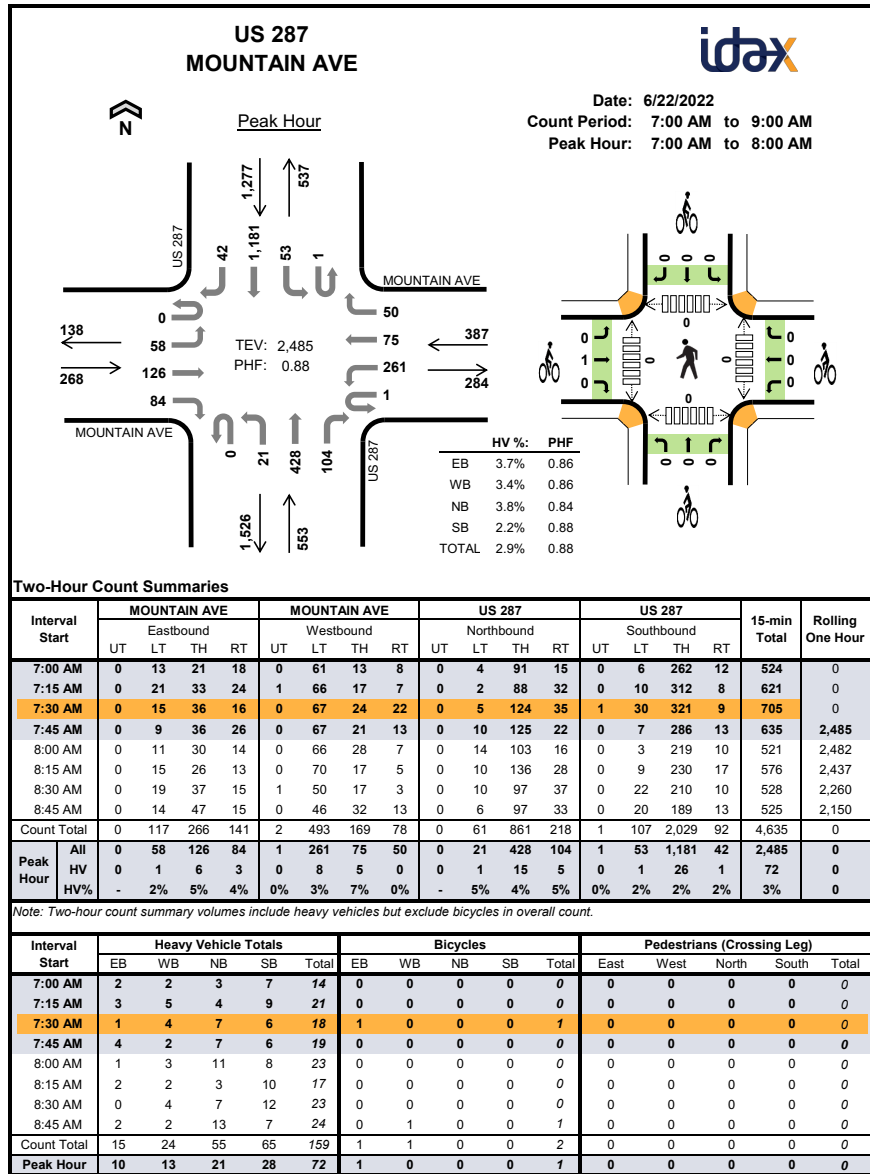
- Appendix A: Intersection Turning Movement Count Data
- Appendix B: Level of Service Worksheets
- Appendix C: NCHRP Internal Trip Capture
- Appendix D: Right-Turn Warrants

Appendix A Intersection Turning Movement Count Data

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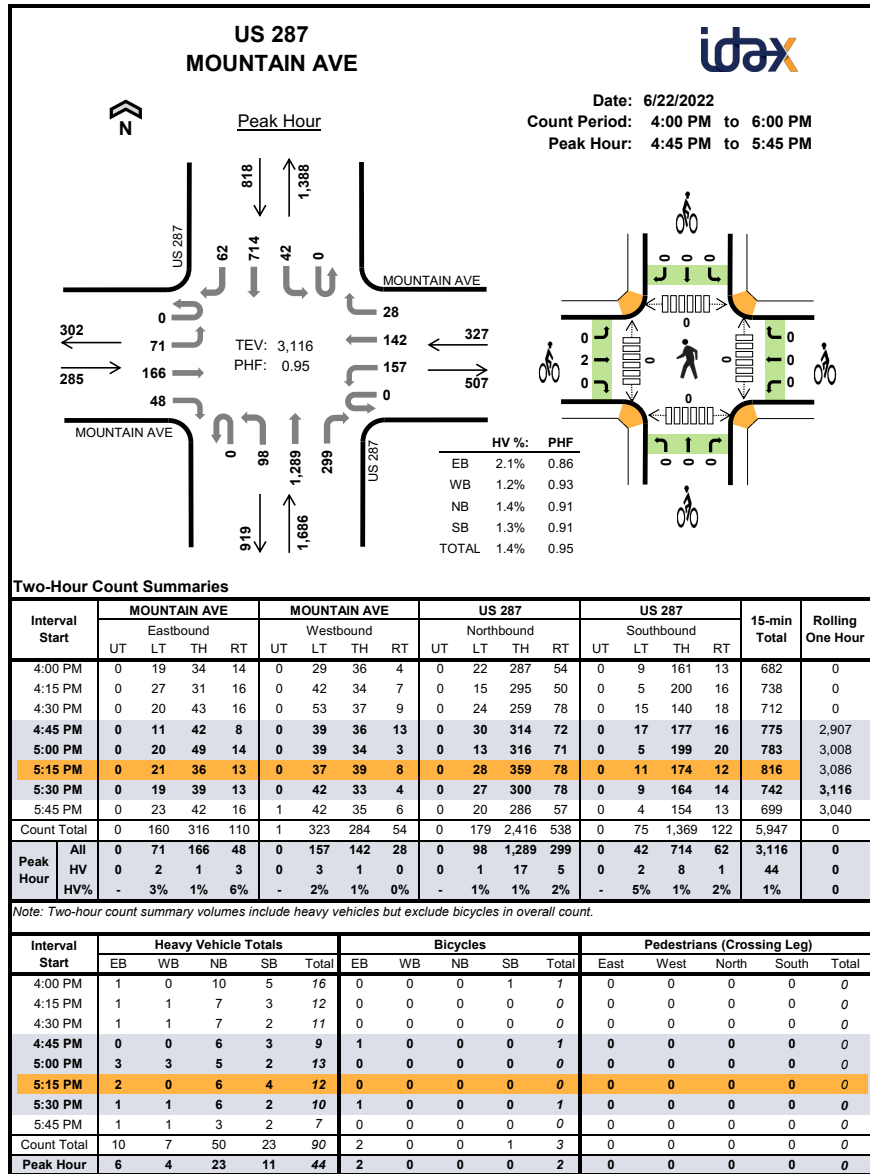
Project Manager: (720) 646-1008

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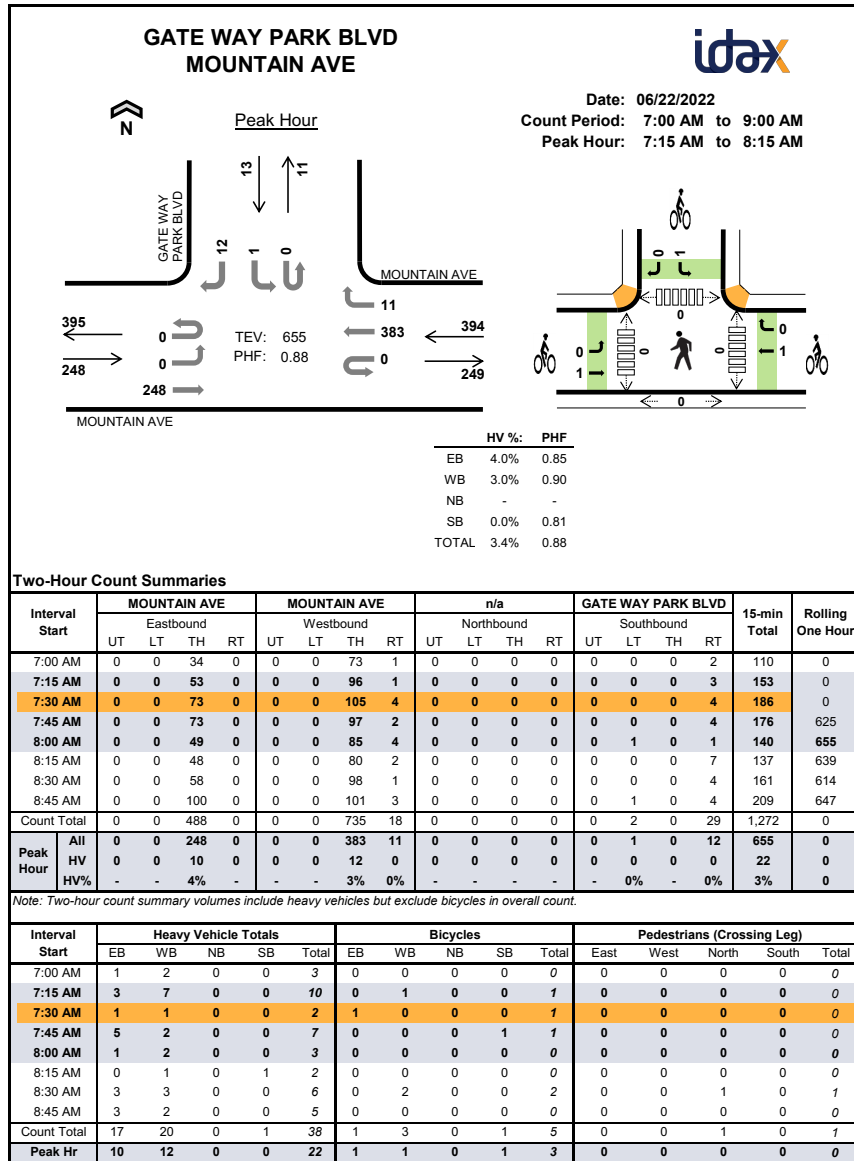
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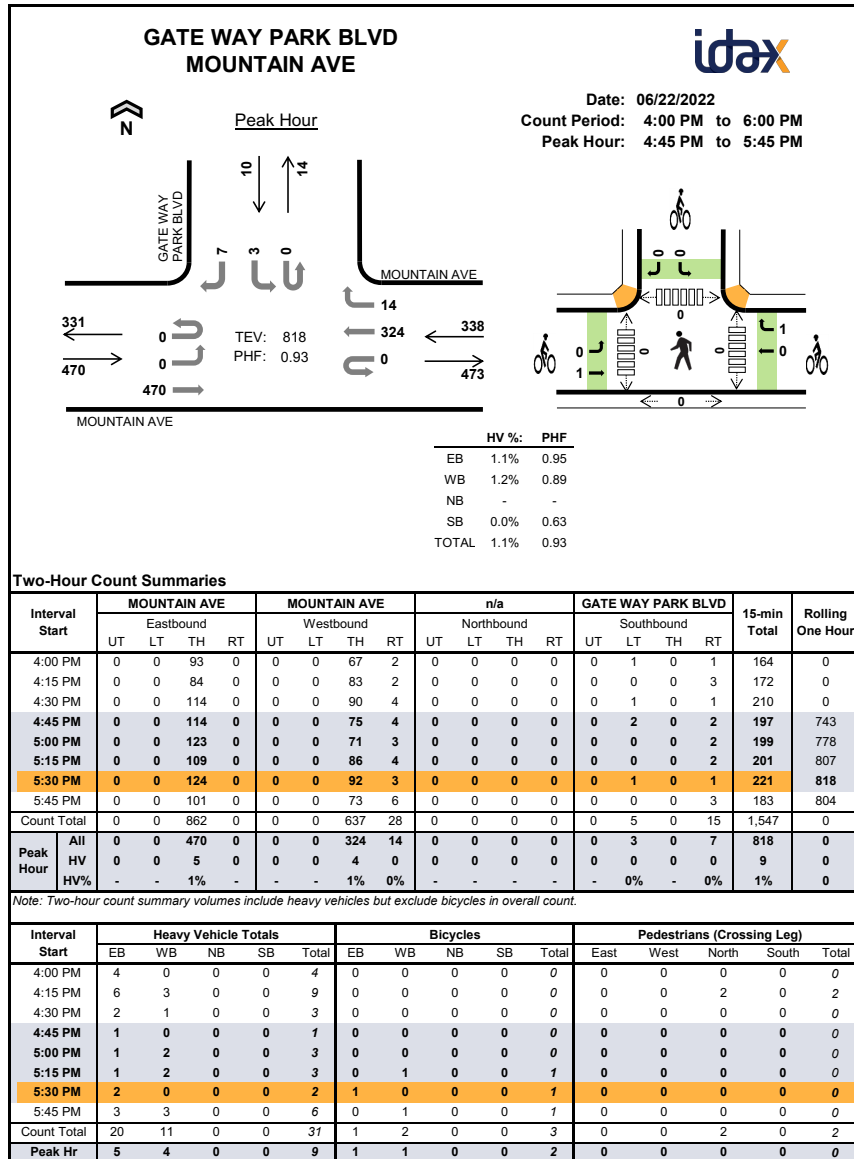
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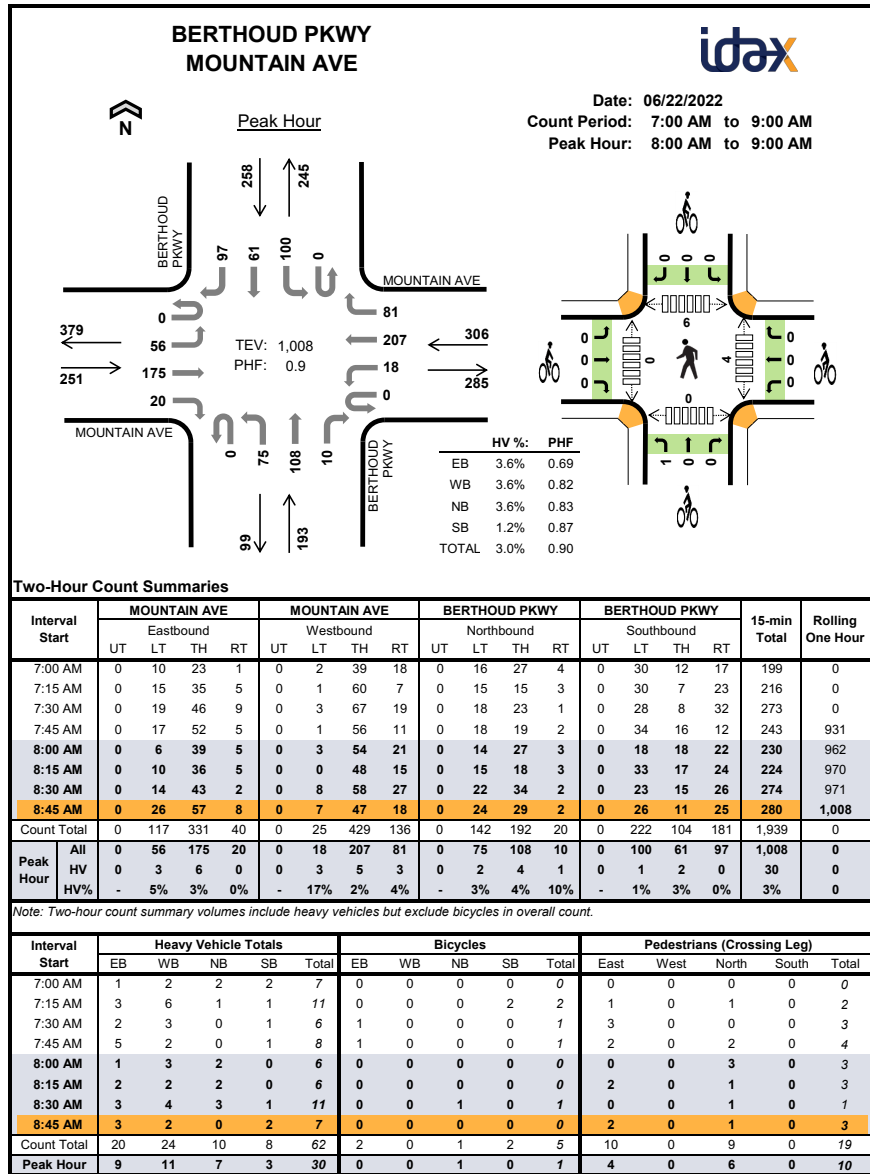
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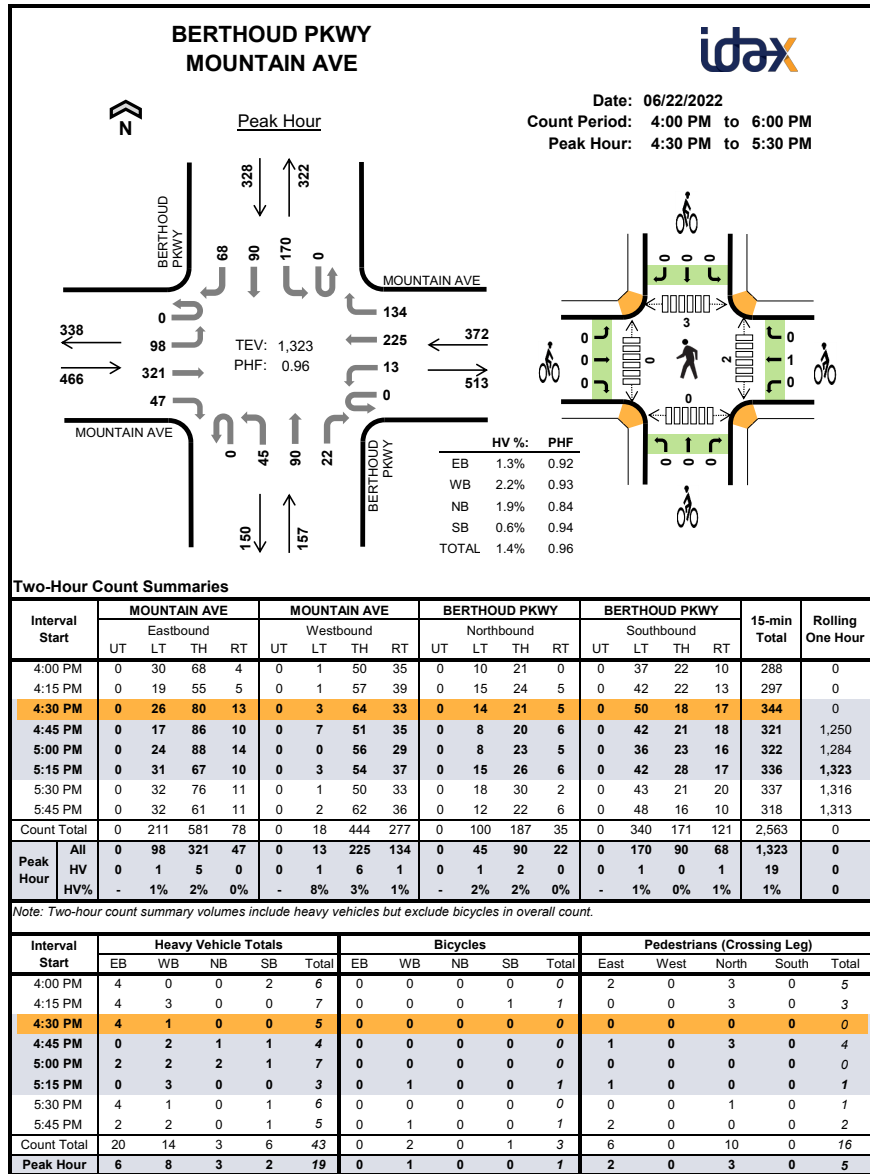
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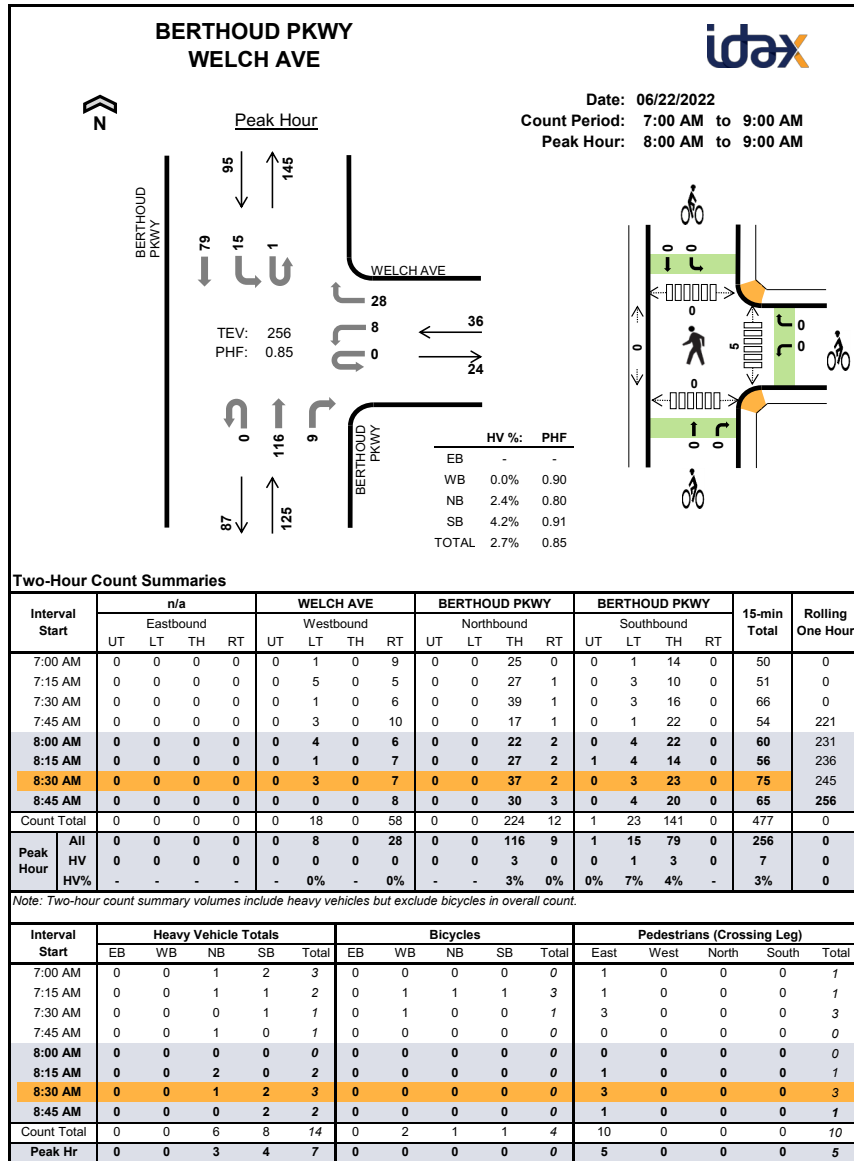
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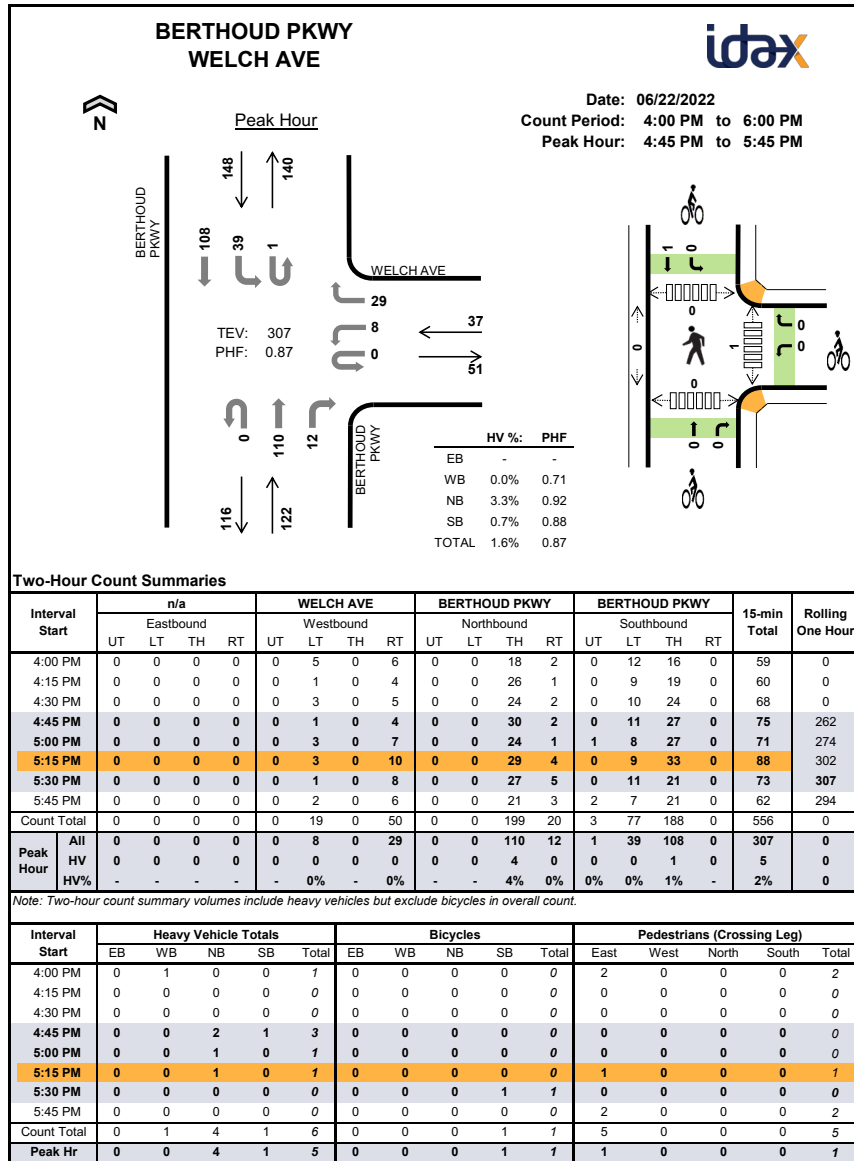
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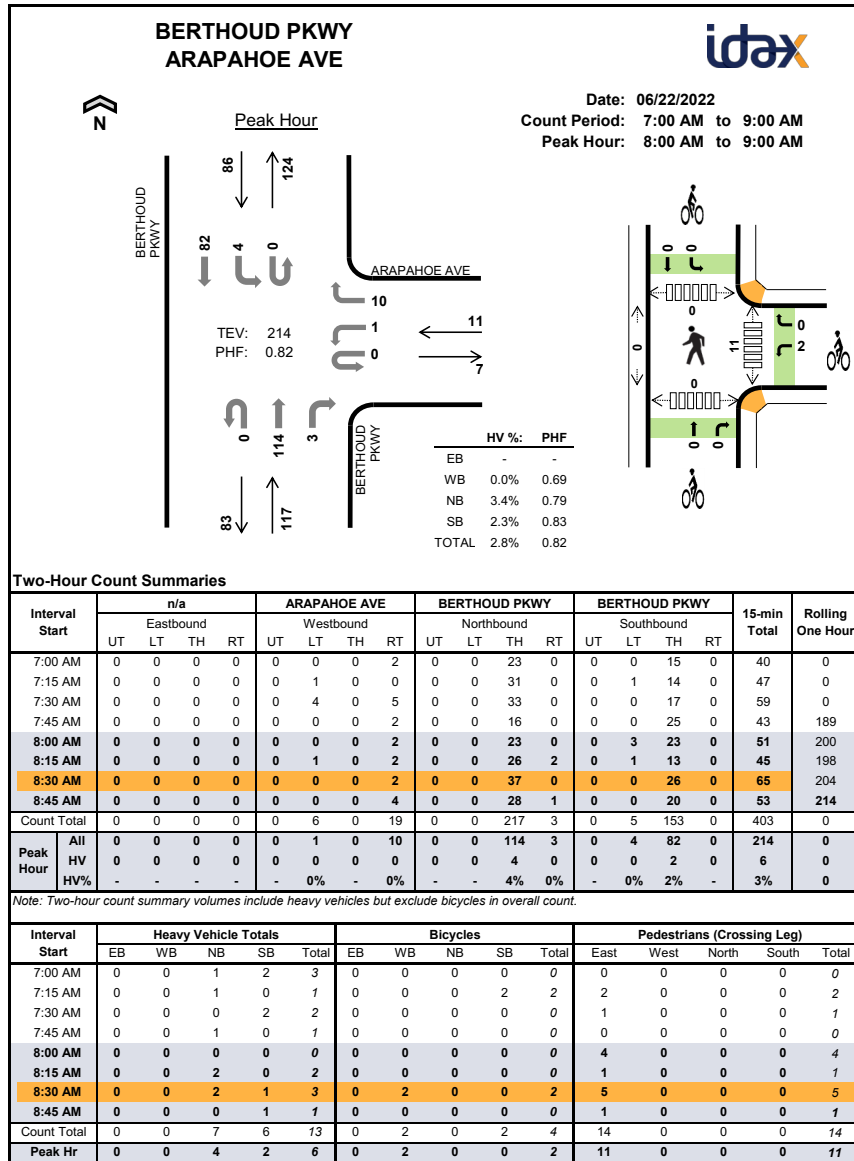
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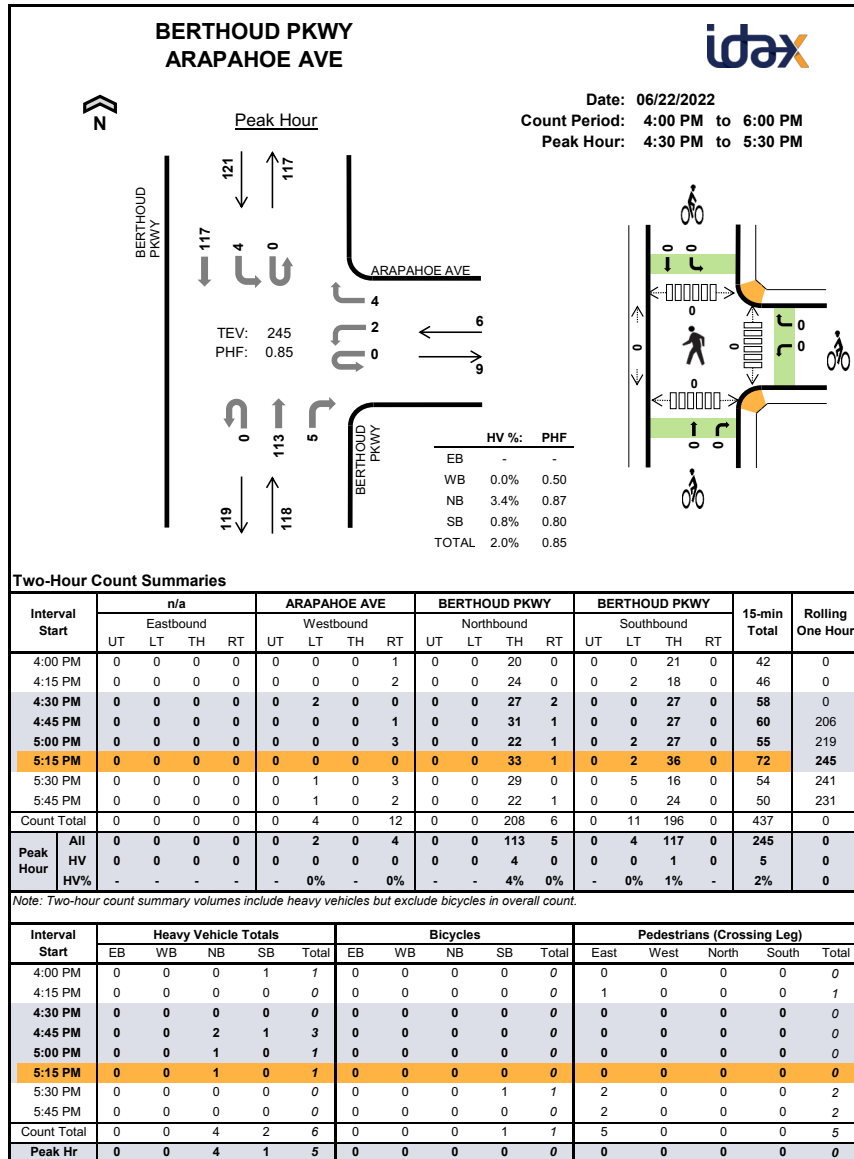
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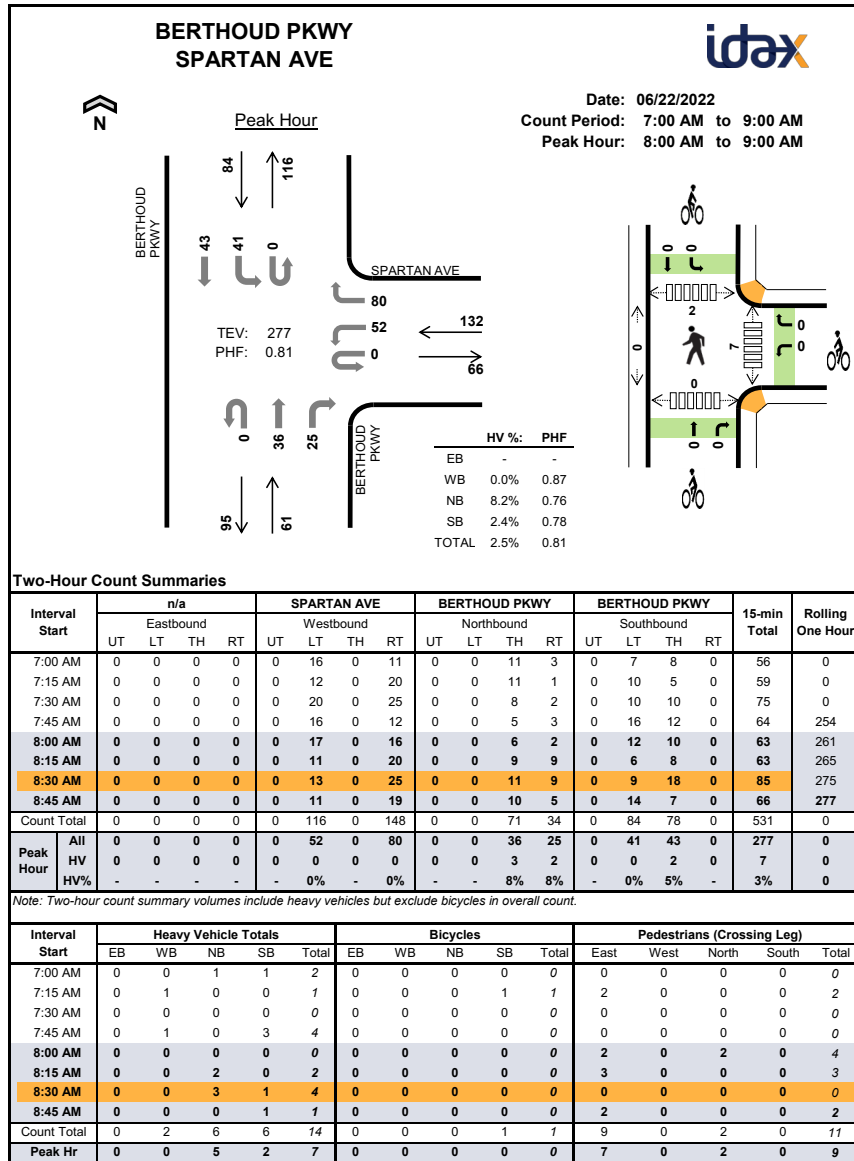
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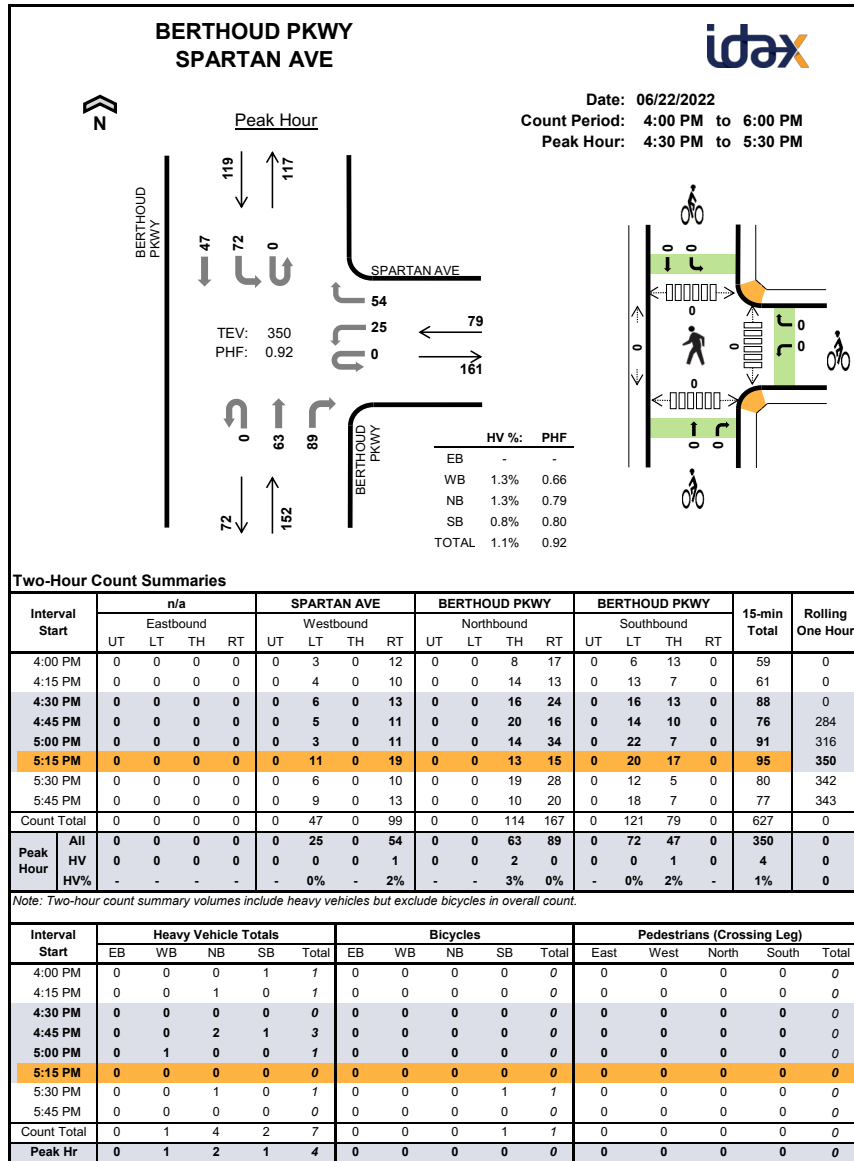


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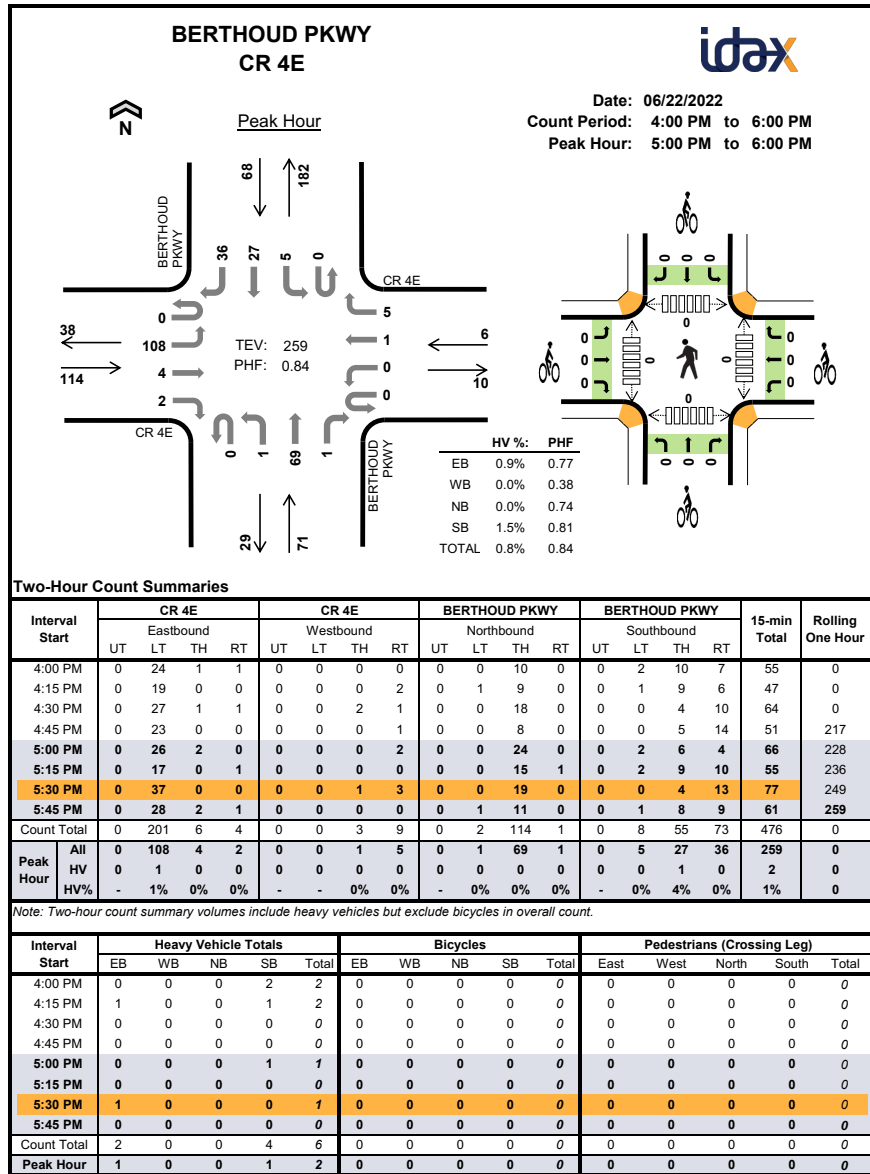
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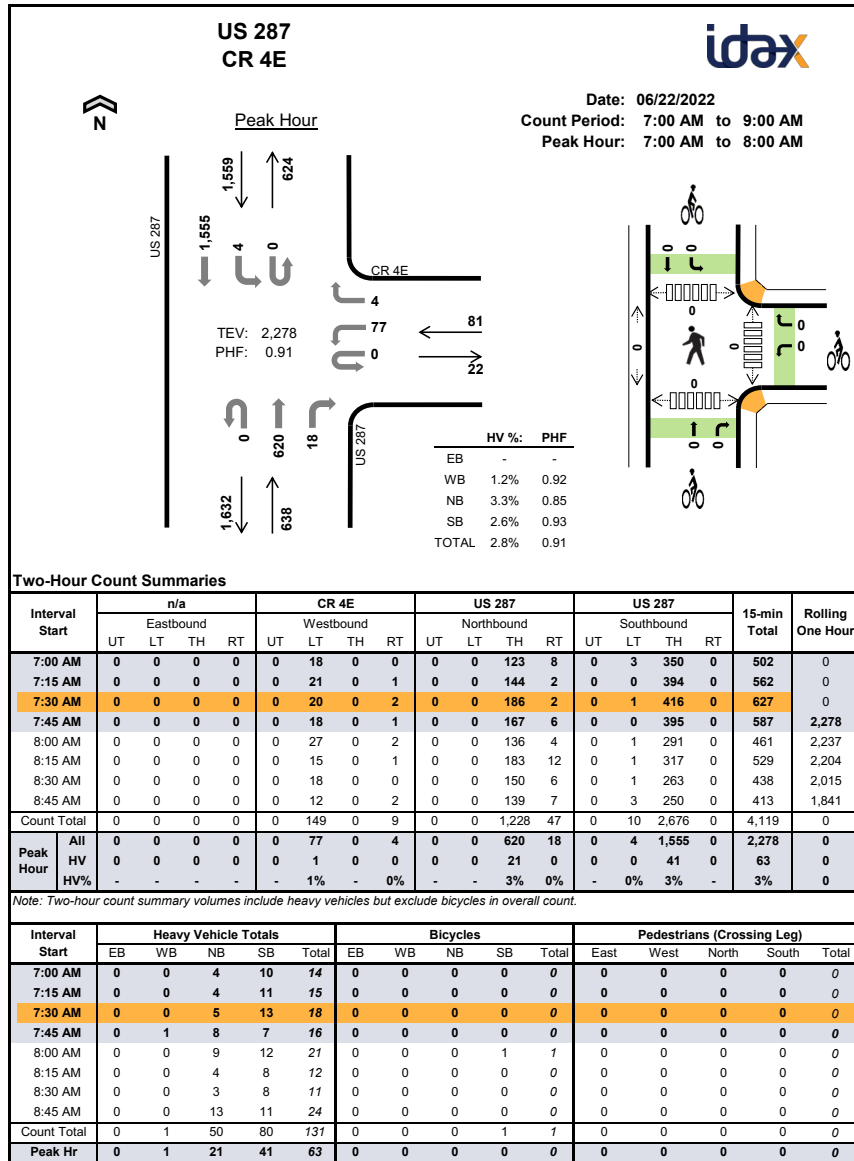
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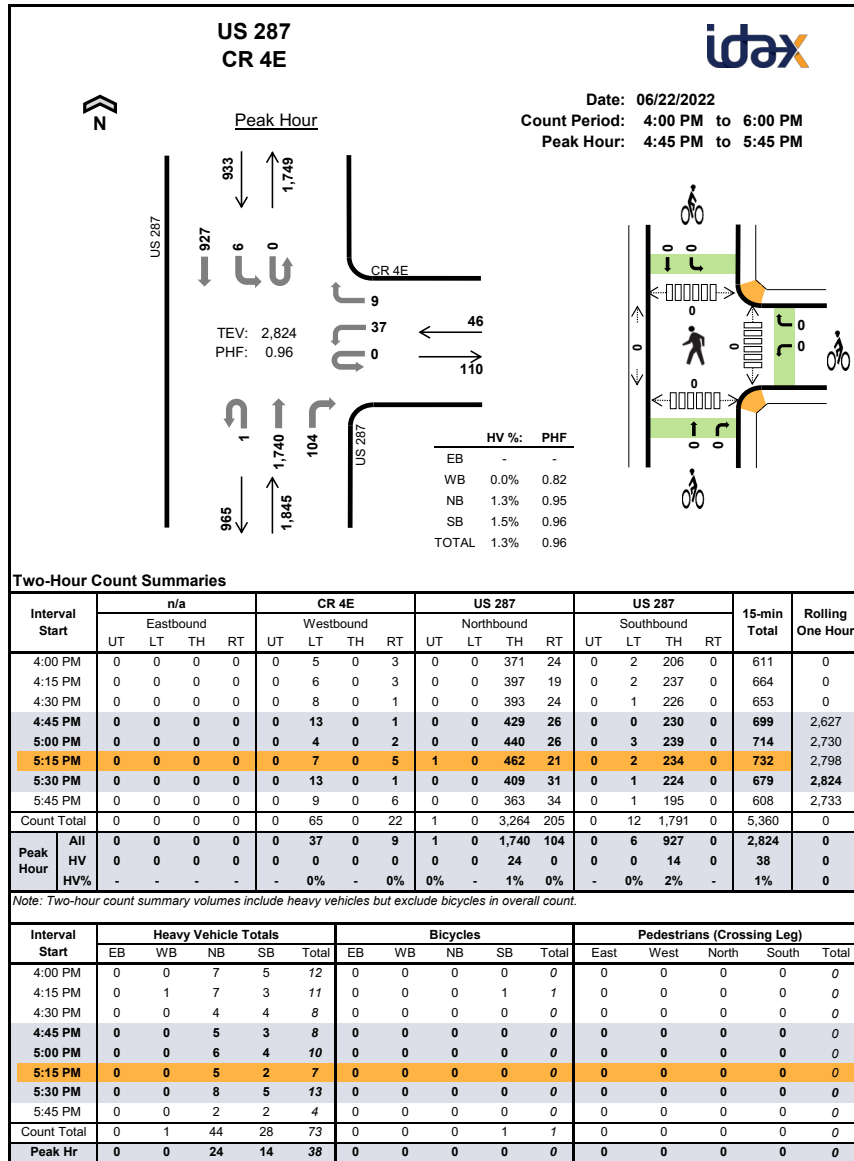
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Appendix B Level of Service Worksheets

EXISTING

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/12/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	197	84	262	88	50	21	428	104	54	1181	42
Future Volume (vph)	58	197	84	262	88	50	21	428	104	54	1181	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1660	1568	3400	1845	1568	1752	3505	1568	1752	3505	1568
Flt Permitted	0.950			0.950			0.099			0.416		
Satd. Flow (perm)	1752	1660	1568	3400	1845	1568	183	3505	1568	767	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			213			213			213			164
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			2270			654			2586	
Travel Time (s)		51.6			34.4			8.1			32.1	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Parking (#/hr)		0										
Adj. Flow (vph)	66	224	95	298	100	57	24	486	118	61	1342	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	224	95	298	100	57	24	486	118	61	1342	48
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free	2		Free	6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												

Existing AM 7:00 am 06/22/2022 Existing AM
RR

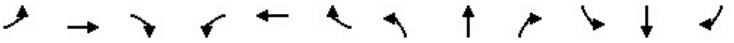
Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/12/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	22.5
Total Split (s)	13.9	23.0		16.0	25.1		9.5	51.4		9.6	51.5	51.5
Total Split (%)	13.9%	23.0%		16.0%	25.1%		9.5%	51.4%		9.6%	51.5%	51.5%
Maximum Green (s)	9.4	18.5		11.5	20.6		5.0	46.9		5.1	47.0	47.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	8.3	16.8	100.0	11.5	22.1	100.0	54.4	50.3	100.0	56.4	54.3	54.3
Actuated g/C Ratio	0.08	0.17	1.00	0.12	0.22	1.00	0.54	0.50	1.00	0.56	0.54	0.54
v/c Ratio	0.46	0.80	0.06	0.76	0.25	0.04	0.13	0.28	0.08	0.13	0.70	0.05
Control Delay	53.8	61.6	0.1	56.5	34.9	0.0	11.3	15.8	0.1	10.5	20.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.8	61.6	0.1	56.5	34.9	0.0	11.3	15.8	0.1	10.5	20.9	0.1
LOS	D	E	A	E	C	A	B	B	A	B	C	A
Approach Delay		45.1			44.7			12.7			19.7	
Approach LOS		D			D			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 25.5

Intersection LOS: C

Intersection Capacity Utilization 69.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: US 287 & Mountain



Existing AM 7:00 am 06/22/2022 Existing AM
RR

Synchro 11 Light Report
Page 2

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

2: Mountain & Gate Way

08/24/2022

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↑		↑
Traffic Vol, veh/h	0	319	396	11	0	12
Future Vol, veh/h	0	319	396	11	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	363	450	13	0	14
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	-	450
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	-	0	607
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	607
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		11.1		
HCM LOS	B					
Minor Lane/Major Mvmt	EBT	WBT	WBR SBLn1			
Capacity (veh/h)	-	-	607			
HCM Lane V/C Ratio	-	-	0.022			
HCM Control Delay (s)	-	-	11.1			
HCM Lane LOS	-	-	B			
HCM 95th %tile Q(veh)	-	-	0.1			

Existing AM 7:00 am 06/22/2022 Existing AM
RR

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

2: Mountain & Gate Way

08/24/2022

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↑		↑
Traffic Vol, veh/h	0	470	355	14	0	7
Future Vol, veh/h	0	470	355	14	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	505	382	15	0	8
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	-	382
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	-	0	663
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	663
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		10.5		
HCM LOS				B		
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1		
Capacity (veh/h)	-	-	-	663		
HCM Lane V/C Ratio	-	-	-	0.011		
HCM Control Delay (s)	-	-	-	10.5		
HCM Lane LOS	-	-	-	B		
HCM 95th %tile Q(veh)	-	-	-	0		

Existing PM 5:00 pm 06/22/2022

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	175	91	18	207	81	88	122	10	100	132	97
Future Volume (vph)	56	175	91	18	207	81	88	122	10	100	132	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.979			0.979	
Satd. Flow (prot)	1752	1751	0	1752	1845	1568	0	1806	1568	0	1806	1568
Flt Permitted	0.512			0.568				0.780			0.778	
Satd. Flow (perm)	944	1751	0	1048	1845	1568	0	1439	1568	0	1435	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		51				119			119			119
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1257			3652			531			2550	
Travel Time (s)		19.0			55.3			10.3			49.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	62	194	101	20	230	90	98	136	11	111	147	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	295	0	20	230	90	0	234	11	0	258	108
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Existing AM 7:00 am 06/22/2022 Existing AM
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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

09/13/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.5	22.5		9.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.5		9.5	22.5	22.5	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (%)	17.3%	40.9%		17.3%	40.9%	40.9%	41.8%	41.8%	41.8%	41.8%	41.8%	41.8%
Maximum Green (s)	5.0	18.0		5.0	18.0	18.0	18.5	18.5	18.5	18.5	18.5	18.5
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5		4.5	4.5		4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max	Max	Max	Max	Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0	0	0	0	0	0	0
Act Effct Green (s)	15.5	14.7		13.9	11.2	11.2		19.2	19.2		19.2	19.2
Actuated g/C Ratio	0.35	0.33		0.31	0.25	0.25		0.43	0.43		0.43	0.43
v/c Ratio	0.15	0.48		0.05	0.50	0.19		0.38	0.01		0.42	0.15
Control Delay	8.8	12.8		7.9	19.0	3.2		13.9	0.0		14.5	3.4
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	8.8	12.8		7.9	19.0	3.2		13.9	0.0		14.5	3.4
LOS	A	B		A	B	A		B	A		B	A
Approach Delay		12.1			14.2			13.3			11.2	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 55

Actuated Cycle Length: 44.7

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 12.6

Intersection LOS: B

Intersection Capacity Utilization 57.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Berthoud Pkwy & Mountain

Existing AM 7:00 am 06/22/2022 Existing AM
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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	321	47	13	225	134	76	121	22	170	90	68
Future Volume (vph)	98	321	47	13	225	134	76	121	22	170	90	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.981			0.968	
Satd. Flow (prot)	1752	1810	0	1752	1845	1568	0	1810	1568	0	1786	1568
Flt Permitted	0.454			0.459				0.801			0.684	
Satd. Flow (perm)	837	1810	0	847	1845	1568	0	1478	1568	0	1262	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13				140			109			109
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1257			3652			531			2550	
Travel Time (s)		19.0			55.3			10.3			49.7	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	102	334	49	14	234	140	79	126	23	177	94	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	383	0	14	234	140	0	205	23	0	271	71
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

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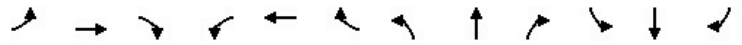
Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.5	22.5		9.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	10.0	24.0		9.5	23.5	23.5	26.5	26.5	26.5	26.5	26.5	26.5
Total Split (%)	16.7%	40.0%		15.8%	39.2%	39.2%	44.2%	44.2%	44.2%	44.2%	44.2%	44.2%
Maximum Green (s)	5.5	19.5		5.0	19.0	19.0	22.0	22.0	22.0	22.0	22.0	22.0
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max	Max	Max	Max	Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0	0	0	0	0	0	0
Act Effct Green (s)	19.5	18.5		16.3	12.5	12.5		22.4	22.4		22.4	22.4
Actuated g/C Ratio	0.38	0.36		0.32	0.24	0.24		0.43	0.43		0.43	0.43
v/c Ratio	0.25	0.58		0.04	0.52	0.29		0.32	0.03		0.50	0.10
Control Delay	10.9	17.5		9.0	22.1	5.3		13.6	0.1		16.8	1.8
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	10.9	17.5		9.0	22.1	5.3		13.6	0.1		16.8	1.8
LOS	B	B		A	C	A		B	A		B	A
Approach Delay		16.1			15.6			12.2			13.7	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 51.7

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 14.8

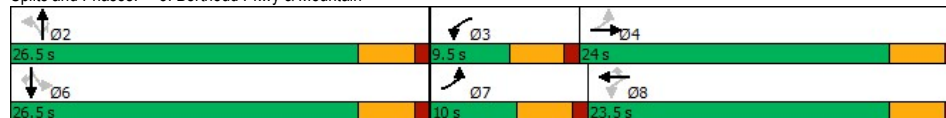
Intersection LOS: B

Intersection Capacity Utilization 63.6%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Berthoud Pkwy & Mountain



Existing PM 5:00 pm 06/22/2022

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

08/24/2022

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	8	28	143	9	16	221
Future Vol, veh/h	8	28	143	9	16	221
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	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	9	33	168	11	19	260
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	472	174	0	0	179	0
Stage 1	174	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	549	867	-	-	1391	-
Stage 1	854	-	-	-	-	-
Stage 2	751	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	540	867	-	-	1391	-
Mov Cap-2 Maneuver	540	-	-	-	-	-
Stage 1	854	-	-	-	-	-
Stage 2	739	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10	0	0.5			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	764	1391		
HCM Lane V/C Ratio	-	-	0.055	0.014		
HCM Control Delay (s)	-	-	10	7.6	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.2	0		

Existing AM 7:00 am 06/22/2022 Existing AM
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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

08/24/2022

Intersection						
Int Delay, s/veh	1.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	8	29	172	12	40	108
Future Vol, veh/h	8	29	172	12	40	108
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	87	87	87	87	87	87
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	9	33	198	14	46	124
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	421	205	0	0	212	0
Stage 1	205	-	-	-	-	-
Stage 2	216	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	587	833	-	-	1352	-
Stage 1	827	-	-	-	-	-
Stage 2	818	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	565	833	-	-	1352	-
Mov Cap-2 Maneuver	565	-	-	-	-	-
Stage 1	827	-	-	-	-	-
Stage 2	788	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	10	0		2.1		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	756	1352		
HCM Lane V/C Ratio	-	-	0.056	0.034		
HCM Control Delay (s)	-	-	10	7.8		
HCM Lane LOS	-	-	B	A		
HCM 95th %tile Q(veh)	-	-	0.2	0.1		

Existing PM 5:00 pm 06/22/2022

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

08/24/2022

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	10	141	3	4	224
Future Vol, veh/h	1	10	141	3	4	224
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	82	82	82	82	82	82
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	1	12	172	4	5	273

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	457	174	0	0	176	0
Stage 1	174	-	-	-	-	-
Stage 2	283	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	560	867	-	-	1394	-
Stage 1	854	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	558	867	-	-	1394	-
Mov Cap-2 Maneuver	558	-	-	-	-	-
Stage 1	854	-	-	-	-	-
Stage 2	760	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT	
Capacity (veh/h)	-	-	825	1394	-
HCM Lane V/C Ratio	-	-	0.016	0.003	-
HCM Control Delay (s)	-	-	9.4	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

08/24/2022

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	2	4	175	5	4	117
Future Vol, veh/h	2	4	175	5	4	117
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	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	2	5	206	6	5	138
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	357	209	0	0	212	0
Stage 1	209	-	-	-	-	-
Stage 2	148	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	639	829	-	-	1352	-
Stage 1	824	-	-	-	-	-
Stage 2	877	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	636	829	-	-	1352	-
Mov Cap-2 Maneuver	636	-	-	-	-	-
Stage 1	824	-	-	-	-	-
Stage 2	873	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	9.8	0	0.3			
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	753	1352	-	
HCM Lane V/C Ratio	-	-	0.009	0.003	-	
HCM Control Delay (s)	-	-	9.8	7.7	0	
HCM Lane LOS	-	-	A	A	A	
HCM 95th %tile Q(veh)	-	-	0	0	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

6: Spartan & Berthoud Pkwy

08/24/2022

Intersection						
Int Delay, s/veh	8.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	87	107	36	53	183	43
Future Vol, veh/h	87	107	36	53	183	43
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	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	107	132	44	65	226	53
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	582	77	0	0	109	0
Stage 1	77	-	-	-	-	-
Stage 2	505	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	474	981	-	-	1475	-
Stage 1	943	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	399	981	-	-	1475	-
Mov Cap-2 Maneuver	399	-	-	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	509	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	15.1	0	6.4			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	593	1475	-	
HCM Lane V/C Ratio	-	-	0.404	0.153	-	
HCM Control Delay (s)	-	-	15.1	7.9	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	1.9	0.5	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

6: Spartan & Berthoud Pkwy

08/24/2022

Intersection						
Int Delay, s/veh	5.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	38	116	63	89	72	47
Future Vol, veh/h	38	116	63	89	72	47
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	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	47	143	78	110	89	58
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	369	133	0	0	188	0
Stage 1	133	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	629	913	-	-	1380	-
Stage 1	891	-	-	-	-	-
Stage 2	801	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	587	913	-	-	1380	-
Mov Cap-2 Maneuver	587	-	-	-	-	-
Stage 1	891	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	10.9	0		4.7		
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	803	1380	-	
HCM Lane V/C Ratio	-	-	0.237	0.064	-	
HCM Control Delay (s)	-	-	10.9	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.9	0.2	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

7: Berthoud Pkwy & CR 4E

08/24/2022

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	34	6	5	0	4	8	2	34	1	5	44	72
Future Vol, veh/h	34	6	5	0	4	8	2	34	1	5	44	72
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	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	36	6	5	0	4	9	2	36	1	5	47	77

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	143	137	86	142	175	37	124	0	0	37	0	0
Stage 1	96	96	-	41	41	-	-	-	-	-	-	-
Stage 2	47	41	-	101	134	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	824	752	970	825	717	1032	1457	-	-	1567	-	-
Stage 1	908	814	-	971	859	-	-	-	-	-	-	-
Stage 2	964	859	-	903	784	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	811	749	970	813	714	1032	1457	-	-	1567	-	-
Mov Cap-2 Maneuver	811	749	-	813	714	-	-	-	-	-	-	-
Stage 1	907	812	-	970	858	-	-	-	-	-	-	-
Stage 2	950	858	-	888	782	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	9.7			9.1			0.4			0.3		
HCM LOS	A			A								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1457	-	-	817	899	1567	-	-
HCM Lane V/C Ratio	0.001	-	-	0.059	0.014	0.003	-	-
HCM Control Delay (s)	7.5	0	-	9.7	9.1	7.3	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0	0	-	-

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 7: Berthoud Pkwy & CR 4E

08/24/2022

Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	34	4	2	0	1	5	1	69	1	5	37	36
Future Vol, veh/h	34	4	2	0	1	5	1	69	1	5	37	36
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	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	40	5	2	0	1	6	1	82	1	6	44	43

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	166	163	66	166	184	83	87	0
Stage 1	78	78	-	85	85	-	-	-
Stage 2	88	85	-	81	99	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-
Pot Cap-1 Maneuver	796	728	995	796	708	974	1503	-
Stage 1	928	828	-	920	822	-	-	-
Stage 2	917	822	-	925	811	-	-	-
Platoon blocked, %								-
Mov Cap-1 Maneuver	787	724	995	787	704	974	1503	-
Mov Cap-2 Maneuver	787	724	-	787	704	-	-	-
Stage 1	927	825	-	919	821	-	-	-
Stage 2	909	821	-	914	808	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.9	9	0.1	0.5
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1503	-	-	788	915	1508	-
HCM Lane V/C Ratio	0.001	-	-	0.06	0.008	0.004	-
HCM Control Delay (s)	7.4	0	-	9.9	9	7.4	0
HCM Lane LOS	A	A	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0	0	-

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

08/24/2022

Intersection						
Int Delay, s/veh	4.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	N	N	S	S
Traffic Vol, veh/h	77	4	628	30	4	1629
Future Vol, veh/h	77	4	628	30	4	1629
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	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	85	4	690	33	4	1790
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1593	345	0	0	723	0
Stage 1	690	-	-	-	-	-
Stage 2	903	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	97	648	-	-	869	-
Stage 1	456	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	97	648	-	-	869	-
Mov Cap-2 Maneuver	97	-	-	-	-	-
Stage 1	456	-	-	-	-	-
Stage 2	351	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	135.8	0	0			
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	101	869	-	
HCM Lane V/C Ratio	-	-	0.881	0.005	-	
HCM Control Delay (s)	-	-	135.8	9.2	-	
HCM Lane LOS	-	-	F	A	-	
HCM 95th %tile Q(veh)	-	-	5.1	0	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

08/24/2022

Intersection						
Int Delay, s/veh	6.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	37	9	1740	104	6	927
Future Vol, veh/h	37	9	1740	104	6	927
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	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	39	9	1813	108	6	966
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	2308	907	0	0	1921	0
Stage 1	1813	-	-	-	-	-
Stage 2	495	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 32	277	-	-	300	-
Stage 1	114	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 31	277	-	-	300	-
Mov Cap-2 Maneuver	~ 31	-	-	-	-	-
Stage 1	114	-	-	-	-	-
Stage 2	564	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	\$ 397.6	0		0.1		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	38	300	-	
HCM Lane V/C Ratio	-	-	1.261	0.021	-	
HCM Control Delay (s)	-	-	\$ 397.6	17.3	-	
HCM Lane LOS	-	-	F	C	-	
HCM 95th %tile Q(veh)	-	-	4.9	0.1	-	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

Existing PM 5:00 pm 06/22/2022

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
11: Meadowlark & Mountain

12/28/2022

Intersection												
Int Delay, s/veh	3.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰	↱		↰	↱
Traffic Vol, veh/h	16	318	21	17	321	8	38	2	12	45	5	49
Future Vol, veh/h	16	318	21	17	321	8	38	2	12	45	5	49
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	0	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	18	361	24	19	365	9	43	2	14	51	6	56

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	374	0	0	385	0	0	848	821	373	825	829	370
Stage 1	-	-	-	-	-	-	409	409	-	408	408	-
Stage 2	-	-	-	-	-	-	439	412	-	417	421	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1179	-	-	1168	-	-	280	308	671	290	305	673
Stage 1	-	-	-	-	-	-	617	594	-	618	595	-
Stage 2	-	-	-	-	-	-	595	593	-	611	587	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1179	-	-	1168	-	-	247	298	671	276	296	673
Mov Cap-2 Maneuver	-	-	-	-	-	-	247	298	-	276	296	-
Stage 1	-	-	-	-	-	-	608	585	-	609	585	-
Stage 2	-	-	-	-	-	-	532	584	-	587	578	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.4			0.4			20.5			17.8		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	291	1179	-	-	1168	-	-	392
HCM Lane V/C Ratio	0.203	0.015	-	-	0.017	-	-	0.287
HCM Control Delay (s)	20.5	8.1	-	-	8.1	-	-	17.8
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	1.2

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 11: Meadowlark & Mountain

12/28/2022

Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰	↱		↰	↱
Traffic Vol, veh/h	63	422	21	20	311	19	39	2	29	21	1	22
Future Vol, veh/h	63	422	21	20	311	19	39	2	29	21	1	22
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	0	-	-	0	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	68	459	23	22	338	21	42	2	32	23	1	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	359	0	0	482	0	0	1012	1010	471	1017	1011	349
Stage 1	-	-	-	-	-	-	607	607	-	393	393	-
Stage 2	-	-	-	-	-	-	405	403	-	624	618	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1194	-	-	1075	-	-	217	239	591	215	239	692
Stage 1	-	-	-	-	-	-	482	485	-	630	604	-
Stage 2	-	-	-	-	-	-	620	598	-	471	479	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1194	-	-	1075	-	-	197	221	591	190	221	692
Mov Cap-2 Maneuver	-	-	-	-	-	-	197	221	-	190	221	-
Stage 1	-	-	-	-	-	-	455	457	-	594	592	-
Stage 2	-	-	-	-	-	-	585	586	-	418	452	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			0.5			23.2			19.3		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	273	1194	-	-	1075	-	-	300
HCM Lane V/C Ratio	0.279	0.057	-	-	0.02	-	-	0.159
HCM Control Delay (s)	23.2	8.2	-	-	8.4	-	-	19.3
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.1	0.2	-	-	0.1	-	-	0.6

Existing PM 5:00 pm 06/22/2022

Synchro 11 Light Report
 Page 1

BACKGROUND 2042

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	275	150	300	145	40	50	555	165	60	1330	70
Future Volume (vph)	90	275	150	300	145	40	50	555	165	60	1330	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			213			164			213			213
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			2270			654			2586	
Travel Time (s)		51.6			34.4			8.1			32.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		0										
Adj. Flow (vph)	98	299	163	326	158	43	54	603	179	65	1446	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	299	163	326	158	43	54	603	179	65	1446	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Over	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			Free						Free			Free
Detector Phase	7	4		3	8	1	5	2		1	6	
Switch Phase												

Background 2042 AM 7:00 am 06/22/2022 Background 2042 AM

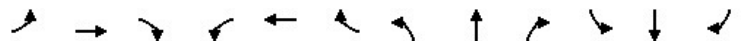
Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	11.4	25.0		15.5	29.1	10.0	9.5	49.5		10.0	50.0	
Total Split (%)	11.4%	25.0%		15.5%	29.1%	10.0%	9.5%	49.5%		10.0%	50.0%	
Maximum Green (s)	6.9	20.5		11.0	24.6	5.5	5.0	45.0		5.5	45.5	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	C-Max			None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.7	19.9	100.0	11.2	26.4	5.5	5.1	47.5	100.0	5.5	47.9	100.0
Actuated g/C Ratio	0.07	0.20	1.00	0.11	0.26	0.06	0.05	0.48	1.00	0.06	0.48	1.00
v/c Ratio	0.43	0.91	0.10	0.86	0.33	0.18	0.31	0.36	0.11	0.35	0.86	0.05
Control Delay	50.8	71.1	0.1	66.3	32.9	1.6	50.8	18.1	0.1	50.9	30.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	71.1	0.1	66.3	32.9	1.6	50.8	18.1	0.1	50.9	30.7	0.1
LOS	D	E	A	E	C	A	D	B	A	D	C	A
Approach Delay		46.9			51.0			16.4			30.1	
Approach LOS		D			D			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 32.6

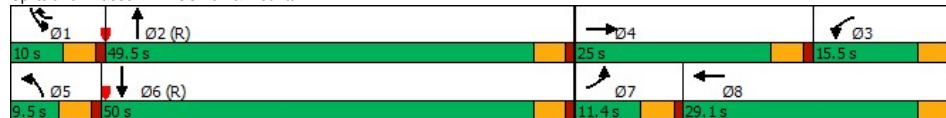
Intersection LOS: C

Intersection Capacity Utilization 71.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: US 287 & Mountain



Background 2042 AM 7:00 am 06/22/2022 Background 2042 AM

Synchro 11 Light Report
Page 2

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	305	110	200	325	20	170	1480	425	50	860	120
Future Volume (vph)	125	305	110	200	325	20	170	1480	425	50	860	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			238			193			238			238
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			2270			654			2586	
Travel Time (s)		51.6			34.4			8.1			32.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		0										
Adj. Flow (vph)	136	332	120	217	353	22	185	1609	462	54	935	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	332	120	217	353	22	185	1609	462	54	935	130
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Over	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			Free						Free			Free
Detector Phase	7	4		3	8	1	5	2		1	6	
Switch Phase												

Background 2042 PM 4:00 pm 06/22/2022 Background 2042 PM
RR

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/13/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	11.0	28.0		11.5	28.5	9.5	15.6	61.0		9.5	54.9	
Total Split (%)	10.0%	25.5%		10.5%	25.9%	8.6%	14.2%	55.5%		8.6%	49.9%	
Maximum Green (s)	6.5	23.5		7.0	24.0	5.0	11.1	56.5		5.0	50.4	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	C-Max			None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.5	23.3	110.0	7.2	24.0	5.0	10.3	58.4	110.0	5.0	51.2	110.0
Actuated g/C Ratio	0.06	0.21	1.00	0.07	0.22	0.05	0.09	0.53	1.00	0.05	0.47	1.00
v/c Ratio	0.68	0.95	0.08	0.97	0.88	0.09	0.58	0.86	0.29	0.35	0.57	0.08
Control Delay	68.4	80.2	0.1	105.5	65.3	0.7	49.2	25.8	0.1	57.5	23.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.4	80.2	0.1	105.5	65.3	0.7	49.2	25.8	0.1	57.5	23.3	0.1
LOS	E	F	A	F	E	A	D	C	A	E	C	A
Approach Delay		61.1			77.7			22.4			22.3	
Approach LOS		E			E			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 34.6

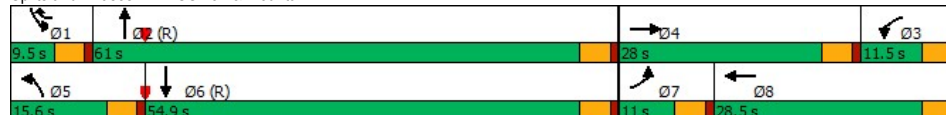
Intersection LOS: C

Intersection Capacity Utilization 81.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: US 287 & Mountain



LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

2: Mountain & Gate Way

09/13/2022

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↑		↑
Traffic Vol, veh/h	0	455	470	10	0	15
Future Vol, veh/h	0	455	470	10	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	495	511	11	0	16
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	-	511
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	-	0	561
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	561
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		11.6		
HCM LOS	B					
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1		
Capacity (veh/h)	-	-	-	561		
HCM Lane V/C Ratio	-	-	-	0.029		
HCM Control Delay (s)	-	-	-	11.6		
HCM Lane LOS	-	-	-	B		
HCM 95th %tile Q(veh)	-	-	-	0.1		

Background 2042 AM 7:00 am 06/22/2022 Background 2042 AM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

2: Mountain & Gate Way

09/13/2022

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↑		↑
Traffic Vol, veh/h	0	670	480	15	0	10
Future Vol, veh/h	0	670	480	15	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	728	522	16	0	11
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	-	522
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	-	0	553
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	553
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		11.6		
HCM LOS	B					
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1		
Capacity (veh/h)	-	-	-	553		
HCM Lane V/C Ratio	-	-	-	0.02		
HCM Control Delay (s)	-	-	-	11.6		
HCM Lane LOS	-	-	-	B		
HCM 95th %tile Q(veh)	-	-	-	0.1		

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 2010 Roundabout
 3: Berthoud Pkwy & Mountain

09/13/2022

Intersection					
Intersection Delay, s/veh	12.2				
Intersection LOS	B				
Approach	EB		WB		NB
Entry Lanes	2		1		1
Conflicting Circle Lanes	1		1		1
Adj Approach Flow, veh/h	494		397		293
Demand Flow Rate, veh/h	509		409		302
Vehicles Circulating, veh/h	320		369		527
Vehicles Exiting, veh/h	526		460		302
Follow-Up Headway, s	3.186		3.186		3.186
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	10.1		12.5		12.3
Approach LOS	B		B		B
Lane	Left	Right	Left	Left	Left
Designated Moves	LT	R	LTR	LTR	LTR
Assumed Moves	LT	R	LTR	LTR	LTR
RT Channelized					
Lane Util	0.792	0.208	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193	5.193
Entry Flow, veh/h	403	106	409	302	432
Cap Entry Lane, veh/h	821	821	781	667	747
Entry HV Adj Factor	0.970	0.972	0.970	0.971	0.970
Flow Entry, veh/h	391	103	397	293	419
Cap Entry, veh/h	796	797	758	647	725
V/C Ratio	0.491	0.129	0.524	0.453	0.578
Control Delay, s/veh	11.3	5.8	12.5	12.3	14.4
LOS	B	A	B	B	B
95th %tile Queue, veh	3	0	3	2	4

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 2010 Roundabout
 3: Berthoud Pkwy & Mountain

09/13/2022

Intersection					
Intersection Delay, s/veh	22.3				
Intersection LOS	C				
Approach	EB		WB		SB
Entry Lanes	2		1		1
Conflicting Circle Lanes	1		1		1
Adj Approach Flow, veh/h	718		544		424
Demand Flow Rate, veh/h	739		561		437
Vehicles Circulating, veh/h	370		410		488
Vehicles Exiting, veh/h	555		738		483
Follow-Up Headway, s	3.186		3.186		3.186
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	25.9		21.9		17.2
Approach LOS	D		C		C
Lane	Left	Right	Left	Left	Left
Designated Moves	LT	R	LTR	LTR	LTR
Assumed Moves	LT	R	LTR	LTR	LTR
RT Channelized					
Lane Util	0.886	0.114	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193	5.193
Entry Flow, veh/h	655	84	561	286	437
Cap Entry Lane, veh/h	780	780	750	477	694
Entry HV Adj Factor	0.970	0.976	0.970	0.970	0.971
Flow Entry, veh/h	636	82	544	277	424
Cap Entry, veh/h	757	762	728	463	673
V/C Ratio	0.839	0.108	0.748	0.599	0.630
Control Delay, s/veh	28.5	5.8	21.9	21.7	17.2
LOS	D	A	C	C	C
95th %tile Queue, veh	10	0	7	4	4

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

09/12/2022

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	10	30	200	10	20	280
Future Vol, veh/h	10	30	200	10	20	280
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	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	12	35	235	12	24	329
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	618	241	0	0	247	0
Stage 1	241	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	451	795	-	-	1313	-
Stage 1	797	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	441	795	-	-	1313	-
Mov Cap-2 Maneuver	441	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10.9	0	0.5			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	662	1313	-	
HCM Lane V/C Ratio	-	-	0.071	0.018	-	
HCM Control Delay (s)	-	-	10.9	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

09/12/2022

Intersection						
Int Delay, s/veh	1.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	10	30	220	15	45	185
Future Vol, veh/h	10	30	220	15	45	185
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	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	12	35	259	18	53	218
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	592	268	0	0	277	0
Stage 1	268	-	-	-	-	-
Stage 2	324	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	467	768	-	-	1280	-
Stage 1	775	-	-	-	-	-
Stage 2	731	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	445	768	-	-	1280	-
Mov Cap-2 Maneuver	445	-	-	-	-	-
Stage 1	775	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	11	0	1.6			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	650	1280	-	
HCM Lane V/C Ratio	-	-	0.072	0.041	-	
HCM Control Delay (s)	-	-	11	7.9	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

09/12/2022

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	5	5	200	5	5	280
Future Vol, veh/h	5	5	200	5	5	280
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	82	82	82	82	82	82
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	6	6	244	6	6	341
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	600	247	0	0	250	0
Stage 1	247	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	462	789	-	-	1310	-
Stage 1	792	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	459	789	-	-	1310	-
Mov Cap-2 Maneuver	459	-	-	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	705	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	11.3	0	0.1			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	580	1310	-	
HCM Lane V/C Ratio	-	-	0.021	0.005	-	
HCM Control Delay (s)	-	-	11.3	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	

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Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

09/12/2022

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	5	5	225	5	5	195
Future Vol, veh/h	5	5	225	5	5	195
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	82	82	82	82	82	82
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	6	6	274	6	6	238
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	527	277	0	0	280	0
Stage 1	277	-	-	-	-	-
Stage 2	250	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	510	759	-	-	1277	-
Stage 1	767	-	-	-	-	-
Stage 2	789	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	507	759	-	-	1277	-
Mov Cap-2 Maneuver	507	-	-	-	-	-
Stage 1	767	-	-	-	-	-
Stage 2	785	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	11	0	0.2			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	608	1277	-	
HCM Lane V/C Ratio	-	-	0.02	0.005	-	
HCM Control Delay (s)	-	-	11	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout

6: Spartan Ave/Spartan & Berthoud Pkwy

09/12/2022

Intersection				
Intersection Delay, s/veh	6.2			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	158	307	250	325
Demand Flow Rate, veh/h	163	316	257	334
Vehicles Circulating, veh/h	356	203	345	256
Vehicles Exiting, veh/h	234	399	174	263
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.5	6.0	6.5	6.6
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LT	TR	LTR	LR
Assumed Moves	LT	TR	LTR	LR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	163	316	257	334
Cap Entry Lane, veh/h	960	1122	971	1063
Entry HV Adj Factor	0.970	0.970	0.972	0.973
Flow Entry, veh/h	158	307	250	325
Cap Entry, veh/h	931	1088	944	1034
V/C Ratio	0.170	0.282	0.265	0.314
Control Delay, s/veh	5.5	6.0	6.5	6.6
LOS	A	A	A	A
95th %tile Queue, veh	1	1	1	1

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 6: Spartan & Berthoud Pkwy

09/12/2022

Intersection				
Intersection Delay, s/veh	5.5			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	244	261	234	244
Demand Flow Rate, veh/h	252	268	241	250
Vehicles Circulating, veh/h	278	199	244	172
Vehicles Exiting, veh/h	144	286	286	295
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.9	5.5	5.6	5.1
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LT	R	TR	L
Assumed Moves	LT	R	TR	L
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	252	268	241	250
Cap Entry Lane, veh/h	1039	1126	1076	1158
Entry HV Adj Factor	0.969	0.972	0.972	0.974
Flow Entry, veh/h	244	261	234	244
Cap Entry, veh/h	1007	1095	1046	1128
V/C Ratio	0.242	0.238	0.224	0.216
Control Delay, s/veh	5.9	5.5	5.6	5.1
LOS	A	A	A	A
95th %tile Queue, veh	1	1	1	1

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 7: Berthoud Pkwy & CR 4E

09/12/2022

Intersection												
Int Delay, s/veh	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Vol, veh/h	50	15	5	5	40	10	5	55	5	15	85	90
Future Vol, veh/h	50	15	5	5	40	10	5	55	5	15	85	90
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	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	53	16	5	5	43	11	5	59	5	16	90	96

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	269	244	138	253	290	62	186	0	0	64	0	0
Stage 1	170	170	-	72	72	-	-	-	-	-	-	-
Stage 2	99	74	-	181	218	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	682	656	908	698	619	1000	1382	-	-	1532	-	-
Stage 1	830	756	-	935	833	-	-	-	-	-	-	-
Stage 2	905	831	-	818	721	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	631	646	908	673	609	1000	1382	-	-	1532	-	-
Mov Cap-2 Maneuver	631	646	-	673	609	-	-	-	-	-	-	-
Stage 1	827	747	-	931	830	-	-	-	-	-	-	-
Stage 2	846	828	-	786	712	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	10.9			11			0.6			0.6		
HCM LOS	B			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1382	-	-	631	696	662	1532	-	-
HCM Lane V/C Ratio	0.004	-	-	0.084	0.031	0.088	0.01	-	-
HCM Control Delay (s)	7.6	0	-	11.2	10.3	11	7.4	0	-
HCM Lane LOS	A	A	-	B	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0.3	0	-	-

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 2010 TWSC

7: Berthoud Pkwy & CR 4E

09/12/2022

Intersection												
Int Delay, s/veh	4.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	75	45	5	5	30	15	5	100	5	10	85	60
Future Vol, veh/h	75	45	5	5	30	15	5	100	5	10	85	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	80	48	5	5	32	16	5	106	5	11	90	64

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	287	265	122	290	295	109	154	0	0	111	0	0
Stage 1	144	144	-	119	119	-	-	-	-	-	-	-
Stage 2	143	121	-	171	176	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	663	639	926	660	615	942	1420	-	-	1473	-	-
Stage 1	856	776	-	883	795	-	-	-	-	-	-	-
Stage 2	857	794	-	829	752	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	620	631	926	612	608	942	1420	-	-	1473	-	-
Mov Cap-2 Maneuver	620	631	-	612	608	-	-	-	-	-	-	-
Stage 1	853	770	-	879	792	-	-	-	-	-	-	-
Stage 2	805	791	-	767	746	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.4	10.7	0.3	0.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1420	-	-	620	652	681	1473	-	-
HCM Lane V/C Ratio	0.004	-	-	0.129	0.082	0.078	0.007	-	-
HCM Control Delay (s)	7.5	0	-	11.7	11	10.7	7.5	0	-
HCM Lane LOS	A	A	-	B	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.3	0.3	0	-	-

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RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

09/13/2022

Intersection						
Int Delay, s/veh	27.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↱	↱	↕↕	↱	↱	↕↕
Traffic Vol, veh/h	105	35	805	45	15	2035
Future Vol, veh/h	105	35	805	45	15	2035
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	-	0	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	114	38	875	49	16	2212
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	2013	438	0	0	924	0
Stage 1	875	-	-	-	-	-
Stage 2	1138	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 50	564	-	-	729	-
Stage 1	366	-	-	-	-	-
Stage 2	265	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	~ 49	564	-	-	729	-
Mov Cap-2 Maneuver	~ 49	-	-	-	-	-
Stage 1	366	-	-	-	-	-
Stage 2	259	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s\$	592.1		0		0.1	
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	49	564	729	-
HCM Lane V/C Ratio	-	-	2.329	0.067	0.022	-
HCM Control Delay (s)	-	-	\$ 785.5	11.8	10.1	-
HCM Lane LOS	-	-	F	B	B	-
HCM 95th %tile Q(veh)	-	-	11.8	0.2	0.1	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

09/13/2022

Intersection						
Int Delay, s/veh	104.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	70	30	2175	160	40	1215
Future Vol, veh/h	70	30	2175	160	40	1215
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	-	0	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	76	33	2364	174	43	1321
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	3111	1182	0	0	2538	0
Stage 1	2364	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 9	181	-	-	171	-
Stage 1	~ 56	-	-	-	-	-
Stage 2	426	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	~ 7	181	-	-	171	-
Mov Cap-2 Maneuver	~ 7	-	-	-	-	-
Stage 1	~ 56	-	-	-	-	-
Stage 2	319	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	3836.9		0		1.1	
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	7	181	171	-
HCM Lane V/C Ratio	-	-	10.87	0.18	0.254	-
HCM Control Delay (s)	-	\$	5468.8	29.2	33.1	-
HCM Lane LOS	-	-	F	D	D	-
HCM 95th %tile Q(veh)	-	-	11.2	0.6	1	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

Background 2042 PM 4:00 pm 06/22/2022 Background 2042 PM
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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

9: Berthoud Pkwy & Spartan Ave

09/13/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	165	45	820	95	50	1885
Future Volume (vph)	165	45	820	95	50	1885
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	0.850		0.850			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1752	1568	3505	1568	1752	3505
Flt Permitted	0.950				0.266	
Satd. Flow (perm)	1752	1568	3505	1568	491	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		49		103		
Link Speed (mph)	30		30			30
Link Distance (ft)	2742		273			2639
Travel Time (s)	62.3		6.2			60.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	49	891	103	54	2049
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	49	891	103	54	2049
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Minimum Split (s)	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	26.0	26.0	84.4	84.4	9.6	94.0
Total Split (%)	21.7%	21.7%	70.3%	70.3%	8.0%	78.3%
Maximum Green (s)	21.5	21.5	79.9	79.9	5.1	89.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	21.5	21.5	79.9	79.9	89.5	89.5
Actuated g/C Ratio	0.18	0.18	0.67	0.67	0.75	0.75
v/c Ratio	0.57	0.15	0.38	0.10	0.13	0.78
Control Delay	53.1	12.7	9.6	1.5	4.7	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	12.7	9.6	1.5	4.7	12.1

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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY Town of Berthoud

Lanes, Volumes, Timings

9: Berthoud Pkwy & Spartan Ave

09/13/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	D	B	A	A	A	B
Approach Delay	44.5		8.7			11.9
Approach LOS	D		A			B
Intersection Summary						
Area Type:	Other					
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green						
Natural Cycle: 75						
Control Type: Pretimed						
Maximum v/c Ratio: 0.78						
Intersection Signal Delay: 13.2				Intersection LOS: B		
Intersection Capacity Utilization 68.7%				ICU Level of Service C		
Analysis Period (min) 15						

Splits and Phases: 9: Berthoud Pkwy & Spartan Ave



LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

9: Berthoud Pkwy & Spartan Ave

09/13/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	85	45	2150	145	80	1170
Future Volume (vph)	85	45	2150	145	80	1170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	0.850		0.850			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1752	1568	3505	1568	1752	3505
Flt Permitted	0.950				0.051	
Satd. Flow (perm)	1752	1568	3505	1568	94	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		49		139		
Link Speed (mph)	30		30			30
Link Distance (ft)	2742		273			2639
Travel Time (s)	62.3		6.2			60.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	49	2337	158	87	1272
Shared Lane Traffic (%)						
Lane Group Flow (vph)	92	49	2337	158	87	1272
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Minimum Split (s)	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	22.5	22.5	78.0	78.0	9.5	87.5
Total Split (%)	20.5%	20.5%	70.9%	70.9%	8.6%	79.5%
Maximum Green (s)	18.0	18.0	73.5	73.5	5.0	83.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	18.0	18.0	73.5	73.5	83.0	83.0
Actuated g/C Ratio	0.16	0.16	0.67	0.67	0.75	0.75
v/c Ratio	0.32	0.16	1.00	0.14	0.60	0.48
Control Delay	44.2	12.7	37.1	1.8	29.6	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.2	12.7	37.1	1.8	29.6	5.9

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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY **Town of Berthoud**

Lanes, Volumes, Timings

9: Berthoud Pkwy & Spartan Ave

09/13/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	D	B	D	A	C	A
Approach Delay	33.2		34.8			7.4
Approach LOS	C		C			A
Intersection Summary						
Area Type:	Other					
Cycle Length: 110						
Actuated Cycle Length: 110						
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green						
Natural Cycle: 110						
Control Type: Pretimed						
Maximum v/c Ratio: 1.00						
Intersection Signal Delay: 25.5				Intersection LOS: C		
Intersection Capacity Utilization 78.7%				ICU Level of Service D		
Analysis Period (min) 15						

Splits and Phases: 9: Berthoud Pkwy & Spartan Ave



LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
11: Meadowlark & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	350	40	20	325	75	40	15	15	155	20	145
Future Volume (vph)	170	350	40	20	325	75	40	15	15	155	20	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.985					0.850		0.971				0.850
Flt Protected	0.950			0.950				0.972		0.950		
Satd. Flow (prot)	1752	1817	0	1752	1845	1568	0	1741	0	1752	1845	1568
Flt Permitted	0.467			0.406				0.862		0.737		
Satd. Flow (perm)	861	1817	0	749	1845	1568	0	1544	0	1360	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				82		16				158
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		929			1340			2256			516	
Travel Time (s)		21.1			30.5			51.3			11.7	
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
Adj. Flow (vph)	185	380	43	22	353	82	43	16	16	168	22	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	423	0	22	353	82	0	75	0	168	22	158
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	60		60	60		60	60		60	60		60
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	22.5	22.5		22.5	22.5	22.5
Total Split (s)	55.0	55.0		55.0	55.0	55.0	45.0	45.0		45.0	45.0	45.0
Total Split (%)	55.0%	55.0%		55.0%	55.0%	55.0%	45.0%	45.0%		45.0%	45.0%	45.0%
Maximum Green (s)	50.5	50.5		50.5	50.5	50.5	40.5	40.5		40.5	40.5	40.5
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5		4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	0
Act Effct Green (s)	50.5	50.5		50.5	50.5	50.5		40.5		40.5	40.5	40.5
Actuated g/C Ratio	0.50	0.50		0.50	0.50	0.50		0.40		0.40	0.40	0.40
v/c Ratio	0.43	0.46		0.06	0.38	0.10		0.12		0.31	0.03	0.22
Control Delay	12.2	10.6		13.2	16.7	3.3		15.6		22.2	18.2	3.9
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	12.2	10.6		13.2	16.7	3.3		15.6		22.2	18.2	3.9

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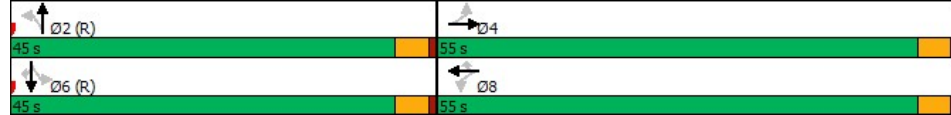
LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
11: Meadowlark & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	B		B	B	A		B		C	B	A
Approach Delay		11.0			14.1			15.6			13.6	
Approach LOS		B			B			B			B	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 45												
Control Type: Pretimed												
Maximum v/c Ratio: 0.46												
Intersection Signal Delay: 12.8						Intersection LOS: B						
Intersection Capacity Utilization 51.2%						ICU Level of Service A						
Analysis Period (min) 15												

Splits and Phases: 11: Meadowlark & Mountain



LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
11: Meadowlark & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	335	460	25	20	375	80	45	20	30	175	20	160
Future Volume (vph)	335	460	25	20	375	80	45	20	30	175	20	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992				0.850		0.957				0.850
Flt Protected	0.950			0.950				0.977		0.950		
Satd. Flow (prot)	1752	1830	0	1752	1845	1568	0	1725	0	1752	1845	1568
Flt Permitted	0.470			0.390				0.868		0.686		
Satd. Flow (perm)	867	1830	0	719	1845	1568	0	1532	0	1265	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				87		21				174
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		929			1340			2256			516	
Travel Time (s)		14.1			20.3			51.3			11.7	
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
Adj. Flow (vph)	364	500	27	22	408	87	49	22	33	190	22	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	364	527	0	22	408	87	0	104	0	190	22	174
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	22.5	22.5		22.5	22.5	22.5
Total Split (s)	75.0	75.0		75.0	75.0	75.0	35.0	35.0		35.0	35.0	35.0
Total Split (%)	68.2%	68.2%		68.2%	68.2%	68.2%	31.8%	31.8%		31.8%	31.8%	31.8%
Maximum Green (s)	70.5	70.5		70.5	70.5	70.5	30.5	30.5		30.5	30.5	30.5
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5		4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	0
Act Effct Green (s)	70.5	70.5		70.5	70.5	70.5		30.5		30.5	30.5	30.5
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64		0.28		0.28	0.28	0.28
v/c Ratio	0.66	0.45		0.05	0.35	0.08		0.24		0.54	0.04	0.31
Control Delay	17.6	11.5		7.7	10.1	1.8		26.1		40.7	29.5	6.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	17.6	11.5		7.7	10.1	1.8		26.1		40.7	29.5	6.2

Background 2042 PM 4:00 pm 06/22/2022 Background 2042 PM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

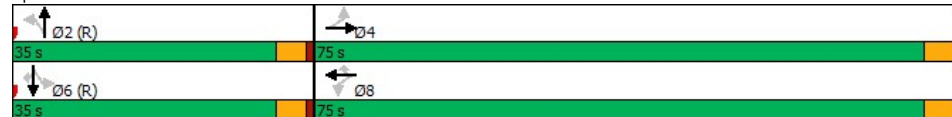
Lanes, Volumes, Timings

11: Meadowlark & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	B		A	B	A		C		D	C	A
Approach Delay		14.0			8.6			26.1			24.5	
Approach LOS		B			A			C			C	
Intersection Summary												
Area Type:	Other											
Cycle Length: 110												
Actuated Cycle Length: 110												
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 60												
Control Type: Pretimed												
Maximum v/c Ratio: 0.66												
Intersection Signal Delay: 15.3							Intersection LOS: B					
Intersection Capacity Utilization 65.9%							ICU Level of Service C					
Analysis Period (min) 15												

Splits and Phases: 11: Meadowlark & Mountain



LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

TOTAL 2042

Lanes, Volumes, Timings
1: US 287 & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	295	165	310	175	145	70	595	180	105	1365	70
Future Volume (vph)	90	295	165	310	175	145	70	595	180	105	1365	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			262			164			262			262
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			822			654			2586	
Travel Time (s)		51.6			12.5			8.1			32.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		0										
Adj. Flow (vph)	98	321	179	337	190	158	76	647	196	114	1484	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	321	179	337	190	158	76	647	196	114	1484	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Over	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			Free						Free			Free
Detector Phase	7	4		3	8	1	5	2		1	6	
Switch Phase												

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
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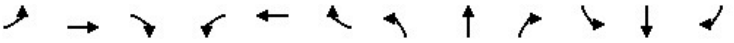
LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	13.4	27.0		15.3	28.9	17.7	9.5	40.0		17.7	48.2	
Total Split (%)	13.4%	27.0%		15.3%	28.9%	17.7%	9.5%	40.0%		17.7%	48.2%	
Maximum Green (s)	8.9	22.5		10.8	24.4	13.2	5.0	35.5		13.2	43.7	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	C-Max			None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	7.9	21.6	100.0	11.2	27.0	8.9	5.1	40.4	100.0	8.9	46.1	100.0
Actuated g/C Ratio	0.08	0.22	1.00	0.11	0.27	0.09	0.05	0.40	1.00	0.09	0.46	1.00
v/c Ratio	0.37	0.90	0.11	0.89	0.38	0.55	0.43	0.46	0.12	0.38	0.92	0.05
Control Delay	47.3	66.4	0.1	60.3	23.5	16.7	45.2	18.7	0.2	46.1	36.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.3	66.4	0.1	60.3	23.5	16.7	45.2	18.7	0.2	46.1	36.7	0.1
LOS	D	E	A	E	C	B	D	B	A	D	B	A
Approach Delay		43.5			40.0			17.0			35.6	
Approach LOS		D			D			B			D	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 33.2

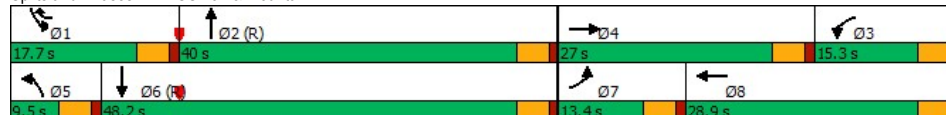
Intersection LOS: C

Intersection Capacity Utilization 80.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: US 287 & Mountain



Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	345	135	225	360	100	190	1525	445	155	915	120
Future Volume (vph)	125	345	135	225	360	100	190	1525	445	155	915	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			177			177			183			177
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			822			654			2586	
Travel Time (s)		51.6			12.5			8.1			32.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		0										
Adj. Flow (vph)	136	375	147	245	391	109	207	1658	484	168	995	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	375	147	245	391	109	207	1658	484	168	995	130
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	12.0	32.9		14.1	35.0		17.5	60.0		13.0	55.5	
Total Split (%)	10.0%	27.4%		11.8%	29.2%		14.6%	50.0%		10.8%	46.3%	
Maximum Green (s)	7.5	28.4		9.6	30.5		13.0	55.5		8.5	51.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	7.5	28.2	120.0	9.8	30.5	120.0	11.8	55.5	120.0	8.5	52.2	120.0
Actuated g/C Ratio	0.06	0.24	1.00	0.08	0.25	1.00	0.10	0.46	1.00	0.07	0.44	1.00
v/c Ratio	0.64	0.96	0.09	0.88	0.84	0.07	0.62	1.02	0.31	0.70	0.65	0.08
Control Delay	69.4	83.1	0.1	74.8	48.0	0.1	53.6	46.7	0.1	70.8	29.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.4	83.1	0.1	74.8	48.0	0.1	53.6	46.7	0.1	70.8	29.5	0.1
LOS	E	F	A	E	D	A	D	D	A	E	C	A
Approach Delay		61.7			49.8			37.7			31.9	
Approach LOS		E			D			D			C	

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 113.5 (95%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 41.1	Intersection LOS: D
Intersection Capacity Utilization 86.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: US 287 & Mountain



Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

2: Mountain & Gate Way

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	485	55	40	480	10	70	5	25	15	5	15
Future Volume (vph)	5	485	55	40	480	10	70	5	25	15	5	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.873			0.886	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1610	0	1752	1634	0
Flt Permitted	0.266			0.261			0.744			0.736		
Satd. Flow (perm)	491	1845	1568	481	1845	1568	1372	1610	0	1358	1634	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			60			33		27			16	
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1447			1257			342			493	
Travel Time (s)		21.9			19.0			7.8			11.2	
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
Adj. Flow (vph)	5	527	60	43	522	11	76	5	27	16	5	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	527	60	43	522	11	76	32	0	16	21	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	0	0	2	1	0	0		1	0	
Detector Template	Left	Thru	Thru	Thru	Thru	Right	Thru	Thru		Left	Thru	
Leading Detector (ft)	20	100	0	0	100	20	0	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	0	0	6	20	0	0		20	0	
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

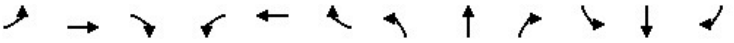
Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

2: Mountain & Gate Way

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5		22.5	22.5	
Total Split (s)	27.0	27.0	27.0	27.0	27.0	27.0	23.0	23.0		23.0	23.0	
Total Split (%)	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	46.0%	46.0%		46.0%	46.0%	
Maximum Green (s)	22.5	22.5	22.5	22.5	22.5	22.5	18.5	18.5		18.5	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	18.9	18.9	18.9	18.9	18.9	18.9	22.1	22.1		22.1	22.1	
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38	0.38	0.44	0.44		0.44	0.44	
v/c Ratio	0.03	0.76	0.10	0.24	0.75	0.02	0.13	0.04		0.03	0.03	
Control Delay	4.4	15.2	1.0	12.8	20.3	1.3	10.7	5.6		10.1	6.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	4.4	15.2	1.0	12.8	20.3	1.3	10.7	5.6		10.1	6.4	
LOS	A	B	A	B	C	A	B	A		B	A	
Approach Delay	13.7			19.4			9.2			8.0		
Approach LOS	B			B			A			A		

Intersection Summary

Area Type: Other

Cycle Length: 50

Actuated Cycle Length: 50

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 15.7

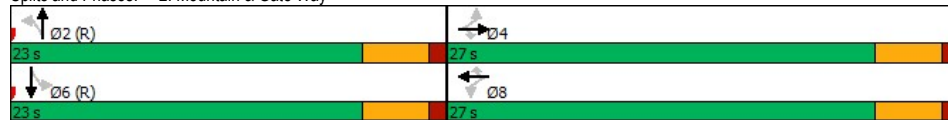
Intersection LOS: B

Intersection Capacity Utilization 51.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Mountain & Gate Way



Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
 RR

Synchro 11 Light Report
 Page 2

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

2: Mountain & Gate Way

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	690	120	70	510	15	115	5	80	10	5	10
Future Volume (vph)	15	690	120	70	510	15	115	5	80	10	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.858			0.897	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1583	0	1752	1655	0
Flt Permitted	0.313			0.153			0.747			0.697		
Satd. Flow (perm)	577	1845	1568	282	1845	1568	1378	1583	0	1286	1655	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			130			27		87			11	
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1447			1257			342			493	
Travel Time (s)		21.9			19.0			7.8			11.2	
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
Adj. Flow (vph)	16	750	130	76	554	16	125	5	87	11	5	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	750	130	76	554	16	125	92	0	11	16	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	0	0	2	1	0	0		1	0	
Detector Template	Left	Thru	Thru	Thru	Thru	Right	Thru	Thru		Left	Thru	
Leading Detector (ft)	20	100	0	0	100	20	0	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	0	0	6	20	0	0		20	0	
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

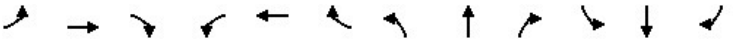
Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

2: Mountain & Gate Way

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5		22.5	22.5	
Total Split (s)	37.0	37.0	37.0	37.0	37.0	37.0	23.0	23.0		23.0	23.0	
Total Split (%)	61.7%	61.7%	61.7%	61.7%	61.7%	61.7%	38.3%	38.3%		38.3%	38.3%	
Maximum Green (s)	32.5	32.5	32.5	32.5	32.5	32.5	18.5	18.5		18.5	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	29.2	29.2	29.2	29.2	29.2	29.2	21.8	21.8		21.8	21.8	
Actuated g/C Ratio	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.36		0.36	0.36	
v/c Ratio	0.06	0.84	0.16	0.55	0.62	0.02	0.25	0.15		0.02	0.03	
Control Delay	8.7	23.1	3.2	28.2	14.1	2.1	16.9	5.4		14.7	10.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	8.7	23.1	3.2	28.2	14.1	2.1	16.9	5.4		14.7	10.1	
LOS	A	C	A	C	B	A	B	A		B	B	
Approach Delay		19.9			15.5			12.0			12.0	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 17.2

Intersection LOS: B

Intersection Capacity Utilization 64.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Mountain & Gate Way

	
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Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
Page 2

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	310	95	70	285	90	95	240	125	110	195	140
Future Volume (vph)	105	310	95	70	285	90	95	240	125	110	195	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1845	1568	1752	1845	1568
Flt Permitted	0.399			0.448			0.625			0.566		
Satd. Flow (perm)	736	1845	1568	826	1845	1568	1153	1845	1568	1044	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			119			119			136			152
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1257			3652			531			2550	
Travel Time (s)		19.0			55.3			10.3			49.7	
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
Adj. Flow (vph)	114	337	103	76	310	98	103	261	136	120	212	152
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	337	103	76	310	98	103	261	136	120	212	152
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	10.0	22.9	22.9	9.6	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (%)	18.2%	41.6%	41.6%	17.5%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%
Maximum Green (s)	5.5	18.4	18.4	5.1	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	20.0	16.7	16.7	18.5	14.4	14.4	23.6	23.6	23.6	23.6	23.6	23.6
Actuated g/C Ratio	0.36	0.30	0.30	0.34	0.26	0.26	0.43	0.43	0.43	0.43	0.43	0.43
v/c Ratio	0.31	0.60	0.18	0.21	0.64	0.20	0.21	0.33	0.18	0.27	0.27	0.20
Control Delay	10.6	21.1	3.6	9.4	23.8	3.6	14.3	14.3	3.9	15.3	13.7	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	21.1	3.6	9.4	23.8	3.6	14.3	14.3	3.9	15.3	13.7	3.8
LOS	B	C	A	A	C	A	B	B	A	B	B	A
Approach Delay		15.7			17.5			11.5			11.0	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 13.9

Intersection LOS: B

Intersection Capacity Utilization 54.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Berthoud Pkwy & Mountain

 Ø2 (R)	 Ø3	 Ø4
22.5 s	9.6 s	22.9 s
 Ø5 (R)	 Ø7	 Ø8
22.5 s	10 s	22.5 s

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

12/31/2022

Intersection												
Int Delay, s/veh	2.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	↔
Traffic Vol, veh/h	55	1	5	10	1	30	5	340	10	20	355	20
Future Vol, veh/h	55	1	5	10	1	30	5	340	10	20	355	20
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	-	-	-	-	-	-	0	-	-	0	-	0
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	60	1	5	11	1	33	5	370	11	22	386	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	833	821	386	830	838	376	408	0	0	381	0	0
Stage 1	430	430	-	386	386	-	-	-	-	-	-	-
Stage 2	403	391	-	444	452	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	287	308	660	288	301	668	1145	-	-	1172	-	-
Stage 1	601	582	-	635	608	-	-	-	-	-	-	-
Stage 2	622	605	-	591	569	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	267	301	660	280	294	668	1145	-	-	1172	-	-
Mov Cap-2 Maneuver	267	301	-	280	294	-	-	-	-	-	-	-
Stage 1	599	571	-	632	606	-	-	-	-	-	-	-
Stage 2	588	603	-	574	558	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	21.7			13.1			0.1			0.4		
HCM LOS	C			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1145	-	-	281	488	1172	-	-
HCM Lane V/C Ratio	0.005	-	-	0.236	0.091	0.019	-	-
HCM Control Delay (s)	8.2	-	-	21.7	13.1	8.1	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.9	0.3	0.1	-	-

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

12/28/2022

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	↔
Traffic Vol, veh/h	30	1	15	10	1	30	10	345	15	45	350	55
Future Vol, veh/h	30	1	15	10	1	30	10	345	15	45	350	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	0	-	0
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	33	1	16	11	1	33	11	375	16	49	380	60

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	900	891	380	922	943	383	440	0	0	391	0	0
Stage 1	478	478	-	405	405	-	-	-	-	-	-	-
Stage 2	422	413	-	517	538	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	258	281	665	250	262	662	1115	-	-	1162	-	-
Stage 1	566	554	-	620	597	-	-	-	-	-	-	-
Stage 2	607	592	-	539	521	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	235	266	665	234	248	662	1115	-	-	1162	-	-
Mov Cap-2 Maneuver	235	266	-	234	248	-	-	-	-	-	-	-
Stage 1	560	531	-	614	591	-	-	-	-	-	-	-
Stage 2	570	586	-	503	499	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	19.4		14		0.2		0.8	
HCM LOS	C		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1115	-	-	299	445	1162	-	-
HCM Lane V/C Ratio	0.01	-	-	0.167	0.1	0.042	-	-
HCM Control Delay (s)	8.3	-	-	19.4	14	8.2	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.6	0.3	0.1	-	-

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

12/28/2022

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	↕
Traffic Vol, veh/h	30	1	10	5	1	10	5	310	5	5	345	15
Future Vol, veh/h	30	1	10	5	1	10	5	310	5	5	345	15
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	-	-	-	-	-	-	0	-	-	0	-	0
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	33	1	11	5	1	11	5	337	5	5	375	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	741	737	375	749	751	340	391	0	0	342	0	0
Stage 1	385	385	-	350	350	-	-	-	-	-	-	-
Stage 2	356	352	-	399	401	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	331	345	669	327	338	700	1162	-	-	1211	-	-
Stage 1	636	609	-	664	631	-	-	-	-	-	-	-
Stage 2	659	630	-	625	599	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	323	342	669	319	335	700	1162	-	-	1211	-	-
Mov Cap-2 Maneuver	323	342	-	319	335	-	-	-	-	-	-	-
Stage 1	633	607	-	661	628	-	-	-	-	-	-	-
Stage 2	645	627	-	611	597	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.1			12.7			0.1			0.1		
HCM LOS	C			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1162	-	-	370	486	1211	-	-
HCM Lane V/C Ratio	0.005	-	-	0.12	0.036	0.004	-	-
HCM Control Delay (s)	8.1	-	-	16.1	12.7	8	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0	-	-

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

12/28/2022

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	↕
Traffic Vol, veh/h	20	1	5	5	1	5	10	340	5	5	335	40
Future Vol, veh/h	20	1	5	5	1	5	10	340	5	5	335	40
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	-	-	-	-	-	-	0	-	-	0	-	0
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	22	1	5	5	1	5	11	370	5	5	364	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	772	771	364	794	812	373	407	0	0	375	0	0
Stage 1	374	374	-	395	395	-	-	-	-	-	-	-
Stage 2	398	397	-	399	417	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	315	330	679	305	312	671	1146	-	-	1178	-	-
Stage 1	645	616	-	628	603	-	-	-	-	-	-	-
Stage 2	626	602	-	625	590	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	308	325	679	299	308	671	1146	-	-	1178	-	-
Mov Cap-2 Maneuver	308	325	-	299	308	-	-	-	-	-	-	-
Stage 1	639	614	-	622	597	-	-	-	-	-	-	-
Stage 2	614	596	-	616	588	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.4			14.3			0.2			0.1		
HCM LOS	C			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1146	-	-	345	401	1178	-	-
HCM Lane V/C Ratio	0.009	-	-	0.082	0.03	0.005	-	-
HCM Control Delay (s)	8.2	-	-	16.4	14.3	8.1	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0	-	-

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

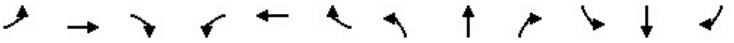
Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

6: Spartan Ave/Spartan & Berthoud Pkwy

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↖		↗	↖	
Traffic Volume (vph)	100	100	65	30	145	100	85	125	65	170	100	70
Future Volume (vph)	100	100	65	30	145	100	85	125	65	170	100	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.951			0.949			0.938	
Flt Protected		0.981			0.995		0.950			0.950		
Satd. Flow (prot)	0	1750	0	0	1746	0	1752	1751	0	1752	1730	0
Flt Permitted		0.713			0.949		0.641			0.628		
Satd. Flow (perm)	0	1272	0	0	1665	0	1182	1751	0	1158	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34			60			54			73	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		2716			4520			2200			580	
Travel Time (s)		61.7			102.7			42.9			11.3	
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
Adj. Flow (vph)	109	109	71	33	158	109	92	136	71	185	109	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	289	0	0	300	0	92	207	0	185	185	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	0	0		1	0		0	2		1	2	
Detector Template	Thru	Thru		Left	Thru		Thru	Thru		Left	Thru	
Leading Detector (ft)	0	0		20	0		0	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	0	0		20	0		0	6		20	6	
Detector 1 Type				Cl+Ex			Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

6: Spartan Ave/Spartan & Berthoud Pkwy

12/28/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	30.0	30.0		30.0	30.0		30.0	30.0		30.0	30.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	25.5	25.5		25.5	25.5		25.5	25.5		25.5	25.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		14.0			14.0			25.8			25.8	
Actuated g/C Ratio		0.29			0.29			0.53			0.53	
v/c Ratio		0.75			0.58			0.15			0.30	
Control Delay		26.2			16.1			8.3			9.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		26.2			16.1			8.3			9.8	
LOS		C			B			A			A	
Approach Delay		26.2			16.1			7.0			7.7	
Approach LOS		C			B			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 48.8

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 13.8

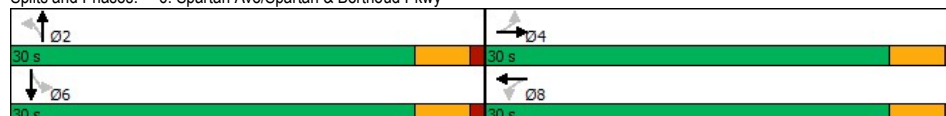
Intersection LOS: B

Intersection Capacity Utilization 65.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 6: Spartan Ave/Spartan & Berthoud Pkwy



Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

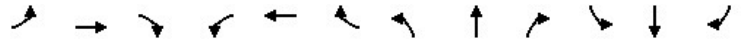
Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

6: Spartan Ave/Spartan & Berthoud Pkwy

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	110	135	115	40	90	110	80	135	55	65	165	110
Future Volume (vph)	110	135	115	40	90	110	80	135	55	65	165	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.957			0.938			0.957			0.940	
Flt Protected		0.985			0.992		0.950			0.950		
Satd. Flow (prot)	0	1739	0	0	1716	0	1752	1765	0	1752	1734	0
Flt Permitted		0.811			0.906		0.562			0.628		
Satd. Flow (perm)	0	1432	0	0	1568	0	1037	1765	0	1158	1734	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49			89			43			70	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		2716			4520			2200			580	
Travel Time (s)		61.7			102.7			42.9			11.3	
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
Adj. Flow (vph)	120	147	125	43	98	120	87	147	60	71	179	120
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	392	0	0	261	0	87	207	0	71	299	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	0	0		1	0		0	2		1	2	
Detector Template	Thru	Thru		Left	Thru		Thru	Thru		Left	Thru	
Leading Detector (ft)	0	0		20	0		0	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	0	0		20	0		0	6		20	6	
Detector 1 Type				Cl+Ex				Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

6: Spartan Ave/Spartan & Berthoud Pkwy

12/28/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	30.0	30.0		30.0	30.0		30.0	30.0		30.0	30.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	25.5	25.5		25.5	25.5		25.5	25.5		25.5	25.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		17.1			17.1			25.8			25.8	
Actuated g/C Ratio		0.33			0.33			0.50			0.50	
v/c Ratio		0.78			0.45			0.17			0.12	
Control Delay		24.9			11.1			10.3			9.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		24.9			11.1			10.3			9.8	
LOS		C			B			B			A	
Approach Delay		24.9			11.1			8.8			8.8	
Approach LOS		C			B			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 52

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 14.0

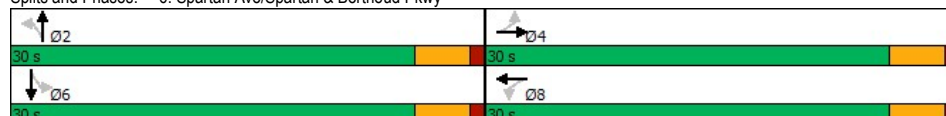
Intersection LOS: B

Intersection Capacity Utilization 66.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 6: Spartan Ave/Spartan & Berthoud Pkwy



Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

7: Berthoud Pkwy & CR 4E

12/31/2022

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Vol, veh/h	55	15	5	5	40	10	5	90	5	15	135	105
Future Vol, veh/h	55	15	5	5	40	10	5	90	5	15	135	105
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	0	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	60	16	5	5	43	11	5	98	5	16	147	114

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	374	349	204	358	404	101	261	0	0	103	0	0
Stage 1	236	236	-	111	111	-	-	-	-	-	-	-
Stage 2	138	113	-	247	293	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	581	573	834	596	534	952	1298	-	-	1483	-	-
Stage 1	765	708	-	892	802	-	-	-	-	-	-	-
Stage 2	863	800	-	755	668	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	531	563	834	572	525	952	1298	-	-	1483	-	-
Mov Cap-2 Maneuver	531	563	-	572	525	-	-	-	-	-	-	-
Stage 1	762	699	-	888	799	-	-	-	-	-	-	-
Stage 2	803	797	-	723	659	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	12.2			12			0.4			0.4		
HCM LOS	B			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1298	-	-	531	613	576	1483	-	-
HCM Lane V/C Ratio	0.004	-	-	0.113	0.035	0.104	0.011	-	-
HCM Control Delay (s)	7.8	0	-	12.6	11.1	12	7.5	0	-
HCM Lane LOS	A	A	-	B	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0.3	0	-	-

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

7: Berthoud Pkwy & CR 4E

12/31/2022

Intersection												
Int Delay, s/veh	4.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	45	5	5	30	15	5	165	5	10	140	40
Future Vol, veh/h	90	45	5	5	30	15	5	165	5	10	140	40
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	0	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	98	49	5	5	33	16	5	179	5	11	152	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	412	390	174	415	409	182	195	0	0	184	0	0
Stage 1	196	196	-	192	192	-	-	-	-	-	-	-
Stage 2	216	194	-	223	217	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	549	544	867	546	531	858	1372	-	-	1385	-	-
Stage 1	803	737	-	807	740	-	-	-	-	-	-	-
Stage 2	784	738	-	777	721	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	508	537	867	500	524	858	1372	-	-	1385	-	-
Mov Cap-2 Maneuver	508	537	-	500	524	-	-	-	-	-	-	-
Stage 1	800	730	-	804	737	-	-	-	-	-	-	-
Stage 2	732	735	-	714	715	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	13.2			11.7			0.2			0.4		
HCM LOS	B			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1372	-	-	508	558	590	1385	-	-
HCM Lane V/C Ratio	0.004	-	-	0.193	0.097	0.092	0.008	-	-
HCM Control Delay (s)	7.6	0	-	13.8	12.1	11.7	7.6	0	-
HCM Lane LOS	A	A	-	B	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.3	0.3	0	-	-

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

12/31/2022

Intersection						
Int Delay, s/veh	52.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↰	↰↰	↰	↰	↰↰
Traffic Vol, veh/h	120	35	900	50	15	2230
Future Vol, veh/h	120	35	900	50	15	2230
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	-	0	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	130	38	978	54	16	2424
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	2222	489	0	0	1032	0
Stage 1	978	-	-	-	-	-
Stage 2	1244	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 36	522	-	-	663	-
Stage 1	323	-	-	-	-	-
Stage 2	233	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	~ 35	522	-	-	663	-
Mov Cap-2 Maneuver	~ 35	-	-	-	-	-
Stage 1	323	-	-	-	-	-
Stage 2	227	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, \$	1134.8	0		0.1		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 35	522	663	-	
HCM Lane V/C Ratio	-	- 3.727	0.073	0.025	-	
HCM Control Delay (s)	-	\$ 1462.2	12.4	10.6	-	
HCM Lane LOS	-	- F	B	B	-	
HCM 95th %tile Q(veh)	-	- 15.2	0.2	0.1	-	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
 RR

Synchro 11 Light Report
 Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

12/31/2022

Intersection						
Int Delay, s/veh	292.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↰	↰↰	↰	↰	↰↰
Traffic Vol, veh/h	80	30	2395	175	40	1370
Future Vol, veh/h	80	30	2395	175	40	1370
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	-	0	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	87	33	2603	190	43	1489
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	3434	1302	0	0	2793	0
Stage 1	2603	-	-	-	-	-
Stage 2	831	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 5	150	-	-	135	-
Stage 1	~ 41	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	~ 3	150	-	-	135	-
Mov Cap-2 Maneuver	~ 3	-	-	-	-	-
Stage 1	~ 41	-	-	-	-	-
Stage 2	263	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay (s)	10873.8	0	1.2			
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	3	150	135	-
HCM Lane V/C Ratio	-	-	28.986	0.217	0.322	-
HCM Control Delay (s)	-	-	14938.2	35.5	43.8	-
HCM Lane LOS	-	-	F	E	E	-
HCM 95th %tile Q(veh)	-	-	13	0.8	1.3	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
 Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
 9: US 287 & Spartan Ave

12/28/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	 		 		 	 
Traffic Volume (vph)	350	115	835	175	95	1895
Future Volume (vph)	350	115	835	175	95	1895
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt	0.850		0.850			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3400	1568	3505	1568	1752	3505
Flt Permitted	0.950				0.251	
Satd. Flow (perm)	3400	1568	3505	1568	463	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		125		190		
Link Speed (mph)	30		30			30
Link Distance (ft)	2716		245			2668
Travel Time (s)	61.7		5.6			60.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	380	125	908	190	103	2060
Shared Lane Traffic (%)						
Lane Group Flow (vph)	380	125	908	190	103	2060
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	24		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Minimum Split (s)	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	22.5	22.5	67.1	67.1	10.4	77.5
Total Split (%)	22.5%	22.5%	67.1%	67.1%	10.4%	77.5%
Maximum Green (s)	18.0	18.0	62.6	62.6	5.9	73.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	18.0	18.0	62.6	62.6	73.0	73.0
Actuated g/C Ratio	0.18	0.18	0.63	0.63	0.73	0.73
v/c Ratio	0.62	0.33	0.41	0.18	0.25	0.81
Control Delay	42.9	9.1	10.1	1.5	6.3	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.9	9.1	10.1	1.5	6.3	20.7

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY Town of Berthoud

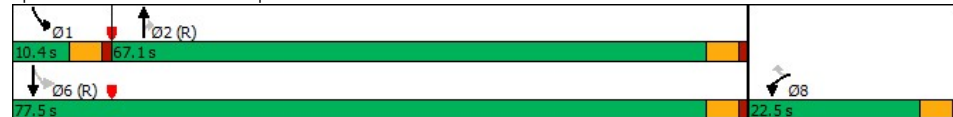
Lanes, Volumes, Timings

9: US 287 & Spartan Ave

12/28/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	D	A	B	A	A	C
Approach Delay	34.5		8.7			20.0
Approach LOS	C		A			B
Intersection Summary						
Area Type:	Other					
Cycle Length: 100						
Actuated Cycle Length: 100						
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green						
Natural Cycle: 75						
Control Type: Pretimed						
Maximum v/c Ratio: 0.81						
Intersection Signal Delay: 18.6				Intersection LOS: B		
Intersection Capacity Utilization 69.9%				ICU Level of Service C		
Analysis Period (min) 15						

Splits and Phases: 9: US 287 & Spartan Ave



Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
9: US 287 & Spartan Ave

12/28/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	210	120	2175	335	200	1200
Future Volume (vph)	210	120	2175	335	200	1200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt	0.850		0.850			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3400	1568	3505	1568	1752	3505
Flt Permitted	0.950				0.049	
Satd. Flow (perm)	3400	1568	3505	1568	90	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		130		157		
Link Speed (mph)	30		30			30
Link Distance (ft)	2716		245			2668
Travel Time (s)	61.7		5.6			60.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	130	2364	364	217	1304
Shared Lane Traffic (%)						
Lane Group Flow (vph)	228	130	2364	364	217	1304
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	24		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA	pm+ov	pm+pt	NA
Protected Phases	8		2	8	1	6
Permitted Phases		8		2		6
Minimum Split (s)	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	20.0	20.0	82.0	20.0	18.0	100.0
Total Split (%)	16.7%	16.7%	68.3%	16.7%	15.0%	83.3%
Maximum Green (s)	15.5	15.5	77.5	15.5	13.5	95.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	15.5	15.5	77.5	97.5	95.5	95.5
Actuated g/C Ratio	0.13	0.13	0.65	0.81	0.80	0.80
v/c Ratio	0.52	0.41	1.04	0.28	0.84	0.47
Control Delay	53.5	12.2	53.9	2.0	46.5	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.5	12.2	53.9	2.0	46.5	11.5

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

10: Berthoud Pkwy & Estate Lot Access

12/31/2022

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W		W	↑	↑	
Traffic Vol, veh/h	30	20	5	245	185	10
Future Vol, veh/h	30	20	5	245	185	10
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, %	3	3	3	3	3	3
Mvmt Flow	33	22	5	266	201	11
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	483	207	212	0	-	0
Stage 1	207	-	-	-	-	-
Stage 2	276	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	541	831	1352	-	-	-
Stage 1	825	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	539	831	1352	-	-	-
Mov Cap-2 Maneuver	539	-	-	-	-	-
Stage 1	822	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	11.3	0.2	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR		
Capacity (veh/h)	1352	-	627	-		
HCM Lane V/C Ratio	0.004	-	0.087	-		
HCM Control Delay (s)	7.7	-	11.3	-		
HCM Lane LOS	A	-	B	-		
HCM 95th %tile Q(veh)	0	-	0.3	-		

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY Town of Berthoud

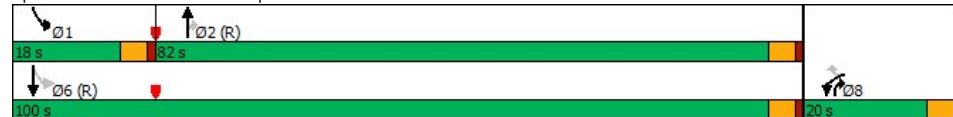
Lanes, Volumes, Timings

9: US 287 & Spartan Ave

12/28/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	D	B	D	A	D	B
Approach Delay	38.5		47.0		16.5	
Approach LOS	D		D		B	
Intersection Summary						
Area Type:	Other					
Cycle Length:	120					
Actuated Cycle Length:	120					
Offset:	0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green					
Natural Cycle:	140					
Control Type:	Pretimed					
Maximum v/c Ratio:	1.04					
Intersection Signal Delay:	36.3			Intersection LOS: D		
Intersection Capacity Utilization	88.4%			ICU Level of Service E		
Analysis Period (min)	15					

Splits and Phases: 9: US 287 & Spartan Ave



Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

10: Berthoud Pkwy & Estate Lot Access

12/31/2022

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W		W	↑	↑	
Traffic Vol, veh/h	30	20	5	245	185	10
Future Vol, veh/h	30	20	5	245	185	10
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, %	3	3	3	3	3	3
Mvmt Flow	33	22	5	266	201	11
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	483	207	212	0	-	0
Stage 1	207	-	-	-	-	-
Stage 2	276	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	541	831	1352	-	-	-
Stage 1	825	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	539	831	1352	-	-	-
Mov Cap-2 Maneuver	539	-	-	-	-	-
Stage 1	822	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	11.3	0.2	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR		
Capacity (veh/h)	1352	-	627	-		
HCM Lane V/C Ratio	0.004	-	0.087	-		
HCM Control Delay (s)	7.7	-	11.3	-		
HCM Lane LOS	A	-	B	-		
HCM 95th %tile Q(veh)	0	-	0.3	-		

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

10: Berthoud Pkwy & Estate Lot Access

12/31/2022

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W		W	↑	↑	
Traffic Vol, veh/h	20	10	20	320	345	30
Future Vol, veh/h	20	10	20	320	345	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	22	11	22	348	375	33
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	784	392	408	0	-	0
Stage 1	392	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	361	655	1145	-	-	-
Stage 1	681	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	354	655	1145	-	-	-
Mov Cap-2 Maneuver	354	-	-	-	-	-
Stage 1	668	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	14.3	0.5	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR		
Capacity (veh/h)	1145	-	418	-	-	
HCM Lane V/C Ratio	0.019	-	0.078	-	-	
HCM Control Delay (s)	8.2	-	14.3	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
11: Mountain & Meadowlark

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	405	50	30	400	75	105	15	45	155	20	145
Future Volume (vph)	170	405	50	30	400	75	105	15	45	155	20	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.887				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1636	0	1752	1845	1568
Flt Permitted	0.407			0.402			0.743			0.715		
Satd. Flow (perm)	751	1845	1568	742	1845	1568	1371	1636	0	1319	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			54			82		49				158
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		822			1447			2668			493	
Travel Time (s)		12.5			21.9			60.6			11.2	
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
Adj. Flow (vph)	185	440	54	33	435	82	114	16	49	168	22	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	440	54	33	435	82	114	65	0	168	22	158
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5		22.5	22.5	22.5
Total Split (s)	57.0	57.0	57.0	57.0	57.0	57.0	43.0	43.0		43.0	43.0	43.0
Total Split (%)	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	43.0%	43.0%		43.0%	43.0%	43.0%
Maximum Green (s)	52.5	52.5	52.5	52.5	52.5	52.5	38.5	38.5		38.5	38.5	38.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	0
Act Effect Green (s)	52.5	52.5	52.5	52.5	52.5	52.5	38.5	38.5		38.5	38.5	38.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52	0.52	0.38	0.38		0.38	0.38	0.38
v/c Ratio	0.47	0.45	0.06	0.08	0.45	0.10	0.22	0.10		0.33	0.03	0.23
Control Delay	16.1	12.9	3.7	18.8	25.1	8.5	22.0	8.4		24.0	19.4	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	16.1	12.9	3.7	18.8	25.1	8.5	22.0	8.4		24.0	19.4	4.2

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

11: Mountain & Meadowlark

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	B	A	B	C	A	C	A		C	B	A
Approach Delay		13.1			22.2			17.1			14.7	
Approach LOS		B			C			B			B	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 50												
Control Type: Pretimed												
Maximum v/c Ratio: 0.47												
Intersection Signal Delay: 16.7						Intersection LOS: B						
Intersection Capacity Utilization 57.0%						ICU Level of Service B						
Analysis Period (min) 15												

Splits and Phases: 11: Mountain & Meadowlark

 Ø2 (R)	 Ø4
43 s	57 s
 Ø6 (R)	 Ø8
43 s	57 s

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
11: Mountain & Meadowlark

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	335	570	90	45	470	80	85	20	45	175	20	160
Future Volume (vph)	335	570	90	45	470	80	85	20	45	175	20	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.896				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1653	0	1752	1845	1568
Flt Permitted	0.421			0.358			0.743			0.711		
Satd. Flow (perm)	777	1845	1568	660	1845	1568	1371	1653	0	1312	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			98			87		49				174
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		822			1447			2668			493	
Travel Time (s)		18.7			32.9			60.6			11.2	
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
Adj. Flow (vph)	364	620	98	49	511	87	92	22	49	190	22	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	364	620	98	49	511	87	92	71	0	190	22	174
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	60		60	60		60	60		60	60		60
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5		22.5	22.5	22.5
Total Split (s)	89.0	89.0	89.0	89.0	89.0	89.0	31.0	31.0		31.0	31.0	31.0
Total Split (%)	74.2%	74.2%	74.2%	74.2%	74.2%	74.2%	25.8%	25.8%		25.8%	25.8%	25.8%
Maximum Green (s)	84.5	84.5	84.5	84.5	84.5	84.5	26.5	26.5		26.5	26.5	26.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	0
Act Effect Green (s)	84.5	84.5	84.5	84.5	84.5	84.5	26.5	26.5		26.5	26.5	26.5
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.22	0.22		0.22	0.22	0.22
v/c Ratio	0.67	0.48	0.09	0.11	0.39	0.08	0.30	0.18		0.66	0.05	0.36
Control Delay	19.5	13.0	3.9	10.9	14.4	5.1	42.4	16.8		54.8	37.5	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	19.5	13.0	3.9	10.9	14.4	5.1	42.4	16.8		54.8	37.5	7.9

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

11: Mountain & Meadowlark

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	B	A	B	B	A	D	B		D	D	A
Approach Delay		14.3			12.9			31.2			32.7	
Approach LOS		B			B			C			C	
Intersection Summary												
Area Type:	Other											
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Natural Cycle: 65												
Control Type: Pretimed												
Maximum v/c Ratio: 0.67												
Intersection Signal Delay: 18.2						Intersection LOS: B						
Intersection Capacity Utilization 70.9%						ICU Level of Service C						
Analysis Period (min) 15												

Splits and Phases: 11: Mountain & Meadowlark

 Ø2 (R)	 Ø4
Ø1 s	Ø9 s
 Ø6 (R)	 Ø8
Ø1 s	Ø9 s

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
Page 2

TOTAL 2042 WITH ROUNDABOUT

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 2: Mountain & Gate Way

01/01/2023

Intersection					
Intersection Delay, s/veh	7.1				
Intersection LOS	A				
Approach	EB	WB	NB	SB	
Entry Lanes	1	1	1	1	
Conflicting Circle Lanes	1	1	1	1	
Adj Approach Flow, veh/h	592	576	108	37	
Demand Flow Rate, veh/h	610	593	111	37	
Vehicles Circulating, veh/h	65	88	564	660	
Vehicles Exiting, veh/h	632	587	49	21	
Ped Vol Crossing Leg, #/h	0	0	0	0	
Ped Cap Adj	1.000	1.000	1.000	1.000	
Approach Delay, s/veh	6.7	7.9	6.3	5.7	
Approach LOS	A	A	A	A	
Lane	Left	Bypass	Left	Left	Left
Designated Moves	LT	R	LTR	LTR	LTR
Assumed Moves	LT	R	LTR	LTR	LTR
RT Channelized		Yield			
Lane Util	1.000		1.000	1.000	1.000
Follow-Up Headway, s	2.609		2.609	2.609	2.609
Critical Headway, s	4.976	62	4.976	4.976	4.976
Entry Flow, veh/h	548	1313	593	111	37
Cap Entry Lane, veh/h	1291	0.971	1261	776	704
Entry HV Adj Factor	0.971	60	0.972	0.972	0.996
Flow Entry, veh/h	532	1274	576	108	37
Cap Entry, veh/h	1254	0.047	1226	754	701
V/C Ratio	0.424	3.2	0.470	0.143	0.053
Control Delay, s/veh	7.1	A	7.9	6.3	5.7
LOS	A	0	A	A	A
95th %tile Queue, veh	2		3	0	0

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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Synchro 11 Light Report
 Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 2: Mountain & Gate Way

01/01/2023

Intersection					
Intersection Delay, s/veh	10.0				
Intersection LOS	B				
Approach	EB	WB	NB	SB	
Entry Lanes	1	1	1	1	
Conflicting Circle Lanes	1	1	1	1	
Adj Approach Flow, veh/h	896	646	217	27	
Demand Flow Rate, veh/h	922	665	224	27	
Vehicles Circulating, veh/h	94	150	800	778	
Vehicles Exiting, veh/h	711	874	83	37	
Ped Vol Crossing Leg, #/h	0	0	0	0	
Ped Cap Adj	1.000	1.000	1.000	1.000	
Approach Delay, s/veh	9.9	9.9	11.4	6.3	
Approach LOS	A	A	B	A	
Lane	Left	Bypass	Left	Left	Left
Designated Moves	LT	R	LTR	LTR	LTR
Assumed Moves	LT	R	LTR	LTR	LTR
RT Channelized		Yield			
Lane Util	1.000		1.000	1.000	1.000
Follow-Up Headway, s	2.609		2.609	2.609	2.609
Critical Headway, s	4.976	134	4.976	4.976	4.976
Entry Flow, veh/h	788	1268	665	224	27
Cap Entry Lane, veh/h	1254	0.971	1184	610	624
Entry HV Adj Factor	0.971	130	0.972	0.968	0.995
Flow Entry, veh/h	766	1231	646	217	27
Cap Entry, veh/h	1218	0.106	1151	591	621
V/C Ratio	0.629	3.8	0.562	0.367	0.043
Control Delay, s/veh	11.0	A	9.9	11.4	6.3
LOS	B	0	A	B	A
95th %tile Queue, veh	5		4	2	0

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 3: Berthoud Pkwy & Mountain

01/01/2023

Intersection									
Intersection Delay, s/veh	8.3								
Intersection LOS	A								
Approach	EB		WB		NB		SB		
Entry Lanes	2		2		1		1		
Conflicting Circle Lanes	1		1		1		1		
Adj Approach Flow, veh/h	554		490		500		484		
Demand Flow Rate, veh/h	570		504		515		499		
Vehicles Circulating, veh/h	426		492		588		509		
Vehicles Exiting, veh/h	425		471		408		487		
Ped Vol Crossing Leg, #/h	0		0		0		0		
Ped Cap Adj	1.000		1.000		1.000		1.000		
Approach Delay, s/veh	8.9		8.6		8.8		6.7		
Approach LOS	A		A		A		A		
Lane	Left	Right	Left	Right	Left	Bypass	Left	Bypass	
Designated Moves	LT	R	LT	R	LT	R	LT	R	
Assumed Moves	LT	R	LT	R	LT	R	LT	R	
RT Channelized						Free		Free	
Lane Util	0.814	0.186	0.800	0.200	1.000		1.000		
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.609		2.609		
Critical Headway, s	4.544	4.544	4.544	4.544	4.976	140	4.976	157	
Entry Flow, veh/h	464	106	403	101	375	1957	342	1957	
Cap Entry Lane, veh/h	964	964	908	908	758	0.971	821	0.971	
Entry HV Adj Factor	0.972	0.972	0.972	0.970	0.971	136	0.970	152	
Flow Entry, veh/h	451	103	392	98	364	1900	332	1900	
Cap Entry, veh/h	936	936	882	881	736	0.072	796	0.080	
V/C Ratio	0.481	0.110	0.444	0.111	0.495	0.0	0.417	0.0	
Control Delay, s/veh	9.8	4.9	9.5	5.2	12.1	A	9.8	A	
LOS	A	A	A	A	B	0	A	0	
95th %tile Queue, veh	3	0	2	0	3		2		

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 3: Berthoud Pkwy & Mountain

01/01/2023

Intersection									
Intersection Delay, s/veh	21.6								
Intersection LOS	C								
Approach	EB		WB		NB		SB		
Entry Lanes	2		2		1		1		
Conflicting Circle Lanes	1		1		1		1		
Adj Approach Flow, veh/h	826		750		446		559		
Demand Flow Rate, veh/h	852		773		460		576		
Vehicles Circulating, veh/h	610		511		969		700		
Vehicles Exiting, veh/h	532		778		493		584		
Ped Vol Crossing Leg, #/h	0		0		0		0		
Ped Cap Adj	1.000		1.000		1.000		1.000		
Approach Delay, s/veh	37.0		13.9		15.0		14.2		
Approach LOS	E		B		B		B		
Lane	Left	Right	Left	Right	Left	Bypass	Left	Bypass	
Designated Moves	LT	R	LT	R	LT	R	LT	R	
Assumed Moves	LT	R	LT	R	LT	R	LT	R	
RT Channelized						Free		Free	
Lane Util	0.894	0.106	0.789	0.211	1.000		1.000		
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.609		2.609		
Critical Headway, s	4.544	4.544	4.544	4.544	4.976	140	4.976	134	
Entry Flow, veh/h	762	90	610	163	320	1957	442	1957	
Cap Entry Lane, veh/h	815	815	892	892	514	0.971	676	0.971	
Entry HV Adj Factor	0.970	0.967	0.971	0.969	0.970	136	0.971	130	
Flow Entry, veh/h	739	87	592	158	310	1900	429	1900	
Cap Entry, veh/h	791	788	866	865	498	0.072	656	0.068	
V/C Ratio	0.935	0.110	0.684	0.183	0.623	0.0	0.654	0.0	
Control Delay, s/veh	40.7	5.7	16.1	6.0	21.5	A	18.5	A	
LOS	E	A	C	A	C	0	C	0	
95th %tile Queue, veh	14	0	6	1	4		5		

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout

6: Spartan Ave/Spartan & Berthoud Pkwy

01/01/2023

Intersection				
Intersection Delay, s/veh	7.4			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	289	300	299	370
Demand Flow Rate, veh/h	297	309	308	381
Vehicles Circulating, veh/h	337	347	415	292
Vehicles Exiting, veh/h	336	376	219	364
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.9	7.2	7.9	7.6
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	297	309	308	381
Cap Entry Lane, veh/h	979	969	904	1024
Entry HV Adj Factor	0.972	0.972	0.971	0.970
Flow Entry, veh/h	289	300	299	370
Cap Entry, veh/h	951	941	877	994
V/C Ratio	0.304	0.319	0.341	0.372
Control Delay, s/veh	6.9	7.2	7.9	7.6
LOS	A	A	A	A
95th %tile Queue, veh	1	1	2	2

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout

6: Spartan Ave/Spartan & Berthoud Pkwy

01/01/2023

Intersection				
Intersection Delay, s/veh	7.3			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	392	261	294	370
Demand Flow Rate, veh/h	404	269	303	381
Vehicles Circulating, veh/h	301	365	348	235
Vehicles Exiting, veh/h	315	286	357	399
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.0	6.8	7.1	7.0
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	404	269	303	381
Cap Entry Lane, veh/h	1015	951	968	1086
Entry HV Adj Factor	0.969	0.970	0.969	0.970
Flow Entry, veh/h	392	261	294	370
Cap Entry, veh/h	984	923	938	1053
V/C Ratio	0.398	0.283	0.313	0.351
Control Delay, s/veh	8.0	6.8	7.1	7.0
LOS	A	A	A	A
95th %tile Queue, veh	2	1	1	2

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

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BACKGROUND & TOTAL 2042 WITH IMPROVEMENTS

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Signalized Intersection Summary
8: US 287 & CR 4E

01/02/2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↰	↕	↕	↰	↕
Traffic Volume (veh/h)	120	35	900	50	15	2230
Future Volume (veh/h)	120	35	900	50	15	2230
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	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	130	38	978	54	16	2424
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	185	165	2579	1150	472	2579
Arrive On Green	0.10	0.10	0.73	0.73	0.73	0.73
Sat Flow, veh/h	1767	1572	3618	1572	542	3618
Grp Volume(v), veh/h	130	38	978	54	16	2424
Grp Sat Flow(s),veh/h/ln	1767	1572	3618	1572	542	3618
Q Serve(g_s), s	3.9	1.2	5.7	0.5	0.6	32.5
Cycle Q Clear(g_c), s	3.9	1.2	5.7	0.5	6.3	32.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	185	165	2579	1150	472	2579
V/C Ratio(X)	0.70	0.23	0.38	0.05	0.03	0.94
Avail Cap(c_a), veh/h	578	515	2579	1150	472	2579
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	23.8	22.6	2.7	2.1	3.9	6.3
Incr Delay (d2), s/veh	4.8	0.7	0.4	0.1	0.1	8.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.5	1.0	0.1	0.1	7.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.5	23.3	3.2	2.1	4.0	14.7
LnGrp LOS	C	C	A	A	A	B
Approach Vol, veh/h	168		1032			2440
Approach Delay, s/veh	27.3		3.1			14.6
Approach LOS	C		A			B
Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		44.7			44.7	10.3
Change Period (Y+Rc), s		4.5			4.5	4.5
Max Green Setting (Gmax), s		28.0			28.0	18.0
Max Q Clear Time (g_c+I1), s		7.7			34.5	5.9
Green Ext Time (p_c), s		7.4			0.0	0.3
Intersection Summary						
HCM 6th Ctrl Delay			12.0			
HCM 6th LOS			B			

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Signalized Intersection Summary
8: US 287 & CR 4E

01/02/2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↕	↱	↰	↕
Traffic Volume (veh/h)	80	30	2395	175	40	1370
Future Volume (veh/h)	80	30	2395	175	40	1370
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	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	87	33	2603	190	43	1489
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	130	116	2737	1221	134	2737
Arrive On Green	0.07	0.07	0.78	0.78	0.78	0.78
Sat Flow, veh/h	1767	1572	3618	1572	97	3618
Grp Volume(v), veh/h	87	33	2603	190	43	1489
Grp Sat Flow(s),veh/h/ln	1767	1572	1763	1572	97	1763
Q Serve(g_s), s	2.9	1.2	37.9	1.8	8.7	9.8
Cycle Q Clear(g_c), s	2.9	1.2	37.9	1.8	46.6	9.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	130	116	2737	1221	134	2737
V/C Ratio(X)	0.67	0.29	0.95	0.16	0.32	0.54
Avail Cap(c_a), veh/h	530	472	2737	1221	134	2737
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	27.1	26.3	5.7	1.7	28.6	2.6
Incr Delay (d2), s/veh	5.8	1.3	9.0	0.3	6.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.5	7.7	0.3	0.8	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.9	27.6	14.8	2.0	34.8	3.4
LnGrp LOS	C	C	B	A	C	A
Approach Vol, veh/h	120		2793			1532
Approach Delay, s/veh	31.4		13.9			4.3
Approach LOS	C		B			A
Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		51.1			51.1	8.9
Change Period (Y+Rc), s		4.5			4.5	4.5
Max Green Setting (Gmax), s		33.0			33.0	18.0
Max Q Clear Time (g_c+I1), s		39.9			48.6	4.9
Green Ext Time (p_c), s		0.0			0.0	0.2
Intersection Summary						
HCM 6th Ctrl Delay			11.1			
HCM 6th LOS			B			

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Synchro 11 Light Report
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Appendix C NCHRP Internal Trip Capture

NCHRP 684 Internal Trip Capture Estimation Tool						
Project Name:	Ludlow			Organization:		
Project Location:	Berthoud CO			Performed By:	R Rollins	
Scenario Description:	Full Buildout			Date:	6/9/22	
Analysis Year:	2040			Checked By:		
Analysis Period:	PM Street Peak Hour			Date:		

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ¹		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				61	10	51
Retail				682	328	355
Restaurant				0		
Cinema/Entertainment				0		
Residential				1,075	678	398
Hotel				0		
All Other Land Uses ²				0		
				1,818	1,016	804

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

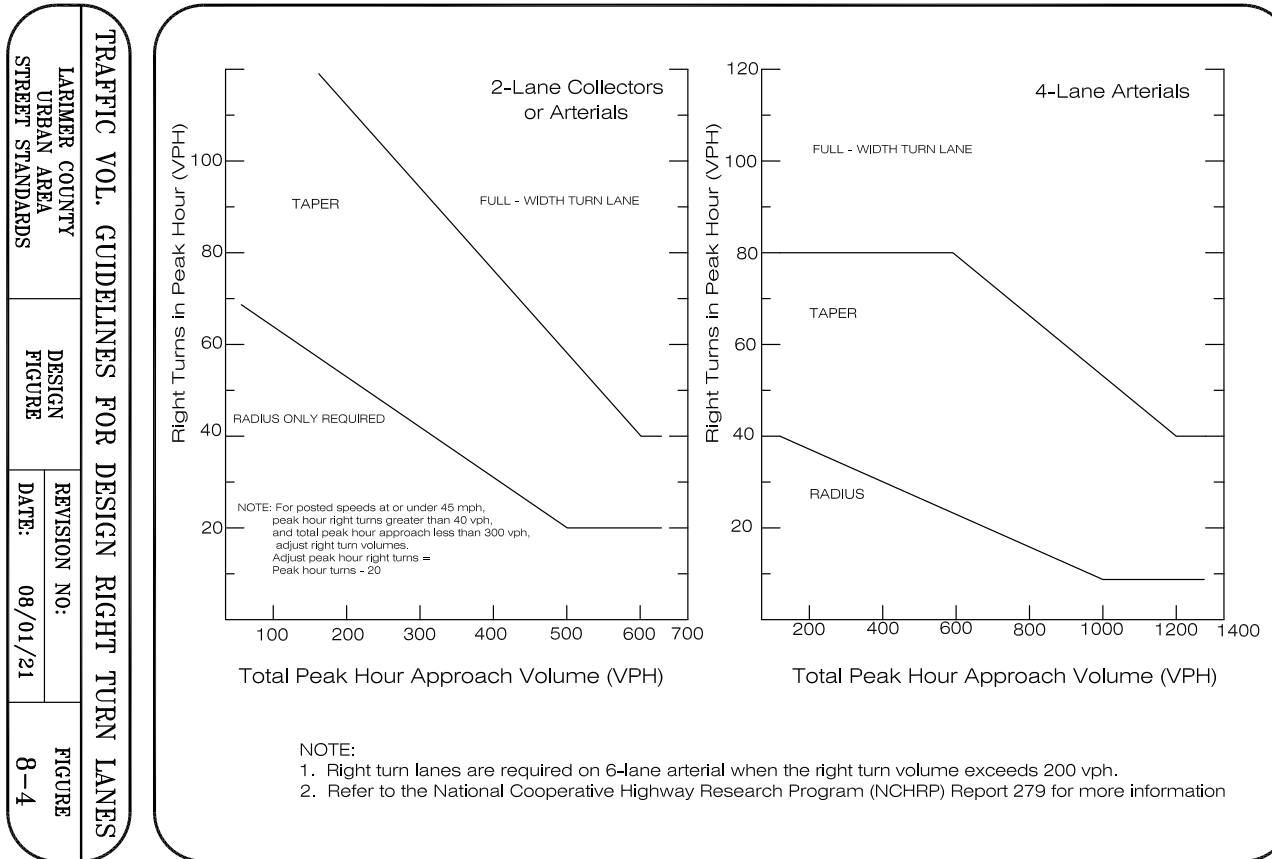
Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		10	0	0	1	0
Retail	3		0	0	92	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	6	33	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,820	1,016	804
Internal Capture Percentage	16%	14%	18%
External Vehicle-Trips ⁵	1,530	871	659
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	90%	22%
Retail	13%	27%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	14%	10%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-P.
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
[*] Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Appendix D LCUASS Right-Turn Warrants



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September 22, 2022

Community Development Department

Berthoud CO 80513

I am responding to the development proposal called the Ludlow Subdivision, just west of where I live. Of course, I hate to see the farm ground go, as part of Berthoud's charm is its agricultural heritage which is slipping away rather quickly. But if we need to keep approving these massive developments, then we must change how they are constructed and built.

Just my simple mathematics shows that this proposed subdivision, based on Berthoud's current water usage, will suck almost half the amount of water that the entire town is now using, between 216,000 and 430,000 gallons of new water usage. Water is becoming more and more in short supply. It doesn't matter that the city has many water rights outstanding if the water, because of shortfall of precipitation and hotter weather, just isn't there. Do water rights on this land come with this proposal?

So what I am trying to say is, if we must approve these subdivisions, then we must change how they are constructed, oriented, supplied with energy and still give wildlife a fair chance at life. This could mean no gas lines installed, electricity only. Will the grid stand for this, or will the developer have to supply the energy needed?

No polluting fireplaces. Induction ranges required. Heat pump heating and cooling systems or even requiring geothermic systems for the best efficiency.

No areas of Bluegrass. Only native grasses and plants allowed for lawns and parkways. Water conserving trees only. Proper orientation of the houses for best efficiency in heating and cooling.

If we have to build, then we have to build smarter! Here are some ideas to tickle your minds and encourage you to think like I am suggesting. If the city can waste \$30,000 on a silly ballot proposal, then investing in someone with knowledge of sustainable building and living should be considered.

<https://www.casbe.org.au/what-we-do/sustainable-subdivisions/>

<https://6c5pw269zs2tv6x0418kzx2k-wpengine.netdna-ssl.com/wp-content/uploads/2020/09/3.0-Energy.pdf>

<https://6c5pw269zs2tv6x0418kzx2k-wpengine.netdna-ssl.com/wp-content/uploads/2020/09/5.0-Integrated-Water-Management.pdf>

David Luck

100 Bein Street

Berthoud CO 80513, 303-887-4192

Adam Olinger

From: Katie Erbes <Victoriandreams8@hotmail.com>
Sent: Friday, September 23, 2022 9:35 AM
To: Curt Freese; Adam Olinger
Subject: Ludlow Farms

Per your "Neighborhood Notice" we received yesterday. We have lived here for 26 years and enough is enough of the housing, Do we want to be another overgrown town? Loveland is now almost connected to Fort Collins and Greeley; We have 9 miles from Berthoud to Longmont. Loveland is building enough housing, Longmont is building enough housing, Greeley is building enough housing and Mead is now overgrowing. Why does Berthoud want to do this?

You see Firestone and Frederick grown together and you don't even know where each town begins or ends.

Bring in business for this outgrown town as it is now. We need schools, another grocery store, another fast-food business. Why you ask? Because A & W is loaded at all times, Hays is too small for a town like ours that is overgrown already and schools? Where are we putting all these children right now? Overloaded schools?

These towns such as Loveland and Longmont are so close that we can go to the markets there for shopping, eating and entertainment. Housing won't bring shopping here; it will just make a small town big with more crime.

Why do you want to make a small town with so much new housing when there is plenty of new housing all around us?

I say "NO" to this and if that needs to be put on the vote, I would vote "NO" Listen to those that have lived here a long time. Keep Berthoud small and safe.

When they said they were building homes over on Spartan St we were concerned about that and the trees that were at one time there, well we went to meetings about those trees and the council said they would not be cut down. Well guess what happen, they were cut down and I still have a video tape showing that and the disappointment that the town council did not listen to the people of Berthoud.

Is this going to be happening again? I bet a lot of Berthoud residents don't want this and I bet you won't listen again.

Kay Erbes

Adam Olinger

From: Steven Allen <drspallen@sbcglobal.net>
Sent: Sunday, October 2, 2022 7:22 PM
To: Curt Freese; Adam Olinger
Cc: cnmmidwifewendy@gmail.com
Subject: Ludlow Farms Development

Good morning,

I recently received a letter from the Town of Berthoud regarding a new development in the vicinity of my home in Berthoud. Before, I provide some comment, I would like to take a minute to introduce myself.

Steven Allen and spouse, Wendy, currently from Libertyville, Illinois, but soon to be permanent residents of Berthoud residing in the Harvest Ridge North development. Over the past 25 years my family and I have vacationed in the state of Colorado multiple times every year. It did not take long for us to realize that Colorado would someday be our destination for retirement. Over the past 5 years, our visits focused on exploring the various towns up and down the front range resulting in us discovering Berthoud, which is perfectly suited for the lifestyle we are looking for in retirement. When we settled in Libertyville, over 30 years ago, the surrounding area was a lot like Berthoud today, undergoing rapid expansion. With this in mind, you should be able to understand where I am coming from with my comments and question in regard to the Ludlow Farms development.

Assume 1500 units as stated in the letter, also assume 2 residents per unit resulting in an influx of 3000 new community members.

1. How is the developer addressing this influx of residents in regard to the overall infrastructure of the town of Berthoud?
2. What commercial development is being proposed to support the growing population? For example, the current community does not have a major grocery store. Is there already commitment from commercial investors to establish new businesses?
3. What support will be provided for our First Responders, Police, Fire and EMTs?

Let's now assume half of these units, 750, will be a family of four, 2 adults and eventually two school age children.

1. Can the current Berthoud schools support 1500 additional students over time?
2. How is the developer addressing the expansion that may be need for both the elementary and secondary school systems?

Development location, this development is in a recognized flood plain.

1. What is being done or will be done by the developer to address the risk this may pose to new homeowners?
2. Could these plans impact the surrounding developments that are already underway with many homes already complete?

Thank you for the opportunity to share our thoughts with you, as we are looking forward to being active members of our new community.

Regards,
Steven & Wendy Allen

Adam Olinger

From: Curt Freese
Sent: Monday, October 3, 2022 8:12 AM
To: Adam Olinger
Subject: FW: Ludlow Farms



Curt Freese, AICP
Community Development Director

Phone: 970-532-2643
Fax: 970-532-0640
cfreese@berthoud.org
Berthoud.org
807 Mountain Ave. Berthoud, CO 80513



From: Jeanene Imerzel <jeanene.imerzel@gmail.com>
Sent: Friday, September 30, 2022 9:48 AM
To: Curt Freese <CFreese@berthoud.org>
Subject: Ludlow Farms

Good morning,

We received the neighborhood notice and have concerns that this development could block our mountain views here in Rose Farm Acres. We are fine with growth but prefer the park side to be on Berthoud Pkwy as opposed to 287 where there are no houses.

Thank you
Jeanene Imerzel

Adam Olinger

From: Chris Shepherd <docshep97@aol.com>
Sent: Sunday, October 2, 2022 10:20 AM
To: Adam Olinger; Curt Freese
Subject: Ludlow development

I have received the neighborhood notice regarding the Ludlow development and wish to comment. The developers of this subdivision do have the right to propose whatever they want, but I believe this massive development would create many problems for the city of Berthoud. Since this addition would increase the size of this nice town by about 40% using the 2020 population number (10300), the current infrastructure of this town would have to be changed completely. At this point, there is only one main road running from Hwy 287 to I-25 (Mountain Ave.). The residents of the Ludlow development would most likely use this street for access to I-25. Are the residents of this historic town ready and willing to have the road widened to four lanes which would eliminate the wonderful businesses along the way and require the felling of the gorgeous trees. This would also eliminate the on street parking and require off street parking lots. There must have been a reason that Hwy 287 was routed around the middle of town when it was expanded many years ago.

Access to Hwy 287 is also a concern. At this point the only relatively safe access is Mountain Ave. Attempting to access southbound 287 from 2E and 4E is very dangerous. Can 287 withstand the huge influx of traffic. There were two fatal accidents on 287 this last week alone. Does the developer have water rights? If there are 1800 homes with only two residents in each, the town will increase by 3600 new residents and that's a low estimate. This will increase the need for Berthoud town to provide safe drinking water, lawn irrigation and an increase in waste treatment.

Berthoud schools are full. Would there be building of enough new schools to accommodate the influx. City services would need to increase. At this point, snow plowing for the residential areas is not at the top of the list. How about public safety. I know the town had its own police department. Would this need to be recreated? The availability of recruiting new police officers might be difficult. Even the postal department is having a hard find hiring employees.

I hope that the planning commission thinks of how this huge development would affect the residents of this town. This is a very nice small town with a safe and engaging personality.

Will this proposal also be sent to all of the residents of Berthoud instead of just the few surrounding the area? The folks of Berthoud need to know. What would be the benefit for Berthoud if the gateway to the historic town is changed forever.

Thanks for your time.

Christine Shepherd
1100 Monroe Ave
Berthoud

Adam Olinger

From: Curt Freese
Sent: Monday, October 3, 2022 2:57 PM
To: Adam Olinger
Subject: FW: Ludlow Farms Development comments



Curt Freese, AICP
Community Development Director

Phone: 970-532-2643
Fax: 970-532-0640
cfreese@berthoud.org
Berthoud.org
807 Mountain Ave. Berthoud, CO 80513



From: M Moden <MODEN5685@msn.com>
Sent: Monday, October 3, 2022 2:50 PM
To: Curt Freese <CFreese@berthoud.org>
Subject: Ludlow Farms Development comments

I have lived and worked in Berthoud since 1999 so I have watched it grow over the years and appreciate the "small town" feel we have here.

My concern with the Ludlow Farms Development is that in my opinion future development should be spread out farther - perhaps 4-6 year increments to allow for the economy to level out and assure a need for it before adding an additional 1500-1800 more residences to the community.

With as much building that has taken place here in Berthoud in the past few years I am quite sure that in the near future, Berthoud will be full of vacant homes and rental homes as the market will price folks right out of buying their dream (and even renting). Berthoud also has developments where "METRO TAX" has been implemented and I for one hope that this will be a thing of the past as it too prices home buyers right out of the market without them even knowing it!

I know Berthoud wants to keep up with other surrounding communities, but growth isn't always the answer. Be careful Berthoud.....don't ruin a good thing!

Marie Moden-Homeowner
110 Bein St
Berthoud, Co 80513
970-218-2763 cell

Adam Olinger

From: Jeanne <jeannepo@frii.com>
Sent: Wednesday, October 5, 2022 11:41 AM
To: Curt Freese; Adam Olinger
Subject: Neighborhood Notice - Ludlow Farms

I am writing in regards to the Neighborhood Notice I received from the Community Development Department in Berthoud regarding the proposal for Ludlow Farms.

Being 30 year Berthoud residents, we have seen MUCH growth in recent years for Berthoud. In 1992 when we moved here, there were 4 schools (two elementary, 1 middle and 1 HS). With the thousands of new homes that have gone in in the past 5 years, there have been no new schools built.

Also, your proposal includes access to this development from Hwy 287. This is unacceptable. As is (I live ¼ mile from the intersection of W Rd 4/287) we see regular and sometimes fatal accidents between Hwy 56 and Hwy 66. And, rarely is there law enforcement for speeders. Adding more traffic, by means of an intersection is just adding to the number of accidents we will witness in the area.

As Berthoud residents, we are highly against the proposed development, Ludlow Farms, due to the above mentioned concerns.

Thank you,

Tom and Jeanne Poirier

Adam Olinger

From: Jennifer Talbott <jenniferjeantalbott@gmail.com>
Sent: Thursday, October 6, 2022 12:54 PM
To: Curt Freese; Adam Olinger
Subject: Ludlow Farms Neighborhood Notice Comments

I am writing this in response to the letter I received regarding the Ludlow Farms property. I have several concerns regarding this proposed project as I am sure many fellow neighbors do. With the rapid growth of Berthoud there are several things that will be affected and I would like to know how the town plans to address these. I understand growth is essential to economic improvement but also feel that Berthoud is growing rapidly without addressing issues that will arise.

My concerns with Ludlow Farms are:

- The traffic increase to Berthoud Parkway and surrounding roads. Berthoud Parkway is already extremely busy and with the projected amount of housing that is going in this area's traffic is going to become a problem with more accidents, road disintegration and flow.
- Is there a projection to build more schools in the very near future? Our already crowded schools are going to become unmanageable for staff and facilities.
- Crime that will come with this much growth-our already very small police presence will have to be increased.
- Water resources-Our already strained water system will be stretched even further.
- There are several other new communities being built near this area and adding all of these at the same time is going to cause several issues.

I would love to be of any help and am not here to just complain but rather to find solutions. I come from a long history of realtors and understand building is inevitable but the size of this community and number of units is what is most concerning.

Thanks,
Jennifer Talbott

Adam Olinger

From: Lisa Morris <lisakmorris@gmail.com>
Sent: Thursday, October 6, 2022 12:56 PM
To: Adam Olinger; cfreesee@berthoud.com
Cc: Shawn Nelson
Subject: Ludlow Farms

Hello,

To whom this may concern, we received the summary proposal for the above mentioned neighborhood and were directed to submit comments/concerns to you. We live in the newly built Richmond Homes, just a few blocks Southwest of Berthoud High School.

Our main questions/concerns are the following:

1. Being so close to the high school and aware that for years the town of Berthoud wasn't "growing". What is the plan for the schools in the area to support the undoubtable group that this community will cause to the schools?

2. What is going to be done for the roads/sidewalks to support the number of families that this community will be adding to the town of Berthoud?

Specifically, Berthoud Parkway, will this road be converted into a 4 lane road to support the amount of commuting traffic that this development will eventually cause?

With that as well, will there be bike paths/lanes on the roadways?

Will the sidewalks be wide enough to support many people walking together OR will it be the mini sidewalks that only really allow groups to only walk single file?

3. Along with the roads, what will be done for parking in this neighborhood? If you drive through other neighborhoods with condos, townhouses and single family residences there is rarely enough parking and the streets do not accommodate two way traffic if vehicles are parked on both sides of the street.

The neighborhood "Prairie Star", on the Southeast corner of Berthoud Parkway and Highway 287 is a perfect example. I know part of the issue is that there is no requirement for people to park in their garage, so most people in Prairie Star are using their garage for storage and not parking. As well as the assumption that one family only has one vehicle, when in truth on average the average family of four has a minimum of four vehicles.

4. Our neighborhood is dealing with many drainage issues, which in turn we believe is causing an abundance of mosquitoes in the neighborhood. Will there be anyone to monitor, test and ensure that this issue doesn't happen to this new neighborhood as well?

Thank you for your time and please let me know if you have any available answers to these concerns.

Lisa & Shawn Nelson
303-525-7869

Adam Olinger

From: Curt Freese
Sent: Thursday, October 6, 2022 11:01 AM
To: Adam Olinger
Subject: FW: Comments Ludlow Farms

Curt Freese, AICP
Community Development Director

Phone: 970-532-2643
Fax: 970-532-0640
cfreese@berthoud.org
Berthoud.org
807 Mountain Ave. Berthoud, CO 80513

-----Original Message-----

From: Wendy McCauley <55goodwitch@gmail.com>
Sent: Thursday, October 6, 2022 10:19 AM
To: Curt Freese <CFreese@berthoud.org>
Subject: Comments Ludlow Farms

My comments are regarding Spartan Ave. It appears based on the Drawings provided that Spartan Ave will become much busier given the location of the high school and use as an artery to other roads leading downtown or out of Berthoud. I would ask that a reduced speed limit be posted and also some type of traffic calming circles be installed. Long straight roads tend to encourage speeding and in some cases careless driving behavior. Also more traffic equals more noise.

People are attracted to Berthoud for many reasons, a couple being. it is a pleasure to walk safely about town for folks of all ages, and has a small town feel. I hope the planning committee will ensure that these important attributes are kept in mind when finalizing the plans for the roadways.

Some things we will loose are inevitable, our beautiful view of the mountains and the stars.

Thank you for contacting us much appreciated 409 Cheyenne.

Sent from my iPhone

Community Development Department
PO Box 1229
Berthoud, CO 80513

Thank you for the opportunity to comment on the LUDLOW FARMS application.

This response to the development review proposal identified as LUDLOW Farms development, is comprised of comments and concerns of multiple residents of Sioux Drive. While the proposal generally adheres to the guidelines set forth in the 2021 Comprehensive Master Plan of the Town of Berthoud, there are many concerns and apprehensions about the implementation of the structures, amenities and commerce in practice.

To begin with, is it truly in the best interest of the Town to promote the development of 3-story condominiums in light of the strong citizen desire to maintain the “natural beauty of the area” and “small town feel?” Does it present the best image of the Town to have these placed so prominently that they’re the first thing a visitor sees as they enter the town from the west? Additionally, will a concentration of 3-story condominiums require the Town to bear the burden of procuring expensive fire trucks and other high dollar safety equipment, hiring of several additional first responders and possibly construction of additional fire stations? Does the TOWN even have equipment presently to evacuate residents and extinguish a fire in a 3-story structure of this density?

Regarding the overall layout of the proposed development, there is an opportunity here to make South Berthoud Parkway feel significantly more like a “Parkway”. A large portion, or the entirety, of the “LINEAR PARK” could be shifted to run adjacent to SBP from Welch to Spartan with the benefit of drawing more ‘feeling of community’ from surrounding neighborhoods with better access to trails and greenspace, and better foot and bike traffic access to the new commercial endeavors of this proposal. The posted speed limit could be lowered to 35 or even 30 to enhance safety and the sense of parkway while still maintaining the Major Collector attributes set forth in the 2021 Comprehensive Plan.

Vehicle access from the north and east should only be at points coincident with existing roads (Gateway, Welch, Arapahoe, Spartan). The identified “Minor Collector” proposed along the “Approximate Future Land Use Boundary” line that intersects South Berthoud Parkway must be eliminated. There is absolutely no need for any future or existing resident to bear the imposition of frequent headlights shining directly into their residence. (It just so happens to appear to be coincident to the family room windows at 103 Sioux Dr).

Architectural innovations should be minimized to maintain the cohesive feel of “small rural town” such as that feel of Mary's Farm which blends rural into suburban seamlessly and elegantly. Architectural innovations such as those in Prairie Star could best be suited for New Berthoud promoting a higher level of modern urbanization according to the 2021 Comprehensive Plan, while minimizing a disorganized blend of styles along the Mountain Corridor and adjacent neighborhoods.

There is no apparent consideration for school load increases with the introduction of 1500-1800 residences and the potential for 200-500 students. Should at least an elementary school be part of this proposal? It would fit nicely into the traffic access both vehicular and pedestrian.

With the proposed concentration density of residences, there's a very high concern over the increase in light and noise pollution. Will all lighting be downward directed and held to a minimum especially in the condominium, townhouse and commercial/mixed use areas while still providing a safe environment for residents and visitors? Minimal, aesthetically pleasing lighting along a widened South Berthoud Parkway greenspace, similar to that along North Berthoud Parkway trail would be very attractive and effective while at the same time still allowing a view of Berthoud's nighttime sky.

The Traffic Study conducted for evaluation of lane and flow adjustments should be deemed irrelevant as it was conducted on June 22, 2021 when there were no schools in session and we were still in 'work from home' mode by many normal commuters. At a minimum an updated study should be conducted to account for more 'normal' traffic.

Is this a good development to consider additional Senior housing, both unassisted and assisted living styles? Should a general emergency medical facility be considered as part of the mixed-use establishments to better serve the Town?

While it would be naive to think that the primary reason for my move to Berthoud 26 years ago, would continue unencumbered in perpetuity (small rural town with a great view of the mountain range), many of these ideas will minimize the impact of blocking the view and maintain the small-town feel. Not a totally bad trade-off. In the bigger picture however, each new development added to the city should always strive to enhance the beauty and appeal of the place people call – and want to call – home.

Recognizing that family-owned farms are a thing of the past, does it mean that they must be converted to high density housing to the excessive economic benefit of the developer and TOWN coffers? In light of other growth developments in the planning or implementation phases, could satisfactory economic gains be met with 1000-1200 residences and strong industrial and commercial endeavors?

A concern for the implementation of the proposed development would be the barren land when the economy is not conducive to rapid construction of the next phase. It would be beneficial to the environment, and the neighboring residents, to leave or plant sufficient erosion control crops (weeds are not a good crop) to minimize dust and runoff.

Finally, construction vehicle traffic on SBP should be minimized during plan implementation to avoid excessive wear on the newly rebuilt road (per the 2024 project plan).

Thank you for considering these comments and ideas. We look forward to the developer's comments and proposed resolutions.

Richard Alexander 103 Sioux Dr.	Steve Vettori 107 Sioux Drive	Laurel Tollefsrud 101 Sioux Dr	Susan Ellis 109 Sioux Dr

Adam Olinger

From: Curt Freese
Sent: Monday, October 10, 2022 9:39 AM
To: Adam Olinger
Subject: Fwd: Ludlow Farms comment

Sent from my iPhone

Begin forwarded message:

From: Kimberly McNally <kimberlyamcnally@gmail.com>
Date: October 10, 2022 at 9:21:08 AM MDT
To: ailinger@berthoud.org, Curt Freese <CFreese@berthoud.org>
Subject: Ludlow Farms comment

Town of Berthoud
Community Development Department,

I don't want more houses in this area.
You have allowed this sweet town to turn into a bedroom community.
We don't have the infrastructure to handle anymore traffic.
Mountain Ave is a 2 lane road through town and unless you want to remove the oak trees, it can never be anything wider.
Traffic is so bad at most times you can't cross the street on foot let alone cross streets in a car.
I'm near the high school and pulling out onto 10th or Berthoud Parkway can be very hard due to school traffic.
Parking in the business district is almost impossible therefore the businesses will suffer rather than flourish. People will go shop in other towns due to parking constraints.
One grocery store? Get real.
Almost all restaurants are closed on Monday!!!
Police force is lacking to. Crime has gone up.
My one comment probably doesn't count but I'm so tired of more houses and houses and apartments and townhouses.
Taxes, you have to be raking them in. Why do you keep raising ours?

Kim McNally
--

Kimberly McNally

Adam Olinger

From: natasha w <thecowojos@yahoo.com>
Sent: Monday, October 10, 2022 4:54 PM
To: Adam Olinger; wkatspeck@berthoud.org; Karl Ayers; Sean Murphy
Subject: Ludlow farm berthoud parkway and mountain

Hello Adam thank you for your time last week and filling me in on the plans for ludlow farm on the west corner of berthoud parkway and mountain. As a resident and homeowner were asking the board deny the proposal and bring back a growth cap for Berthoud. The excess building is unneeded and without proper infrastructure, affordable water, schools (yes I know this is Thompson school district but the schools are overcrowded period and voters will not approve) but the board can say no and should say no to protect the quality of our schools and do more for our water its going to keep being an issue. The water here is outrageously expensive and barely passes standards. Our water in Berthoud is some of the most expensive in the state besides Vail. Without proper infrastructure and water, building needs to stop the small town charm of Berthoud is being lost and the board can say no. Please listen to your residents look on Facebook over 200 comments saying no and enough. Preserve Berthoud and put back a building freeze, it's needed. Plus builders need to be paying for the road damage their causing like on Berthoud parkway it's not fair our tax dollars are being wasted on their wear and tear make the builders pay on the front end. Stop destroying the Berthoud we love, deny the ludlow proposal. The board needs to address the current issues and stop the excess building. Thank you, the Wojciechowski's

Adam Olinger

From: Carole <cvwhitt@aol.com>
Sent: Monday, October 10, 2022 6:17 PM
To: Adam Olinger
Subject: Ludlow Farms

How can you people vote in more homes in Berthoud when so many of us seniors cannot afford the higher taxes?

I am an 82-year-old senior and cannot get my taxes lowered for at 3 more years because I haven't lived in my home 10 years yet.

It's getting so difficult for some of us to go anywhere around town like we used to.

It doesn't seem plausible to add more homes when we don't even have a post office that can handle more. It just doesn't make sense.

My family has several businesses here in Berthoud, and there isn't much parking around so many of them. So instead of increasing their sales it will tak from them.

Please Please, no more here
Thank you

Carole Whittington

Adam Olinger

From: John Stocklin <stocklinphotography@gmail.com>
Sent: Monday, October 10, 2022 8:34 PM
To: Adam Olinger
Subject: Ludlow Farms Proposal

Hello,

John Stocklin here!

First of all, thank you for doing all the amazing things that you do for our wonderful community, it really means a lot.

I would like to formally oppose the Ludlow Farms proposal, it is just frankly not a good idea. There is a ton of growth already happening in town which is expected but we can't only focus on single family / multifamily dwellings.

We need more schools and other service items such as grocery stores etc. Not to mention the infrastructure should probably be improved before adding 1500+ homes PLUS the influx of at least 3000 people if not more.

Please please say no to this, it'll be such a bad idea for Berthoud.

Much appreciated and thank you.

Cheers,

John

Adam Olinger

From: Curt Freese
Sent: Monday, October 10, 2022 9:06 PM
To: Adam Olinger
Subject: Fwd: Ludlow Farms

Sent from my iPhone

Begin forwarded message:

From: rkurcab <rkurcab@yahoo.com>
Date: October 10, 2022 at 9:03:27 PM MDT
To: Curt Freese <CFreese@berthoud.org>
Subject: **Ludlow Farms**

To whom it may concern,

We feel that the proposed subdivision is too large in scope for the town of Berthoud. At build out this would increase the current population of the town by over 40% by itself. The small lot sizes and townhomes and condos bring a high density which is not in character with the town. This would put a strain on the downtown and infrastructure in place. The entrance at 287 would also greatly increase traffic through other neighborhoods in the area and the high school area.

Views of the mountains from Mountain Ave, which has been deemed important to the town, would be impacted by the project, especially on the north end with townhomes and condos.

If this development does go forward it should be scaled way back with less density.

Thank you for your consideration,

Richard Kurcab
Sandra Nickerson

Sent from my Galaxy Tab® S2

Adam Olinger

From: Curt Freese
Sent: Monday, October 10, 2022 9:18 PM
To: Adam Olinger
Subject: Fwd: Ludlow Farms opposition

Sent from my iPhone

Begin forwarded message:

From: Shannan Johnson <shannanmjohnson@gmail.com>
Date: October 10, 2022 at 9:17:08 PM MDT
To: Adam Olinger <aolinger@berthoud.org>, Curt Freese <CFreese@berthoud.org>
Subject: **Ludlow Farms opposition**

I would like to formally oppose the proposed developments at Ludlow Farms. The mere fact that Berthoud is currently building in multiple new developments with no foreseeable plan for immediate increase in schooling capacity is more than enough to oppose this. Our elementary students are currently in classes at Ivy Stockwell with very high student to teacher ratio already. Most new developments would be expected to have a large proportion of families with young children...where will they all go? Perhaps a smaller development with larger lots and more single family homes would be appropriate; we are already set to have additional multi-family units built at the corner of Berthoud Parkway and Spartan, an already busy area when school is in session. Berthoud Parkway in this area will become very congested. The draw of living in a community like this is the small town feel, beautiful mountain views, and ample farmland. Packing in homes into this development goes against all of that. It's too many new residential units!!!

Please consider scaling back the residential plan at this site.

Adam Olinger

From: Curt Freese
Sent: Monday, October 10, 2022 9:21 PM
To: Adam Olinger
Subject: Fwd: opposition

Sent from my iPhone

Begin forwarded message:

From: Amy Stocklin <amystocklin@gmail.com>
Date: October 10, 2022 at 8:41:20 PM MDT
To: Adam Olinger <aolinger@berthoud.org>, Curt Freese <CFreese@berthoud.org>
Subject: **opposition**

First of all, thank you for doing all the amazing things that you do for our wonderful community, it really means a lot.

I would like to formally oppose the Ludlow Farms proposal, it is just frankly not a good idea. There is a ton of growth already happening in town which is expected but we can't only focus on single-family / multifamily dwellings. We in no way have the infrastructure that is needed for what is being proposed.

We need more schools and other service items such as grocery stores etc. Not to mention the infrastructure should probably be improved before adding 1500+ homes PLUS the influx of at least 3000 people if not more.

Please please say no to this, it'll be such a bad idea for Berthoud.

Much appreciated and thank you.

Amy Porto

Adam Olinger

From: Derrik Johnson <dj8skate@gmail.com>
Sent: Monday, October 10, 2022 9:31 PM
To: Adam Olinger; Curt Freese
Subject: Ludlow Farms proposal

Good evening,

I'd like to voice my opposition to the proposal of development for the Ludlow Farms community. As a Berthoud resident in a community next to the proposed development (I live in Rose Farm Acres), the impact on our community would be significant. I would be happy to share the many ways we would be impacted, but to name a few I know that our schools will be impacted negatively as they are at capacity as it is. The new community would surely grow faster than any schools could be built, stressing our education system well beyond its limits and negatively impacting my children and their classmates. Furthermore, the recreation center is new and is already near capacity. It cannot support thousands more people. Finally, the development of the new community would impact both the noise levels and beautiful mountain views that were key factors in our decision to move to this neighborhood. Please feel free to reach out for further discussion if needed. Thank you.

Derrik Johnson

Adam Olinger

From: DaveandDianne Michael <dandmichael1985@gmail.com>
Sent: Monday, October 10, 2022 9:52 PM
To: Adam Olinger
Subject: Ludlow Farms proposal opposition

Hello,

We are at a bit of a disadvantage because my husband and I are out of town so we don't have access to the proposal specifics that we received in the mail.

But we are strongly opposed to the Ludlow Farms development. A project of that size would completely change the small town feel of Berthoud with that one community. Adding that many homes doesn't give Berthoud time to catch up on resources, such as police department, fire department, water, schools, mail carriers, etc.

At first, we weren't going to speak up because it doesn't feel like the city planners listen to the citizens, but we decided we should at least try.

We understand growth happens, but this growth is excessive.

Several of the city council candidates said they wanted to keep Berthoud's small town charm, but this isn't it!

Thank you for your consideration,
Dianne and Dave Michael
1099 Blue Bell Rd., Berthoud

Adam Olinger

From: Brandon Watkins <bwatkins6688@gmail.com>
Sent: Monday, October 10, 2022 10:21 PM
To: Curt Freese; Adam Olinger
Cc: Kelsey Wood
Subject: Ludlow Farms Proposal

Hello,

The Ludlow Farms proposal cannot be approved. Berthoud does not have the infrastructure, retail, water supply, school system capacity, or resources to properly build 1800 housing units in this area. Berthoud has seen sustained growth for several years now, increasing its economy and creating jobs. However, we have reached the point of growth going too far. Berthoud is losing its identity by turning every farm into a housing development. I understand the financial benefit of this massive development is enticing to the city, but I urge you to halt this project and consider the long term effects of destroying our agricultural land and not ensuring a sustainable, gradual growth plan. Small communities like Berthoud are rapidly disappearing. If this project is approved, there will no longer be any defining line between Longmont, Berthoud, and Loveland. We need small, iconic communities like Berthoud to stand up to big development and tell them enough is enough. Please do not allow this project to move forward.

-Brandon Watkins

Sent from my iPhone

Adam Olinger

From: Jessica Erickson <jerickson1005@gmail.com>
Sent: Monday, October 10, 2022 10:27 PM
To: Adam Olinger; Curt Freese
Subject: Ludlow Farms Opposition

To whom it may concern,

Hello, my name is Jessica Erickson and I am a concerned resident of Berthoud. Our town infrastructure cannot sustain a development of this magnitude. I also have a young child and I am already concerned about the lack of schools for our community. Adding another large neighborhood that will, no doubt, be filled with school age children will wreak havoc on our already filled schools.

I am also concerned about how this development will affect the safety of our community along with traffic, noise and environmental impacts.

Overall, this is not a good choice for Berthoud.

Please do not approve this development.

Thank you,
Jessica

Adam Olinger

From: Aron Erickson <aron.broman@gmail.com>
Sent: Monday, October 10, 2022 10:35 PM
To: Adam Olinger; Curt Freese
Subject: Ludlow farms proposal opposition

Dear Adam and Curt,

I am a concerned resident in Berthoud and against the approval of the Ludlow farms proposal. This development is extensive for the town of Berthoud without the infrastructure to support it. The town needs to propose improvements to energy, water, roads, and schools before considering additional home developments in the area. Schools in Berthoud can't handle the student population levels as it is and also can't hire or support enough teachers to handle proper teaching standards.

Traffic, noise, and safety are additional concerns for properties surrounding this proposed development. Current developments in the area have not provided proper safety standards and theft has increased in these areas. Further the development location is in a marshy area. This will cause future development problems with drainage issues and settling concerns.

I would prefer Berthoud maintain it's small hometown feel and grow responsibly to maintain proper infrastructure. I moved to this town recently because of it's unique character. Please consider denying this proposal.

Thank you,
Aron Erickson

Adam Olinger

From: Rhonda Callahan <rhondacallahan@gmail.com>
Sent: Monday, October 10, 2022 11:00 PM
To: Adam Olinger
Subject: No to ludlow farms.

There is enough traffic..not enough schools. Not enough water..you are being irresponsible and it's been 2 years and you can't get a cross walk marked for the kids in the neighborhoods we all ready have..be responsible for the families all ready here!!!

Sent from my iPhone

Adam Olinger

From: KAAREN CARONE <kcee369@aol.com>
Sent: Wednesday, October 12, 2022 6:57 PM
To: Adam Olinger; Curt Freese
Subject: Ludlow Farms proposal opposition

1,800 additional homes in this area creates a hazard insofar as safety, traffic, air quality, and the quality of life of current residents are concerned. There must also be concern regarding water supplies to the area. Please deny this proposal.

Kaaren Carone

Please email your thoughts to both email addresses below:

cfreese@berthoud.org

Cheers!

Sent from my iPad

Adam Olinger

From: Richard Calvo <rcalv002@gmail.com>
Sent: Thursday, October 13, 2022 8:14 AM
To: Curt Freese; Adam Olinger
Subject: Community Development: Ludlow Farms

Hello!

We received this proposal in the mail and we are completely against it. It's the only space around our neighborhood that is still open. It is also the only view of the mountains for us. There has been construction all around us since we moved here and this sounds like another huge, lengthy construction mess.

Adam Olinger

From: Kathleen Tabor <kathy.tabor@icloud.com>
Sent: Wednesday, October 12, 2022 3:00 PM
To: Adam Olinger
Cc: kathleen Tabor
Subject: Neighborhood notice Ludlow

Town of Berthoud

I apologize for the lateness but Covid is visiting my household. My husband and I received your letter regarding the Ludlow property proposal and we are homeowners impacted by this densely planned development (as is the rest of Berthoud). The town is unrecognizable as Berthoud anymore. All you see as you drive through town are great expanses of grey rooftops in densely built developments . Gone are lots that allow for privacy in exchange for a few feet distance between homes.

I can't believe an unbiased, thorough environmental impact study was done before these developments were approved. We are building too rapidly for our infrastructure .Where is the water for all these new homes going to come from? How are the police going to handle the increase in traffic, accidents and crime ? The same for our schools, fire department and roadways.

When are you going to cap the growth in this town as so many have requested? How are you going to protect existing neighborhoods from these densely populated developments from using the same resources? I already see it in our parks and along 10th street- the trash and traffic. When the Rose Farm went in I saw that tree lawns were included as open space. Are children supposed to include that as a park space to play in? No, they have to go to the closest available park in the Berthoud Heights West development. The town board members are approving more homes in less space and approve leaving only a small percentage as open space. Only developers/builders would have this type of mind set that would approve these type of developments and unbridled growth. Squeeze the land for as many dollars as possible.

Address the density and open space issue and put a growth cap back in place. Protect our resources and the people that have called this town home for so many years. You might as well change the town insignia to a mountain of rooftops instead of mountains because that is all you'll be capable of seeing.

Kathy Tabor
305 Cheyenne Drive
Berthoud. Co80513

Adam Olinger

From: Jeremy Olinger
Sent: Monday, October 24, 2022 4:49 PM
To: Adam Olinger
Subject: FW: Email contact from Berthoud, CO



Jeremy Olinger, CPRP
Deputy Town Administrator

Phone: 970.344.5824
jolinger@berthoud.org
Berthoud.org
807 Mountain Ave. Berthoud,
CO 80513



From: Berthoud, CO <webmaster@berthoud.org>
Sent: Monday, October 24, 2022 3:44 PM
To: Jeremy Olinger <jolinger@berthoud.org>
Subject: Email contact from Berthoud, CO

Message submitted from the <Berthoud, CO> website.

Site Visitor Name: Greg
Site Visitor Email: Gwojo321@yahoo.com

Please bring back the building cap for berthoud between water costs and usage, infrastructure, schools, the loss of farms and habitat for animals it's to much. We are against ludlow farm building thousands of homes bring back the building cap before berthoud is lost.



Planning Commission Meeting March 9, 2023



Planning Commission Meeting March 9, 2023



Public Hearing Information Guide



1. STAFF PRESENTATION

- The agenda item is introduced by Town Staff, including details of the official request, location, and how the project satisfies the Development Code and Comprehensive Plan.

2. APPLICANT PRESENTATION

- The applicant presents their proposal and makes their case for approval.



3. PUBLIC HEARING

- The Mayor or Chairperson opens the public hearing for citizen testimony.
- One at a time, citizens have an opportunity to speak up for up to three minutes about the project. This time is usually used to ask questions, provide concerns, and offer approval or disapproval of the project.
 - Because the project is being heard as a hearing, public comments are treated as testimony and not as conversation. The Applicant, Staff, and Trustees/Commissioners will not respond to any of the comments until the public hearing is closed.
- Once there are no more citizens wishing to speak, the Mayor/Chairperson will officially close the Public Hearing, which ends the public testimony period.

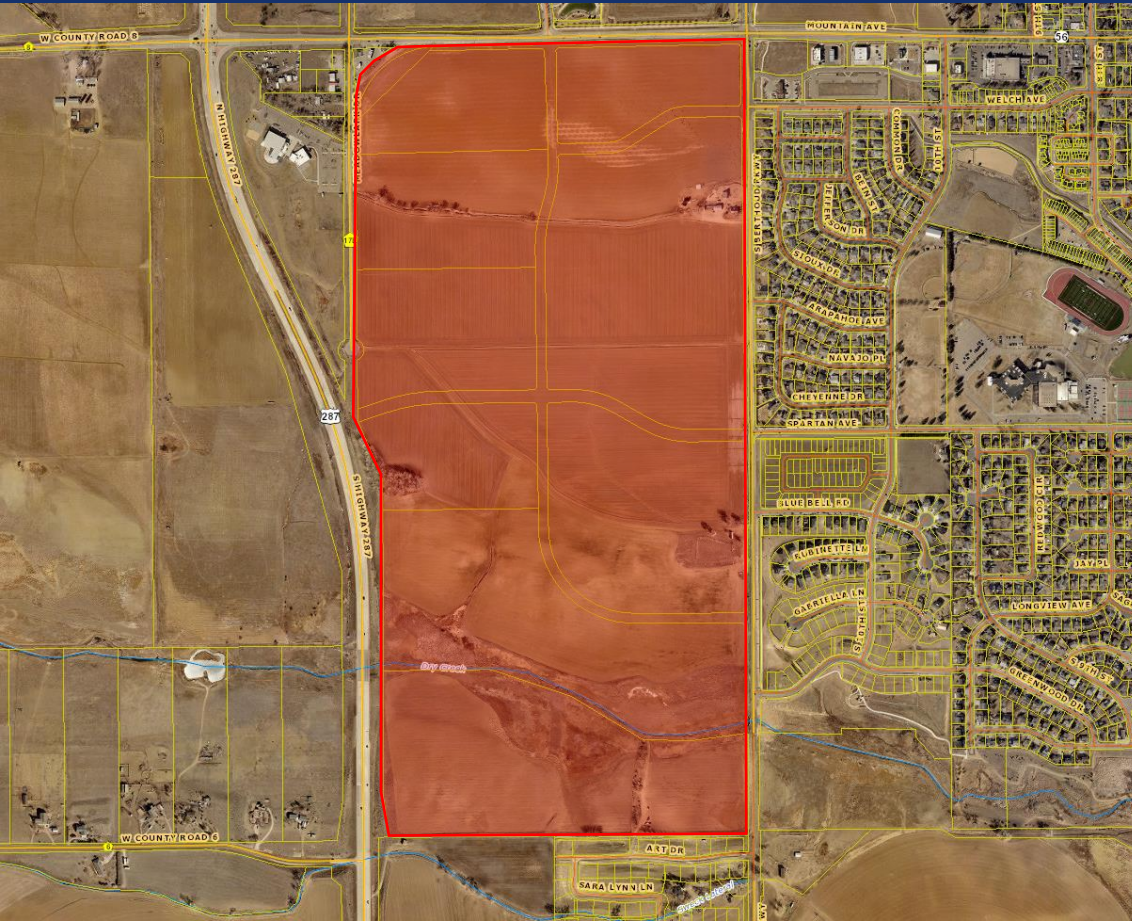


4. DISCUSSION AND VOTE

- The Trustees/Commissioners confer and have an opportunity to ask the applicant or staff questions that arose during the public hearing period or questions of their own.
- A motion must be made on an item, and if a motion is seconded, a vote is called; a majority must be found for any issue to pass (tie votes do not result in the passage of the item).
- If any citizen disagrees with the decision, they have thirty days to file an appeal with the Town.

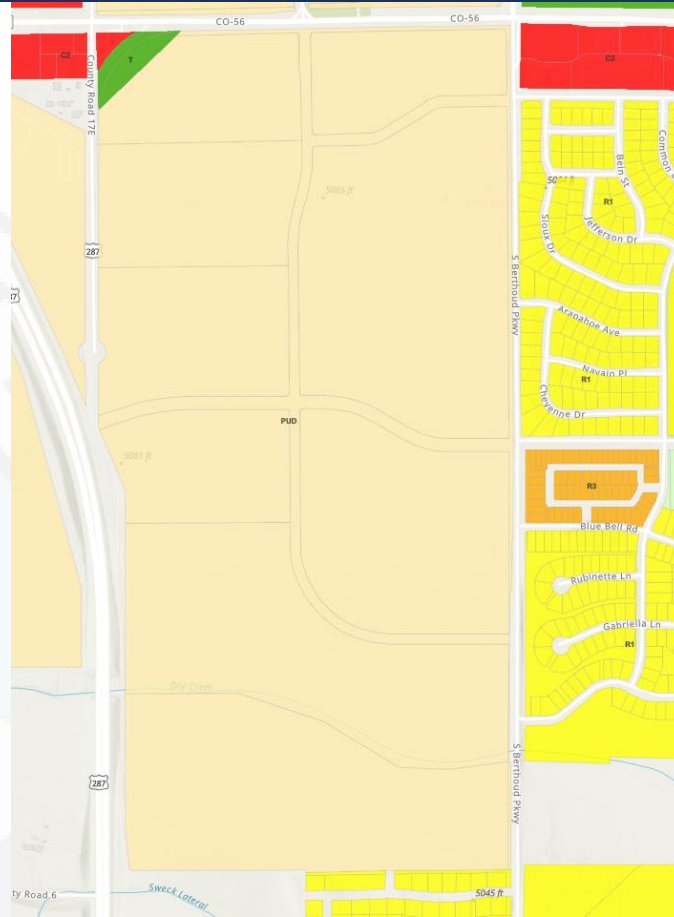


Ludlow Farms

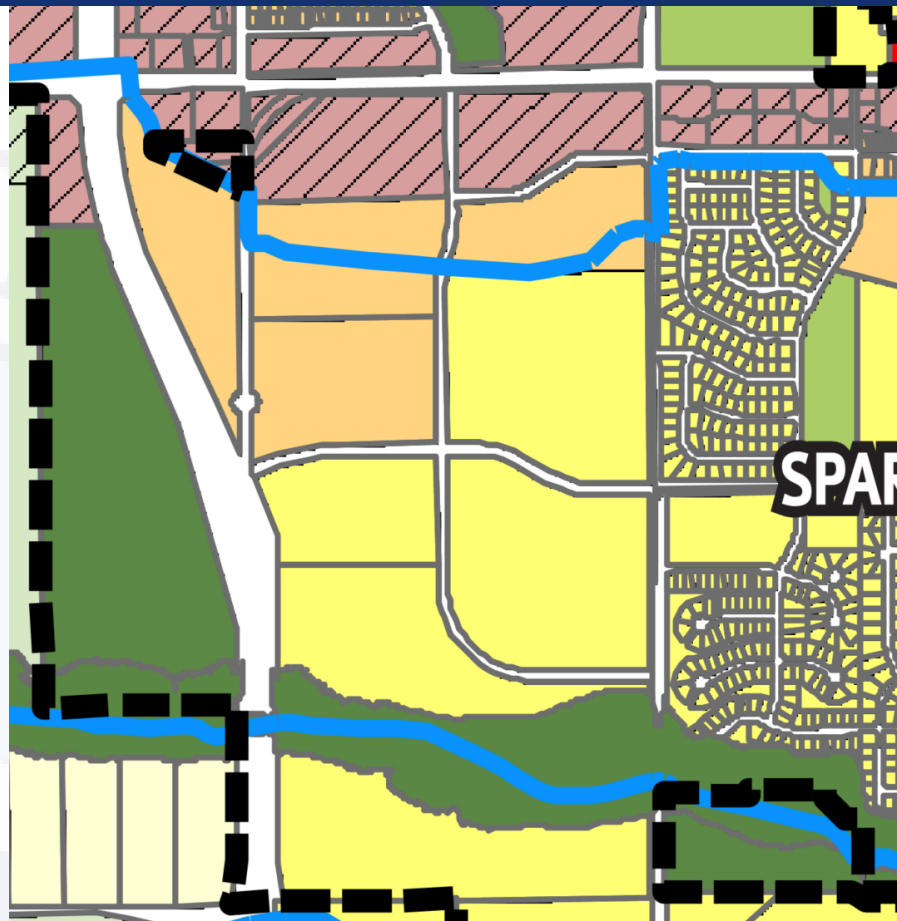


PROJECT:	Ludlow Farms NMP & Rezoning
APPLICANT:	Ludlow Farms, LLC
LOCATION:	Between Highway 287 and Berthoud Parkway, and South of Mountain Avenue
CURRENT ZONING:	PUD
SIZE:	306.4 Acres
APPLICANT'S REQUEST:	Neighborhood Master Plan and Rezoning.

Ludlow Farms – Zoning Map



Ludlow Farms – Future Land Use Map





LAND USE SUMMARY

SINGLE FAMILY DETACHED (40' X 110').....	
SINGLE FAMILY DETACHED (50' X 110')*.....	
SINGLE FAMILY DETACHED (60' X 110')*.....	
TOWNHOMES OR SFD.....	
CONDOS.....	
MIXED USE.....	
COMMERCIAL.....	

ESTIMATED PROJECT TOTAL.....1500-1800 UNITS

***NOTE: LOT SIZES ARE CONCEPTUAL AND SUBJECT TO CHANGE AT PLAT.**

LAND USE STATISTICS

TOTAL ACREAGE	~306.4 ACRES
ROW/PRIVATE DRIVE/PARKING	~ 54.0 ACRES
% OF SITE AS ROW/DRIVE/PARKING	17.6%
OPEN SPACE ACREAGE	~67.4 ACRES
% OF SITE AS OPEN SPACE	22.0%

- TRAFFIC INFORMATION**
- REFER TO PLAN FOR PROPOSED STREET NETWORK AND EXISTING ROAD NETWORK INCLUDING ALL ACCESS POINTS.
 - UNLESS OTHERWISE NOTED ON THE PLAN, ALL STREETS ARE LOCAL STREETS AND/OR ALLEYS.

SHEET INDEX

SHEET 1 - OVERALL NEIGHBORHOOD MASTER PLAN
 SHEETS 2-3 - OPEN SPACE, CIRCULATION, & PARKS

Ludlow Farms – Neighborhood Master Plan Criteria



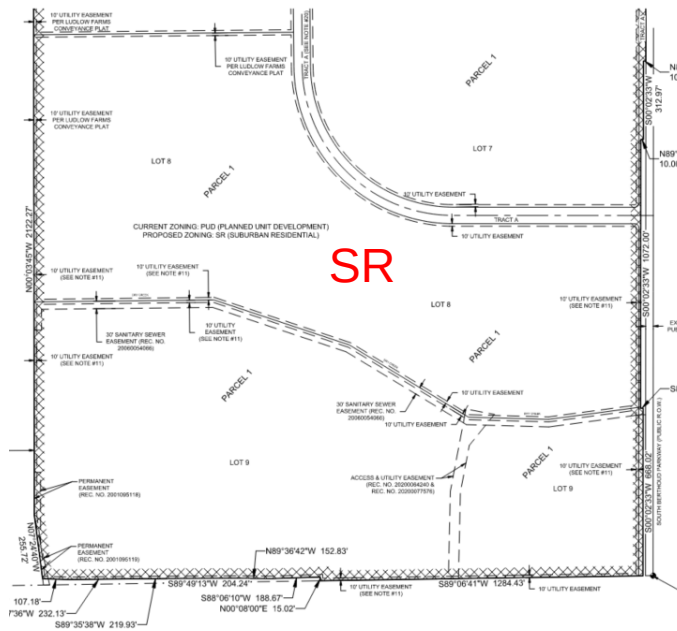
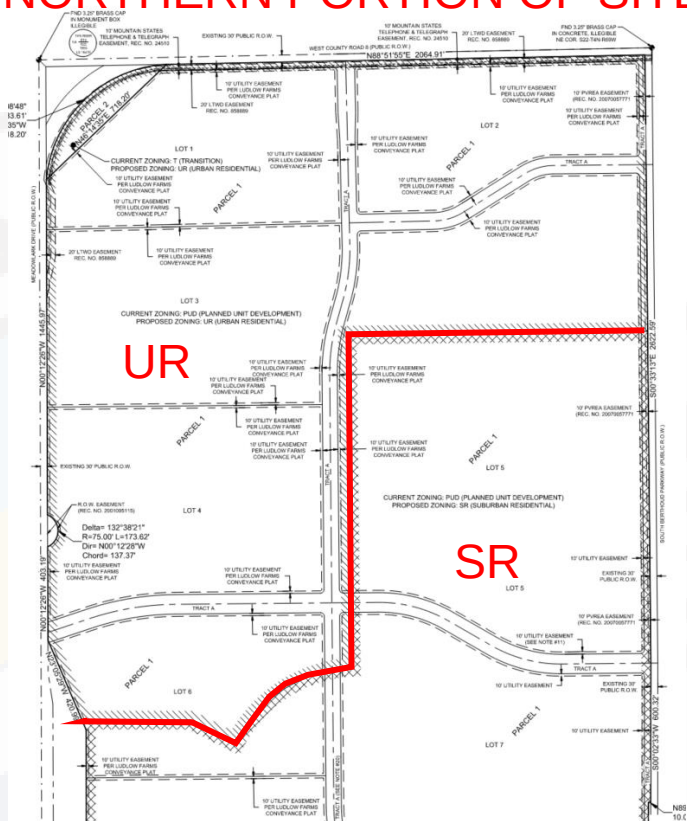
1. The land use mix within the project conforms to Berthoud's Zoning District Map and Comprehensive Plan Preferred Land Use Map and furthers the goals and policies of the Comprehensive Plan.
2. The Neighborhood Master Plan represents a functional system of land use and is consistent with the rationale and criteria set forth in this Chapter, The Town Comprehensive Plan, and the Parks, Open Space and Recreation (PORT) Plan as amended.
3. The preliminary traffic, open space, park utility and pedestrian design is adequate and functional given the existing and planned capacities of each system and meets the standards found in this code.
4. Negative impacts on adjacent land uses have been identified and satisfactorily mitigated.
5. There is a need or desirability within the community for the development and the development will help achieve a balance of land use and/or housing types within Berthoud according to town goals.

Ludlow Farms- Rezoning



NORTHERN PORTION OF SITE

SOUTHERN PORTION OF SITE



Ludlow Farms– Rezoning Criteria



1. To correct a manifest error in an ordinance establishing the zoning for a specific property; or
2. To rezone an area or extend the boundary of an existing district because of changed or changing conditions in a particular area or in the Town generally; or
3. The land to be rezoned was zoned in error and as presently zoned is inconsistent with the policies and goals of the Town Comprehensive Plan; or
4. The proposed rezoning is necessary to provide land for a community-related use that was not anticipated at the time of the adoption of the Town Comprehensive Plan, and the rezoning will be consistent with the policies and goals of the Comprehensive Plan; or
5. The area requested for rezoning has changed or is changing to such a degree that it is in the public interest to encourage development or redevelopment of the area

Ludlow Farms– NMP and Rezoning



Findings and Recommendations

Neighborhood Master Plan

Staff recommends Planning Commission make a motion to recommend approval of the Neighborhood Master Plan to the Town Board.

Rezoning

Staff recommends Planning Commission make a motion to recommend approval to the Town Board of the Rezoning with the following condition:

- **The rezoning will be approved only upon approval of the Neighborhood Master Plan.**



Planning Commission Meeting March 9, 2023



A map of Berthoud, Colorado, highlighting the Ludlow Farms Property. The property is a large, rectangular area with diagonal hatching, located south of County Road 17E and west of N Berthoud Pkwy. A callout box labeled "LUDLOW FARMS PROPERTY" points to the hatched area. The map includes various landmarks such as Loveland Reservoir, Bacon Lake, Coleman Reservoir, and Dry Creek. Major roads like N CR-21, County Road 8, and E County Road 6C are also shown. A north arrow is in the bottom right corner.

LUDLOW FARMS

LEGAL DESCRIPTION

PROPERTY 1:
TRACT A AND LOTS 1 THROUGH 9, INCLUSIVE, LUDLOW FARMS
ACCORDING TO THE RECORDED CONVEYANCE PLAT, COUNTY OF
LARIMER, STATE OF COLORADO

PROPERTY 2:
A TRACT OF LAND SITUATED IN THE NORTHWEST CORNER OF THE
NORTHEAST QUARTER OF SECTION 22, TOWNSHIP 4 NORTH OF
RANGE 69 WEST OF THE 6TH PM, MORE PARTICULARLY DESCRIBED
AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF THIS TRACT FROM
WHENCE THE NORTH QUARTER OF SAID SECTION 22 BEARS NORTH
46° 17' WEST 42.4 FEET DISTANT; THENCE SOUTH 0° 20' EAST ALONG A
LINE WHICH IS 30 FEET EAST OF AND PARALLEL TO QUARTER SECTION
LINE A DISTANCE OF 486.4 FEET TO THE TRUE POINT OF BEGINNING;
THENCE NORTH 43° 54' EAST 718.4 FEET TO A POINT 30 FEET SOUTH
OF THE NORTH LINE OF SAID SECTION 22; THENCE ALONG A CURVE TO
THE LEFT, SAID CURVE HAVING A CENTRAL ANGLE OF 87° 12' 34", A
RADIUS OF 543.00 FEET, AN ARC LENGTH OF 828.50 FEET, A CHORD
BEARING SOUTH 44° 04' 22" WEST, A DISTANCE OF 748.99 FEET TO THE
TRUE POINT OF BEGINNING,
COUNTY OF LARIMER, STATE OF COLORADO

SUBDIVISION IDENTITY & RESIDENTIAL STANDARDS

UNITS PROVIDED: APPROX. 1500-1800

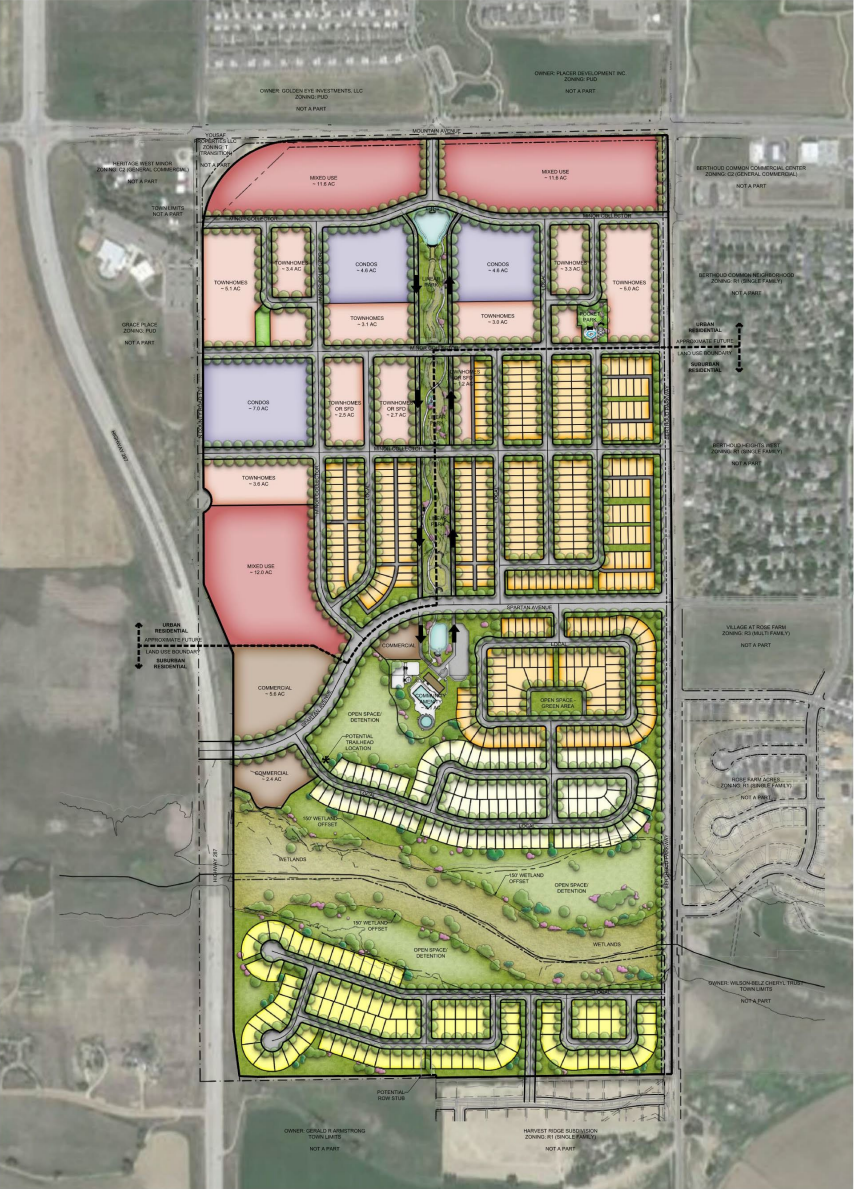
SUBDIVISION IDENTITY ELEMENTS POINTS REQUIRED: 8

THE SUBDIVISION IDENTITY ELEMENTS TO BE PROVIDED WILL BE
DETERMINED AT THE TIME OF PLAT. A MINIMUM OF 8 ELEMENT
POINTS WILL BE PROVIDED. THE FOLLOWING IS A LIST OF ELEMENTS
THAT IS BEING EVALUATED FOR THIS SITE, BUT IS SUBJECT TO
CHANGE, SO LONG AS THE REQUIRED ELEMENT POINTS ARE
ACHIEVED AT THE TIME OF PLAT:

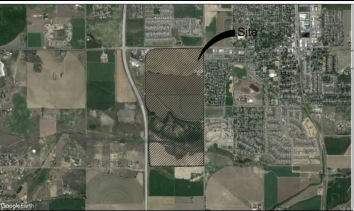
1. POCKET PARK	1
2. TRAILS	1
3. PLAYGROUND	1
4. POOL	2
5. POLLINATOR PLANT PALETTE	1
6. COMMUNITY BUILDING	2
7. ALLEY LOADED STREETS	2
TOTAL :	10

NOTES:

- PROPOSED LOT COUNT AND LOT SIZES ARE CONCEPTUAL AND
MAY CHANGE AT TIME OF PLAT, DEPENDING ON MARKET
CONDITIONS.
- COMMERCIAL AREAS ALONG HIGHWAY 287 ARE CONCEPTUAL IN
SIZE AND MAY ADJUST, DEPENDING ON MARKET CONDITIONS.
- RESIDENTIAL PRODUCT TYPES DEPICTED ARE CONCEPTUAL
AND MAY BE ADJUSTED AT PLATTING. PER THE MUNICIPAL
CODE, A MINIMUM OF FOUR (4) PRODUCT TYPES WILL BE
INCLUDED IN THE SUBDIVISION. RESIDENTIAL PRODUCT TYPES
COULD INCLUDE, BUT ARE NOT LIMITED TO: SINGLE FAMILY
DETACHED, TOWNHOMES, DUPLEXES, CONDOMINIUMS,
APARTMENTS AND/OR OTHER RESIDENTIAL PRODUCT TYPES
AS SPECIFIED IN THE MUNICIPAL CODE, PER ZONE DISTRICT.



VICINITY MAP



LAND USE SUMMARY

SINGLE FAMILY DETACHED (40' X 110')*	
SINGLE FAMILY DETACHED (50' X 110')*	
SINGLE FAMILY DETACHED (60' X 110')*	
TOWNHOMES OR SFD	
CONDOS	
MIXED USE	
COMMERCIAL	

ESTIMATED PROJECT TOTAL.....1500-1800 UNITS

*NOTE: LOT SIZES ARE CONCEPTUAL AND SUBJECT TO
CHANGE AT PLAT.

LAND USE STATISTICS

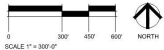
TOTAL ACREAGE	~306.4 ACRES
ROW/PRIVATE DRIVE/PARKING	~ 54.0 ACRES
% OF SITE AS ROW/DRIVE/PARKING	17.6%
OPEN SPACE ACREAGE	~67.4 ACRES
% OF SITE AS OPEN SPACE	22.0%

TRAFFIC INFORMATION

- REFER TO PLAN FOR PROPOSED STREET
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SHEET INDEX

SHEET 1 - OVERALL NEIGHBORHOOD MASTER PLAN
SHEETS 2-3 - OPEN SPACE, CIRCULATION, & PARKS
SHEET 4 - PARKS ENLARGEMENT



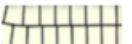
SUBDIVISION IDENTITY & RESIDENTIAL STANDARDS

SUBDIVISION IDENTITY ELEMENTS POINTS REQUIRED: 8

THE SUBDIVISION IDENTITY ELEMENTS TO BE PROVIDED WILL BE DETERMINED AT THE TIME OF PLAT. A MINIMUM OF 8 ELEMENT POINTS WILL BE PROVIDED. THE FOLLOWING IS A LIST OF ELEMENTS THAT IS BEING EVALUATED FOR THIS SITE, BUT IS SUBJECT TO CHANGE, SO LONG AS THE REQUIRED ELEMENT POINTS ARE ACHIEVED AT THE TIME OF PLAT:

1. POCKET PARK	1
2. TRAILS	1
3. PLAYGROUND	1
4. POOL	2
5. POLLINATOR PLANT PALETTE	1
6. COMMUNITY BUILDING	2
7. ALLEY LOADED STREETS	2
TOTAL :	10

LAND USE SUMMARY

SINGLE FAMILY DETACHED (40' X 110')*	
SINGLE FAMILY DETACHED (50' X 110')*	
SINGLE FAMILY DETACHED (60' X 110')*	
TOWNHOMES OR SFD.....	
CONDOS.....	
MIXED USE.....	
COMMERCIAL.....	

LUDLOW FARMS

PARK STATISTICS:

ESTIMATED PARK SPACE REQUIRED
(APPROX. 1500-1800 UNITS) 15-18 ACRES

PARK SPACE PROVIDED 13.54 ACRES
4.4% OF SITE

NOTE: FINAL PARK SPACE REQUIREMENT WILL BE BASED ON ACTUAL UNIT COUNT.
TO BE DETERMINED WITH FINAL PLATS.

OPEN SPACE CALCULATIONS:

TOTAL OPEN SPACE REQUIRED=	30.6 AC	10.0%
TOTAL OPEN SPACE PROVIDED=	76.7 AC	25.0%

TOTAL SITE ACREAGE = ~306.4 AC

COMMUNITY PARK ELEMENTS:

LIST B: 3 ELEMENTS REQUIRED

- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

LIST D: 2 ELEMENTS REQUIRED

- AMPHITHEATER
- PLAYGROUND
- SPLASH PARK
- COMMUNITY BUILDING
- POOL

LIST E: 4 ELEMENTS, + 1 RESTROOM BUILDING REQUIRED

- BBQ GRILLS (MIN. 1 PER EVERY 2 TABLES)
- BENCHES (MIN. ONE PER HALF ACRE)
- DRINKING FOUNTAINS (MIN. 1 PER EVERY 4 ACRES)
- SHADE STRUCTURES FOR COMPONENTS FROM LIST C (AT SPLASH PARK)

POCKET PARK ELEMENTS:

LIST A: ALL ELEMENTS REQUIRED

- ELECTRICITY
- IRRIGATION
- SECURITY LIGHTING
- TRASH RECEPTACLES (MIN. 2 PER AC)
- WATER SERVICE
- BIKE RACKS
- LANDSCAPING

LIST B: 3 ELEMENTS REQUIRED

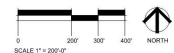
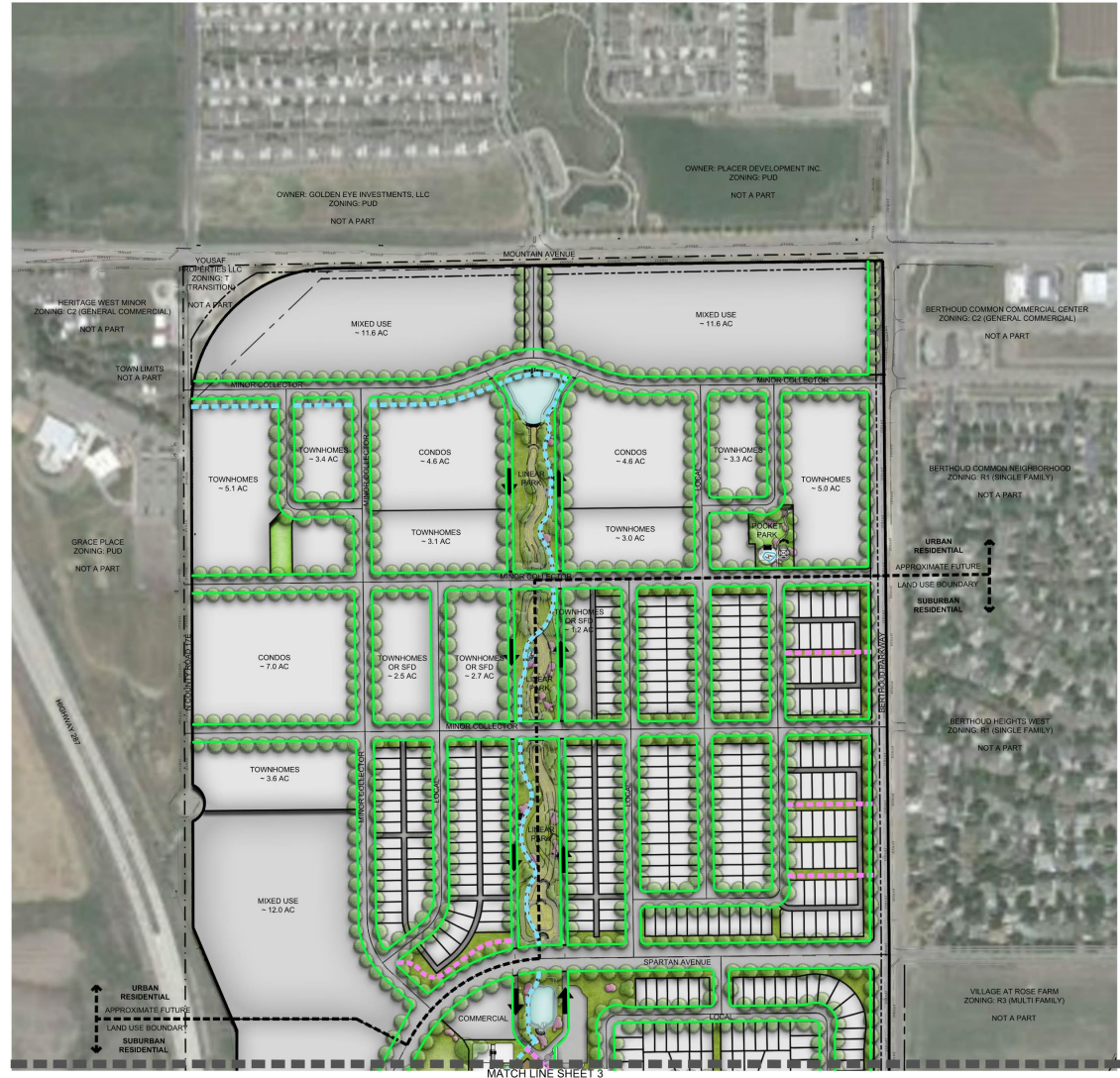
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- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

LIST D: 2 ELEMENTS REQUIRED

- COMMERCIAL-GRADE PLAYGROUND
- AMPHITHEATER

LIST E: RESTROOMS + 3 ELEMENTS REQUIRED

- PORTABLE RESTROOMS
- SHADE STRUCTURE FOR PLAYGROUND
- BENCHES (1 PER 1/2 ACRE)
- BBQS (1 PER 2 TABLES)



LUDLOW FARMS

OPEN SPACE ELEMENTS

OPEN SPACE ELEMENTS	4 ELEMENTS REQUIRED
OPEN SPACE ELEMENTS	4 ELEMENTS PROVIDED
HABITAT AREA	1 ELEMENT
GREEN AREA	2 ELEMENTS
TRAILHEAD	1 ELEMENT

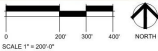
OPEN SPACE SUMMARY

	PARK SPACE	13.5 ACRES
	OPEN SPACE	67.4 ACRES
TOTAL		80.9 ACRES

WALKS/TRAILS SUMMARY*

	DETACHED CONCRETE SIDEWALK - 74,976 feet
	PROPOSED TRAIL/TRAIL CONNECTION PER TOWN PORT PLAN, MATERIAL TBD - 5,383 feet
	TRAIL CONNECTION PER TOWN PLAN - 9,415 feet

*NOTE: TRAIL LOCATIONS ARE CONCEPTUAL. FINAL LOCATION
TO BE DETERMINED AT PLAT.



LUDLOW FARMS

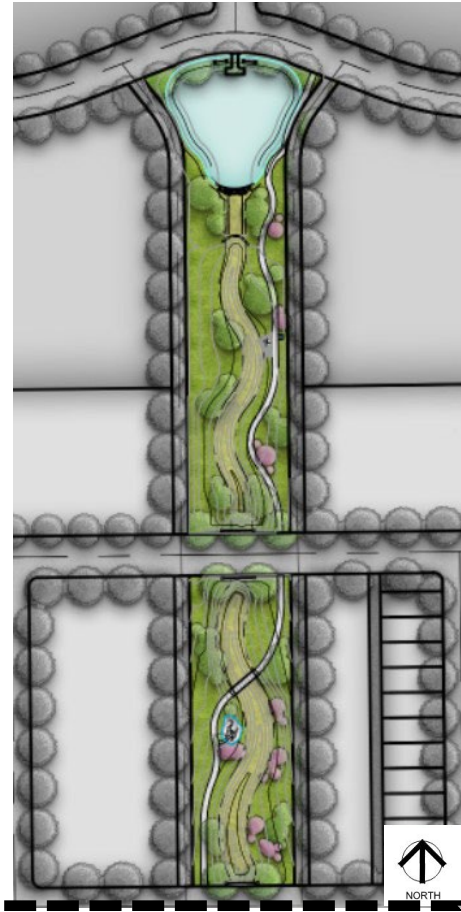


POCKET PARK ELEMENTS

- LOOP WALK
- TURF AREA
- SHADE STRUCTURE
- PLAYGROUND
- GATHERING AREA
- AMPHITHEATER



LUDLOW FARMS



MATCHLINE (RIGHT IMAGE)

MATCHLINE (LEFT IMAGE)



COMMUNITY PARK ELEMENTS

- LOOP WALK
- SHADED PAVILION

- AMPITHEATRE / TURF SPACE
- RESTROOMS



- PICKLEBALL COURTS
- COMMUNITY BUILDING & POOL

- SPLASH PARK
- PLAYGROUND

[illegible]

Additional Slides Here



STAFF REPORT: LUDLOW FARMS NEIGHBORHOOD MASTER PLAN AND REZONING

DATE: March 9, 2023

GENERAL INFORMATION

Applicant:	Ludlow Farms, LLC – Jim Hinson, Manager	Size: 306.4 acres
Site Location:	This property is located between Highway 287 and Berthoud Parkway, and south of Mountain Avenue.	
Applicant's Request:	The Applicant is requesting a rezoning to Suburban Residential (SR) and Urban Residential (UR) from the Ludlow Farms Planned Unit Development (PUD) and a Neighborhood Master Plan.	
Current Zoning:	Sommers PUD: Light Industrial uses to the north, undefined mixed use to be determined at FDP to the south.	

ZONING DISTRICT INFORMATION

	<u>PUD</u>	<u>UR</u>	<u>SR</u>
Max Density	Set at FDP	N/A	N/A
Min. Lot Size	Set at FDP	2,000 sq.ft. for Duplex 2,500 sq.ft. for SFR	3,000 sq.ft.
Min. Lot Width	Set at FDP	N/A	20'
Front Setback	Set at FDP	8'-12' build-to line	10' rear loaded
Side Setback	Set at FDP	0' attached side, 5' unattached side, 10' corner side	5'
Rear Setback	Set at FDP	5'	5'
Building Height:	Set at FDP	30'	30'

SURROUNDING ZONING, LAND USE AND REQUIRED BUFFERS

	<u>Adjacent Zoning</u>	<u>Adjacent Land Uses</u>	<u>Setbacks for Adjacent Zoning/ Buffer required if rezoned</u>
North	PUD	Vacant (Planned for future commercial spaces)	N/A
South	R-1	Single-Family Residential	N/A
East	R-1	Single-Family Residential	N/A
West	PUD and C2	Religious Assembly and Commercial	N/A

Proposal

This is a two-part request for a Neighborhood Master Plan and a rezoning to UR (Urban Residential) and SR (Suburban Residential) for the Ludlow Farms development. The Neighborhood Master Plan shows commercial and higher density uses along the north and west portions of the site along Highway 287 and Mountain Avenue, and tapers into lower density residential uses along the south and east portions of the project. The rezoning map similarly shows UR along the northwestern portions of the project, and SR for the southeastern portions.

Background

This project is currently zoned as the Ludlow Farms PUD. The PUD was approved in 2011, in conjunction with an annexation request in 2010. The PUD proposed a similar layout of uses to what is being considered with this NMP and Rezoning, with a slightly larger area proposed for commercial uses. The prior PUD process set development standards at the FDP stage, and no submittal was made for the project. The town has strongly encouraged PUD property owners to transition their projects to the newly created zone districts rather than continuing the PUD/FDP process. The project has had two rounds of review, and two notices have been sent to neighboring property owners.

Neighborhood Master Plan

The Neighborhood Master Plan is a conceptual design of the development, submitted with a rezoning or major subdivision application, that depicts the applicant's vision for the overall development, including zoning, transportation, pedestrian network, parks, open space, subdivision identity standards and other amenities. The Neighborhood Master Plan is binding on a development, and all platting/zoning actions must follow the approved plan or apply for an amendment of said plan. Section 30-6-106 of the municipal code states that a Neighborhood Master Plan must consist of the following required elements:

30-6-106(C) Required Elements	Finding	Rationale
1. <u>Traffic Plan</u>: The applicant shall provide a preliminary traffic plan that addresses the following elements: i. The proposed street network connectivity to the existing road network, including all proposed access points. ii. The location and layout of all arterial and collector roads within the development. Local streets and alleys do not need to be depicted. iii. A preliminary traffic impact study prepared by a licensed traffic engineer which evaluates proposed access points, the existing street system, and any need for any road improvements (including off-site improvements) created by the proposed development.	Yes	i. The proposed development would connect to the existing road network via connections to Highway 287, Mountain Avenue, Berthoud Parkway, and Art (within the Harvest Ridge Subdivision to the south) ii. Minor Collectors are depicted throughout the site to provide adequate traffic flow. Additionally, Spartan Avenue would be extended through the project and provide a new access point to Highway 287. iii. A preliminary traffic impact study/analysis was provided with the submittal.

30-6-106(C) Required Elements	Finding	Rationale
2. <u>Open Space Plan:</u> The applicant shall provide a preliminary open space plan that addresses the following elements: i. Proposed open space distribution and location, including percentage of open space. ii. Compliance with 30-2-109(D)(4) open space elements. iii. Required buffer areas as per 30-2-109(C)(2)	Yes	i. An open space plan was provided as part of the Neighborhood Master Plan. The plan includes more than 10% open space. ii. By code the applicant would need to provide four open space elements. The applicant has chosen to meet these requirements through a habitat area, two Green Areas (counts as two elements), and a trailhead location. iii. A wetland is identified near the southern end of the site, and a 150' buffer is provided.
3. <u>Park(s) Plan:</u> i. Proposed park locations and types of parks as per Section 30-2-109(B)(2) and (3) ii. Proposed park acreage as per Section 30-2-109(B)(2)	Yes	(i.-ii.) Parks are provided in accordance with 30-2-109(B)(2) and (3). A full list of how the project meets these requirements can be found on page 4 of the NMP.
4. <u>Pedestrian Network:</u> i. Location of all trails within development, and connection to existing trail network. ii. Connectivity of sidewalks to the existing pedestrian system, including any off-site sidewalk improvements. iii. Depiction of any bike lanes or any other multi-modal features.	Yes	i. Locations of all trails are depicted on the NMP. Connections are provided to the existing trail network, and additional trails are provided throughout the project. ii. Sidewalks will be constructed along the frontages of all properties, and will then connect to the existing pedestrian system. iii. No bike lanes are proposed. However, the project does offer a large number of trail connections with bike racks identified.
5. <u>Zoning:</u> i. The location of zoning boundaries shall be provided with the application and depicted on the Neighborhood Master Plan. ii. The plan should show how lot diversity standards of Section 30-2-116(D)(1)(c), are met and create a mix of zoning which is harmonious with the surrounding area, and within the property itself. iii. Density and lot diversity shall be distributed throughout the project and shall not be located in only one area.	Yes	i. In addition to the Neighborhood Master Plan, this project also includes a rezoning request. The Master Plan identifies the project showing the proposed zoning changes. ii. The proposed zoning districts will be consistent with the neighboring residential districts to the south and east. By utilizing the new Urban Residential (UR) and Suburban Residential (SR) zoning districts, the applicant is proposing a slightly denser development than the existing neighborhoods. This area provides a good transition between the existing residences and the commercial uses to the north and west. iii. Density and diversity are distributed throughout the residential portions of the project.

30-6-106(C) Required Elements	Finding	Rationale
6. <u>Overall Utility Plan:</u> i. A preliminary utility plan depicting the existing capacity of the utility system for both the proposal and any potential future development. ii. Proposed connections to the existing utility system. iii. The location of any proposed or required lift stations. iv. Utility plans for the interior of the development (such as water and sewer service lines) are not required as part of this process.	Yes	(i. – iv.) A preliminary utility plan has been provided showing the water line and sewer line connections capacity and demand, and where the lines would be located to verify the project can served by utilities. The project will connect to existing Town of Berthoud utilities through one connection to the north, one to the west, and three to the east.
7. <u>Subdivision Identity Standards:</u> i. The applicant shall provide compliance with subdivision identity standards found in Section 30-2-131.	Yes	i. Code requires the proposed development to provide eight subdivision identity and place elements. The applicant has chosen to provide: a pocket park(1), trails(1), playground(1), pool(2), pollinator plant palette(1), community building(2), and alley loaded streets(2).

Neighborhood Master Plan Review Criteria

Section 30-6-106(G) states that the town shall use the following criteria in addition to other applicable provisions of the code to evaluate the application.

30-6-106(G) Review Criteria	Finding	Rationale
1. The land use mix within the project conforms to Berthoud's Zoning District Map and Comprehensive Plan Preferred Land Use Map and furthers the goals and policies of the Comprehensive Plan.	Yes	The Preferred Land Use plan envisions this area as Suburban business, Urban Residential, and Suburban Residential transitioning from the higher intensity uses to the northwest, and lower intensity to the south east. Additionally, the Comprehensive Plan was developed to encourage form based transect zoning from open space/ rural areas to alley-loaded urban residential lots which allow for a variety of dense, affordable residential uses such as those included in this project.
2. The Neighborhood Master plan represents a functional system of land use and is consistent with the rationale and criteria set forth in this Chapter, the Town Comprehensive Plan, and the Parks, Open Space and Recreation (PORT) Plan as amended.	Yes	The proposed plan is consistent with this criterion. The project will extend existing roadways to service the property allowing for a more connected neighborhood design. Additionally, the trail system proposed will allow connections throughout the project and into neighboring areas.

30-6-106(G) Review Criteria	Finding	Rationale
3. The preliminary traffic, open space, park utility and pedestrian design is adequate and functional given the existing and planned capacities of each system, and meets the standards found in this Code.	Yes	Plans were reviewed by Town staff as well as outside referral agencies. No deficient capacity issues were identified.
4. Negative impacts on adjacent land uses have been identified and satisfactorily mitigated.	Yes	Impacts to neighboring properties have been mitigated through multiple access points as to not create congested roadways, as well as placing the lower intensity uses closer to existing residential, and higher intensity uses closer to existing commercial.
5. There is a need or desirability within the community for the development and the development will help achieve a balance of land use and/or housing types within Berthoud according to town goals.	Yes	This project is substantially similar to what was originally proposed when the property was annexed into the Town. Additionally, the project offers a mix of uses that is consistent with the future land use map in the comprehensive plan.

Rezoning

The site is currently zoned PUD as part of the Ludlow Farms Planned Unit Development. This PUD was approved in 2011 in conjunction with an annexation approved in 2010. The approved PUD plan shares a similar vision for the area to what is proposed in the rezoning. An FDP plan is still required for the PUD, and rather than continuing through the now removed PUD process, staff has recommended the applicant instead rezone the property. The applicant has requested to rezone the property from PUD to UR (Urban Residential) and SR (Suburban Residential). If approved the rezoning would result in properties to the north and west zoned UR, and properties to the south and east zoned SR. The commercial and higher density areas would be focused in the UR areas, while the lower density residential uses would be rezoned SR.

Rezoning is addressed through an official zoning map amendment. Section 30-3-110(D) states for the purpose of establishing and maintaining sound stable and desirable development within the Town, the Zoning Map shall not be amended except when it addresses one or more of the criteria in the following table.

30-3-110(D) Zoning Map Amendment Criteria	Finding	Rationale
1. To correct a manifest error in an ordinance establishing the zoning for a specific property; or 2. To rezone an area or extend the boundary of an existing district because of changed or changing conditions in a particular area or in the Town generally; or 3. The land to be rezoned was zoned in error and as presently zoned is inconsistent with the policies and goals of the Town Comprehensive Plan; or 4. The proposed rezoning is necessary to provide land for a community-related use that was not anticipated at the time of the adoption of the Town Comprehensive Plan, and the rezoning will be consistent with the policies and goals of the Comprehensive Plan; or 5. The area requested for rezoning has changed or is changing to such a degree that it is in the public interest to encourage development or redevelopment of the area	Yes	Staff finds that the proposed rezoning meets criterion 2. The town has shifted away from Planned Unit Developments, and the proposed rezoning will help create more consistency between the project and what is intended in the Future Land Use map in the Comprehensive Plan.

PUBLIC NOTICE AND COMMENT

Notice of the Planning Commission Public Hearing has been mailed to property owners within 1,000 feet of the subject property, a legal ad published, and the property was posted as required by the Development Code on February 23, 2023. In addition, the application was sent out to all property owners within 1,000 feet, with an invitation to comment on the request within three weeks of receipt. All comments received can be found in this packet.

FINDINGS AND RECOMMENDATIONS

Neighborhood Master Plan

Staff recommends Planning Commission make a motion to recommend approval of the Neighborhood Master Plan to the Board of Trustees.

Rezoning

Staff recommends Planning Commission make a motion to recommend approval of the Rezoning to the Town Board.

Attachments

1. Application form
2. Neighborhood master plan

-
3. Rezoning map
 4. Preliminary traffic impact study/analysis
 5. Public Comments
 6. Staff Presentation
 7. Applicant Presentation



Town of Berthoud
807 Mountain Ave.
P.O. Box 1229
Berthoud, CO 80513
970.532.2643

DEVELOPMENT REVIEW APPLICATION

All required information must be provided before submittal will be accepted and deemed complete.
To be complete, the application must include all items identified on the submittal checklist.
Please complete both sides of application form.

Parcel Number(s): 9422105001 - 9422405009		
Site Address: SW Corner of Mountain Avenue & Berthoud Parkway		
Project Name: Ludlow Farms		
Brief description of project: Residential and mixed-use subdivision.		
APPLICATION TYPE (Check as appropriate):		
☐ Annexation	☐ Preliminary Subdivision Plat	☐ Final Site Plan
☒ Rezoning	☐ Final Subdivision Plat	☐ PUD Amendment
☒ Concept Plan	☐ Plat Amendment	☐ PUD Preliminary Development Plan
☐ Minor Subdivision	☐ Oil and Gas	☐ PUD Final Development Plan
☐ Special Use Review	☐ ROW Vacation	☐ Other _____
APPLICANT		
Name: Ludlow Farms, LLC - JM Hinson, Manager		
E-mail: jmhinson@me.com	Mailing Address: 700 Ken Pratt Blvd Suite 113	
Phone: 1-904-945-8636	City/State/Zip: Longmont, CO 80501	
CONTACT PERSON (will receive correspondence from Town Staff/Referral Agencies)		
Name: Kristin Turner - TB Group		
E-mail: kristin@tbgroup.us	Mailing Address: 444 Mountain Avenue	
Phone: 970.532.5891	City/State/Zip: Berthoud, CO 80513	
OWNER(S) (If different than applicant)		
Name: Greg Ludlow		
E-mail: greg.ludlow5@gmail.com	Mailing Address: 1909 Sundance Drive	
Phone: (970) 302-9332	City/State/Zip: Longmont, Colorado 80504	
CONSULTANT (Engineer, Surveyor, or Planner)		
Name:		
E-mail:	Mailing Address:	
Phone:	City/State/Zip:	

LAND USE INFORMATION							
Existing Use: Vacant Proposed Use: Residential, Commercial, Mi Existing Zoning: PUD Proposed Zoning: (if applicable): SR, UR Number of acres: ~306.4 AC Proposed Access: Berthoud Parkway & Mc	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #d9e1f2;"> <th colspan="2" style="text-align: center; padding: 5px;">Adjacent zoning / land use:</th> </tr> </thead> <tbody> <tr> <td style="width: 50%; padding: 5px;">East Side: BERTHOUD PARKWAY</td> <td style="width: 50%; padding: 5px;">North Side: MOUNTAIN AVENUE</td> </tr> <tr> <td style="padding: 5px;">West Side: HWY 287</td> <td style="padding: 5px;">South Side: R1 AND LARIMER COUNTY</td> </tr> </tbody> </table>	Adjacent zoning / land use:		East Side: BERTHOUD PARKWAY	North Side: MOUNTAIN AVENUE	West Side: HWY 287	South Side: R1 AND LARIMER COUNTY
Adjacent zoning / land use:							
East Side: BERTHOUD PARKWAY	North Side: MOUNTAIN AVENUE						
West Side: HWY 287	South Side: R1 AND LARIMER COUNTY						
UTILITY SERVICE INFORMATION							
Water: Town of Berthoud	Sewer: Town of Berthoud						
PROJECT INFORMATION							
Number of proposed units: estimated 1500-1800 Number of phases: TBD - multiple Number of Units per phase: TBD Number of lots proposed: estimated 1500-1800 Lot size minimum: 4,400 sf Lot size maximum: 6,600 sf Lot size average: 5,500 sf Gross density (units/acre): 4.8-5.8 Net density (units/acre): 5.9-7.1 Area and percent open space: 67.4 AC/ 22%	Non-Residential Building Area (Sq. Ft.) Proposed: TBD - 31.2 ac estimated Non-Residential Construction Floor Area Ratio Proposed: TBD Total Number of Parking Spaces: TBD <u>Acreage of Site:</u> a. Gross: 306.4 b. Right-of-Way: 54.0 c. Net (a-b) 252.4 <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr style="background-color: #d9e1f2;"> <th colspan="2" style="text-align: center; padding: 5px;">Type of Housing Proposed (please check):</th> </tr> </thead> <tbody> <tr> <td style="width: 50%; padding: 5px;"> ☒ Future Single Family ☒ Duplex ☒ Multi-family (# of units: TBD) </td> <td style="width: 50%; padding: 5px;"> ☒ Townhouse ☐ Condominium </td> </tr> </tbody> </table>	Type of Housing Proposed (please check):		☒ Future Single Family ☒ Duplex ☒ Multi-family (# of units: TBD)	☒ Townhouse ☐ Condominium		
Type of Housing Proposed (please check):							
☒ Future Single Family ☒ Duplex ☒ Multi-family (# of units: TBD)	☒ Townhouse ☐ Condominium						

Signatures are required for ALL Property Owners and the Applicant

I hereby certify that I am the lawful owner of the parcel(s) of land that this application concerns and consent to the action. I hereby permit Town of Berthoud staff to enter upon the property for the purposes of inspection relating to the application. Building Permits will not be accepted while this application is in process.

Property Owner(s): DocuSigned by:
Greg Ludlow
D8BEF5D68CD544C... Date: 9/15/2022

Property Owner(s): _____ Date: _____

In submitting the application materials and signing this application agreement, I acknowledge and agree that the application is subject to the applicable processing and public hearing requirements set forth in the Development Code.

Applicant: DocuSigned by:
M. Hinson
55A1B323E8844C3... Date: 9/15/2022

FOR OFFICE USE ONLY
Received By:
Date:

PROPERTY 1:
TRACT A AND LOTS 1 THROUGH 9, INCLUSIVE, LUDLOW FARMS
ACCORDING TO THE RECORDED CONVEYANCE PLAT, COUNTY OF
LARIMER, STATE OF COLORADO

A TRACT OF LAND SITUATED IN THE NORTHWEST CORNER OF THE
NORTHEAST QUARTER OF SECTION 22, TOWNSHIP 4 NORTH OF
RANGE 69 WEST OF THE 6TH PM, MORE PARTICULARLY DESCRIBED
AS FOLLOWS:

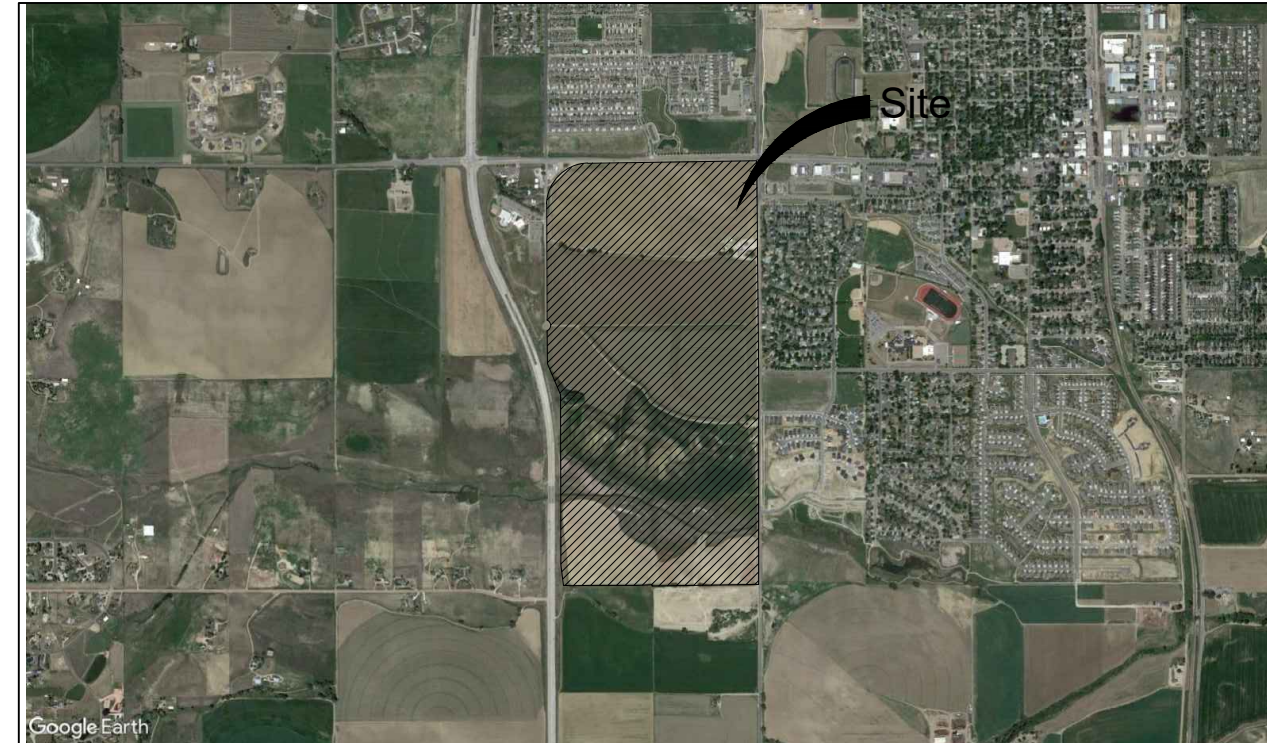
SUBDIVISION IDENTITY & RESIDENTIAL STANDARDS

SUBDIVISION IDENTITY ELEMENTS POINTS REQUIRED: 8

1. POCKET PARK	1
2. TRAILS	1
3. PLAYGROUND	1
4. POOL	2
5. POLLINATOR PLANT PALETTE	1
6. COMMUNITY BUILDING	2
7. ALLEY LOADED STREETS	2

TOTAL : 10

1. PROPOSED LOT COUNT AND LOT SIZES ARE CONCEPTUAL AND MAY CHANGE AT TIME OF PLAT, DEPENDING ON MARKET CONDITIONS.
2. COMMERCIAL AREAS ALONG HIGHWAY 287 ARE CONCEPTUAL IN SIZE AND MAY ADJUST, DEPENDING ON MARKET CONDITIONS.
3. RESIDENTIAL PRODUCT TYPES DEPICTED ARE CONCEPTUAL AND MAY BE ADJUSTED AT PLATTING. PER THE MUNICIPAL CODE, A MINIMUM OF FOUR (4) PRODUCT TYPES WILL BE INCLUDED IN THE SUBDIVISION. RESIDENTIAL PRODUCT TYPES COULD INCLUDE, BUT ARE NOT LIMITED TO: SINGLE FAMILY DETACHED, TOWNHOMES, DUPLEXES, CONDOMINIUMS, APARTMENTS AND/OR OTHER RESIDENTIAL PRODUCT TYPES AS SPECIFIED IN THE MUNICIPAL CODE, PER ZONE DISTRICT.



SINGLE FAMILY DETACHED (40' X 110')*.....	
SINGLE FAMILY DETACHED (50' X 110')*.....	
SINGLE FAMILY DETACHED (60' X 110')*.....	
TOWNHOMES OR SFD.....	
CONDOS.....	
MIXED USE.....	
COMMERCIAL.....	

ESTIMATED PROJECT TOTAL.....1500-1800 UNITS

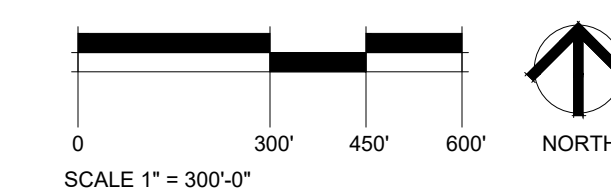
LAND USE STATISTICS

<u>TOTAL ACREAGE</u>	~306.4 ACRES
<u>ROW/PRIVATE DRIVE/PARKING</u>	~ 54.0 ACRES
% OF SITE AS ROW/DRIVE/PARKING	17.6%
<u>OPEN SPACE ACREAGE</u>	~67.4 ACRES
% OF SITE AS OPEN SPACE	22.0%

1. REFER TO PLAN FOR PROPOSED STREET NETWORK AND EXISTING ROAD NETWORK INCLUDING ALL ACCESS POINTS.

2. UNLESS OTHERWISE NOTED ON THE PLAN, ALL
STREETS ARE LOCAL STREETS AND/OR ALLEYS.

SHEET 1 - OVERALL NEIGHBORHOOD MASTER PLAN
SHEETS 2-3 - OPEN SPACE, CIRCULATION, & PARKS
SHEET 4 - PARKS ENLARGEMENT



444 Mountain Ave. | TEL 970.532.5891
Berthoud, CO 80513 | WEB TBGroup.us

SEA

PROJECT TITLE

LUDLOW FARMS
NEIGHBORHOOD
MASTER PLAN

BERTHOUD, CO

PREPARED FOR:

OWNER:
LUDLOW FARMS,
LLC

700 KEN PRATT BLVD,
STE. 113
LONGMONT, CO 80501

[illegible]

DAT

SEPTEMBER 15, 2022

SHEET TITLE

OVERALL NEIGHBORHOOD
MASTER PLAN

SHEET INFORMATION

Sheet Number: 1

Of: 4

PARK STATISTICS:

ESTIMATED PARK SPACE REQUIRED
(APPROX. 1500-1800 UNITS) 15-18 ACRES

PARK SPACE PROVIDED 13.54 ACRES
4.4% OF SITE

NOTE: FINAL PARK SPACE REQUIREMENT WILL BE BASED ON ACTUAL UNIT COUNT.
TO BE DETERMINED WITH FINAL PLATS.

OPEN SPACE CALCULATIONS:

TOTAL OPEN SPACE REQUIRED= 30.6 AC 10.0%
TOTAL OPEN SPACE PROVIDED= 76.7 AC 25.0%

TOTAL SITE ACREAGE = ~306.4 AC

COMMUNITY PARK ELEMENTS:

LIST B: 3 ELEMENTS REQUIRED

- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

LIST D: 2 ELEMENTS REQUIRED

- AMPHITHEATER
- PLAYGROUND
- SPLASH PARK
- COMMUNITY BUILDING
- POOL

LIST E: 4 ELEMENTS, + 1 RESTROOM BUILDING REQUIRED

- BBQ GRILLS (MIN. 1 PER EVERY 2 TABLES)
- BENCHES (MIN. ONE PER HALF ACRE)
- DRINKING FOUNTAINS (MIN. 1 PER EVERY 4 ACRES)
- SHADE STRUCTURES FOR COMPONENTS FROM LIST C (AT SPLASH PARK)

POCKET PARK ELEMENTS:

LIST A: ALL ELEMENTS REQUIRED

- ELECTRICITY
- IRRIGATION
- SECURITY LIGHTING
- TRASH RECEPTACLES (MIN. 2 PER AC)
- WATER SERVICE
- BIKE RACKS
- LANDSCAPING

LIST B: 3 ELEMENTS REQUIRED

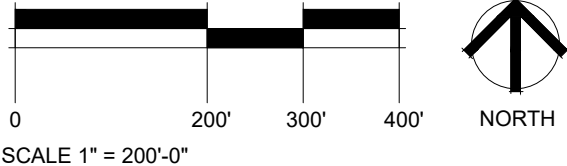
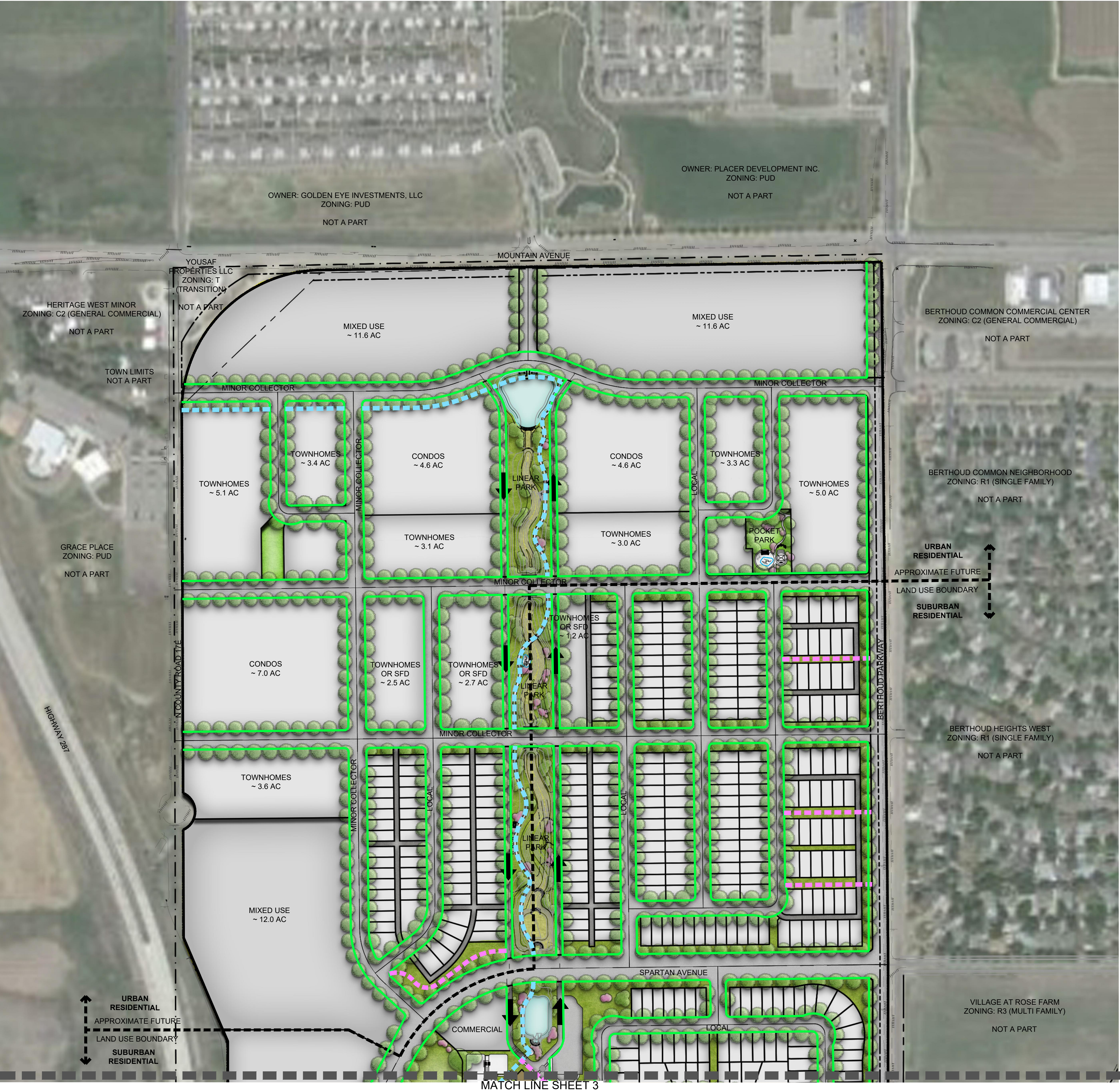
- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

LIST D: 2 ELEMENTS REQUIRED

- COMMERCIAL-GRADE PLAYGROUND
- AMPHITHEATER

LIST E: RESTROOMS + 3 ELEMENTS REQUIRED

- PORTABLE RESTROOMS
- SHADE STRUCTURE FOR PLAYGROUND
- BENCHES (1 PER ½ ACRE)
- BBQS (1 PER 2 TABLES)



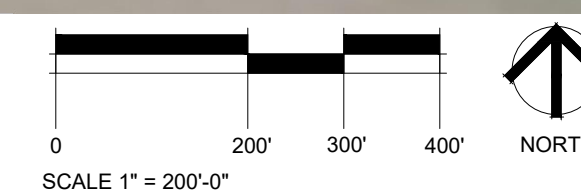
OPEN SPACE ELEMENTS	4 ELEMENTS REQUIRED
OPEN SPACE ELEMENTS	4 ELEMENTS PROVIDED

HABITAT AREA	1 ELEMENT
GREEN AREA	2 ELEMENTS
TRAILHEAD	1 ELEMENT

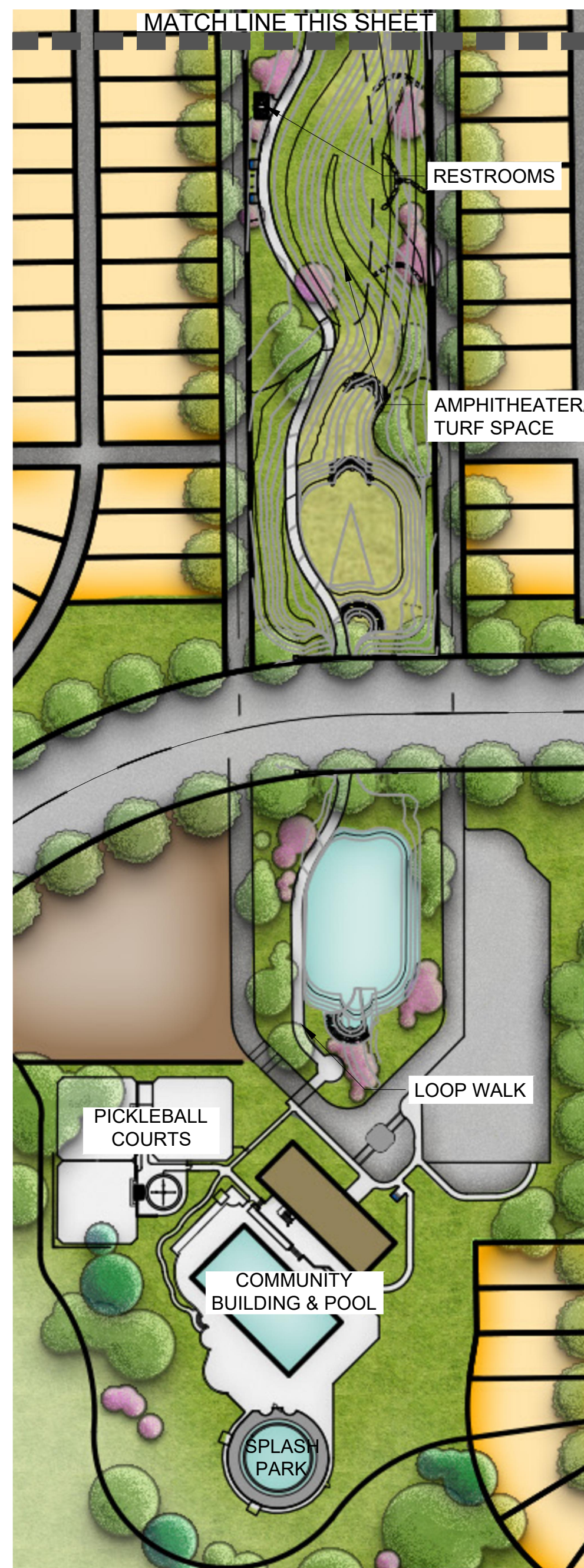
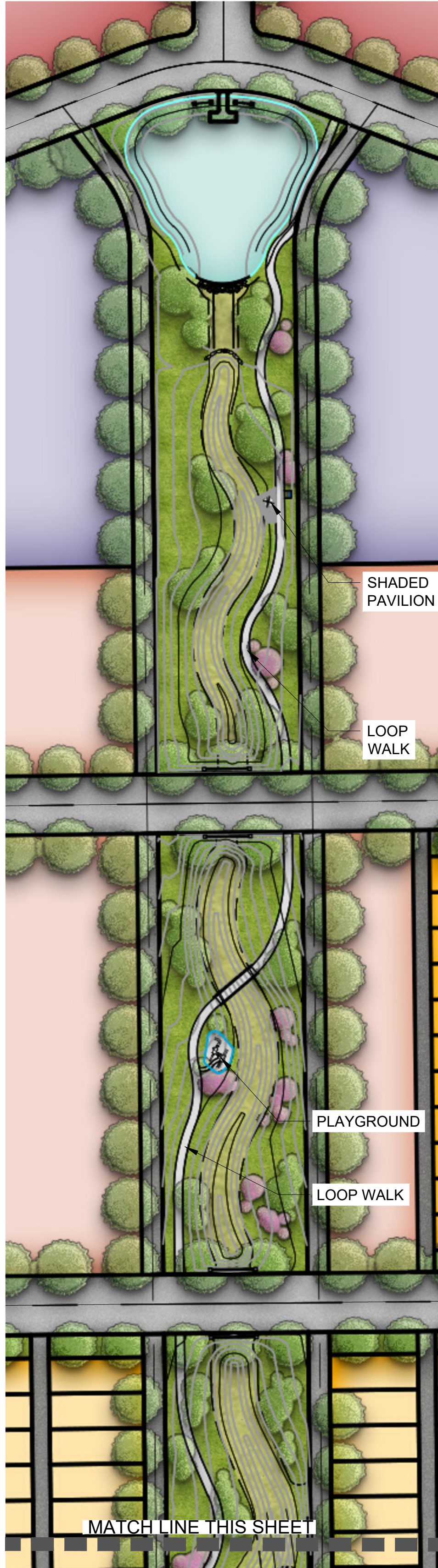
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	OPEN SPACE	67.4 ACRES
TOTAL		80.9 ACRES

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	TRAIL CONNECTION PER TOWN PLAN - 9,415 feet

*NOTE: TRAIL LOCATIONS ARE CONCEPTUAL. FINAL LOCATION TO BE DETERMINED AT PLAT.

[illegible]

COMMUNITY PARK - A



COMMUNITY PARK ELEMENTS:

LIST A: ALL ELEMENTS REQUIRED

- ELECTRICITY
 - IRRIGATION
 - SECURITY LIGHTING
 - TRASH RECEPTACLES (MIN. 2 PER AC)
 - WATER SERVICE
 - BIKE RACKS
- LANDSCAPING

LIST B: 3 ELEMENTS REQUIRED

- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

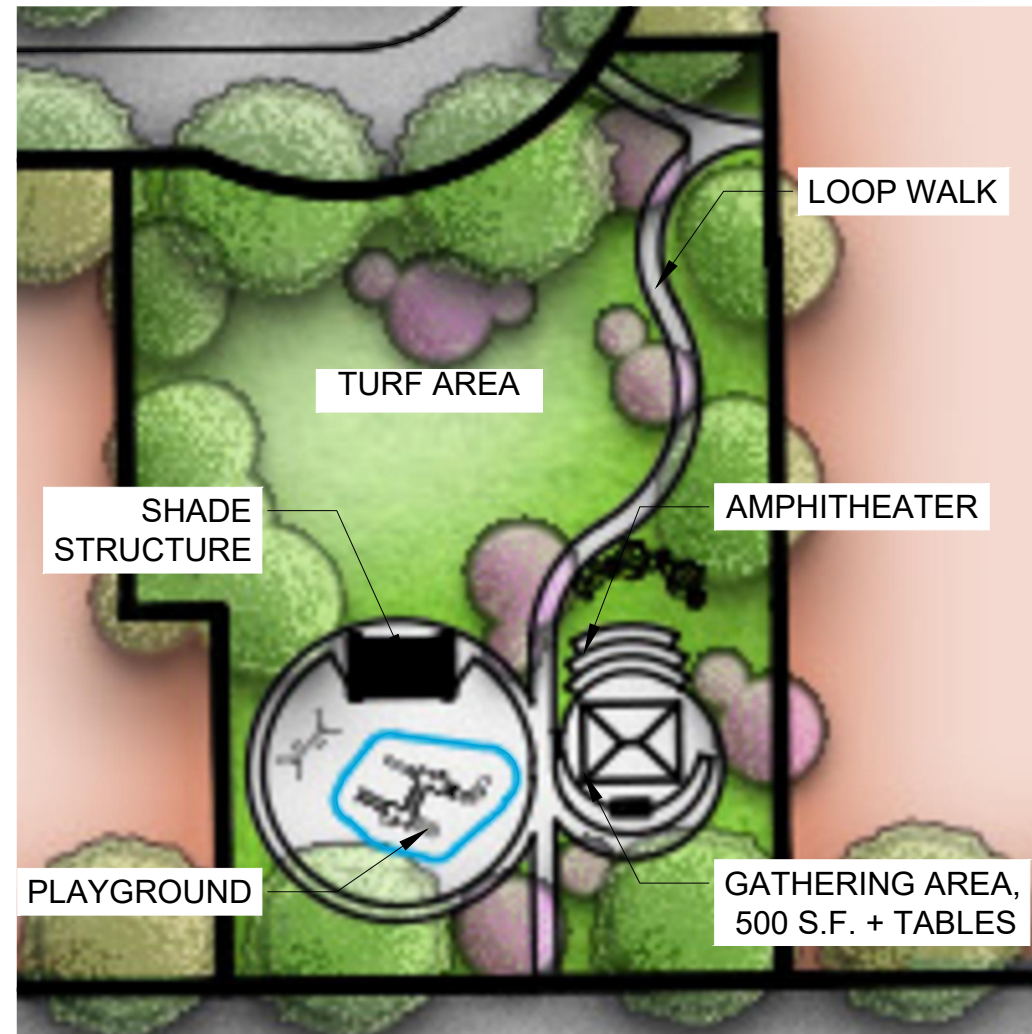
LIST D: 2 ELEMENTS REQUIRED

- AMPHITHEATER
- PLAYGROUND
- SPLASH PARK
- COMMUNITY BUILDING
- POOL

LIST E: 4 ELEMENTS, + 1 RESTROOM BUILDING
REQUIRED

- BBQ GRILLS (MIN. 1 PER EVERY 2 TABLES)
- BENCHES (MIN. ONE PER HALF ACRE)
- DRINKING FOUNTAINS (MIN. 1 PER EVERY 4 ACRES)
- SHADE STRUCTURES FOR COMPONENTS FROM LIST C (AT SPLASH PARK)

POCKET PARK - B



POCKET PARK ELEMENTS:

LIST A: ALL ELEMENTS REQUIRED

- ELECTRICITY
- IRRIGATION
- SECURITY LIGHTING
- TRASH RECEPTACLES (MIN. 2 PER AC)
- WATER SERVICE
- BIKE RACKS
- LANDSCAPING

LIST B: 3 ELEMENTS REQUIRED

- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

LIST D: 2 ELEMENTS REQUIRED

- COMMERCIAL-GRADE PLAYGROUND
- AMPHITHEATER

LIST E: RESTROOMS + 3 ELEMENTS REQUIRED

- PORTABLE RESTROOMS
- SHADE STRUCTURE FOR PLAYGROUND
- BENCHES (1 PER $\frac{1}{2}$ ACRE)
- BBQS (1 PER 2 TABLES)



444 Mountain Ave. | TEL 970.532.5891
 Berthoud, CO 80513 | WEB TBGroup.us

SEAL

PROJECT TITLE

LUDLOW FARMS

NEIGHBORHOOD MASTER PLAN

BERTHOUD, CO

PREPARED FOR

OWNER:

LUDLOW FARMS,
LLC

700 KEN PRATT BLVD,
STE. 113
LONGMONT, CO 80501

[illegible]

DATE _____

SEPTEMBER 15, 2022

SHEET TITLE

PARKS ENLARGEMENT

SHEET INFORMATION

Sheet Number: 4

Of: 4

LUDLOW FARMS REZONE MAP

LOCATED IN THE EAST HALF OF SECTION 22, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M.,
TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

DESCRIPTION OF REZONING AREA PUD & T TO URBAN RESIDENTIAL & SUBURBAN RESIDENTIAL:

Parcel 1:
Tract A, and Lots 1 through 9, inclusive, Ludlow Farms according to the recorded Conveyance Plat, County of Larimer, State of Colorado

Parcel 2:
A tract of land situated in the Northwest Corner of the Northeast Quarter of Section 22, Township 4 North of Range 69 West of the 6th PM, more particularly described as follows:
Beginning at the Northwest corner of this tract from whence the North Quarter of said Section 22 bears North 46°17' West 42.4 feet distant; thence South 0°20' East along a line which is 30 feet East of and parallel to quarter section line a distance of 486.4 feet to the TRUE POINT OF BEGINNING; thence North 43°54' East 718.4 feet to a point 30 feet South of the North line of said Section 22; thence along a curve to the left, said curve having a central angle of 87°12'34", a radius of 543.00 feet, an arc length of 826.50 feet, a chord bearing South 44°04'22" West, a distance of 748.99 feet to the TRUE POINT OF BEGINNING,
County of Larimer, State of Colorado

NOTES:

- 1) First National Title Insurance Company, Commitment No. 830003001-SE, dated 08/30/2022 at 8:00 a.m. was used in the preparation of this document.
- 2) The Basis of Bearings is the North line of Ludlow Farms - Conveyance Plat as bearing North 88°51'55" East, and monumented as shown on drawing.
- 3) Northern Engineering relied upon the plat of Ludlow Farms Conveyance Plat recorded at Reception Number 20110018205 Larimer County Clerk and Recorder.
- 4) This is not a statutory boundary survey, lines ran or shown have not been evaluated for title rights either written or unwritten.
- 5) This map is not a land survey plat or improvement survey plat, and it is not to be relied upon for the establishment of fence, building, or other future improvement lines.
- 6) Adjacent property owner information per the Larimer County Land information Locator.
- 7) Zoning information per the Official Zoning map, Town of Berthoud, dated October, 2021 .
- 8) Parcel 1 of Subject Property contains 13,067,650 square feet or 299.99 acres, more or less.
Parcel 2 of Subject Property contains 66,183 square feet or 1.52 acres, more or less.
- 9) Proposed Zone UR (Urban Residential) contains 5,069,393 square feet or 116.380 acres, more or less.
Proposed Zone SR (Suburban Residential) contains 8,064,440 square feet or 185.131 acres, more or less.

OWNER:

BY: _____

STATE OF COLORADO)
)SS
COUNTY OF LARIMER)

The foregoing instrument was acknowledged before me this ____ day of _____, 2022, by
_____ as _____ of .

Witness my hand and official seal

My commission expires: _____

Notary Public

LIENHOLDER:

BY: _____

STATE OF COLORADO)
)SS
COUNTY OF LARIMER)

The foregoing instrument was acknowledged before me this ____ day of _____, 2022, by
_____ as _____ of .

Witness my hand and official seal

My commission expires: _____

Notary Public

APPROVAL CERTIFICATES:

This is to certify that the rezoning of the above described property was approved by Ordinance No. _____ of the Town of Berthoud, passed and adopted on the ____ day of _____, 2022, and that the Mayor of the Town of Berthoud as authorized by said ordinance on behalf of the Town of Berthoud hereby for all acknowledges and adopts the said annexation upon which the certificate is endorsed for all purposes indicated hereon.

Approved by the Board of Trustees of the Town of Berthoud, Colorado this ____ day of _____, 2022.

Mayor

The foregoing map is approved for filing and accepted by the Town of Berthoud, Colorado this ____ day of _____, 2022.

ATTEST: _____
Town Clerk

APPROVAL CERTIFICATES:

Approved by the Planning Commission of the Town of Berthoud, Colorado this ____ day of _____, 2022.

Chairman

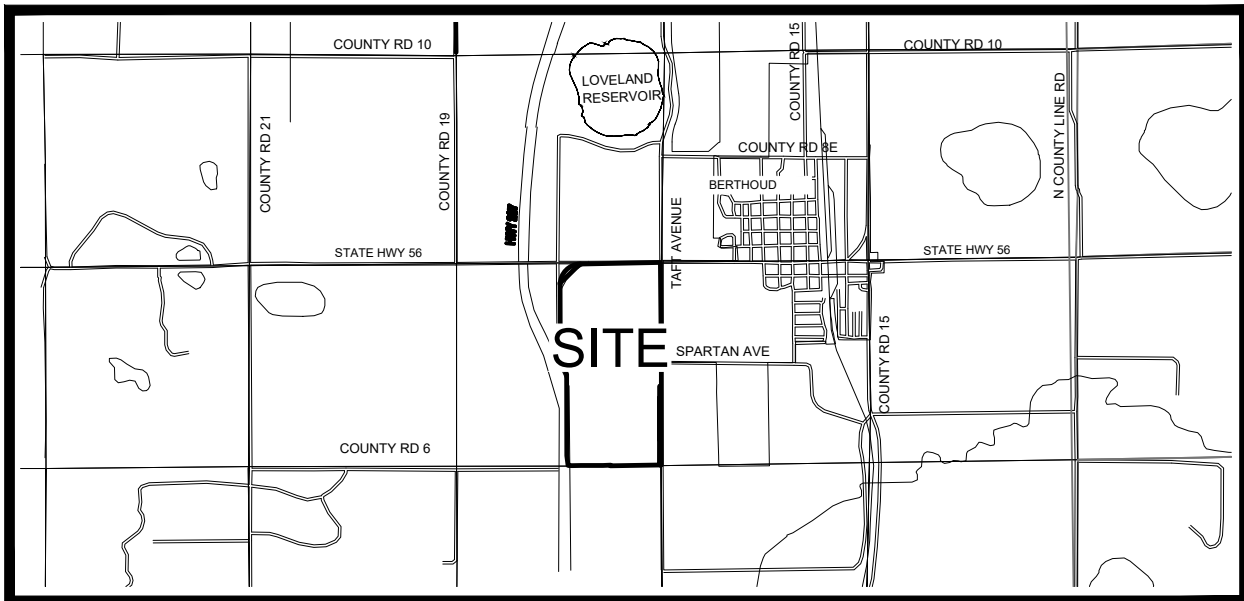
The foregoing map is approved for filing and accepted by the Town of Berthoud, Colorado this ____ day of _____, 2022.

ATTEST: _____
Planning Technician

LARIMER COUNTY CLERK & RECORDER CERTIFICATE:

This Rezoning Map was accepted for filing in the Office of the Larimer County Clerk & Recorder on this ____ day of _____, 2022, A.D. at _____ M. in Book _____, Page _____, Reception No. _____

By: _____
Larimer County Clerk and Recorder



 **VICINITY MAP**
1" = 2000'

SURVEYOR'S STATEMENT

I, Robert C. Tessely, a Colorado Registered Professional Land Surveyor, do hereby state that this map of land proposed to be rezoned in the County of Larimer, State of Colorado was prepared under my direct supervision from existing documents of record and that the same is true and correct to the best of my knowledge, information and belief.

For and on behalf of Northern Engineering Services, Inc.
Robert C. Tessely
Colorado Registered Professional Land Surveyor No. 38470

DRAFT
03-01-23
PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION

NOTICE:
According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years after the date of the certificate shown herein.

SECTION: 22	TOWNSHIP: 4 N	RANGE: 69 W of the 6th PM
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**NORTHERN
ENGINEERING**

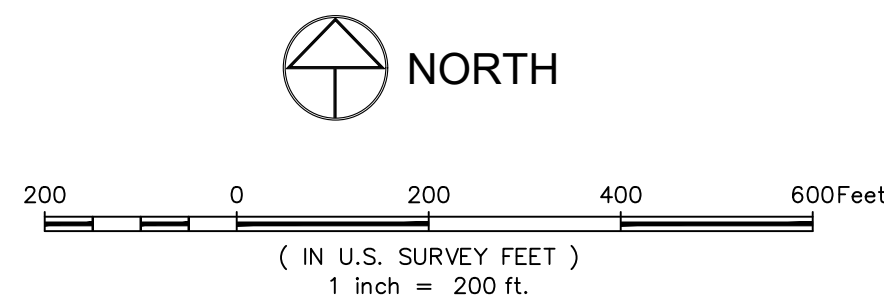
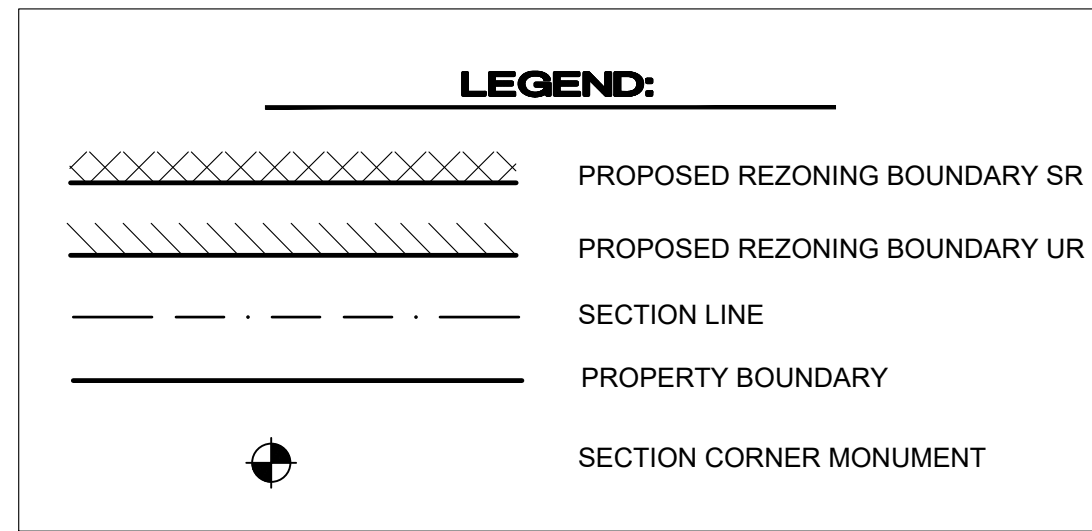
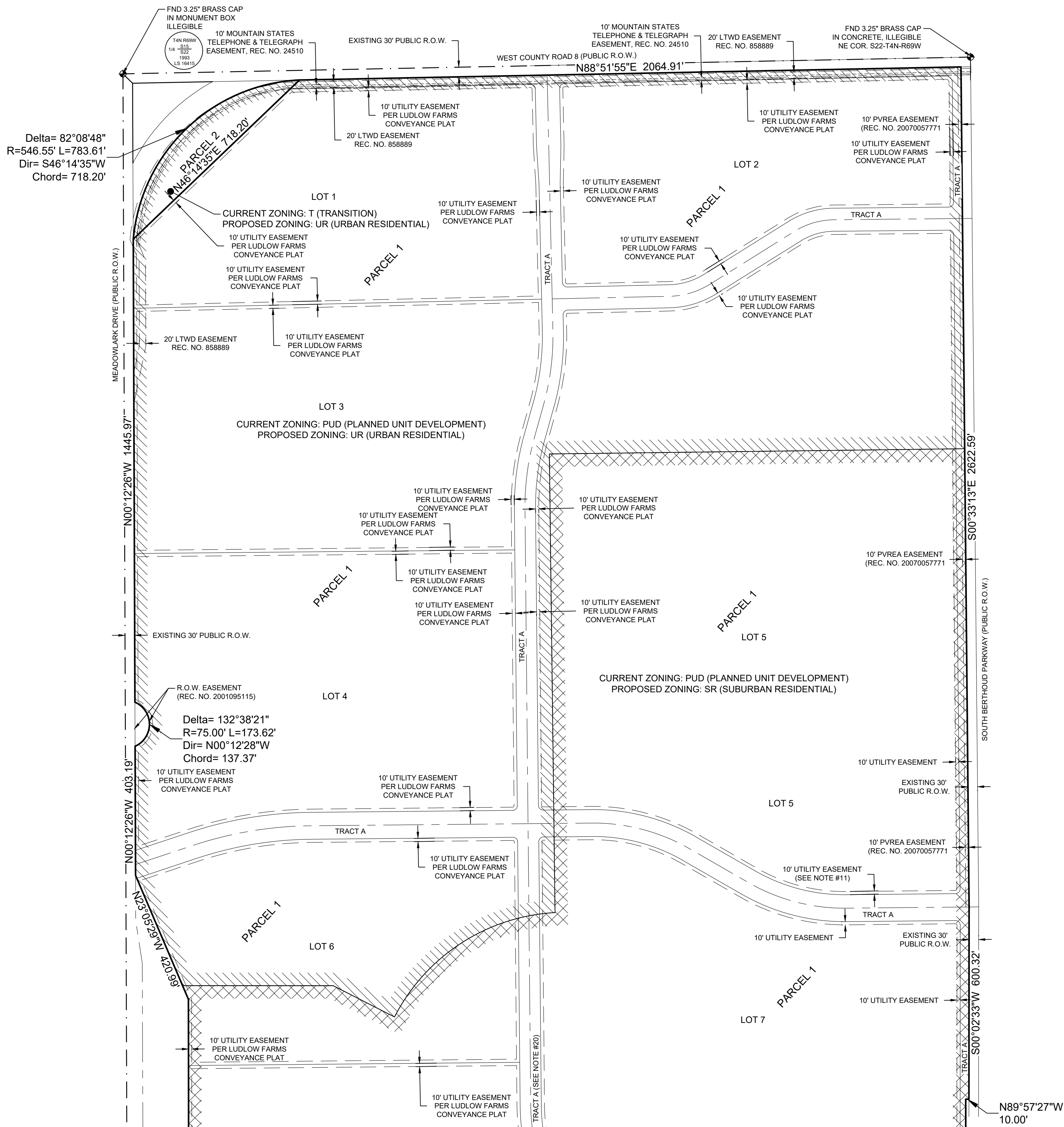
SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.231.1188
NORTHERNENGINEERING.COM

PROJECT: 1659-001	DATE: 03/01/23	SCALE: As shown	REVIEWED BY: R. Tessely
CLIENT: LUDLOW FARMS LLC	DRAWN BY: M. Kinode		

LUDLOW FARMS REZONE MAP
TOWN OF BERTHOUD
LARIMER COUNTY, COLORADO

LUDLOW FARMS REZONE MAP

LOCATED IN THE EAST HALF OF SECTION 22, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M.,
TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO



DRAFT
03-01-23
PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION

PRELIMINARY

For and on behalf of Northern Engineering Services, Inc.
Robert C. Tesseley
Colorado Registered Professional Land Surveyor No. 38470

NOTICE:
According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years after the date of the certificate shown herein.

SECTION:
22
TOWNSHIP:
4 N
RANGE:
69 W of the 6th PM

NORTHERN ENGINEERING
SURVEY | MUNICIPAL | LAND DEVELOPMENT
FORT COLLINS | GREELEY 970.221.1188
NORTHERNENGINEERING.COM

PROJECT:
1859-001
CLIENT:
LUDLOW FARMS LLC
DATE:
03/01/23
SCALE:
1" = 200'
REVIEWED BY:
R. Tesseley

LUDLOW FARMS REZONE MAP
TOWN OF BERTHOUD
LARIMER COUNTY, COLORADO

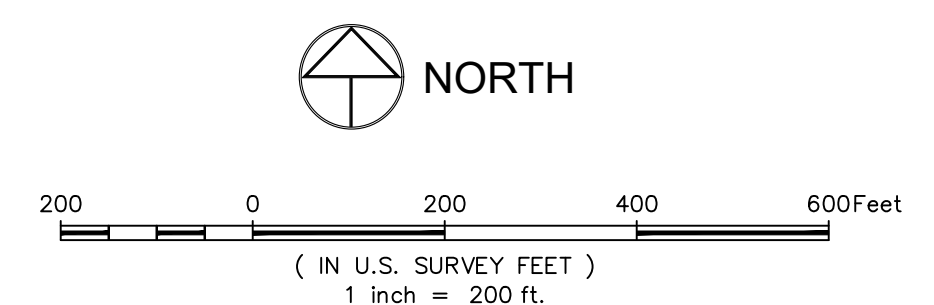
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2
Of 3 Sheets

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LIST OF REVISIONS: [None]

LOCATED IN THE EAST HALF OF SECTION 22, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M.,
TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

[illegible]

	PROPOSED REZONING BOUNDARY SR
	PROPOSED REZONING BOUNDARY UR
	SECTION LINE
	PROPERTY BOUNDARY
	SECTION CORNER MONUMENT



DRAFT
03-01-23
**PRELIMINARY - NOT FOR CONSTRUCTION,
RECORDING PURPOSES OR IMPLEMENTATION**

PRELIMINARY

For and on behalf of Northern Engineering Services, Inc.

For and on behalf of Northern Engineering Services, Inc.
Robert C. Tessely
Colorado Registered Professional Land Surveyor No. 38470

NOTICE: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years after the date of the certificate shown herein.

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	2013-2014

TOWN OF BERTHOUD
LARIMER COUNTY, COLORADO

Of 3 Sheets

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LAYOUT NAME: Sheet 3
DATE: Feb 28, 2023 - 3:03pm CAD OPERATOR: mike
LIST OF XREFS: [NES-border-Rezone]

Transportation Impact Study Town of Berthoud

January 3, 2023
Original September 15, 2022

Prepared for:
Ludlow Farms LLC

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1 INTRODUCTION

This report documents the results of a study to evaluate the potential traffic impacts of the proposed Ludlow Farm Neighborhood Master Plan (NMP) in the Town of Berthoud. Rollins Consult LLC conducted the study as required for the project's development application. This study will focus on long range transportation conditions. As each phase of the proposed project is submitted, a transportation study will be performed.

PROJECT DESCRIPTION

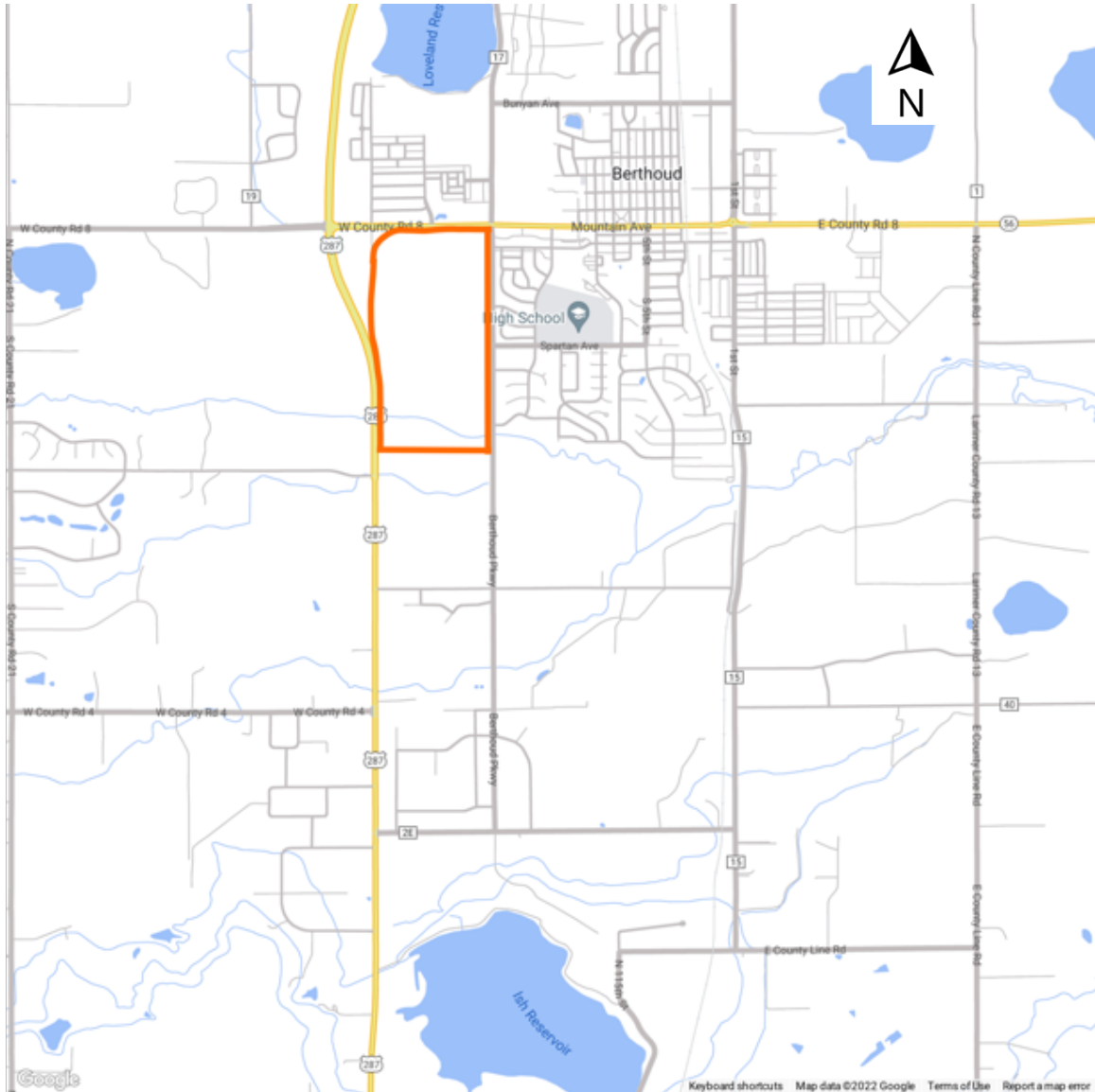
The proposed Ludlow Farm project is located to the west of downtown Berthoud. The project site is located to the south of Mountain Avenue and east of the intersection of US 287. Figure 1 illustrates the project location and the study area. The site is currently undeveloped.

A potential project site is depicted on Figure 2. The site will be developed in numerous phases. The project was modeled with the following land uses and transportation elements:

- The potential for 526 single family homes and 1,353 multi-family dwelling units, dispersed throughout the site.
- 165,700 square feet of commercial located south of Mountain Avenue and at the intersection of US 287 and Spartan Avenue.
- A daycare center is located central to the site.
- 30,000 square feet of office use.
- The extension of Spartan Avenue from Berthoud Parkway to the west with a connection to US 287.

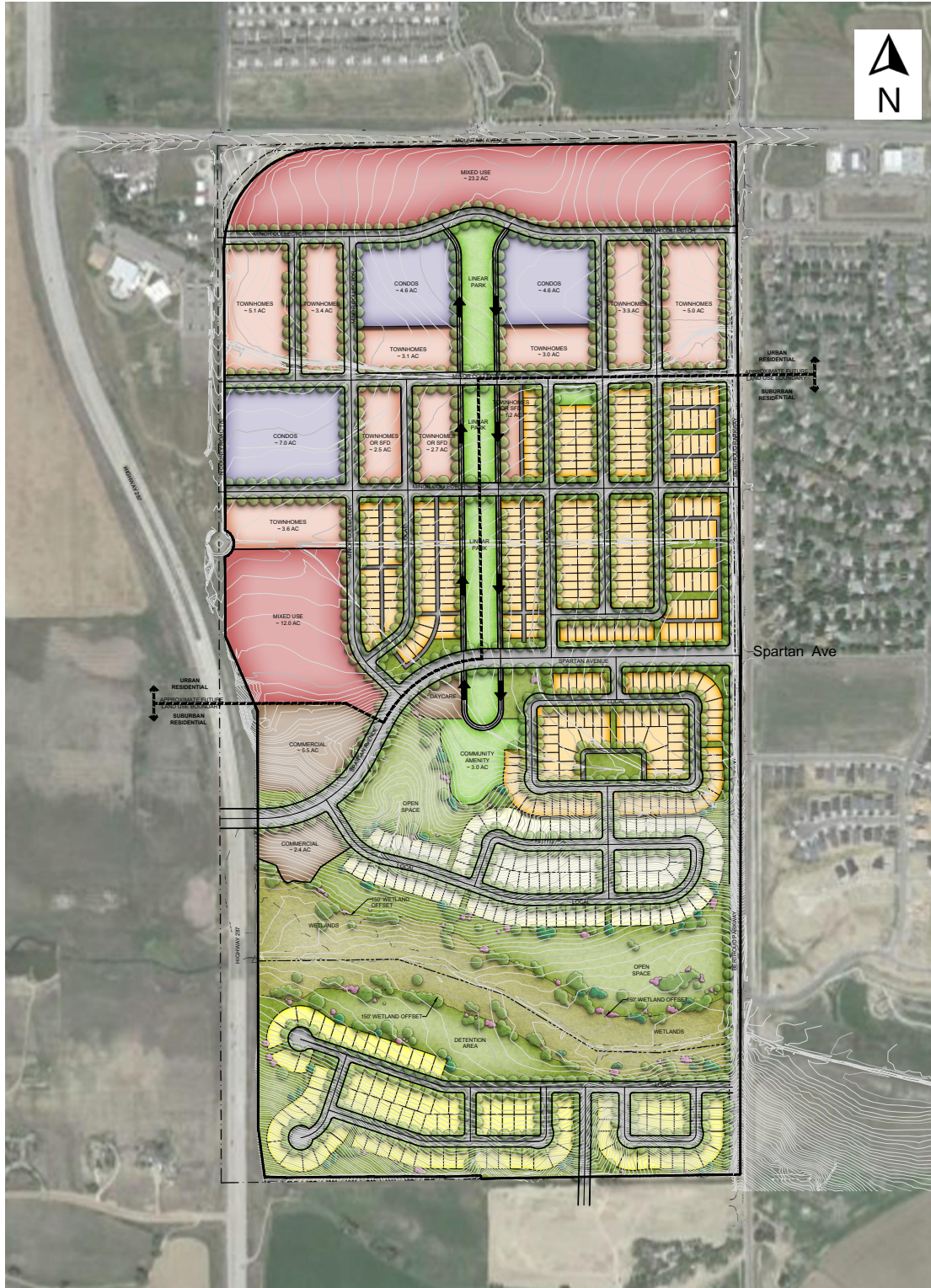
LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Figure 1 – Project Location



LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Figure 2 – Site Plan



STUDY SCOPE

The scope of work for this study was developed in conjunction with the Town of Berthoud's traffic engineering consultant. The base assumptions, technical methodologies, and geographic coverage of the study were all identified as part of the study approach. The study analyzes the potential project-generated traffic impacts on the adjacent street system.

The study evaluates the transportation system after the completion of the proposed Ludlow Farm development for the year 2042. The following transportation scenarios were analyzed for the AM and PM peak hours:

- **Existing Conditions** – The analysis of existing traffic conditions provides a basis for the remainder of the study. The existing transportation system is described. Peak hour intersection operations are evaluated.
- **Project Travel Demand** – The traffic generated by the Project will be estimated, distributed, and assigned to the transportation network.
- **2042 Background Conditions** – Future traffic conditions are projected without the proposed Project for the buildout year 2042. The background traffic will include overall growth in traffic within the area and traffic from proposed development projects near the site.
- **Total Future Conditions** – The traffic associated with the Project will be added to the Background traffic. The intersection operations will be determined.
- **Auxiliary Lanes** – The need for left-turn and right-turn lanes at the project access point will be evaluated.

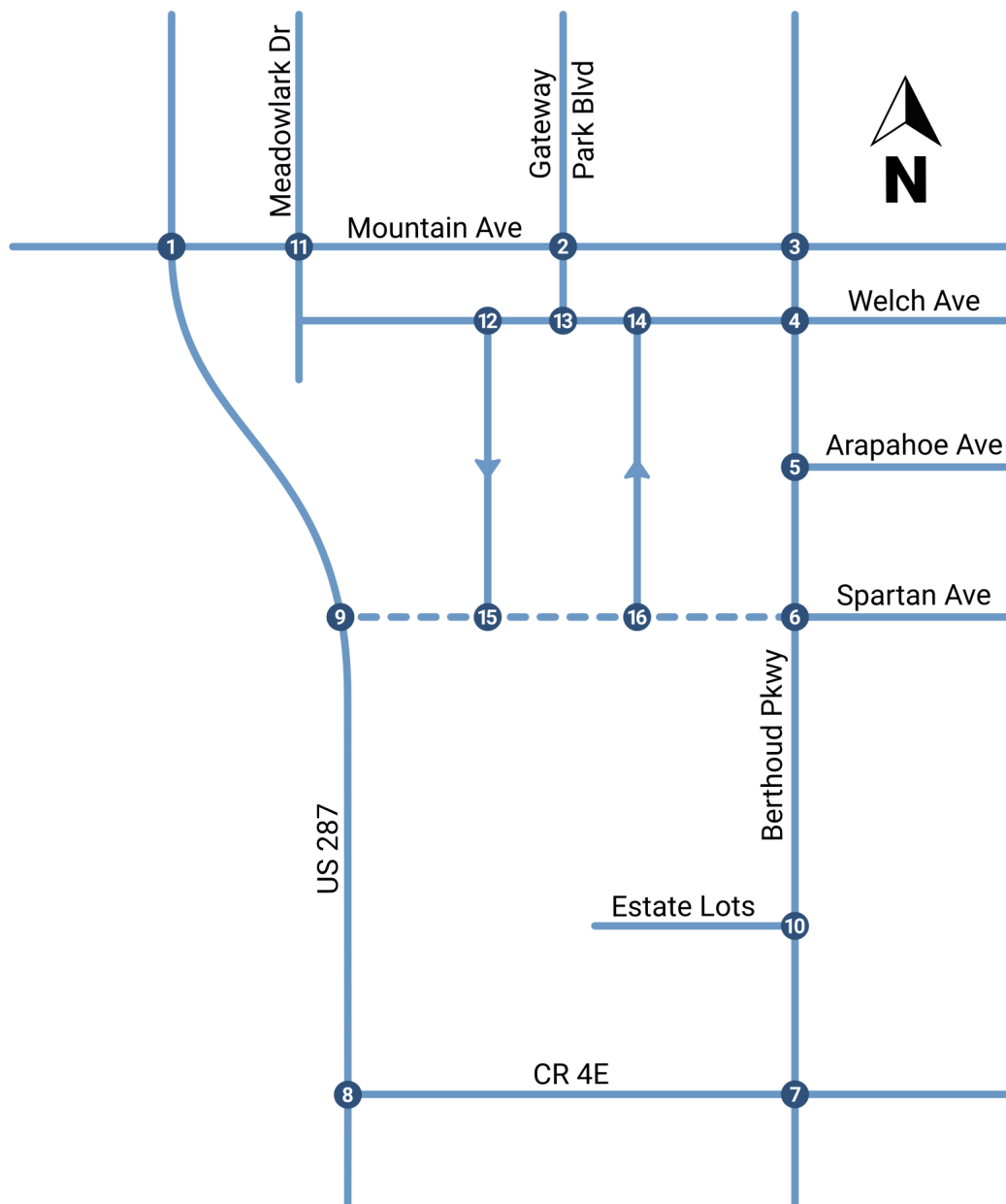
The study examined nine existing intersections, two planned project access streets, and five internal intersections along the proposed one-way streets. The study intersections are depicted on Figure 3. These were identified by the Town for inclusion in the study. The study intersections are listed below.

1. US 287 at Mountain Avenue
2. Gateway Park Boulevard at Mountain Avenue
3. Berthoud Parkway at Mountain Avenue
4. Berthoud Parkway at Welch Avenue
5. Berthoud Parkway at Arapahoe Avenue
6. Berthoud Parkway at Spartan Avenue
7. Berthoud Parkway at CR 4E
8. US 287 at CR 4E
9. US 287 at Spartan Avenue (future)
10. Berthoud Parkway at Estate Lot Access (future)

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

11. Meadowlark Drive at Mountain Avenue
12. Southbound One-Way at Welch Avenue (future)
13. Gateway Park Boulevard at Welch Avenue (future)
14. Northbound One-Way at Welch Avenue (future)
15. Southbound One-Way at Spartan Avenue (future)
16. Northbound One-Way at Spartan Avenue (future)

Figure 3 – Study Intersections



2 EXISTING CONDITIONS

The transportation system has numerous elements that are described in this chapter. The roadway network is described, and traffic volume information is presented for the study intersections.

ADJACENT LANDUSE

The Project site is located east of US 287 and south of Mountain Avenue. East of the project site is commercial use and residential. To the west is rural undeveloped land. South of the future Ludlow Farm is residential uses. North of the site is residential and proposed commercial.

TRANSPORTATION NETWORK

The primary roadways that serve the Project site are described below. Roadway designations were provided in the Town of Berthoud *Transportation Plan Map*, 2021.

Roadway Network

US 287 is a north-south state highway that connects cities within northern Colorado from Fort Collins south to Longmont. US 287 is a four-lane highway with paved shoulders and room for a center left-turn lane. The speed limit in the study area is 65 mph.

Meadowlark Drive is a north-south two-lane local street. There is a striped shoulder and no sidewalks. North of Mountain Avenue, where development has occurred there are sidewalks.

Gateway Park Boulevard is a two-lane north-south local street. There are bike lanes and sidewalks on both sides of Gateway Park Boulevard north of Tundra Avenue. Near Mountain Avenue, there are sidewalks on the east side of the street.

Berthoud Parkway is a north-south two-lane roadway. This major collector is currently posted with a 35 to 40 mph speed limit. There are no auxiliary lanes on the road currently. Berthoud Parkway is classified as a two-lane Arterial north of Mountain Avenue and a Major Collector south of Mountain Avenue. There is a pedestrian/bike trail north of Mountain Avenue on the east side of Berthoud Parkway. To the south of Mountain Avenue, there is a paved shoulder. There are sidewalks adjacent to developed sections.

Mountain Avenue is a two-lane east-west roadway that runs through downtown Berthoud. This road is also SH 56. It is classified as a two-lane Arterial. There are paved shoulders and a sidewalk on the north side adjacent to existing residential areas. The speed limit is posted at 45 mph adjacent to the project site and 50 mph west of US 287.

Welch Avenue is a two-lane east-west road that provides access to commercial areas along Mountain Avenue and adjacent residential areas. The speed limit is posted at

25 mph. There are sidewalks on both sides of the street. Welch Avenue is classified as a local street.

Arapahoe Avenue is a two-lane east-west local street. It has sidewalks on both sides of the street. The speed limit is 25 mph.

Spartan Avenue is a two-lane east-west roadway. It provides access to adjacent residential uses and the Berthoud High School. Spartan is classified as a minor collector east of Berthoud Parkway. The Town has identified Spartan to extend to the west and connect to US 287. The speed limit is 30 mph.

CR 4E is a two-lane east-west road that borders the south of the Project site. It is identified as a major collector. The speed limit is posted at 45 mph.

Pedestrian, Bicycle, and Transit Network

The location of pedestrian and bicycle lanes adjacent to the roads is described above. As areas develop they will include bike lanes and sidewalks within their public rights-of-way. Berthoud has identified two pedestrian/bike trails within the Ludlow project. These are identified in the Town's *Berthoud Unified Trail Master Plan*, June 2018. One is an east/west trail to be located in the southern area of the site and the other is a north/south trail on the western edge of the site.

Berthoud is served by Transfort's Flex service. This is a regional bus that serves the communities of Fort Collins, Loveland, Berthoud, Longmont, and Boulder. There are stops on Mountain Avenue at 2nd and 3rd Streets. Berthoud also operates the Berthoud Area Transportation Service (BATS). It offers door-to-door service within Berthoud and offers service to Loveland and Longmont.

EXISTING TRAFFIC CONDITIONS

Existing intersection operations were evaluated for both the morning and evening peak hours. Intersection count data was collected in June of 2022. These counts were performed at eight of the existing study intersections. Peak hour traffic data on Meadowlark Avenue at Mountain Avenue was obtained from the Traffic Impact Study for Gateway (northeast corner of us 287 and mountain avenue), Aldridge Transportation Consultants, LLC, October 24, 2019.

Appendix A includes the intersection turning movement count data. The counts were compared to peak hour counts conducted when school was in session and the volumes were modified upward to reflect school time conditions. The resulting peak hour turning movement is provided on Figure 4. The current lane configurations of the study intersections are shown on Figure 5.

Figure 4 – Existing Peak Hour Traffic Volumes

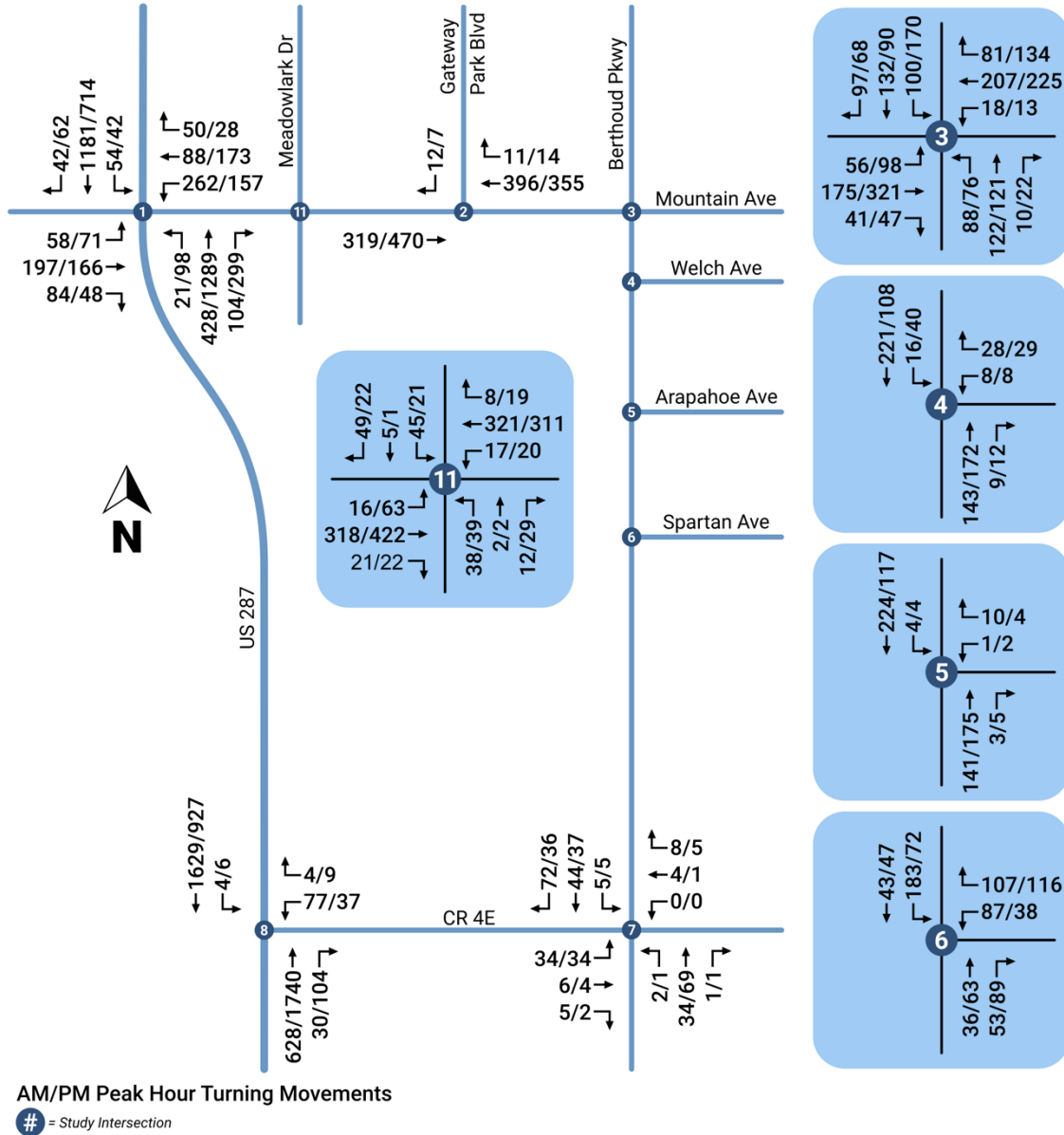
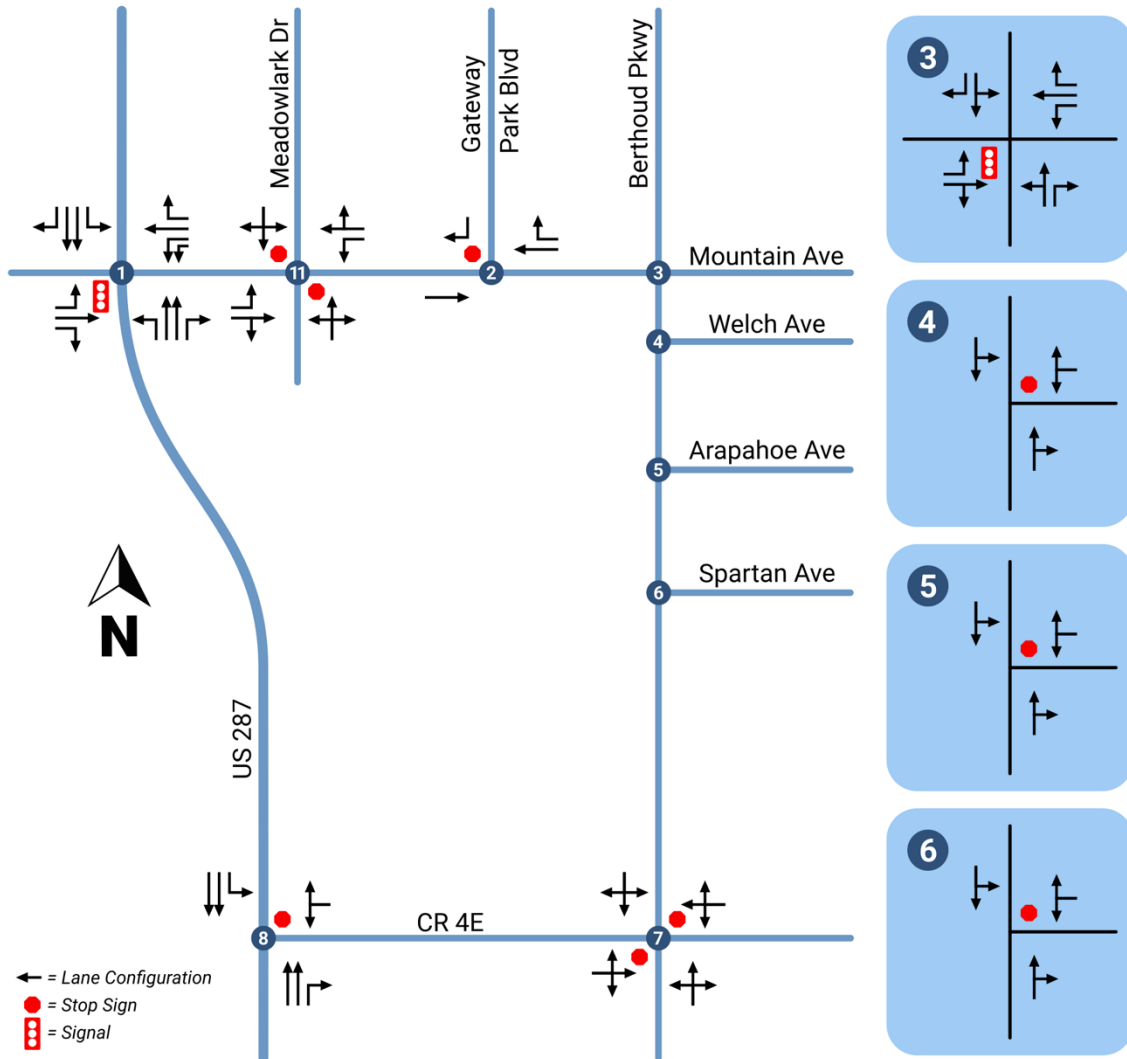


Figure 5 – Existing Lane Configurations



Intersection Level of Service Analysis Methodologies

Transportation professionals evaluate intersections to determine how they are currently operating and will operate in the future. The methods employed can be found in the Transportation Research Board's, 6th Edition, 2016 *Highway Capacity Manual* (HCM). Level of service (LOS) is based on a "graded" system from LOS A, with very little to no delays to LOS F which represents excessive delays and congestion. Table 1 provides the thresholds for acceptable levels of service. The table is from the *Larimer County Urban Area Street Standards* (LCUASS), August 1, 2021.

Table 1
Intersection Level of Service Thresholds

Intersection Component	Major Intersection ¹	Minor Intersection ²	Driveway
Overall (City Limits)	LOS C	LOS C	No Limit
Overall (GMAs)	LOS D	LOS D	No Limit
Any Leg	LOS D	LOS E	No Limit
Any Movement	LOS E	LOS F	No Limit
¹ Includes all signalized and unsignalized arterial/arterial and arterial/ major collector intersections. ² Includes all unsignalized intersections (except major intersections) and high volume driveways ³ There are no LOS standards for I-25 Interchanges. ⁴ On State Highways, overall LOS D is acceptable.			

Signalized Intersection

Peak hour levels of motor vehicle delay at signalized intersections were estimated using methods provided in the HCM. This operations analysis method uses various intersection characteristics (such as traffic volumes, lane geometry, and signal phasing) to estimate the average control delay experienced by motorists traveling through an intersection. Table 2 summarizes the relationship between the average control delay per vehicle and LOS for signalized intersections.

Table 2
Signalized Intersection Level of Service Definitions

Level of Service	Average Control Delay Per Vehicle (Seconds)	Description
A	≤ 10.0	Free Flow or Insignificant Delays: Operations with very low delay, when signal progression is extremely favorable and most vehicles arrive during the green light phase. Most vehicles do not stop at all.
B	> 10.0 and ≤ 20.0	Stable Operation or Minimal Delays: Generally, occurs with good signal progression and/or short cycle lengths. More vehicles stop than with LOS A, causing higher levels of average delay. An occasional approach phase is fully utilized.
C	> 20.0 and ≤ 35.0	Stable Operation or Acceptable Delays: Higher delays resulting from fair signal progression and/or longer cycle lengths. Drivers begin having to wait through more than one red light. Most drivers feel somewhat restricted.
D	> 35.0 and ≤ 55.0	Approaching Unstable or Tolerable Delays: Influence of congestion becomes more noticeable. Longer delays result from unfavorable signal progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop. Drivers may have to wait through more than one red light. Queues may develop, but dissipate rapidly, without excessive delays.
E	> 55.0 and ≤ 80.0	Unstable Operation or Significant Delays: Considered to be the limit of acceptable delay. High delays indicate poor signal progression, long cycle lengths, and high volume to capacity ratios. Individual cycle failures are frequent occurrences. Vehicles may wait through several signal cycles. Long queues form upstream from intersection.
F	> 80.0	Forced Flow or Excessive Delays: Occurs with oversaturation when flows exceed the intersection capacity. Represents jammed conditions. Many cycle failures. Queues may block upstream intersections.

Source: Transportation Research Board, Highway Capacity Manual, 2016.

Unsignalized Intersection

Peak hour levels of motor vehicle delay at unsignalized intersections were estimated using the method from Chapter 17 of the 2016 *Highway Capacity Manual*. The delays for the entire intersection and the movement and/or approach are determined. Table 3 summarizes the relationship between the average control delay per vehicle and LOS for unsignalized intersections.

Table 3
Unsignalized Intersection Level of Service Definitions

Level of Service	Average Control Delay Per Vehicle (Seconds)	Description
A	≤ 10.0	No delay for stop-controlled approaches.
B	10.0 and ≤ 15.0	Operations with minor delay.
C	> 15.0 and ≤ 25.0	Operations with moderate delays.
D	> 25.0 and ≤ 35.0	Operations with increasingly unacceptable delays.
E	> 35.0 and ≤ 50.0	Operations with high delays, and long queues.
F	> 50.0	Operations with extreme congestion, and with very high delays and long queues unacceptable to most drivers.

Source: Transportation Research Board, Highway Capacity Manual, 2016

Existing Intersection Conditions

Using the HCM methodology, the weekday AM, and PM peak hour intersection operations were determined. The results are provided in Table 4. The Town's LOS thresholds, provided in Table 1, were utilized to evaluate existing operations. As indicated in Table 4, the study intersections are currently operating at acceptable levels of service. The detailed analysis worksheets are provided in Appendix B. It should be noted that at US 287/CR 4E the westbound direction operates at LOS F, this is a minor intersection, and a LOS F is considered acceptable.

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Table 4
Existing Weekday Peak-Hour Intersection Level of Service

#	Intersection	Overall Movement	Level of Service	
			AM Peak Hr	PM Peak Hr
1	US 287 & Berthoud Parkway Signal	Overall	C	C
		EB LT	D	E
		EB T	E	E
		EB RT	A	A
		WB LT	E	E
		WB T	C	D
		WB RT	A	A
		NB LT	B	B
		NB T	B	C
		NB RT	A	A
		SB LT	B	B
		SB T	C	B
		SB RT	A	A
2	Gateway PK Blvd & Mountain Ave Right-In-Right-Out	Overall	A	A
		SB RT	B	B
3	Berthoud Pkwy & Mountain Ave Signal	Overall	B	B
		EB LT	A	B
		EB T/RT	B	B
		WB LT	A	A
		WB T	B	C
		WB RT	A	A
		NB LT/T	B	B
		NB RT	A	A
		SB LT/T	B	B
		SB RT	A	A

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

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Table 4 (continued)
Existing Weekday Peak-Hour Intersection Level of Service

#	Intersection	Overall Movement	Level of Service	
			AM Peak Hr	PM Peak Hr
4	Berthoud Pkwy & Welch Ave T-Stop	Overall	A	A
		WB LT/RT	B	B
		SB LT	A	A
5	Berthoud Pkwy & Arapahoe Ave T-Stop	Overall	A	A
		WB LT/RT	A	A
		SB LT	A	A
6	Berthoud Pkwy & Spartan Ave T-Stop	Overall	A	A
		WB LT/RT	C	B
		SB LT	A	A
7	Berthoud Pkwy & CR 4E Two-Way Stop	Overall	A	A
		NB LT	A	A
		EB Approach	A	A
		WB Approach	A	A
		SB LT	A	A
8	US 287 & CR 4E T-Stop	Overall	A	A
		WB Approach	F	F
		SB LT	A	C
11	Meadowlark Dr & Mountain Ave Two-Way Stop	Overall	A	A
		NB Approach	C	C
		EB LT	A	A
		WB LT	A	A
		SB Approach	C	C

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

3 PROJECT TRAVEL DEMAND

This chapter provides an overview of the project and a description of the travel demand methodology to estimate vehicle trip generation, distribution, and assignment of project-generated traffic along area roadways and intersections.

PROJECT CHARACTERISTICS

The proposed Ludlow Farm project will include various uses. The project is envisioned to be phased. The project site plan is depicted on Figure 2. As shown on the figure, vehicular access to the project will be from locations along Mountain Avenue, Berthoud Parkway, and US 287.

PROJECT TRIP GENERATION

The trip generation characteristics of the project were estimated using data from the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 11th Edition. Table 5 provides the trip generation estimated for the Ludlow Farm project. As indicated in the table, the full buildout of the project will result in an estimated net of 18,835 daily, 815 morning, and 1,445 evening peak hour trips.

The net trips take into account an internal capture (trips that happen within the Ludlow project site) based on the mixture of residential/office/commercial. This estimate was determined based on data from National Cooperative Highway Research Program (NCHRP) Report 285, Enhancing Internal Trip Capture Estimation for Mixed-Use Developments, 2011. Appendix C provides the internal trip calculation worksheets. A 15 percent internal capture was applied to the PM peak hour and relevant daily volumes. The net trips also account for pass by trips on both Mountain Avenue and US 287. Based on data from the ITE *Trip Generation Handbook*, 3rd Edition, 2017. For commercial uses, the pass by trips range from 16% up to 66% and is dependent on the size of the commercial site and its location. A pass by trip is already present on the road. It is therefore not a new trip. Note that at the project's access points, all the trips should be present and no pass by discount is taken.

Table 5
Estimated Trip Generation

ITE Land Use Code & Rates		Project	Project Trip Generation						
Land Use	Land Use Code	Dwelling Units KSF	Daily	AM			PM		
				IN	Out	Total	IN	Out	Total
Single-Family Detached	210	526	4,647	88	250	337	298	175	473
Multi-Family Low Rise	220	1353	8,748	106	336	442	379	223	602
Shop Ctr > 150 KSF	820	165.7	6,133	86	53	139	270	293	563
Day Care Center	565	15	714	87	78	165	78	88	167
General Office	710	30	407	52	7	59	10	51	61
INITIAL TOTAL			20,649	420	723	1,143	1,037	830	1,867
Internal Capture - PM 15%			(280)				(156)	(125)	(280)
Pass-By Trip Reduction Commercial 25%			(1533)				(68)	(73)	(141)
Total Reductions				0	0	0	(224)	(198)	(421)
TOTAL			18,836	420	723	1,143	813	632	1,446

Based on ITE Trip Generation 11th Edition

PROJECT TRIP DISTRIBUTION | ASSIGNMENT

The distribution of the project traffic onto the roadway system was based on the location of the project within Berthoud and northern Colorado, the roadway system, and existing traffic data. The project trip distribution is depicted on Figure 6 and indicates the distribution for residential and commercial/office uses. The resulting peak hour traffic associated with the buildout of Ludlow Farm is shown on Figure 7.

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Figure 6 – Trip Distribution

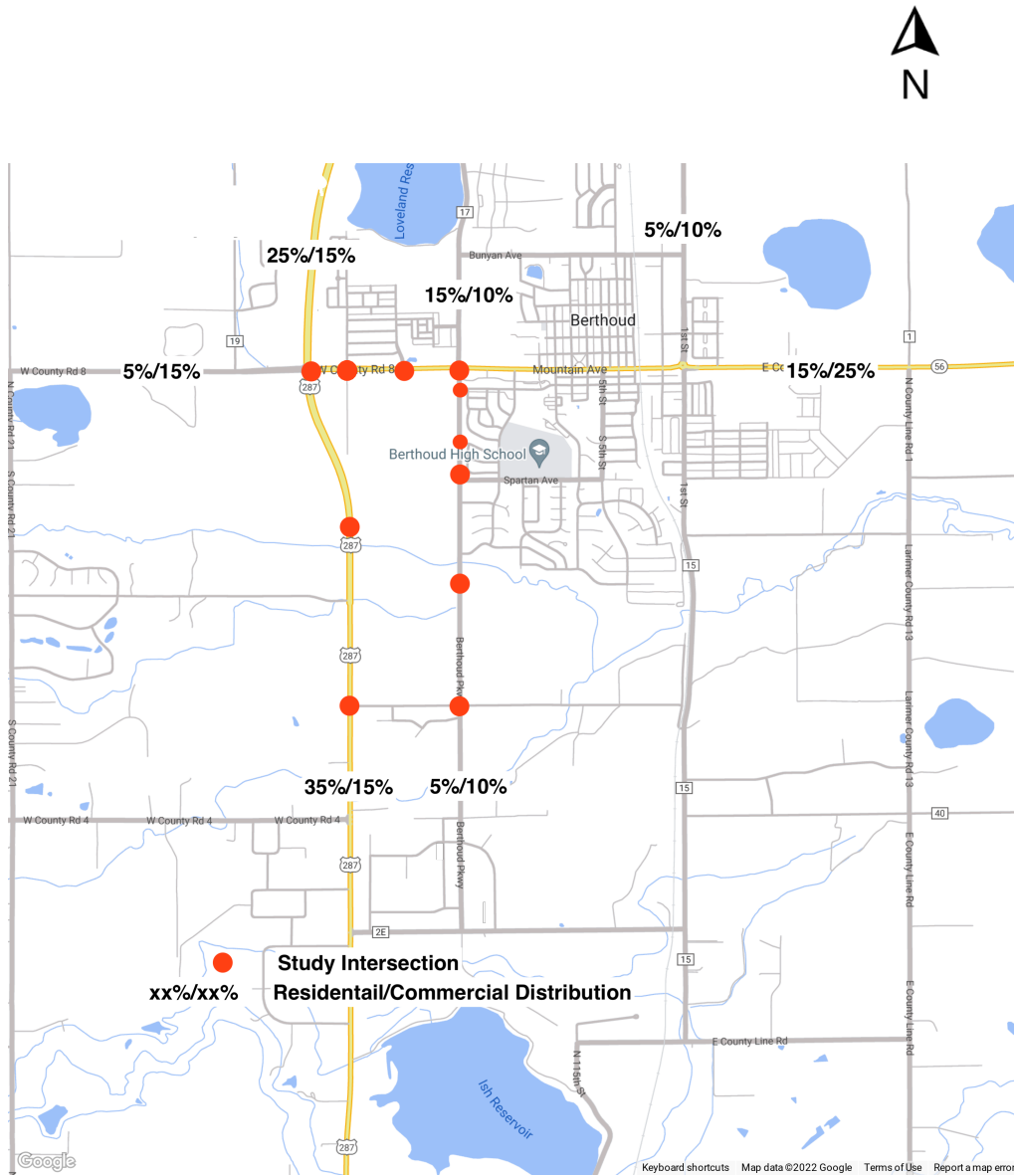
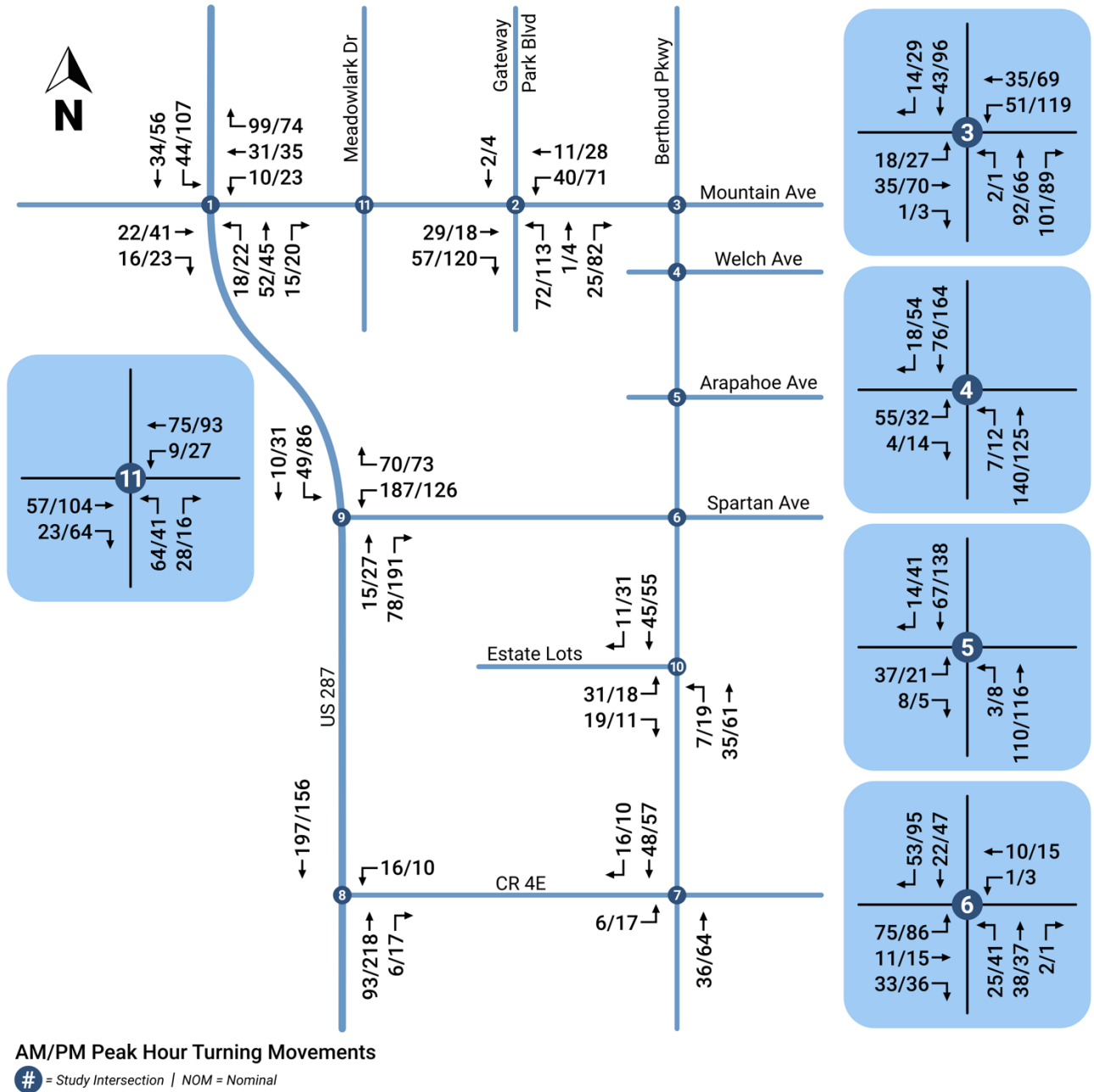


Figure 7 – Project Traffic



4 FUTURE TRAFFIC PROJECTIONS

Estimates of future traffic conditions both with and without the proposed Project were necessary to evaluate the potential impact of the Project on the local street system. The background base traffic scenario represents future traffic conditions without the addition of the Project, while the total scenario represents future traffic conditions with the completion of the proposed Project. These projections were developed for Year 2042. The development of these future traffic scenarios is described in this chapter.

BACKGROUND 2042 TRAFFIC PROJECTIONS

The background traffic projections reflect growth in traffic from two primary sources: ambient growth in the existing traffic volumes due to regional growth both in and outside of the study area, and consideration of traffic generated by nearby planned projects. Each of these elements is described below.

- The **areawide/ambient growth** in traffic was determined based on the direction from the Colorado Department of Transportation (CDOT). The 20 year growth factors were from 1.18 to 1.39. Because numerous other projects' traffic will also be included, a 20 year growth factor of 1.10 was applied.
- The future connection of Spartan Avenue between Berthoud Parkway and US 287 was assumed. Traffic was modified by shifting traffic to this future connection.
- The future traffic related to the **other proposed projects** was added to the background traffic. Three proposed projects were included as follows.
 - Traffic Impact Study for Gateway (northeast corner of US 287 and Mountain Avenue), Aldridge Transportation Consultants, LLC, October 24, 2019
 - Trails at Creekview (northeast corner Berthoud Parkway and CR 4E) Rollins Consult LLC, January 27, 2022.
 - The upcoming Revere project (northwest corner of US 287 and Mountain Avenue) is being prepared by Rollins Consult LLC

The resulting Background 2042 traffic projections for the study intersections are provided on Figure 8.

TOTAL TRAFFIC PROJECTIONS

The total traffic projections include both the background plus project traffic. The project-generated traffic volumes from Figure 7 were added to the Year 2042 background traffic volumes illustrated on Figure 8 to develop background plus project peak hour traffic volumes. The resulting Year 2042 total traffic is depicted on Figure 9.

Figure 8 – Background Traffic 2042

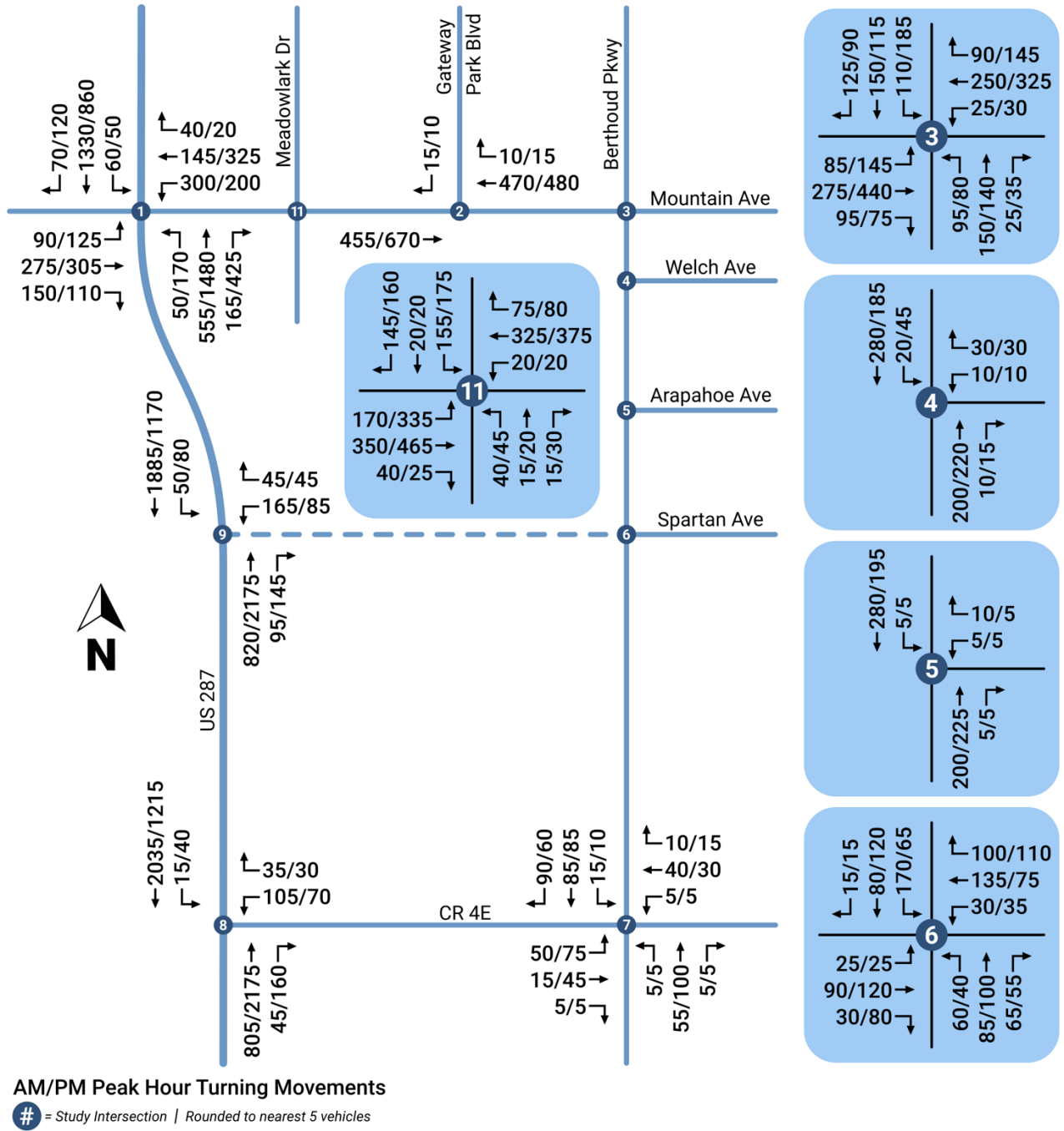
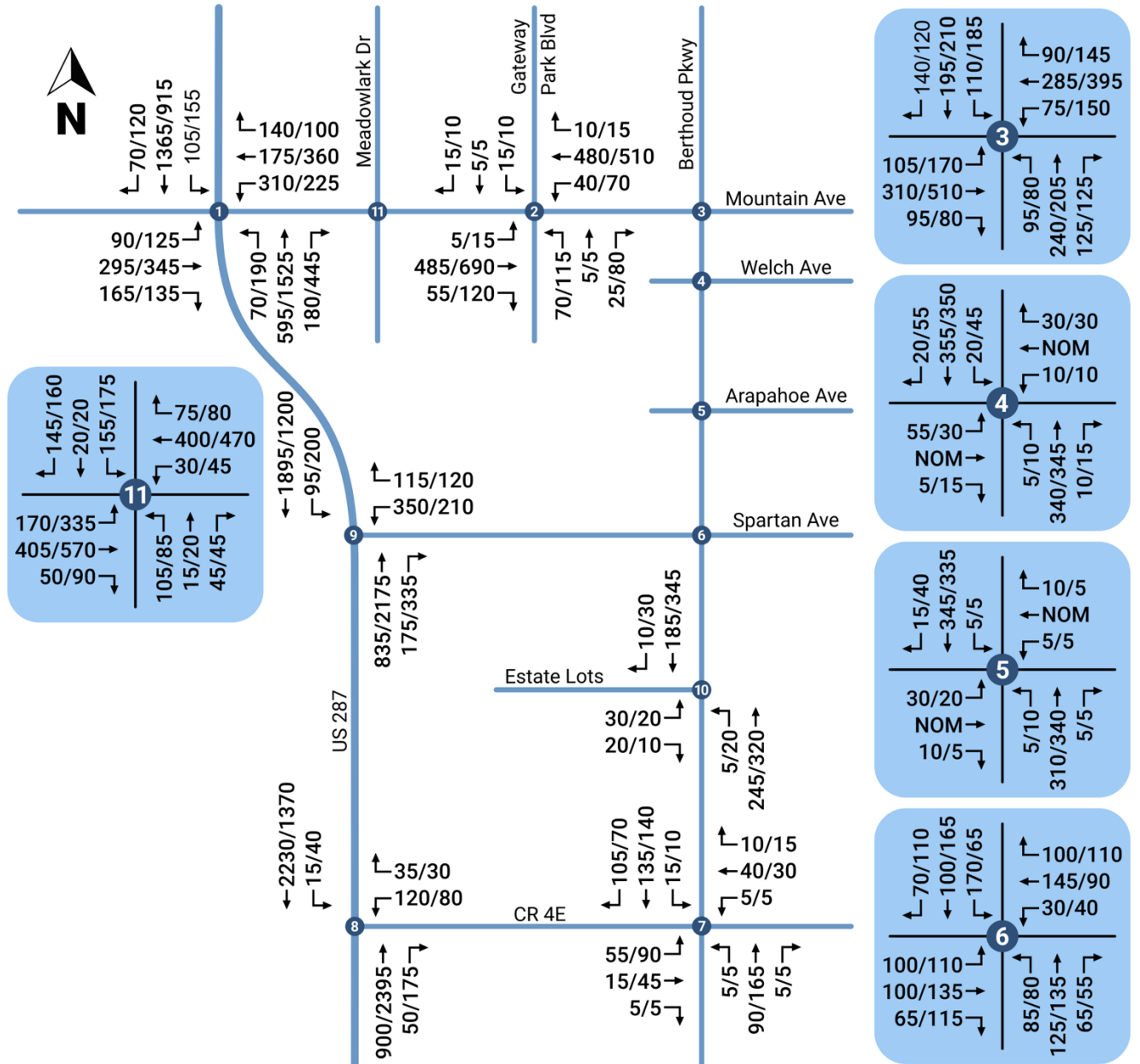


Figure 9 – Total Traffic 2042



5 AUXILIARY LANE ANALYSIS

An analysis was conducted to determine the need for auxiliary turn lanes to the project site from US 287, Mountain Avenue, and Berthoud Parkway.

The guidelines from Figure 8-4 in LCUASS (provided in Appendix D) were applied to the total future projected volumes depicted on Figure 9 for 2042 total traffic conditions. Using the LCUASS criteria, it was determined that several auxiliary lanes satisfy the turn lane criteria. The following lanes are required under 2042 Total conditions.

US 287

- A northbound right-turn lane at Spartan Avenue

Mountain Avenue

- An eastbound right-turn lane at Gateway Park Boulevard

Berthoud Parkway

- A southbound right-turn lane at both Welch and Arapahoe Avenues
- A southbound right-turn lane at Spartan Avenue

These lanes will be assumed for the analysis of the study intersection operations for 2042 conditions. However, for the future roundabout at Berthoud Parkway and Spartan Avenue, it will be assumed that each leg is a single lane.

6 TRAFFIC IMPACT ANALYSIS

This chapter presents an analysis of the potential impacts of the traffic generated by the proposed Ludlow Farm project on the local street system. The analysis compares the projected levels of service at each study intersection under future background and total conditions to estimate the incremental increase in the level of service caused by the proposed Project. This provides the information needed to assess the potential impact of the Project using the acceptable operations criteria.

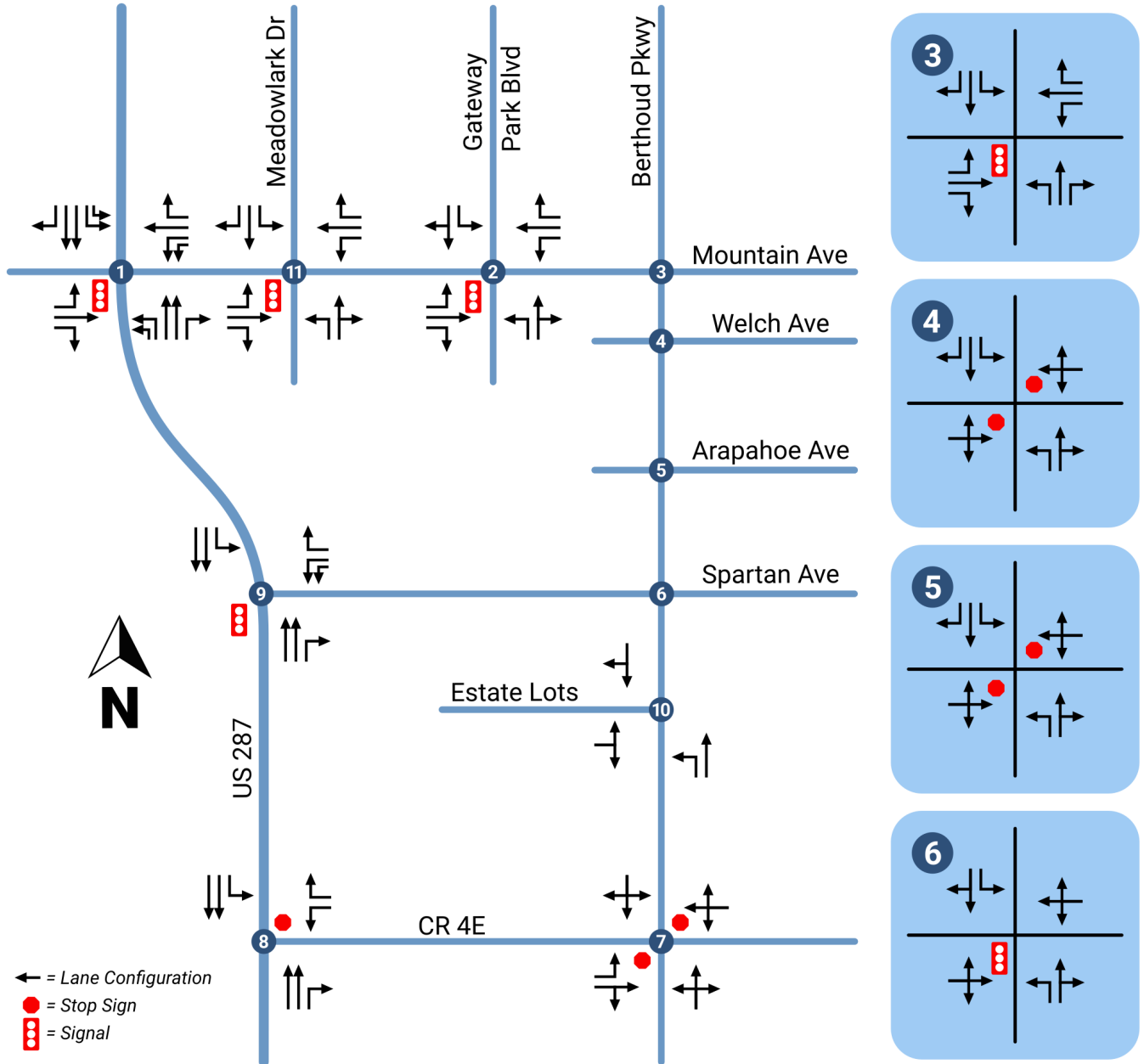
The extension of Spartan Avenue from Berthoud Parkway to US 287 is proposed as part of the project. It should be noted that without this future roadway extension, the future traffic conditions on Mountain Avenue would be over capacity. This is critical for the intersections along Mountain Avenue at US 287 and Berthoud Parkway. This improvement is part of the Ludlow ODP.

FUTURE INTERSECTION TRAFFIC CONDITIONS

The future traffic projections at the eleven external study intersections were analyzed to determine their operating conditions. An analysis of the proposed one-way internal streets is provided in the following section of the report. The analysis of future conditions was performed with both signalized intersections and roundabouts at Berthoud Parkway/Mountain Avenue, Berthoud Parkway/Spartan Avenue, and Gateway Park Boulevard/ Mountain Avenue. The intersection configurations under background 2042 conditions are provided on Figure 10. The analysis results are provided in Table 6 for both background and total conditions (signalized intersection) and in Table 7 for the three potential roundabout intersections. As indicated in Table 6, the intersections are projected to operate within the acceptable limits established by the Town of Berthoud with the following exceptions:

- At the intersection of US 287 and Mountain Avenue, the westbound left-turn and eastbound through movements are projected to experience long delays under both background and total traffic conditions. As traffic volumes on US 287 increase, the cross streets are expected to experience longer delays. Overall, the intersection will operate at an acceptable level of service.
- The intersection of US 287 and CR 4E will operate with high delays and LOS F under background and total traffic conditions. This location may require signalization. The operations with a signal are provided in Table 8 and indicate the intersection would operate at acceptable levels.

Figure 10
2042 Intersection Configurations



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Table 6
2042 Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
1	US 287 & Berthoud Parkway Signal	Overall	C	C	C	D
		EB LT	D	E	D	E
		EB T	E	F	E	F
		EB RT	A	A	A	A
		WB LT	E	F	E	F
		WB T	C	E	C	E
		WB RT	A	A	B	A
		NB LT	D	D	D	D
		NB T	B	C	B	D
		NB RT	A	A	A	A
		SB LT	D	E	D	E
		SB T	C	C	D	C
		SB RT	A	A	A	A
2	Gateway PK Blvd & Mountain Ave Signal	Overall	A	A	B	B
		EB LT	-	-	A	A
		EB T	-	-	B	C
		EB RT	-	-	A	A
		WB LT	-	-	B	C
		WB T	-	-	C	B
		WB RT	-	-	A	A
		NB LT/T	-	-	B	B
		NB RT	-	-	A	A
		SB LT/T	-	-	B	B
		SB RT	B	B	A	B
3	Berthoud Pkwy & Mountain Ave Signal	Overall	B	B	B	B
		EB LT	B	B	B	B
		EB T	C	C	C	C
		EB RT	A	A	A	A
		WB LT	A	A	A	B
		WB T	C	C	C	C
		WB RT	A	A	A	A
		NB LT	B	B	B	B
		NB T	B	B	B	B
		NB RT	A	A	A	A
		SB LT	B	B	B	C
		SB T	B	B	B	B
		SB RT	A	A	A	A

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

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Table 6 (continued)
2042 Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
4	Berthoud Pkwy & Welch Ave T-Stop	Overall	A	A	A	A
		NB LT	-	-	A	A
		EB LT/T/RT	-	-	C	C
		WB LT/T/RT	B	B	B	B
		SB LT	A	A	A	A
5	Berthoud Pkwy & Arapahoe Ave T-Stop	Overall	A	A	A	A
			-	-	A	A
			-	-	C	C
		WB LT/RT	B	B	B	B
		SB LT	A	A	A	A
6	Berthoud Pkwy & Spartan Ave All-Way Stop (Background) Signal (Total)	Overall	B	B	B	B
		EB LT/T/RT	B	B	C	C
		WB LT/T/RT	B	B	B	B
		NB LT	B	B	A	B
		NB T/RT	B	B	A	A
		SB LT	B	B	A	A
		SB T/RT	B	B	A	A
7	Berthoud Pkwy & CR 4E Two-Way Stop	Overall	A	A	A	A
		NB LT	A	A	A	A
		EB LT	B	B	B	B
		EB T/RT	B	B	B	B
		WB Approach	B	B	B	B
		SB LT	A	A	A	A
8	US 287 & CR 4E T-Stop	Overall	D	F	F	F
		WB LT	F	F	F	F
		WB RT	B	D	B	E
		SB LT	B	D	B	E

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

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Table 6 (continued)
2042 Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
9	US 287 & Spartan Ave Signal	Overall	B	C	B	D
		WB LT	D	D	D	D
		WB RT	B	B	A	B
		NB T	A	D	B	D
		NB RT	A	A	A	A
		SB LT	A	C	A	D
		SB T	B	A	C	B
10	Berthoud Pkwy & Estate Lot Access T-Stop	Overall	-	-	A	A
		NB LT	-	-	A	A
		EB LT/RT	-	-	B	B
11	Meadowlark Dr & Mountain Ave Signal	Overall	B	B	B	B
		EB LT	B	B	B	B
		EB T/RT	B	B	-	-
		EB T	-	-	B	B
		EB RT	-	-	A	A
		WB LT	B	A	B	B
		WB T	B	B	C	B
		WB RT	A	A	A	A
		NB L/T/R	B	C	-	-
		NB LT	-	-	C	D
		NB T/RT	-	-	A	B
		SB LT	C	D	C	D
		SB T	B	C	B	D
		SB RT	A	A	A	A

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement

Table 7 - Roundabout
2042 Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
2	Gateway Park Blvd & Mountain Ave Roundabout	Overall	-	-	A	B
		EB LT/T	-	-	A	A
		EB RT	-	-	A	A
		WB LT/T/RT	-	-	A	A
		NB LT/T/RT	-	-	A	A
		SB LT/T/RT	-	-	A	A
3	Berthoud Pkwy & Mountain Ave Roundabout	Overall	B	C	A	C
		EB LT/T	B	D	A	E
		EB RT	A	A	A	A
		WB LT/T/RT	B	C	-	-
		WB LT/T	-	-	A	C
		WB RT	-	-	A	A
		NB LT/T/R	B	C	-	-
		NB LT/T	-	-	B	C
		NB RT	-	-	A	A
		SB LT/T/RT	B	C	-	-
		SB LT/T	-	-	A	C
		SB RT	-	-	A	A
6	Berthoud Pkwy & Spartan Ave Roundabout	Overall	A	A	A	A
		EB Entry	A	A	A	A
		WB Entry	A	A	A	A
		NB Entry	A	A	A	A
		SB Entry	A	A	A	A

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach

As indicated in Table 7, the intersections are projected to operate within the acceptable limits established by the Town of Berthoud with the following noted operations, at the intersection of Berthoud Parkway and Mountain Avenue the potential roundabout will require two lanes on Mountain Avenue and single lanes with exclusive right-turn lanes on Berthoud Parkway. The eastbound direction has an estimated queue length of 15 vehicles. Pedestrian crossings at this roundabout will be challenging especially for vulnerable users such as youth and older adults.

Table 8
2042 Peak Hour Intersection Level of Service With Improvements

#	Intersection	Overall Movement	Background		Total	
			AM	PM	AM	PM
8	US 287 & CR 4E Signal	Overall	A	A	B	B
		WB LT	D	C	C	C
		WB RT	B	C	C	C
		NB T	A	B	A	B
		NB RT	A	A	A	A
		SB LT	A	A	A	C
		SB T	A	A	B	A

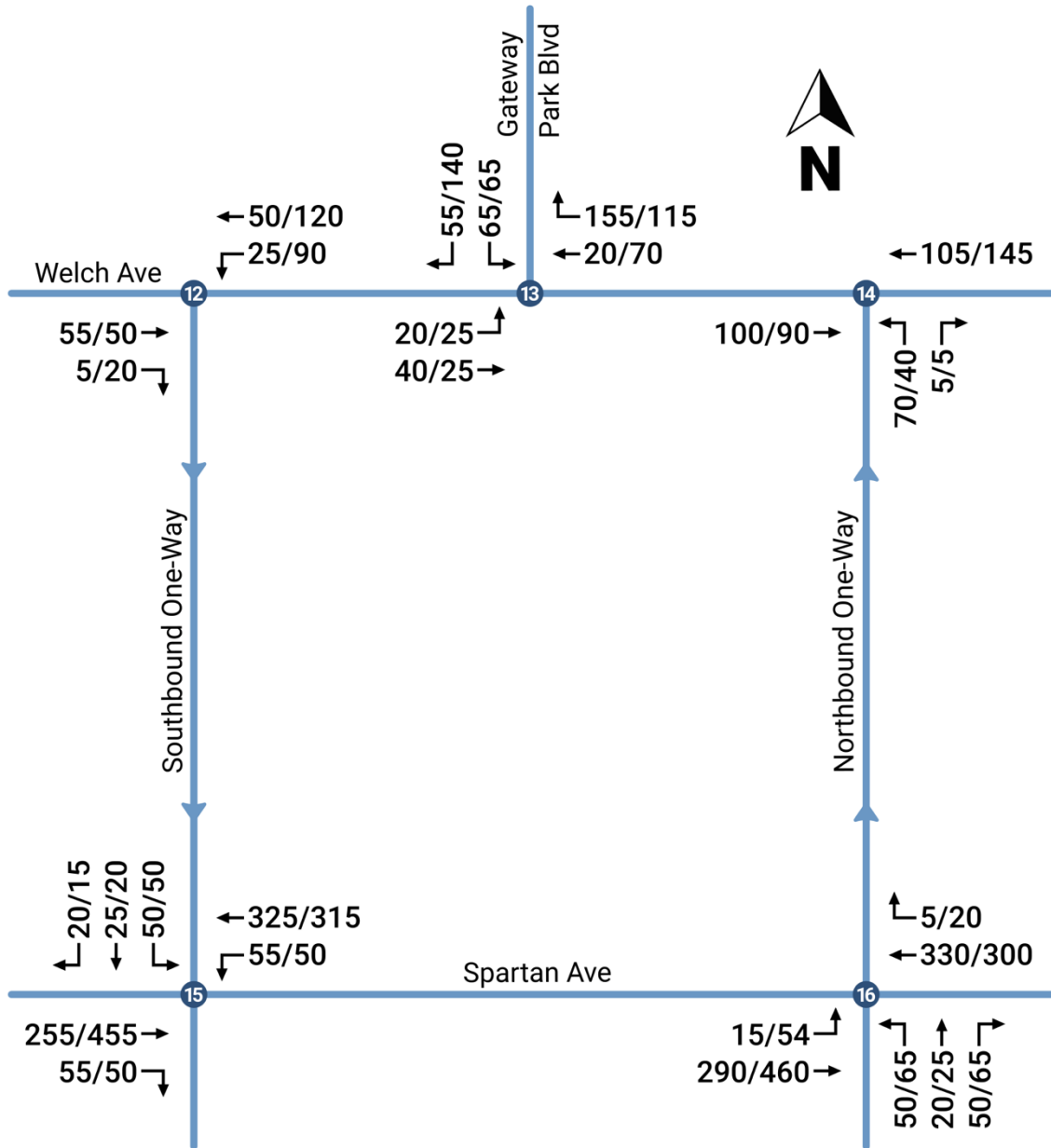
1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach

INTERNAL ONE-WAY STREETS

The core of the Ludlow ODP includes a central park area framed by one-way streets. The intersection of the one-way streets was analyzed on both the north and south ends. The projected traffic volumes are depicted on Figure 11. The expected peak hour volumes were factored upward by 25% to ensure that the intersection spacing and configurations would operate well. The spacing between the one-way pairs along Spartan Avenue is approximately 177 feet (flow line to flow line). Along Welch Avenue between Gateway Park Boulevard and the one-way street the intersection spacing is between approximately 160 and 165 feet (flow line to flow line).

The results of the intersection level of service analysis and queue lengths are provided in Table 9. As indicated in the table, each of the intersections along both Welch Avenue and Spartan Avenue are expected to operate acceptably with the full buildout of the Ludlow ODP. The intersection configurations are provided on Figure 12, no left-turn lanes will be necessary on either Welch or Spartan Avenues. The access spacing as proposed is anticipated to operate with minimal delays and minor vehicular stacking.

Figure 11
2042 One-Way Peak Hour Traffic Volumes



AM/PM Peak Hour Turning Movements

= Study Intersection | Rounded to nearest 5 vehicles

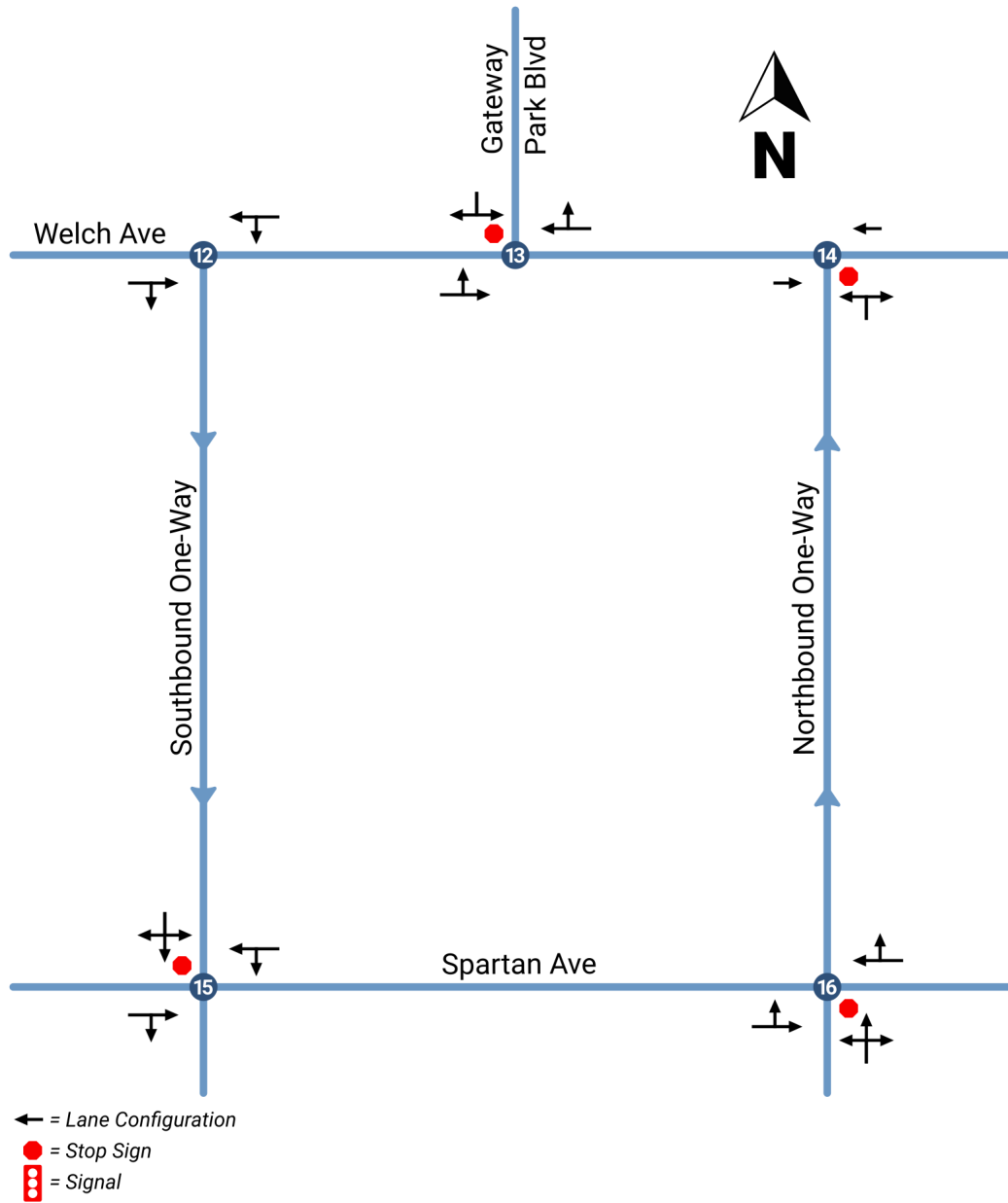
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Table 9
2042 One-Way Peak Hour Intersection Level of Service

#	Intersection	Overall Movement	Level of Service/ Queue(veh)	
			AM Peak Hr	PM Peak Hr
12	SB One-Way & Welch Ave T-Stop	Overall	A	A
		WB LT/T	A / 0.1	A / 0.2
13	Gateway PK Blvd & Welch Ave T-Stop	Overall	A	A
		EB LT/T	A / 0.1	A / 0.1
		SB LT/RT	B / 0.6	B / 1.2
14	NB One-Way & Welch Ave T-Stop	Overall	A	A
		NB LT/RT	B / 0.4	B / 0.2
15	SB One-Way & Spartan Ave T-Stop	Overall	A	A
		WB LT/T	A / 0.2	A / 0.2
		SB LT/T/RT	C / 1.0	C / 1.2
16	NB One-Way & Spartan Ave T-Stop	Overall	A	A
		NB LT/T/RT	B / 1.0	C / 2.3
		EB LT/T	A / 0	A / 0.1

1. LOS calculations performed using Synchro which is based on the Transportation Research Board HCM 2016.
2. LOS is reported for both overall intersection and each constrained STOP-controlled movement or approach.

Figure 12
2042 One-Way Intersection Configurations



7 CONCLUSIONS

This study was undertaken to analyze the potential long range traffic impacts of the proposed Ludlow Farm property in the Town of Berthoud. The following summarizes the results of this analysis:

- The proposed Ludlow Farm project is located south of Mountain Avenue and east of US 287. The site is currently undeveloped.
- The traffic study analyzed the long range 2042 traffic conditions with the full buildout of the project.
- The proposed project includes the extension of Spartan Avenue from Berthoud Parkway to US 287. This future connection will benefit the transportation network and relieve the potential for Mountain Avenue to exceed capacity in the long range future.
- The project was modeled with 526 single family homes and 1,353 multi-family dwellings that are located throughout the site. A total of 165,700 square feet of commercial located adjacent to Mountain Avenue and at US 287/Spartan Avenue. Office uses are proposed at 30,000 square feet. A 15,000 square foot daycare center is also proposed
- The full buildout of the project is anticipated to result in an estimated 18,835 daily, 1,145 morning, and 1,445 evening peak hour trips.
- Currently, the study intersections are at acceptable levels.
- Several right-turn lanes are required to access the project site. These are in the eastbound direction at Gateway Park/Mountain, northbound at US 287/Spartan, and southbound along Berthoud Parkway at Welch, Arapahoe, and Spartan Avenues (unless Spartan Avenue at Berthoud Parkway is a roundabout).
- The study intersections are projected to operate acceptably under the 2042 background and total traffic conditions with the noted exceptions listed below.
- At the intersection of US 287 and Mountain Avenue, the westbound left-turn and eastbound through movements are projected to experience long delays under both background and total traffic conditions. As traffic volumes on US 287 increase, the cross streets are expected to experience longer delays. Overall, the intersection will operate at an acceptable level of service.
- The intersection of Gateway Park Boulevard and Mountain Avenue works both as signalized and a single-lane roundabout with an eastbound right-turn lane.
- The signalized intersection of Berthoud Parkway and Mountain Avenue will operate acceptably. A roundabout will require a thorough/left-turn lane and exclusive free flow right-turn lanes. The free flow right-turn lanes would be similar to the northbound approach at the existing roundabout of 1st Street and Mountain Avenue. Under background conditions, this is required in the

eastbound direction. Under total traffic conditions, each approach requires right turns.

- The intersection of Berthoud Parkway and Spartan Avenue works as both a signalized intersection and a single lane roundabout.
- The intersection of US 287 and CR 4E will operate with high delays and LOS F under background and total traffic conditions. This location may require signalization. The operations with a signal at the intersection would operate at acceptable levels.
- The internal one-way streets that frame the central park will operate at good levels of service at the proposed spacing. No left-turn lanes are required on Welch Avenue and Spartan Avenue where they intersect the one-way street.

APPENDICIES

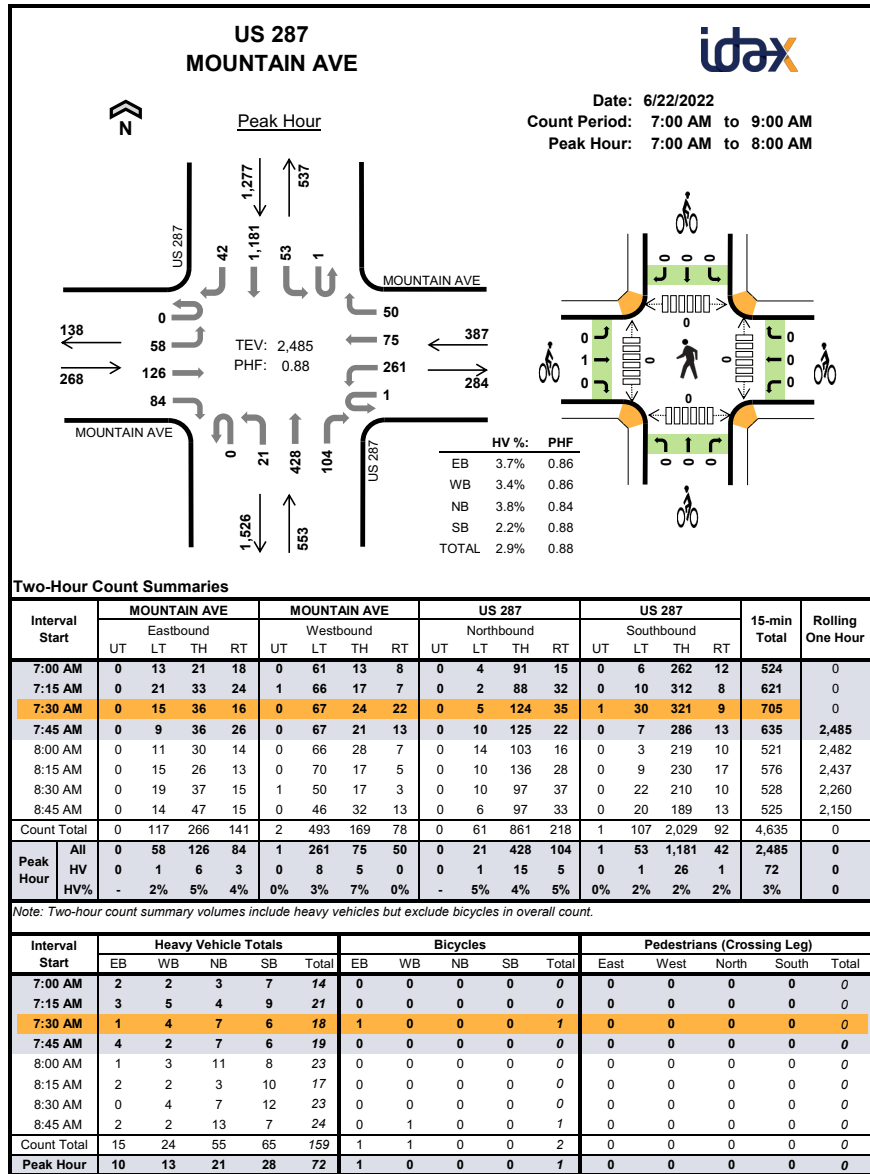
- Appendix A: Intersection Turning Movement Count Data
- Appendix B: Level of Service Worksheets
- Appendix C: NCHRP Internal Trip Capture
- Appendix D: Right-Turn Warrants

Appendix A Intersection Turning Movement Count Data

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Town of Berthoud

www.idaxdata.com



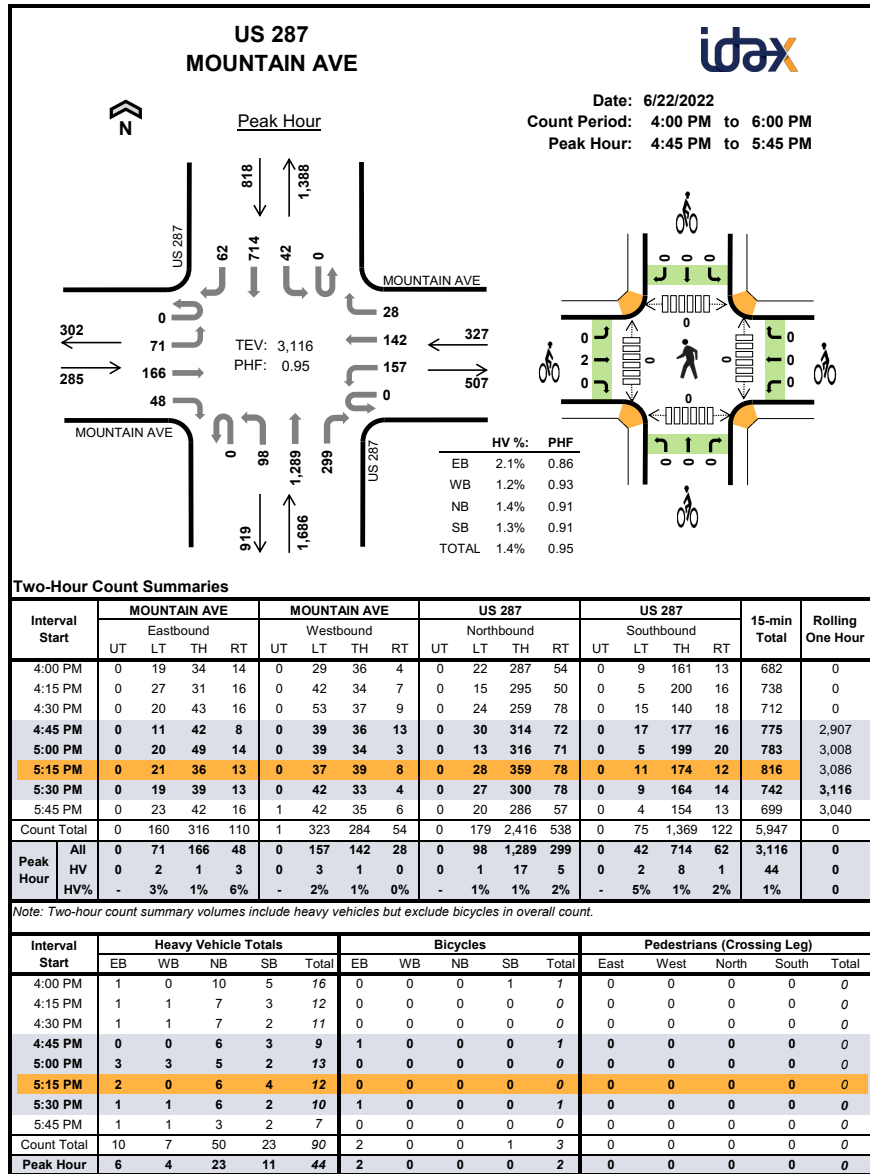
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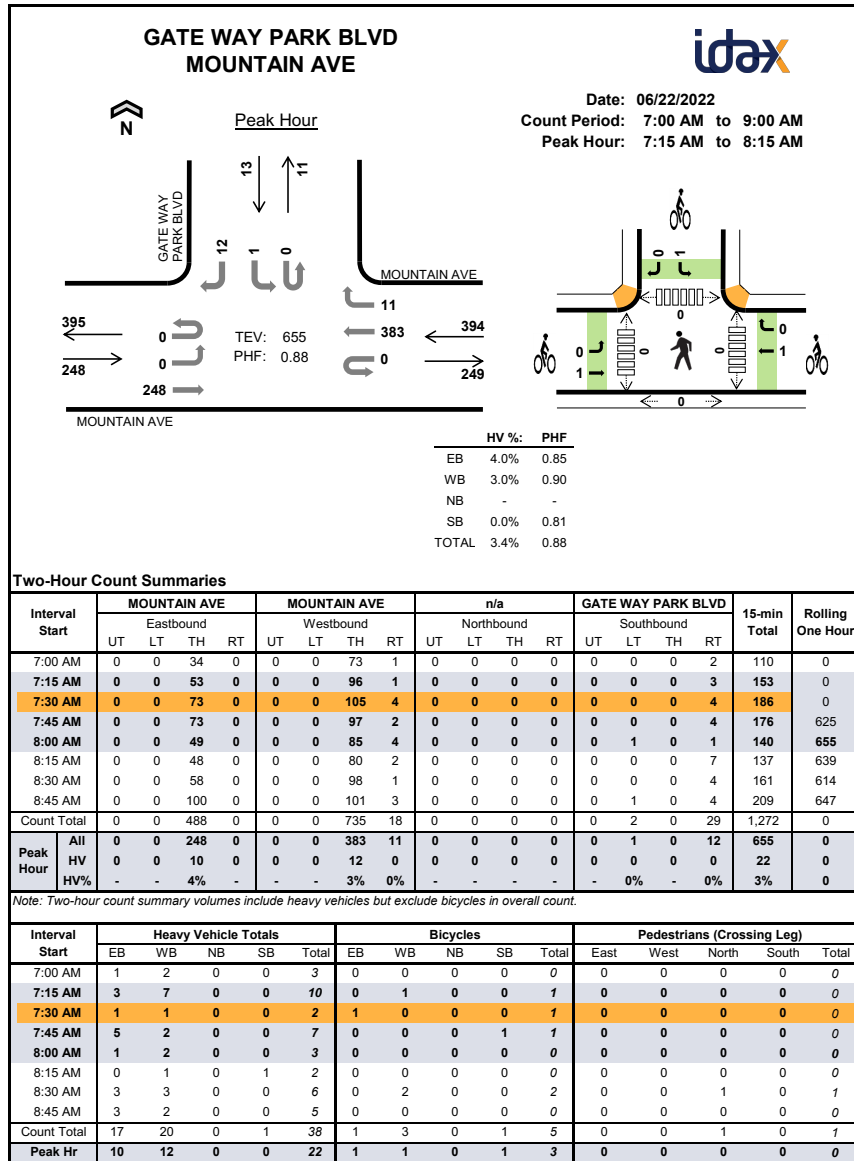
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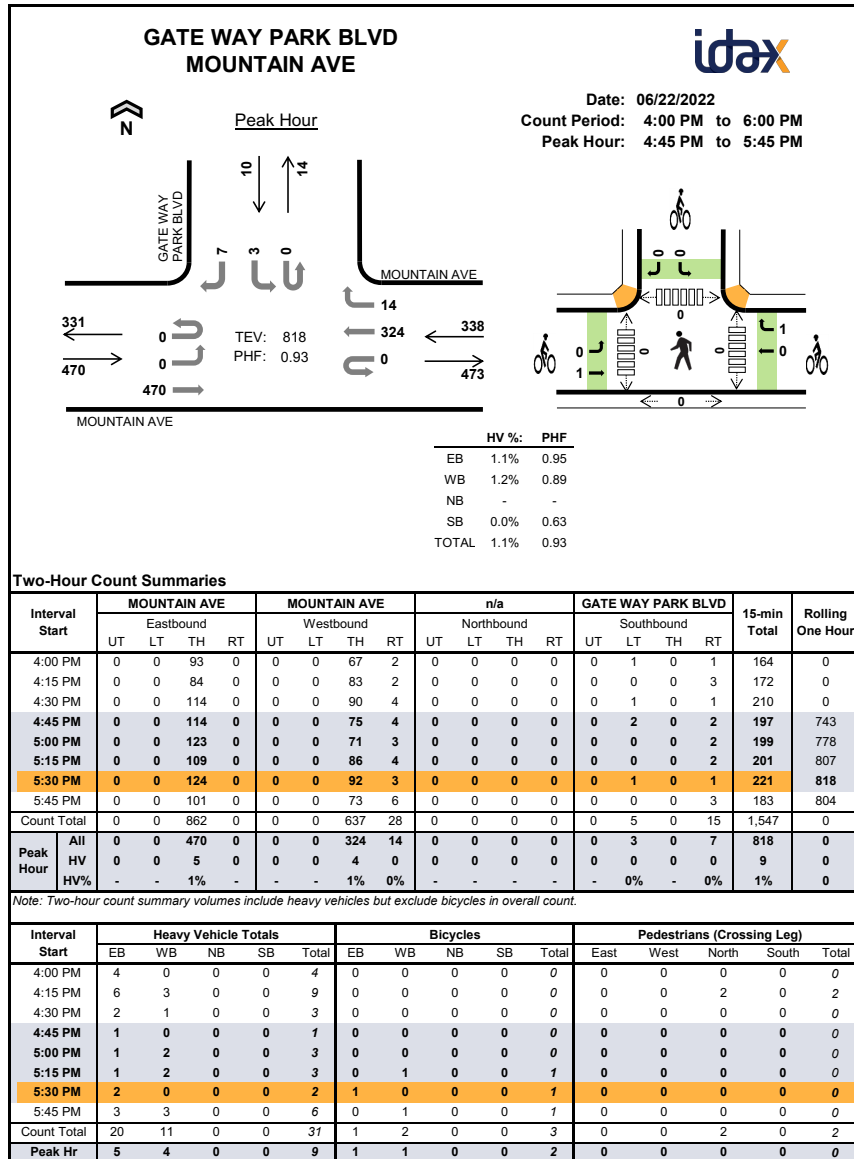
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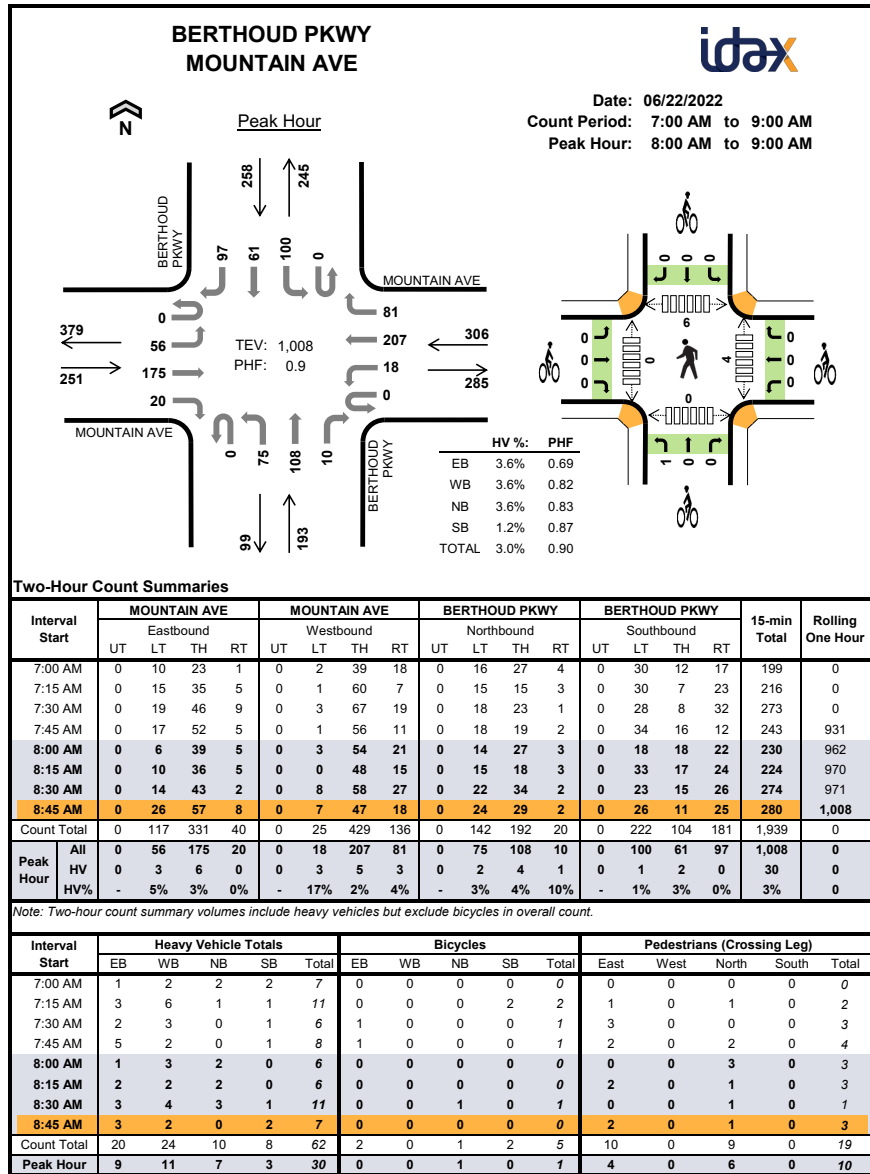
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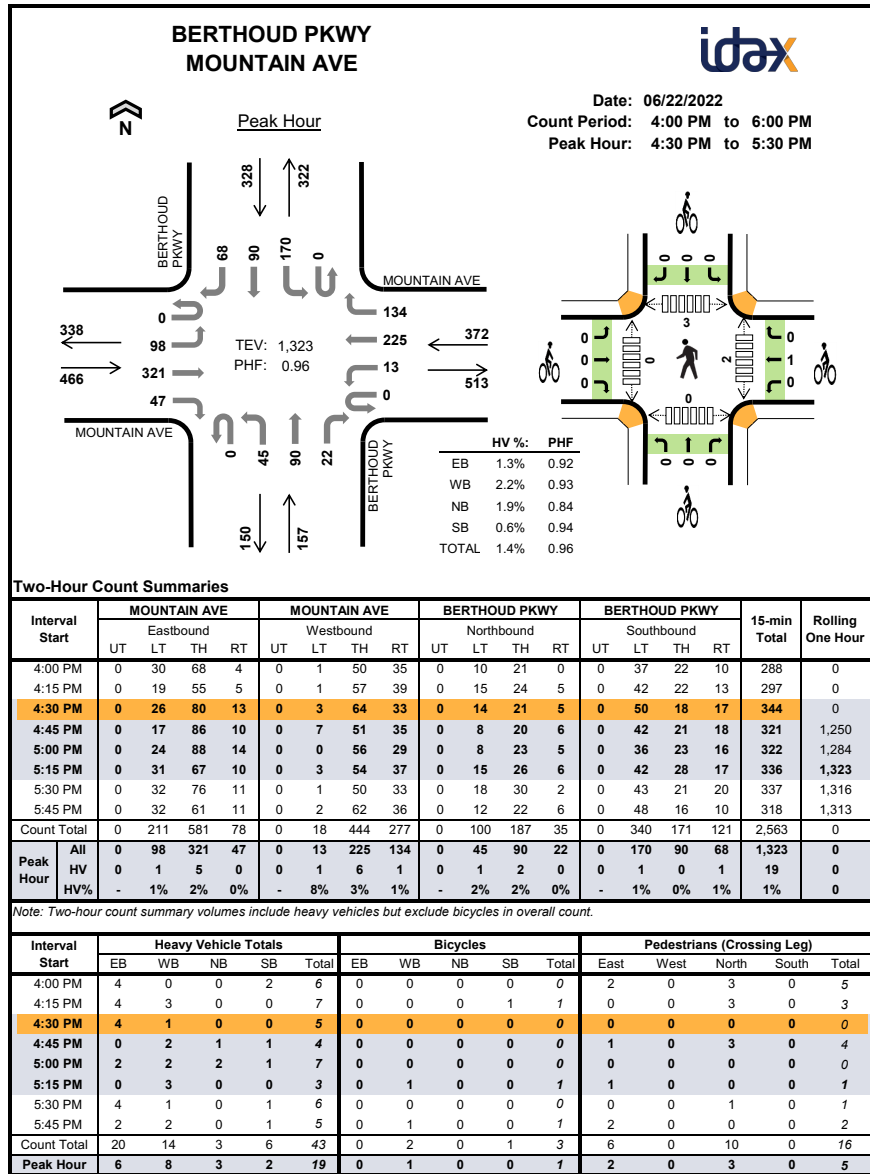
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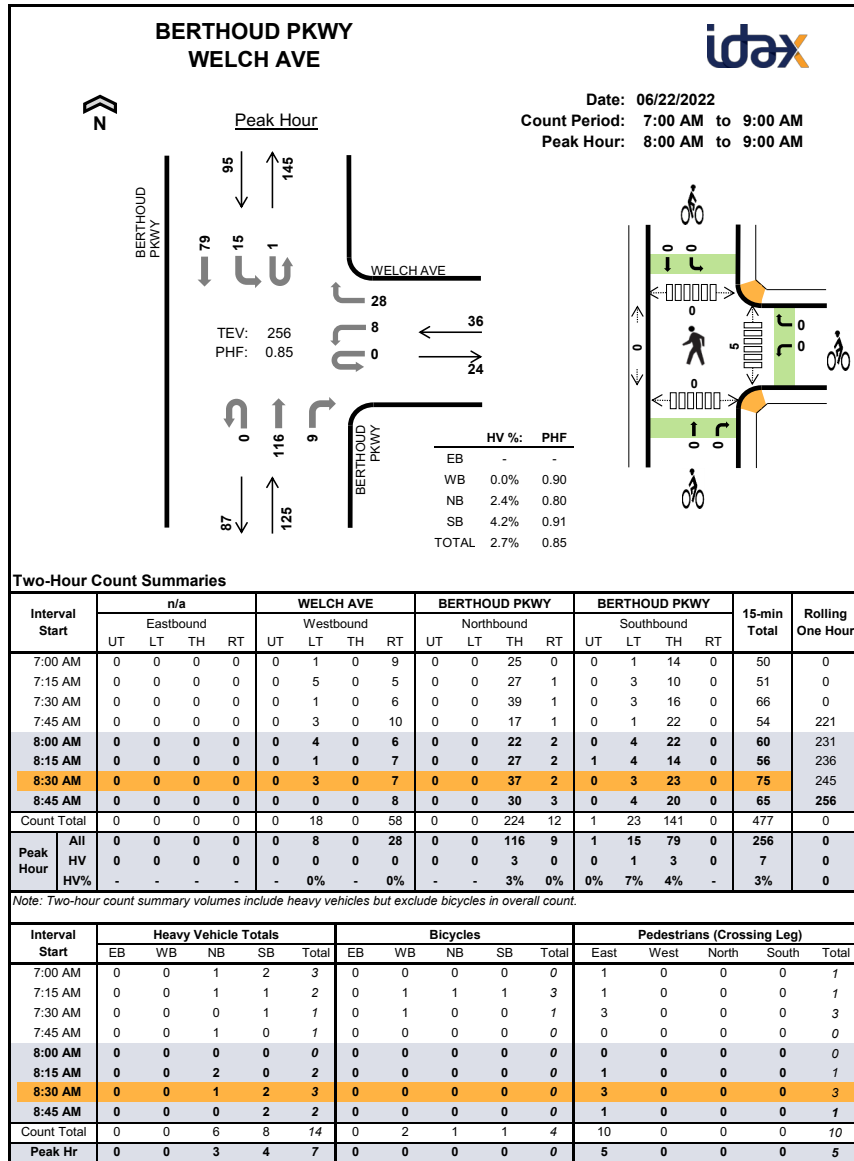
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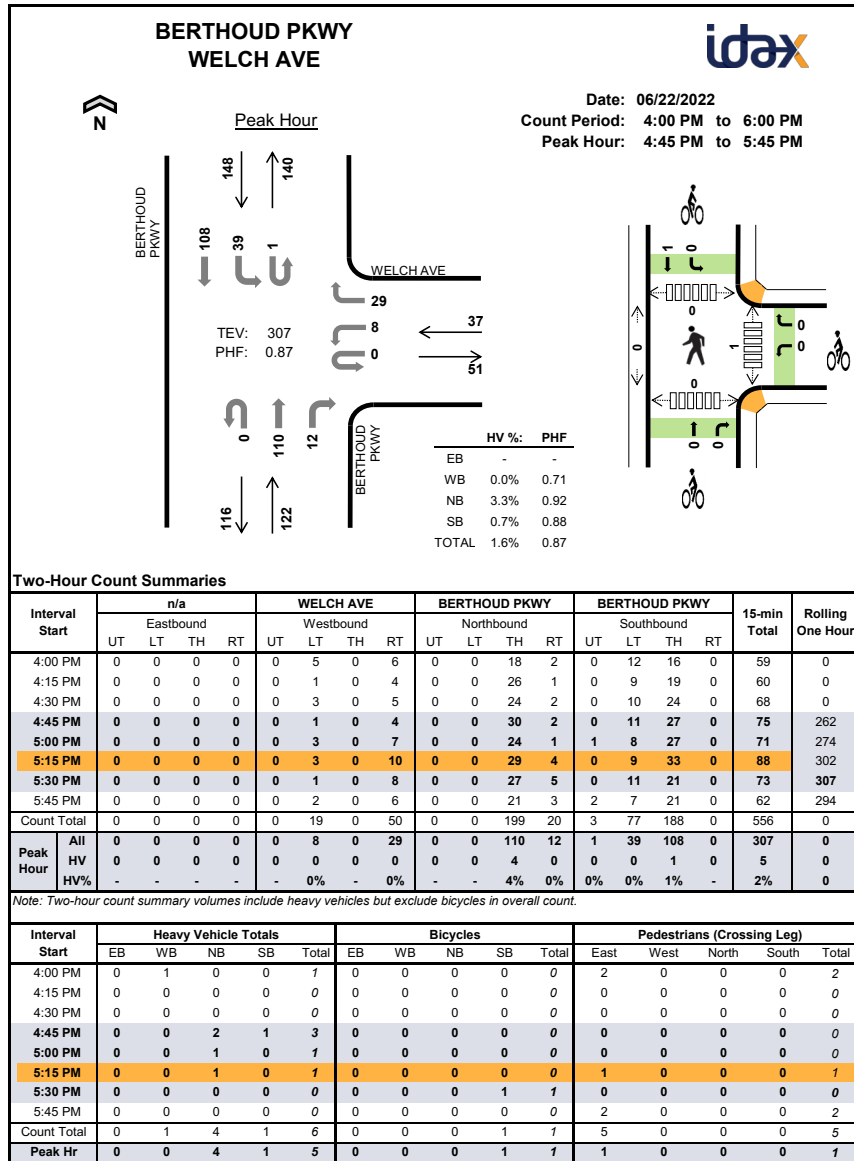
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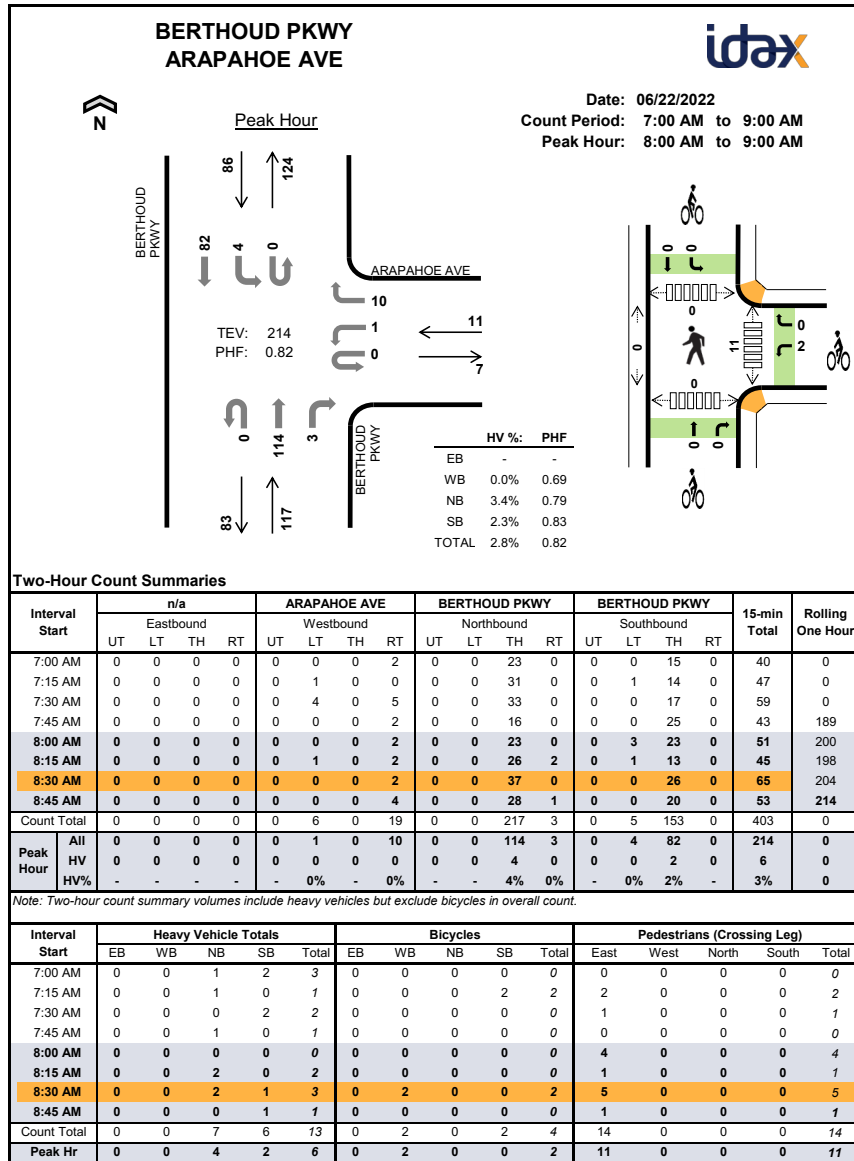
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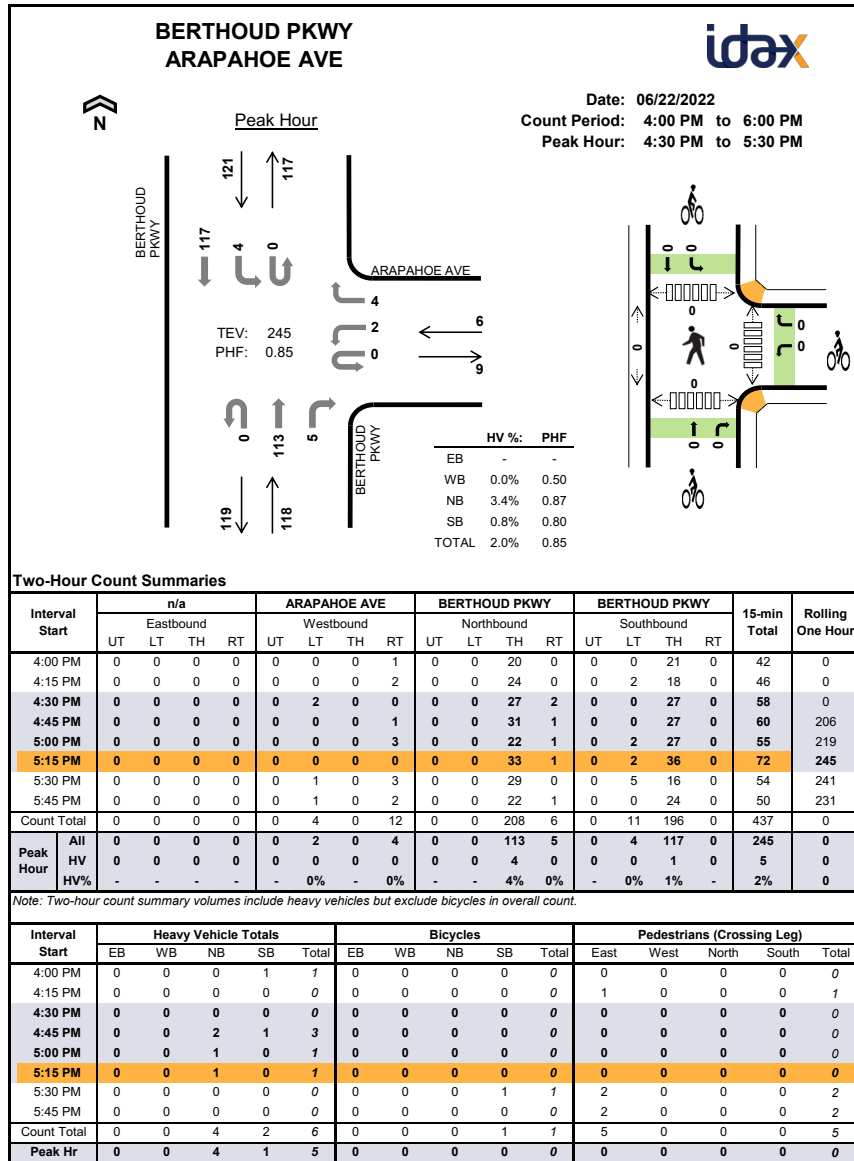
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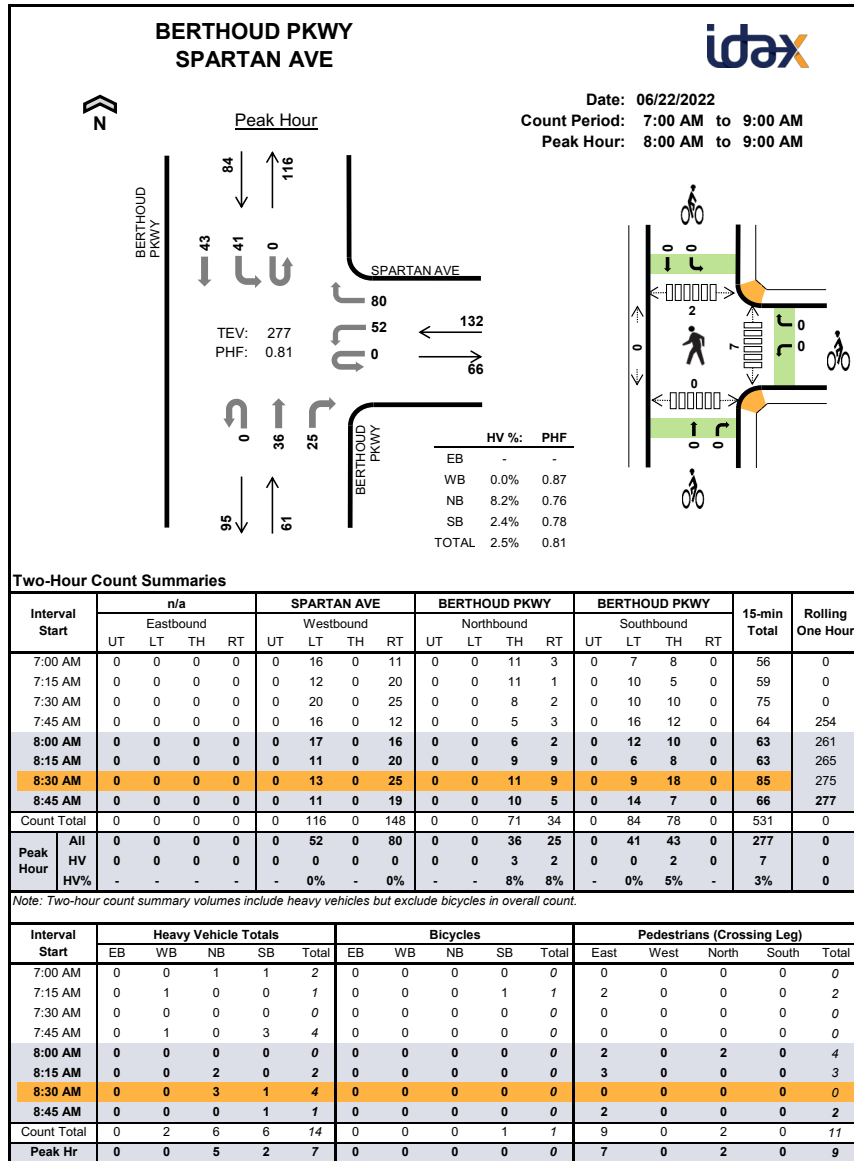


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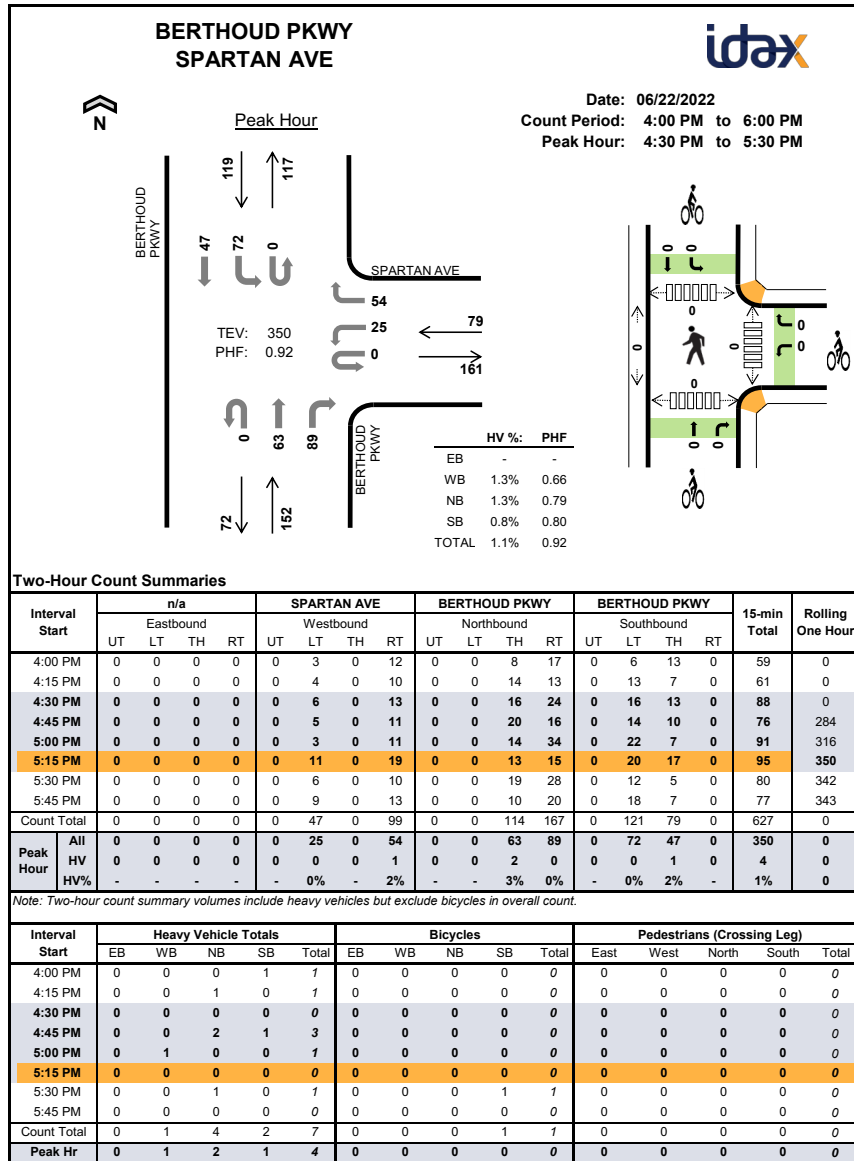


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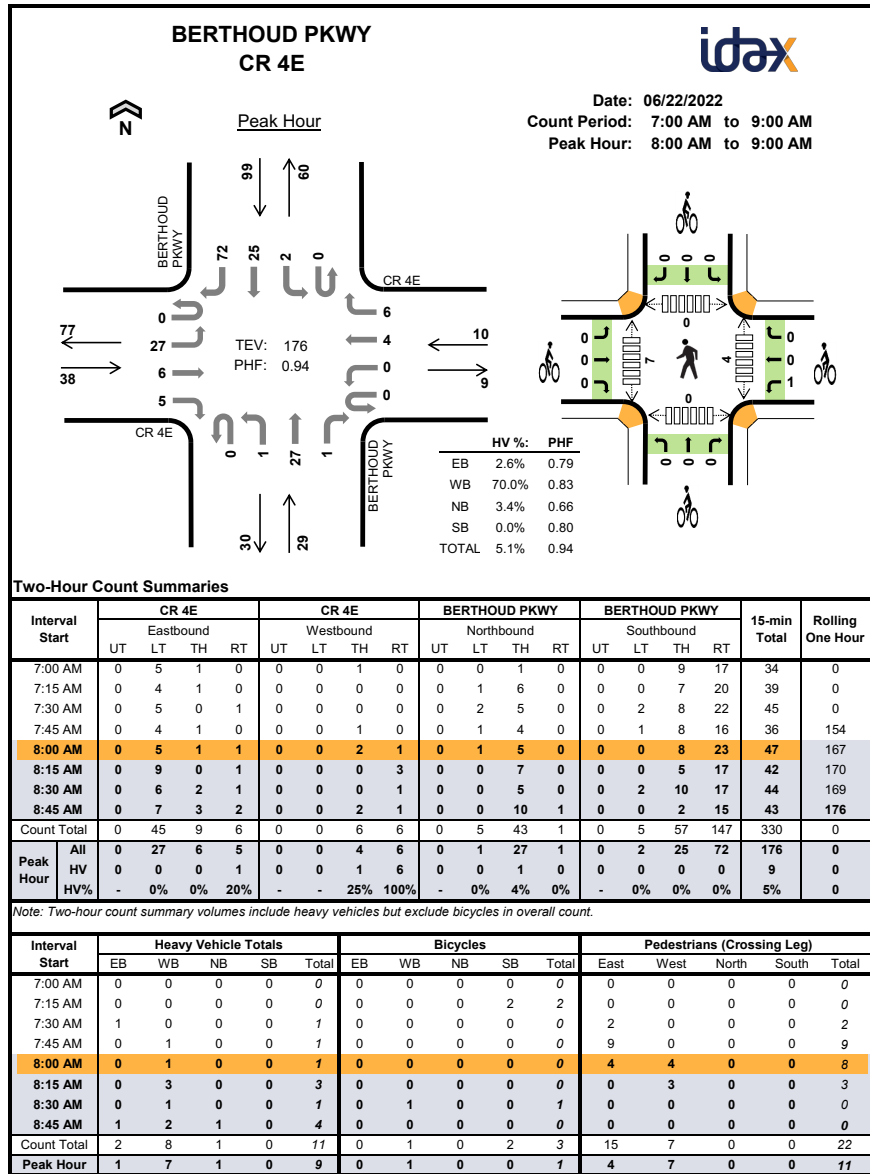
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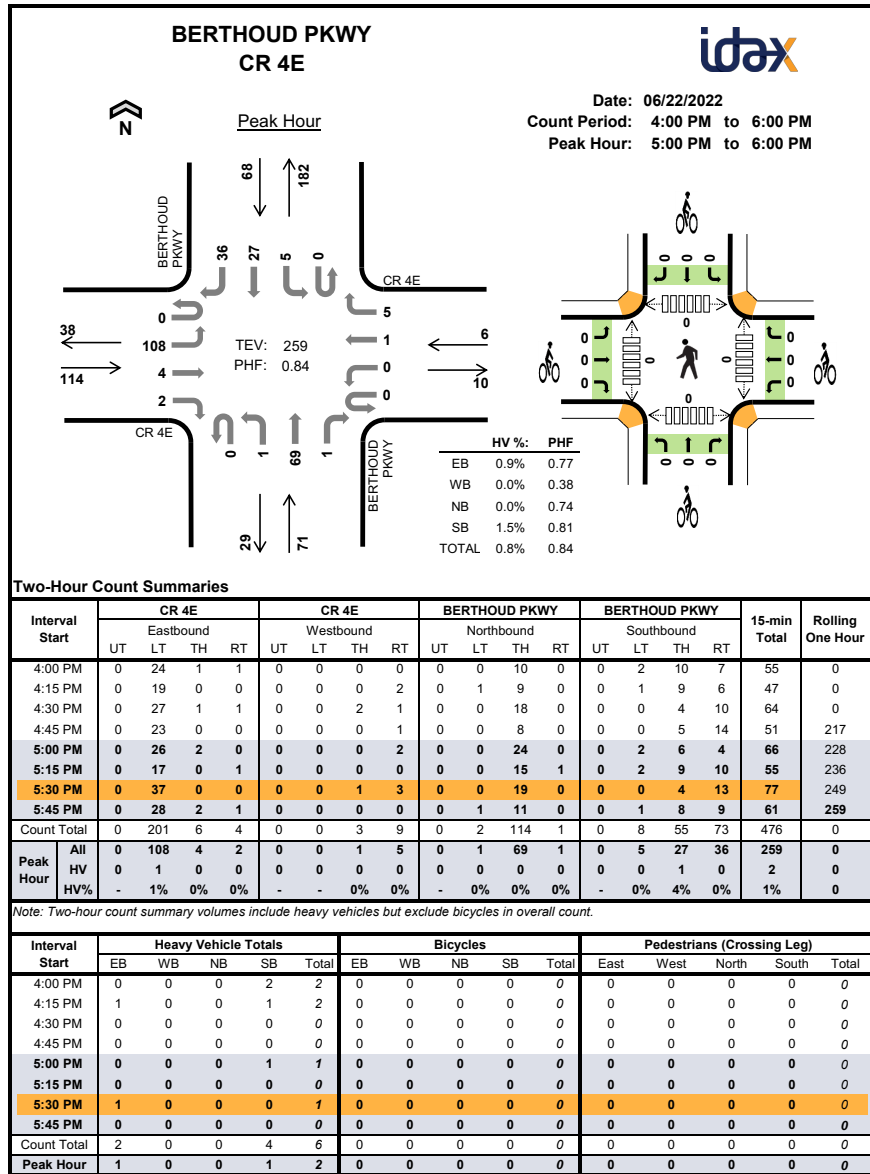
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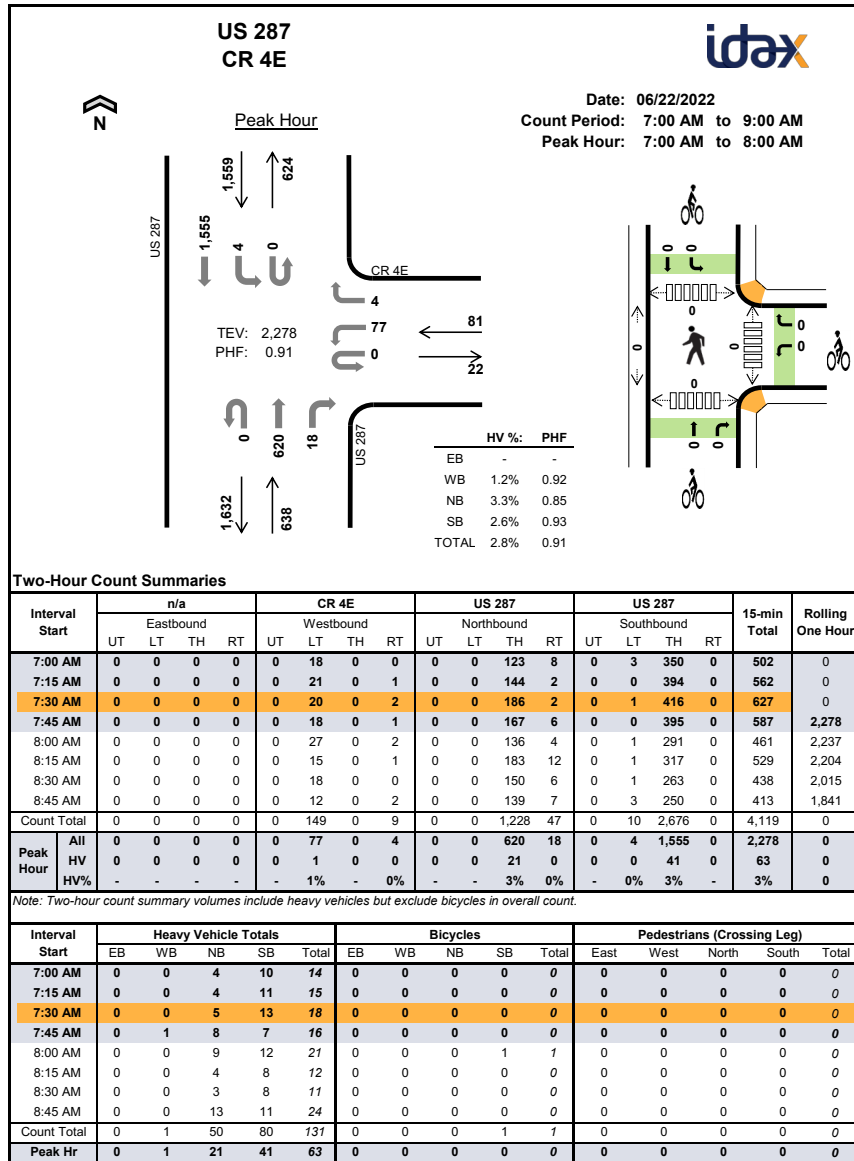
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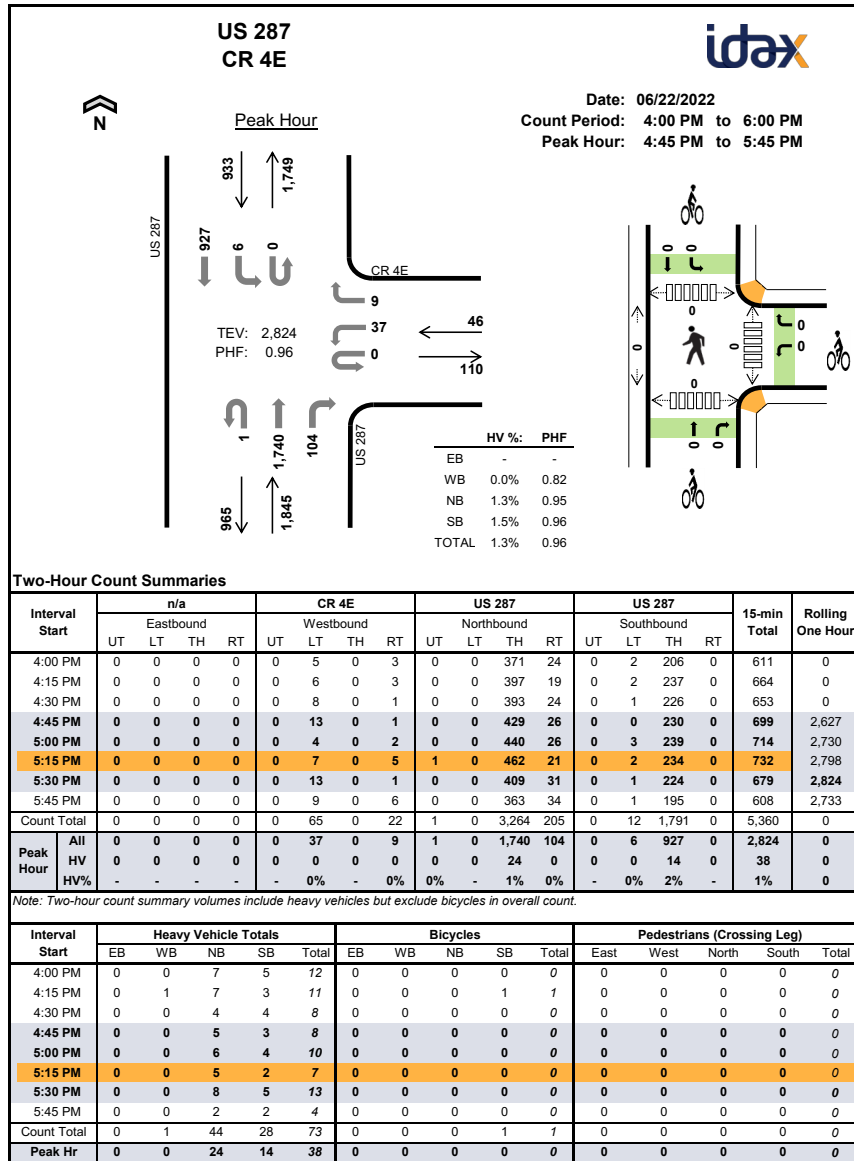
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Appendix B Level of Service Worksheets

EXISTING

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/12/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	197	84	262	88	50	21	428	104	54	1181	42
Future Volume (vph)	58	197	84	262	88	50	21	428	104	54	1181	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1660	1568	3400	1845	1568	1752	3505	1568	1752	3505	1568
Flt Permitted	0.950			0.950			0.099			0.416		
Satd. Flow (perm)	1752	1660	1568	3400	1845	1568	183	3505	1568	767	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			213			213			213			164
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			2270			654			2586	
Travel Time (s)		51.6			34.4			8.1			32.1	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Parking (#/hr)		0										
Adj. Flow (vph)	66	224	95	298	100	57	24	486	118	61	1342	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	224	95	298	100	57	24	486	118	61	1342	48
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Free	pm+pt	NA	Free	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free	2		Free	6		6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												

Existing AM 7:00 am 06/22/2022 Existing AM
RR

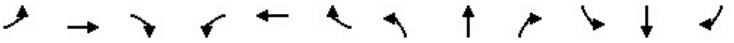
Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

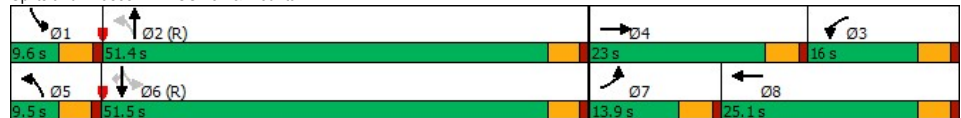
09/12/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	22.5
Total Split (s)	13.9	23.0		16.0	25.1		9.5	51.4		9.6	51.5	51.5
Total Split (%)	13.9%	23.0%		16.0%	25.1%		9.5%	51.4%		9.6%	51.5%	51.5%
Maximum Green (s)	9.4	18.5		11.5	20.6		5.0	46.9		5.1	47.0	47.0
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	C-Max
Walk Time (s)		7.0			7.0			7.0			7.0	7.0
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	11.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	8.3	16.8	100.0	11.5	22.1	100.0	54.4	50.3	100.0	56.4	54.3	54.3
Actuated g/C Ratio	0.08	0.17	1.00	0.12	0.22	1.00	0.54	0.50	1.00	0.56	0.54	0.54
v/c Ratio	0.46	0.80	0.06	0.76	0.25	0.04	0.13	0.28	0.08	0.13	0.70	0.05
Control Delay	53.8	61.6	0.1	56.5	34.9	0.0	11.3	15.8	0.1	10.5	20.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.8	61.6	0.1	56.5	34.9	0.0	11.3	15.8	0.1	10.5	20.9	0.1
LOS	D	E	A	E	C	A	B	B	A	B	C	A
Approach Delay		45.1			44.7			12.7			19.7	
Approach LOS		D			D			B			B	

Intersection Summary

Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 25.5	Intersection LOS: C
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: US 287 & Mountain



Existing AM 7:00 am 06/22/2022 Existing AM
RR

Synchro 11 Light Report
Page 2

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

2: Mountain & Gate Way

08/24/2022

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↑		↑
Traffic Vol, veh/h	0	319	396	11	0	12
Future Vol, veh/h	0	319	396	11	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	363	450	13	0	14
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	-	450
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	-	0	607
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	607
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		11.1		
HCM LOS	B					
Minor Lane/Major Mvmt	EBT	WBT	WBR SBLn1			
Capacity (veh/h)	-	-	607			
HCM Lane V/C Ratio	-	-	0.022			
HCM Control Delay (s)	-	-	11.1			
HCM Lane LOS	-	-	B			
HCM 95th %tile Q(veh)	-	-	0.1			

Existing AM 7:00 am 06/22/2022 Existing AM
RR

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

2: Mountain & Gate Way

08/24/2022

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↑		↑
Traffic Vol, veh/h	0	470	355	14	0	7
Future Vol, veh/h	0	470	355	14	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	505	382	15	0	8
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	-	382
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	-	0	663
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	663
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		10.5		
HCM LOS	B					
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1		
Capacity (veh/h)	-	-	-	663		
HCM Lane V/C Ratio	-	-	-	0.011		
HCM Control Delay (s)	-	-	-	10.5		
HCM Lane LOS	-	-	-	B		
HCM 95th %tile Q(veh)	-	-	-	0		

Existing PM 5:00 pm 06/22/2022

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	175	91	18	207	81	88	122	10	100	132	97
Future Volume (vph)	56	175	91	18	207	81	88	122	10	100	132	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.979			0.979	
Satd. Flow (prot)	1752	1751	0	1752	1845	1568	0	1806	1568	0	1806	1568
Flt Permitted	0.512			0.568				0.780			0.778	
Satd. Flow (perm)	944	1751	0	1048	1845	1568	0	1439	1568	0	1435	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		51				119			119			119
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1257			3652			531			2550	
Travel Time (s)		19.0			55.3			10.3			49.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	62	194	101	20	230	90	98	136	11	111	147	108
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	295	0	20	230	90	0	234	11	0	258	108
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.5	22.5		9.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	9.5	22.5		9.5	22.5	22.5	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (%)	17.3%	40.9%		17.3%	40.9%	40.9%	41.8%	41.8%	41.8%	41.8%	41.8%	41.8%
Maximum Green (s)	5.0	18.0		5.0	18.0	18.0	18.5	18.5	18.5	18.5	18.5	18.5
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max	Max	Max	Max	Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0	0	0	0	0	0	0
Act Effct Green (s)	15.5	14.7		13.9	11.2	11.2		19.2	19.2		19.2	19.2
Actuated g/C Ratio	0.35	0.33		0.31	0.25	0.25		0.43	0.43		0.43	0.43
v/c Ratio	0.15	0.48		0.05	0.50	0.19		0.38	0.01		0.42	0.15
Control Delay	8.8	12.8		7.9	19.0	3.2		13.9	0.0		14.5	3.4
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	8.8	12.8		7.9	19.0	3.2		13.9	0.0		14.5	3.4
LOS	A	B		A	B	A		B	A		B	A
Approach Delay		12.1			14.2			13.3			11.2	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 55

Actuated Cycle Length: 44.7

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 12.6

Intersection LOS: B

Intersection Capacity Utilization 57.7%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Berthoud Pkwy & Mountain

 Ø2	 Ø3	 Ø4
23 s	9.5 s	22.5 s
 Ø6	 Ø7	 Ø8
23 s	9.5 s	22.5 s

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	321	47	13	225	134	76	121	22	170	90	68
Future Volume (vph)	98	321	47	13	225	134	76	121	22	170	90	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.981			0.968	
Satd. Flow (prot)	1752	1810	0	1752	1845	1568	0	1810	1568	0	1786	1568
Flt Permitted	0.454			0.459				0.801			0.684	
Satd. Flow (perm)	837	1810	0	847	1845	1568	0	1478	1568	0	1262	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13				140			109			109
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1257			3652			531			2550	
Travel Time (s)		19.0			55.3			10.3			49.7	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	102	334	49	14	234	140	79	126	23	177	94	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	383	0	14	234	140	0	205	23	0	271	71
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2		2	6		6
Detector Phase	7	4		3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

09/13/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.5	22.5		9.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	10.0	24.0		9.5	23.5	23.5	26.5	26.5	26.5	26.5	26.5	26.5
Total Split (%)	16.7%	40.0%		15.8%	39.2%	39.2%	44.2%	44.2%	44.2%	44.2%	44.2%	44.2%
Maximum Green (s)	5.5	19.5		5.0	19.0	19.0	22.0	22.0	22.0	22.0	22.0	22.0
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Max	Max	Max	Max	Max	Max
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		11.0			11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0	0	0	0	0	0	0	0
Act Effct Green (s)	19.5	18.5		16.3	12.5	12.5	22.4	22.4		22.4	22.4	22.4
Actuated g/C Ratio	0.38	0.36		0.32	0.24	0.24	0.43	0.43		0.43	0.43	0.43
v/c Ratio	0.25	0.58		0.04	0.52	0.29	0.32	0.03		0.50	0.10	0.10
Control Delay	10.9	17.5		9.0	22.1	5.3	13.6	0.1		16.8	1.8	1.8
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	10.9	17.5		9.0	22.1	5.3	13.6	0.1		16.8	1.8	1.8
LOS	B	B		A	C	A	B	A		B	A	A
Approach Delay		16.1			15.6		12.2			13.7		
Approach LOS		B			B		B			B		

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 51.7

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 14.8

Intersection LOS: B

Intersection Capacity Utilization 63.6%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Berthoud Pkwy & Mountain

26.5 s	9.5 s	24 s
26.5 s	10 s	23.5 s

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

08/24/2022

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	8	28	143	9	16	221
Future Vol, veh/h	8	28	143	9	16	221
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	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	9	33	168	11	19	260
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	472	174	0	0	179	0
Stage 1	174	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	549	867	-	-	1391	-
Stage 1	854	-	-	-	-	-
Stage 2	751	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	540	867	-	-	1391	-
Mov Cap-2 Maneuver	540	-	-	-	-	-
Stage 1	854	-	-	-	-	-
Stage 2	739	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10	0	0.5			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	764	1391	-	
HCM Lane V/C Ratio	-	-	0.055	0.014	-	
HCM Control Delay (s)	-	-	10	7.6	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.2	0	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

08/24/2022

Intersection						
Int Delay, s/veh	1.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	8	29	172	12	40	108
Future Vol, veh/h	8	29	172	12	40	108
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	87	87	87	87	87	87
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	9	33	198	14	46	124
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	421	205	0	0	212	0
Stage 1	205	-	-	-	-	-
Stage 2	216	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	587	833	-	-	1352	-
Stage 1	827	-	-	-	-	-
Stage 2	818	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	565	833	-	-	1352	-
Mov Cap-2 Maneuver	565	-	-	-	-	-
Stage 1	827	-	-	-	-	-
Stage 2	788	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10	0	2.1			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	756	1352	-	
HCM Lane V/C Ratio	-	-	0.056	0.034	-	
HCM Control Delay (s)	-	-	10	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

08/24/2022

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	1	10	141	3	4	224
Future Vol, veh/h	1	10	141	3	4	224
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	82	82	82	82	82	82
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	1	12	172	4	5	273
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	457	174	0	0	176	0
Stage 1	174	-	-	-	-	-
Stage 2	283	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	560	867	-	-	1394	-
Stage 1	854	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	558	867	-	-	1394	-
Mov Cap-2 Maneuver	558	-	-	-	-	-
Stage 1	854	-	-	-	-	-
Stage 2	760	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	9.4	0		0.1		
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	825	1394	-	
HCM Lane V/C Ratio	-	-	0.016	0.003	-	
HCM Control Delay (s)	-	-	9.4	7.6	0	
HCM Lane LOS	-	-	A	A	A	
HCM 95th %tile Q(veh)	-	-	0.1	0		

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

08/24/2022

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	2	4	175	5	4	117
Future Vol, veh/h	2	4	175	5	4	117
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	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	2	5	206	6	5	138
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	357	209	0	0	212	0
Stage 1	209	-	-	-	-	-
Stage 2	148	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	639	829	-	-	1352	-
Stage 1	824	-	-	-	-	-
Stage 2	877	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	636	829	-	-	1352	-
Mov Cap-2 Maneuver	636	-	-	-	-	-
Stage 1	824	-	-	-	-	-
Stage 2	873	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	9.8	0	0.3			
HCM LOS	A					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	753	1352	-	
HCM Lane V/C Ratio	-	-	0.009	0.003	-	
HCM Control Delay (s)	-	-	9.8	7.7	0	
HCM Lane LOS	-	-	A	A	A	
HCM 95th %tile Q(veh)	-	-	0	0	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

6: Spartan & Berthoud Pkwy

08/24/2022

Intersection						
Int Delay, s/veh	8.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	87	107	36	53	183	43
Future Vol, veh/h	87	107	36	53	183	43
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	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	107	132	44	65	226	53
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	582	77	0	0	109	0
Stage 1	77	-	-	-	-	-
Stage 2	505	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	474	981	-	-	1475	-
Stage 1	943	-	-	-	-	-
Stage 2	604	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	399	981	-	-	1475	-
Mov Cap-2 Maneuver	399	-	-	-	-	-
Stage 1	943	-	-	-	-	-
Stage 2	509	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	15.1	0	6.4			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	593	1475	-	
HCM Lane V/C Ratio	-	-	0.404	0.153	-	
HCM Control Delay (s)	-	-	15.1	7.9	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	1.9	0.5	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

6: Spartan & Berthoud Pkwy

08/24/2022

Intersection						
Int Delay, s/veh	5.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	38	116	63	89	72	47
Future Vol, veh/h	38	116	63	89	72	47
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	81	81	81	81	81	81
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	47	143	78	110	89	58
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	369	133	0	0	188	0
Stage 1	133	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	629	913	-	-	1380	-
Stage 1	891	-	-	-	-	-
Stage 2	801	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	587	913	-	-	1380	-
Mov Cap-2 Maneuver	587	-	-	-	-	-
Stage 1	891	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10.9	0	4.7			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	803	1380	-	
HCM Lane V/C Ratio	-	-	0.237	0.064	-	
HCM Control Delay (s)	-	-	10.9	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.9	0.2	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

7: Berthoud Pkwy & CR 4E

08/24/2022

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	34	6	5	0	4	8	2	34	1	5	44	72
Future Vol, veh/h	34	6	5	0	4	8	2	34	1	5	44	72
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	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	36	6	5	0	4	9	2	36	1	5	47	77

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	143	137	86	142	175	37	124	0	0	37	0	0
Stage 1	96	96	-	41	41	-	-	-	-	-	-	-
Stage 2	47	41	-	101	134	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	824	752	970	825	717	1032	1457	-	-	1567	-	-
Stage 1	908	814	-	971	859	-	-	-	-	-	-	-
Stage 2	964	859	-	903	784	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	811	749	970	813	714	1032	1457	-	-	1567	-	-
Mov Cap-2 Maneuver	811	749	-	813	714	-	-	-	-	-	-	-
Stage 1	907	812	-	970	858	-	-	-	-	-	-	-
Stage 2	950	858	-	888	782	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	9.7			9.1			0.4			0.3		
HCM LOS	A			A								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1457	-	-	817	899	1567	-
HCM Lane V/C Ratio	0.001	-	-	0.059	0.014	0.003	-
HCM Control Delay (s)	7.5	0	-	9.7	9.1	7.3	0
HCM Lane LOS	A	A	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0	0	-

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 7: Berthoud Pkwy & CR 4E

08/24/2022

Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕			↕			↕			↕		
Traffic Vol, veh/h	34	4	2	0	1	5	1	69	1	5	37	36
Future Vol, veh/h	34	4	2	0	1	5	1	69	1	5	37	36
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	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	40	5	2	0	1	6	1	82	1	6	44	43

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	166	163	66	166	184	83	87	0
Stage 1	78	78	-	85	85	-	-	-
Stage 2	88	85	-	81	99	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-
Pot Cap-1 Maneuver	796	728	995	796	708	974	1503	-
Stage 1	928	828	-	920	822	-	-	-
Stage 2	917	822	-	925	811	-	-	-
Platoon blocked, %								-
Mov Cap-1 Maneuver	787	724	995	787	704	974	1503	-
Mov Cap-2 Maneuver	787	724	-	787	704	-	-	-
Stage 1	927	825	-	919	821	-	-	-
Stage 2	909	821	-	914	808	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.9	9	0.1	0.5
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1503	-	-	788	915	1508	-
HCM Lane V/C Ratio	0.001	-	-	0.06	0.008	0.004	-
HCM Control Delay (s)	7.4	0	-	9.9	9	7.4	0
HCM Lane LOS	A	A	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0	0	-

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

08/24/2022

Intersection						
Int Delay, s/veh	4.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	N	N	S	S
Traffic Vol, veh/h	77	4	628	30	4	1629
Future Vol, veh/h	77	4	628	30	4	1629
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	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	85	4	690	33	4	1790
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1593	345	0	0	723	0
Stage 1	690	-	-	-	-	-
Stage 2	903	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	97	648	-	-	869	-
Stage 1	456	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	97	648	-	-	869	-
Mov Cap-2 Maneuver	97	-	-	-	-	-
Stage 1	456	-	-	-	-	-
Stage 2	351	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	135.8	0	0			
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	101	869	-	
HCM Lane V/C Ratio	-	-	0.881	0.005	-	
HCM Control Delay (s)	-	-	135.8	9.2	-	
HCM Lane LOS	-	-	F	A	-	
HCM 95th %tile Q(veh)	-	-	5.1	0	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

08/24/2022

Intersection						
Int Delay, s/veh	6.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	37	9	1740	104	6	927
Future Vol, veh/h	37	9	1740	104	6	927
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	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	39	9	1813	108	6	966
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	2308	907	0	0	1921	0
Stage 1	1813	-	-	-	-	-
Stage 2	495	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 32	277	-	-	300	-
Stage 1	114	-	-	-	-	-
Stage 2	575	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	~ 31	277	-	-	300	-
Mov Cap-2 Maneuver	~ 31	-	-	-	-	-
Stage 1	114	-	-	-	-	-
Stage 2	564	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	\$ 397.6	0		0.1		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	38	300	-	
HCM Lane V/C Ratio	-	-	1.261	0.021	-	
HCM Control Delay (s)	-	-	\$ 397.6	17.3	-	
HCM Lane LOS	-	-	F	C	-	
HCM 95th %tile Q(veh)	-	-	4.9	0.1	-	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
11: Meadowlark & Mountain

12/28/2022

Intersection												
Int Delay, s/veh	3.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↰	↱		↰	↱
Traffic Vol, veh/h	16	318	21	17	321	8	38	2	12	45	5	49
Future Vol, veh/h	16	318	21	17	321	8	38	2	12	45	5	49
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	0	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	18	361	24	19	365	9	43	2	14	51	6	56

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	374	0	0	385	0	0	848	821	373	825	829	370
Stage 1	-	-	-	-	-	-	409	409	-	408	408	-
Stage 2	-	-	-	-	-	-	439	412	-	417	421	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1179	-	-	1168	-	-	280	308	671	290	305	673
Stage 1	-	-	-	-	-	-	617	594	-	618	595	-
Stage 2	-	-	-	-	-	-	595	593	-	611	587	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1179	-	-	1168	-	-	247	298	671	276	296	673
Mov Cap-2 Maneuver	-	-	-	-	-	-	247	298	-	276	296	-
Stage 1	-	-	-	-	-	-	608	585	-	609	585	-
Stage 2	-	-	-	-	-	-	532	584	-	587	578	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.4			0.4			20.5			17.8		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	291	1179	-	-	1168	-	-	392
HCM Lane V/C Ratio	0.203	0.015	-	-	0.017	-	-	0.287
HCM Control Delay (s)	20.5	8.1	-	-	8.1	-	-	17.8
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.1	-	-	1.2

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 11: Meadowlark & Mountain

12/28/2022

Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱			↕			↕	
Traffic Vol, veh/h	63	422	21	20	311	19	39	2	29	21	1	22
Future Vol, veh/h	63	422	21	20	311	19	39	2	29	21	1	22
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	0	-	-	0	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	68	459	23	22	338	21	42	2	32	23	1	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	359	0	0	482	0	0	1012	1010	471	1017	1011	349
Stage 1	-	-	-	-	-	-	607	607	-	393	393	-
Stage 2	-	-	-	-	-	-	405	403	-	624	618	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1194	-	-	1075	-	-	217	239	591	215	239	692
Stage 1	-	-	-	-	-	-	482	485	-	630	604	-
Stage 2	-	-	-	-	-	-	620	598	-	471	479	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1194	-	-	1075	-	-	197	221	591	190	221	692
Mov Cap-2 Maneuver	-	-	-	-	-	-	197	221	-	190	221	-
Stage 1	-	-	-	-	-	-	455	457	-	594	592	-
Stage 2	-	-	-	-	-	-	585	586	-	418	452	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	1			0.5			23.2			19.3		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	273	1194	-	-	1075	-	-	300
HCM Lane V/C Ratio	0.279	0.057	-	-	0.02	-	-	0.159
HCM Control Delay (s)	23.2	8.2	-	-	8.4	-	-	19.3
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.1	0.2	-	-	0.1	-	-	0.6

Existing PM 5:00 pm 06/22/2022

Synchro 11 Light Report
 Page 1

BACKGROUND 2042

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	275	150	300	145	40	50	555	165	60	1330	70
Future Volume (vph)	90	275	150	300	145	40	50	555	165	60	1330	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			213			164			213			213
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			2270			654			2586	
Travel Time (s)		51.6			34.4			8.1			32.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		0										
Adj. Flow (vph)	98	299	163	326	158	43	54	603	179	65	1446	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	299	163	326	158	43	54	603	179	65	1446	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Over	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			Free						Free			Free
Detector Phase	7	4		3	8	1	5	2		1	6	
Switch Phase												

Background 2042 AM 7:00 am 06/22/2022 Background 2042 AM

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	11.4	25.0		15.5	29.1	10.0	9.5	49.5		10.0	50.0	
Total Split (%)	11.4%	25.0%		15.5%	29.1%	10.0%	9.5%	49.5%		10.0%	50.0%	
Maximum Green (s)	6.9	20.5		11.0	24.6	5.5	5.0	45.0		5.5	45.5	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	C-Max			None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.7	19.9	100.0	11.2	26.4	5.5	5.1	47.5	100.0	5.5	47.9	100.0
Actuated g/C Ratio	0.07	0.20	1.00	0.11	0.26	0.06	0.05	0.48	1.00	0.06	0.48	1.00
v/c Ratio	0.43	0.91	0.10	0.86	0.33	0.18	0.31	0.36	0.11	0.35	0.86	0.05
Control Delay	50.8	71.1	0.1	66.3	32.9	1.6	50.8	18.1	0.1	50.9	30.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	71.1	0.1	66.3	32.9	1.6	50.8	18.1	0.1	50.9	30.7	0.1
LOS	D	E	A	E	C	A	D	B	A	D	C	A
Approach Delay		46.9			51.0			16.4			30.1	
Approach LOS		D			D			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 32.6

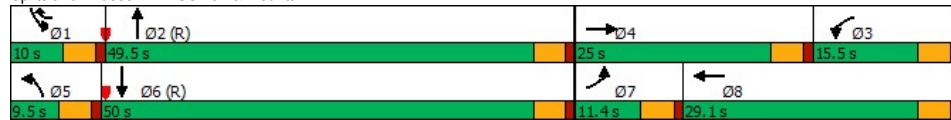
Intersection LOS: C

Intersection Capacity Utilization 71.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: US 287 & Mountain



Background 2042 AM 7:00 am 06/22/2022 Background 2042 AM

Synchro 11 Light Report
Page 2

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	305	110	200	325	20	170	1480	425	50	860	120
Future Volume (vph)	125	305	110	200	325	20	170	1480	425	50	860	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			238			193			238			238
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			2270			654			2586	
Travel Time (s)		51.6			34.4			8.1			32.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		0										
Adj. Flow (vph)	136	332	120	217	353	22	185	1609	462	54	935	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	332	120	217	353	22	185	1609	462	54	935	130
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Over	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			Free						Free			Free
Detector Phase	7	4		3	8	1	5	2		1	6	
Switch Phase												

Background 2042 PM 4:00 pm 06/22/2022 Background 2042 PM
RR

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

09/13/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	11.0	28.0		11.5	28.5	9.5	15.6	61.0		9.5	54.9	
Total Split (%)	10.0%	25.5%		10.5%	25.9%	8.6%	14.2%	55.5%		8.6%	49.9%	
Maximum Green (s)	6.5	23.5		7.0	24.0	5.0	11.1	56.5		5.0	50.4	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	C-Max			None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.5	23.3	110.0	7.2	24.0	5.0	10.3	58.4	110.0	5.0	51.2	110.0
Actuated g/C Ratio	0.06	0.21	1.00	0.07	0.22	0.05	0.09	0.53	1.00	0.05	0.47	1.00
v/c Ratio	0.68	0.95	0.08	0.97	0.88	0.09	0.58	0.86	0.29	0.35	0.57	0.08
Control Delay	68.4	80.2	0.1	105.5	65.3	0.7	49.2	25.8	0.1	57.5	23.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.4	80.2	0.1	105.5	65.3	0.7	49.2	25.8	0.1	57.5	23.3	0.1
LOS	E	F	A	F	E	A	D	C	A	E	C	A
Approach Delay		61.1			77.7			22.4			22.3	
Approach LOS		E			E			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 34.6

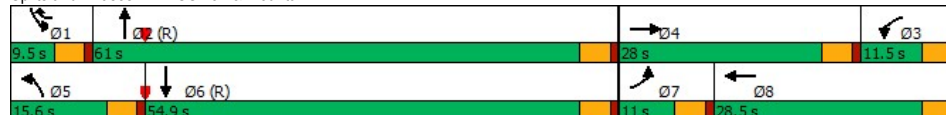
Intersection LOS: C

Intersection Capacity Utilization 81.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: US 287 & Mountain



LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

2: Mountain & Gate Way

09/13/2022

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↑		↑
Traffic Vol, veh/h	0	455	470	10	0	15
Future Vol, veh/h	0	455	470	10	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	495	511	11	0	16

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	-	0	-	0	511
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	0	561
Stage 1	0	-	-	0	-
Stage 2	0	-	-	0	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	561
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.6
HCM LOS	B		

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	561
HCM Lane V/C Ratio	-	-	-	0.029
HCM Control Delay (s)	-	-	-	11.6
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Background 2042 AM 7:00 am 06/22/2022 Background 2042 AM

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

2: Mountain & Gate Way

09/13/2022

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑	↑		↑
Traffic Vol, veh/h	0	670	480	15	0	10
Future Vol, veh/h	0	670	480	15	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	0	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	0	728	522	16	0	11
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	-	522
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.327
Pot Cap-1 Maneuver	0	-	-	-	0	553
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	553
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB	SB			
HCM Control Delay, s	0	0	11.6			
HCM LOS	B					
Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1		
Capacity (veh/h)	-	-	-	553		
HCM Lane V/C Ratio	-	-	-	0.02		
HCM Control Delay (s)	-	-	-	11.6		
HCM Lane LOS	-	-	-	B		
HCM 95th %tile Q(veh)	-	-	-	0.1		

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 2010 Roundabout
 3: Berthoud Pkwy & Mountain

09/13/2022

Intersection					
Intersection Delay, s/veh	12.2				
Intersection LOS	B				
Approach	EB		WB		NB
Entry Lanes	2		1		1
Conflicting Circle Lanes	1		1		1
Adj Approach Flow, veh/h	494		397		293
Demand Flow Rate, veh/h	509		409		302
Vehicles Circulating, veh/h	320		369		527
Vehicles Exiting, veh/h	526		460		302
Follow-Up Headway, s	3.186		3.186		3.186
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	10.1		12.5		12.3
Approach LOS	B		B		B
Lane	Left	Right	Left	Left	Left
Designated Moves	LT	R	LTR	LTR	LTR
Assumed Moves	LT	R	LTR	LTR	LTR
RT Channelized					
Lane Util	0.792	0.208	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193	5.193
Entry Flow, veh/h	403	106	409	302	432
Cap Entry Lane, veh/h	821	821	781	667	747
Entry HV Adj Factor	0.970	0.972	0.970	0.971	0.970
Flow Entry, veh/h	391	103	397	293	419
Cap Entry, veh/h	796	797	758	647	725
V/C Ratio	0.491	0.129	0.524	0.453	0.578
Control Delay, s/veh	11.3	5.8	12.5	12.3	14.4
LOS	B	A	B	B	B
95th %tile Queue, veh	3	0	3	2	4

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 2010 Roundabout
 3: Berthoud Pkwy & Mountain

09/13/2022

Intersection					
Intersection Delay, s/veh	22.3				
Intersection LOS	C				
Approach	EB		WB		SB
Entry Lanes	2		1		1
Conflicting Circle Lanes	1		1		1
Adj Approach Flow, veh/h	718		544		424
Demand Flow Rate, veh/h	739		561		437
Vehicles Circulating, veh/h	370		410		488
Vehicles Exiting, veh/h	555		738		483
Follow-Up Headway, s	3.186		3.186		3.186
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	25.9		21.9		17.2
Approach LOS	D		C		C
Lane	Left	Right	Left	Left	Left
Designated Moves	LT	R	LTR	LTR	LTR
Assumed Moves	LT	R	LTR	LTR	LTR
RT Channelized					
Lane Util	0.886	0.114	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193	5.193
Entry Flow, veh/h	655	84	561	286	437
Cap Entry Lane, veh/h	780	780	750	477	694
Entry HV Adj Factor	0.970	0.976	0.970	0.970	0.971
Flow Entry, veh/h	636	82	544	277	424
Cap Entry, veh/h	757	762	728	463	673
V/C Ratio	0.839	0.108	0.748	0.599	0.630
Control Delay, s/veh	28.5	5.8	21.9	21.7	17.2
LOS	D	A	C	C	C
95th %tile Queue, veh	10	0	7	4	4

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

09/12/2022

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	10	30	200	10	20	280
Future Vol, veh/h	10	30	200	10	20	280
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	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	12	35	235	12	24	329
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	618	241	0	0	247	0
Stage 1	241	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	451	795	-	-	1313	-
Stage 1	797	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	441	795	-	-	1313	-
Mov Cap-2 Maneuver	441	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10.9	0	0.5			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	662	1313	-	
HCM Lane V/C Ratio	-	-	0.071	0.018	-	
HCM Control Delay (s)	-	-	10.9	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

09/12/2022

Intersection						
Int Delay, s/veh	1.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	10	30	220	15	45	185
Future Vol, veh/h	10	30	220	15	45	185
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	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	12	35	259	18	53	218
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	592	268	0	0	277	0
Stage 1	268	-	-	-	-	-
Stage 2	324	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	467	768	-	-	1280	-
Stage 1	775	-	-	-	-	-
Stage 2	731	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	445	768	-	-	1280	-
Mov Cap-2 Maneuver	445	-	-	-	-	-
Stage 1	775	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	11	0	1.6			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	650	1280	-	
HCM Lane V/C Ratio	-	-	0.072	0.041	-	
HCM Control Delay (s)	-	-	11	7.9	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

09/12/2022

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	5	5	200	5	5	280
Future Vol, veh/h	5	5	200	5	5	280
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	82	82	82	82	82	82
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	6	6	244	6	6	341
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	600	247	0	0	250	0
Stage 1	247	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	462	789	-	-	1310	-
Stage 1	792	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	459	789	-	-	1310	-
Mov Cap-2 Maneuver	459	-	-	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	705	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	11.3	0	0.1			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	580	1310	-	
HCM Lane V/C Ratio	-	-	0.021	0.005	-	
HCM Control Delay (s)	-	-	11.3	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

09/12/2022

Intersection						
Int Delay, s/veh	0.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	5	5	225	5	5	195
Future Vol, veh/h	5	5	225	5	5	195
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	82	82	82	82	82	82
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	6	6	274	6	6	238
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	527	277	0	0	280	0
Stage 1	277	-	-	-	-	-
Stage 2	250	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	510	759	-	-	1277	-
Stage 1	767	-	-	-	-	-
Stage 2	789	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	507	759	-	-	1277	-
Mov Cap-2 Maneuver	507	-	-	-	-	-
Stage 1	767	-	-	-	-	-
Stage 2	785	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	11	0	0.2			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	608	1277	-	
HCM Lane V/C Ratio	-	-	0.02	0.005	-	
HCM Control Delay (s)	-	-	11	7.8	0	
HCM Lane LOS	-	-	B	A	A	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout

6: Spartan Ave/Spartan & Berthoud Pkwy

09/12/2022

Intersection				
Intersection Delay, s/veh	6.2			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	158	307	250	325
Demand Flow Rate, veh/h	163	316	257	334
Vehicles Circulating, veh/h	356	203	345	256
Vehicles Exiting, veh/h	234	399	174	263
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.5	6.0	6.5	6.6
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LT	TR	LTR	LR
Assumed Moves	LT	TR	LTR	LR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	163	316	257	334
Cap Entry Lane, veh/h	960	1122	971	1063
Entry HV Adj Factor	0.970	0.970	0.972	0.973
Flow Entry, veh/h	158	307	250	325
Cap Entry, veh/h	931	1088	944	1034
V/C Ratio	0.170	0.282	0.265	0.314
Control Delay, s/veh	5.5	6.0	6.5	6.6
LOS	A	A	A	A
95th %tile Queue, veh	1	1	1	1

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 6: Spartan & Berthoud Pkwy

09/12/2022

Intersection				
Intersection Delay, s/veh	5.5			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	244	261	234	244
Demand Flow Rate, veh/h	252	268	241	250
Vehicles Circulating, veh/h	278	199	244	172
Vehicles Exiting, veh/h	144	286	286	295
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.9	5.5	5.6	5.1
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LT	R	TR	L
Assumed Moves	LT	R	TR	L
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	252	268	241	250
Cap Entry Lane, veh/h	1039	1126	1076	1158
Entry HV Adj Factor	0.969	0.972	0.972	0.974
Flow Entry, veh/h	244	261	234	244
Cap Entry, veh/h	1007	1095	1046	1128
V/C Ratio	0.242	0.238	0.224	0.216
Control Delay, s/veh	5.9	5.5	5.6	5.1
LOS	A	A	A	A
95th %tile Queue, veh	1	1	1	1

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 7: Berthoud Pkwy & CR 4E

09/12/2022

Intersection												
Int Delay, s/veh	4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	15	5	5	40	10	5	55	5	15	85	90
Future Vol, veh/h	50	15	5	5	40	10	5	55	5	15	85	90
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	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	53	16	5	5	43	11	5	59	5	16	90	96

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	269	244	138	253	290	62	186	0	0	64	0	0
Stage 1	170	170	-	72	72	-	-	-	-	-	-	-
Stage 2	99	74	-	181	218	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	682	656	908	698	619	1000	1382	-	-	1532	-	-
Stage 1	830	756	-	935	833	-	-	-	-	-	-	-
Stage 2	905	831	-	818	721	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	631	646	908	673	609	1000	1382	-	-	1532	-	-
Mov Cap-2 Maneuver	631	646	-	673	609	-	-	-	-	-	-	-
Stage 1	827	747	-	931	830	-	-	-	-	-	-	-
Stage 2	846	828	-	786	712	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.9		11		0.6		0.6	
HCM LOS	B		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1382	-	-	631	696	662	1532	-	-
HCM Lane V/C Ratio	0.004	-	-	0.084	0.031	0.088	0.01	-	-
HCM Control Delay (s)	7.6	0	-	11.2	10.3	11	7.4	0	-
HCM Lane LOS	A	A	-	B	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0.3	0	-	-

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 2010 TWSC

7: Berthoud Pkwy & CR 4E

09/12/2022

Intersection												
Int Delay, s/veh	4.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	75	45	5	5	30	15	5	100	5	10	85	60
Future Vol, veh/h	75	45	5	5	30	15	5	100	5	10	85	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	80	48	5	5	32	16	5	106	5	11	90	64

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	287	265	122	290	295	109	154	0	0	111	0	0
Stage 1	144	144	-	119	119	-	-	-	-	-	-	-
Stage 2	143	121	-	171	176	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	663	639	926	660	615	942	1420	-	-	1473	-	-
Stage 1	856	776	-	883	795	-	-	-	-	-	-	-
Stage 2	857	794	-	829	752	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	620	631	926	612	608	942	1420	-	-	1473	-	-
Mov Cap-2 Maneuver	620	631	-	612	608	-	-	-	-	-	-	-
Stage 1	853	770	-	879	792	-	-	-	-	-	-	-
Stage 2	805	791	-	767	746	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	11.4			10.7			0.3			0.5		
HCM LOS	B			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1420	-	-	620	652	681	1473	-	-
HCM Lane V/C Ratio	0.004	-	-	0.129	0.082	0.078	0.007	-	-
HCM Control Delay (s)	7.5	0	-	11.7	11	10.7	7.5	0	-
HCM Lane LOS	A	A	-	B	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.3	0.3	0	-	-

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RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

09/13/2022

Intersection						
Int Delay, s/veh	27.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↱	↱	↕↕	↱	↱	↕↕
Traffic Vol, veh/h	105	35	805	45	15	2035
Future Vol, veh/h	105	35	805	45	15	2035
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	-	0	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	114	38	875	49	16	2212
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	2013	438	0	0	924	0
Stage 1	875	-	-	-	-	-
Stage 2	1138	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 50	564	-	-	729	-
Stage 1	366	-	-	-	-	-
Stage 2	265	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	~ 49	564	-	-	729	-
Mov Cap-2 Maneuver	~ 49	-	-	-	-	-
Stage 1	366	-	-	-	-	-
Stage 2	259	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s\$	592.1	0		0.1		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	49	564	729	-
HCM Lane V/C Ratio	-	-	2.329	0.067	0.022	-
HCM Control Delay (s)	-	-	\$ 785.5	11.8	10.1	-
HCM Lane LOS	-	-	F	B	B	-
HCM 95th %tile Q(veh)	-	-	11.8	0.2	0.1	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

09/13/2022

Intersection						
Int Delay, s/veh	104.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	70	30	2175	160	40	1215
Future Vol, veh/h	70	30	2175	160	40	1215
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	-	0	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	76	33	2364	174	43	1321
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	3111	1182	0	0	2538	0
Stage 1	2364	-	-	-	-	-
Stage 2	747	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 9	181	-	-	171	-
Stage 1	~ 56	-	-	-	-	-
Stage 2	426	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	~ 7	181	-	-	171	-
Mov Cap-2 Maneuver	~ 7	-	-	-	-	-
Stage 1	~ 56	-	-	-	-	-
Stage 2	319	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	3836.9	0		1.1		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	7	181	171	-
HCM Lane V/C Ratio	-	-	10.87	0.18	0.254	-
HCM Control Delay (s)	-	\$	5468.8	29.2	33.1	-
HCM Lane LOS	-	-	F	D	D	-
HCM 95th %tile Q(veh)	-	-	11.2	0.6	1	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

9: Berthoud Pkwy & Spartan Ave

09/13/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↕	↱	↰	↕
Traffic Volume (vph)	165	45	820	95	50	1885
Future Volume (vph)	165	45	820	95	50	1885
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	0.850		0.850			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1752	1568	3505	1568	1752	3505
Flt Permitted	0.950				0.266	
Satd. Flow (perm)	1752	1568	3505	1568	491	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		49		103		
Link Speed (mph)	30		30			30
Link Distance (ft)	2742		273			2639
Travel Time (s)	62.3		6.2			60.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	49	891	103	54	2049
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	49	891	103	54	2049
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Minimum Split (s)	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	26.0	26.0	84.4	84.4	9.6	94.0
Total Split (%)	21.7%	21.7%	70.3%	70.3%	8.0%	78.3%
Maximum Green (s)	21.5	21.5	79.9	79.9	5.1	89.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	21.5	21.5	79.9	79.9	89.5	89.5
Actuated g/C Ratio	0.18	0.18	0.67	0.67	0.75	0.75
v/c Ratio	0.57	0.15	0.38	0.10	0.13	0.78
Control Delay	53.1	12.7	9.6	1.5	4.7	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	12.7	9.6	1.5	4.7	12.1

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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY Town of Berthoud

Lanes, Volumes, Timings

9: Berthoud Pkwy & Spartan Ave

09/13/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	D	B	A	A	A	B
Approach Delay	44.5		8.7			11.9
Approach LOS	D		A			B
Intersection Summary						
Area Type:	Other					
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green						
Natural Cycle: 75						
Control Type: Pretimed						
Maximum v/c Ratio: 0.78						
Intersection Signal Delay: 13.2				Intersection LOS: B		
Intersection Capacity Utilization 68.7%				ICU Level of Service C		
Analysis Period (min) 15						

Splits and Phases: 9: Berthoud Pkwy & Spartan Ave



LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

9: Berthoud Pkwy & Spartan Ave

09/13/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↕	↱	↰	↕
Traffic Volume (vph)	85	45	2150	145	80	1170
Future Volume (vph)	85	45	2150	145	80	1170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	0.850		0.850			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1752	1568	3505	1568	1752	3505
Flt Permitted	0.950				0.051	
Satd. Flow (perm)	1752	1568	3505	1568	94	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		49		139		
Link Speed (mph)	30		30			30
Link Distance (ft)	2742		273			2639
Travel Time (s)	62.3		6.2			60.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	49	2337	158	87	1272
Shared Lane Traffic (%)						
Lane Group Flow (vph)	92	49	2337	158	87	1272
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Minimum Split (s)	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	22.5	22.5	78.0	78.0	9.5	87.5
Total Split (%)	20.5%	20.5%	70.9%	70.9%	8.6%	79.5%
Maximum Green (s)	18.0	18.0	73.5	73.5	5.0	83.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	18.0	18.0	73.5	73.5	83.0	83.0
Actuated g/C Ratio	0.16	0.16	0.67	0.67	0.75	0.75
v/c Ratio	0.32	0.16	1.00	0.14	0.60	0.48
Control Delay	44.2	12.7	37.1	1.8	29.6	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.2	12.7	37.1	1.8	29.6	5.9

Background 2042 PM 4:00 pm 06/22/2022 Background 2042 PM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY **Town of Berthoud**

Lanes, Volumes, Timings

9: Berthoud Pkwy & Spartan Ave

09/13/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	D	B	D	A	C	A
Approach Delay	33.2		34.8			7.4
Approach LOS	C		C			A
Intersection Summary						
Area Type:	Other					
Cycle Length: 110						
Actuated Cycle Length: 110						
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green						
Natural Cycle: 110						
Control Type: Pretimed						
Maximum v/c Ratio: 1.00						
Intersection Signal Delay: 25.5				Intersection LOS: C		
Intersection Capacity Utilization 78.7%				ICU Level of Service D		
Analysis Period (min) 15						

Splits and Phases: 9: Berthoud Pkwy & Spartan Ave



LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

11: Meadowlark & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	350	40	20	325	75	40	15	15	155	20	145
Future Volume (vph)	170	350	40	20	325	75	40	15	15	155	20	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.985					0.850		0.971				0.850
Flt Protected	0.950			0.950				0.972		0.950		
Satd. Flow (prot)	1752	1817	0	1752	1845	1568	0	1741	0	1752	1845	1568
Flt Permitted	0.467			0.406				0.862		0.737		
Satd. Flow (perm)	861	1817	0	749	1845	1568	0	1544	0	1360	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				82		16				158
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		929			1340			2256			516	
Travel Time (s)		21.1			30.5			51.3			11.7	
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
Adj. Flow (vph)	185	380	43	22	353	82	43	16	16	168	22	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	423	0	22	353	82	0	75	0	168	22	158
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	60		60	60		60	60		60	60		60
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	22.5	22.5		22.5	22.5	22.5
Total Split (s)	55.0	55.0		55.0	55.0	55.0	45.0	45.0		45.0	45.0	45.0
Total Split (%)	55.0%	55.0%		55.0%	55.0%	55.0%	45.0%	45.0%		45.0%	45.0%	45.0%
Maximum Green (s)	50.5	50.5		50.5	50.5	50.5	40.5	40.5		40.5	40.5	40.5
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5		4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	0
Act Effct Green (s)	50.5	50.5		50.5	50.5	50.5		40.5		40.5	40.5	40.5
Actuated g/C Ratio	0.50	0.50		0.50	0.50	0.50		0.40		0.40	0.40	0.40
v/c Ratio	0.43	0.46		0.06	0.38	0.10		0.12		0.31	0.03	0.22
Control Delay	12.2	10.6		13.2	16.7	3.3		15.6		22.2	18.2	3.9
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	12.2	10.6		13.2	16.7	3.3		15.6		22.2	18.2	3.9

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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
11: Meadowlark & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	B		B	B	A		B		C	B	A
Approach Delay		11.0			14.1			15.6			13.6	
Approach LOS		B			B			B			B	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 45												
Control Type: Pretimed												
Maximum v/c Ratio: 0.46												
Intersection Signal Delay: 12.8						Intersection LOS: B						
Intersection Capacity Utilization 51.2%						ICU Level of Service A						
Analysis Period (min) 15												

Splits and Phases: 11: Meadowlark & Mountain

 Ø2 (R)	 Ø4
45 s	55 s
 Ø6 (R)	 Ø8
45 s	55 s

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

11: Meadowlark & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	335	460	25	20	375	80	45	20	30	175	20	160
Future Volume (vph)	335	460	25	20	375	80	45	20	30	175	20	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992				0.850		0.957				0.850
Flt Protected	0.950			0.950				0.977		0.950		
Satd. Flow (prot)	1752	1830	0	1752	1845	1568	0	1725	0	1752	1845	1568
Flt Permitted	0.470			0.390				0.868		0.686		
Satd. Flow (perm)	867	1830	0	719	1845	1568	0	1532	0	1265	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				87		21				174
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		929			1340			2256			516	
Travel Time (s)		14.1			20.3			51.3			11.7	
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
Adj. Flow (vph)	364	500	27	22	408	87	49	22	33	190	22	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	364	527	0	22	408	87	0	104	0	190	22	174
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		6
Minimum Split (s)	22.5	22.5		22.5	22.5	22.5	22.5	22.5		22.5	22.5	22.5
Total Split (s)	75.0	75.0		75.0	75.0	75.0	35.0	35.0		35.0	35.0	35.0
Total Split (%)	68.2%	68.2%		68.2%	68.2%	68.2%	31.8%	31.8%		31.8%	31.8%	31.8%
Maximum Green (s)	70.5	70.5		70.5	70.5	70.5	30.5	30.5		30.5	30.5	30.5
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5		4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	0
Act Effct Green (s)	70.5	70.5		70.5	70.5	70.5		30.5		30.5	30.5	30.5
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64		0.28		0.28	0.28	0.28
v/c Ratio	0.66	0.45		0.05	0.35	0.08		0.24		0.54	0.04	0.31
Control Delay	17.6	11.5		7.7	10.1	1.8		26.1		40.7	29.5	6.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0		0.0	0.0	0.0
Total Delay	17.6	11.5		7.7	10.1	1.8		26.1		40.7	29.5	6.2

Background 2042 PM 4:00 pm 06/22/2022 Background 2042 PM
RR

Synchro 11 Light Report
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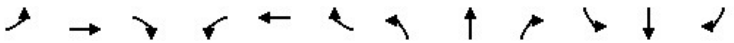
LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

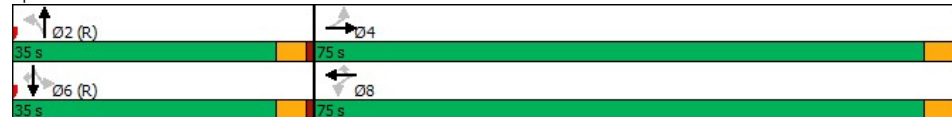
Lanes, Volumes, Timings

11: Meadowlark & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	B		A	B	A		C		D	C	A
Approach Delay		14.0			8.6			26.1			24.5	
Approach LOS		B			A			C			C	
Intersection Summary												
Area Type:	Other											
Cycle Length: 110												
Actuated Cycle Length: 110												
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 60												
Control Type: Pretimed												
Maximum v/c Ratio: 0.66												
Intersection Signal Delay: 15.3							Intersection LOS: B					
Intersection Capacity Utilization 65.9%							ICU Level of Service C					
Analysis Period (min) 15												

Splits and Phases: 11: Meadowlark & Mountain



LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

TOTAL 2042

Lanes, Volumes, Timings
1: US 287 & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	295	165	310	175	145	70	595	180	105	1365	70
Future Volume (vph)	90	295	165	310	175	145	70	595	180	105	1365	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			262			164			262			262
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			822			654			2586	
Travel Time (s)		51.6			12.5			8.1			32.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		0										
Adj. Flow (vph)	98	321	179	337	190	158	76	647	196	114	1484	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	321	179	337	190	158	76	647	196	114	1484	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Over	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			Free						Free			Free
Detector Phase	7	4		3	8	1	5	2		1	6	
Switch Phase												

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5	9.5	9.5	22.5		9.5	22.5	
Total Split (s)	13.4	27.0		15.3	28.9	17.7	9.5	40.0		17.7	48.2	
Total Split (%)	13.4%	27.0%		15.3%	28.9%	17.7%	9.5%	40.0%		17.7%	48.2%	
Maximum Green (s)	8.9	22.5		10.8	24.4	13.2	5.0	35.5		13.2	43.7	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lead		Lag	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	C-Max			None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	7.9	21.6	100.0	11.2	27.0	8.9	5.1	40.4	100.0	8.9	46.1	100.0
Actuated g/C Ratio	0.08	0.22	1.00	0.11	0.27	0.09	0.05	0.40	1.00	0.09	0.46	1.00
v/c Ratio	0.37	0.90	0.11	0.89	0.38	0.55	0.43	0.46	0.12	0.38	0.92	0.05
Control Delay	47.3	66.4	0.1	60.3	23.5	16.7	45.2	18.7	0.2	46.1	36.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.3	66.4	0.1	60.3	23.5	16.7	45.2	18.7	0.2	46.1	36.7	0.1
LOS	D	E	A	E	C	B	D	B	A	D	B	A
Approach Delay		43.5			40.0			17.0			35.6	
Approach LOS		D			D			B			D	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 33.2

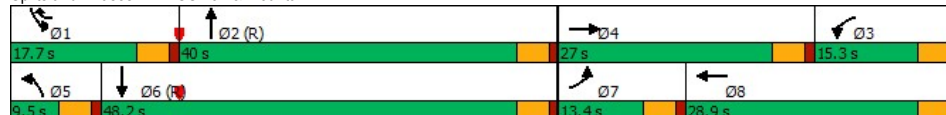
Intersection LOS: C

Intersection Capacity Utilization 80.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 1: US 287 & Mountain



Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	345	135	225	360	100	190	1525	445	155	915	120
Future Volume (vph)	125	345	135	225	360	100	190	1525	445	155	915	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	1660	1568	3400	1845	1568	3400	3505	1568	3400	3505	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			177			177			183			177
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		3408			822			654			2586	
Travel Time (s)		51.6			12.5			8.1			32.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)		0										
Adj. Flow (vph)	136	375	147	245	391	109	207	1658	484	168	995	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	375	147	245	391	109	207	1658	484	168	995	130
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free	Prot	NA	Free
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			Free			Free			Free			Free
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

1: US 287 & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	22.5		9.5	22.5		9.5	22.5	
Total Split (s)	12.0	32.9		14.1	35.0		17.5	60.0		13.0	55.5	
Total Split (%)	10.0%	27.4%		11.8%	29.2%		14.6%	50.0%		10.8%	46.3%	
Maximum Green (s)	7.5	28.4		9.6	30.5		13.0	55.5		8.5	51.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	7.5	28.2	120.0	9.8	30.5	120.0	11.8	55.5	120.0	8.5	52.2	120.0
Actuated g/C Ratio	0.06	0.24	1.00	0.08	0.25	1.00	0.10	0.46	1.00	0.07	0.44	1.00
v/c Ratio	0.64	0.96	0.09	0.88	0.84	0.07	0.62	1.02	0.31	0.70	0.65	0.08
Control Delay	69.4	83.1	0.1	74.8	48.0	0.1	53.6	46.7	0.1	70.8	29.5	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.4	83.1	0.1	74.8	48.0	0.1	53.6	46.7	0.1	70.8	29.5	0.1
LOS	E	F	A	E	D	A	D	D	A	E	C	A
Approach Delay		61.7			49.8			37.7			31.9	
Approach LOS		E			D			D			C	

Intersection Summary

Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 113.5 (95%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 41.1	Intersection LOS: D
Intersection Capacity Utilization 86.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: US 287 & Mountain



Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
Page 2

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

2: Mountain & Gate Way

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	485	55	40	480	10	70	5	25	15	5	15
Future Volume (vph)	5	485	55	40	480	10	70	5	25	15	5	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.873			0.886	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1610	0	1752	1634	0
Flt Permitted	0.266			0.261			0.744			0.736		
Satd. Flow (perm)	491	1845	1568	481	1845	1568	1372	1610	0	1358	1634	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			60			33		27			16	
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1447			1257			342			493	
Travel Time (s)		21.9			19.0			7.8			11.2	
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
Adj. Flow (vph)	5	527	60	43	522	11	76	5	27	16	5	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	527	60	43	522	11	76	32	0	16	21	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	0	0	2	1	0	0		1	0	
Detector Template	Left	Thru	Thru	Thru	Thru	Right	Thru	Thru		Left	Thru	
Leading Detector (ft)	20	100	0	0	100	20	0	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	0	0	6	20	0	0		20	0	
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

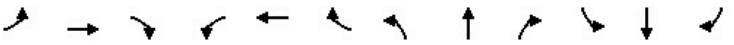
Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

2: Mountain & Gate Way

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5		22.5	22.5	
Total Split (s)	27.0	27.0	27.0	27.0	27.0	27.0	23.0	23.0		23.0	23.0	
Total Split (%)	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	46.0%	46.0%		46.0%	46.0%	
Maximum Green (s)	22.5	22.5	22.5	22.5	22.5	22.5	18.5	18.5		18.5	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	18.9	18.9	18.9	18.9	18.9	18.9	22.1	22.1		22.1	22.1	
Actuated g/C Ratio	0.38	0.38	0.38	0.38	0.38	0.38	0.44	0.44		0.44	0.44	
v/c Ratio	0.03	0.76	0.10	0.24	0.75	0.02	0.13	0.04		0.03	0.03	
Control Delay	4.4	15.2	1.0	12.8	20.3	1.3	10.7	5.6		10.1	6.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	4.4	15.2	1.0	12.8	20.3	1.3	10.7	5.6		10.1	6.4	
LOS	A	B	A	B	C	A	B	A		B	A	
Approach Delay	13.7			19.4			9.2			8.0		
Approach LOS	B			B			A			A		

Intersection Summary

Area Type: Other

Cycle Length: 50

Actuated Cycle Length: 50

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 15.7

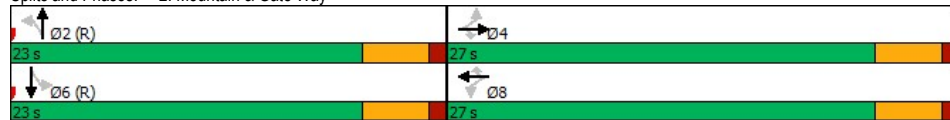
Intersection LOS: B

Intersection Capacity Utilization 51.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Mountain & Gate Way



Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
 RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

2: Mountain & Gate Way

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	690	120	70	510	15	115	5	80	10	5	10
Future Volume (vph)	15	690	120	70	510	15	115	5	80	10	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.858			0.897	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1583	0	1752	1655	0
Flt Permitted	0.313			0.153			0.747			0.697		
Satd. Flow (perm)	577	1845	1568	282	1845	1568	1378	1583	0	1286	1655	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			130			27		87			11	
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		1447			1257			342			493	
Travel Time (s)		21.9			19.0			7.8			11.2	
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
Adj. Flow (vph)	16	750	130	76	554	16	125	5	87	11	5	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	750	130	76	554	16	125	92	0	11	16	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	0	0	2	1	0	0		1	0	
Detector Template	Left	Thru	Thru	Thru	Thru	Right	Thru	Thru		Left	Thru	
Leading Detector (ft)	20	100	0	0	100	20	0	0		20	0	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	0	0	6	20	0	0		20	0	
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex				Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

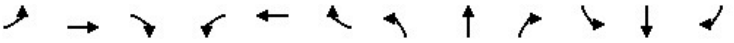
Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

2: Mountain & Gate Way

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5		22.5	22.5	
Total Split (s)	37.0	37.0	37.0	37.0	37.0	37.0	23.0	23.0		23.0	23.0	
Total Split (%)	61.7%	61.7%	61.7%	61.7%	61.7%	61.7%	38.3%	38.3%		38.3%	38.3%	
Maximum Green (s)	32.5	32.5	32.5	32.5	32.5	32.5	18.5	18.5		18.5	18.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	29.2	29.2	29.2	29.2	29.2	29.2	21.8	21.8		21.8	21.8	
Actuated g/C Ratio	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.36		0.36	0.36	
v/c Ratio	0.06	0.84	0.16	0.55	0.62	0.02	0.25	0.15		0.02	0.03	
Control Delay	8.7	23.1	3.2	28.2	14.1	2.1	16.9	5.4		14.7	10.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	8.7	23.1	3.2	28.2	14.1	2.1	16.9	5.4		14.7	10.1	
LOS	A	C	A	C	B	A	B	A		B	B	
Approach Delay	19.9			15.5			12.0			12.0		
Approach LOS	B			B			B			B		

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 17.2

Intersection LOS: B

Intersection Capacity Utilization 64.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: Mountain & Gate Way

 Ø2 (R)	 Ø4
23 s	37 s
 Ø6 (R)	 Ø8
23 s	37 s

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
Page 2

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	310	95	70	285	90	95	240	125	110	195	140
Future Volume (vph)	105	310	95	70	285	90	95	240	125	110	195	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1845	1568	1752	1845	1568
Flt Permitted	0.399			0.448			0.625			0.566		
Satd. Flow (perm)	736	1845	1568	826	1845	1568	1153	1845	1568	1044	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			119			119			136			152
Link Speed (mph)		45			45			35			35	
Link Distance (ft)		1257			3652			531			2550	
Travel Time (s)		19.0			55.3			10.3			49.7	
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
Adj. Flow (vph)	114	337	103	76	310	98	103	261	136	120	212	152
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	337	103	76	310	98	103	261	136	120	212	152
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	7	4	4	3	8	8	2	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

3: Berthoud Pkwy & Mountain

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	9.5	22.5	22.5	9.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	10.0	22.9	22.9	9.6	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (%)	18.2%	41.6%	41.6%	17.5%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%
Maximum Green (s)	5.5	18.4	18.4	5.1	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	20.0	16.7	16.7	18.5	14.4	14.4	23.6	23.6	23.6	23.6	23.6	23.6
Actuated g/C Ratio	0.36	0.30	0.30	0.34	0.26	0.26	0.43	0.43	0.43	0.43	0.43	0.43
v/c Ratio	0.31	0.60	0.18	0.21	0.64	0.20	0.21	0.33	0.18	0.27	0.27	0.20
Control Delay	10.6	21.1	3.6	9.4	23.8	3.6	14.3	14.3	3.9	15.3	13.7	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	21.1	3.6	9.4	23.8	3.6	14.3	14.3	3.9	15.3	13.7	3.8
LOS	B	C	A	A	C	A	B	B	A	B	B	A
Approach Delay		15.7			17.5			11.5			11.0	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 13.9

Intersection LOS: B

Intersection Capacity Utilization 54.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Berthoud Pkwy & Mountain

 Ø2 (R)	 Ø3	 Ø4
22.5 s	9.6 s	22.9 s
 Ø5 (R)	 Ø7	 Ø8
22.5 s	10 s	22.5 s

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

12/31/2022

Intersection												
Int Delay, s/veh	2.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	↔
Traffic Vol, veh/h	55	1	5	10	1	30	5	340	10	20	355	20
Future Vol, veh/h	55	1	5	10	1	30	5	340	10	20	355	20
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	-	-	-	-	-	-	0	-	-	0	-	0
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	60	1	5	11	1	33	5	370	11	22	386	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	833	821	386	830	838	376	408	0	0	381	0	0
Stage 1	430	430	-	386	386	-	-	-	-	-	-	-
Stage 2	403	391	-	444	452	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	287	308	660	288	301	668	1145	-	-	1172	-	-
Stage 1	601	582	-	635	608	-	-	-	-	-	-	-
Stage 2	622	605	-	591	569	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	267	301	660	280	294	668	1145	-	-	1172	-	-
Mov Cap-2 Maneuver	267	301	-	280	294	-	-	-	-	-	-	-
Stage 1	599	571	-	632	606	-	-	-	-	-	-	-
Stage 2	588	603	-	574	558	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	21.7			13.1			0.1			0.4		
HCM LOS	C			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1145	-	-	281	488	1172	-	-
HCM Lane V/C Ratio	0.005	-	-	0.236	0.091	0.019	-	-
HCM Control Delay (s)	8.2	-	-	21.7	13.1	8.1	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.9	0.3	0.1	-	-

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

4: Welch & Berthoud Pkwy

12/28/2022

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	↔
Traffic Vol, veh/h	30	1	15	10	1	30	10	345	15	45	350	55
Future Vol, veh/h	30	1	15	10	1	30	10	345	15	45	350	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	0	-	0
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	33	1	16	11	1	33	11	375	16	49	380	60

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	900	891	380	922	943	383	440	0	0	391	0	0
Stage 1	478	478	-	405	405	-	-	-	-	-	-	-
Stage 2	422	413	-	517	538	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	258	281	665	250	262	662	1115	-	-	1162	-	-
Stage 1	566	554	-	620	597	-	-	-	-	-	-	-
Stage 2	607	592	-	539	521	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	235	266	665	234	248	662	1115	-	-	1162	-	-
Mov Cap-2 Maneuver	235	266	-	234	248	-	-	-	-	-	-	-
Stage 1	560	531	-	614	591	-	-	-	-	-	-	-
Stage 2	570	586	-	503	499	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	19.4			14			0.2			0.8		
HCM LOS	C			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1115	-	-	299	445	1162	-	-
HCM Lane V/C Ratio	0.01	-	-	0.167	0.1	0.042	-	-
HCM Control Delay (s)	8.3	-	-	19.4	14	8.2	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.6	0.3	0.1	-	-

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

12/28/2022

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	↕
Traffic Vol, veh/h	30	1	10	5	1	10	5	310	5	5	345	15
Future Vol, veh/h	30	1	10	5	1	10	5	310	5	5	345	15
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	-	-	-	-	-	-	0	-	-	0	-	0
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	33	1	11	5	1	11	5	337	5	5	375	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	741	737	375	749	751	340	391	0	0	342	0	0
Stage 1	385	385	-	350	350	-	-	-	-	-	-	-
Stage 2	356	352	-	399	401	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	331	345	669	327	338	700	1162	-	-	1211	-	-
Stage 1	636	609	-	664	631	-	-	-	-	-	-	-
Stage 2	659	630	-	625	599	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	323	342	669	319	335	700	1162	-	-	1211	-	-
Mov Cap-2 Maneuver	323	342	-	319	335	-	-	-	-	-	-	-
Stage 1	633	607	-	661	628	-	-	-	-	-	-	-
Stage 2	645	627	-	611	597	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.1			12.7			0.1			0.1		
HCM LOS	C			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1162	-	-	370	486	1211	-	-
HCM Lane V/C Ratio	0.005	-	-	0.12	0.036	0.004	-	-
HCM Control Delay (s)	8.1	-	-	16.1	12.7	8	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0	-	-

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

5: Berthoud Pkwy & Arapahoe

12/28/2022

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	↕
Traffic Vol, veh/h	20	1	5	5	1	5	10	340	5	5	335	40
Future Vol, veh/h	20	1	5	5	1	5	10	340	5	5	335	40
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	-	-	-	-	-	-	0	-	-	0	-	0
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	22	1	5	5	1	5	11	370	5	5	364	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	772	771	364	794	812	373	407	0	0	375	0	0
Stage 1	374	374	-	395	395	-	-	-	-	-	-	-
Stage 2	398	397	-	399	417	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	315	330	679	305	312	671	1146	-	-	1178	-	-
Stage 1	645	616	-	628	603	-	-	-	-	-	-	-
Stage 2	626	602	-	625	590	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	308	325	679	299	308	671	1146	-	-	1178	-	-
Mov Cap-2 Maneuver	308	325	-	299	308	-	-	-	-	-	-	-
Stage 1	639	614	-	622	597	-	-	-	-	-	-	-
Stage 2	614	596	-	616	588	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.4			14.3			0.2			0.1		
HCM LOS	C			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1146	-	-	345	401	1178	-	-
HCM Lane V/C Ratio	0.009	-	-	0.082	0.03	0.005	-	-
HCM Control Delay (s)	8.2	-	-	16.4	14.3	8.1	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.1	0	-	-

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

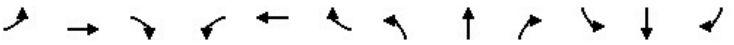
Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

6: Spartan Ave/Spartan & Berthoud Pkwy

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	100	100	65	30	145	100	85	125	65	170	100	70
Future Volume (vph)	100	100	65	30	145	100	85	125	65	170	100	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.951			0.949			0.938	
Flt Protected		0.981			0.995		0.950			0.950		
Satd. Flow (prot)	0	1750	0	0	1746	0	1752	1751	0	1752	1730	0
Flt Permitted		0.713			0.949		0.641			0.628		
Satd. Flow (perm)	0	1272	0	0	1665	0	1182	1751	0	1158	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		34			60			54			73	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		2716			4520			2200			580	
Travel Time (s)		61.7			102.7			42.9			11.3	
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
Adj. Flow (vph)	109	109	71	33	158	109	92	136	71	185	109	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	289	0	0	300	0	92	207	0	185	185	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	0	0		1	0		0	2		1	2	
Detector Template	Thru	Thru		Left	Thru		Thru	Thru		Left	Thru	
Leading Detector (ft)	0	0		20	0		0	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	0	0		20	0		0	6		20	6	
Detector 1 Type				Cl+Ex			Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

6: Spartan Ave/Spartan & Berthoud Pkwy

12/28/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	30.0	30.0		30.0	30.0		30.0	30.0		30.0	30.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	25.5	25.5		25.5	25.5		25.5	25.5		25.5	25.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		14.0			14.0			25.8			25.8	
Actuated g/C Ratio		0.29			0.29			0.53			0.53	
v/c Ratio		0.75			0.58			0.15			0.30	
Control Delay		26.2			16.1			8.3			9.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		26.2			16.1			8.3			9.8	
LOS		C			B			A			A	
Approach Delay		26.2			16.1			7.0			7.7	
Approach LOS		C			B			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 48.8

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 13.8

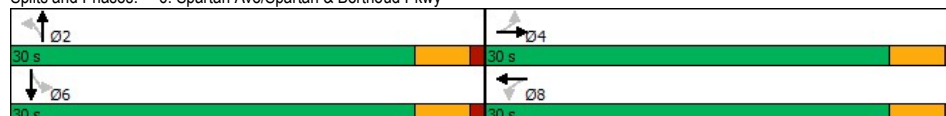
Intersection LOS: B

Intersection Capacity Utilization 65.1%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 6: Spartan Ave/Spartan & Berthoud Pkwy

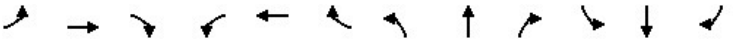


LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

6: Spartan Ave/Spartan & Berthoud Pkwy

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Volume (vph)	110	135	115	40	90	110	80	135	55	65	165	110
Future Volume (vph)	110	135	115	40	90	110	80	135	55	65	165	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.957			0.938			0.957			0.940	
Flt Protected		0.985			0.992		0.950			0.950		
Satd. Flow (prot)	0	1739	0	0	1716	0	1752	1765	0	1752	1734	0
Flt Permitted		0.811			0.906		0.562			0.628		
Satd. Flow (perm)	0	1432	0	0	1568	0	1037	1765	0	1158	1734	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49			89		43			70		
Link Speed (mph)		30			30		35			35		
Link Distance (ft)		2716			4520		2200			580		
Travel Time (s)		61.7			102.7		42.9			11.3		
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
Adj. Flow (vph)	120	147	125	43	98	120	87	147	60	71	179	120
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	392	0	0	261	0	87	207	0	71	299	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0		12			12		
Link Offset(ft)		0			0		0			0		
Crosswalk Width(ft)		16			16		16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	0	0		1	0		0	2		1	2	
Detector Template	Thru	Thru		Left	Thru		Thru	Thru		Left	Thru	
Leading Detector (ft)	0	0		20	0		0	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	0	0		20	0		0	6		20	6	
Detector 1 Type				Cl+Ex			Cl+Ex			Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

6: Spartan Ave/Spartan & Berthoud Pkwy

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	30.0	30.0		30.0	30.0		30.0	30.0		30.0	30.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	25.5	25.5		25.5	25.5		25.5	25.5		25.5	25.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		17.1			17.1			25.8			25.8	
Actuated g/C Ratio		0.33			0.33			0.50			0.50	
v/c Ratio		0.78			0.45			0.17			0.12	
Control Delay		24.9			11.1			10.3			9.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		24.9			11.1			10.3			9.8	
LOS		C			B			B			A	
Approach Delay		24.9			11.1			8.8			8.8	
Approach LOS		C			B			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 52

Natural Cycle: 45

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 14.0

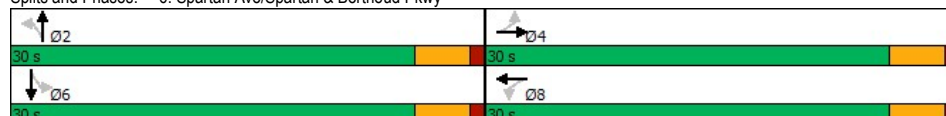
Intersection LOS: B

Intersection Capacity Utilization 66.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 6: Spartan Ave/Spartan & Berthoud Pkwy



Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

7: Berthoud Pkwy & CR 4E

12/31/2022

Intersection												
Int Delay, s/veh	3.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Traffic Vol, veh/h	55	15	5	5	40	10	5	90	5	15	135	105
Future Vol, veh/h	55	15	5	5	40	10	5	90	5	15	135	105
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	0	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	60	16	5	5	43	11	5	98	5	16	147	114

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	374	349	204	358	404	101	261	0	0	103	0	0
Stage 1	236	236	-	111	111	-	-	-	-	-	-	-
Stage 2	138	113	-	247	293	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	581	573	834	596	534	952	1298	-	-	1483	-	-
Stage 1	765	708	-	892	802	-	-	-	-	-	-	-
Stage 2	863	800	-	755	668	-	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	531	563	834	572	525	952	1298	-	-	1483	-	-
Mov Cap-2 Maneuver	531	563	-	572	525	-	-	-	-	-	-	-
Stage 1	762	699	-	888	799	-	-	-	-	-	-	-
Stage 2	803	797	-	723	659	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	12.2			12			0.4			0.4		
HCM LOS	B			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1298	-	-	531	613	576	1483	-	-
HCM Lane V/C Ratio	0.004	-	-	0.113	0.035	0.104	0.011	-	-
HCM Control Delay (s)	7.8	0	-	12.6	11.1	12	7.5	0	-
HCM Lane LOS	A	A	-	B	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0.3	0	-	-

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

7: Berthoud Pkwy & CR 4E

12/31/2022

Intersection												
Int Delay, s/veh	4.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	90	45	5	5	30	15	5	165	5	10	140	40
Future Vol, veh/h	90	45	5	5	30	15	5	165	5	10	140	40
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	0	-	-	-	-	-	-	-	-	-	-	-
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, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	98	49	5	5	33	16	5	179	5	11	152	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	412	390	174	415	409	182	195	0	0	184	0	0
Stage 1	196	196	-	192	192	-	-	-	-	-	-	-
Stage 2	216	194	-	223	217	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	549	544	867	546	531	858	1372	-	-	1385	-	-
Stage 1	803	737	-	807	740	-	-	-	-	-	-	-
Stage 2	784	738	-	777	721	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	508	537	867	500	524	858	1372	-	-	1385	-	-
Mov Cap-2 Maneuver	508	537	-	500	524	-	-	-	-	-	-	-
Stage 1	800	730	-	804	737	-	-	-	-	-	-	-
Stage 2	732	735	-	714	715	-	-	-	-	-	-	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	13.2			11.7			0.2			0.4		
HCM LOS	B			B								

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1372	-	-	508	558	590	1385	-	-
HCM Lane V/C Ratio	0.004	-	-	0.193	0.097	0.092	0.008	-	-
HCM Control Delay (s)	7.6	0	-	13.8	12.1	11.7	7.6	0	-
HCM Lane LOS	A	A	-	B	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.3	0.3	0	-	-

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

12/31/2022

Intersection						
Int Delay, s/veh	52.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↰	↰↰	↰	↰	↰↰
Traffic Vol, veh/h	120	35	900	50	15	2230
Future Vol, veh/h	120	35	900	50	15	2230
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	-	0	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	130	38	978	54	16	2424
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	2222	489	0	0	1032	0
Stage 1	978	-	-	-	-	-
Stage 2	1244	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 36	522	-	-	663	-
Stage 1	323	-	-	-	-	-
Stage 2	233	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	~ 35	522	-	-	663	-
Mov Cap-2 Maneuver	~ 35	-	-	-	-	-
Stage 1	323	-	-	-	-	-
Stage 2	227	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, \$	1134.8	0		0.1		
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 35	522	663	-	
HCM Lane V/C Ratio	-	- 3.727	0.073	0.025	-	
HCM Control Delay (s)	-	\$ 1462.2	12.4	10.6	-	
HCM Lane LOS	-	- F	B	B	-	
HCM 95th %tile Q(veh)	-	- 15.2	0.2	0.1	-	
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
 RR

Synchro 11 Light Report
 Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC
 8: US 287 & CR 4E

12/31/2022

Intersection						
Int Delay, s/veh	292.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↱	↱	↱↱	↱	↱	↱↱
Traffic Vol, veh/h	80	30	2395	175	40	1370
Future Vol, veh/h	80	30	2395	175	40	1370
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	-	0	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	87	33	2603	190	43	1489
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	3434	1302	0	0	2793	0
Stage 1	2603	-	-	-	-	-
Stage 2	831	-	-	-	-	-
Critical Hdwy	6.86	6.96	-	-	4.16	-
Critical Hdwy Stg 1	5.86	-	-	-	-	-
Critical Hdwy Stg 2	5.86	-	-	-	-	-
Follow-up Hdwy	3.53	3.33	-	-	2.23	-
Pot Cap-1 Maneuver	~ 5	150	-	-	135	-
Stage 1	~ 41	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	~ 3	150	-	-	135	-
Mov Cap-2 Maneuver	~ 3	-	-	-	-	-
Stage 1	~ 41	-	-	-	-	-
Stage 2	263	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10873.8	0	1.2			
HCM LOS	F					
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	3	150	135	-
HCM Lane V/C Ratio	-	-	28.986	0.217	0.322	-
HCM Control Delay (s)	-	-	14938.2	35.5	43.8	-
HCM Lane LOS	-	-	F	E	E	-
HCM 95th %tile Q(veh)	-	-	13	0.8	1.3	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
 Page 1

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
9: US 287 & Spartan Ave

12/28/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰↱	↱	↰↱	↱	↰↱	↰↱
Traffic Volume (vph)	350	115	835	175	95	1895
Future Volume (vph)	350	115	835	175	95	1895
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt	0.850		0.850			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3400	1568	3505	1568	1752	3505
Flt Permitted	0.950				0.251	
Satd. Flow (perm)	3400	1568	3505	1568	463	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		125		190		
Link Speed (mph)	30		30			30
Link Distance (ft)	2716		245			2668
Travel Time (s)	61.7		5.6			60.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	380	125	908	190	103	2060
Shared Lane Traffic (%)						
Lane Group Flow (vph)	380	125	908	190	103	2060
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	24		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Minimum Split (s)	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	22.5	22.5	67.1	67.1	10.4	77.5
Total Split (%)	22.5%	22.5%	67.1%	67.1%	10.4%	77.5%
Maximum Green (s)	18.0	18.0	62.6	62.6	5.9	73.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	18.0	18.0	62.6	62.6	73.0	73.0
Actuated g/C Ratio	0.18	0.18	0.63	0.63	0.73	0.73
v/c Ratio	0.62	0.33	0.41	0.18	0.25	0.81
Control Delay	42.9	9.1	10.1	1.5	6.3	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.9	9.1	10.1	1.5	6.3	20.7

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

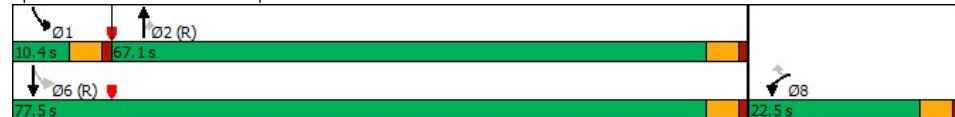
Lanes, Volumes, Timings

9: US 287 & Spartan Ave

12/28/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	D	A	B	A	A	C
Approach Delay	34.5		8.7			20.0
Approach LOS	C		A			B
Intersection Summary						
Area Type:	Other					
Cycle Length: 100						
Actuated Cycle Length: 100						
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green						
Natural Cycle: 75						
Control Type: Pretimed						
Maximum v/c Ratio: 0.81						
Intersection Signal Delay: 18.6				Intersection LOS: B		
Intersection Capacity Utilization 69.9%				ICU Level of Service C		
Analysis Period (min) 15						

Splits and Phases: 9: US 287 & Spartan Ave



Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings

9: US 287 & Spartan Ave

12/28/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	210	120	2175	335	200	1200
Future Volume (vph)	210	120	2175	335	200	1200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt	0.850		0.850			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3400	1568	3505	1568	1752	3505
Flt Permitted	0.950				0.049	
Satd. Flow (perm)	3400	1568	3505	1568	90	3505
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		130		157		
Link Speed (mph)	30		30			30
Link Distance (ft)	2716		245			2668
Travel Time (s)	61.7		5.6			60.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	130	2364	364	217	1304
Shared Lane Traffic (%)						
Lane Group Flow (vph)	228	130	2364	364	217	1304
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	24		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA	pm+ov	pm+pt	NA
Protected Phases	8		2	8	1	6
Permitted Phases		8		2		6
Minimum Split (s)	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	20.0	20.0	82.0	20.0	18.0	100.0
Total Split (%)	16.7%	16.7%	68.3%	16.7%	15.0%	83.3%
Maximum Green (s)	15.5	15.5	77.5	15.5	13.5	95.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	15.5	15.5	77.5	97.5	95.5	95.5
Actuated g/C Ratio	0.13	0.13	0.65	0.81	0.80	0.80
v/c Ratio	0.52	0.41	1.04	0.28	0.84	0.47
Control Delay	53.5	12.2	53.9	2.0	46.5	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.5	12.2	53.9	2.0	46.5	11.5

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

10: Berthoud Pkwy & Estate Lot Access

12/31/2022

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W		W	↑	↑	
Traffic Vol, veh/h	30	20	5	245	185	10
Future Vol, veh/h	30	20	5	245	185	10
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, %	3	3	3	3	3	3
Mvmt Flow	33	22	5	266	201	11
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	483	207	212	0	-	0
Stage 1	207	-	-	-	-	-
Stage 2	276	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	541	831	1352	-	-	-
Stage 1	825	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	539	831	1352	-	-	-
Mov Cap-2 Maneuver	539	-	-	-	-	-
Stage 1	822	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	11.3	0.2	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR		
Capacity (veh/h)	1352	-	627	-		
HCM Lane V/C Ratio	0.004	-	0.087	-		
HCM Control Delay (s)	7.7	-	11.3	-		
HCM Lane LOS	A	-	B	-		
HCM 95th %tile Q(veh)	0	-	0.3	-		

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY Town of Berthoud

Lanes, Volumes, Timings

9: US 287 & Spartan Ave

12/28/2022

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	D	B	D	A	D	B
Approach Delay	38.5		47.0		16.5	
Approach LOS	D		D		B	
Intersection Summary						
Area Type:	Other					
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green						
Natural Cycle: 140						
Control Type: Pretimed						
Maximum v/c Ratio: 1.04						
Intersection Signal Delay: 36.3				Intersection LOS: D		
Intersection Capacity Utilization 88.4%				ICU Level of Service E		
Analysis Period (min) 15						

Splits and Phases: 9: US 287 & Spartan Ave



Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

10: Berthoud Pkwy & Estate Lot Access

12/31/2022

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W		W	↑	↑	
Traffic Vol, veh/h	30	20	5	245	185	10
Future Vol, veh/h	30	20	5	245	185	10
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, %	3	3	3	3	3	3
Mvmt Flow	33	22	5	266	201	11
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	483	207	212	0	-	0
Stage 1	207	-	-	-	-	-
Stage 2	276	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	541	831	1352	-	-	-
Stage 1	825	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	539	831	1352	-	-	-
Mov Cap-2 Maneuver	539	-	-	-	-	-
Stage 1	822	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	11.3	0.2	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR		
Capacity (veh/h)	1352	-	627	-		
HCM Lane V/C Ratio	0.004	-	0.087	-		
HCM Control Delay (s)	7.7	-	11.3	-		
HCM Lane LOS	A	-	B	-		
HCM 95th %tile Q(veh)	0	-	0.3	-		

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th TWSC

10: Berthoud Pkwy & Estate Lot Access

12/31/2022

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W		W	↑	↑	
Traffic Vol, veh/h	20	10	20	320	345	30
Future Vol, veh/h	20	10	20	320	345	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	22	11	22	348	375	33
Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	784	392	408	0	-	0
Stage 1	392	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	361	655	1145	-	-	-
Stage 1	681	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	354	655	1145	-	-	-
Mov Cap-2 Maneuver	354	-	-	-	-	-
Stage 1	668	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Approach	EB	NB	SB			
HCM Control Delay, s	14.3	0.5	0			
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT EBLn1	SBT	SBR		
Capacity (veh/h)	1145	-	418	-		
HCM Lane V/C Ratio	0.019	-	0.078	-		
HCM Control Delay (s)	8.2	-	14.3	-		
HCM Lane LOS	A	-	B	-		
HCM 95th %tile Q(veh)	0.1	-	0.3	-		

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

Lanes, Volumes, Timings
11: Mountain & Meadowlark

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	405	50	30	400	75	105	15	45	155	20	145
Future Volume (vph)	170	405	50	30	400	75	105	15	45	155	20	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.887				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1636	0	1752	1845	1568
Flt Permitted	0.407			0.402			0.743			0.715		
Satd. Flow (perm)	751	1845	1568	742	1845	1568	1371	1636	0	1319	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			54			82		49				158
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		822			1447			2668			493	
Travel Time (s)		12.5			21.9			60.6			11.2	
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
Adj. Flow (vph)	185	440	54	33	435	82	114	16	49	168	22	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	440	54	33	435	82	114	65	0	168	22	158
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5		22.5	22.5	22.5
Total Split (s)	57.0	57.0	57.0	57.0	57.0	57.0	43.0	43.0		43.0	43.0	43.0
Total Split (%)	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	43.0%	43.0%		43.0%	43.0%	43.0%
Maximum Green (s)	52.5	52.5	52.5	52.5	52.5	52.5	38.5	38.5		38.5	38.5	38.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	0
Act Effect Green (s)	52.5	52.5	52.5	52.5	52.5	52.5	38.5	38.5		38.5	38.5	38.5
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52	0.52	0.38	0.38		0.38	0.38	0.38
v/c Ratio	0.47	0.45	0.06	0.08	0.45	0.10	0.22	0.10		0.33	0.03	0.23
Control Delay	16.1	12.9	3.7	18.8	25.1	8.5	22.0	8.4		24.0	19.4	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	16.1	12.9	3.7	18.8	25.1	8.5	22.0	8.4		24.0	19.4	4.2

Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

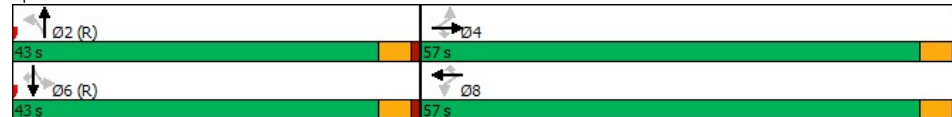
Lanes, Volumes, Timings

11: Mountain & Meadowlark

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	B	A	B	C	A	C	A		C	B	A
Approach Delay		13.1			22.2			17.1			14.7	
Approach LOS		B			C			B			B	
Intersection Summary												
Area Type:	Other											
Cycle Length: 100												
Actuated Cycle Length: 100												
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 50												
Control Type: Pretimed												
Maximum v/c Ratio: 0.47												
Intersection Signal Delay: 16.7						Intersection LOS: B						
Intersection Capacity Utilization 57.0%						ICU Level of Service B						
Analysis Period (min) 15												

Splits and Phases: 11: Mountain & Meadowlark



Total 2042 AM 7:00 am 06/22/2022 Total 2042 AM
RR

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

11: Mountain & Meadowlark

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	335	570	90	45	470	80	85	20	45	175	20	160
Future Volume (vph)	335	570	90	45	470	80	85	20	45	175	20	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.896				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1845	1568	1752	1845	1568	1752	1653	0	1752	1845	1568
Flt Permitted	0.421			0.358			0.743			0.711		
Satd. Flow (perm)	777	1845	1568	660	1845	1568	1371	1653	0	1312	1845	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			98			87		49				174
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		822			1447			2668			493	
Travel Time (s)		18.7			32.9			60.6			11.2	
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
Adj. Flow (vph)	364	620	98	49	511	87	92	22	49	190	22	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	364	620	98	49	511	87	92	71	0	190	22	174
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	60		60	60		60	60		60	60		60
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5		22.5	22.5	22.5
Total Split (s)	89.0	89.0	89.0	89.0	89.0	89.0	31.0	31.0		31.0	31.0	31.0
Total Split (%)	74.2%	74.2%	74.2%	74.2%	74.2%	74.2%	25.8%	25.8%		25.8%	25.8%	25.8%
Maximum Green (s)	84.5	84.5	84.5	84.5	84.5	84.5	26.5	26.5		26.5	26.5	26.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	0
Act Effct Green (s)	84.5	84.5	84.5	84.5	84.5	84.5	26.5	26.5		26.5	26.5	26.5
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.22	0.22		0.22	0.22	0.22
v/c Ratio	0.67	0.48	0.09	0.11	0.39	0.08	0.30	0.18		0.66	0.05	0.36
Control Delay	19.5	13.0	3.9	10.9	14.4	5.1	42.4	16.8		54.8	37.5	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	19.5	13.0	3.9	10.9	14.4	5.1	42.4	16.8		54.8	37.5	7.9

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY

Town of Berthoud

Lanes, Volumes, Timings

11: Mountain & Meadowlark

12/28/2022

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	B	A	B	B	A	D	B		D	D	A
Approach Delay		14.3			12.9			31.2			32.7	
Approach LOS		B			B			C			C	
Intersection Summary												
Area Type:	Other											
Cycle Length: 120												
Actuated Cycle Length: 120												
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green												
Natural Cycle: 65												
Control Type: Pretimed												
Maximum v/c Ratio: 0.67												
Intersection Signal Delay: 18.2						Intersection LOS: B						
Intersection Capacity Utilization 70.9%						ICU Level of Service C						
Analysis Period (min) 15												

Splits and Phases: 11: Mountain & Meadowlark

 Ø2 (R)	 Ø4
Ø1 s	Ø9 s
 Ø6 (R)	 Ø8
Ø1 s	Ø9 s

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

Synchro 11 Light Report
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TOTAL 2042 WITH ROUNDABOUT

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 2: Mountain & Gate Way

01/01/2023

Intersection					
Intersection Delay, s/veh	7.1				
Intersection LOS	A				
Approach	EB	WB	NB	SB	
Entry Lanes	1	1	1	1	
Conflicting Circle Lanes	1	1	1	1	
Adj Approach Flow, veh/h	592	576	108	37	
Demand Flow Rate, veh/h	610	593	111	37	
Vehicles Circulating, veh/h	65	88	564	660	
Vehicles Exiting, veh/h	632	587	49	21	
Ped Vol Crossing Leg, #/h	0	0	0	0	
Ped Cap Adj	1.000	1.000	1.000	1.000	
Approach Delay, s/veh	6.7	7.9	6.3	5.7	
Approach LOS	A	A	A	A	
Lane	Left	Bypass	Left	Left	Left
Designated Moves	LT	R	LTR	LTR	LTR
Assumed Moves	LT	R	LTR	LTR	LTR
RT Channelized		Yield			
Lane Util	1.000		1.000	1.000	1.000
Follow-Up Headway, s	2.609		2.609	2.609	2.609
Critical Headway, s	4.976	62	4.976	4.976	4.976
Entry Flow, veh/h	548	1313	593	111	37
Cap Entry Lane, veh/h	1291	0.971	1261	776	704
Entry HV Adj Factor	0.971	60	0.972	0.972	0.996
Flow Entry, veh/h	532	1274	576	108	37
Cap Entry, veh/h	1254	0.047	1226	754	701
V/C Ratio	0.424	3.2	0.470	0.143	0.053
Control Delay, s/veh	7.1	A	7.9	6.3	5.7
LOS	A	0	A	A	A
95th %tile Queue, veh	2		3	0	0

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Synchro 11 Light Report
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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 2: Mountain & Gate Way

01/01/2023

Intersection					
Intersection Delay, s/veh	10.0				
Intersection LOS	B				
Approach	EB	WB	NB	SB	
Entry Lanes	1	1	1	1	
Conflicting Circle Lanes	1	1	1	1	
Adj Approach Flow, veh/h	896	646	217	27	
Demand Flow Rate, veh/h	922	665	224	27	
Vehicles Circulating, veh/h	94	150	800	778	
Vehicles Exiting, veh/h	711	874	83	37	
Ped Vol Crossing Leg, #/h	0	0	0	0	
Ped Cap Adj	1.000	1.000	1.000	1.000	
Approach Delay, s/veh	9.9	9.9	11.4	6.3	
Approach LOS	A	A	B	A	
Lane	Left	Bypass	Left	Left	Left
Designated Moves	LT	R	LTR	LTR	LTR
Assumed Moves	LT	R	LTR	LTR	LTR
RT Channelized		Yield			
Lane Util	1.000		1.000	1.000	1.000
Follow-Up Headway, s	2.609		2.609	2.609	2.609
Critical Headway, s	4.976	134	4.976	4.976	4.976
Entry Flow, veh/h	788	1268	665	224	27
Cap Entry Lane, veh/h	1254	0.971	1184	610	624
Entry HV Adj Factor	0.971	130	0.972	0.968	0.995
Flow Entry, veh/h	766	1231	646	217	27
Cap Entry, veh/h	1218	0.106	1151	591	621
V/C Ratio	0.629	3.8	0.562	0.367	0.043
Control Delay, s/veh	11.0	A	9.9	11.4	6.3
LOS	B	0	A	B	A
95th %tile Queue, veh	5		4	2	0

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 3: Berthoud Pkwy & Mountain

01/01/2023

Intersection									
Intersection Delay, s/veh	8.3								
Intersection LOS	A								
Approach	EB		WB		NB		SB		
Entry Lanes	2		2		1		1		
Conflicting Circle Lanes	1		1		1		1		
Adj Approach Flow, veh/h	554		490		500		484		
Demand Flow Rate, veh/h	570		504		515		499		
Vehicles Circulating, veh/h	426		492		588		509		
Vehicles Exiting, veh/h	425		471		408		487		
Ped Vol Crossing Leg, #/h	0		0		0		0		
Ped Cap Adj	1.000		1.000		1.000		1.000		
Approach Delay, s/veh	8.9		8.6		8.8		6.7		
Approach LOS	A		A		A		A		
Lane	Left	Right	Left	Right	Left	Bypass	Left	Bypass	
Designated Moves	LT	R	LT	R	LT	R	LT	R	
Assumed Moves	LT	R	LT	R	LT	R	LT	R	
RT Channelized						Free		Free	
Lane Util	0.814	0.186	0.800	0.200	1.000		1.000		
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.609		2.609		
Critical Headway, s	4.544	4.544	4.544	4.544	4.976	140	4.976	157	
Entry Flow, veh/h	464	106	403	101	375	1957	342	1957	
Cap Entry Lane, veh/h	964	964	908	908	758	0.971	821	0.971	
Entry HV Adj Factor	0.972	0.972	0.972	0.970	0.971	136	0.970	152	
Flow Entry, veh/h	451	103	392	98	364	1900	332	1900	
Cap Entry, veh/h	936	936	882	881	736	0.072	796	0.080	
V/C Ratio	0.481	0.110	0.444	0.111	0.495	0.0	0.417	0.0	
Control Delay, s/veh	9.8	4.9	9.5	5.2	12.1	A	9.8	A	
LOS	A	A	A	A	B	0	A	0	
95th %tile Queue, veh	3	0	2	0	3		2		

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout
 3: Berthoud Pkwy & Mountain

01/01/2023

Intersection									
Intersection Delay, s/veh	21.6								
Intersection LOS	C								
Approach	EB		WB		NB		SB		
Entry Lanes	2		2		1		1		
Conflicting Circle Lanes	1		1		1		1		
Adj Approach Flow, veh/h	826		750		446		559		
Demand Flow Rate, veh/h	852		773		460		576		
Vehicles Circulating, veh/h	610		511		969		700		
Vehicles Exiting, veh/h	532		778		493		584		
Ped Vol Crossing Leg, #/h	0		0		0		0		
Ped Cap Adj	1.000		1.000		1.000		1.000		
Approach Delay, s/veh	37.0		13.9		15.0		14.2		
Approach LOS	E		B		B		B		
Lane	Left	Right	Left	Right	Left	Bypass	Left	Bypass	
Designated Moves	LT	R	LT	R	LT	R	LT	R	
Assumed Moves	LT	R	LT	R	LT	R	LT	R	
RT Channelized						Free		Free	
Lane Util	0.894	0.106	0.789	0.211	1.000		1.000		
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.609		2.609		
Critical Headway, s	4.544	4.544	4.544	4.544	4.976	140	4.976	134	
Entry Flow, veh/h	762	90	610	163	320	1957	442	1957	
Cap Entry Lane, veh/h	815	815	892	892	514	0.971	676	0.971	
Entry HV Adj Factor	0.970	0.967	0.971	0.969	0.970	136	0.971	130	
Flow Entry, veh/h	739	87	592	158	310	1900	429	1900	
Cap Entry, veh/h	791	788	866	865	498	0.072	656	0.068	
V/C Ratio	0.935	0.110	0.684	0.183	0.623	0.0	0.654	0.0	
Control Delay, s/veh	40.7	5.7	16.1	6.0	21.5	A	18.5	A	
LOS	E	A	C	A	C	0	C	0	
95th %tile Queue, veh	14	0	6	1	4		5		

Total 2042 PM 2:17 pm 09/11/2022 Total 2042 PM

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout

6: Spartan Ave/Spartan & Berthoud Pkwy

01/01/2023

Intersection				
Intersection Delay, s/veh	7.4			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	289	300	299	370
Demand Flow Rate, veh/h	297	309	308	381
Vehicles Circulating, veh/h	337	347	415	292
Vehicles Exiting, veh/h	336	376	219	364
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.9	7.2	7.9	7.6
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	297	309	308	381
Cap Entry Lane, veh/h	979	969	904	1024
Entry HV Adj Factor	0.972	0.972	0.971	0.970
Flow Entry, veh/h	289	300	299	370
Cap Entry, veh/h	951	941	877	994
V/C Ratio	0.304	0.319	0.341	0.372
Control Delay, s/veh	6.9	7.2	7.9	7.6
LOS	A	A	A	A
95th %tile Queue, veh	1	1	2	2

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Roundabout

6: Spartan Ave/Spartan & Berthoud Pkwy

01/01/2023

Intersection				
Intersection Delay, s/veh	7.3			
Intersection LOS	A			
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	392	261	294	370
Demand Flow Rate, veh/h	404	269	303	381
Vehicles Circulating, veh/h	301	365	348	235
Vehicles Exiting, veh/h	315	286	357	399
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.0	6.8	7.1	7.0
Approach LOS	A	A	A	A
Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	404	269	303	381
Cap Entry Lane, veh/h	1015	951	968	1086
Entry HV Adj Factor	0.969	0.970	0.969	0.970
Flow Entry, veh/h	392	261	294	370
Cap Entry, veh/h	984	923	938	1053
V/C Ratio	0.398	0.283	0.313	0.351
Control Delay, s/veh	8.0	6.8	7.1	7.0
LOS	A	A	A	A
95th %tile Queue, veh	2	1	1	2

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BACKGROUND & TOTAL 2042 WITH IMPROVEMENTS

LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Signalized Intersection Summary
8: US 287 & CR 4E

01/02/2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↱	↰	↰	↱
Traffic Volume (veh/h)	120	35	900	50	15	2230
Future Volume (veh/h)	120	35	900	50	15	2230
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	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	130	38	978	54	16	2424
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	185	165	2579	1150	472	2579
Arrive On Green	0.10	0.10	0.73	0.73	0.73	0.73
Sat Flow, veh/h	1767	1572	3618	1572	542	3618
Grp Volume(v), veh/h	130	38	978	54	16	2424
Grp Sat Flow(s),veh/h/ln	1767	1572	3618	1572	542	3618
Q Serve(g_s), s	3.9	1.2	5.7	0.5	0.6	32.5
Cycle Q Clear(g_c), s	3.9	1.2	5.7	0.5	6.3	32.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	185	165	2579	1150	472	2579
V/C Ratio(X)	0.70	0.23	0.38	0.05	0.03	0.94
Avail Cap(c_a), veh/h	578	515	2579	1150	472	2579
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	23.8	22.6	2.7	2.1	3.9	6.3
Incr Delay (d2), s/veh	4.8	0.7	0.4	0.1	0.1	8.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.5	1.0	0.1	0.1	7.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.5	23.3	3.2	2.1	4.0	14.7
LnGrp LOS	C	C	A	A	A	B
Approach Vol, veh/h	168		1032			2440
Approach Delay, s/veh	27.3		3.1			14.6
Approach LOS	C		A			B
Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		44.7			44.7	10.3
Change Period (Y+Rc), s		4.5			4.5	4.5
Max Green Setting (Gmax), s		28.0			28.0	18.0
Max Q Clear Time (g_c+I1), s		7.7			34.5	5.9
Green Ext Time (p_c), s		7.4			0.0	0.3
Intersection Summary						
HCM 6th Ctrl Delay			12.0			
HCM 6th LOS			B			

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LUDLOW FARM | TRANSPORTATION IMPACT STUDY
Town of Berthoud

HCM 6th Signalized Intersection Summary
8: US 287 & CR 4E

01/02/2023

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱	↕	↱	↰	↕
Traffic Volume (veh/h)	80	30	2395	175	40	1370
Future Volume (veh/h)	80	30	2395	175	40	1370
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	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	87	33	2603	190	43	1489
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	130	116	2737	1221	134	2737
Arrive On Green	0.07	0.07	0.78	0.78	0.78	0.78
Sat Flow, veh/h	1767	1572	3618	1572	97	3618
Grp Volume(v), veh/h	87	33	2603	190	43	1489
Grp Sat Flow(s),veh/h/ln	1767	1572	1763	1572	97	1763
Q Serve(g_s), s	2.9	1.2	37.9	1.8	8.7	9.8
Cycle Q Clear(g_c), s	2.9	1.2	37.9	1.8	46.6	9.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	130	116	2737	1221	134	2737
V/C Ratio(X)	0.67	0.29	0.95	0.16	0.32	0.54
Avail Cap(c_a), veh/h	530	472	2737	1221	134	2737
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	27.1	26.3	5.7	1.7	28.6	2.6
Incr Delay (d2), s/veh	5.8	1.3	9.0	0.3	6.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.5	7.7	0.3	0.8	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.9	27.6	14.8	2.0	34.8	3.4
LnGrp LOS	C	C	B	A	C	A
Approach Vol, veh/h	120		2793			1532
Approach Delay, s/veh	31.4		13.9			4.3
Approach LOS	C		B			A
Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		51.1			51.1	8.9
Change Period (Y+Rc), s		4.5			4.5	4.5
Max Green Setting (Gmax), s		33.0			33.0	18.0
Max Q Clear Time (g_c+I1), s		39.9			48.6	4.9
Green Ext Time (p_c), s		0.0			0.0	0.2
Intersection Summary						
HCM 6th Ctrl Delay			11.1			
HCM 6th LOS			B			

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Appendix C NCHRP Internal Trip Capture

NCHRP 684 Internal Trip Capture Estimation Tool						
Project Name:		Ludlow			Organization:	
Project Location:		Berthoud CO			Performed By:	
Scenario Description:		Full Buildout			Date:	
Analysis Year:		2040			Checked By:	
Analysis Period:		PM Street Peak Hour			Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ¹		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				61	10	51
Retail				682	328	355
Restaurant				0		
Cinema/Entertainment				0		
Residential				1,075	678	398
Hotel				0		
All Other Land Uses ²				0		
				1,818	1,016	804

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		10	0	0	1	0
Retail	3		0	0	92	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	6	33	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,820	1,016	804
Internal Capture Percentage	16%	14%	18%
External Vehicle-Trips ⁵	1,530	871	659
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	90%	22%
Retail	13%	27%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	14%	10%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-P.

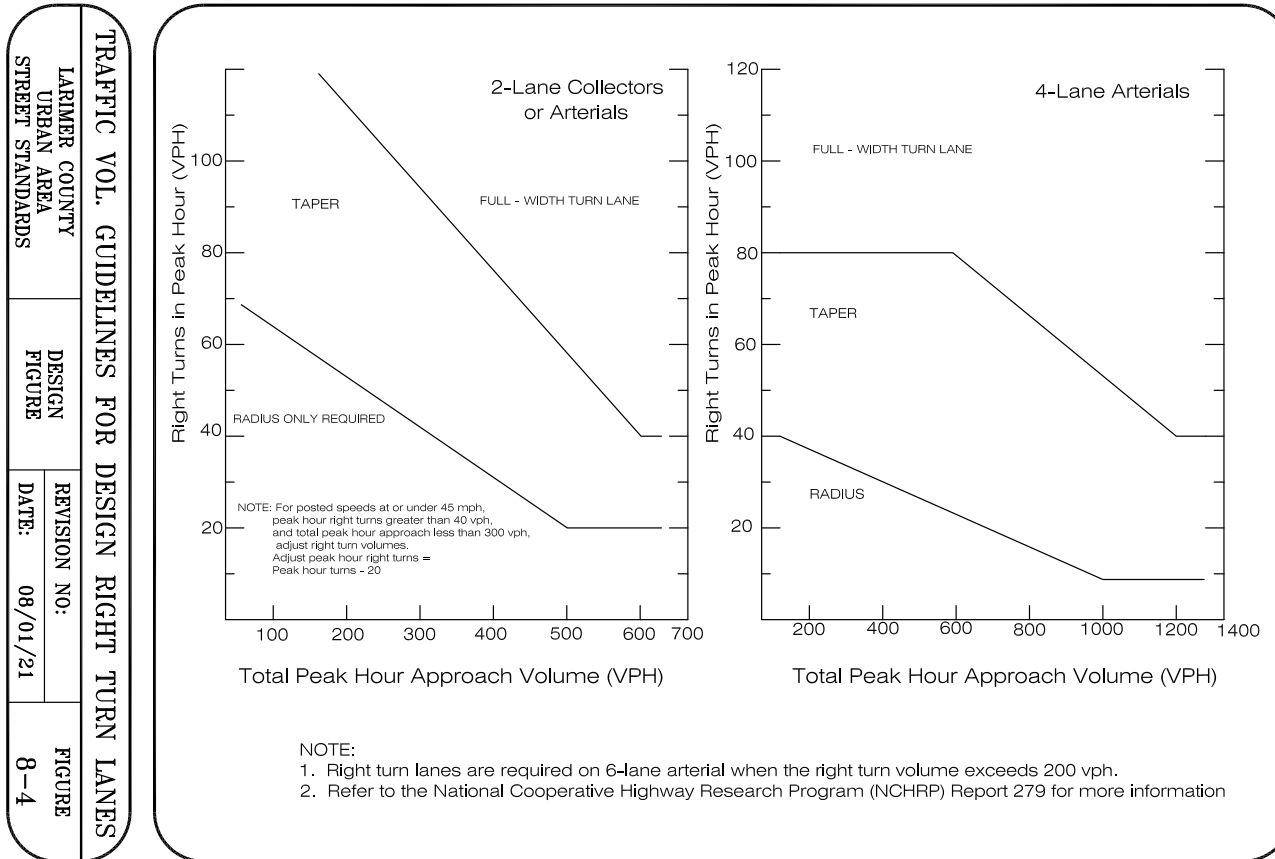
⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

⁶Person-Trips

^{*}Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Appendix D LCUASS Right-Turn Warrants



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September 22, 2022

Community Development Department

Berthoud CO 80513

I am responding to the development proposal called the Ludlow Subdivision, just west of where I live. Of course, I hate to see the farm ground go, as part of Berthoud's charm is its agricultural heritage which is slipping away rather quickly. But if we need to keep approving these massive developments, then we must change how they are constructed and built.

Just my simple mathematics shows that this proposed subdivision, based on Berthoud's current water usage, will suck almost half the amount of water that the entire town is now using, between 216,000 and 430,000 gallons of new water usage. Water is becoming more and more in short supply. It doesn't matter that the city has many water rights outstanding if the water, because of shortfall of precipitation and hotter weather, just isn't there. Do water rights on this land come with this proposal?

So what I am trying to say is, if we must approve these subdivisions, then we must change how they are constructed, oriented, supplied with energy and still give wildlife a fair chance at life. This could mean no gas lines installed, electricity only. Will the grid stand for this, or will the developer have to supply the energy needed?

No polluting fireplaces. Induction ranges required. Heat pump heating and cooling systems or even requiring geothermic systems for the best efficiency.

No areas of Bluegrass. Only native grasses and plants allowed for lawns and parkways. Water conserving trees only. Proper orientation of the houses for best efficiency in heating and cooling.

If we have to build, then we have to build smarter! Here are some ideas to tickle your minds and encourage you to think like I am suggesting. If the city can waste \$30,000 on a silly ballot proposal, then investing in someone with knowledge of sustainable building and living should be considered.

<https://www.casbe.org.au/what-we-do/sustainable-subdivisions/>

<https://6c5pw269zs2tv6x0418kzx2k-wpengine.netdna-ssl.com/wp-content/uploads/2020/09/3.0-Energy.pdf>

<https://6c5pw269zs2tv6x0418kzx2k-wpengine.netdna-ssl.com/wp-content/uploads/2020/09/5.0-Integrated-Water-Management.pdf>

David Luck

100 Bein Street

Berthoud CO 80513, 303-887-4192

Adam Olinger

From: Katie Erbes <Victoriandreams8@hotmail.com>
Sent: Friday, September 23, 2022 9:35 AM
To: Curt Freese; Adam Olinger
Subject: Ludlow Farms

Per your "Neighborhood Notice" we received yesterday. We have lived here for 26 years and enough is enough of the housing, Do we want to be another overgrown town? Loveland is now almost connected to Fort Collins and Greeley; We have 9 miles from Berthoud to Longmont. Loveland is building enough housing, Longmont is building enough housing, Greeley is building enough housing and Mead is now overgrowing. Why does Berthoud want to do this?

You see Firestone and Frederick grown together and you don't even know where each town begins or ends.

Bring in business for this outgrown town as it is now. We need schools, another grocery store, another fast-food business. Why you ask? Because A & W is loaded at all times, Hays is too small for a town like ours that is overgrown already and schools? Where are we putting all these children right now? Overloaded schools?

These towns such as Loveland and Longmont are so close that we can go to the markets there for shopping, eating and entertainment. Housing won't bring shopping here; it will just make a small town big with more crime.

Why do you want to make a small town with so much new housing when there is plenty of new housing all around us?

I say "NO" to this and if that needs to be put on the vote, I would vote "NO" Listen to those that have lived here a long time. Keep Berthoud small and safe.

When they said they were building homes over on Spartan St we were concerned about that and the trees that were at one time there, well we went to meetings about those trees and the council said they would not be cut down. Well guess what happen, they were cut down and I still have a video tape showing that and the disappointment that the town council did not listen to the people of Berthoud.

Is this going to be happening again? I bet a lot of Berthoud residents don't want this and I bet you won't listen again.

Kay Erbes

Adam Olinger

From: Steven Allen <drspallen@sbcglobal.net>
Sent: Sunday, October 2, 2022 7:22 PM
To: Curt Freese; Adam Olinger
Cc: cnmmidwifewendy@gmail.com
Subject: Ludlow Farms Development

Good morning,

I recently received a letter from the Town of Berthoud regarding a new development in the vicinity of my home in Berthoud. Before, I provide some comment, I would like to take a minute to introduce myself.

Steven Allen and spouse, Wendy, currently from Libertyville, Illinois, but soon to be permanent residents of Berthoud residing in the Harvest Ridge North development. Over the past 25 years my family and I have vacationed in the state of Colorado multiple times every year. It did not take long for us to realize that Colorado would someday be our destination for retirement. Over the past 5 years, our visits focused on exploring the various towns up and down the front range resulting in us discovering Berthoud, which is perfectly suited for the lifestyle we are looking for in retirement. When we settled in Libertyville, over 30 years ago, the surrounding area was a lot like Berthoud today, undergoing rapid expansion. With this in mind, you should be able to understand where I am coming from with my comments and question in regard to the Ludlow Farms development.

Assume 1500 units as stated in the letter, also assume 2 residents per unit resulting in an influx of 3000 new community members.

1. How is the developer addressing this influx of residents in regard to the overall infrastructure of the town of Berthoud?
2. What commercial development is being proposed to support the growing population? For example, the current community does not have a major grocery store. Is there already commitment from commercial investors to establish new businesses?
3. What support will be provided for our First Responders, Police, Fire and EMTs?

Let's now assume half of these units, 750, will be a family of four, 2 adults and eventually two school age children.

1. Can the current Berthoud schools support 1500 additional students over time?
2. How is the developer addressing the expansion that may be need for both the elementary and secondary school systems?

Development location, this development is in a recognized flood plain.

1. What is being done or will be done by the developer to address the risk this may pose to new homeowners?
2. Could these plans impact the surrounding developments that are already underway with many homes already complete?

Thank you for the opportunity to share our thoughts with you, as we are looking forward to being active members of our new community.

Regards,
Steven & Wendy Allen

Adam Olinger

From: Curt Freese
Sent: Monday, October 3, 2022 8:12 AM
To: Adam Olinger
Subject: FW: Ludlow Farms



Curt Freese, AICP
Community Development Director

Phone: 970-532-2643

Fax: 970-532-0640

cfreese@berthoud.org

Berthoud.org

807 Mountain Ave. Berthoud, CO 80513



From: Jeanene Imerzel <jeanene.imerzel@gmail.com>
Sent: Friday, September 30, 2022 9:48 AM
To: Curt Freese <CFreese@berthoud.org>
Subject: Ludlow Farms

Good morning,

We received the neighborhood notice and have concerns that this development could block our mountain views here in Rose Farm Acres. We are fine with growth but prefer the park side to be on Berthoud Pkwy as opposed to 287 where there are no houses.

Thank you
Jeanene Imerzel

Adam Olinger

From: Chris Shepherd <docshep97@aol.com>
Sent: Sunday, October 2, 2022 10:20 AM
To: Adam Olinger; Curt Freese
Subject: Ludlow development

I have received the neighborhood notice regarding the Ludlow development and wish to comment. The developers of this subdivision do have the right to propose whatever they want, but I believe this massive development would create many problems for the city of Berthoud. Since this addition would increase the size of this nice town by about 40% using the 2020 population number (10300), the current infrastructure of this town would have to be changed completely. At this point, there is only one main road running from Hwy 287 to I-25 (Mountain Ave.). The residents of the Ludlow development would most likely use this street for access to I-25. Are the residents of this historic town ready and willing to have the road widened to four lanes which would eliminate the wonderful businesses along the way and require the felling of the gorgeous trees. This would also eliminate the on street parking and require off street parking lots. There must have been a reason that Hwy 287 was routed around the middle of town when it was expanded many years ago.

Access to Hwy 287 is also a concern. At this point the only relatively safe access is Mountain Ave. Attempting to access southbound 287 from 2E and 4E is very dangerous. Can 287 withstand the huge influx of traffic. There were two fatal accidents on 287 this last week alone. Does the developer have water rights? If there are 1800 homes with only two residents in each, the town will increase by 3600 new residents and that's a low estimate. This will increase the need for Berthoud town to provide safe drinking water, lawn irrigation and an increase in waste treatment.

Berthoud schools are full. Would there be building of enough new schools to accommodate the influx. City services would need to increase. At this point, snow plowing for the residential areas is not at the top of the list. How about public safety. I know the town had its own police department. Would this need to be recreated? The availability of recruiting new police officers might be difficult. Even the postal department is having a hard find hiring employees.

I hope that the planning commission thinks of how this huge development would affect the residents of this town. This is a very nice small town with a safe and engaging personality.

Will this proposal also be sent to all of the residents of Berthoud instead of just the few surrounding the area? The folks of Berthoud need to know. What would be the benefit for Berthoud if the gateway to the historic town is changed forever.

Thanks for your time.

Christine Shepherd
1100 Monroe Ave
Berthoud

Adam Olinger

From: Curt Freese
Sent: Monday, October 3, 2022 2:57 PM
To: Adam Olinger
Subject: FW: Ludlow Farms Development comments



Curt Freese, AICP
Community Development Director

Phone: 970-532-2643
Fax: 970-532-0640
cfreese@berthoud.org
Berthoud.org
807 Mountain Ave. Berthoud, CO 80513



From: M Moden <MODEN5685@msn.com>
Sent: Monday, October 3, 2022 2:50 PM
To: Curt Freese <CFreese@berthoud.org>
Subject: Ludlow Farms Development comments

I have lived and worked in Berthoud since 1999 so I have watched it grow over the years and appreciate the "small town" feel we have here.

My concern with the Ludlow Farms Development is that in my opinion future development should be spread out farther - perhaps 4-6 year increments to allow for the economy to level out and assure a need for it before adding an additional 1500-1800 more residences to the community.

With as much building that has taken place here in Berthoud in the past few years I am quite sure that in the near future, Berthoud will be full of vacant homes and rental homes as the market will price folks right out of buying their dream (and even renting). Berthoud also has developments where "METRO TAX" has been implemented and I for one hope that this will be a thing of the past as it too prices home buyers right out of the market without them even knowing it!

I know Berthoud wants to keep up with other surrounding communities, but growth isn't always the answer. Be careful Berthoud.....don't ruin a good thing!

Marie Moden-Homeowner
110 Bein St
Berthoud, Co 80513
970-218-2763 cell

Adam Olinger

From: Jeanne <jeannepo@frii.com>
Sent: Wednesday, October 5, 2022 11:41 AM
To: Curt Freese; Adam Olinger
Subject: Neighborhood Notice - Ludlow Farms

I am writing in regards to the Neighborhood Notice I received from the Community Development Department in Berthoud regarding the proposal for Ludlow Farms.

Being 30 year Berthoud residents, we have seen MUCH growth in recent years for Berthoud. In 1992 when we moved here, there were 4 schools (two elementary, 1 middle and 1 HS). With the thousands of new homes that have gone in in the past 5 years, there have been no new schools built.

Also, your proposal includes access to this development from Hwy 287. This is unacceptable. As is (I live ¼ mile from the intersection of W Rd 4/287) we see regular and sometimes fatal accidents between Hwy 56 and Hwy 66. And, rarely is there law enforcement for speeders. Adding more traffic, by means of an intersection is just adding to the number of accidents we will witness in the area.

As Berthoud residents, we are highly against the proposed development, Ludlow Farms, due to the above mentioned concerns.

Thank you,

Tom and Jeanne Poirier

Adam Olinger

From: Jennifer Talbott <jenniferjeantalbott@gmail.com>
Sent: Thursday, October 6, 2022 12:54 PM
To: Curt Freese; Adam Olinger
Subject: Ludlow Farms Neighborhood Notice Comments

I am writing this in response to the letter I received regarding the Ludlow Farms property. I have several concerns regarding this proposed project as I am sure many fellow neighbors do. With the rapid growth of Berthoud there are several things that will be affected and I would like to know how the town plans to address these. I understand growth is essential to economic improvement but also feel that Berthoud is growing rapidly without addressing issues that will arise.

My concerns with Ludlow Farms are:

- The traffic increase to Berthoud Parkway and surrounding roads. Berthoud Parkway is already extremely busy and with the projected amount of housing that is going in this area's traffic is going to become a problem with more accidents, road disintegration and flow.
- Is there a projection to build more schools in the very near future? Our already crowded schools are going to become unmanageable for staff and facilities.
- Crime that will come with this much growth-our already very small police presence will have to be increased.
- Water resources-Our already strained water system will be stretched even further.
- There are several other new communities being built near this area and adding all of these at the same time is going to cause several issues.

I would love to be of any help and am not here to just complain but rather to find solutions. I come from a long history of realtors and understand building is inevitable but the size of this community and number of units is what is most concerning.

Thanks,
Jennifer Talbott

Adam Olinger

From: Lisa Morris <lisakmorris@gmail.com>
Sent: Thursday, October 6, 2022 12:56 PM
To: Adam Olinger; cfreesee@berthoud.com
Cc: Shawn Nelson
Subject: Ludlow Farms

Hello,

To whom this may concern, we received the summary proposal for the above mentioned neighborhood and were directed to submit comments/concerns to you. We live in the newly built Richmond Homes, just a few blocks Southwest of Berthoud High School.

Our main questions/concerns are the following:

1. Being so close to the high school and aware that for years the town of Berthoud wasn't "growing". What is the plan for the schools in the area to support the undoubtable group that this community will cause to the schools?

2. What is going to be done for the roads/sidewalks to support the number of families that this community will be adding to the town of Berthoud?

Specifically, Berthoud Parkway, will this road be converted into a 4 lane road to support the amount of commuting traffic that this development will eventually cause?

With that as well, will there be bike paths/lanes on the roadways?

Will the sidewalks be wide enough to support many people walking together OR will it be the mini sidewalks that only really allow groups to only walk single file?

3. Along with the roads, what will be done for parking in this neighborhood? If you drive through other neighborhoods with condos, townhouses and single family residences there is rarely enough parking and the streets do not accommodate two way traffic if vehicles are parked on both sides of the street.

The neighborhood "Prairie Star", on the Southeast corner of Berthoud Parkway and Highway 287 is a perfect example. I know part of the issue is that there is no requirement for people to park in their garage, so most people in Prairie Star are using their garage for storage and not parking. As well as the assumption that one family only has one vehicle, when in truth on average the average family of four has a minimum of four vehicles.

4. Our neighborhood is dealing with many drainage issues, which in turn we believe is causing an abundance of mosquitoes in the neighborhood. Will there be anyone to monitor, test and ensure that this issue doesn't happen to this new neighborhood as well?

Thank you for your time and please let me know if you have any available answers to these concerns.

Lisa & Shawn Nelson
303-525-7869

Adam Olinger

From: Curt Freese
Sent: Thursday, October 6, 2022 11:01 AM
To: Adam Olinger
Subject: FW: Comments Ludlow Farms

Curt Freese, AICP
Community Development Director

Phone: 970-532-2643
Fax: 970-532-0640
cfreese@berthoud.org
Berthoud.org
807 Mountain Ave. Berthoud, CO 80513

-----Original Message-----

From: Wendy McCauley <55goodwitch@gmail.com>
Sent: Thursday, October 6, 2022 10:19 AM
To: Curt Freese <CFreese@berthoud.org>
Subject: Comments Ludlow Farms

My comments are regarding Spartan Ave. It appears based on the Drawings provided that Spartan Ave will become much busier given the location of the high school and use as an artery to other roads leading downtown or out of Berthoud. I would ask that a reduced speed limit be posted and also some type of traffic calming circles be installed. Long straight roads tend to encourage speeding and in some cases careless driving behavior. Also more traffic equals more noise.

People are attracted to Berthoud for many reasons, a couple being. it is a pleasure to walk safely about town for folks of all ages, and has a small town feel. I hope the planning committee will ensure that these important attributes are kept in mind when finalizing the plans for the roadways.

Some things we will loose are inevitable, our beautiful view of the mountains and the stars.

Thank you for contacting us much appreciated 409 Cheyenne.

Sent from my iPhone

Community Development Department
PO Box 1229
Berthoud, CO 80513

Thank you for the opportunity to comment on the LUDLOW FARMS application.

This response to the development review proposal identified as LUDLOW Farms development, is comprised of comments and concerns of multiple residents of Sioux Drive. While the proposal generally adheres to the guidelines set forth in the 2021 Comprehensive Master Plan of the Town of Berthoud, there are many concerns and apprehensions about the implementation of the structures, amenities and commerce in practice.

To begin with, is it truly in the best interest of the Town to promote the development of 3-story condominiums in light of the strong citizen desire to maintain the “natural beauty of the area” and “small town feel?” Does it present the best image of the Town to have these placed so prominently that they’re the first thing a visitor sees as they enter the town from the west? Additionally, will a concentration of 3-story condominiums require the Town to bear the burden of procuring expensive fire trucks and other high dollar safety equipment, hiring of several additional first responders and possibly construction of additional fire stations? Does the TOWN even have equipment presently to evacuate residents and extinguish a fire in a 3-story structure of this density?

Regarding the overall layout of the proposed development, there is an opportunity here to make South Berthoud Parkway feel significantly more like a “Parkway”. A large portion, or the entirety, of the “LINEAR PARK” could be shifted to run adjacent to SBP from Welch to Spartan with the benefit of drawing more ‘feeling of community’ from surrounding neighborhoods with better access to trails and greenspace, and better foot and bike traffic access to the new commercial endeavors of this proposal. The posted speed limit could be lowered to 35 or even 30 to enhance safety and the sense of parkway while still maintaining the Major Collector attributes set forth in the 2021 Comprehensive Plan.

Vehicle access from the north and east should only be at points coincident with existing roads (Gateway, Welch, Arapahoe, Spartan). The identified “Minor Collector” proposed along the “Approximate Future Land Use Boundary” line that intersects South Berthoud Parkway must be eliminated. There is absolutely no need for any future or existing resident to bear the imposition of frequent headlights shining directly into their residence. (It just so happens to appear to be coincident to the family room windows at 103 Sioux Dr).

Architectural innovations should be minimized to maintain the cohesive feel of “small rural town” such as that feel of Mary's Farm which blends rural into suburban seamlessly and elegantly. Architectural innovations such as those in Prairie Star could best be suited for New Berthoud promoting a higher level of modern urbanization according to the 2021 Comprehensive Plan, while minimizing a disorganized blend of styles along the Mountain Corridor and adjacent neighborhoods.

There is no apparent consideration for school load increases with the introduction of 1500-1800 residences and the potential for 200-500 students. Should at least an elementary school be part of this proposal? It would fit nicely into the traffic access both vehicular and pedestrian.

With the proposed concentration density of residences, there's a very high concern over the increase in light and noise pollution. Will all lighting be downward directed and held to a minimum especially in the condominium, townhouse and commercial/mixed use areas while still providing a safe environment for residents and visitors? Minimal, aesthetically pleasing lighting along a widened South Berthoud Parkway greenspace, similar to that along North Berthoud Parkway trail would be very attractive and effective while at the same time still allowing a view of Berthoud's nighttime sky.

The Traffic Study conducted for evaluation of lane and flow adjustments should be deemed irrelevant as it was conducted on June 22, 2021 when there were no schools in session and we were still in 'work from home' mode by many normal commuters. At a minimum an updated study should be conducted to account for more 'normal' traffic.

Is this a good development to consider additional Senior housing, both unassisted and assisted living styles? Should a general emergency medical facility be considered as part of the mixed-use establishments to better serve the Town?

While it would be naive to think that the primary reason for my move to Berthoud 26 years ago, would continue unencumbered in perpetuity (small rural town with a great view of the mountain range), many of these ideas will minimize the impact of blocking the view and maintain the small-town feel. Not a totally bad trade-off. In the bigger picture however, each new development added to the city should always strive to enhance the beauty and appeal of the place people call – and want to call – home.

Recognizing that family-owned farms are a thing of the past, does it mean that they must be converted to high density housing to the excessive economic benefit of the developer and TOWN coffers? In light of other growth developments in the planning or implementation phases, could satisfactory economic gains be met with 1000-1200 residences and strong industrial and commercial endeavors?

A concern for the implementation of the proposed development would be the barren land when the economy is not conducive to rapid construction of the next phase. It would be beneficial to the environment, and the neighboring residents, to leave or plant sufficient erosion control crops (weeds are not a good crop) to minimize dust and runoff.

Finally, construction vehicle traffic on SBP should be minimized during plan implementation to avoid excessive wear on the newly rebuilt road (per the 2024 project plan).

Thank you for considering these comments and ideas. We look forward to the developer's comments and proposed resolutions.

Richard Alexander 103 Sioux Dr.	Steve Vettori 107 Sioux Drive	Laurel Tollefsrud 101 Sioux Dr	Susan Ellis 109 Sioux Dr

Adam Olinger

From: Curt Freese
Sent: Monday, October 10, 2022 9:39 AM
To: Adam Olinger
Subject: Fwd: Ludlow Farms comment

Sent from my iPhone

Begin forwarded message:

From: Kimberly McNally <kimberlyamcnally@gmail.com>
Date: October 10, 2022 at 9:21:08 AM MDT
To: ailinger@berthoud.org, Curt Freese <CFreese@berthoud.org>
Subject: Ludlow Farms comment

Town of Berthoud
Community Development Department,

I don't want more houses in this area.
You have allowed this sweet town to turn into a bedroom community.
We don't have the infrastructure to handle anymore traffic.
Mountain Ave is a 2 lane road through town and unless you want to remove the oak trees, it can never be anything wider.
Traffic is so bad at most times you can't cross the street on foot let alone cross streets in a car.
I'm near the high school and pulling out onto 10th or Berthoud Parkway can be very hard due to school traffic.
Parking in the business district is almost impossible therefore the businesses will suffer rather than flourish. People will go shop in other towns due to parking constraints.
One grocery store? Get real.
Almost all restaurants are closed on Monday!!!
Police force is lacking to. Crime has gone up.
My one comment probably doesn't count but I'm so tired of more houses and houses and apartments and townhouses.
Taxes, you have to be raking them in. Why do you keep raising ours?

Kim McNally
--

Kimberly McNally

Adam Olinger

From: natasha w <thecowojos@yahoo.com>
Sent: Monday, October 10, 2022 4:54 PM
To: Adam Olinger; wkatspeck@berthoud.org; Karl Ayers; Sean Murphy
Subject: Ludlow farm berthoud parkway and mountain

Hello Adam thank you for your time last week and filling me in on the plans for ludlow farm on the west corner of berthoud parkway and mountain. As a resident and homeowner were asking the board deny the proposal and bring back a growth cap for Berthoud. The excess building is unneeded and without proper infrastructure, affordable water, schools (yes I know this is Thompson school district but the schools are overcrowded period and voters will not approve) but the board can say no and should say no to protect the quality of our schools and do more for our water its going to keep being an issue. The water here is outrageously expensive and barely passes standards. Our water in Berthoud is some of the most expensive in the state besides Vail. Without proper infrastructure and water, building needs to stop the small town charm of Berthoud is being lost and the board can say no. Please listen to your residents look on Facebook over 200 comments saying no and enough. Preserve Berthoud and put back a building freeze, it's needed. Plus builders need to be paying for the road damage their causing like on Berthoud parkway it's not fair our tax dollars are being wasted on their wear and tear make the builders pay on the front end. Stop destroying the Berthoud we love, deny the ludlow proposal. The board needs to address the current issues and stop the excess building. Thank you, the Wojciechowski's

Adam Olinger

From: Carole <cvwhitt@aol.com>
Sent: Monday, October 10, 2022 6:17 PM
To: Adam Olinger
Subject: Ludlow Farms

How can you people vote in more homes in Berthoud when so many of us seniors cannot afford the higher taxes?

I am an 82-year-old senior and cannot get my taxes lowered for at 3 more years because I haven't lived in my home 10 years yet.

It's getting so difficult for some of us to go anywhere around town like we used to.

It doesn't seem plausible to add more homes when we don't even have a post office that can handle more. It just doesn't make sense.

My family has several businesses here in Berthoud, and there isn't much parking around so many of them. So instead of increasing their sales it will tak from them.

Please Please, no more here
Thank you

Carole Whittington

Adam Olinger

From: John Stocklin <stocklinphotography@gmail.com>
Sent: Monday, October 10, 2022 8:34 PM
To: Adam Olinger
Subject: Ludlow Farms Proposal

Hello,

John Stocklin here!

First of all, thank you for doing all the amazing things that you do for our wonderful community, it really means a lot.

I would like to formally oppose the Ludlow Farms proposal, it is just frankly not a good idea. There is a ton of growth already happening in town which is expected but we can't only focus on single family / multifamily dwellings.

We need more schools and other service items such as grocery stores etc. Not to mention the infrastructure should probably be improved before adding 1500+ homes PLUS the influx of at least 3000 people if not more.

Please please say no to this, it'll be such a bad idea for Berthoud.

Much appreciated and thank you.

Cheers,

John

Adam Olinger

From: Curt Freese
Sent: Monday, October 10, 2022 9:06 PM
To: Adam Olinger
Subject: Fwd: Ludlow Farms

Sent from my iPhone

Begin forwarded message:

From: rkurcab <rkurcab@yahoo.com>
Date: October 10, 2022 at 9:03:27 PM MDT
To: Curt Freese <CFreese@berthoud.org>
Subject: **Ludlow Farms**

To whom it may concern,

We feel that the proposed subdivision is too large in scope for the town of Berthoud. At build out this would increase the current population of the town by over 40% by itself. The small lot sizes and townhomes and condos bring a high density which is not in character with the town. This would put a strain on the downtown and infrastructure in place. The entrance at 287 would also greatly increase traffic through other neighborhoods in the area and the high school area.

Views of the mountains from Mountain Ave, which has been deemed important to the town, would be impacted by the project, especially on the north end with townhomes and condos.

If this development does go forward it should be scaled way back with less density.

Thank you for your consideration,

Richard Kurcab
Sandra Nickerson

Sent from my Galaxy Tab® S2

Adam Olinger

From: Curt Freese
Sent: Monday, October 10, 2022 9:18 PM
To: Adam Olinger
Subject: Fwd: Ludlow Farms opposition

Sent from my iPhone

Begin forwarded message:

From: Shannan Johnson <shannanmjohnson@gmail.com>
Date: October 10, 2022 at 9:17:08 PM MDT
To: Adam Olinger <aolinger@berthoud.org>, Curt Freese <CFreese@berthoud.org>
Subject: **Ludlow Farms opposition**

I would like to formally oppose the proposed developments at Ludlow Farms. The mere fact that Berthoud is currently building in multiple new developments with no foreseeable plan for immediate increase in schooling capacity is more than enough to oppose this. Our elementary students are currently in classes at Ivy Stockwell with very high student to teacher ratio already. Most new developments would be expected to have a large proportion of families with young children...where will they all go? Perhaps a smaller development with larger lots and more single family homes would be appropriate; we are already set to have additional multi-family units built at the corner of Berthoud Parkway and Spartan, an already busy area when school is in session. Berthoud Parkway in this area will become very congested. The draw of living in a community like this is the small town feel, beautiful mountain views, and ample farmland. Packing in homes into this development goes against all of that. It's too many new residential units!!!

Please consider scaling back the residential plan at this site.

Adam Olinger

From: Curt Freese
Sent: Monday, October 10, 2022 9:21 PM
To: Adam Olinger
Subject: Fwd: opposition

Sent from my iPhone

Begin forwarded message:

From: Amy Stocklin <amystocklin@gmail.com>
Date: October 10, 2022 at 8:41:20 PM MDT
To: Adam Olinger <aolinger@berthoud.org>, Curt Freese <CFreese@berthoud.org>
Subject: **opposition**

First of all, thank you for doing all the amazing things that you do for our wonderful community, it really means a lot.

I would like to formally oppose the Ludlow Farms proposal, it is just frankly not a good idea. There is a ton of growth already happening in town which is expected but we can't only focus on single-family / multifamily dwellings. We in no way have the infrastructure that is needed for what is being proposed.

We need more schools and other service items such as grocery stores etc. Not to mention the infrastructure should probably be improved before adding 1500+ homes PLUS the influx of at least 3000 people if not more.

Please please say no to this, it'll be such a bad idea for Berthoud.

Much appreciated and thank you.

Amy Porto

Adam Olinger

From: Derrik Johnson <dj8skate@gmail.com>
Sent: Monday, October 10, 2022 9:31 PM
To: Adam Olinger; Curt Freese
Subject: Ludlow Farms proposal

Good evening,

I'd like to voice my opposition to the proposal of development for the Ludlow Farms community. As a Berthoud resident in a community next to the proposed development (I live in Rose Farm Acres), the impact on our community would be significant. I would be happy to share the many ways we would be impacted, but to name a few I know that our schools will be impacted negatively as they are at capacity as it is. The new community would surely grow faster than any schools could be built, stressing our education system well beyond its limits and negatively impacting my children and their classmates. Furthermore, the recreation center is new and is already near capacity. It cannot support thousands more people. Finally, the development of the new community would impact both the noise levels and beautiful mountain views that were key factors in our decision to move to this neighborhood. Please feel free to reach out for further discussion if needed. Thank you.

Derrik Johnson

Adam Olinger

From: DaveandDianne Michael <dandmichael1985@gmail.com>
Sent: Monday, October 10, 2022 9:52 PM
To: Adam Olinger
Subject: Ludlow Farms proposal opposition

Hello,

We are at a bit of a disadvantage because my husband and I are out of town so we don't have access to the proposal specifics that we received in the mail.

But we are strongly opposed to the Ludlow Farms development. A project of that size would completely change the small town feel of Berthoud with that one community. Adding that many homes doesn't give Berthoud time to catch up on resources, such as police department, fire department, water, schools, mail carriers, etc.

At first, we weren't going to speak up because it doesn't feel like the city planners listen to the citizens, but we decided we should at least try.

We understand growth happens, but this growth is excessive.

Several of the city council candidates said they wanted to keep Berthoud's small town charm, but this isn't it!

Thank you for your consideration,
Dianne and Dave Michael
1099 Blue Bell Rd., Berthoud

Adam Olinger

From: Brandon Watkins <bwatkins6688@gmail.com>
Sent: Monday, October 10, 2022 10:21 PM
To: Curt Freese; Adam Olinger
Cc: Kelsey Wood
Subject: Ludlow Farms Proposal

Hello,

The Ludlow Farms proposal cannot be approved. Berthoud does not have the infrastructure, retail, water supply, school system capacity, or resources to properly build 1800 housing units in this area. Berthoud has seen sustained growth for several years now, increasing its economy and creating jobs. However, we have reached the point of growth going too far. Berthoud is losing its identity by turning every farm into a housing development. I understand the financial benefit of this massive development is enticing to the city, but I urge you to halt this project and consider the long term effects of destroying our agricultural land and not ensuring a sustainable, gradual growth plan. Small communities like Berthoud are rapidly disappearing. If this project is approved, there will no longer be any defining line between Longmont, Berthoud, and Loveland. We need small, iconic communities like Berthoud to stand up to big development and tell them enough is enough. Please do not allow this project to move forward.

-Brandon Watkins

Sent from my iPhone

Adam Olinger

From: Jessica Erickson <jerickson1005@gmail.com>
Sent: Monday, October 10, 2022 10:27 PM
To: Adam Olinger; Curt Freese
Subject: Ludlow Farms Opposition

To whom it may concern,

Hello, my name is Jessica Erickson and I am a concerned resident of Berthoud. Our town infrastructure cannot sustain a development of this magnitude. I also have a young child and I am already concerned about the lack of schools for our community. Adding another large neighborhood that will, no doubt, be filled with school age children will wreak havoc on our already filled schools.

I am also concerned about how this development will affect the safety of our community along with traffic, noise and environmental impacts.

Overall, this is not a good choice for Berthoud.

Please do not approve this development.

Thank you,
Jessica

Adam Olinger

From: Aron Erickson <aron.broman@gmail.com>
Sent: Monday, October 10, 2022 10:35 PM
To: Adam Olinger; Curt Freese
Subject: Ludlow farms proposal opposition

Dear Adam and Curt,

I am a concerned resident in Berthoud and against the approval of the Ludlow farms proposal. This development is extensive for the town of Berthoud without the infrastructure to support it. The town needs to propose improvements to energy, water, roads, and schools before considering additional home developments in the area. Schools in Berthoud can't handle the student population levels as it is and also can't hire or support enough teachers to handle proper teaching standards.

Traffic, noise, and safety are additional concerns for properties surrounding this proposed development. Current developments in the area have not provided proper safety standards and theft has increased in these areas. Further the development location is in a marshy area. This will cause future development problems with drainage issues and settling concerns.

I would prefer Berthoud maintain it's small hometown feel and grow responsibly to maintain proper infrastructure. I moved to this town recently because of it's unique character. Please consider denying this proposal.

Thank you,
Aron Erickson

Adam Olinger

From: Rhonda Callahan <rhondacallahan@gmail.com>
Sent: Monday, October 10, 2022 11:00 PM
To: Adam Olinger
Subject: No to ludlow farms.

There is enough traffic..not enough schools. Not enough water..you are being irresponsible and it's been 2 years and you can't get a cross walk marked for the kids in the neighborhoods we all ready have..be responsible for the families all ready here!!!

Sent from my iPhone

Adam Olinger

From: KAAREN CARONE <kcee369@aol.com>
Sent: Wednesday, October 12, 2022 6:57 PM
To: Adam Olinger; Curt Freese
Subject: Ludlow Farms proposal opposition

1,800 additional homes in this area creates a hazard insofar as safety, traffic, air quality, and the quality of life of current residents are concerned. There must also be concern regarding water supplies to the area. Please deny this proposal.

Kaaren Carone

Please email your thoughts to both email addresses below:

cfreese@berthoud.org

Cheers!

Sent from my iPad

Adam Olinger

From: Richard Calvo <rcalv002@gmail.com>
Sent: Thursday, October 13, 2022 8:14 AM
To: Curt Freese; Adam Olinger
Subject: Community Development: Ludlow Farms

Hello!

We received this proposal in the mail and we are completely against it. It's the only space around our neighborhood that is still open. It is also the only view of the mountains for us. There has been construction all around us since we moved here and this sounds like another huge, lengthy construction mess.

Adam Olinger

From: Kathleen Tabor <kathy.tabor@icloud.com>
Sent: Wednesday, October 12, 2022 3:00 PM
To: Adam Olinger
Cc: kathleen Tabor
Subject: Neighborhood notice Ludlow

Town of Berthoud

I apologize for the lateness but Covid is visiting my household. My husband and I received your letter regarding the Ludlow property proposal and we are homeowners impacted by this densely planned development (as is the rest of Berthoud). The town is unrecognizable as Berthoud anymore. All you see as you drive through town are great expanses of grey rooftops in densely built developments . Gone are lots that allow for privacy in exchange for a few feet distance between homes.

I can't believe an unbiased, thorough environmental impact study was done before these developments were approved. We are building too rapidly for our infrastructure .Where is the water for all these new homes going to come from? How are the police going to handle the increase in traffic, accidents and crime ? The same for our schools, fire department and roadways.

When are you going to cap the growth in this town as so many have requested? How are you going to protect existing neighborhoods from these densely populated developments from using the same resources? I already see it in our parks and along 10th street- the trash and traffic. When the Rose Farm went in I saw that tree lawns were included as open space. Are children supposed to include that as a park space to play in? No, they have to go to the closest available park in the Berthoud Heights West development. The town board members are approving more homes in less space and approve leaving only a small percentage as open space. Only developers/builders would have this type of mind set that would approve these type of developments and unbridled growth. Squeeze the land for as many dollars as possible.

Address the density and open space issue and put a growth cap back in place. Protect our resources and the people that have called this town home for so many years. You might as well change the town insignia to a mountain of rooftops instead of mountains because that is all you'll be capable of seeing.

Kathy Tabor
305 Cheyenne Drive
Berthoud. Co80513

Adam Olinger

From: Jeremy Olinger
Sent: Monday, October 24, 2022 4:49 PM
To: Adam Olinger
Subject: FW: Email contact from Berthoud, CO



Jeremy Olinger, CPRP
Deputy Town Administrator

Phone: 970.344.5824
jolinger@berthoud.org
Berthoud.org
807 Mountain Ave. Berthoud,
CO 80513



From: Berthoud, CO <webmaster@berthoud.org>
Sent: Monday, October 24, 2022 3:44 PM
To: Jeremy Olinger <jolinger@berthoud.org>
Subject: Email contact from Berthoud, CO

Message submitted from the <Berthoud, CO> website.

Site Visitor Name: Greg
Site Visitor Email: Gwojo321@yahoo.com

Please bring back the building cap for berthoud between water costs and usage, infrastructure, schools, the loss of farms and habitat for animals it's to much. We are against ludlow farm building thousands of homes bring back the building cap before berthoud is lost.



Planning Commission Meeting March 9, 2023



Planning Commission Meeting March 9, 2023



Public Hearing Information Guide



1. STAFF PRESENTATION

- The agenda item is introduced by Town Staff, including details of the official request, location, and how the project satisfies the Development Code and Comprehensive Plan.

2. APPLICANT PRESENTATION

- The applicant presents their proposal and makes their case for approval.



3. PUBLIC HEARING

- The Mayor or Chairperson opens the public hearing for citizen testimony.
- One at a time, citizens have an opportunity to speak up for up to three minutes about the project. This time is usually used to ask questions, provide concerns, and offer approval or disapproval of the project.
 - Because the project is being heard as a hearing, public comments are treated as testimony and not as conversation. The Applicant, Staff, and Trustees/Commissioners will not respond to any of the comments until the public hearing is closed.
- Once there are no more citizens wishing to speak, the Mayor/Chairperson will officially close the Public Hearing, which ends the public testimony period.

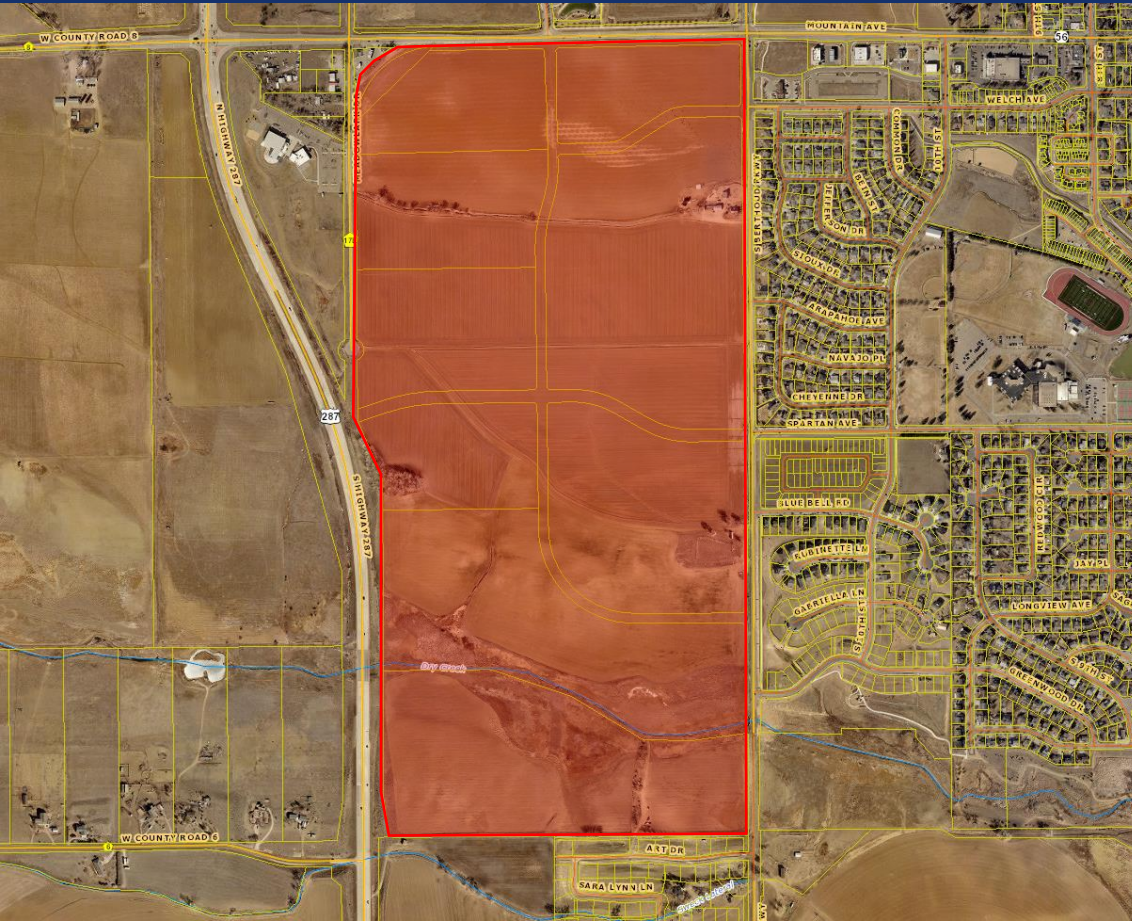


4. DISCUSSION AND VOTE

- The Trustees/Commissioners confer and have an opportunity to ask the applicant or staff questions that arose during the public hearing period or questions of their own.
- A motion must be made on an item, and if a motion is seconded, a vote is called; a majority must be found for any issue to pass (tie votes do not result in the passage of the item).
- If any citizen disagrees with the decision, they have thirty days to file an appeal with the Town.

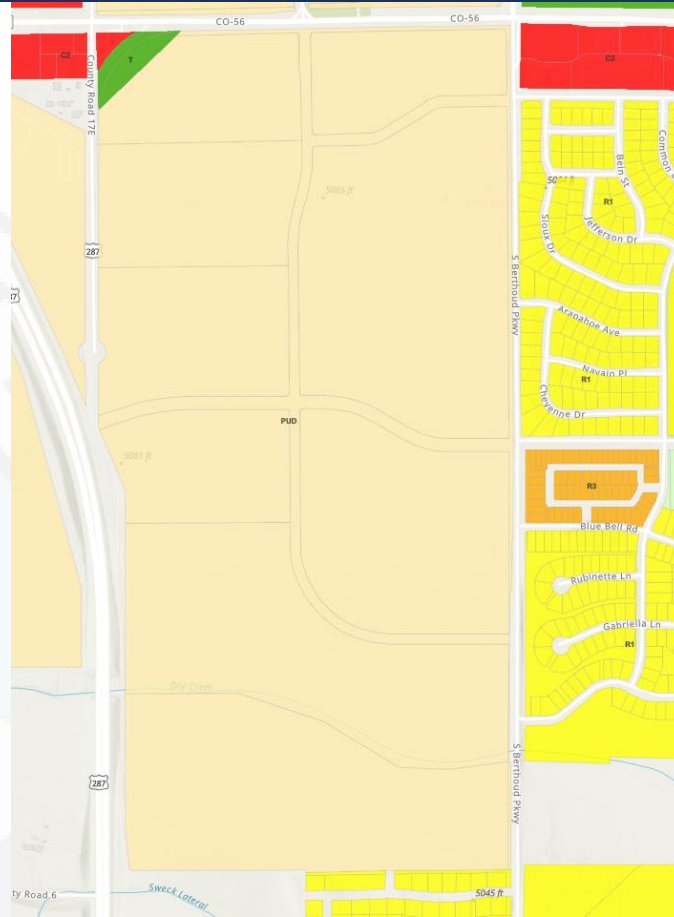


Ludlow Farms

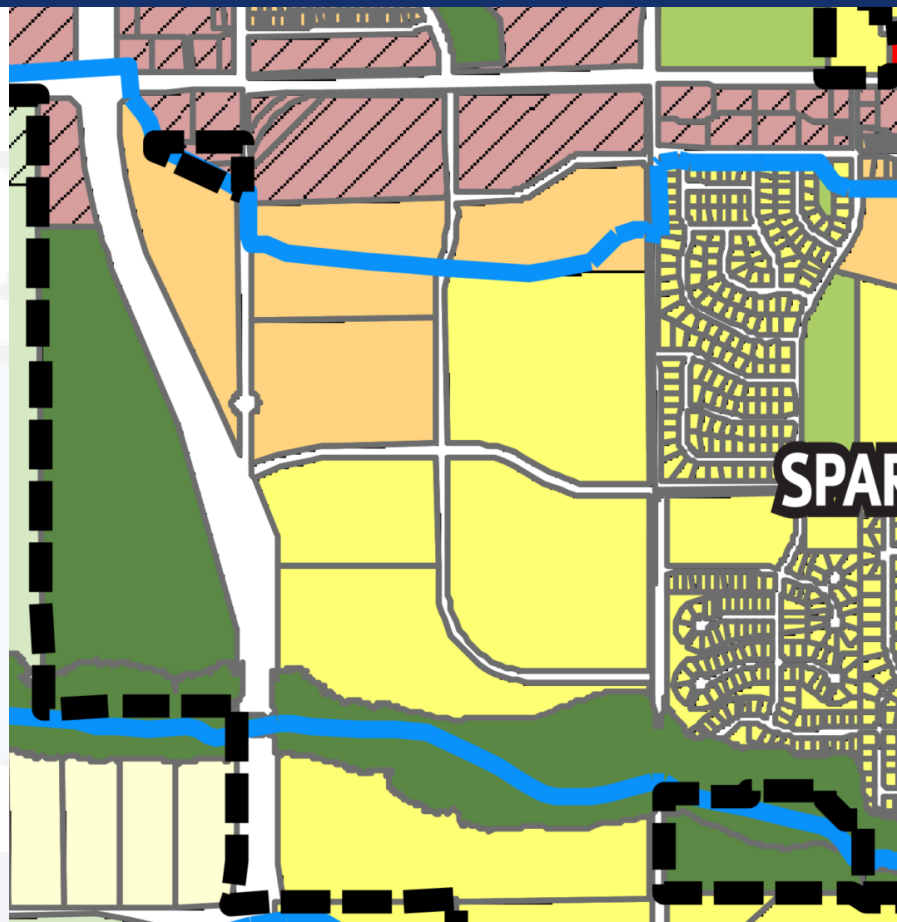


PROJECT:	Ludlow Farms NMP & Rezoning
APPLICANT:	Ludlow Farms, LLC
LOCATION:	Between Highway 287 and Berthoud Parkway, and South of Mountain Avenue
CURRENT ZONING:	PUD
SIZE:	306.4 Acres
APPLICANT'S REQUEST:	Neighborhood Master Plan and Rezoning.

Ludlow Farms – Zoning Map



Ludlow Farms – Future Land Use Map





LAND USE SUMMARY

SINGLE FAMILY DETACHED (40' X 110').....	
SINGLE FAMILY DETACHED (50' X 110').....	
SINGLE FAMILY DETACHED (60' X 110').....	
TOWNHOMES OR SFD.....	
CONDOS.....	
MIXED USE.....	
COMMERCIAL.....	

ESTIMATED PROJECT TOTAL.....1500-1800 UNITS

***NOTE: LOT SIZES ARE CONCEPTUAL AND SUBJECT TO CHANGE AT PLAT.**

LAND USE STATISTICS

TOTAL ACREAGE	~306.4 ACRES
ROW/PRIVATE DRIVE/PARKING	~ 54.0 ACRES
% OF SITE AS ROW/DRIVE/PARKING	17.6%
OPEN SPACE ACREAGE	~67.4 ACRES
% OF SITE AS OPEN SPACE	22.0%

- TRAFFIC INFORMATION**
1. REFER TO PLAN FOR PROPOSED STREET NETWORK AND EXISTING ROAD NETWORK INCLUDING ALL ACCESS POINTS.
 2. UNLESS OTHERWISE NOTED ON THE PLAN, ALL STREETS ARE LOCAL STREETS AND/OR ALLEYS.

SHEET INDEX

SHEET 1 - OVERALL NEIGHBORHOOD MASTER PLAN
 SHEETS 2-3 - OPEN SPACE, CIRCULATION, & PARKS

Ludlow Farms – Neighborhood Master Plan Criteria



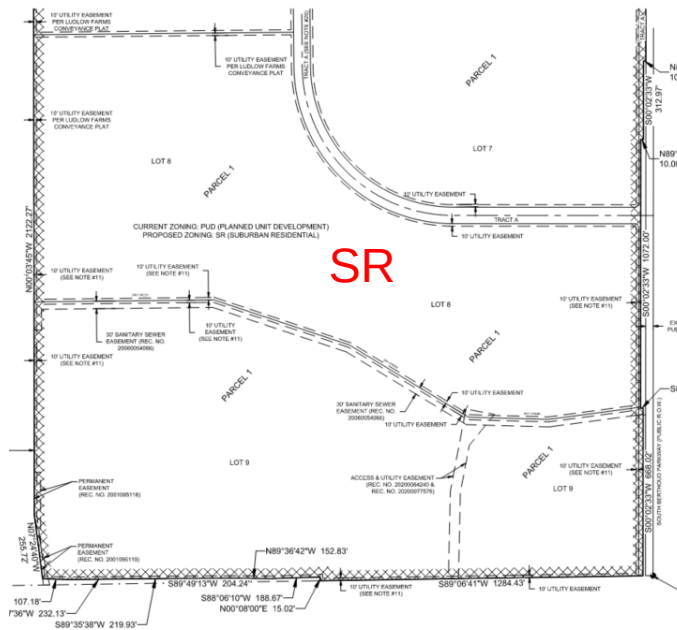
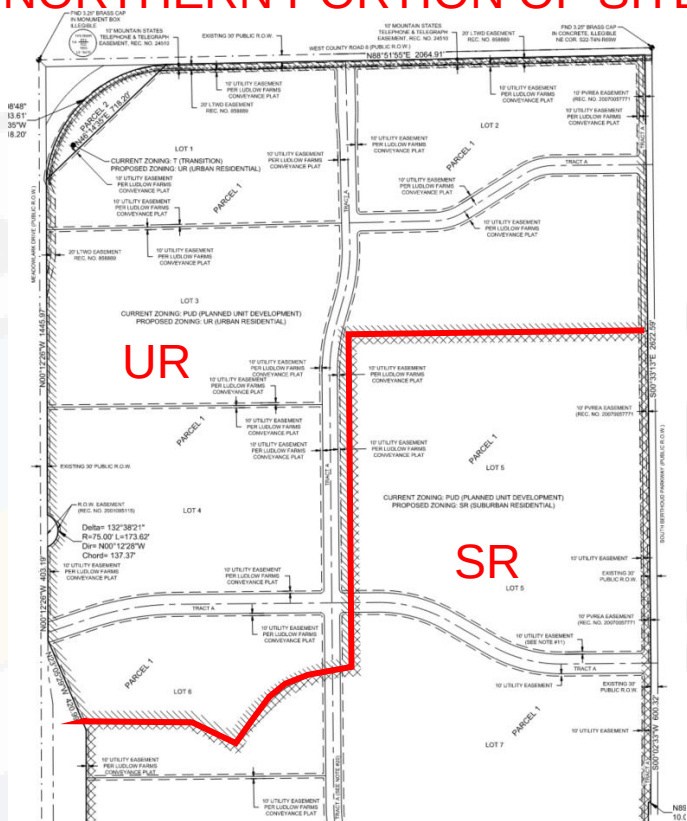
1. The land use mix within the project conforms to Berthoud's Zoning District Map and Comprehensive Plan Preferred Land Use Map and furthers the goals and policies of the Comprehensive Plan.
2. The Neighborhood Master Plan represents a functional system of land use and is consistent with the rationale and criteria set forth in this Chapter, The Town Comprehensive Plan, and the Parks, Open Space and Recreation (PORT) Plan as amended.
3. The preliminary traffic, open space, park utility and pedestrian design is adequate and functional given the existing and planned capacities of each system and meets the standards found in this code.
4. Negative impacts on adjacent land uses have been identified and satisfactorily mitigated.
5. There is a need or desirability within the community for the development and the development will help achieve a balance of land use and/or housing types within Berthoud according to town goals.

Ludlow Farms- Rezoning



NORTHERN PORTION OF SITE

SOUTHERN PORTION OF SITE



Ludlow Farms– Rezoning Criteria



1. To correct a manifest error in an ordinance establishing the zoning for a specific property; or
2. To rezone an area or extend the boundary of an existing district because of changed or changing conditions in a particular area or in the Town generally; or
3. The land to be rezoned was zoned in error and as presently zoned is inconsistent with the policies and goals of the Town Comprehensive Plan; or
4. The proposed rezoning is necessary to provide land for a community-related use that was not anticipated at the time of the adoption of the Town Comprehensive Plan, and the rezoning will be consistent with the policies and goals of the Comprehensive Plan; or
5. The area requested for rezoning has changed or is changing to such a degree that it is in the public interest to encourage development or redevelopment of the area

Ludlow Farms– NMP and Rezoning



Findings and Recommendations

Neighborhood Master Plan

Staff recommends Planning Commission make a motion to recommend approval of the Neighborhood Master Plan to the Town Board.

Rezoning

Staff recommends Planning Commission make a motion to recommend approval to the Town Board of the Rezoning with the following condition:

- **The rezoning will be approved only upon approval of the Neighborhood Master Plan.**



Planning Commission Meeting March 9, 2023



A map of the Ludlow Farms Property in Berthoud, Colorado. The property is a large, rectangular area with diagonal hatching, located west of the town of Berthoud. A black arrow points from a white box labeled "LUDLOW FARMS PROPERTY" to the hatched area. The map shows surrounding features including Loveland Reservoir to the north, Bacon Lake to the northeast, and Coleman Reservoir to the west. Major roads like N Berthoud Pkwy, County Road 17E, and County Road 8 are visible. The town of Berthoud is to the east, with streets such as Bunyan Ave, Franklin Ave, 7th St, 1st St, E Michigan Ave, E Nebraska Ave, E County Road 6C, E CR-6, Kansas Ave, and Greenwood Dr. Other landmarks include Dry Creek, Windrift Ln, Sundown Dr, and Lake Hollow Rd. Elevation markers for 5131 ft and 5064 ft are shown. A north arrow is in the bottom right corner.

LUDLOW FARMS

LEGAL DESCRIPTION

PROPERTY 1:
TRACT A AND LOTS 1 THROUGH 9, INCLUSIVE, LUDLOW FARMS
ACCORDING TO THE RECORDED CONVEYANCE PLAT, COUNTY OF
LARIMER, STATE OF COLORADO

PROPERTY 2:
A TRACT OF LAND SITUATED IN THE NORTHWEST CORNER OF THE
NORTHEAST QUARTER OF SECTION 22, TOWNSHIP 4 NORTH OF
RANGE 69 WEST OF THE 6TH PM, MORE PARTICULARLY DESCRIBED
AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF THIS TRACT FROM
WHENCE THE NORTH QUARTER OF SAID SECTION 22 BEARS NORTH
46° 17' WEST 42.4 FEET DISTANT; THENCE SOUTH 0° 20' EAST ALONG A
LINE WHICH IS 30 FEET EAST OF AND PARALLEL TO QUARTER SECTION
LINE A DISTANCE OF 486.4 FEET TO THE TRUE POINT OF BEGINNING;
THENCE NORTH 43° 54' EAST 718.4 FEET TO A POINT 30 FEET SOUTH
OF THE NORTH LINE OF SAID SECTION 22; THENCE ALONG A CURVE TO
THE LEFT, SAID CURVE HAVING A CENTRAL ANGLE OF 87° 12' 34", A
RADIUS OF 543.00 FEET, AN ARC LENGTH OF 828.50 FEET, A CHORD
BEARING SOUTH 44° 04' 22" WEST, A DISTANCE OF 748.99 FEET TO THE
TRUE POINT OF BEGINNING,
COUNTY OF LARIMER, STATE OF COLORADO

SUBDIVISION IDENTITY & RESIDENTIAL STANDARDS

UNITS PROVIDED: APPROX. 1500-1800

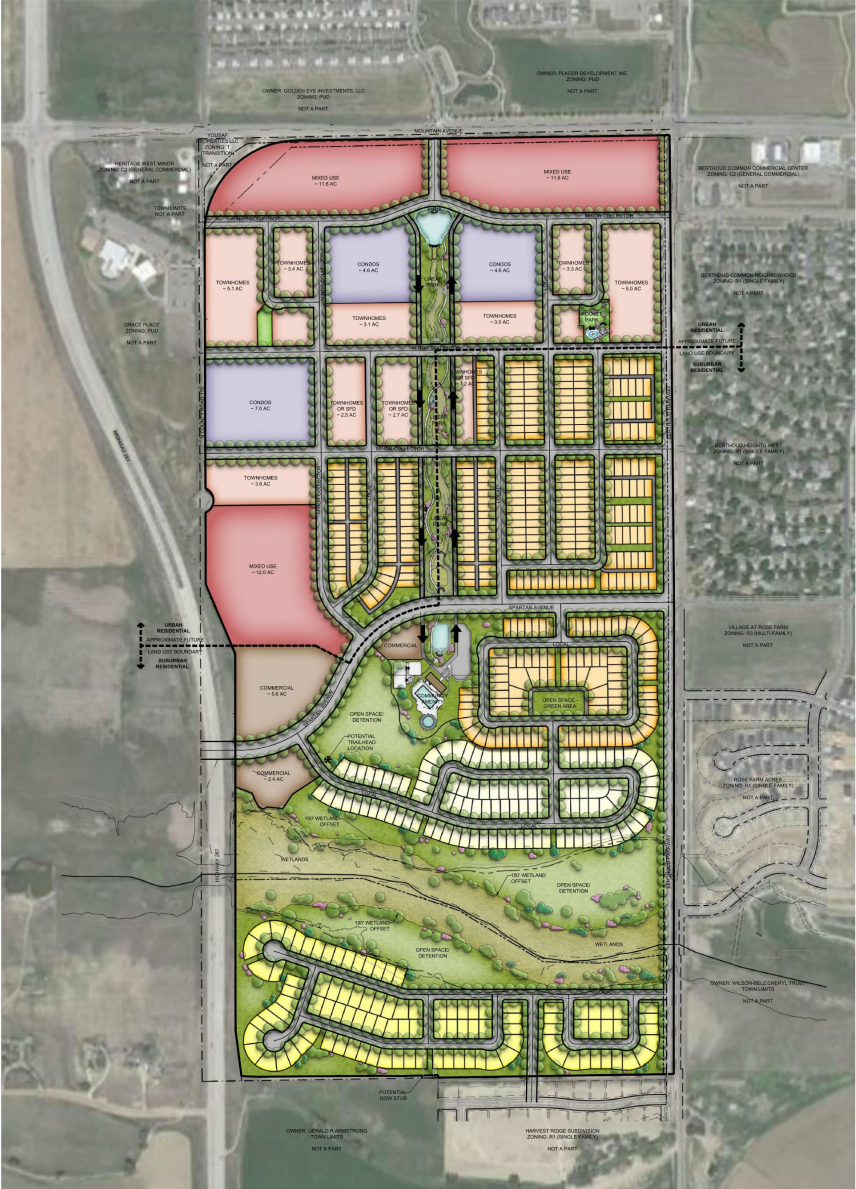
SUBDIVISION IDENTITY ELEMENTS POINTS REQUIRED: 8

THE SUBDIVISION IDENTITY ELEMENTS TO BE PROVIDED WILL BE
DETERMINED AT THE TIME OF PLAT. A MINIMUM OF 8 ELEMENT
POINTS WILL BE PROVIDED. THE FOLLOWING IS A LIST OF ELEMENTS
THAT IS BEING EVALUATED FOR THIS SITE, BUT IS SUBJECT TO
CHANGE, SO LONG AS THE REQUIRED ELEMENT POINTS ARE
ACHIEVED AT THE TIME OF PLAT:

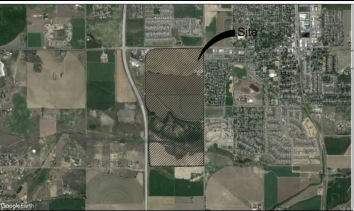
1. POCKET PARK	1
2. TRAILS	1
3. PLAYGROUND	1
4. POOL	2
5. POLLINATOR PLANT PALETTE	1
6. COMMUNITY BUILDING	2
7. ALLEY LOADED STREETS	2
TOTAL :	10

NOTES:

- PROPOSED LOT COUNT AND LOT SIZES ARE CONCEPTUAL AND
MAY CHANGE AT TIME OF PLAT, DEPENDING ON MARKET
CONDITIONS.
- COMMERCIAL AREAS ALONG HIGHWAY 287 ARE CONCEPTUAL IN
SIZE AND MAY ADJUST, DEPENDING ON MARKET CONDITIONS.
- RESIDENTIAL PRODUCT TYPES DEPICTED ARE CONCEPTUAL
AND MAY BE ADJUSTED AT PLATTING. PER THE MUNICIPAL
CODE, A MINIMUM OF FOUR (4) PRODUCT TYPES WILL BE
INCLUDED IN THE SUBDIVISION. RESIDENTIAL PRODUCT TYPES
COULD INCLUDE, BUT ARE NOT LIMITED TO: SINGLE FAMILY
DETACHED, TOWNHOMES, DUPLEXES, CONDOMINIUMS,
APARTMENTS AND/OR OTHER RESIDENTIAL PRODUCT TYPES
AS SPECIFIED IN THE MUNICIPAL CODE, PER ZONE DISTRICT.



VICINITY MAP



LAND USE SUMMARY

SINGLE FAMILY DETACHED (40' X 110')*	
SINGLE FAMILY DETACHED (50' X 110')*	
SINGLE FAMILY DETACHED (60' X 110')*	
TOWNHOMES OR SFD	
CONDOS	
MIXED USE	
COMMERCIAL	

ESTIMATED PROJECT TOTAL.....1500-1800 UNITS

*NOTE: LOT SIZES ARE CONCEPTUAL AND SUBJECT TO
CHANGE AT PLAT.

LAND USE STATISTICS

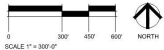
TOTAL ACREAGE	~306.4 ACRES
ROW/PRIVATE DRIVE/PARKING	~ 54.0 ACRES
% OF SITE AS ROW/DRIVE/PARKING	17.6%
OPEN SPACE ACREAGE	~67.4 ACRES
% OF SITE AS OPEN SPACE	22.0%

TRAFFIC INFORMATION

- REFER TO PLAN FOR PROPOSED STREET
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SHEET INDEX

SHEET 1 - OVERALL NEIGHBORHOOD MASTER PLAN
SHEETS 2-3 - OPEN SPACE, CIRCULATION, & PARKS
SHEET 4 - PARKS ENLARGEMENT



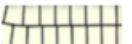
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THE SUBDIVISION IDENTITY ELEMENTS TO BE PROVIDED WILL BE DETERMINED AT THE TIME OF PLAT. A MINIMUM OF 8 ELEMENT POINTS WILL BE PROVIDED. THE FOLLOWING IS A LIST OF ELEMENTS THAT IS BEING EVALUATED FOR THIS SITE, BUT IS SUBJECT TO CHANGE, SO LONG AS THE REQUIRED ELEMENT POINTS ARE ACHIEVED AT THE TIME OF PLAT:

1. POCKET PARK	1
2. TRAILS	1
3. PLAYGROUND	1
4. POOL	2
5. POLLINATOR PLANT PALETTE	1
6. COMMUNITY BUILDING	2
7. ALLEY LOADED STREETS	2
TOTAL :	10

LAND USE SUMMARY

SINGLE FAMILY DETACHED (40' X 110')*	
SINGLE FAMILY DETACHED (50' X 110')*	
SINGLE FAMILY DETACHED (60' X 110')*	
TOWNHOMES OR SFD.....	
CONDOS.....	
MIXED USE.....	
COMMERCIAL.....	

LUDLOW FARMS

PARK STATISTICS:

ESTIMATED PARK SPACE REQUIRED
(APPROX. 1500-1800 UNITS) 15-18 ACRES

PARK SPACE PROVIDED 13.54 ACRES
4.4% OF SITE

NOTE: FINAL PARK SPACE REQUIREMENT WILL BE BASED ON ACTUAL UNIT COUNT.
TO BE DETERMINED WITH FINAL PLATS.

OPEN SPACE CALCULATIONS:

TOTAL OPEN SPACE REQUIRED=	30.6 AC	10.0%
TOTAL OPEN SPACE PROVIDED=	76.7 AC	25.0%

TOTAL SITE ACREAGE = ~306.4 AC

COMMUNITY PARK ELEMENTS:

LIST B: 3 ELEMENTS REQUIRED

- GROUP PICNIC SHELTER (500 S.F. MIN. & 3 TABLES)
- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

LIST D: 2 ELEMENTS REQUIRED

- AMPHITHEATER
- PLAYGROUND
- SPLASH PARK
- COMMUNITY BUILDING
- POOL

LIST E: 4 ELEMENTS, + 1 RESTROOM BUILDING REQUIRED

- BBQ GRILLS (MIN. 1 PER EVERY 2 TABLES)
- BENCHES (MIN. ONE PER HALF ACRE)
- DRINKING FOUNTAINS (MIN. 1 PER EVERY 4 ACRES)
- SHADE STRUCTURES FOR COMPONENTS FROM LIST C (AT SPLASH PARK)

POCKET PARK ELEMENTS:

LIST A: ALL ELEMENTS REQUIRED

- ELECTRICITY
- IRRIGATION
- SECURITY LIGHTING
- TRASH RECEPTACLES (MIN. 2 PER AC)
- WATER SERVICE
- BIKE RACKS
- LANDSCAPING

LIST B: 3 ELEMENTS REQUIRED

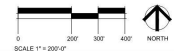
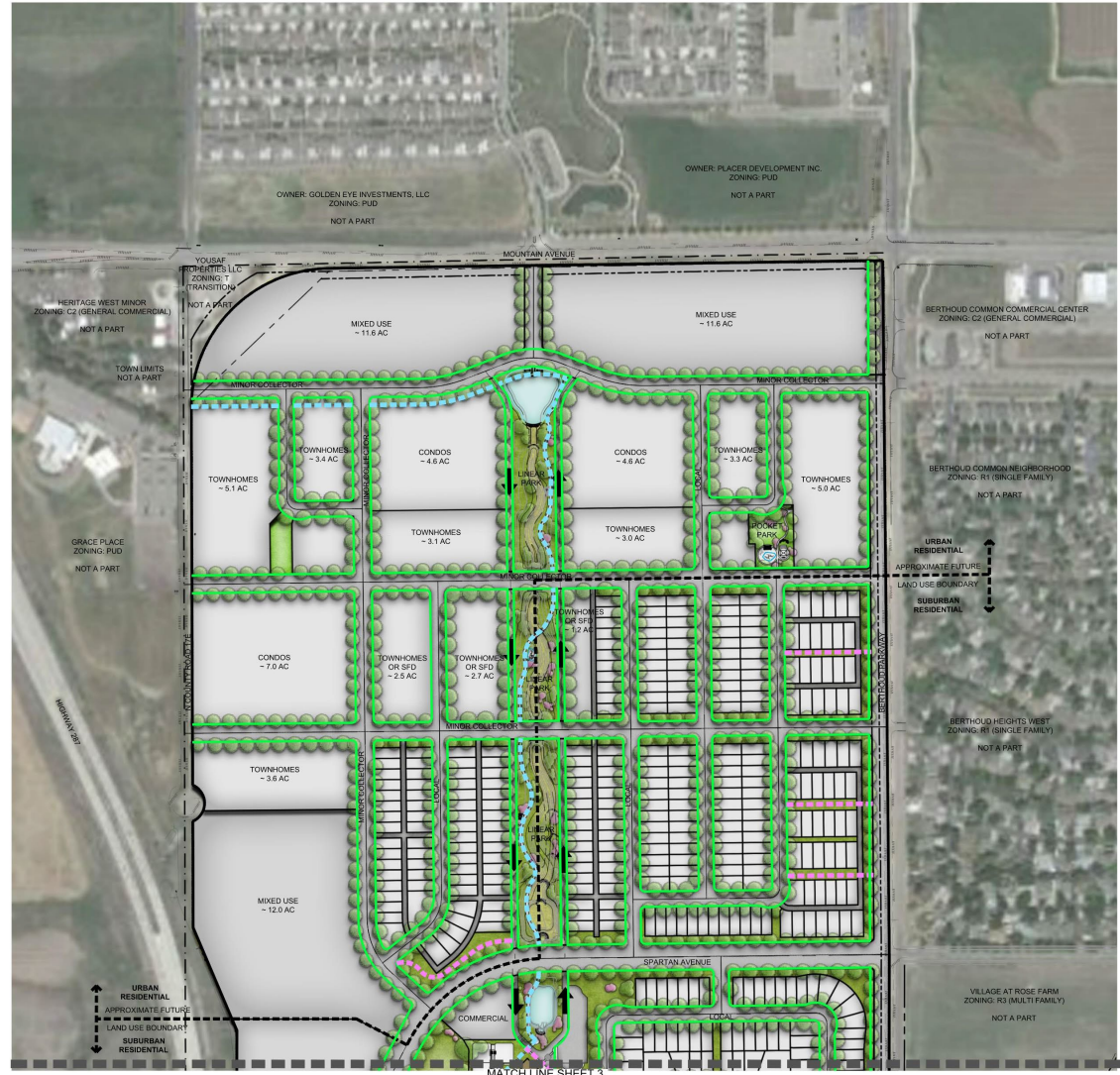
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- MIN. 15,000 S.F. TURF PLAY AREA (COUNTED AS 1 PER 15,000 S.F.)
- LOOP WALK (MIN. 2,000 L.F.)

LIST D: 2 ELEMENTS REQUIRED

- COMMERCIAL-GRADE PLAYGROUND
- AMPHITHEATER

LIST E: RESTROOMS + 3 ELEMENTS REQUIRED

- PORTABLE RESTROOMS
- SHADE STRUCTURE FOR PLAYGROUND
- BENCHES (1 PER 1/2 ACRE)
- BBQS (1 PER 2 TABLES)



LUDLOW FARMS

OPEN SPACE ELEMENTS

OPEN SPACE ELEMENTS	4 ELEMENTS REQUIRED
OPEN SPACE ELEMENTS	4 ELEMENTS PROVIDED
HABITAT AREA	1 ELEMENT
GREEN AREA	2 ELEMENTS
TRAILHEAD	1 ELEMENT

OPEN SPACE SUMMARY

	PARK SPACE	13.5 ACRES
	OPEN SPACE	67.4 ACRES
TOTAL		80.9 ACRES

WALKS/TRAILS SUMMARY*

	DETACHED CONCRETE SIDEWALK - 74,976 feet
	PROPOSED TRAIL/TRAIL CONNECTION PER TOWN PORT PLAN, MATERIAL TBD - 5,383 feet
	TRAIL CONNECTION PER TOWN PLAN - 9,415 feet

*NOTE: TRAIL LOCATIONS ARE CONCEPTUAL. FINAL LOCATION TO BE DETERMINED AT PLAT.



LUDLOW FARMS

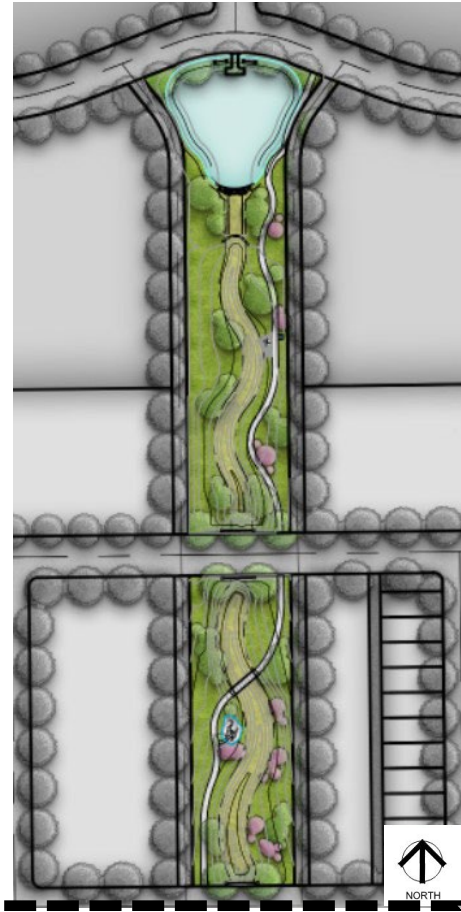


POCKET PARK ELEMENTS

- LOOP WALK
- TURF AREA
- SHADE STRUCTURE
- PLAYGROUND
- GATHERING AREA
- AMPHITHEATER



LUDLOW FARMS



MATCHLINE (RIGHT IMAGE)

MATCHLINE (LEFT IMAGE)



COMMUNITY PARK ELEMENTS

- LOOP WALK
- SHADED PAVILION

- AMPITHEATRE / TURF SPACE
- RESTROOMS



- PICKLEBALL COURTS
- COMMUNITY BUILDING & POOL

- SPLASH PARK
- PLAYGROUND

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Additional Slides Here