



Town of Berthoud Planning Commission
Town Hall
807 Mountain Avenue
Thursday, March 23, 2023, at 6:00 p.m.

Join Zoom Meeting

<https://us02web.zoom.us/j/86049631362>

Meeting ID: 860 4963 1362

One tap mobile

+17193594580,,86049631362# US

+16694449171,,86049631362# US

1. Call Meeting To Order
2. Roll Call
3. Approval Of Minutes
- 3.I. 2023.03.09 Planning Commission Meeting Minutes

Documents:

[2023 03 09 PLANNING COMMISSION MEETING MINUTES.PDF](#)

4. Continuance Request For Bader Amended PUD

Documents:

[2023 03 23 PC BADER CONTINUANCE TO 2023 04 27 PUD.PDF](#)
[CONTINUANCE REQUEST 2023 03 15 APPLICANT 1.PDF](#)
[CONTINUANCE REQUEST 2023 03 15 APPLICANT 2.PDF](#)

5. Continuance Request For Bader Minor Subdivision

Documents:

[2023 03 23 PC BADER CONTINUANCE TO 2023 04 27 MINOR SUB.PDF](#)
[CONTINUANCE REQUEST 2023 03 15 APPLICANT 1.PDF](#)
[CONTINUANCE REQUEST 2023 03 15 APPLICANT 2.PDF](#)

6. Harvest 47 Preliminary Plat-Public Hearing

Documents:

[HARVEST 47 STAFF REPORT.PDF](#)
[HARVEST 47 ATTACHMENTS.PDF](#)

7. Reports:

April Meting

Progress on e-Notebook

8. Adjourn



Planning Commission Minutes – March 09, 2023

- 1. Call to Order** – The Planning Commission convened a regular meeting on March 09, 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) |
| Melissa Feldbush | (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 23, 2023 Planning Commission Meeting.

MOTION made by Commissioner Anderson to APPROVE the Minutes for February 23, 2022.

SECONDED by Commissioner Wing.

Abstained by Commissioner Feldbush due to not attending the meeting.

With those all in favor, THE MOTION CARRIED.

- 4. Public Hearing: 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.

Public Comment was opened at 6:14 p.m.

Public Comment was closed at 6:14 p.m.

MOTION made by Commissioner Kurtz 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.

SECONDED by Commissioner Anderson.

With all in favor, THE MOTION CARRIED.

MOTION made by Commissioner Kurtz to APPROVE the Minor Subdivision with the following condition:

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

SECONDED by Commissioner Anderson.

With all in favor, THE MOTION CARRIED

5. Public Hearing: Heron Lakes 17th Filing (Three Lakes Development Inc., Jim Birdsall - agent)

Director Johnson introduced the request for 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.

Presented by Will Charles of Baseline Engineering.

Public Comment was opened at 6:32 p.m.

John Baker shared his concerns about the added traffic to County Road 14. He would like to see improvements on Country Road 14 such as shoulders and sidewalks.

Public Comment was closed at 6:35 p.m.

MOTION made by Commissioner Anderson to DENY the waiver of the requirement that the applicant not construct a 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.

MOTION made by Commissioner Anderson to AMEND her MOTION to DENY the waiver of the requirement that the applicant construct a 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.

SECONDED by Commissioner Kurtz.

With all in favor, THE MOTION CARRIED.

MOTION made by Commissioner Wing to RECOMMEND APPROVAL of the Preliminary Plat to the Board of Trustees, subject to the following conditions:

- 01. The Applicant shall revise their plan to include a curb and gutter along County Road 14 which shall be constructed in the future by the Applicant for their proportionate share of the improvements when the Town makes such improvements on adjacent properties.**
- 02. The Applicant shall apply for or receive approval of Rezoning prior to approval of Final Plat.**

SECONDED by Commissioner Anderson.

With all in favor, THE MOTION CARRIED.

6. Public Hearing: Ludlow Farms NMP and Rezoning (Ludlow Farms, LLC – Don Hinson, Manager)

Director Johnson introduced the request of rezoning to Suburban Residential (SR) and Urban Residential (UR) from the Ludlow Farms Planned Unit Development (PUD) and a Neighborhood Master Plan.

Presented by Will Charles of Baseline Engineering.

Public Comment (Rezoning) was opened at 8:04 p.m.

Public Comment (Rezoning) was closed at 8:05 p.m.

MOTION made by Commissioner Anderson to RECOMMEND APPROVAL of the Rezoning to the Town Board with the following condition:

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

SECONDED by Commissioner Wing.

With all in favor, THE MOTION CARRIED.

Public Comment (Neighborhood Master Plan) was opened at 8:15 p.m.

George Garmany was concerned about the traffic along Berthoud Parkway. He would like to see one additional access point onto Highway 287.

Kaitlin Shepherd was concerned about gentrification and high home prices.

Carl Tabor agreed with previous statements regarding traffic.

Aron Erickson agreed with previous comments made. He expressed concern about schools and noise and light pollution created from construction.

Derrick Johnson agreed with previous statements. His biggest concern was about schools, and was concerned about traffic increases.

Dianne Michael was concerned about Berthoud losing its small-town feel, the increase in population, and the general character of the town.

Jay Mueller was concerned about the population growth and would like to see the growth to stop.

Christine Torres addressed the concerns about the schools and the importance of the funding from the growth.

Chris Shepherd was concerned about traffic access to Interstate 25.

Anita Conner expressed her concern about the added growth.

Public Comment (Neighborhood Master Plan) was closed at 8:35 p.m.

Chairwoman Dowker asked Applicant about the affordable housing in the development.

Applicant Hinson expressed the desire to work with Mission Homes and David Gregg and to provide for the community.

Commissioner Feldbush and Commissioner Smith both appreciate the use of affordable housing and expressed its importance.

MOTION made by Commissioner Wing to RECOMMEND APPROVAL of the Neighborhood Master Plan to the Board of Trustees.

SECONDED by Commissioner Anderson.

With all in favor, THE MOTION CARRIED.

7. Reports –

Commissioner Anderson, Commissioner Dowker, and Commissioner Smith wanted to thank the commissioners for all their work and support.

Director Johnson:

- She shall be preparing a Planning Commissioner electronic notebook with links for commissioners to helpful information, maps, and more.
- She has reached out to DOLA for commissioner training and information.
- She is currently developing an Active Projects list for the Town of Berthoud website.
- All future participation for Planning Commission meetings shall be in-person.

8. Adjourn –

The meeting was adjourned at 10:33 p.m.

CHAIRPERSON

SECRETARY

PLANNING COMMISSION INFORMATION

COMMUNITY DEVELOPMENT DEPARTMENT



Meeting Date:	March 23, 2023
Agenda Title/Subject:	Request for continuance of Bader Planned Unit Development Amendment including an Amendment to the Overall Development Plan and the Final Development Plan to a date certain of April 27, 2023
Type of Item:	Regular Item
Purpose:	Request of applicant to continue the Planning Commission public hearing scheduled for March 23, 2023 to April 27, 2023
Presented by:	Anne Johnson, Community Development Director

ATTACHMENTS:

- Applicant's letter to request a continuance from the March 23, 2023 public hearing to April 27, 2023.

BACKGROUND:

The applicant is requesting additional time to address staff comments.

UPDATE/NEXT STEPS:

- The applicant will address staff and referral agency comments and incorporate these into their application materials for review.
- The applicant will present their revised materials to Planning Commission for consideration of their request.
- Application materials to be presented to the Planning Commission will include the Amended Planned Unit Development, a Minor Subdivision, and a Conditional Use Permit. Allowing the continuance provides the applicant time to prepare all application materials for one hearing. Presenting all materials in one hearing provides the public and Planning Commission with a holistic vision of the project.

FISCAL IMPACT AND FUND SOURCE:

There is no negative impact to the Town in consideration of this request. All notice is paid by the applicant.

COMMUNITY TOUCHSTONES:

Consideration of this request does not negatively impact community touchstones and in fact, continuance allows the applicant to further refine their request in conformance with the Land Use Code, the Comprehensive Plan, Master Plans affecting the property and input received from referral agencies and staff.

RECOMMENDED ACTION(S):

Staff recommends that the Planning Commission approve the applicant's request to continue this land use matter to the April 27, 2023 public hearing. Suggested motions are below:

Approval: *I move to approve the applicant's request to continue their public hearing to consider amending the Planned Unit Development from March 23, 2023 to April 27, 2023.*

Denial: *I move to deny the applicant's request to continue their public hearing to consider amending the Planned Unit Development from March 23, 2023 to April 27, 2023 for the following reasons: _____.*

From: [Anne Johnson](#)
To: [Anne Johnson](#)
Subject: RE: Berthoud Self-Storage - Explanation of postponed hearings - continuance letter request
Date: Wednesday, March 15, 2023 12:02:34 PM

From: Beau Reinberg <beaureinberg@dss-bcm.com>
Sent: Wednesday, March 15, 2023 12:01 PM
To: Anne Johnson <AJohnson@berthoud.org>; Michael Cleary <mcleary@ssdeng.com>; Lauren Richardson <lauren.richardson@baselinecorp.com>
Cc: Ben Thurston <ben.thurston@baselinecorp.com>; Beau Reinberg <breinberg@bestboxstorage.com>; Matt Garavaglia <garavaglia@dss-bcm.com>
Subject: RE: Berthoud Self-Storage - Explanation of postponed hearings - continuance letter request

Please continue our hearing.

Beau D. Reinberg
beaureinberg@dss-bcm.com
3167 Fee Fee Road
Bridgeton MO 63044
573-673-1191 (Cell) Preferred
314-736-1076 (Office)

From: [Anne Johnson](#)
To: [Anne Johnson](#)
Subject: FW: Berthoud Self-Storage - Explanation of postponed hearings - continuance letter request
Date: Wednesday, March 15, 2023 12:03:43 PM

From: Michael Cleary <mcleary@ssdeng.com>
Sent: Wednesday, March 15, 2023 12:02 PM
To: Anne Johnson <AJohnson@berthoud.org>; Lauren Richardson <lauren.richardson@baselinecorp.com>
Cc: Ben Thurston <ben.thurston@baselinecorp.com>; Beau Reinberg <breinberg@bestboxstorage.com>; Matt Garavaglia <garavaglia@dss-bcm.com>
Subject: RE: Berthoud Self-Storage - Explanation of postponed hearings - continuance letter request

Anne,

Base on the new information provided and the staff's recommendation, we would like to request continuance of the schedule hearing until April 27th.

Michael Cleary, PE
Strategic Site Designs
720-633-0219

PLANNING COMMISSION INFORMATION

COMMUNITY DEVELOPMENT DEPARTMENT



Meeting Date:	March 23, 2023
Agenda Title/Subject:	Request for continuance of Bader Minor Subdivision to a date certain of April 27, 2023
Type of Item:	Regular Item
Purpose:	Request of applicant to continue the Planning Commission public hearing scheduled for March 23, 2023 to April 27, 2023
Presented by:	Anne Johnson, Community Development Director

ATTACHMENTS:

- Applicant's letter to request a continuance from the March 23, 2023 public hearing to April 27, 2023.

BACKGROUND:

The applicant is requesting additional time to address staff comments.

UPDATE/NEXT STEPS:

- The applicant will address staff and referral agency comments and incorporate these into their application materials for review.
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FISCAL IMPACT AND FUND SOURCE:

There is no negative impact to the Town in consideration of this request. All notice is paid by the applicant.

COMMUNITY TOUCHSTONES:

Consideration of this request does not negatively impact community touchstones and in fact, continuance allows the applicant to further refine their request in conformance with the Land Use Code, the Comprehensive Plan, Master Plans affecting the property and input received from referral agencies and staff.

RECOMMENDED ACTION(S):

Staff recommends that the Planning Commission approve the applicant's request to continue this land use matter to the April 27, 2023 public hearing. Suggested motions are below:

Approval: *I move to approve the applicant's request to continue their public hearing to consider the Minor Subdivision from March 23, 2023 to April 27, 2023.*

Denial: *I move to deny the applicant's request to continue their public hearing to consider the Minor Subdivision from March 23, 2023 to April 27, 2023 for the following reasons:*

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Subject: RE: Berthoud Self-Storage - Explanation of postponed hearings - continuance letter request

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Beau D. Reinberg
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3167 Fee Fee Road
Bridgeton MO 63044
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Subject: RE: Berthoud Self-Storage - Explanation of postponed hearings - continuance letter request

Anne,

Base on the new information provided and the staff's recommendation, we would like to request continuance of the schedule hearing until April 27th.

Michael Cleary, PE
Strategic Site Designs
720-633-0219



STAFF REPORT: HARVEST 47 PRELIMINARY PLAT

DATE: March 23, 2023

GENERAL INFORMATION

Applicant	Larry Bebbo	Size: 5.98 acres
Site Location	The property is located near the intersection of Dorothy Drive and Remuda Road. This project is located on the southern portion of the property at 735 State Highway 56 (Parcel 94-24-009702)	
Applicant's Request	The Applicant is requesting a preliminary plat to subdivide the subject property into 29 lots intended for single family residential.	
Current Zoning	UR – Urban Residential	

UR ZONING DISTRICT INFORMATION

Max Density	N/A
Min. Lot Area	2,500 sq.ft.
Min. Lot Width	25'
Front Setback	10'
Side Setback	5'
Rear Setback	5-8'
Building Height	30'

SURROUNDING ZONING, LAND USE AND REQUIRED BUFFERS

	<u>Adjacent Zoning</u>	<u>Adjacent Land Use</u>	<u>Setbacks for Adjacent Zoning/ Buffer required if rezoned</u>
North	PUD	Garden Center	N/A
South	R2	Single Family/ Low-Density Multifamily	N/A
East	R2	Single Family/ Low-Density Multifamily	N/A
West	R1	Single-Family	N/A

This is an aerial map of a residential area in Bismarck, North Dakota. The map displays property boundaries, lot numbers, and street names. A specific property is highlighted with a red border and labeled "BEECHER RD S-76-37-AM". Other labels include "OMALLEY GLEN FARMSTEAD MINOR", "JOHNSONS AM", and various lot numbers such as 942400001 through 942413004. Streets shown include E Michigan Ave, Wild Honey Dr, and E Dakota Ave.

Proposal

The applicant proposes to subdivide the existing 5.98-acre parcel into 29 lots for single-family residential purposes. The preliminary plat, if approved, would allow the applicant to apply for a final plat that would formally subdivide the lots.

Background

In July 2022, a Neighborhood Master Plan, Rezoning, and Minor Subdivision were approved by Planning Commission and the Board of Trustees for this property. The minor subdivision split this lot from the neighboring garden center to the north, and the Rezoning changed this parcel from Planned Unit Development (PUD) to Urban Residential (UR). Additionally, the neighborhood master plan proposed a single-family residential neighborhood consistent with the proposed preliminary plat.

Preliminary Plat Review Criteria

In addition to all provisions of the 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 existing and proposed roadways/alleys of neighboring developments. Additionally, the bulk requirements such as setbacks and building heights are consistent with the standards of the zone district found in the Land Use Code.
2. The application is consistent with the approved concept plan and incorporates the Town's recommendations and conditions of approval.	Yes	The plan is consistent with the approved neighborhood master plan. The neighborhood master plan calls out single family residential in this area consistent with what is proposed.
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 conforms with the Urban Residential (UR) Zone District. The future land use map lists this area as urban residential which allows for developments similar to this one. The project is also consistent with the Comprehensive Plan and PORT Plan.
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 transportation design.
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 similar densities to existing development in the area. Best management practices are required to control stormwater, dust mitigation and tracking onto paved streets. Residential development does generate additional traffic. A Traffic Letter was reviewed and the existing road network was found to be adequate to encompass this development.
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 urban residential. This development is consistent with the goals of the Comprehensive Plan. A key strategy of the comprehensive plan is to provide a mix of housing, goods and services, that meet the varying needs, budgets, and life stages of residents.

7. How the applicant has addressed comments received from the public, during the Public Comment portion of the process.	Yes	No public comments were received during the notice period for the preliminary plat.
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PUBLIC NOTICE AND COMMENT

Notice of the Planning Commission Public Hearing has been mailed to property owners within 500 feet of the subject property on March 14, a legal ad published on March 9, and the property was posted prior to March 16 as required by the Development Code. In addition, when the project was submitted, 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. No comments were received during this initial notice period.

FINDINGS AND RECOMMENDATIONS

Two motions are provided for Planning Commissioners. Staff is recommending approval of the application as it meets the intent of the Master Plans affecting the project, the Comprehensive Plan and Future Land Use Map, and the Land Use Code.

- Two motions are below:
 - *Approval: I move to approve the Harvest 47 Preliminary Plat and ask staff to forward our recommendation of approval to the Town Board of Trustees, subject to the following condition:*
 - *The applicant shall revise drawings to meet final outstanding staff comments.*
 - *Denial: I move to deny the Harvest 47 Preliminary Plat for the following reasons _____ and ask staff to forward our recommendation of denial to the Town Board of Trustees.*

Attachments

1. Application Form
2. Cover Letter
3. Preliminary Plat
4. Traffic Letter
5. Preliminary Drainage Report
6. Staff Comment Response Letter from Applicant
7. Presentation from Staff



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

DEVELOPMENT REVIEW APPLICATION

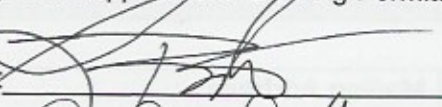
All required information must be provided before submittal will be accepted and deemed complete.
To be complete, the application must include all items identified on the submittal checklist.
Please complete both sides of application form.

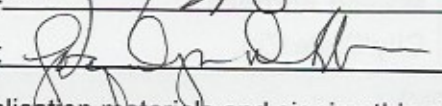
Parcel Number(s): 9424009702 and 9424123006		
Site Address: 735 E. Hwy 56 Berthoud CO 80513		
Project Name: Harvest 47		
Brief description of project: small residential subdivision		
APPLICATION TYPE (Check as appropriate):		
☐ Annexation	☒ Preliminary Subdivision Plat	☐ Final Site Plan
☐ Rezoning	☐ 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: Larry Bebo		
E-mail: mbebo@lmenterprisesinc.com	Mailing Address: 735 E. Hwy 56	
Phone: 970 532-3706	City/State/Zip: Berthoud CO 80513	
CONTACT PERSON (will receive correspondence from Town Staff/Referral Agencies)		
Name: Michael T. Cook P.E.		
E-mail: mtcookpe@msn.com	Mailing Address: 970 East County Road 8	
Phone: 970 310-9332	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: Troy Campbell		
E-mail: troy@i2-consultants.com	Mailing Address: 16911 Potts Place	
Phone: 970 2179148	City/State/Zip: Mead CO 80542	

LAND USE INFORMATION							
Existing Use: commercial / Agriculture Proposed Use: Residential Existing Zoning: PUD Proposed Zoning: (if applicable): R2-Urban Residential Number of acres: 5.98 Proposed Access: Dorothy Drive	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center; background-color: #d3d3d3;">Adjacent zoning / land use:</th> </tr> </thead> <tbody> <tr> <td style="width: 50%;">East Side: R-3</td> <td style="width: 50%;">North Side: PUD</td> </tr> <tr> <td>West Side: R-1</td> <td>South Side: R-2</td> </tr> </tbody> </table>	Adjacent zoning / land use:		East Side: R-3	North Side: PUD	West Side: R-1	South Side: R-2
Adjacent zoning / land use:							
East Side: R-3	North Side: PUD						
West Side: R-1	South Side: R-2						
UTILITY SERVICE INFORMATION							
Water: TOB	Sewer: TOB						
PROJECT INFORMATION							
Number of proposed units: 29 Number of phases: 1 Number of Units per phase: 29 Number of lots proposed: 29 Lot size minimum: 4,212 S.F. (Lot 3, Block 1) Lot size maximum: 9,508 S.F. (Lot 6, Block 2) Lot size average: Average: 6,532.7 S.F. Gross density (units/acre): 4.85 units/acre Net density (units/acre): 6.84 units/acre Area and percent open space: 0.0 0%	Non-Residential Building Area (Sq. Ft.) Proposed: 0.0 Non-Residential Construction Floor Area Ratio Proposed: Total Number of Parking Spaces: <u>Acreage of Site:</u> a. Gross: 5.98 acres b. Right-of-Way: 1.74 acres c. Net (a-b) 4.24 acres <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center; background-color: #d3d3d3;">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: 29) </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: 29)	☐ Townhouse ☐ Condominium		
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☐ Future Single Family ☐ Duplex ☐ Multi-family (# of units: 29)	☐ Townhouse ☐ Condominium						

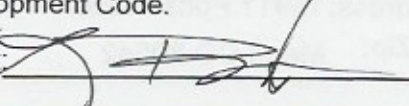
Signatures are required for ALL Property Owners and the Applicant

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: 12-8-22

Property Owner(s):  Date: 12-8-22

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: 12-8-22

FOR OFFICE USE ONLY

Received By:

Date:

February 16th, 2023

Michael T. Cook P.E.
Construction Superintendent
Berthoud Habitat for Humanity
970 East County Road 8
Berthoud, CO 80513
(970) 310-9332
mtcookpe@msn.com

Mr. Will Charles AICP
Principal Planner
will.charles@baselinecorp.com
Baseline Engineering Corporation
112 N. Rubey Drive, #210, Golden, CO 80403

RE: Harvest 47 Subdivision, preliminary plat resubmittal

Dear Will:

Thank you for your prompt response to our submittal of the preliminary plat documents for the Harvest 47 project. This cover letter/narrative along with the attached files is our Resubmittal for the Preliminary Plat for the Harvest 47 subdivision.

In general you will find that we have corrected any deficiencies, made changes as recommended, and have resolved any conflicts identified.

TRC comments: Compliance with section 31-2-116 of the code:

We understand and agree that diversity in the architecture and design elements of the individual residences is both important and required by the Town Code. This project is not being built by a larger production builder that might want to market only 4-6 house designs. As we have reviewed the several updates to this section of the code over the last few years we have always planned that due to the smaller size (number of lots, and number of acres) of our project we would not be required to submit an overall lot and block diversity plan. We expected that we would submit our diversity information as a part of our individual building permit submittal. This project is planned to be very similar to the existing Mary's Farm with the tree lined streets, alley loaded lots with brick and masonry being the prominent architectural design element on each house.

TRC comments: Neighboring properties zoning:

This was a part of the neighborhood master plan documents. We have added the current zoning to our preliminary plat documents.

TRC comments: Remuda Road:

Name of the road is now shown correctly as Remuda Road.

Comments of survey / plat drawings:

February 13, 2023 Response To Comments Regarding The Harvest 47 Subdivision Plat Dated 01.16.2023.

Minor Subdivision Plat

Sheet 1 of 2

1. This document will be recorded with the county, so please include the County Certificate as previously shown. (RESPONSE: The certificate has been added.)
2. The Basis of Bearing Statement should be able to be a standalone statement and therefore must include the bearing and not just a reference to a recorded plat. (RESPONSE: The Basis of Bearings Statement has been corrected.)

Sheet 2 of 2

1. Check/verify the southerly plat boundary dimension. The "Farmstead Second Filing" (under current review has this line listed as 720.38'. (RESPONSE: Both plats (Harvest 47 & Farmstead Second Filing) indicate that the West property pin on that line is to be set. Both distances appear to be calculated. Our field crew has gathered additional right of way control information. We have revised the distance on the South line of the Harvest 47 Subdivision to 720.43'. That distance differs from the Farmstead Second Filing distance by 0.05'. We feel that difference is within acceptable tolerance.)

Site /Landscape plan page:

We have updated the selection of street trees to include 3 different varieties, an Oak, Maple, and Honey Locust. We have reduced the tree count to 25 total to provide appropriate sight triangles at intersections as well as room for proposed street lighting. The location and distribution of the trees are shown on the plan sheet. The exact location of each tree will be adjusted to fit the as-built field conditions at the site as developed and utilities are installed.

Overall utility plan page:

The updated plan sheet shows changes to the proposed sewer connections as requested. **These are not construction plans.** The future construction plans will show water and sewer services in the proper locations for separation and serviceability.

The preliminary storm drain layout has been redone to comply with your direction for inlet locations. **These are not construction plans.** The future construction plans will show the storm drainage system in the proper locations.

Show Farmstead site plan:

We have included the latest design we have for the Farmstead project. We have included the adjacent design along our South border (where we are sharing the alley) as well as along our East border where we adjoin the apartments and also share an alley to the south where they have townhomes planned. We have worked diligently to keep up with the Farmstead project design to ensure that our projects connect well and fit together as they should.

Site landscape plan:

We have added aprons on the street and alley intersections as requested. **These are not construction plans.** The future construction plans will show roadway details with aprons.

We have modified the layout of the lots at intersections as requested to provide for a 10' x 10' setback (with a diagonal line at the corner. We based the layout on the Loveland alley intersection design as well the design used in the adjacent Farmstead project.

We have verified and adjusted side walk widths and Road R.O.W. widths as requested.

Preliminary drainage and erosion control report:

We have adjusted the assumptions and calculations to reflect your suggestions in your review of the preliminary report. The updated report is attached.

Attached you will find:

Harvest 47 resubmittal cover letter. (this document)
Prelim plat resub cover letter.PDF
Harvest 47 updated survey plat drawings.
Harvest 47 updated survey plat drawings.PDF
Harvest 47 preliminary plat drawings with your comments.
i2 Responses Baseline Review_11.0 HarvestPrePlat_2022-12-19.PDF
Harvest 47 updated preliminary plat drawings.
HarvestPrePlat_2023-02-15.PDF
Harvest 47 preliminary drainage and erosion control report with your comments
i2 Baseline Review_13.0 Preliminary drainage report 2022-12-19.PDF
Harvest 47 updated preliminary drainage and erosion control report
Harvest47 PreDrRpt_2023-02-15.PDF

Thank you for your help to bring this unique opportunity for the development of affordable housing to Berthoud. We look forward to working with the Town of Berthoud on moving this project forward to construction.

Michael T. Cook P.E.
Berthoud Habitat for Humanity

PRELIMINARY PLAT FOR
HARVEST 47 SUBDIVISION

BEING A SUBDIVISION OF LOT 2, O'MALLEY GLEN MINOR SUBDIVISION, SITUATE IN THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 24, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M., TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO.

GENERAL NOTES:

- This Minor Subdivision was prepared with the benefit of a TBD Title Commitment prepared by Land Title Guarantee Company (Old Republic National Title Insurance Company) Order No. FOI2519485, effective date December 15, 2022. No further easement and/or right of way research, other than shown on this Plat, was requested by the client or performed by Intermill Land Surveying, Inc. for the preparation of this survey.
- 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 Ave., Berthoud, Colorado 80513.
- 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.
- FLOOD ZONE NOTE:** Per the Federal Emergency Management Agency (FEMA) Flood Zone Mapping (Map 08069C1387H, effective 01/15/2021, panel 1387 of 1420), the property appears to be located in an "area of minimal flood hazard", Zone X.

BASIS OF BEARINGS STATEMENT:

Basis of Bearings for this Plat are based on the record bearing of N89°42'45"E on the North line of the Northeast Quarter of Section 24, Township 4 North, Range 69 West of the 6th P.M., County of Larimer, State of Colorado, Record bearing derived from the Final Plat of The Farmstead, Town of Berthoud, County of Larimer, State of Colorado as filed for record April 1, 2019 in the real property records of the Office of the Clerk and Recorder of Larimer County, Colorado at Reception Number 20190016179. Note: Monumentation of said line as shown hereon.

APPROVAL CERTIFICATES:

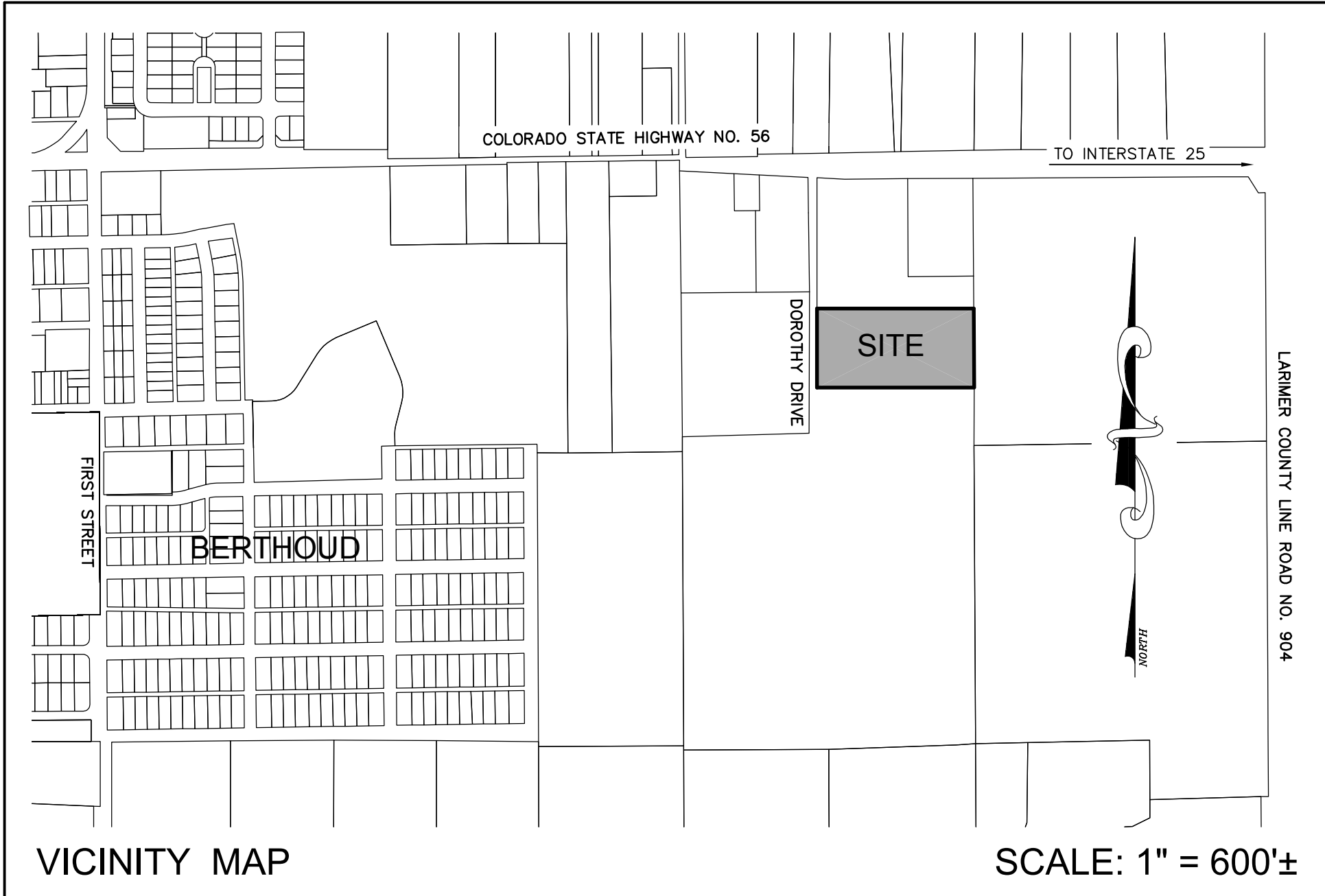
Approved by the Town of Berthoud, Colorado, this ____ day of _____, A.D., 20____.

Mayor

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

ATTEST:

Town Clerk



LEGAL DESCRIPTION AND DEDICATION:

KNOW ALL MEN BY THESE PRESENTS: That the undersigned, being the owners those portions of the Northwest Quarter of the Northeast Quarter of Section 24, 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:

That portion of O'MALLEY GLEN ANNEXATION, Town of Berthoud, County of Larimer, State of Colorado; and Tract 6, THE FARMSTEAD, Town of Berthoud, County of Larimer, State of Colorado situate in the Northwest Quarter of the Northeast Quarter of Section 24, Township 4 North, Range 69 West of the 6th Principal Meridian, Town of Berthoud, County of Larimer, State of Colorado being more particularly described as follows:

Considering the North line of the Northeast Quarter of Section 24, Township 4 North, Range 69 West of the 6th P.M., County of Larimer, State of Colorado as bearing North 89°42'45" East and with all bearings contained herein relative thereto:

Beginning at the North One-Quarter corner of said Section 24; thence along the West line of the Northwest Quarter of the Northeast Quarter of said Section 24, South 00°03'24" East 48.46 feet, more or less, to the Northwest corner of the O'MALLEY GLEN SECOND ANNEXATION to the said Town of Berthoud; said point also being a point on the Southerly Right-of-Way line for Colorado State Highway No. 56; thence departing said West line of the Northwest Quarter of the Northeast Quarter of said Section 24 and along the North line of said O'MALLEY GLEN SECOND ANNEXATION and along the North line of the O'MALLEY GLEN ANNEXATION, to the Town of Berthoud, Colorado and along the North line of THE FARMSTEAD to the Town of Berthoud, Colorado and along said Southerly Right-of-Way line for Colorado State Highway No. 56, South 86°35'48" East 749.34 feet; thence continuing along said North line of said O'MALLEY GLEN ANNEXATION and continuing along said Southerly Right-of-Way line for Colorado State Highway No. 56, North 89°38'35" East 295.56 feet, more or less, to the Northwest corner of Lot 3, AMENDED PLAT OF BEBO M.R.D. NO. S-76-87 to Larimer County, Colorado; thence departing said North line of said O'MALLEY GLEN ANNEXATION and departing said Southerly Right-of-Way line for Colorado State Highway No. 56 and along West line of said Lot 3, AMENDED PLAT OF BEBO M.R.D. NO. S-76-87, South 00°05'41" East 442.95 feet, more or less, to the Southwest corner of said Lot 3, AMENDED PLAT OF BEBO M.R.D. NO. S-76-87; thence along the South line of said Lot 3, AMENDED PLAT OF BEBO M.R.D. NO. S-76-87 North 89°38'35" East 295.01 feet, more or less, to the Southeast corner of said Lot 3, AMENDED PLAT OF BEBO M.R.D. NO. S-76-87; said point also being a point on the East line of the West Half of the Northeast Quarter of said Section 24; thence along said East line of the West Half of the Northeast Quarter of said Section 24, South 00°05'41" East 141.43 feet to the TRUE POINT OF BEGINNING; thence continuing along said East line of the West Half of the Northeast Quarter of said Section 24, South 00°05'41" East 362.00 feet, more or less, to the Northeast corner of Tract 5, of said THE FARMSTEAD; thence along the North line of said Tract 5, of said THE FARMSTEAD, North 89°50'08" West 720.43 feet, more or less, to the Southwest corner of Tract 6, of said THE FARMSTEAD said point also being on the East Right-of-Way line of Dorothy Drive; thence along the West line of said Tract 6, of said THE FARMSTEAD and along the East Right-of-Way line of said Dorothy Drive, North 00°10'08" East 362.00 feet; thence departing the West line of said Tract 6, of said THE FARMSTEAD and departing the East Right-of-Way line of said Dorothy Drive, South 89°50'08" East 718.76 feet, more or less, to a point on the East line of the West Half of the Northeast Quarter of said Section 24 and the TRUE POINT OF BEGINNING.

Containing an area of 260,490.5 Square Feet or 5.98 Acres, more or less.

Have laid out, platted, and subdivided the above described land, under the name and style of HARVEST 47 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, 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, though, over, under, and across streets, utility and other easements, and other public places as shown on the plat.

OWNER(S): LAWRENCE L. BEBO and JACQUELYN D. BEBO

Lawrence L. Bebo

Jacquelyn D. Bebo

STATE OF COLORADO)
COUNTY OF LARIMER)

The foregoing certificate of ownership was acknowledged before me this ____ day of _____, 20____, by Lawrence L. Bebo and Jacquelyn D. Bebo.

Witness my hand and official seal.

My commission expires _____

Notary Public

LAND SURVEYOR'S CERTIFICATE:

I, Steven John Stencel, a Registered Land Surveyor in the State of Colorado, do hereby certify that the survey of HARVEST 47 SUBDIVISION 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.

PREPARED BY AND ON BEHALF OF:

INTERMILL LAND SURVEYING, INC.
1301 North Cleveland Avenue
Loveland, Colorado 80537
P: (970) 669-0516

Steven John Stencel
Colorado PLS No. 30462

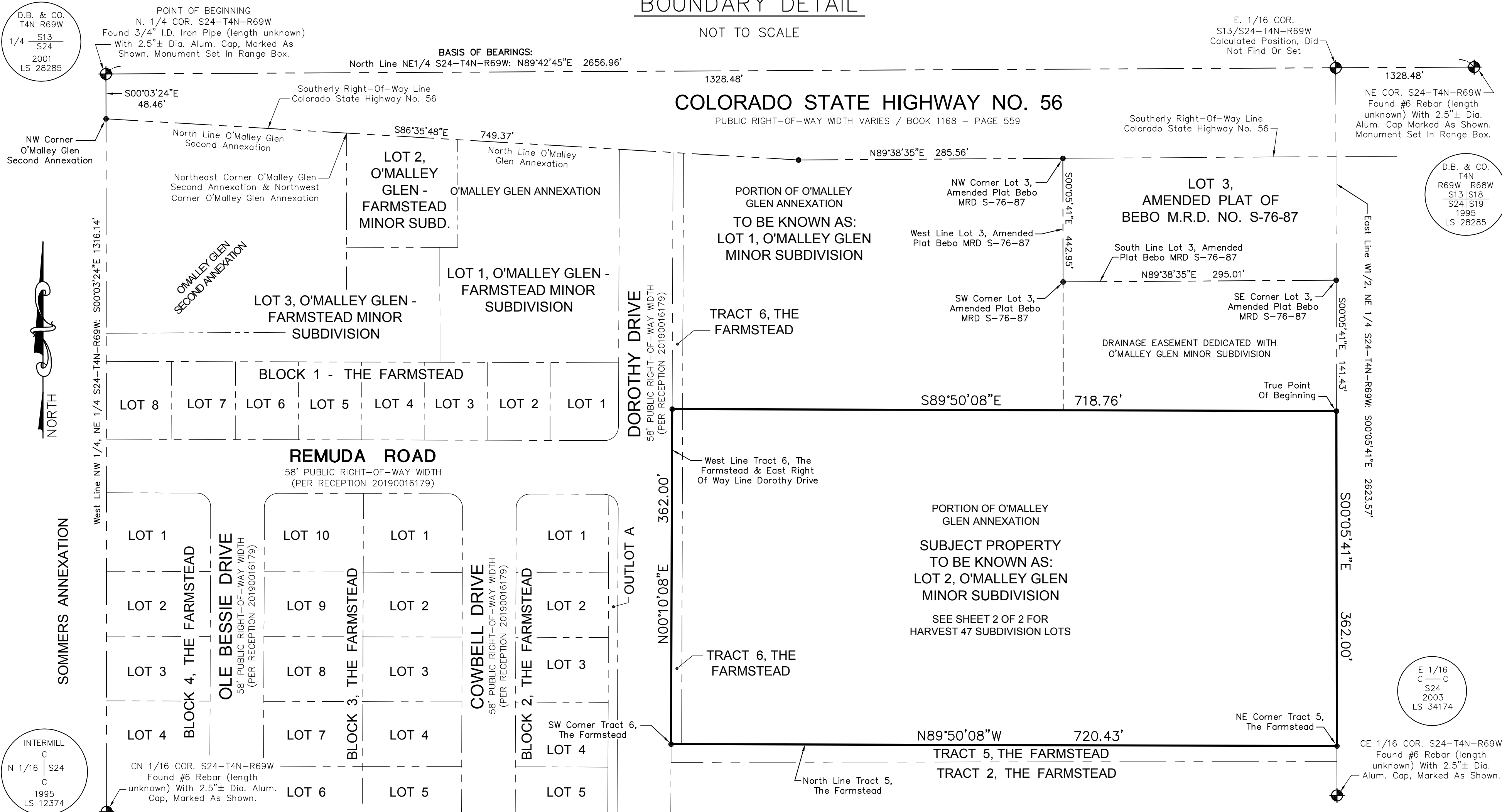
Date: _____

LARIMER COUNTY CLERK AND RECORDER CERTIFICATE:

The foregoing plat is approved for filing and accepted by the County of Larimer, Colorado, this ____ day of _____, A.D., 20____.

ATTEST:

County Clerk



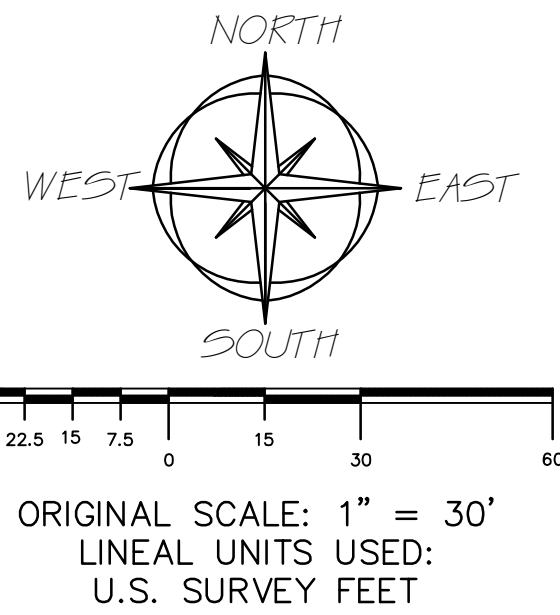
INTERMILL LAND SURVEYING, INC.

1301 NORTH CLEVELAND AVENUE
LOVELAND, COLORADO 80537
BUS. (970) 669-0516 / FAX (970) 635-9775

LARRY and JACKIE BEBO

PRELIMINARY PLAT FOR
HARVEST 47 SUBDIVISION
TO THE TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

DRAWN BY:	JEB
CHECKED BY:	
APPROVED BY:	
DATE:	12/23/2022
SCALE:	1" = 30'
PROJECT NO.:	P-08-6486
SHEET	OF
1	2



PRELIMINARY PLAT FOR
HARVEST 47 SUBDIVISION

BEING A SUBDIVISION OF LOT 2, O'MALLEY GLEN MINOR SUBDIVISION, SITUATE IN THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 24, TOWNSHIP 4 NORTH, RANGE 69 WEST OF THE 6TH P.M., TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO.

BLOCK 1,
THE FARMSTEAD

LOT 1

REMUDA ROAD

58' PUBLIC RIGHT-OF-WAY WIDTH
(PER RECEPTION 20190016179)

LOT 1

LOT 2

LOT 3

LOT 4

LOT 5

DOROTHY DRIVE

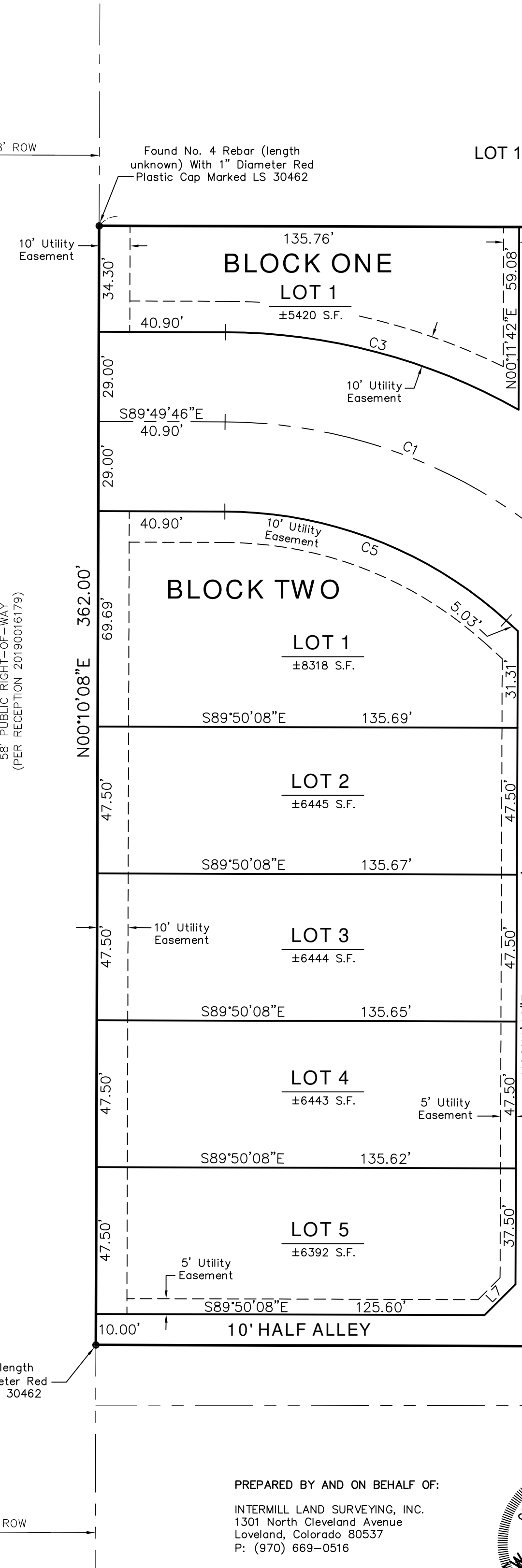
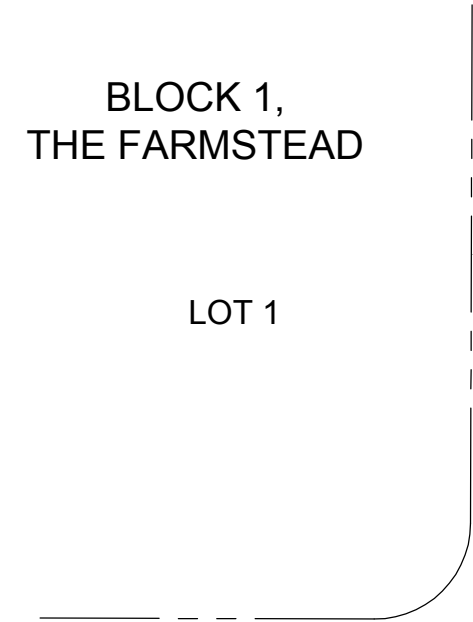
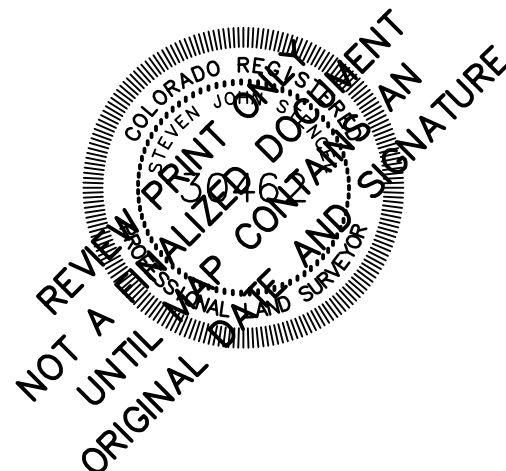
58' PUBLIC RIGHT-OF-WAY
(PER RECEPTION 20190016179)

BLOCK 2, THE FARMSTEAD

OUTLOT A

PREPARED BY AND ON BEHALF OF:
INTERMILL LAND SURVEYING, INC.
1301 North Cleveland Avenue
Loveland, Colorado 80537
P: (970) 669-0516

Steven John Stencel
Colorado PLS No. 30462
Date: _____



20' ALLEY

BLOCK ONE

LOT 2

±4827 S.F.

LOT 3

±4212 S.F.

LOT 4

±7545 S.F.

LOT 5

±7671 S.F.

LOT 6

±7671 S.F.

LOT 7

±4823 S.F.

LOT 8

±4823 S.F.

LOT 9

±4823 S.F.

LOT 10

±7771 S.F.

LOT 11

±4773 S.F.

LOT 12

±4773 S.F.

LOT 13

±5487 S.F.

BLOCK TWO

LOT 6

±9458 S.F.

LOT 7

±7636 S.F.

LOT 8

±7065 S.F.

LOT 9

±7000 S.F.

LOT 10

±7000 S.F.

LOT 11

±7000 S.F.

LOT 12

±7000 S.F.

LOT 13

±7000 S.F.

LOT 14

±7000 S.F.

LOT 15

±7000 S.F.

LOT 16

±7235 S.F.

TRACT 2, THE FARMSTEAD

TRACT 5, THE FARMSTEAD

LINE TABLE		
LINE	BEARING	LENGTH
L1	N45°10'47"E	14.15'
L2	N44°49'13"W	14.14'
L3	N45°10'47"E	14.15'
L4	S89°50'08"E	26.00'
L5	N45°02'05"E	14.11'
L6	N44°49'13"W	14.14'
L7	N45°10'47"E	14.15'

CURVE TABLE				
CURVE	DELTA	RADIUS	LENGTH	BEARING
C1	42°02'28"	165.00'	121.07'	N68°48'32"W
C2	42°02'50"	165.00'	121.09'	S68°48'43"E
C3	29°15'58"	194.00'	99.09'	N75°11'47"W
C4	05°44'49"	194.00'	19.46'	N50°39'42"W
C5	42°02'28"	136.00'	99.79'	N68°48'32"W
C6	42°02'50"	136.00'	99.81'	S68°48'43"E
C7	42°02'50"	194.00'	142.37'	S68°48'43"E
C8	04°35'16"	136.00'	10.89'	S50°04'56"E
C9	17°21'53"	136.00'	41.22'	S61°03'31"E
C10	20°05'40"	136.00'	47.70'	S79°47'18"E
C11	13°37'04"	194.00'	46.11'	S54°35'50"E
C12	15°48'53"	194.00'	53.55'	S69°18'49"E
C13	12°36'53"	194.00'	42.71'	S83°31'42"E

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.

DATE: _____
BY: _____
REVISIONS: _____
1. Per Town of Berthoud Comments Dated 07/16/2023.

INTERMILL LAND SURVEYING, INC.

BUS. (970)-669-0516 / FAX (970)-635-9775

80537

LOVELAND, COLORADO

1301 NORTH CLEVELAND AVENUE

PRELIMINARY PLAT FOR

HARVEST 47 SUBDIVISION

TO THE TOWN OF BERTHOUD, COUNTY OF LARIMER, STATE OF COLORADO

CLIENT:

LARRY and JACKIE BEBO

DRAWN BY: JEB

CHECKED BY: _____

APPROVED BY: _____

DATE: 12/23/2022

SCALE: 1" = 30'

PROJECT NO.:

P-08-6486

SHEET OF

2

2

Harvest 47

735 E. Highway 56, Berthoud, CO

Traffic Letter

KE Job #2021-056

Prepared for:

i2 Consultants
16911 Potts Place
Mead, CO

Prepared by:



KELLAR ENGINEERING

skellar@kellarengineering.com
970.219.1602 phone



December 3, 2021
Sean K. Kellar, PE, PTOE

This document, together with the concepts and recommendations presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization from Kellar Engineering LLC shall be without liability to Kellar Engineering LLC.

1.0 Introduction

The purpose of this Traffic Generation Letter (Traffic Letter) is to evaluate the traffic generated by the proposed project located at 735 E. Highway 56 in Berthoud, CO.

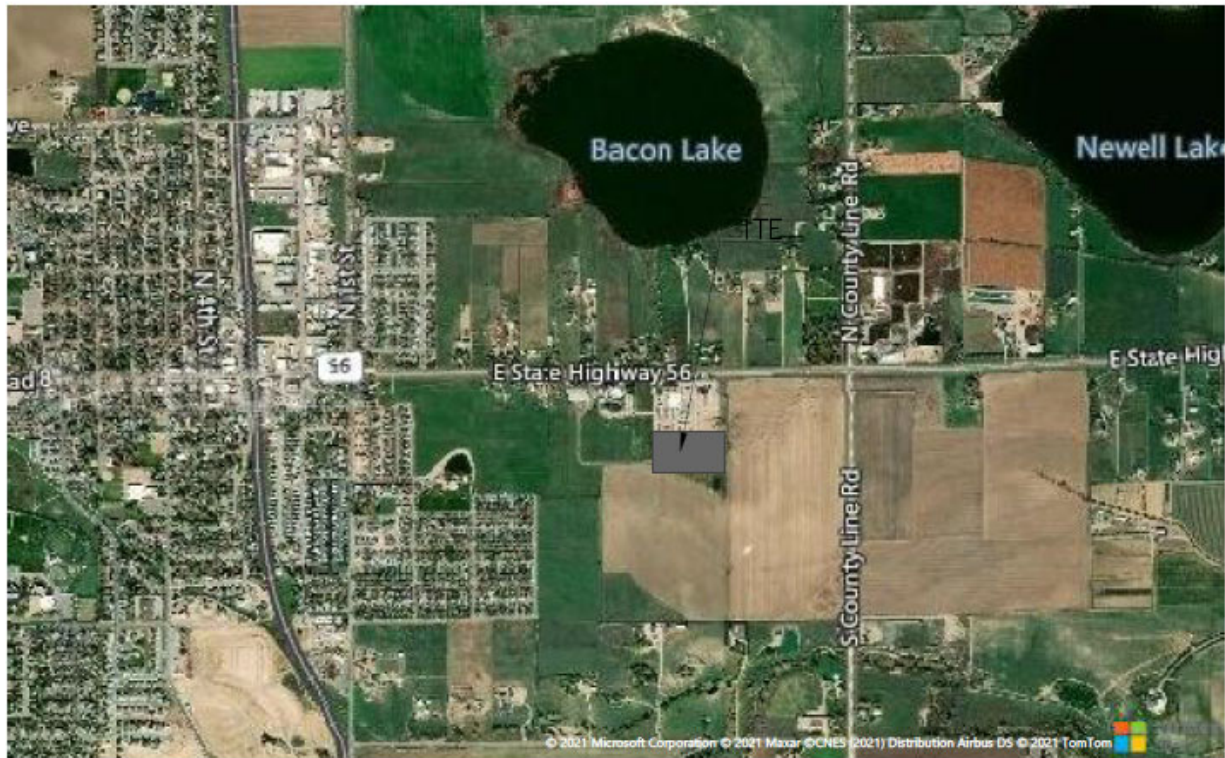
2.0 Proposed Development

The proposed project consists of 28 single-family homes. See Table 1: Trip Generation and Figure 2: Site Plan.

3.0 Trip Generation

Site generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Report* published by the Institute of Transportation Engineers (ITE). ITE has established trip generation rates in nationwide studies of similar land uses. For this study, Kellar Engineering LLC (KE) used the *ITE 10th Edition Trip Generation Report* average trip rates. Per the ITE, the proposed project is anticipated to generate approximately 264 daily trips, 21 AM total peak hour trips, and 28 PM total peak hour trips. See Table 1: Trip Generation.

Figure 1: Vicinity Map



VICINITY MAP

Figure 2: Site Plan

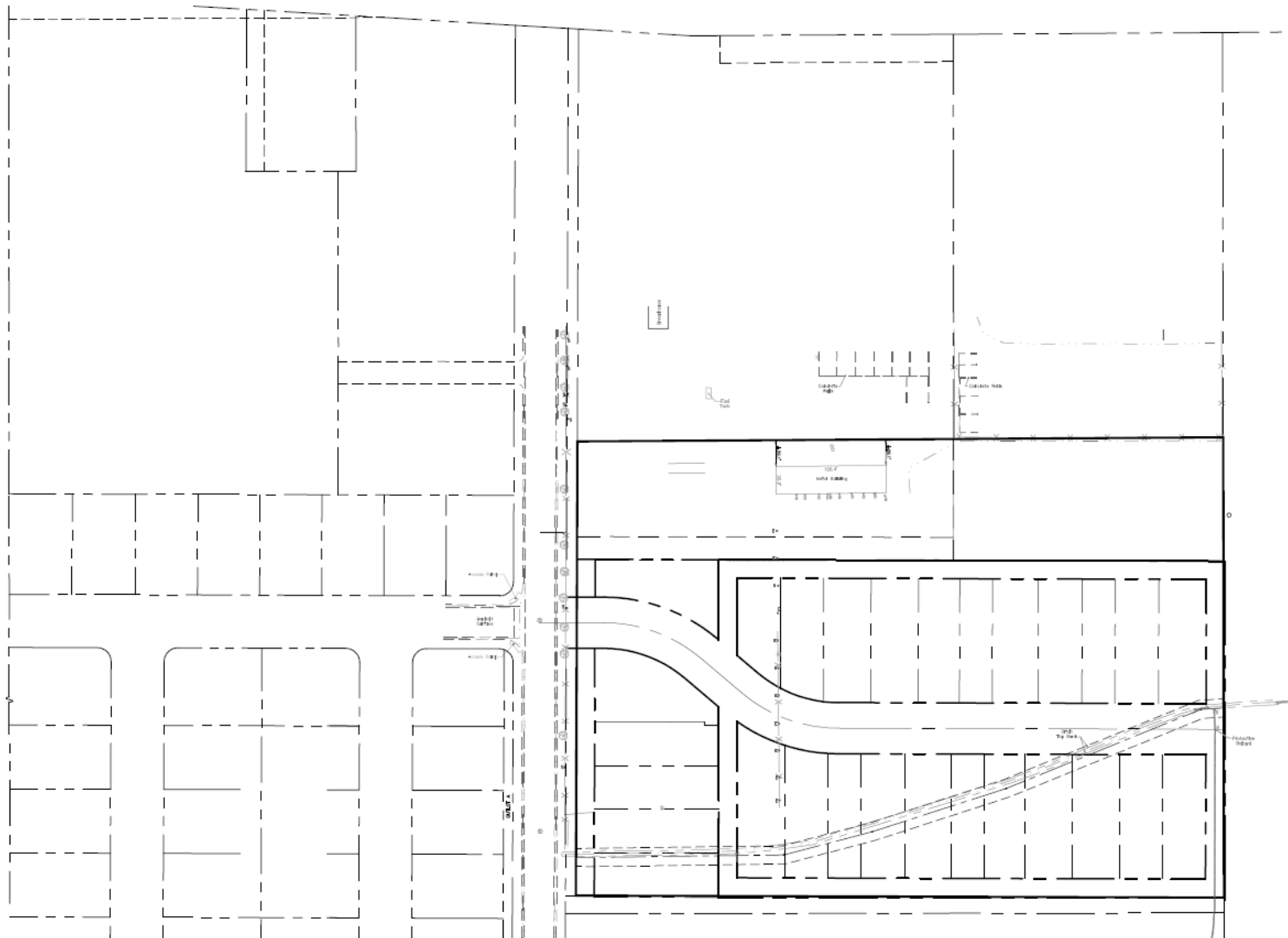


Table 1: Trip Generation (ITE Trip Generation, 10th Edition)

ITE Code	Land Use	Size	Average Daily Trips		AM Peak Hour Trips						PM Peak Hour Trips					
			Rate	Total	Rate	% In	In	% Out	Out	Total	Rate	% In	In	% Out	Out	Total
210	Single Family	28 DU	9.44	264	0.74	25%	5	75%	16	21	0.99	63%	18	37%	10	28
Total				264			5		16	21			18		10	28

DU = Dwelling Units

4.0 Appropriateness

Access to the project site is proposed from a local street internal to a subdivision and not from an arterial roadway. Site access should be taken, when available, on the road of lower classification as proposed with the current project. Therefore, the access to the project site is appropriate based upon the existing road network and location of the project site. The proposed project consists of 28 single-family homes. The adjacent neighborhood also consists of single-family residential homes. The project's site generated traffic is low and the existing transportation network is appropriate to accommodate the proposed project's traffic.

5.0 Conclusions

Based upon the review of the project's low trip generation and location, it can be determined that the proposed use is appropriate from a traffic engineering perspective. The trip generation, site location, land use, and size is appropriate from a traffic engineering perspective.

- Per the ITE, the proposed project generates 264 daily trips, 21 AM total peak hour trips, and 28 PM total peak hour trips. See Table 1: Trip Generation.
- The project's proposed access is appropriate from a traffic engineering standpoint.
- The existing roadway improvements are appropriate to accommodate the proposed project's traffic.



APPENDIX:



Single-Family Detached Housing (210)

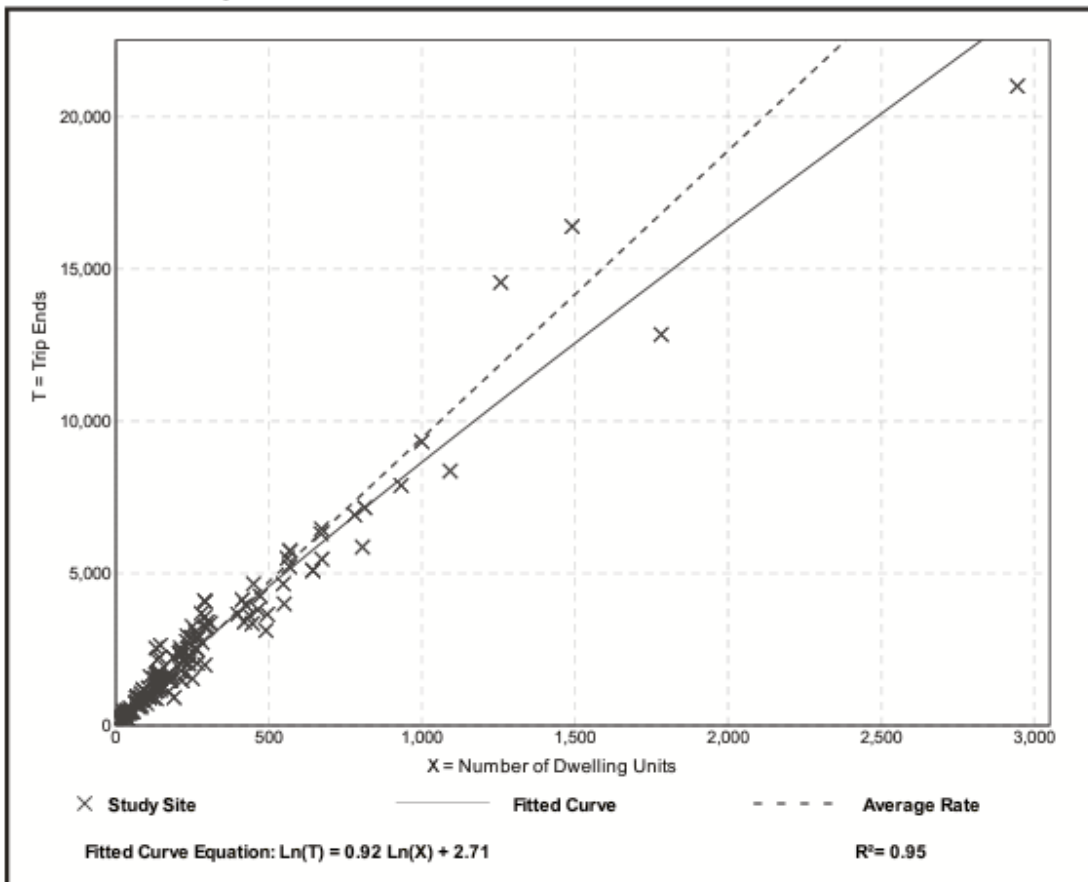
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 173

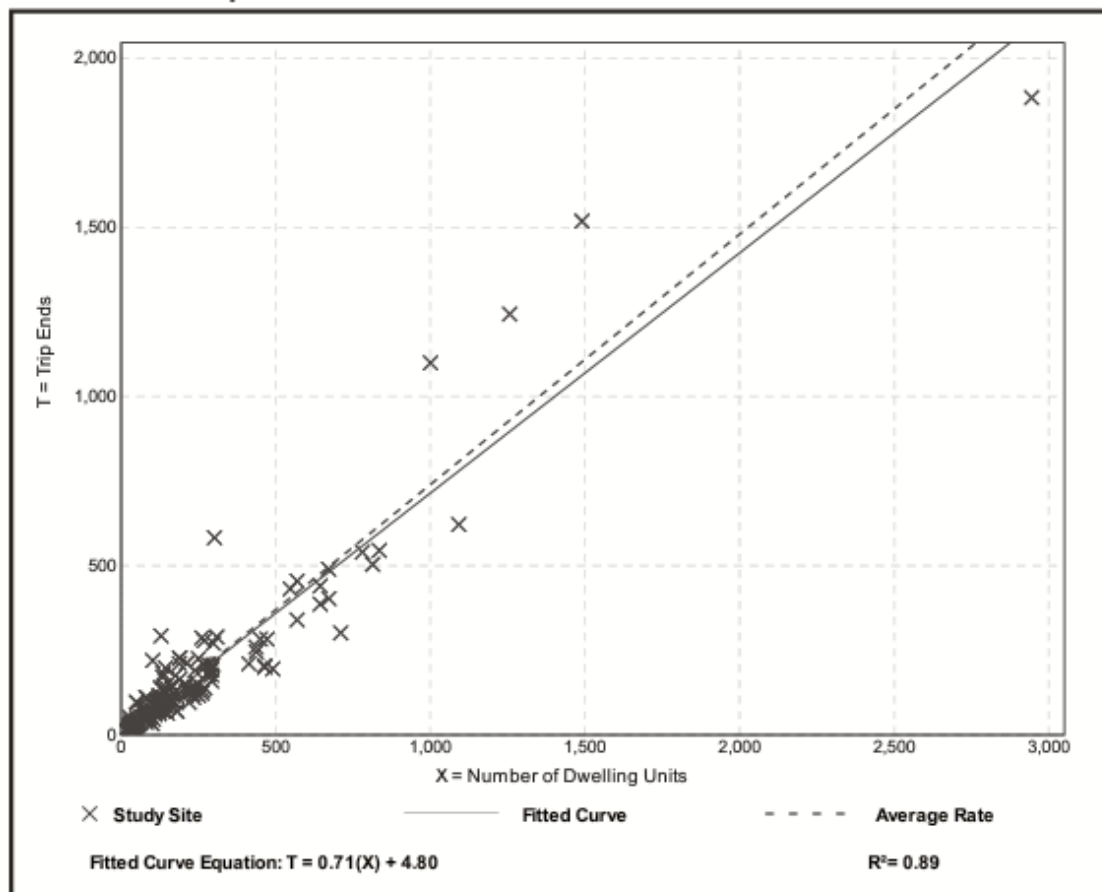
Avg. Num. of Dwelling Units: 219

Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 190

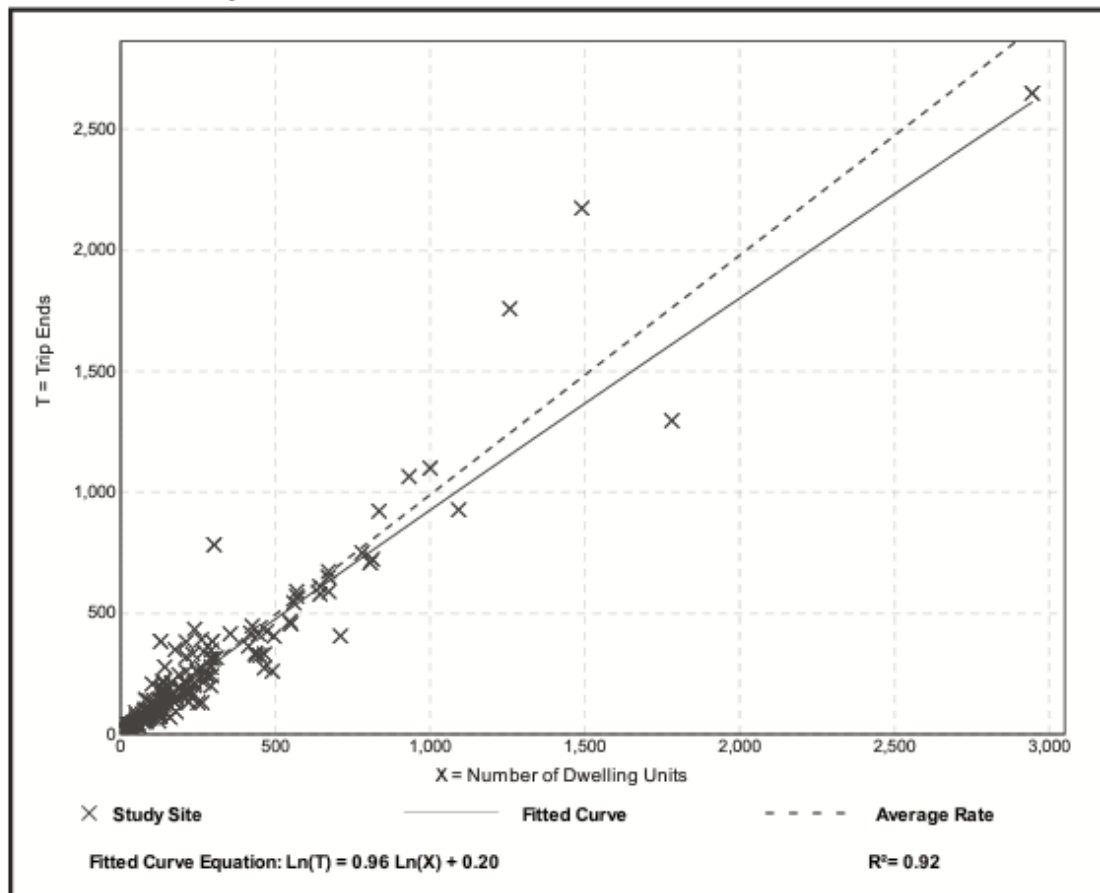
Avg. Num. of Dwelling Units: 242

Directional Distribution: 63% entering, 37% exiting

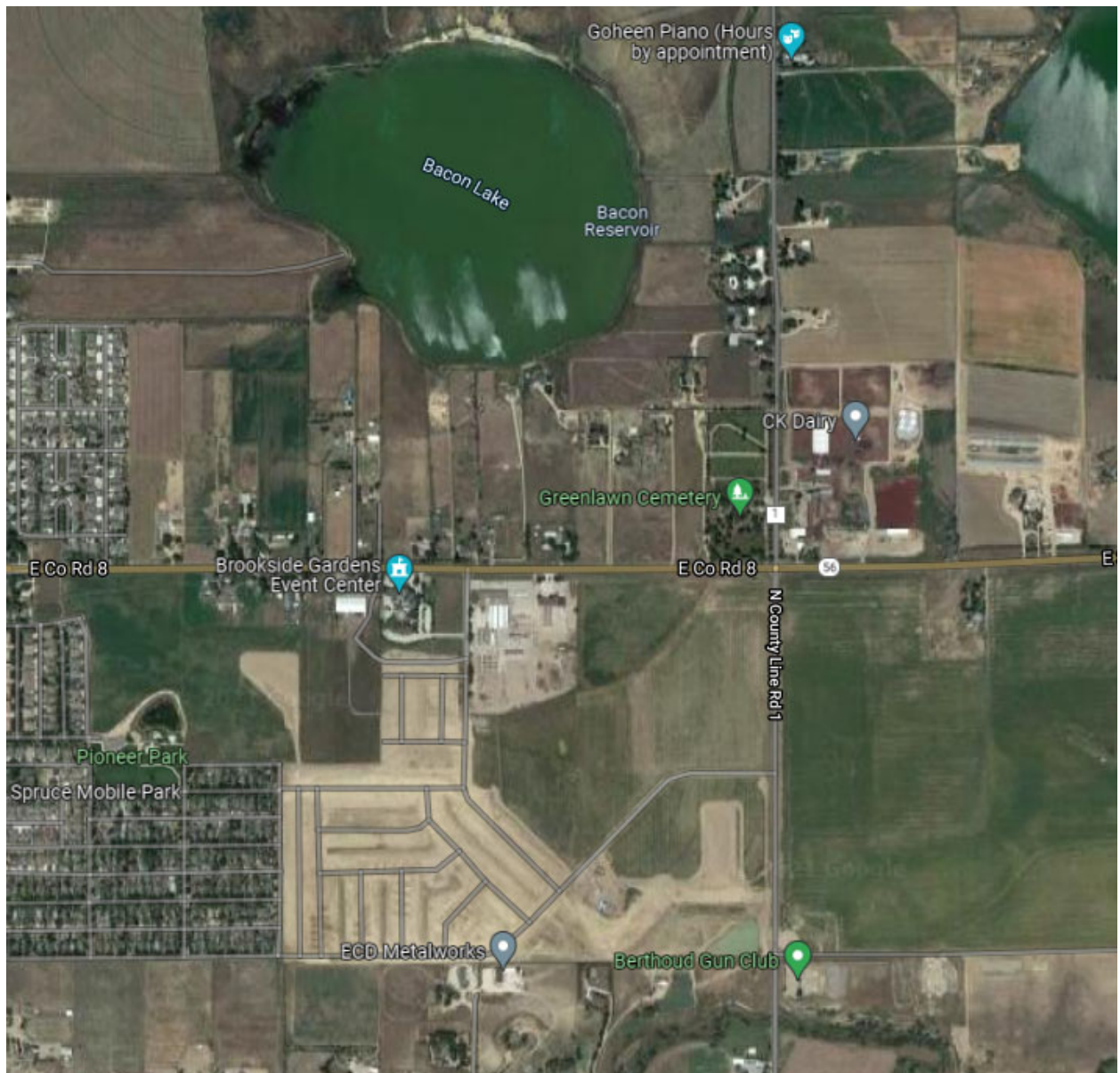
Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Aerial Photo





Sean Kellar, PE, PTOE

Principal Engineer

Education

B.S., Civil Engineering, Arizona State University – Tempe, AZ

Registration

Colorado, Professional Engineer (PE)
Wyoming, Professional Engineer (PE)
Arizona, Professional Engineer (PE)
Kansas, Professional Engineer (PE)
Missouri, Professional Engineer (PE)
Professional Traffic Operations Engineer (PTOE)

Professional Memberships

Institute of Transportation Engineers (ITE)

Industry Tenure

22 Years

Sean's wide range of expertise includes: transportation planning, traffic modeling, roadway design, bike and pedestrian facilities, traffic impact studies, traffic signal warrant analysis, parking studies, corridor planning and access management. Sean's experience in both the private and public sectors; passion for safety and excellence; and strong communication and collaboration skills can bring great value to any project. Prior to starting Kellar Engineering, Sean was employed at the Missouri Department of Transportation (MoDOT) as the District Traffic Engineer for the Kansas City District. Sean also worked for the City of Loveland, CO for over 10 years as a Senior Civil Engineer supervising a division of transportation/traffic engineers. While at the City of Loveland, Sean managed several capital improvement projects, presented several projects to the City Council and Planning Commission in public hearings, and managed the revisions to the City's Street Standards. Sean is also proficient in Highway Capacity Software, Synchro, PT Vissim, Rodel, GIS, and AutoCAD.



WORK EXPERIENCE:

Kellar Engineering, Principal Engineer/President – January 2016 – Present

Missouri Department of Transportation, District Traffic Engineer, Kansas City District – June 2015 – January 2016

City of Loveland, Colorado, Senior Civil Engineer, Public Works Department – February 2005 – June 2015

Kirkham Michael Consulting Engineers, Project Manager - February 2004 – February 2005

Dibble and Associates Consulting Engineers, Project Engineer – August 1999 – February 2004

PRELIMINARY DRAINAGE & EROSION CONTROL REPORT

HARVEST 47

Berthoud, CO

February 20, 2023

Prepared for:

L & J Bebo

PO Box W

Berthoud, CO 80513

Prepared by:

i2 Consultants, Inc.

16911 Potts Place

Mead, CO 80542

Phone: 970.217.9148

Project Number: 1053-1



i2 Consultants, Inc.

February 20, 2023

16911 Potts Place, Mead, CO
970.217.9148
troy@i2-consultants.com

Mr. Noah Nemmers, PE
Baseline Engineering Corporation
112 N. Rubey Drive, #210
Golden, CO 80403
c/o Town of Berthoud

RE: Preliminary Drainage & Erosion Control Report for Harvest 47
Berthoud, CO

Dear Mr. Nemmers:

We are pleased to present this Preliminary Drainage & Erosion Control Report for Harvest 47 for your review and approval. This report has been prepared in general accordance with the *Town of Berthoud Engineering and Infrastructure Design Standards and Construction Specifications, dated October 2021* (Design Standards) and Larimer County Storm Drainage Standards.

We look forward to your favorable review of this project and report. Please do not hesitate to contact our office if you have any questions.

Sincerely,

i2 Consultants, Inc.

Troy W. Campbell, PE
Senior Project Engineer

i2 Consultants, Inc.

RESPONSIBLE PARTY CERTIFICATION

L. & J. Bebo, hereby certifies that the drainage facilities for Harvest 47, Berthoud, CO will be constructed according to the design presented in this report. I understand that the Town of Berthoud does not and shall not assume liability for the drainage facilities designed and/or certified by my engineer. I understand that the Town of Berthoud reviews drainage plans but cannot, on behalf of Harvest 47, Berthoud, CO, guarantee that the final drainage design review will absolve L. & J. Bebo and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the Plat and/or Development Permit does not imply approval of my engineer's drainage design.

Attest:

L. Bebo

Authorized Signature

ENGINEER'S CERTIFICATION

I, Troy W. Campbell, hereby certify that this report (plan) for the drainage design of Harvest 47, Berthoud, CO was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Berthoud Standards and Specifications for the Design and Construction of Public and Private Improvements for the Responsible Parties thereof. I understand that the Town of Berthoud does not and shall not assume liability for drainage facilities designed by others.

Registered Professional Engineer
State of Colorado No. 41159
(Seal)

Preliminary Drainage & Erosion Control Report

Harvest 47

Located within 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

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I. GENERAL LOCATION AND DESCRIPTION

A. Site Location:

The subject site is located in the northwest quarter of Section 24, Township 4 North, Range 69 West, of the 6th Principal Meridian, Town of Berthoud, County of Larimer, State of Colorado. Furthermore, the project is located south of Highway 56, east of Dorothy Drive and west of County Line Road.

B. Site Description:

The subject site is roughly 6.0 acres and is currently undeveloped.

The proposed development will consist of single-family lots, roadway, alleys, sidewalks and landscaping.

Detention and water quality for the subject site will be to the north of the subject site.

The site to the west has been developed and contains single family lots. The area to the south and east is currently being developed as multi-family and single-family lots.

According to the Natural Resources Conversation Service (NRCS) Web Soil Survey, the native soils in this area are:

- Nunn Clay Loam, 0 to 1 percent slopes (Map Unit Symbol #73), which is a Type C soil.
- Wiley Silt Loam, 1 to 3 percent slopes (Map Unit Symbol #118), which is a Type B soil.

Please refer to the NRCS soils information in the Appendix.

There are no irrigation facilities within the subject property boundary. An abandoned irrigation ditch has been removed from the property.

C. Proposed Project Description:

The subject site consists of roughly 6.0 acres and the subject development will be constructed in one phase. The subject project will consist of single-family lots, roadway section, alley and landscaping.

D. Flood Hazard and Relevant Drainage Studies:

The site is shown on FEMA panel 08069C1391H, effective 01/15/2021. The subject site is located with Zone X of the FEMA panel.

Relevant drainage studies for this area include the *Drainage Investigation for L&M Enterprises – MRD*, prepared by Messner Engineering Associates, dated October 11, 1990, as well as the *Preliminary Drainage Report for The Farmstead Third Filing*, prepared by Northern Engineering, dated August 10, 2022.

II. DRAINAGE BASIN

A. Overall Drainage Basin:

Related documents for the subject site are provided below:

- *Drainage Investigation for L&M Enterprises – MRD*, prepared by Messner Engineering Associates, dated October 11, 1990;
- *Preliminary Drainage Report for The Farmstead Third Filing*, prepared by Northern Engineering, dated August 10, 2022.

B. Sub-basin and Site Drainage:

The proposed site is currently undeveloped and the site runoff currently flows from west to northeast and west to southeast.

The subject site has previously been studied in the report prepared by Messner Engineering Associates and has also been included in previous drainage reports for The Farmstead development.

There is no off-site runoff that reaches the subject site.

III. DRAINAGE DESIGN CRITERIA

A. Regulations:

This report has been prepared in general accordance with the Town of Berthoud Design Standards, Larimer County Storm Drainage Standards, the Mile High Flood Control District/*Urban Storm Drainage Criteria Manual (USDCM)* and the *Drainage Investigation for L&M Enterprises – MRD*, prepared by Messner Engineering Associates, dated October 11, 1990.

B. Development Criteria Reference and Constraints:

The study area is currently undeveloped and vacant land.

The increase in runoff from the proposed development will be routed through the onsite and off-site detention facilities.

C. Hydrological Criteria:

Drainage design is in accordance with the Town of Berthoud Design Standards, Larimer County Stormwater Design Standards criteria, as well as the USDCM.

The design storms for this project are the 2-year and the 100-year recurrence intervals. Runoff is calculated using the Rational Method since all basins are smaller than 160 acres. The Rational Method calculations are computed by the following:

$$Q = ciA \quad \text{where:} \quad \begin{array}{ll} Q & = \text{Runoff in cubic feet per second} \\ c & = \text{Calculated runoff coefficient for design event} \\ i & = \text{Storm intensity in inches/hour} \\ A & = \text{Basin area in acres} \end{array}$$

Rational calculations were prepared using *Peak Runoff Prediction by the Rational Method, Version 2.00*, released May 2017, Urban Drainage and Flood Control District.

D. Hydraulic Criteria:

Proposed hydraulic calculations were prepared using *Hydraflow Express Extension for AutoDesk Civil 3D* as well as the *Detention Basin Volume Estimating Workbook, Version 2.35, Released January 2015*, by Urban Drainage and Flood Control District. Refer to the Appendix, Hydraulic Calculations for additional information as well as the Drainage Plan.

E. Variances from Criteria:

No variances are requested with the subject development.

IV. DRAINAGE FACILITY DESIGN

A. General Concept:

The drainage patterns associated with the proposed improvements are generally consistent, to the extent practical and reasonable, with the existing topography, adjacent development and previous drainage investigation for the subject property.

The estimated runoff for the site was determined using the Rational Method, as detailed above. Based on the direction of flow and existing drainage features the subject site has been divided into three (3) onsite drainage basins.

B. Specific Details:

The drainage analysis for the subject area and the layout of the basins corresponds with the proposed drainage conditions to the extent practical. Due to the proposed development, there are some differences between the previously designed basins and proposed basins due to the required layout, surrounding development and grading of the site.

Basin A

Basin A is the western portion of the site and will contain the front portion of residential lots. The proposed drainage pattern for this basin is generally from east to west and then south along Dorothy Drive. Runoff will be conveyed via curb & gutter to the south in Dorothy Drive.

Basin B

Basin B is in the southern portion of the site and will contain the rear/back portion of residential lots. The proposed drainage pattern for this basin is generally from north to south and then east in the alley along the common lot line for Harvest 47 and The Farmstead. Runoff will be conveyed to The Farmstead storm system and detained off-site.

Basin C

Basin C contains the majority of the subject site and consists of roughly 6 acres. Runoff will drain from the southwest to northeast to the proposed detention pond. Runoff will be detained and then released to The Farmstead storm system to the east of the subject site.

The proposed drainage from the subject site is not anticipated to have a negative impact on existing or proposed downstream facilities. Detention and water quality for Basin C will be provided onsite.

Basin C will be detained in the proposed detention pond and will be released to The Farmstead storm system at a 100-year flow of roughly 6 cfs. The release rate was previously determined in the *Drainage Investigation for L&M Enterprises – MRD*, prepared by Messner Engineering Associates, dated October 11, 1990. The proposed 100-year detention volume is roughly 0.51 ac-ft; water quality of 0.15 ac-ft is included within this 100-year volume. The detention pond will include an emergency overflow weir on the east side of the pond. The emergency overflow will be graded to convey flows to the east towards The Farmstead development.

C. Open Channel Flow

Common lot line swales between the single family lots will be necessary to convey developed runoff from the lots.

D. Storm Drainage Pipes

Storm drainage pipes will be utilized to convey runoff from the subject site to the proposed detention pond. The pipes will be sized to convey the 100-year event.

E. Sediment and Erosion Control

Several sediment and erosion control measures will be incorporated into the construction. The initial sediment and erosion control measures to be installed shall include silt fence, as well as vehicle tracking control. After the initial grading operations, sediment control logs shall be installed in onsite swales and rock socks within the curb and gutter adjacent to the subject site.

As construction progresses, there will be a location designated for a concrete washout area. After the onsite roadway has final surface stabilization, rock socks shall be installed along onsite the curb and gutter and remain until final overall development landscaping has been completed.

Inlet protection shall be installed around any onsite inlets and inlets immediately downstream of the subject site.

Additionally, any area that has been disturbed by construction activities and left exposed for more than fourteen (14) days, shall receive drilled seeding and straw mulch at 2 tons/acre, until permanent landscaping or ground cover has been provided.

All stormwater quality and sediment/erosion control measures shall be regularly inspected and maintained during and after the completion of construction. Furthermore, sufficient care shall be taken by the contractor with materials handling and storage.

The proposed measures for sediment and erosion control shall be updated as necessary during construction, as warranted by site conditions.

F. Maintenance of Drainage Facilities

The onsite drainage facilities shall be regularly inspected and maintained by the property owner or homeowner's association. The inspections should include a log for the date, items inspected, maintenance actions and any updates to the drainage system.

The facilities shall be maintained at any time that erosion occurs in order to mitigate possible future erosion and to mitigate material leaving the subject site. Furthermore, items such as onsite culverts and chases shall be cleaned and inspected on a regular basis.

Onsite vegetation shall be maintained and replanted if necessary to establish vegetated groundcover.

V. CONCLUSIONS

A. Compliance with Standards:

The drainage design is in general compliance with the Town of Berthoud Design Standards, Larimer County Storm Drainage Standards, the Mile High Flood Control District/*Urban Storm Drainage Criteria Manual (USDCM)* and the *Drainage Investigation for L&M Enterprises – MRD*, prepared by Messner Engineering Associates, dated October 11, 1990.

B. Drainage Concept:

The drainage patterns associated with the proposed improvements are generally consistent, to the extent practical and reasonable, with the design in the *Drainage Investigation for L&M Enterprises – MRD*, prepared by Messner Engineering Associates, dated October 11, 1990.

The drainage design for this project should not negatively impact improvements downstream or the existing storm system.

VI. REFERENCES

1. *Town of Berthoud Engineering and Infrastructure Design Standards and Construction Specifications, dated October 2021.*
2. *Larimer County Stormwater Design Standards (Addendum to the Urban Storm Drainage Criteria Manuals – Volumes 1, 2 and 3), adopted June 20, 2005.*
3. Urban Drainage and Flood Control District, Drainage Criteria Manual Volumes 1, Revised August 2018, Volume 2, Revised September 2017 and the Volume 3, dated November 2010 and Updated October 2019.
4. *Drainage Investigation for L&M Enterprises – MRD*, prepared by Messner Engineering Associates, dated October 11, 1990.
5. *Preliminary Drainage Report for The Farmstead Third Filing*, prepared by Northern Engineering, dated August 10, 2022.

VII.APPENDICIES

- ❑ Vicinity Map
- ❑ FEMA & Existing Geotechnical Information
- ❑ Hydrologic Calculations
- ❑ Hydraulic Calculations
- ❑ Excerpts from Previous Report
- ❑ Charts and Figures

Vicinity Map



VICINITY MAP

SCALE: 1" = 1,000'

i2
Consultants,
Inc.
16911 Potts Place
Mead, Colorado
970.217.9148

HARVEST 47

BERTHOUD, CO

CLIENT: BEBO
PROJECT NO: 1053-1
DATE: 12/19/2022
REVISED: -

SHEET: 1 OF 1

FEMA & Existing Geotechnical Information

National Flood Hazard Layer FIRMMette



B-1

105°4'W 40°18'26"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation
MAP PANELS		Coastal Transect
		Base Flood Elevation Line (BFE)
OTHER FEATURES		Limit of Study
		Jurisdiction Boundary
OTHER FEATURES		Coastal Transect Baseline
		Profile Baseline
OTHER FEATURES		Hydrographic Feature
		Digital Data Available
MAP PANELS		No Digital Data Available
		Unmapped



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

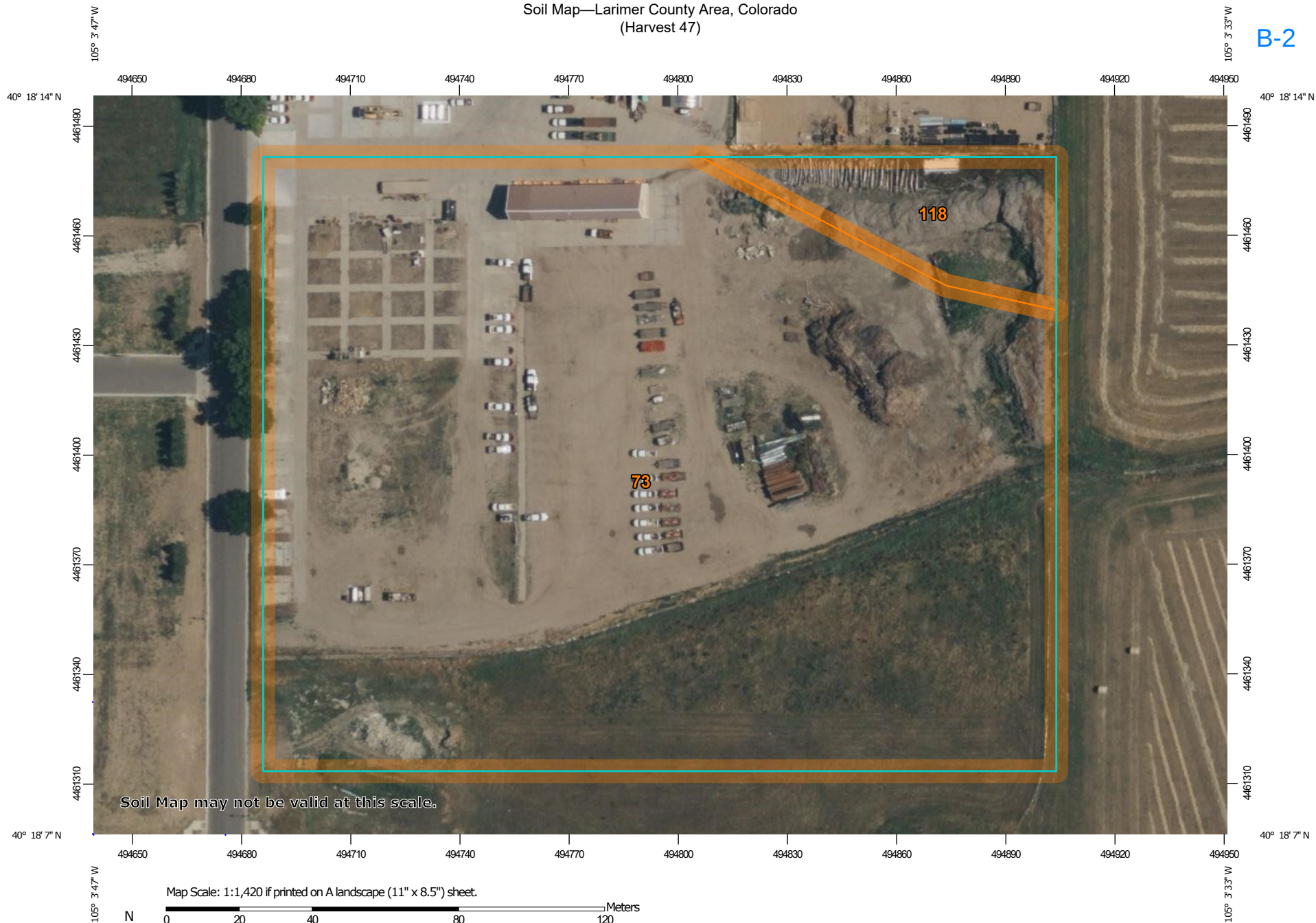
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **12/18/2022 at 1:11 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Soil Map—Larimer County Area, Colorado
(Harvest 47)

B-2



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

12/18/2022
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Larimer County Area, Colorado

Survey Area Data: Version 17, Sep 7, 2022

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

Date(s) aerial images were photographed: Jul 2, 2021—Aug 25, 2021

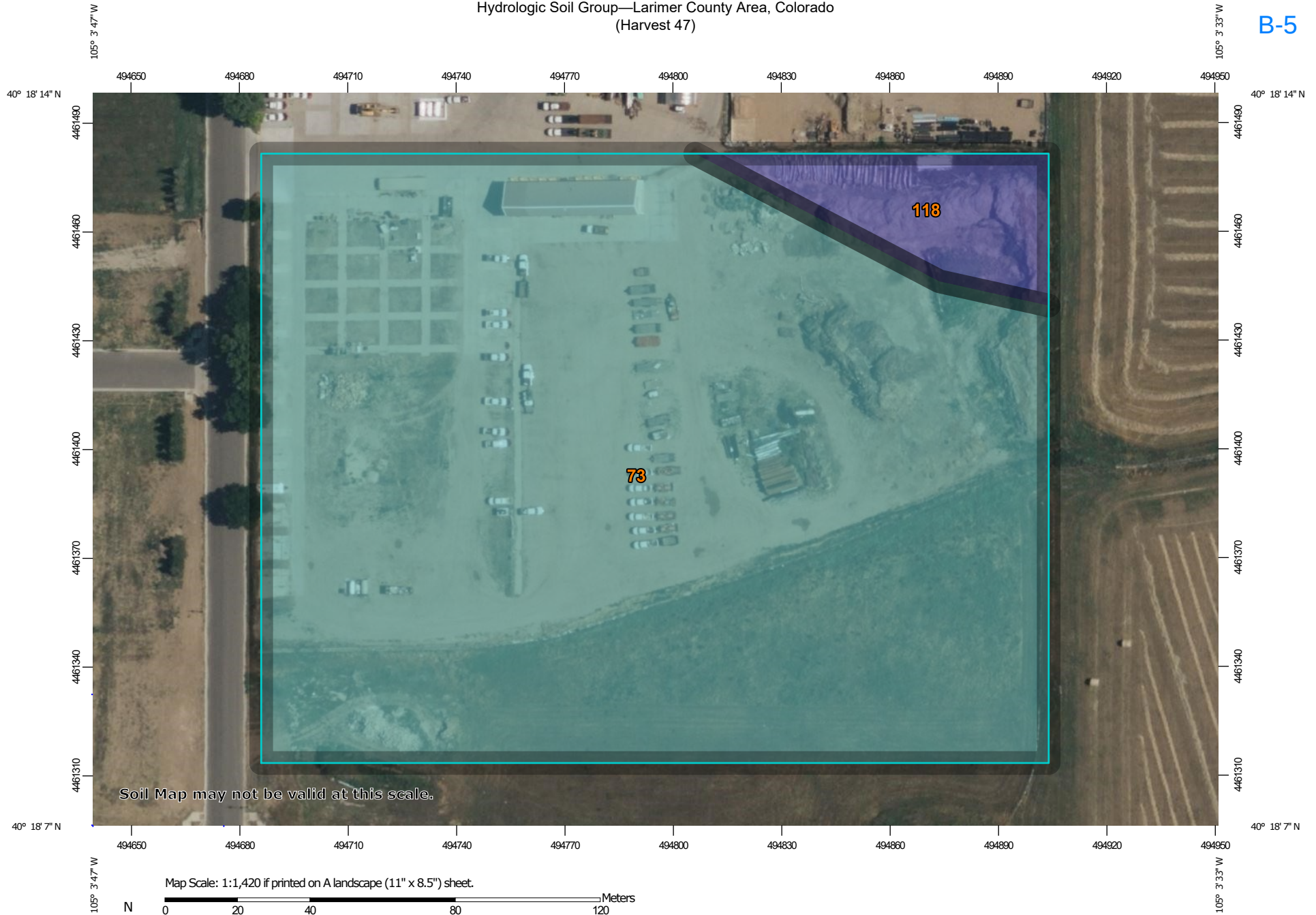
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
73	Nunn clay loam, 0 to 1 percent slopes	8.5	93.6%
118	Wiley silt loam, 1 to 3 percent slopes	0.6	6.4%
Totals for Area of Interest		9.1	100.0%

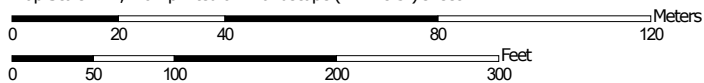
Hydrologic Soil Group—Larimer County Area, Colorado (Harvest 47)

B-5



Soil Map may not be valid at this scale.

Map Scale: 1:1,420 if printed on A landscape (11" x 8.5") sheet.



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



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

12/18/2022
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Larimer County Area, Colorado
 Survey Area Data: Version 17, Sep 7, 2022

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

Date(s) aerial images were photographed: Jul 2, 2021—Aug 25, 2021

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
73	Nunn clay loam, 0 to 1 percent slopes	C	8.5	93.6%
118	Wiley silt loam, 1 to 3 percent slopes	B	0.6	6.4%
Totals for Area of Interest			9.1	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Calculations

Calculation of Peak Runoff using Rational Method

Designer:	twc
Company:	i2 Consultants, Inc.
Date:	2/15/2023
Project:	Harvest 47
Location:	Berthoud, CO

Version 2.00 released May 2017

Cells of this color are for required user-input
Cells of this color are for optional override values
Cells of this color are for calculated results based on overrides

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

Computed $t_c = t_i + t_t$

$$\text{Regional } t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

$$t_{\text{minimum}} = 5 \text{ (urban)}$$

$$t_{\text{minimum}} = 10 \text{ (non-urban)}$$

$$\text{Selected } t_c = \max\{t_{\text{minimum}}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$$

Select UDFCD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website ([click this link](#))

1-hour rainfall depth, P1 (in) =

0.81	1.08	1.38	1.87	2.32	2.84	4.32
------	------	------	------	------	------	------

Rainfall Intensity Equation Coefficients =

28.50	10.00	0.786
-------	-------	-------

$$I(in/hr) = \frac{a * P_1}{(b + t_c)^c}$$

$$Q(cfs) = CIA$$

[illegible]

Hydraulic Calculations

DETENTION VOLUME BY THE MODIFIED FAA METHOD

Project: Harvest 47

Basin ID: Site Detention (Basin C)

(For catchments less than 160 acres only. For larger catchments, use hydrograph routing method)
(NOTE: for catchments larger than 90 acres, CUHP hydrograph and routing are recommended)

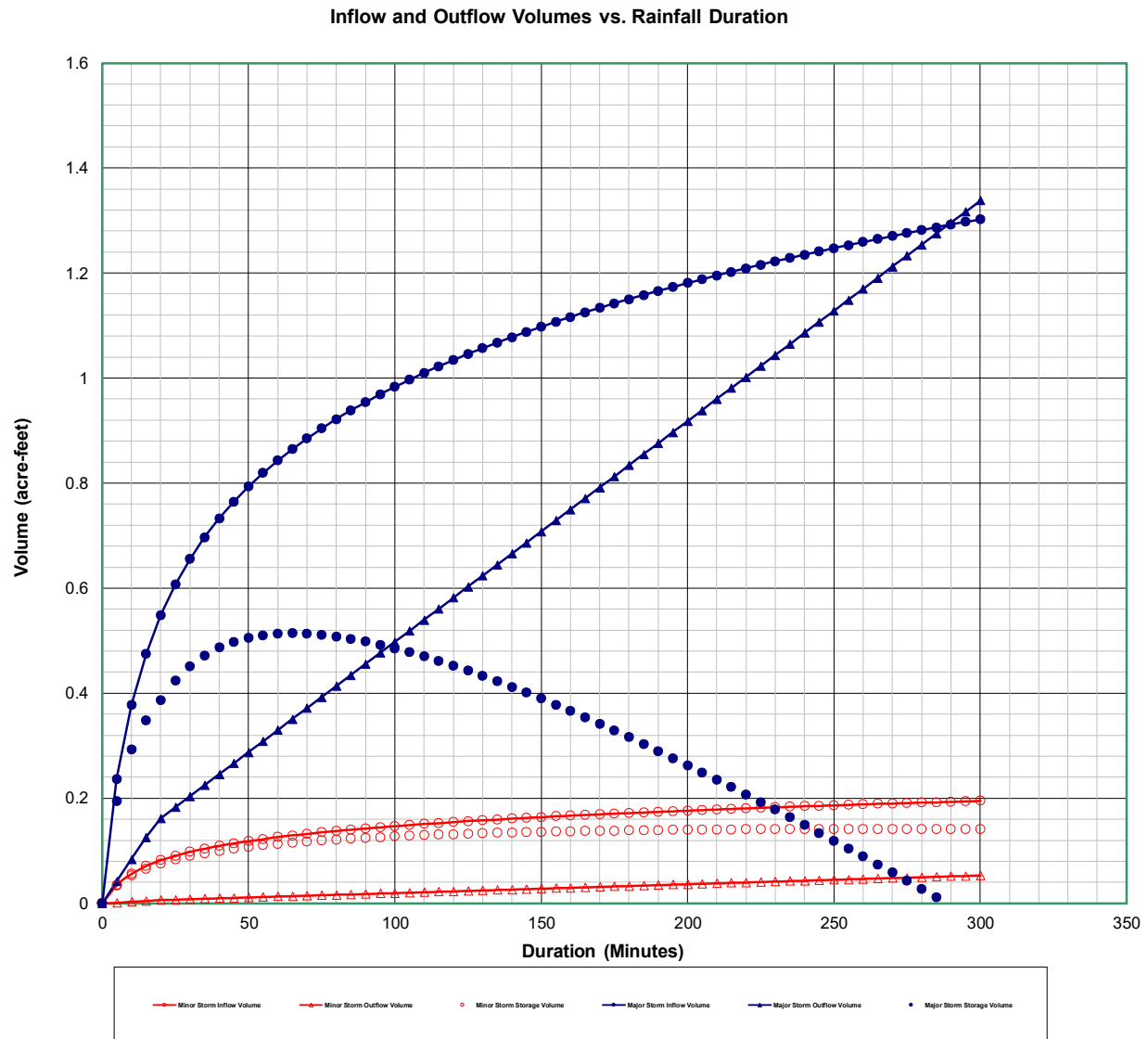
Determination of MINOR Detention Volume Using Modified FAA Method							Determination of MAJOR Detention Volume Using Modified FAA Method						
Design Information (Input): Catchment Drainage Imperviousness $I_p = 45.00$ percent Catchment Drainage Area $A = 6.100$ acres Predevelopment NRCS Soil Group Type = C A, B, C, or D Return Period for Detention Control $T = 2$ years (2, 5, 10, 25, 50, or 100) Time of Concentration of Watershed $T_c = 19$ minutes Allowable Unit Release Rate $q = 0.04$ cfs/acre One-hour Precipitation $P_1 = 0.81$ inches Design Rainfall IDF Formula $i = C_1 \cdot P_1 / (C_2 + T_c)^{C_3}$ Coefficient One $C_1 = 28.50$ Coefficient Two $C_2 = 10$ Coefficient Three $C_3 = 0.789$							Design Information (Input): Catchment Drainage Imperviousness $I_p = 45.00$ percent Catchment Drainage Area $A = 6.100$ acres Predevelopment NRCS Soil Group Type = C A, B, C, or D Return Period for Detention Control $T = 100$ years (2, 5, 10, 25, 50, or 100) Time of Concentration of Watershed $T_c = 19$ minutes Allowable Unit Release Rate $q = 1.00$ cfs/acre One-hour Precipitation $P_1 = 2.84$ inches Design Rainfall IDF Formula $i = C_1 \cdot P_1 / (C_2 + T_c)^{C_3}$ Coefficient One $C_1 = 28.50$ Coefficient Two $C_2 = 10$ Coefficient Three $C_3 = 0.789$						
Determination of Average Outflow from the Basin (Calculated): Runoff Coefficient $C = 0.31$ Inflow Peak Runoff $Q_{p-in} = 3.11$ cfs Allowable Peak Outflow Rate $Q_{p-out} = 0.24$ cfs Mod. FAA Minor Storage Volume = 6,182 cubic feet Mod. FAA Minor Storage Volume = 0.142 acre-ft							Determination of Average Outflow from the Basin (Calculated): Runoff Coefficient $C = 0.59$ Inflow Peak Runoff $Q_{p-in} = 20.72$ cfs Allowable Peak Outflow Rate $Q_{p-out} = 6.10$ cfs Mod. FAA Major Storage Volume = 22,389 cubic feet Mod. FAA Major Storage Volume = 0.514 acre-ft						
5 <- Enter Rainfall Duration Incremental Increase Value Here (e.g. 5 for 5-Minutes)													
Rainfall Duration minutes (input)	Rainfall Intensity inches / hr (output)	Inflow Volume acre-feet (output)	Adjustment Factor "m" (output)	Average Outflow cfs (output)	Outflow Volume acre-feet (output)	Storage Volume acre-feet (output)	Rainfall Duration minutes (input)	Rainfall Intensity inches / hr (output)	Inflow Volume acre-feet (output)	Adjustment Factor "m" (output)	Average Outflow cfs (output)	Outflow Volume acre-feet (output)	Storage Volume acre-feet (output)
0	0.00	0.000	0.00	0.00	0.000	0.000	0	0.00	0.000	0.00	0.00	0.000	0.000
5	2.73	0.035	1.00	0.24	0.002	0.034	5	9.55	0.237	1.00	6.10	0.042	0.195
10	2.17	0.057	1.00	0.24	0.003	0.053	10	7.61	0.377	1.00	6.10	0.084	0.293
15	1.82	0.071	1.00	0.24	0.005	0.066	15	6.39	0.475	1.00	6.10	0.126	0.349
20	1.58	0.082	0.96	0.23	0.006	0.076	20	5.53	0.548	0.96	5.87	0.162	0.387
25	1.40	0.091	0.87	0.21	0.007	0.084	25	4.90	0.607	0.87	5.31	0.183	0.424
30	1.26	0.098	0.81	0.20	0.008	0.090	30	4.41	0.655	0.81	4.93	0.204	0.452
35	1.15	0.104	0.76	0.19	0.009	0.095	35	4.02	0.697	0.76	4.66	0.225	0.472
40	1.05	0.110	0.73	0.18	0.010	0.100	40	3.70	0.733	0.73	4.46	0.246	0.487
45	0.98	0.115	0.71	0.17	0.011	0.104	45	3.43	0.765	0.71	4.30	0.267	0.498
50	0.91	0.119	0.69	0.17	0.012	0.107	50	3.20	0.793	0.69	4.18	0.288	0.505
55	0.86	0.123	0.67	0.16	0.012	0.110	55	3.00	0.819	0.67	4.08	0.309	0.510
60	0.81	0.126	0.65	0.16	0.013	0.113	60	2.83	0.843	0.65	3.99	0.330	0.513
65	0.77	0.130	0.64	0.16	0.014	0.116	65	2.68	0.865	0.64	3.92	0.351	0.514
70	0.73	0.133	0.63	0.15	0.015	0.118	70	2.55	0.885	0.63	3.86	0.372	0.513
75	0.69	0.135	0.62	0.15	0.016	0.120	75	2.43	0.904	0.62	3.80	0.393	0.511
80	0.66	0.138	0.62	0.15	0.017	0.122	80	2.32	0.922	0.62	3.76	0.414	0.508
85	0.64	0.141	0.61	0.15	0.017	0.123	85	2.23	0.938	0.61	3.71	0.435	0.504
90	0.61	0.143	0.60	0.15	0.018	0.125	90	2.14	0.954	0.60	3.68	0.456	0.498
95	0.59	0.145	0.60	0.15	0.019	0.126	95	2.06	0.969	0.60	3.64	0.477	0.492
100	0.57	0.147	0.59	0.14	0.020	0.127	100	1.98	0.983	0.59	3.61	0.498	0.486
105	0.55	0.149	0.59	0.14	0.021	0.129	105	1.92	0.997	0.59	3.59	0.519	0.478
110	0.53	0.151	0.58	0.14	0.022	0.130	110	1.85	1.010	0.58	3.56	0.540	0.470
115	0.51	0.153	0.58	0.14	0.022	0.131	115	1.79	1.022	0.58	3.54	0.561	0.462
120	0.50	0.155	0.58	0.14	0.023	0.132	120	1.74	1.034	0.58	3.52	0.582	0.453
125	0.48	0.157	0.57	0.14	0.024	0.133	125	1.69	1.046	0.57	3.50	0.603	0.443
130	0.47	0.158	0.57	0.14	0.025	0.133	130	1.64	1.057	0.57	3.48	0.624	0.433
135	0.45	0.160	0.57	0.14	0.026	0.134	135	1.60	1.068	0.57	3.47	0.645	0.423
140	0.44	0.162	0.57	0.14	0.027	0.135	140	1.55	1.078	0.57	3.45	0.666	0.412
145	0.43	0.163	0.56	0.14	0.027	0.136	145	1.51	1.088	0.56	3.44	0.687	0.401
150	0.42	0.164	0.56	0.14	0.028	0.136	150	1.48	1.098	0.56	3.43	0.708	0.390
155	0.41	0.166	0.56	0.14	0.029	0.137	155	1.44	1.107	0.56	3.41	0.729	0.378
160	0.40	0.167	0.56	0.14	0.030	0.137	160	1.41	1.116	0.56	3.40	0.750	0.366
165	0.39	0.169	0.56	0.14	0.031	0.138	165	1.38	1.125	0.56	3.39	0.771	0.354
170	0.38	0.170	0.55	0.14	0.032	0.138	170	1.35	1.134	0.55	3.38	0.792	0.342
175	0.38	0.171	0.55	0.13	0.033	0.139	175	1.32	1.142	0.55	3.37	0.813	0.329
180	0.37	0.172	0.55	0.13	0.033	0.139	180	1.29	1.150	0.55	3.36	0.834	0.316
185	0.36	0.174	0.55	0.13	0.034	0.139	185	1.26	1.158	0.55	3.36	0.855	0.303
190	0.35	0.175	0.55	0.13	0.035	0.140	190	1.24	1.166	0.55	3.35	0.876	0.290
195	0.35	0.176	0.55	0.13	0.036	0.140	195	1.21	1.173	0.55	3.34	0.897	0.277
200	0.34	0.177	0.55	0.13	0.037	0.140	200	1.19	1.181	0.55	3.33	0.918	0.263
205	0.33	0.178	0.55	0.13	0.038	0.140	205	1.17	1.188	0.55	3.33	0.939	0.249
210	0.33	0.179	0.54	0.13	0.038	0.141	210	1.15	1.195	0.54	3.32	0.960	0.235
215	0.32	0.180	0.54	0.13	0.039	0.141	215	1.13	1.202	0.54	3.31	0.981	0.221
220	0.32	0.181	0.54	0.13	0.040	0.141	220	1.11	1.209	0.54	3.31	1.002	0.207
225	0.31	0.182	0.54	0.13	0.041	0.141	225	1.09	1.216	0.54	3.30	1.023	0.193
230	0.31	0.183	0.54	0.13	0.042	0.141	230	1.07	1.222	0.54	3.30	1.044	0.178
235	0.30	0.184	0.54	0.13	0.043	0.142	235	1.05	1.229	0.54	3.29	1.065	0.164
240	0.30	0.185	0.54	0.13	0.043	0.142	240	1.04	1.235	0.54	3.29	1.086	0.149
245	0.29	0.186	0.54	0.13	0.044	0.142	245	1.02	1.241	0.54	3.28	1.107	0.134
250	0.29	0.187	0.54	0.13	0.045	0.142	250	1.01	1.247	0.54	3.28	1.128	0.119
255	0.28	0.188	0.54	0.13	0.046	0.142	255	0.99	1.253	0.54	3.27	1.149	0.104
260	0.28	0.189	0.54	0.13	0.047	0.142	260	0.98	1.259	0.54	3.27	1.170	0.089
265	0.27	0.190	0.53	0.13	0.048	0.142	265	0.96	1.265	0.53	3.26	1.191	0.074
270	0.27	0.190	0.53	0.13	0.048	0.142	270	0.95	1.270	0.53	3.26	1.212	0.058
275	0.27	0.191	0.53	0.13	0.049	0.142	275	0.94	1.276	0.53	3.26	1.233	0.043
280	0.26	0.192	0.53	0.13	0.050	0.142	280	0.92	1.282	0.53	3.25	1.254	0.028
285	0.26	0.193	0.53	0.13	0.051	0.142	285	0.91	1.287	0.53	3.25	1.275	0.012
290	0.26	0.194	0.53	0.13	0.052	0.142	290	0.90	1.292	0.53	3.24	1.296	-0.004
295	0.25	0.194	0.53	0.13	0.053	0.142	295	0.89	1.298	0.53	3.24	1.317	-0.020
300	0.25	0.195	0.53	0.13	0.054	0.142	300	0.88	1.303	0.53	3.24	1.338	-0.035
Mod. FAA Minor Storage Volume (cubic ft.) = 6,182 Mod. FAA Minor Storage Volume (acre-ft.) = 0.1419							Mod. FAA Major Storage Volume (cubic ft.) = 22,389 Mod. FAA Major Storage Volume (acre-ft.) = 0.5140						

UDFCD DETENTION BASIN VOLUME ESTIMATING WORKBOOK Version 2.35, Released January 2015

DETENTION VOLUME BY THE MODIFIED FAA METHOD

Project: Harvest 47

Basin ID: Site Detention (Basin C)



STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Project: Harvest 47

Basin ID: Basin C Water Quality

WQCV Design Volume (Input):

Catchment Imperviousness, I_a	=	45.0	percent
Catchment Area, A	=	6.10	acres
Depth at WQCV outlet above lowest perforation, H	=	1.0	feet
Vertical distance between rows, h	=	4.00	inches
Number of rows, N_L	=	1.00	
Orifice discharge coefficient, C_o	=	0.65	
Time to Drain the Pond	=	40	hours

Diameter of holes, D = 0.801 inches

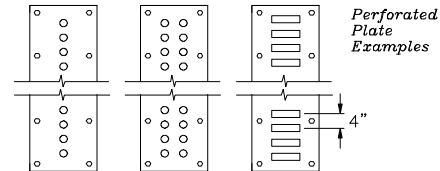
Number of holes per row, N = 1

OR

Height of slot, $H =$ inches

Watershed Design Information (Input):

Percent Soil Type A =		%
Percent Soil Type B =		%
Percent Soil Type C/D =	100	%



Outlet Design Information (Output):

Water Quality Capture Volume, WQCV =	0.252 watershed inches
Water Quality Capture Volume (WQCV) =	0.128 acre-feet
Design Volume (WQCV / 12 * Area * 1.2) Vol =	0.154 acre-feet
Outlet area per row, Ao =	0.50 square inches
Total opening area at each row based on user-input above, Ao =	0.50 square inches
Total opening area at each row based on user-input above, Ao =	0.003 square feet

3

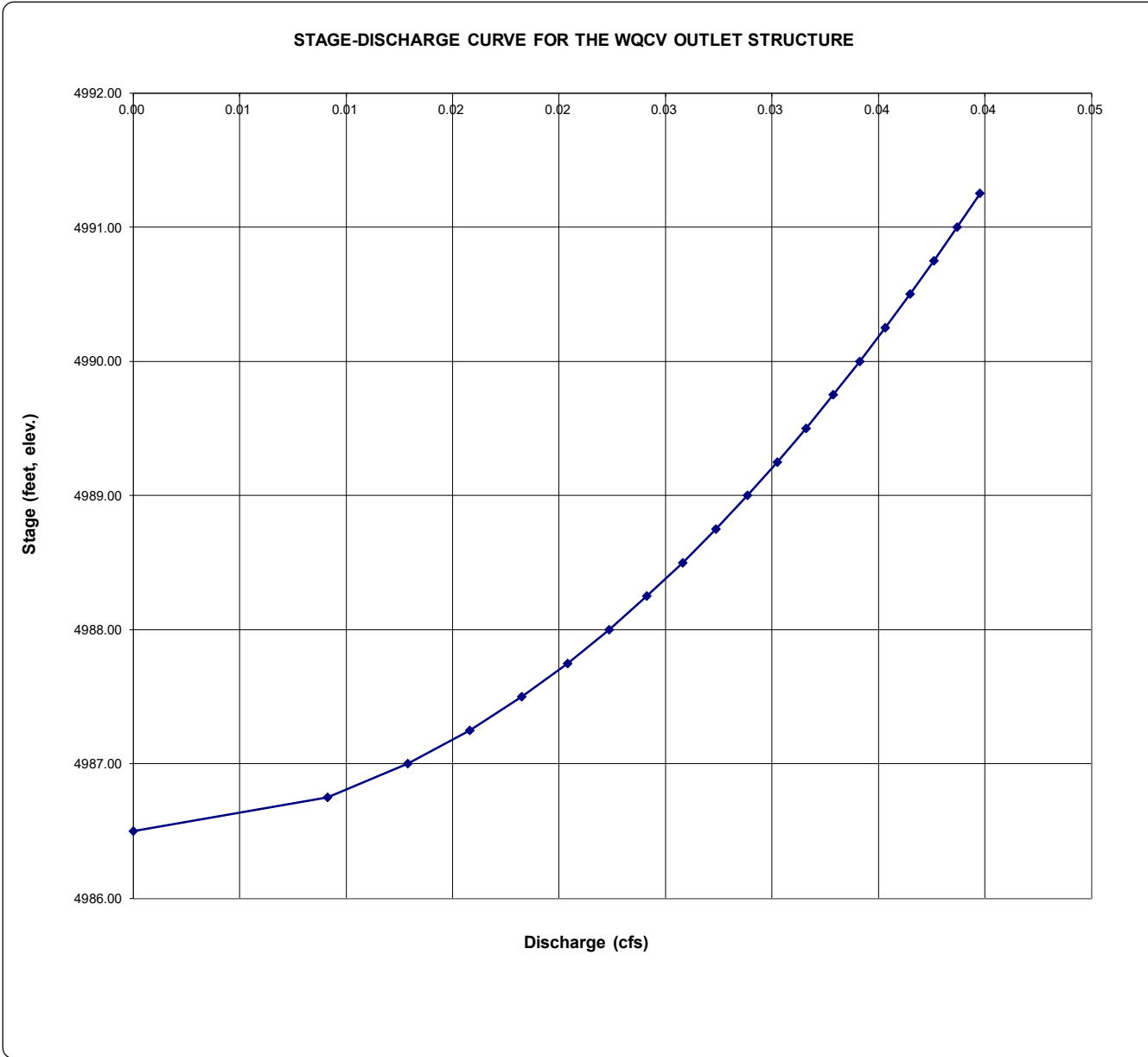
[illegible]

STAGE-DISCHARGE SIZING OF THE WATER QUALITY CAPTURE VOLUME (WQCV) OUTLET

Worksheet Protected

Project: Harvest 47

Basin ID: Basin C Water Quality



Excerpts from Previous Report

1053-1

DRAINAGE INVESTIGATION
FOR
L & M ENTERPRISES - M.R.D.
LARIMER, COUNTY, COLORADO

Prepared for

L & M Enterprises, Inc.
835 East Highway No. 56
Berthoud, Colorado 80513

October 11, 1990
Project No. PLA-017-89

CONSULTING ENGINEER

MESSNER Engineering Associates
150 East 29th Street, Suite 225
Loveland, Colorado 80538

Civil and Environmental Engineering Consultants

MESSNER

Engineering Associates

Project No. PLA-017-89
October 11, 1990

Mr. Larry Bebo
L & M Enterprises, Inc.
835 E. Hwy. 56
Berthoud, Colorado 80513

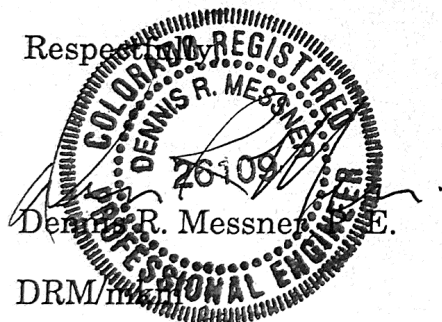
Dear Mr. Bebo,

The enclosed report represents the results of a drainage investigation for the L & M ENTERPRISES - M.R.D. as applies to the proposed and existing accesses to L& M Enterprises, Inc. and the L & M Greenhouse located in Larimer County, Colorado.

This investigation was based upon the M.R.D. site development plan; on-site observations; and available topographic information. The investigation was performed in accordance with the criteria established in the Larimer County - "Storm Drainage Criteria Manual".

Enclosed you will find the results of this investigation. If you should have any questions or desire additional information, please feel free to contact this office.

Respectfully,

A circular professional engineer seal for Dennis R. Messner, Colorado. The seal contains the text "COLORADO REGISTERED PROFESSIONAL ENGINEER" around the perimeter, "DENNIS R. MESSNER" in the center, and the number "26109" below the name. A signature is written over the seal.

Dennis R. Messner, E.

DRM/m

Enclosure

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Proposed Development	2
Conclusions and Recommendations	2

EXHIBITS

Vicinity Map	Exhibit A
Calculations	Exhibit B
Drainage Details	Exhibit C

SCOPE

The following report represents the results of a drainage investigation for existing and future development to be known as the L & M ENTERPRISES - M.R.D., Larimer County, Colorado. The investigation was performed for L & M Enterprises, Inc. The purpose of this investigation is to determine the effects of the development on the areas existing drainage conditions and to determine the improvements, if any, and the appropriate sizing for proposed improvements so that it may be incorporated with the construction of access drives for the project. The conclusions and recommendations presented in this report are based upon the M.R.D. site development plan; proposed access construction plans; on-site observations; and the available topographic information. The analysis was performed in accordance with the Larimer County "Storm Drainage Criteria Manual".

SITE DESCRIPTION

The site is generally rectangular in shape and is 77.6± acres in area. The sites East-West dimension is approximately 1,329 feet and its North-South dimension varies from approximately 2,583 feet at the westerly boundary to approximately 2,527 feet at the easterly boundary. The site is situated approximately one-half mile east of the Town of Berthoud and abuts the southerly right-of-way of Colorado Highway 56. The site is not located within a designated floodway.

EXISTING CONDITIONS

The site is presently comprised of four distinct uses. A contracting business, L & M Enterprises, Inc., is situated on the 5± acre tract located at the northeast corner of the site. This tract is identified as Lot 3 on the attached exhibits. The existing retail greenhouse and landscaping materials business, L & M Greenhouse, is located on the 7.5± acre tract located immediately west of the contracting business. The greenhouse and associated landscaping materials business is located on Lot 4. Lot 2 is the largest of the parcels and comprises approximately 62.7 acres. This tract is currently being used for agricultural purposes. It is expected to be developed into service related retail uses along the Highway frontage with single-family residential to be situated on the balance of the tract. No near term development of this tract is anticipated. Lot 1 is a single-family residential lot with the existing Bebo residence. Lot 1 contains approximately 2.3 acres.

The site does not receive runoff from any other properties. The irrigation ditch which forms the southerly boundaries of Lots 3 and 4 is situated along the crest of a ridge traversing the site from west to east. The natural slope away from this ridge crest is 1% to 1.5%. The direction of fall away from the crest is towards the south and the north. The portion of the properties located to the west of the site on the northerly side of the ditch drain toward the north and eventually into the curb and gutter section of Highway 56. The runoff flows easterly along the gutter until the curb and gutter ends at a point on the easterly boundary of Lot 1. The runoff is then carried easterly in a roadside drainage swale. The swale is discharged into a inlet that is situated over the outlet pipe from Bacon Lake. This ultimately discharges into the little Thompson River.

PROPOSED DEVELOPMENT

The proposed construction is to consist of a new access to serve the existing greenhouse and landscaping business located on Lot 4 as well as the future development that is anticipated for Lot 2. The access is to be a dedicated public street. The existing accesses serving Lot 1 and Lot 3 are to remain.

The drainage considerations made for the existing and proposed accesses are:

1.) Only the area situated to the north of the existing irrigation ditch has been considered.

2.) The existing useage and development on Lot 3 has been considered in order to determine the volume of detention and rate of release to conform with the existing access permit requirements.

3.) Additional consideration was made for the ultimate paving of the greenhouse parking lot located on Lot 4 in order to determine the volume of detention and rate of release.

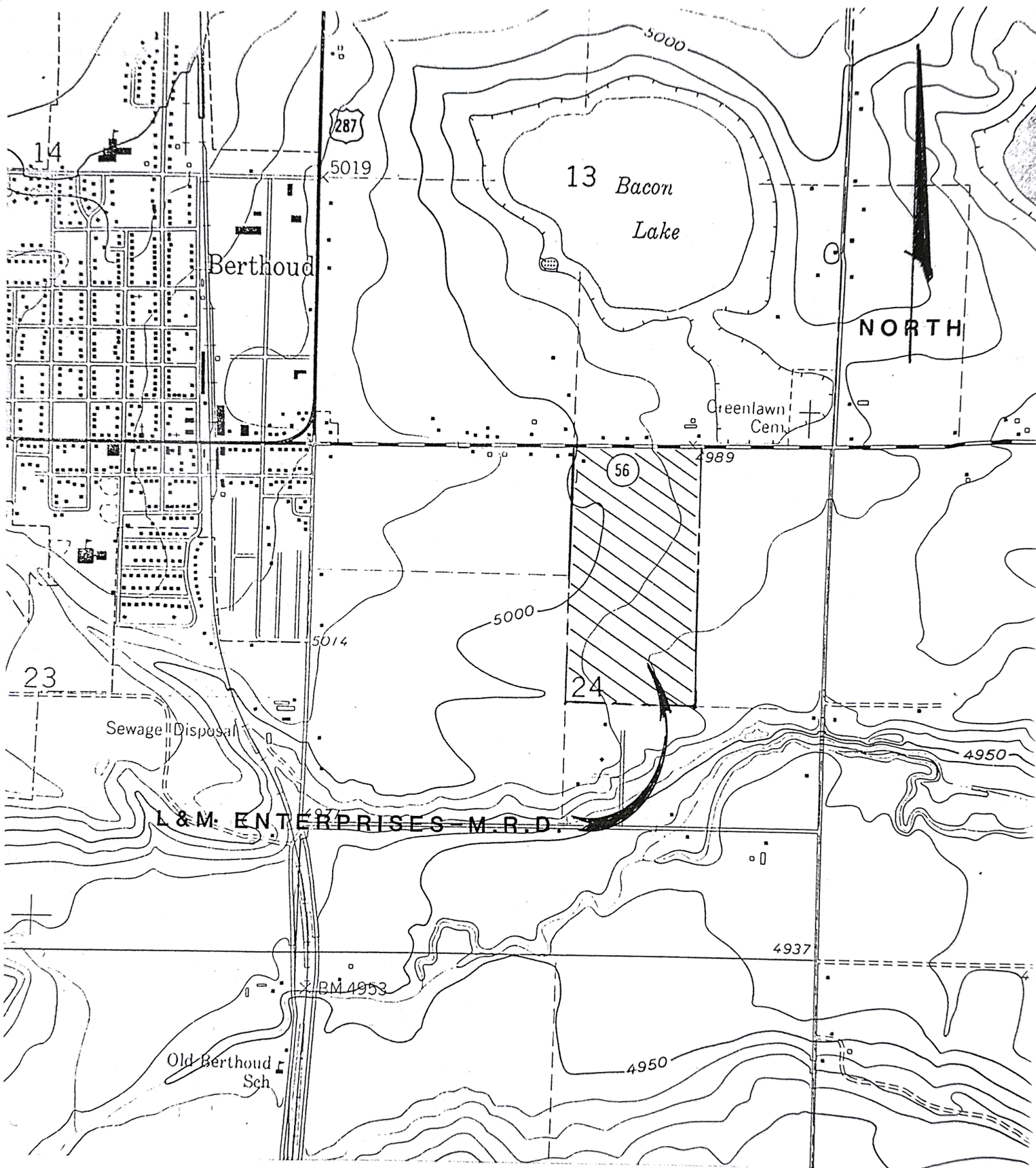
4.) No determination was made for the volume of detention and rate of release to be established on Lot 2. Due to the unknown nature of development that may occur on this lot, it is not possible to adequately project these requirements. The design and construction of these drainage improvements will be performed at the time that the property is considered for development.

CONCLUSIONS AND RECOMMENDATIONS

1. The construction as proposed will improve the existing drainage pattern to the benefit of the existing development in the vicinity.
2. Onsite detention of storm water is required by the Colorado State Department of Highways in order to discharge runoff from the site onto the existing Highway right-of-way.
3. All construction is recommended to be performed in accordance with the State of Colorado State Department of Highways-Standards and Specifications.
4. The site is not located within the designated floodway or flood plain.

VICINITY MAP

EXHIBIT "A"



VICINITY MAP

CALCULATIONS

EXHIBIT "B"

Calculations for Drainage Investigation for L & M Enterprises - M.R.D.

$$\begin{aligned}\text{Total Area} &= 77.6 \text{ acres} \pm \\ \text{Area Considered} &= 26.75 \text{ acres} \pm\end{aligned}$$

NOTE, only the area of the site that is situated north of the irrigation ditch traversing the site is considered to drain toward Highway 56.

Area "A" - located at the Northwest portion of the site that includes all of Lot 1 and all of Lot 2 that lies North of the irrigation ditch. No change from the existing conditions anticipated at this time.

$$\text{Area} = 15.3 \text{ acres} \pm$$

$$C_{10} = 0.20 \quad C_{100} = 0.35$$

$$T_c = 25 \text{ minutes} \pm$$

Rainfall Intensities:

$$I_{10} @ 25 \text{ min.} = 2.85 \text{ in./hr} \quad I_{100} @ 25 \text{ min.} = 4.6 \text{ in./hr.}$$

Runoff, Q = CIA

Therefore, the Estimated Drainage Flow from the site concentrating at Point "A"

$$Q_{10} = 8.7 \text{ c.f.s.}$$

$$Q_{100} = 24.6 \text{ c.f.s.}$$

Area "B" - includes existing greenhouse and approximately one-half of the L & M Enterprises building and surrounding concrete pavement.

$$\text{Area} = 5.25 \text{ acres} \pm$$

Area of Impervious Coverage (Building and Concrete Pavement) = 2.15 acres $\pm$

Therefore, Impervious Coverage = 41%

$$C_{10} = 0.26 \quad C_{100} = 0.40$$

$$T_c = 15 \text{ minutes}$$

Rainfall Intensities:

$$I_{10} @ 15 \text{ min.} = 3.65 \text{ in./hr} \quad I_{100} @ 15 \text{ min.} = 6.0 \text{ in./hr.}$$

Therefore, the Estimated Drainage Flow Concentrating at "B"

$$Q_{10} = 8.6 \text{ c.f.s.}$$

$$Q_{100} = 17.3 \text{ c.f.s.}$$

Area "C" - includes approximately one-half of the L & M Enterprises building and surrounding concrete pavement and the undeveloped portion to the South and West.

$$\text{Area} = 6.2 \text{ acres} \pm$$

Area of Impervious Coverage (Building and Concrete Pavement) = 1.4 acres $\pm$

Therefore, Impervious Coverage = 23%

$$C_{10} = 0.30 \quad C_{100} = 0.45$$

(Area "C" calculations cont.)

$$T_c = 20 \text{ minutes}$$

Rainfall Intensities:

$$I_{10} @ 20 \text{ min.} = 3.25 \text{ in./hr} \quad I_{100} @ 20 \text{ min.} = 5.2 \text{ in./hr.}$$

Therefore, the Estimated Drainage Flow Concentrating at "C"

$$Q_{10} = 6.05 \text{ c.f.s.}$$

$$Q_{100} = 14.5 \text{ c.f.s.}$$

Total Area draining to Northeast corner of site.

$$\text{Area} = 26.75 \text{ acres} \pm$$

Area of Impervious Coverage (Building and Concrete Pavement) = 3.55 acres $\pm$

Therefore, Impervious Coverage = 15%

$$C_{10} = 0.27 \quad C_{100} = 0.41$$

$$T_c = 30 \text{ minutes}$$

Rainfall Intensities:

$$I_{10} @ 30 \text{ min.} = 2.55 \text{ in./hr} \quad I_{100} @ 30 \text{ min.} = 4.2 \text{ in./hr.}$$

Therefore, the Estimated Drainage Flow Concentrating at the Northeast Corner

$$Q_{10} = 18.4 \text{ c.f.s.}$$

$$Q_{100} = 46.1 \text{ c.f.s.}$$

DETENTION SIZING

Onsite Detention is to be required by the Colorado State Department of Highways.

The Urban Drainage and Flood Control District's criteria has been used. This is an empirical formula method, where:

$$V = KA$$

$$K_{100} = (1.78 \times I - 0.002 \times I^2 - 3.56) / 1000$$

$$K_{10} = (0.95 \times I - 1.90) / 1000$$

I = Developed Basin imperviousness (%)

A = Basin Area (Acres)

V = Volume (Acre-Feet)

$$Q_{100} = 1.00 \times A$$

$$Q_{10} = 0.24 \times A$$

Q = Release Rate (Cubic-Feet-Per-Second)

Area "B"

Detention Sizing

$$I = 41\%$$

$$\text{Area} = 5.25 \text{ Acres}$$

$$K_{10} = (0.95 \times 41 - 1.90) / 1000 = 0.037$$

$$K_{100} = (1.78 \times 41 - 0.002 \times 41^2 - 3.56) / 1000 = 0.066$$

$$V_{10} = K_{10} A = 0.037 \times 5.25 = 0.195 \text{ Ac-Ft} = 8,473 \text{ cu. ft.}$$

$$V_{100} = K_{100} A = 0.066 \times 5.25 = 0.347 \text{ Ac-Ft} = 15,107 \text{ cu.ft.}$$

$$Q_{10} = 0.24 \times 5.25 = 1.26 \text{ c.f.s.}$$

$$Q_{100} = 1.00 \times 5.25 = 5.25 \text{ c.f.s.}$$

Outlet Sizing

$$\text{Weir Equation } Q = CLH^{3/2}$$

$$Q = \text{Discharge (c.f.s.)}$$

$$C = \text{Weir Coefficient}$$

$$L = \text{Length (feet)}$$

$$H = \text{Total Energy Head (feet)}$$

$$L = Q / CH^{3/2}$$

$$L_{10} = 1.26 / (2.85 \times 0.50^{3/2}) = 1.25 \text{ ft.} = 1 \text{ ft.} - 3 \text{ in.}$$

$$L_{100} = 5.25 / (2.85 \times 0.22^{3/2}) = 17.85 \text{ ft.} = 17 \text{ ft.} - 10\text{-}1/4 \text{ in.}$$

Area "C"

Detention Sizing

$$I = 23\%$$

$$\text{Area} = 6.2 \text{ Acres}$$

$$K_{10} = (0.95 \times 23 - 1.90) / 1000 = 0.02$$

$$K_{100} = (1.78 \times 23 - 0.002 \times 23^2 - 3.56) / 1000 = 0.04$$

$$V_{10} = K_{10} A = 0.02 \times 6.2 = 0.124 \text{ Ac-Ft} = 5,388 \text{ cu. ft.}$$

$$V_{100} = K_{100} A = 0.04 \times 6.2 = 0.225 \text{ Ac-Ft} = 9,809 \text{ cu.ft.}$$

$$Q_{10} = 0.24 \times 6.2 = 1.5 \text{ c.f.s.}$$

$$Q_{100} = 1.00 \times 6.2 = 6.2 \text{ c.f.s.}$$

Outlet Sizing

$$L = Q / CH^{3/2}$$

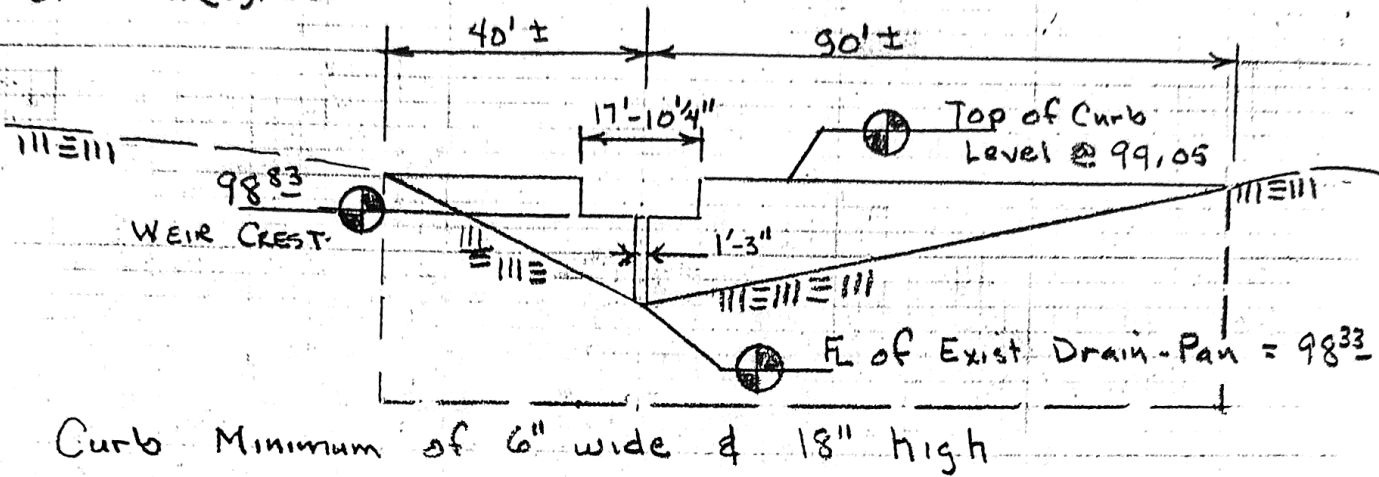
$$L_{10} = 1.5 / (2.85 \times 1.0^{3/2}) = 0.53 \text{ ft.} = 0 \text{ ft.} - 6\text{-}5/16 \text{ in.}$$

$$L_{100} = 6.2 / (2.85 \times 0.5^{3/2}) = 6.15 \text{ ft.} = 6 \text{ ft.} - 1\text{-}13/16 \text{ in.}$$

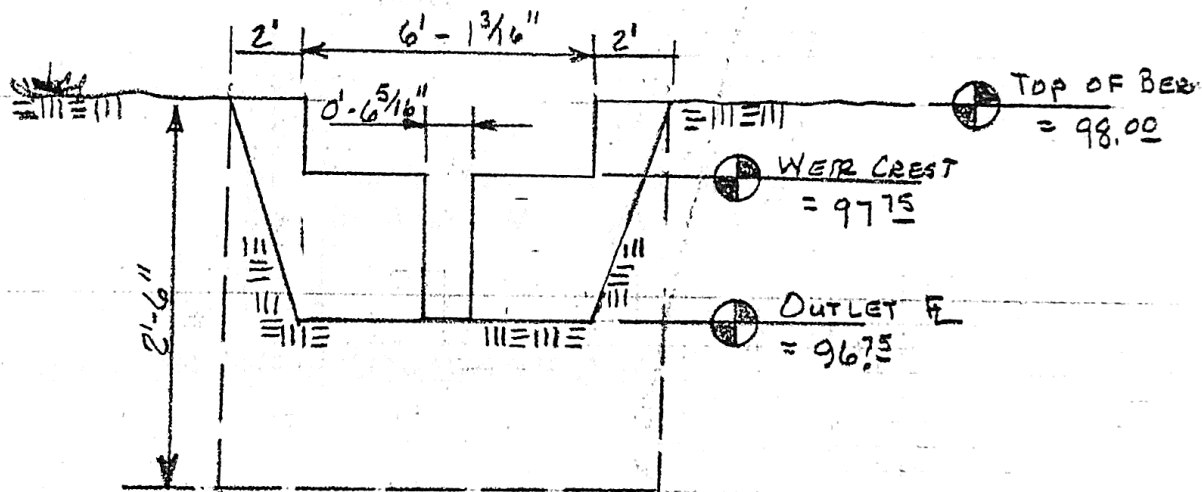
DRAINAGE DETAILS

EXHIBIT "C"

CURB @ Pt. "B" w/ OUTLET CONTROL
OPENING(S).



CONCRETE CONTROL STR. @ Pt. "C"



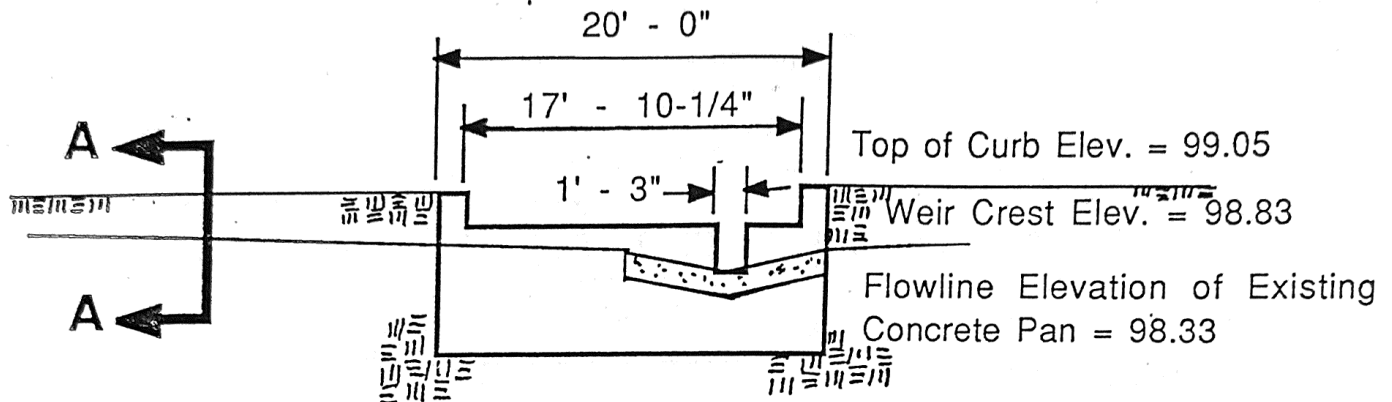
10-7-90
L&M

L&M ENTERPRISES
#HYD-017-89.

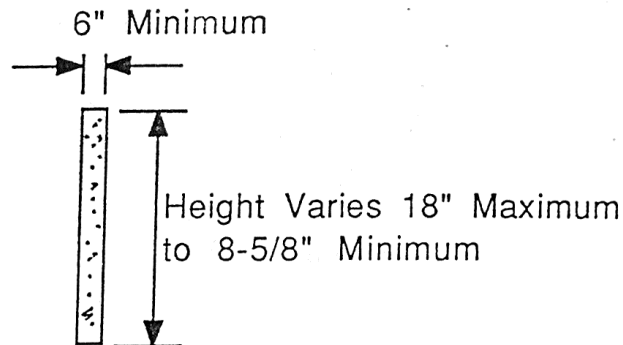
DRAINAGE DETAILS

DISCHARGE CONTROL OPENING @ DESIGN PT. "B"

Extend Top of Berm Level at Elev. 99.05 to Point of Match

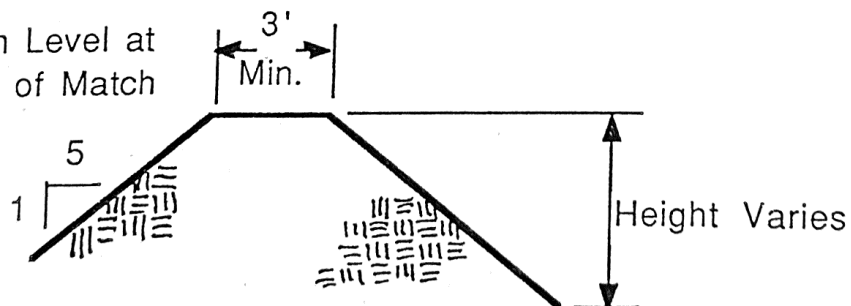


CONCRETE CURB / CONTROL OPENING



SECTION THRU CONCRETE CURB

Extend Top of Berm Level at Elev. 99.05 to Point of Match



SECTION A - A
(Earth Berm)

Note that berm may be widened and side slopes flattened to match existing conditions

Revised: Sept. 24, 1991
By: DRM

Diagram illustrating the cross-section of a weir structure. The structure is shown with a central opening and a concrete pan at the base. Key dimensions and elevations are provided:

- Top of Curb Elev. = 98.00
- Weir Crest Elev. = 97.75
- Flowline Elevation of Existing Concrete Pan = 96.75
- Dimensions (from left to right):
 - 9' - 0"
 - 6' - 1-3/16"
 - 0' - 6-5/16"

Section lines A-A are indicated on the left side of the diagram.

Diagram illustrating the cross-section of a weir structure. The structure is shown with a central opening and a concrete pan at the base. Key dimensions and elevations are provided:

- Top of Curb Elev. = 98.00
- Weir Crest Elev. = 97.75
- Flowline Elevation of Existing Concrete Pan = 96.75
- Dimensions (from left to right):
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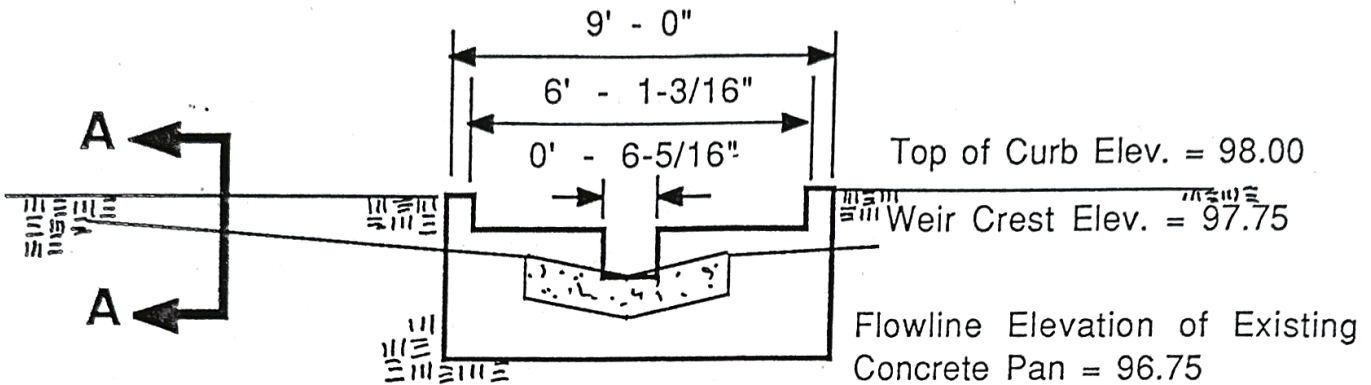


Diagram illustrating the cross-section of a weir structure. The structure is shown with a central opening and a concrete pan at the base. Key dimensions and elevations are provided:

- Top of Curb Elev. = 98.00
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 - 9' - 0"
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 - 0' - 6-5/16"

Section lines A-A are indicated on the left side of the diagram.

Diagram illustrating a road cross-section with a parabolic vertical curve. The diagram shows a horizontal line representing the 'Level at of Match' with a 3' horizontal distance marked. A vertical curve is shown with a 5' horizontal distance from the start to the peak. The height of the curve is labeled 'Height Varies'.

Charts and Figures

Town of Berthoud Engineering and Infrastructure Standards

1. Drainage designs for areas in and around the Town of Berthoud should use the depth-duration frequency information provided in the Precipitation-Frequency Atlas of the Western United States (Volume 2 - Colorado), published by NOAA. The NOAA Atlas can be accessed on the NOAA website.

Table 600-1, shall be used but may be superseded if more recent NOAA data is published for the Town. The table below is based on NOAA Atlas 14, Volume 8, Version 2 for Berthoud, Colorado.

Table 600- 1: Point Precipitation Frequency Estimates in Inches

Estimated Rainfall Depth in Inches									
	Average Return Interval (ARI)								
	(Years)								
Duration	1	2	5	10	25	50	100	200	500
5-minutes	0.233	0.277	0.37	0.469	0.635	0.787	0.961	1.16	1.45
10-minutes	0.341	0.405	0.542	0.686	0.93	1.15	1.41	1.7	2.13
15-minutes	0.416	0.494	0.661	0.837	1.13	1.41	1.72	2.07	2.6
30-minutes	0.553	0.658	0.881	1.12	1.51	1.87	2.28	2.74	3.44
60-minutes	0.684	0.811	1.08	1.38	1.87	2.32	2.84	3.44	4.32
2-hours	0.816	0.963	1.29	1.63	2.23	2.78	3.41	4.13	5.21
3-hours	0.899	1.06	1.41	1.79	2.44	3.04	3.73	4.52	5.71
6-hours	1.07	1.26	1.66	2.09	2.81	3.48	4.24	5.11	6.4
24-hours	1.56	1.84	2.37	2.88	3.68	4.37	5.14	5.98	7.2

C. The Rational Method

1. The Rational Method is one method for determining runoff from a proposed development or road construction project. Note that it should not be used for basins greater than 160 acres. The MHFD spreadsheets can also be used for basins that are no greater than 160 acres. Refer to the rainfall chapter of the MHFD USDCM for more information regarding the rainfall parameters required to use the Rational Method.

D. Larger Basin Rainfall Methods (Basins sizes 160 acres and greater)

1. As noted above, the Rational Method should not be used to determine runoff for basins larger than 160 acres. Where areas are larger than 160 acres that have drainage characteristics similar to an urban area, the Colorado Urban Hydrograph Procedure (CUHP) is an acceptable model for determining runoff amounts. The CUHP model can be used for basins from 0 to 3,000 acres. The parameter adjustments provided in the runoff chapter of the MHFD USDCM Manual (Volume 1) should be used when dealing with basins that are larger than 160 acres.
2. The CUHP model is not applicable in non-urban areas, including those areas in Larimer County that are outside of the Denver metropolitan area. The U.S. Army Corps of Engineers (USACE) HEC-HMS model is more applicable for mixed suburban-agricultural areas. The HEC-HMS model can be used on watersheds and drainage basins larger than 160 acres provided the modeling follows the parameters in the HEC- HMS User's Manual, the HEC-HMS Technical Reference Manual, the HEC-HMS Application's Guide.

D. Differences between the Town of Berthoud and the MHFD

1. The Town of Berthoud will allow the use of other modeling methodologies on a case-by-case basis when complete documentation of all assumptions is provided. The Town of Berthoud reserves the right to review alternative methods and compare with other commonly used approaches, including those discussed in the MHFD USDCM Manual.

Table 600- 2: Recommended Percentage Imperviousness Values

Land Use or Surface Characteristics	Percentage of Imperviousness
Business:	
Commercial Areas	95
Neighborhood Area	85
Residential Lots: (lot area only)	
Single-Family, 0.25 acres or less	45
Single-Family, 0.25 - 0.75 acres	30
Single Family, 0.75 acres or larger	20
Multi-Family (attached)	60
Multi-Family (detached)	75
Apartments	80
Industrial:	
Light Areas	80
Heavy Areas	90
Parks and Cemeteries	10
Playgrounds	25
Schools	55
Railroad Yard Areas	50
Undeveloped Areas	
Historic Flow Analysis	2
Greenbelts, Agricultural	2
Off-site flow analysis (when land use not defined)	45
Streets:	
Paved	100
Gravel (packed)	40
Drive and Walks	90
Roofs	90
Lawns, sandy soil	2
Lawns, clayey soil	2

602.4 Roadway and Street Drainage

A. General Criteria

1. When runoff in the street exceeds allowable limits, a storm sewer system or open channel is required to convey the excess flows.
2. Design Criteria Based on Frequency and Magnitude: The design criteria for the collection and conveyance of storm water runoff on public streets are based on an allowable frequency and magnitude of traffic interference. The primary design objective shall be to keep the depth and spread (encroachment) of stormwater on the street below an acceptable value for a given storm event.

Harvest 47 Preliminary Plat Submittal

Comments and responses

March 13, 2023

Planning, Community Development Department:

1. Charles; A monument sign is indicated on the plans, but not identified where it will go.

The proposed sign is a part of the subdivision identification requirements for the project. It is planned to be installed on Lot #1 adjacent to the entrance to the subdivision off Dorothy Dr. The final location will be included in the construction plans for the development.

Baseline Engineering:

1. Lancaster; Berthoud, Colorado - Code of Ordinances Chapter 30 - BERTHOUD DEVELOPMENT CODE SECTION 6 - SUBDIVISION REGULATIONS 30-6-107 - Preliminary plat, B, 2, c. Requires that a title commitment must be current and dated no more than 30 days from the date of preliminary plat application submittal. No commitment was provided with this submittal.

A current title commitment was provided along with the original submittal of the preliminary plat documents (dated 12/15/2022). A new and current title commitment will be provided at the time of approval by the Town Board.

2. Nemmers; Discuss the proposed storm sewer conveyance as it will need to convey the 100 yr to the pond.
3. Nemmers; In final design be sure to size the inlets to capture the 100-year storm and the pipes to convey it to the pond.

The preliminary drainage documents provided as apart of the preliminary plat submittal included the comments" Basin C will be detained in the proposed detention pond and will be released to The Farmstead storm system at a 100-year flow of roughly 6 cfs." And "Storm drainage pipes will be utilized to convey runoff from the subject site to the proposed detention pond. The pipes will be sized to convey the 100-year event."

The preliminary layout of the storm drainage system and connection to the Farmstead were done with this in mind. The final construction plans for the storm water system will be designed to convey the required 100 yr event.

4. Nemmers; (In reference to the North alley) Is this proposed to be curb and gutter here?

The North alley is being planned to utilize a center drainage alignment consistent with Figure 7-9L alley option (a) (drainage to center) in the current adopted Lcuass standards.

5. Iseeber; Is this MH needed? Frontage of lot2.

Final details will be adjusted as required with submittal of construction drawings.

6. Iseeber; Question on the location of the water tap for block 2, lot1;

The tap was shown off Ramuda Road to eliminate another road cut on Dorothy dr. Final details will be adjusted as required with submittal of construction drawings.

7. Iseeber; Pond top of bank note.

Final details of the detention pond will be a part of the construction documents.



Planning Commission Meeting March 23, 2023



Planning Commission Meeting March 23, 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

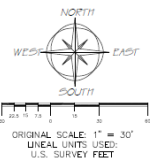
- The Trustees/Commissioners confer and have an opportunity to ask the applicant or staff questions that arose during the public hearing period or questions of their own.
- A motion must be made on an item, and if a motion is seconded, a vote is called; a majority must be found for any issue to pass (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.



Harvest 47



PROJECT:	Harvest 47
APPLICANT:	Larry Bebbo
LOCATION:	Near the intersection of Dorothy Drive and Remuda Road.
CURRENT ZONING:	UR
SIZE:	5.98 acres
APPLICANT'S REQUEST:	Preliminary Plat



HARVEST 47 SUBDIVISION

BEING A SUBDIVISION OF LOT 2, O'MALLEY GLEN MINOR SUBDIVISION, SITUATE IN THE NORTHWEST QUARTER OF 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.

DE CONVO LOT 3, AMENDED PLAT NO. 5-75-87
BEBO M.R.D. NO. 5-75-87

DE CONVO LOT 3, AMENDED PLAT NO. 5-75-87
BEBO M.R.D. NO. 5-75-87

DE CONVO LOT 3, AMENDED PLAT NO. 5-75-87
BEBO M.R.D. NO. 5-75-87



BLOCK 1, THE FARMSTEAD

REMUDA ROAD
10' RIGHT-OF-WAY WITH
10' RIGHT-OF-WAY

LOT 1

LOT 2

LOT 3

LOT 4

LOT 5

According to Colorado law, no person can prepare any land survey without first obtaining a license from the State of Colorado. The State of Colorado has the authority to regulate the practice of land surveying. The survey is considered valid only if it is made by a person who is a duly licensed land surveyor under the laws of the State of Colorado.

DOROTHY DRIVE
10' RIGHT-OF-WAY WITH
10' RIGHT-OF-WAY

OUTLET A

10' HALF ALLEY

10' HALF ALLEY

BLOCK ONE
LOT 1
4,410 S.F.

BLOCK TWO
LOT 1
4,410 S.F.

LOT 3
4,411 S.F.

LOT 5
4,410 S.F.

LOT 1, O'MALLEY GLEN MINOR SUBDIVISION

BLOCK ONE
LOT 2
4,412 S.F.

LOT 3
4,412 S.F.

LOT 4
4,411 S.F.

LOT 5
4,411 S.F.

LOT 6
4,411 S.F.

LOT 7
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LOT 8
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LOT 9
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LOT 10
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LOT 11
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BLOCK ONE
LOT 12
4,412 S.F.

LOT 13
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LOT 20
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LOT 21
4,411 S.F.

TRACT 2, THE FARMSTEAD

LINE	TYPE	LENGTH	BEARING	AREA
1	1/4	14.00	N 89° 50' 08" E	196.00
2	1/4	14.00	N 89° 50' 08" E	196.00
3	1/4	14.00	N 89° 50' 08" E	196.00
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Comprehensive Plan & PORT Plan



2-9 Housing Needs

- A range of housing for older adults/seniors
- Smaller homes (1,200 square feet or less)

3-1 Key Strategies

- Provide a mix of housing, goods and services that meet the varying needs, budgets, and life stages of residents.

PORT Plan

- This plan features detached sidewalks behind tree lawns, connecting to existing sidewalk/trail networks.

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

Preliminary Plat Recommendation



Findings and Recommendations

PRELIMINARY PLAT

- Staff recommends that Planning Commission find the application meets the intent of the Master Plans affecting the project, the Comprehensive Plan and Future Land Use Map, and the Land Use Code.
- Two suggested motions are below:
 - Approval: I move to approve the Harvest 47 Preliminary Plat and ask staff to forward our recommendation of approval to the Town Board of Trustees, subject to the following condition.
 - The applicant shall revise drawings to meet final outstanding staff comments.
 - Denial: I move to deny the Harvest 47 Preliminary Plat for the following reasons

_____ and ask staff to forward our recommendation of denial to the Town Board of Trustees.



Planning Commission Meeting March 23, 2023

