

ITEM: PUD-000557-2025 – Louisville Mill Site Redevelopment PUD
1st Amendment and SRU-000558-2025 – Louisville Mill Site
Redevelopment SRU to Allow an Outdoor Eating and
Drinking Establishment and Mobile Food Court

STAFF: Rob Zuccaro, AICP, Community Development Director

REQUEST: Approval of Resolution 18, Series 2025 Recommending to
the City Council approval of the Louisville Mill Site
Redevelopment PUD, 1st Amendment and an SRU for an
Outdoor Eating and Drinking Establishment and Mobile Food
Court

VICINITY MAP:



SUMMARY:

The applicants, Louisville Mill Site LLC, 544CR LLC, and RCC LLC, request approval of an amendment to the Louisville Mill Site Redevelopment Planned Unit Development (PUD) for redevelopment and renovation of the historic Louisville Grain Elevator building. The proposal includes use of the property as an Eating and Drinking Establishment and a Special Review Use (SRU) to allow an Outdoor Eating and Drinking Establishment and a Mobile Food Court. The majority of the development would take place on Lot 2 and Outlot A of the Louisville Mill Site Subdivision, with limited development for parking, drive aisles, and drainage infrastructure occurring on

Lot 1 and Lot 3 and in the BNSF right of way. See Attachment No. 2 for application materials and supporting documentation.

BACKGROUND:

The City purchased the Louisville Grain Elevator property in 2012 for \$950,000 using Historic Preservation Funds (HPF) in order to avoid the demolition of the historic building. The Grain Elevator represents a unique part of Louisville's agricultural history, is among few remaining historic grain elevators, and has been considered a high value property for local historic preservation. The City's acquisition included the Grain Elevator property and the adjoining commercial property at 544 Front Street (previously a NAPA auto parts store and currently houses E-Bike of Colorado).

The City then published a request for proposals (RFP) for a public-private partnership to redevelop the properties, which included the restoration and activation of the Grain Elevator property for commercial use. The City initially entered into an agreement with a redevelopment company (Olde Town Group) for restoration of the Grain Elevator property and approved up to \$2.1M in HPF grants to assist with development costs.

Issues arose around property boundaries and a building encroachment onto the adjoining property to the south (500 Front Street). Due to a lack of resolution around these issues, the project with Olde Town Group was dropped, and instead the City entered into an agreement with a different entity, Louisville Mill Site, LLC. This new development partnership included the owner of 500 Front Street and facilitated resolution of the outstanding encroachment and property boundary issues.

The agreement with Louisville Mill Site, LLC included selling the property for a discounted price of \$200,000, a grant from the HPF for \$500,000 for initial stabilization work on the Grain Elevator, waiver of public land dedication fees or requirements, and rebates on application fees associated with the redevelopment of the property. The initial stabilization work was completed in 2016 and the property transferred to Louisville Mill Site, LLC.

In 2015, the City approved the following applications related to the Grain Elevator property:

- Designation of the Grain Elevator building as a local landmark, establishment of a conservation easement for the building, and approval of a historic preservation "Alternation Certificate" for the restoration work on the building and to allow a small building addition on the east side of the Grain Elevator.
- The Louisville Mill Site Subdivision, establishing three lots and an outlot in front of the Grain Elevator (see Attachment No. 3). Lot 1 encompassed the existing commercial building on the south side of the development, Lot 2 encompassed the Grain Elevator, and Lot 3 encompassed the existing commercial building on the north side of the development. Outlot A is located in front of the Grain Elevator. Outlot A and portions of Lots 2 and 3 include a conservation easement (Note No. 8 on plat) that provides "No Build Areas" limiting development in order to preserve public view corridors to the Grain Elevator building.

- The Louisville Mill Site Redevelopment PUD/SRU, which approved the demolition of the NAPA building (Lot 3) to be replaced by a new 19,000 sq. ft. three-story commercial building, a three-story addition to the existing commercial building on Lot 3, a small building addition on the east side the Grain Elevator (Lot 2), and an outdoor gathering area on Outlot A with an alternative plan for development as a parking lot (see Attachment No. 4). The development plans also included use of a leased area from BNSF for additional parking in the BNSF right of way on the east side of the development. The SRU authorized an “outdoor activity area” on Outlot A and Lot 2 to include food and beverage service. The PUD and SRU approvals have since expired.

Figure 1: Current Louisville Mill Site Subdivision with No Build Area Highlighted

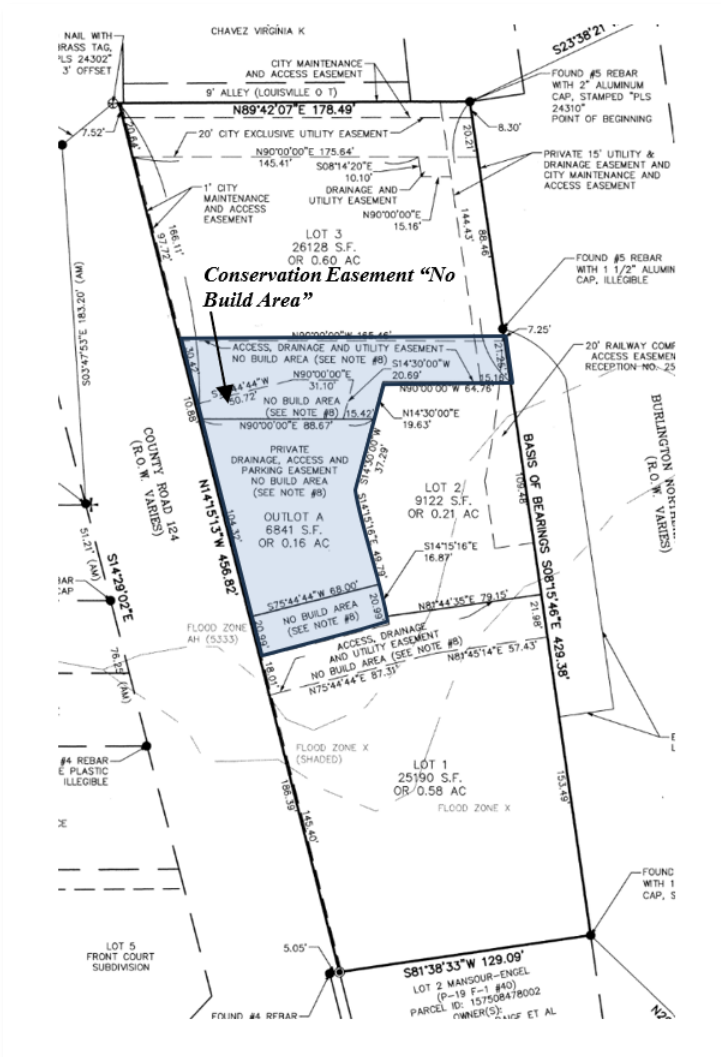


Figure 2: Current Louisville Mill Site Redevelopment PUD Site Plan

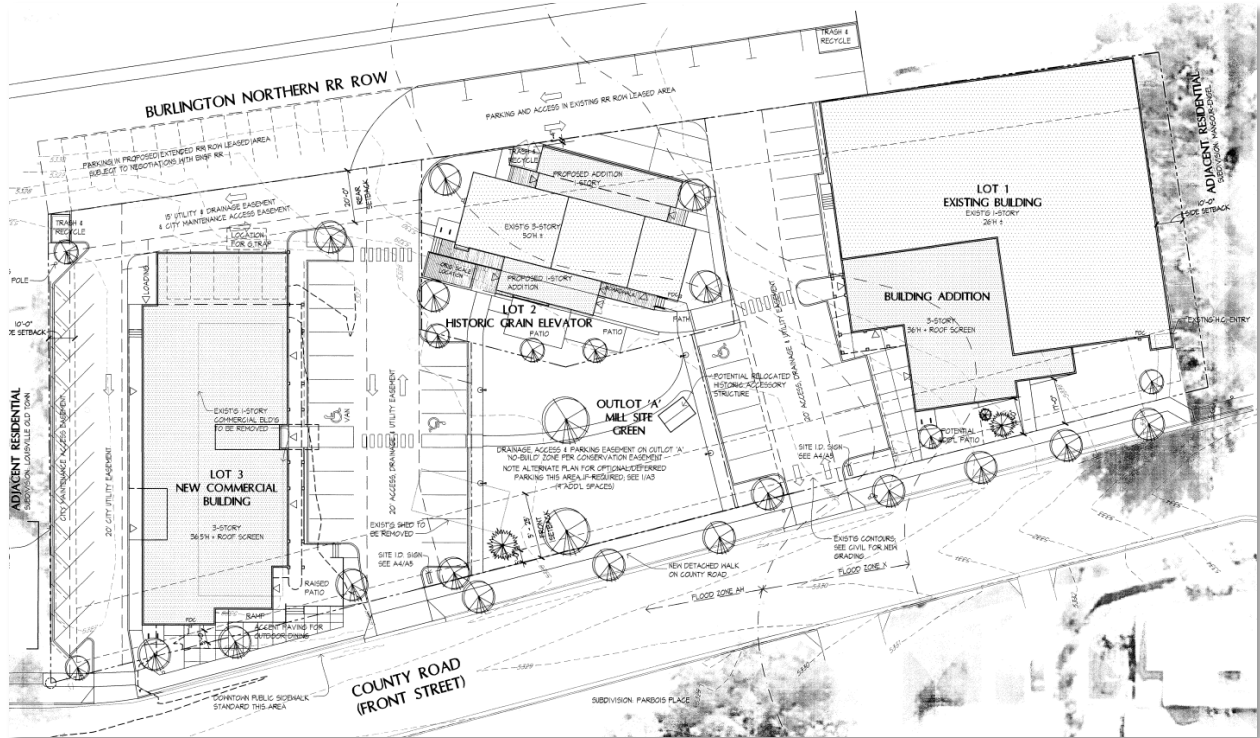
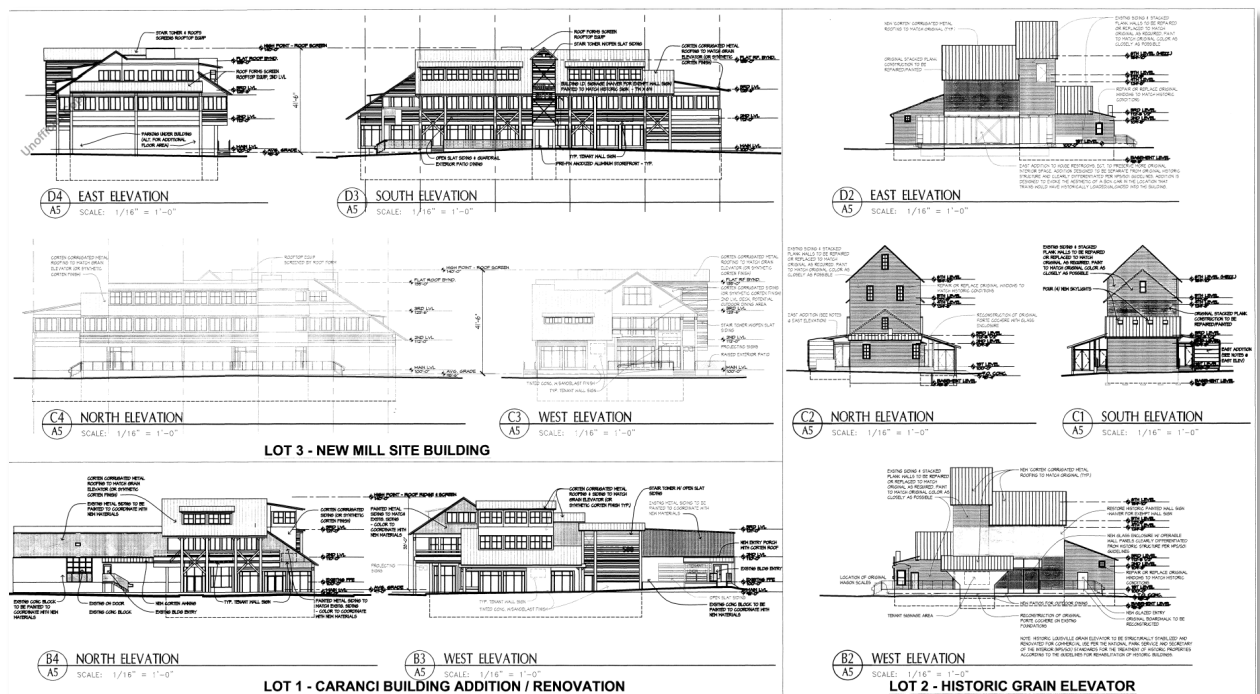


Figure 3: Current Louisville Mill Site Redevelopment PUD Building



To date, the City and the City's Urban Renewal Authority have provided \$1,470,439 in assistance for the redevelopment of the property. The applicants currently have an additional HPF grant request for \$1,476,557 that is under review and the City is anticipating additional urban renewal grant funding and tax increment financing requests.

Table 1: Prior City Financial Contributions

Sale of Property*	\$750,000
HPF Stabilization Grant	\$500,000
Urban Renewal Public Streetscape Improvements**	\$163,526
Public Land Dedication Waiver	\$48,927
Fee Waivers	\$7,986
TOTAL	\$1,470,439

* \$950,000 acquisition cost minus \$200,000 sale price

** Required Infrastructure by Subdivision Improvement Agreement

PROPOSAL:

The current proposal focuses on the development of Lot 2 and Outlot A to complete restoration of the Grain Elevator building and leasing the space to The Grain Yard, LLC, which intends to occupy the space as a bar, gathering space, and Mobile Food Court. The plans include restoring the porte cochere and boardwalk on the front side of the building, including a historic wagon scale, and a small "boxcar" building addition on the rear of the Grain Elevator. The outdoor gathering area would be fenced and include, food truck pads, outdoor seating, a relocated historic accessory structure used as a tap house, and a small stage in the southwest corner of the lot.

The proposal includes improved drive aisles and parking on the north and south sides of the Grain Elevator property in parts of Lot 1 and Lot 3, and parking in the BNSF right of way on the east side of the property. There would be 24 parking spaces developed as part of the site improvements. The applicants have submitted a shared parking agreement and a Common Area Use, Maintenance, and Management Agreement covering access, drainage and utilities covering all properties within the subdivision and the BNSF lease area.

Drainage improvements would be installed for this first phase of development that could be expanded with additional development on Lot 1 and Lot 3.

Figure 4: Birdseye Rendering of Proposal



Figure 5: Proposed Site Plan

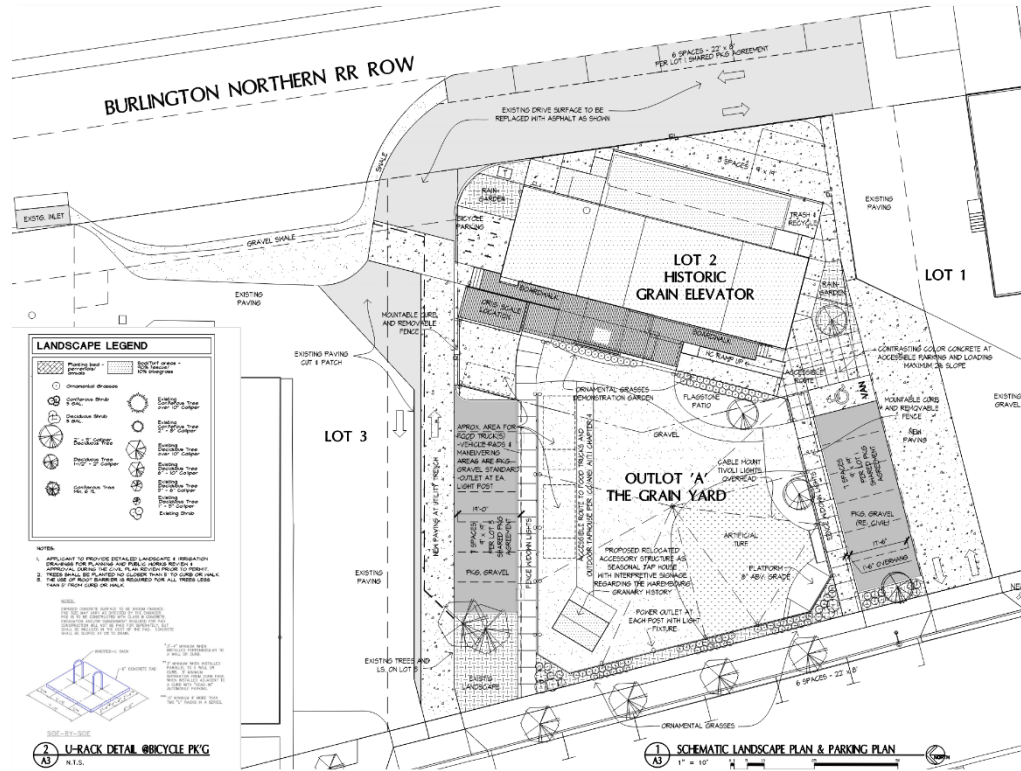
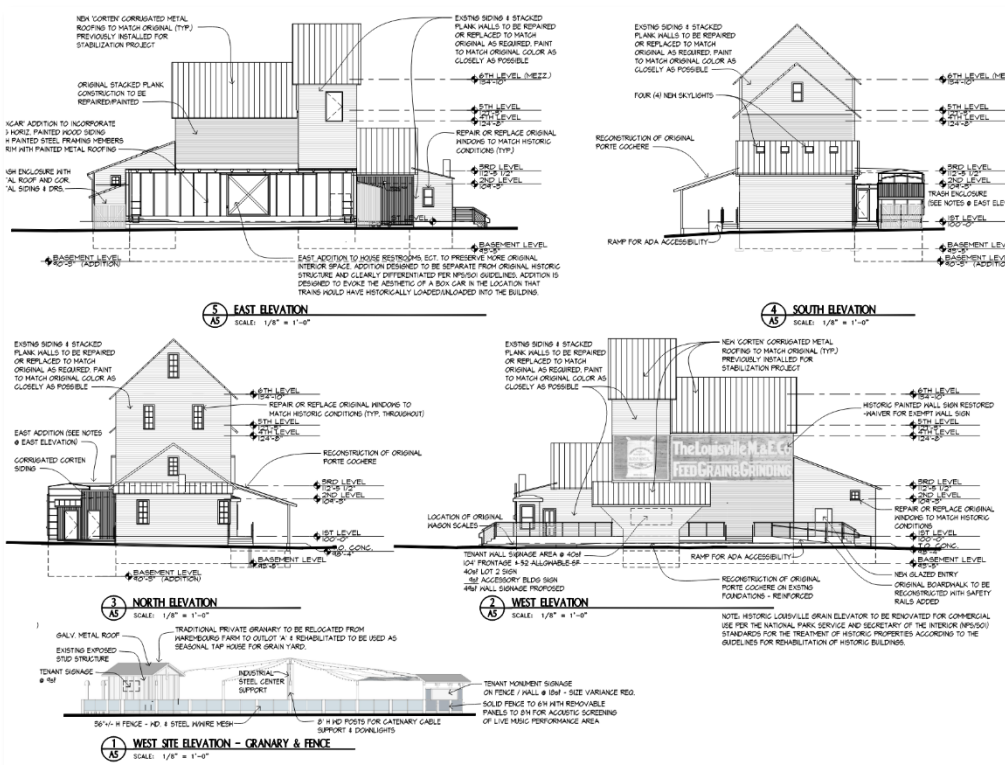


Figure 6: Proposed Grain Elevator and Outdoor Gather Space Elevations



The SRU proposal includes requests for approval of an Outdoor Eating and Drinking Establishment and a Mobile Food Court in part of Lot 2 and in Outlot A. There are three food truck pads proposed on the north side of the outdoor activity area. The lighting plan includes outdoor string lighting, building mounted lighting for the boardwalk and tap house building, stage lighting, and pedestrian level pole-mounted lighting along the fencing. The plans note the following restrictions:

- Use of the outdoor areas would be limited to 8am and midnight seven days a week, and outdoor amplified music limited to 9pm Sunday through Thursday and 10pm on Friday and Saturday.
- Outdoor decorative lights and stage lighting would be turned off after business hours.
- Temporary structures, such as tents, would be allowed but limited to 60 days total in any 6-month period. Temporary shade features and table umbrellas would be exempt.
- Each of the Food Truck vendor pads would be equipped with electrical connections so that the use of electrical generators are not needed.

ANALYSIS:

The project is located within the Commercial Core Transition Area of Downtown and the property is zoned Commercial Business (CB). Staff analysis includes review of the following standards applicable to the development:

- [Design Handbook for Downtown Louisville](#)
- [Parking Standards Designated for Downtown Louisville \(LMC Sec. 17.20.025\)](#)
- Waiver Requests to CB Zoning Standards
- Compliance with the No-Build Area and view corridor conservation easement restrictions established through the Louisville Mill Site Subdivision
- [Special Review Use Criteria \(LMC Chapter 17.40\)](#) and [Mobile Food Court Criteria \(LMC Sec. 17.16.310.D\)](#)
- [Planned Unit Development Criteria \(LMC Sec. 17.28.120\)](#) (Staff analysis provided in Appendix)

Design Handbook for Downtown Louisville

Staff have highlighted the following policies that are applicable to the project, along with staff's analysis in italics. Staff finds that the project is consistent with applicable standards and guidelines outlined in the Design Handbook. Please reference pg. 4 of the Design Handbook for further discussion on how the policies are structured as either mandatory or only encouraged. Policies are broken out by categories of General Standards and Guidelines (“G”) applicable to all areas of Downtown, Transition Area Standards and Guidelines (“T”), and Historic Standards and Guidelines (“H”). Not all policies need to be met for approval or support of a project, but all projects should seek to meet all applicable policies when appropriate.

G1. All projects should respect the traditional context of downtown.

- 1) In all cases, consideration should be given to the broader context of the block and the town at large.
- 2) If historic resources exist on the property, then the Design Standards and Guidelines for Historic Buildings also shall apply.

The Grain Elevator is not immediately adjacent to other historic buildings and is unique in its context and location near the railroad tracks, where it was used for loading agricultural products into rail cars for transport. The surrounding development includes new and historic residences and commercial buildings.

G10. Minimize the visual impacts of site and architectural lighting.

- 1) Prevent glare onto adjacent properties by using shielded and focused light sources that direct light onto the ground.
- 2) Un-shielded, high intensity light sources and those which direct light upward will not be permitted.
- 3) Shield lighting associated with service areas, parking lots and parking structures.
- 4) Avoid placing lights in highly visible locations, such as on the upper walls of buildings.

All lighting is full cut off to minimize glare except the string lights used for the outdoor gathering area and stage lighting. The proposal includes limiting the times when these lights could be turned on to business hours. The plans also include a photometric analysis demonstrating minimal light spill outside of the project boundary.

G11. Provide site lighting that encourages pedestrian activity at night.

- 1) Site lighting should be at a pedestrian scale and help define different functional areas of the property.

The development includes lighting in the outdoor areas so that the areas are well lit but not excessively lit according to the photometric plans submitted. The lighting is meant to support the outdoor activity areas and are mounted on poles around the fenced area and include decorative string lights. There is additional lighting for the tap house accessory building, the stage and the boardwalk.

G13. Where appropriate, design a parking area to be accessed from an alley rather than the street.

- 1) In a residential context, the use of a detached garage, located along the alley, is especially encouraged.

The project does include alley access to parking, but primary access will be from Front Street.

G14. Screen a parking lot from view from the street.

- 1) Provide buffers between the edge of a parking lot and sidewalk.
- 2) Use planted areas, decorative paving, fences, hedges and decorative walls.

- 3) The landscape should be at least 5 feet in width.

The new parking areas on the north and side sides of the Grain Elevator property and The plans include minimum 5' landscape buffers between the sidewalk and the parking area.

G15. Locate parking such that it will be subordinate to other site features.

- 1) An on-site parking area should be located inside or behind a building, where its visual impacts will be minimized.
- 2) Minimize the surface area of paving and consider using less impervious material. Options to consider are modular pavers in the Core Area and "grasscrete" in the Transition Areas.

Due to the existing location of the Grain Elevator building there is limited opportunity to provide parking behind the building. The plans included some parking behind the building in an area leased from BNSF. The new parking areas on the north and side sides of the Grain Elevator property and Outlot A are compact gravel rather than pavement, providing less impervious materials.

G17. Minimize the visual impacts of trash storage areas.

- 1) Trash enclosures should be constructed with similar materials as those of the primary structure.
- 2) Locate a service area along the rear of a site, accessed by an alley, when feasible.
- 3) Trash areas, including large waste containers (dumpsters) should also be screened from view of major pedestrian routes, using a fence or hedge. For a larger storage facility, consider using a shed to enclose it.
- 4) Combine service areas with other properties, when feasible.

A fenced and covered trash enclosure is located on the east side of the building south of the proposed "box car" building addition and includes metal doors and fencing that will be architecturally incorporated into the building.

G20. New construction should appear similar in mass and scale to structures found traditionally in the area.

The Grain Elevator building is unique in its mass and scale for the area and will be maintained. Restoration of the porte cochere and boardwalk on the front of the building will closely resemble the historic design of the structure. The "boxcar" addition on the east side of the building will be largely screened from view from Front Street.

T1. Maintain the general alignment of building fronts.

- 1) Front yard setbacks range from 5 to 25 feet. This range of setbacks should be maintained in new construction.
- 2) Where similar front setbacks are characteristic, maintain the alignment of building facades.

- 3) New construction should be set back to match the general alignment of buildings on the street and to maintain the traditional front yard.
- 4) Landscaping and fences that help define the yard's front edge are encouraged.

The Grain Elevator building is situated in its traditional location at the rear of the development adjacent to the railroad tracks. The proposed outdoor activity area includes a historic one-story outbuilding to be relocated to the property that is located near Front Street, complimenting the residential context of the properties on the west side of Front Street. The proposed stage, fencing, and outdoor gathering areas will help define the front edge of the development.

H1. Respect the original design character of the building.

- 1) Analyze the building to determine which elements are essential to its character.
- 2) Don't try to make it appear older (or younger) in style than it really is. Instead, the genuine heritage of downtown *should be expressed*.

The existing Grain Elevator would be rehabilitated and the plans include restoring the front porte cochere and boardwalk back to the historic form.

H3. Preserve an historic structure in its original location on the site when feasible.

- 1) This includes orientation, setbacks, building height and the relationship of the first floor to finish grade.
- 2) Existing historic landscape features, such as fences, sidewalks and mature vegetation, should be preserved, and should be protected during construction.

The Grain Elevator would be maintained in its historic location and maintain its historic building height.

H4. Avoid removing or altering any historic material or significant architectural features.

- 1) Original materials and details that contribute to the historic significance of the structure are qualities that should be preserved whenever feasible.
- 2) Rehabilitation work should not destroy the distinguishing character of the property or its environment.
- 3) Retain and preserve original wall and siding material.

The restoration and rehabilitation plans include preserving the majority of original materials when feasible.

H5. Avoid adding materials, elements or details which were not part of the original building.

- 1) For example, details such as decorative millwork or shingles should not be added to buildings if they were not an original feature of that structure.

The restoration and rehabilitation plans include preserving the majority of original materials when feasible and restoration work on the front porte cochere and boardwalk

similar to the original structure.

H6. Maintain existing significant stylistic elements.

- 1) The best preservation procedure is to maintain historic features from the outset so that intervention is not required. Employ treatments such as rust removal, caulking, limited paint removal and reapplication of paint.
- 2) Protect historic material with maintenance treatments such as rust removal, caulking and re-painting.
- 3) Repair only those features that are deteriorated. Finally, replace only those features that are beyond repair.
- 4) Patch, piece-in, splice, consolidate or otherwise upgrade the existing material, using recognized preservation methods whenever possible.

The restoration and rehabilitation plans include preserving the majority of original materials when feasible and restoration work on the front porte cochere and boardwalk similar to the original structure.

H7. Replace only missing portions of original elements when necessary.

- 1) Don't throw out an entire window frame, for example, if only the sill is rotted.
- 2) Match the original material when patching with new material.

The plans included restoring the front porte cochere and boardwalk back to the historic form using appropriate materials to match historic architecture and form.

H10. Replace missing original features in kind when feasible.

- 1) Use the same kind of material as the original when feasible. A substitute material may be acceptable if the form and design of the substitute itself conveys the visual appearance of the original material.
- 2) Replacement of missing architectural elements should be based on accurate duplications of original features. In some cases, an entire detail must be reconstructed. In the event replacement is necessary, the new material should match the original in design, color, texture and other visual qualities.
- 3) Where reconstruction of an element is impossible because of a lack of historical evidence, then a new design that relates to the building in general size, scale and material may be considered.

The plans included restoring the front porte cochere and boardwalk back to the historic form using appropriate materials to match historic architecture and form.

H12. Preserve original siding when feasible.

- 1) Avoid removing siding that is in good condition or that can be repaired in place.
- 2) If portions of wood siding must be replaced, be sure to match the style and lap dimensions of the original.
- 3) Maintain protective coatings of paint. If the building was painted historically, it should remain painted, including all trim.

The restoration and rehabilitation plans include preserving the majority of original materials when feasible.

H16. Design an addition to be as inconspicuous as possible.

- 1) An addition should be visually subordinate to the main building.
- 2) Set an addition back from the primary facade in order to allow the original proportions, form and overall character of the main building to remain prominent.
- 3) Consider setting an addition back from the sides of buildings, as well.
- 4) Additions to buildings in visible locations, such as corners, require greater sensitivity.

The “box car” addition is located behind the main façade of the Grain Elevator and would be visually subordinate to the main building.

Parking Standards Designated for Downtown Louisville

The zoning code establishes off-street parking standards specific to Downtown Louisville recognizing the unique urban design of the Downtown area. This includes a focus on Downtown Louisville having a traditional street grid network with alleys, and public parking and shared street parking that fosters pedestrian friendly development with a focus on an active streetscape. This differs significantly from suburban-type development patterns that have a higher demand for vehicular parking and incorporate all parking within the development parcel.

The Downtown Louisville parking standards also promote new development and redevelopment by exempting the first 999 sq. ft. of new floor area from meeting minimum parking standards and exempts areas such as uninhabitable areas below grade, restrooms, food prep and service areas, and circulation areas such as hallways and stairwells. Any additional building area beyond the first 999 sq. ft. must provide parking at a ratio of 1 new space for each 500 sq. ft. of additional new development, rounded to the nearest 500 sq. ft.

The proposed development includes 2,937 sq. ft. of new development area with 2,915 sq. ft. of that area falling under the exemptions. Therefore, under the parking requirements for Downtown Louisville, no additional off-street parking is required for the project. However, the proposal will have a significant outdoor activity area that will add to the parking demand, and additional parking can be required through the SRU review process, which is discussed further below. The project provides 24 additional off-street parking spaces and has a shared parking agreement with the two adjoining commercial properties. Additionally, on-street parking is available adjacent to the property and the public parking lots located south of Lucky Pie and Sweet Cow are near the site. The proposal also includes 8 bicycle parking racks on the north side of the building. Staff finds that the proposed parking plan provides sufficient parking to meet the standards for Downtown Louisville and adequately addresses additional parking demand.

Waiver Criteria

The applicant is requesting the following waivers from the CB zoning standards:

- 8' front setback for the accessory building in the outdoor gathering area where a 30' front setback is required.
- 9'-4" side setback on the south side for the existing Grain Elevator building where a 10' side setback is required.
- 1'-4" rear setback for the proposed "box car" addition where 20' is required.
- 44% lot coverage on Lot 2 where a 40% maximum is required.

LMC Sec. 17.28.110 states that waivers may be granted through a PUD approval process "if the spirit and intent of the development plan criteria contained in section 17.28.120 are met and the city council finds that the development plan contains areas allocated for usable open space in common park area in excess of public use dedication requirements or that the modification or waiver is warranted by the design and amenities incorporated in the development plan, and the needs of residents for usable or functional open space and buffer areas can be met."

Staff finds that the waivers are warranted by the design and amenities incorporated in the development plan and that usable and functional open spaces are provided in the outdoor activity area. The setback waivers associated with the Grain Elevator building accommodate the preservation of the historic structure and facilitate an appropriate design of the "box car" addition behind and subordinate to the historic structure. The front yard setback for the accessory building in Outlot A is appropriate considering the design of the Mobile Food Court and outdoor activity area layout. The lot coverage is well below the 40% standard when considering the Lot 2 and Outlot A areas combined.

No-Build Area and View Corridor Conservation Easement

The No-Build Area and conservation easement established through the Louisville Mill Site Subdivision is intended to preserve view corridors to the Grain Elevator for historic preservation purposes. The No-Build Area generally prohibits buildings and other improvements within the area. However, the conservation easement allows consideration of some development in the No-Build Area if authorized through a resolution approved by City Council. Considering the stated intent of the conservation easement, staff finds that limited development within the No-Build Area could be appropriate if such development does not materially impact the public view corridors to the Grain Elevator. The proposed use of the No-Build Area includes parking areas, the Mobile Food Court and associated development such as the accessory building, fencing, a stage, and decorative lighting. These improvements will help facilitate redevelopment and activation of the property and will have a minimal impact on the intended view corridors.

Figure 7: Conservation Easement Note

8. NO-BUILD AREA: THE NO-BUILD AREAS NOTED ON THIS PLAT ARE SUBJECT TO THE FOLLOWING RESTRICTION: NO BUILDINGS OR OTHER IMPROVEMENTS SHALL BE CONSTRUCTED WITHIN THE NO-BUILD AREA WITHOUT THE EXPRESS PRIOR WRITTEN CONSENT OF THE CITY OF LOUISVILLE, AS EVIDENCED BY WRITTEN RESOLUTION OF THE CITY OF LOUISVILLE CITY COUNCIL. THE OWNERS HEREBY ESTABLISH THAT THE FOREGOING RESTRICTION SHALL CONSTITUTE A COVENANT RUNNING WITH OUTLOT A AND THOSE PORTIONS OF LOTS 1 AND 3 WITHIN THE NO-BUILD AREA, AND THAT SUCH RESTRICTION SHALL ENCUMBER THE NO-BUILD AREA AND BE BINDING UPON ALL OWNERS OF ANY OWNERSHIP OR OTHER INTEREST IN THE NO-BUILD AREA. THE OWNERS HEREBY FURTHER DEDICATE TO THE CITY OF LOUISVILLE A PERPETUAL CONSERVATION EASEMENT IN GROSS TO ENFORCE THE FOREGOING PROHIBITION ON THE CONSTRUCTION OF BUILDINGS OR OTHER IMPROVEMENTS WITHIN THE NO-BUILD AREA, IT BEING THE INTENT THAT SUCH PROHIBITION IS FOR THE PRESERVATION OF VIEW CORRIDORS FOR HISTORIC PRESERVATION PURPOSES. THE RESTRICTION AND EASEMENT HEREIN ESTABLISHED SHALL NOT BE SUBJECT TO ABANDONMENT OR MERGER AND MAY ONLY BE MODIFIED, TERMINATED, EXTINGUISHED OR RELEASED BY INSTRUMENT APPROVED BY RESOLUTION OF THE LOUISVILLE CITY COUNCIL AND EXECUTED BY THE MAYOR AND CITY CLERK. IMPROVEMENTS AUTHORIZED BY THE LOUISVILLE MILL SITE PLANNED UNIT DEVELOPMENT PLAN, AS APPROVED BY CITY COUNCIL RESOLUTION, SHALL BE PERMITTED IMPROVEMENTS IN THE NO-BUILD AREA.

Figure 8: Street Level View of Grain Elevator and Mobile Food Court

**Grain Yard - West
View From West Side of Street**



Special Review Use

LMC Sec. 17.12.030 allows Outdoor Eating and Drinking Establishments and Mobile Food Courts in the CB zone district if approved through an SRU. SRUs shall be reviewed against the criteria listed in LMC Sec. 17.40.100 to determine whether the proposed use is compatible with the surrounding area and if any conditions on the use may be appropriate. LMC Sec. 17.16.310.D includes additional criteria for Mobile Food Courts. Staff's analysis of the SRU review criteria is provided below.

General SRU Criteria:

1. That the proposed use/development is consistent in all respects with the spirit and intent of the comprehensive plan and of this chapter, and that it would not be contrary to the general welfare and economic prosperity of the city or the immediate neighborhood.

The Comprehensive Plan (Plan) envisions “a healthy and vibrant Downtown” (Policy LU-4.2) with a “mix of uses that bring new revenue generation to the Downtown area” (Policy ED-5.3). The Comprehensive Plan classifies Downtown Louisville as Center type development and describes Center development by the following:

Centers are defined by their mixture of uses (retail, commercial, and residential), street interconnectivity, and integrated public spaces. A center’s physical design is that of a destination or gathering point for city-wide activities. Centers are connected to and oriented toward their adjacent land uses. Centers typically have the greatest retailing opportunities. Centers feature integrated public spaces with a recognized public space, or focal point.

*The Downtown Louisville Framework Plan includes a goal to “Maintain downtown as a vibrant, mixed-use activity center”. The use and activation of this previously vacant site will improve economic activity and vibrancy of downtown while also improving the streetscape and pedestrian scale development patterns. **Staff find the proposal meets this criterion.***

2. That such use/development will lend economic stability, compatible with the character of any surrounding established areas;

*The proposed uses will support continued economic activity and investment in the area. The building design is consistent with Design Handbook for Downtown Louisville policies, including creating an inviting pedestrian scale to Downtown. Surrounding development includes a mix of residential and commercial uses, which are all compatible with an outdoor dining use in the downtown area. **Staff find the proposal meets this criterion.***

3. That the use/development is adequate for internal efficiency of the proposal, considering the functions of residents, recreation, public access, safety and such factors including storm drainage facilities, sewage and water facilities, grades, dust control and such other factors directly related to public health and convenience;

*Public Works has reviewed the drainage plan and is coordinating the utility plans for the development and is in support of the proposal. The Fire District has also reviewed the plans and has no conflict with the proposal. **Staff finds the proposal meets this criterion.***

4. That external effects of the proposal are controlled, considering compatibility of land use; movement or congestion of traffic; services, including arrangement of signs and lighting devices as to prevent the occurrence of nuisances; landscaping and other similar features to prevent the littering or accumulation of

trash, together with other factors deemed to affect public health, welfare, safety and convenience;

The development proposal includes parking exceeding the standards for Downtown Louisville, partly to accommodate parking demand for the outdoor activity areas. The site is fenced and landscaped, providing a buffer from the public way. The applicant also proposes limits on the allowed hours of use for the outdoor area, limits on hours when amplified music is allowed and a requirement to turn off the outdoor decorative lights after business hours. These restrictions are similar to other restrictions placed on Outdoor Eating and Drinking Establishments. Staff find the proposal meets this criterion.

5. That an adequate amount and proper location of pedestrian walks, malls and landscaped spaces to prevent pedestrian use of vehicular ways and parking spaces and to separate pedestrian walks, malls and public transportation loading places from general vehicular circulation facilities.

The proposal includes 5-foot paved sidewalks connecting to Front Street proving adequate access to the site separated from the parking and drive aisles. The trash enclosure access and loading areas are available south of the development to provide adequate and separated loading areas from pedestrian ways. Adequate vehicular circulation is provided around the development separated from the pedestrian ways. Staff find the proposal meets this criterion.

Mobile Food Court Criteria:

Under the City's code for Mobile Retail Food Establishments, mobile food vehicles or vending carts are allowed to locate in temporary locations on private property or in public rights of way and require approval of any brick and mortar restaurant within 150 feet of the proposed location. The Mobile Food Court designation allows the permanent establishment of an area for food trucks and vending carts to operate through the public hearing SRU process, even if such area is within 150 feet of a brick and mortar restaurant. Mobile Food Courts must have designated vendor pads equipped with electrical connections (generators are prohibited) and minimum setbacks from residential areas matching any established minimum setbacks for parking areas applicable to the property. Hours of operation for mobile food vehicles or vending carts is limited to 7am to 9pm, but these hours may be reduced or expanded for a Mobile Food Court through the SRU process. Additionally, mobile food vehicles and vending carts are not allowed to operate amplified music. However, amplified music may be authorized through the SRU process for Mobile Food Courts.

LMC Sec. 17.16.310.D.5. requires that the applicant provide a site plan as part of the SRU application with the following information:

- a) *The location and orientation of each vendor pad;*
- b) *The location of all proposed dining areas and areas designated for gathering and activities;*

- c) *The location of any paving, trash enclosures, landscaping, planters, fencing, or any other site requirement by the international building code or Boulder County Public Health Department;*
- d) *The location of permanent electrical and other necessary utility connections;*
- e) *The circulation of all pedestrian, bicycle, and vehicle traffic;*
- f) *The location of any fixed or movable seating and tables;*
- g) *The location of permanent and ADA accessible restrooms;*
- h) *The location of vehicular and bicycle parking.*

Staff finds that the proposed operation of the Mobile Food Court is in compliance with the SRU standards and specific site plan standards for Mobile Food Courts. The minimum parking setback in the Transition area of Downtown is 5', and the vendor pads are setback beyond that minimum. The proposal includes expansion of hours of operation beyond the standard 9pm cutoff for mobile food vehicles and vending carts and would allow operation until midnight, with amplified music allowed until 9pm on Sundays through Thursdays and 10pm on Fridays and Saturdays. The Mobile Food Court is located adjacent to residential areas, and restrictions on hours of operation and ensuring decorative lights are turned off after business hours will help to limit potential impacts to those residential areas.

DEVELOPMENT CAP IN WESTERLY PORTION OF DOWNTOWN:

Section 17.12.060 of the LMC establishes a cap of 475,000 sq. ft. of floor area for the [Westerly Portion of Downtown](#), which this property is within the boundaries of. Current floor area totals 348,195 sq. ft. and would increase by 2,937 sq. ft. with this proposal for a total of 351,132 sq. ft. which is within the maximum floor area allowed.

PUBLIC COMMENTS:

See Attachment No. 5 for public comments received prior to publication of this report.

STAFF RECOMMENDATION:

Staff recommends approval of Resolution 18, Series 2025 recommending to the City Council approval of the Louisville Mill Site Redevelopment PUD, 1st Amendment and an SRU for an Outdoor Eating and Drinking Establishment and Mobile Food Court with the following conditions:

1. Prior to the City Council hearing, the applicant shall obtain an Alteration Certificate approval from the Louisville Historic Preservation Commission.
2. Prior to the City Council hearing, the applicant shall submit to Public Works civil engineering construction plans for review.
3. Prior the City Council hearing, the applicant shall revise the PUD plans and Drainage Report to address outstanding Public Works comments related to the drainage infrastructure.

ATTACHMENTS:

1. Resolution 18, Series 2025, Recommending to the City Council approval of the Louisville Mill Site Redevelopment PUD, 1st Amendment and an SRU for an Outdoor Eating and Drinking Establishment and Mobile Food Court

2. Application Materials
3. Louisville Mill Site Subdivision
4. Louisville Mill Site Redevelopment PUD/SRU
5. Public Comments

APPENDIX: PUD Criteria Analysis

Criteria 17.28.120 (A)	Finding	Narrative
1. An appropriate relationship to the surrounding area.	Compliant	The design is appropriate for the area and permitted in the CB zone district. The site and building design are compatible with the Design Handbook for Downtown Louisville.
2. Circulation in terms of the internal street circulation system, designed for the type of traffic generated, safety, separation from living areas, convenience, access, and noise and exhaust control. Proper circulation in parking areas in terms of safety, convenience, separation and screening.	Compliant	The application provides for adequate and safe internal circulation. The City's engineering division and Fire District have reviewed the proposal and have no concerns.
3. Consideration and provision for low and moderate-income housing	Not Applicable	No housing is proposed.
4. Functional open space in terms of optimum preservation of natural features, including trees and drainage areas, recreation, views, density relief and convenience of function	Compliant	The project provides functional private open space and landscape buffers.
5. Variety in terms of housing types, densities, facilities and open space	Not Applicable	No housing is proposed.
6. Privacy in terms of the needs of individuals, families and neighbors	Compliant	The proposal provides limits on use of the outdoor areas to limit potential impacts to neighbors.
7. Pedestrian and bicycle traffic in terms of safety, separation, convenience, access points of destination and attractiveness	Compliant	The PUD provides pedestrian amenities, creates pedestrian scale development in Downtown and adds bicycle parking.
8. Building types in terms of appropriateness to density, site relationship and bulk	Compliant	The application is compatible with surrounding development, preserves a unique historic building in Downtown, and meets Design Handbook for Downtown Louisville policies for historic buildings.
9. Building design in terms of orientation, spacing, materials, color, texture, storage, signs and lighting	Compliant	The PUD complies with the architectural design and site planning requirements in the Design Handbook for Downtown Louisville.

Criteria 17.28.120 (A)	Finding	Narrative
10. Landscaping of total site in terms of purpose, such as screening, ornamental types used, and materials used, if any; and maintenance, suitability and effect on the neighborhood	Compliant	The PUD complies with landscape requirements in the Design Handbook for Downtown Louisville.
11. Compliance with all applicable development design standards and guidelines and all applicable regulations pertaining to matters of state interest, as specified in <u>chapter 17.32</u>	Compliant	The PUD complies with all applicable development design standards and guidelines.
12. None of the standards for annexation specified in <u>chapter 16.32</u> have been violated	Not applicable	Annexation is not proposed.
13. Services including utilities, fire and police protection, and other such services are available or can be made available to adequately serve the development specified in the final development plan	Compliant	The Public Works Department and Louisville Fire District reviewed the PUD and meets their requirements.

Criteria 17.28.120 (B)	Finding	Narrative
1. Development shall be in accordance with the adopted elements of the comprehensive development plan of the city, and in accordance with any adopted development design standards and guidelines.	Compliant	The PUD complies with the adopted elements of the comprehensive plan, and the adopted development design standards and guidelines.
2. No structures in a planned unit development shall encroach upon the floodplain. Existing bodies of water and existing stream courses shall not be channelized or altered in a planned unit development plan.	Compliant	The property is not located in a floodplain, nor are there any existing bodies of water in the area.
3. No occupied structure shall be located on ground showing severe subsidence potential without adequate design and study approved specifically by the city.	Compliant	There is no known subsidence on the property.

Criteria 17.28.120 (B)	Finding	Narrative
4. The proposal should utilize and preserve existing vegetation, land forms, waterways, and historical or archeological sites in the best manner possible. Steep slopes and important natural drainage systems shall not be disrupted. How the proposal meets this provision, including an inventory of how existing vegetation is included in the proposal, shall be set forth on the landscape plan submitted to the city.	Compliant	The PUD preserves and activates the open area in front of the Grain Elevator building, and creatively activates use of the historic property. There is no noteworthy existing vegetation or topography that should be preserved on the property.
5. Visual relief and variety of visual sitings shall be located within a development in the overall site plan. Such relief shall be accomplished by building placements, shortened or interrupted street vistas, visual access to open space and other methods of design.	Compliant	The PUD complies with site planning requirements in the Design Handbook for Downtown Louisville.
6. Open space within the project shall be located in such a manner as to facilitate pedestrian use and to create an area that is usable and accessible to residents of surrounding developments.	Compliant	The proposal includes private outdoor areas that will provide a new public amenity for Downtown.
7. Street design should minimize through traffic passing residential units. Suggested standards with respect to paving widths, housing setbacks and landscaping are set forth in public works standards of the city and applicable development design standards and guidelines. The system of streets, including parking lots, shall aid the order and aesthetic quality of the development.	Compliant	The PUD complies with requirements in the Design Handbook for Downtown Louisville, ensuring properly designed orientation to the adjacent street network.

Criteria 17.28.120 (B)	Finding	Narrative
8. There shall exist an internal pedestrian circulation system separate from the vehicular system such that allows access to adjacent parcels as well as to parks, open space or recreation facilities within the development. Pedestrian links to trail systems of the city shall be provided.	Compliant	The PUD complies with bicycle and pedestrian requirements in the Design Handbook for Downtown Louisville and municipal code, ensuring adequate pedestrian and bicycle access.
9. The project and development should attempt to incorporate features which reduce the demand for water usage.	Compliant	The PUD proposes appropriate use of water, with minimal landscaping and no turf included in the proposal.
10. Landscape plans shall attempt to reduce heating and cooling demands of buildings through the selection and placement of landscape materials, paving, vegetation, earth forms, walls, fences, or other materials.	Compliant	Street trees were previously installed along the road frontage.
11. Proposed developments shall be buffered from collector and arterial streets. Such buffering may be accomplished by earthen berms, landscaping, leafing patterns, and other materials. Entrance islands defining traffic patterns along with landscaping shall be incorporated into entrances to developments.	Not applicable	The PUD is adjacent to a local street; it is not located next to collector or arterial streets.
12. There shall be encouraged the siting of lot arrangement, building orientation and roof orientation in developments so as to obtain the maximum use of solar energy for heating.	Compliant	The main building is an existing building and historic in nature. No new substantial buildings are proposed.
13. The overall PUD shall provide a variety of housing types.	Not applicable	No housing is proposed.
14. Neighborhoods within a PUD shall provide a range of housing size.	Not applicable	No housing is proposed.

Criteria 17.28.120 (B)	Finding	Narrative
15. Architectural design of buildings shall be compatible in design with the contours of the site, compatible with surrounding designs and neighborhoods, shall promote harmonious transitions and scale in character in areas of different planned uses, and shall contribute to a mix of styles within the city.	Compliant	The plans do not have significant new buildings. The “box car” accessory building will be the closest to the adjoining neighborhood and is appropriately scaled in character.

**RESOLUTION NO. 18
SERIES 2025**

**A RESOLUTION RECOMMENDING APPROVAL OF A PLANNED UNIT
DEVELOPMENT AMENDMENT AND SPECIAL REVIEW USE TO ALLOW
CONSTRUCTION OF A 728 SF ADDITION TO AN EXISTING BUILDING TO
ESTABLISH OUTDOOR DINING AND OUTDOOR COMMERCIAL AMUSEMENT
USES WITH A BAR AND RESTAURANT LOCATED AT 947 PINE STREET.**

WHEREAS, there has been submitted to the Louisville Planning Commission an application for a final planned unit development amendment for redevelopment and preservation of the Grain Elevator property, with improvements planned on Lots 1, 2, and 3 and Outlot A of the Louisville Mill Site Subdivision;

WHEREAS, there has been submitted to the Louisville Planning Commission an application to approve a Special Review Use to and Outdoor Eating and Drinking Establishment and Mobile Food Court associated with the redevelopment of the Grain Elevator property;

WHEREAS, City staff has reviewed the information submitted and found that, with the requested waivers, the application complies with the applicable zoning regulations, design standards, and other applicable sections of the Louisville Municipal Code; and

WHEREAS, the Planning Commission has considered the application at a duly noticed public hearing on November 18, 2025, where evidence and testimony were entered into the record.

NOW THEREFORE, BE IT RESOLVED that the Planning Commission of the City of Louisville, Colorado does hereby recommend approval of the Louisville Mill Site Redevelopment PUD, 1st Amendment and an SRU for an Outdoor Eating and Drinking Establishment and Mobile Food Court with the following conditions:

1. Prior to the City Council hearing, the applicant shall obtain an Alteration Certificate approval from the Louisville Historic Preservation Commission.
2. Prior to the City Council hearing, the applicant shall submit to Public Works civil engineering construction plans for review.
3. Prior the City Council hearing, the applicant shall revise the PUD plans and Drainage Report to address outstanding Public Works comments related to the drainage infrastructure.

PASSED AND ADOPTED this 18th day of November 2025.

By: _____
Steve Brauneis, Chair
Planning Commission

Attest: _____
Debra Baskett, Secretary
Planning Commission

Development Review Application Form

Please complete this form and include it with the submittal documents for your development review application. Applications will not be processed until all required information is provided to the satisfaction of the City of Louisville Planning Department.

Property Information

Common Address(es): 520 and 540 County Road, Louisville Colorado

Legal Description:

Lot 2 & Outlot 'A' Block 1 Subdivision Louisville Mill Site Subdivision

Lot Area: 9,122 (Lot 2) + 6,841 (Outlot A) Sq. Ft. or 0.366 Acres

LAND USE PROCESS (check all that apply)

- ☐ Annexation
- ☐ Concept Plan
- ☐ Easement Vacation
- ☐ Oil and Gas
- ☐ General Development Plan (GDP)
 - ☐ Amendment
 - ☐ New GDP
- ☒ Planned Unit Development (PUD)
 - ☒ Amendment
 - ☐ Preliminary
 - ☐ New PUD
- ☐ Rezoning
- ☒ Special Review Use (SRU)
 - ☐ Amendment
 - ☒ New SRU
- ☐ Subdivision
 - ☐ Final or Replat
 - ☐ Preliminary Plat
- ☐ Temporary Use Permit
- ☐ Variance
- ☐ Vested Property Right
- ☐ Wireless Facility
- ☐ Other: _____

PROJECT DESCRIPTION:

Louisville Mill Site LLC & Louisville's Living Room LLC are proposing to redevelop Lot 2 and Outlot A of the Louisville Mill Site Subdivision. This will include the historic grain elevator and the outlot/open space in front of the grain elevator. Louisville's Living Room LLC is proposing to create a unique food beverage venue called "The Grain Yard" on this property that will showcase the historic grain elevator structure and add vitality to the southern end of Downtown Louisville. The 'front yard' will become a vibrant, active part of the concept as an informal gathering space for the community and a new outdoor area for events. The redevelopment will focus on 520 and 540 County Road, and will affect 500 and 544 County Road only as necessary for utilities, drainage and access. The original PUD and SRU are the basis for this Amendment.

Property Owner Information

Name: J. Erik Hartronft & Ross Bowdy Entity (if applicable) Louisville Mill Site, LLC
 Address: 950 Spruce Street, Suite 2C, Louisville, CO 80027
 Phone: LMS LLC: 303-673-9304 Ross Bowdy: 720-583-4369 Email: erik@hapcdesign.com & ross@foxpropertymgmt.com

Application Representative Information

Name: J. Erik Hartronft Entity (if applicable) Hartronft Associates, p.c.
 Address: 950 Spruce Street, Suite 2C, Louisville, CO 80027
 Phone: 303-673-9304 Email: erik@hapcdesign.com

Certification/Signature

I certify that the information I have submitted is true and correct to the best of my knowledge and in filing the application and submittal documents, I am acting as and/or with the knowledge and consent of those persons who are owners of the subject property or are parties to this application.

Signature*  _____ Print Name J. Erik Hartronft, AIA Date 09/15/25

*If acting as a representative/agent of the owner, include written authorization from the owner that certifies the agent's right to submit this application

Development Review Application Form

Please complete this form and include it with the submittal documents for your development review application. Applications will not be processed until all required information is provided to the satisfaction of the City of Louisville Planning Department.

Property Information

Common Address(es): 544 County Road, Louisville Colorado

Legal Description:

Lot 3 Block 1 Subdivision Louisville Mill Site Subdivision

Lot Area: 27,158.57 sf Sq. Ft. or 0.623 Acres

LAND USE PROCESS (check all that apply)

- ☐ Annexation
- ☐ Concept Plan
- ☐ Easement Vacation
- ☐ Oil and Gas
- ☐ General Development Plan (GDP)
 - ☐ Amendment
 - ☐ New GDP
- ☒ Planned Unit Development (PUD)
 - ☒ Amendment
 - ☐ Preliminary
 - ☐ New PUD
- ☐ Rezoning
- ☒ Special Review Use (SRU)
 - ☐ Amendment
 - ☒ New SRU
- ☐ Subdivision
 - ☐ Final or Replat
 - ☐ Preliminary Plat
- ☐ Temporary Use Permit
- ☐ Variance
- ☐ Vested Property Right
- ☐ Wireless Facility
- ☐ Other: _____

PROJECT DESCRIPTION:

Note: This property will not be redeveloped per this application. Previously approved PUD will be amended as indicated herein to allow the redevelopment of Lot 2 and Outlot A, including access and drainage improvements on this property & installation of utilities within easements.

Property Owner Information

Name: J. Erik Hartrnft & Randall C. Caranci Entity (if applicable) 544CR, LLC

Address: 950 Spruce Street, Suite 2C, Louisville, CO 80027

Phone: Erik Hartrnft: 303-673-9304 Randall C Caranci: 303-910-0019 Email: erik@hapcdesign.com & randy@carancicorp.com

Application Representative Information

Name: J. Erik Hartrnft Entity (if applicable) Hartrnft Associates, p.c.

Address: 950 Spruce Street, Suite 2C, Louisville, CO 80027

Phone: 303-673-9304 Email: erik@hapcdesign.com

Certification/Signature

I certify that the information I have submitted is true and correct to the best of my knowledge and in filing the application and submittal documents, I am acting as and/or with the knowledge and consent of those persons who are owners of the subject property or are parties to this application.

Signature*

J. Erik Hartrnft, AIA

Print Name

09/15/25

Date

*If acting as a representative/agent of the owner, include written authorization from the owner that certifies the agent's right to submit this application

Development Review Application Form

Please complete this form and include it with the submittal documents for your development review application. Applications will not be processed until all required information is provided to the satisfaction of the City of Louisville Planning Department.

Property Information

Common Address(es): 500 County Road, Louisville Colorado

Legal Description:

Lot 1 Block 1 Subdivision Louisville Mill Site Subdivision

Lot Area: 26,220.15sf Sq. Ft. or 0.601 Acres

LAND USE PROCESS (check all that apply)

- ☐ Annexation
- ☐ Concept Plan
- ☐ Easement Vacation
- ☐ Oil and Gas
- ☐ General Development Plan (GDP)
 - ☐ Amendment
 - ☐ New GDP
- ☒ Planned Unit Development (PUD)
 - ☒ Amendment
 - ☐ Preliminary
 - ☐ New PUD
- ☐ Rezoning
- ☒ Special Review Use (SRU)
 - ☐ Amendment
 - ☒ New SRU
- ☐ Subdivision
 - ☐ Final or Replat
 - ☐ Preliminary Plat
- ☐ Temporary Use Permit
- ☐ Variance
- ☐ Vested Property Right
- ☐ Wireless Facility
- ☐ Other: _____

PROJECT DESCRIPTION:

Note: This property will not be redeveloped per this application. Previously approved PUD will be amended as indicated herein to allow the redevelopment of Lot 2 and Outlot A, including access and drainage improvements on this property & installation of utilities within easements.

Property Owner Information

Name: Randall C. Caranci Entity (if applicable) R.C.C. LLC

Address: 441 Elk Trail, Lafayette, CO 80026

Phone: Randall C Caranci: 303-910-0019 Email: randy@carancicorp.com

Application Representative Information

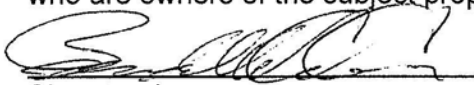
Name: NA Entity (if applicable) _____

Address: _____

Phone: _____ Email: _____

Certification/Signature

I certify that the information I have submitted is true and correct to the best of my knowledge and in filing the application and submittal documents, I am acting as and/or with the knowledge and consent of those persons who are owners of the subject property or are parties to this application.



Signature*

* Randall C. Caranci

Print Name

09/15/25

Date

*If acting as a representative/agent of the owner, include written authorization from the owner that certifies the agent's right to submit this application

LOUISVILLE MILL SITE LLC



950 Spruce Street, Suite 2C, Louisville, CO 80027 303.673.9304

Mr. Rob Zuccaro, Planning Director
City of Louisville, Colorado
749 Main Street
Louisville, CO 80027

16 May 2025

Re: Louisville Mill Site Redevelopment
Final PUD Amendment - Phase 1
520, 540 County Road (Front Street)

Rob,

We are pleased to present herein, an amendment to the Louisville Mill Site Final PUD for the first phase development of the Louisville Mill Site Subdivision.

The redevelopment of Louisville's historic Grain Elevator is intended to transform this iconic 120-year-old utilitarian agrarian structure into a vibrant venue that will become a community gathering place, contributing to Downtown Louisville's vitality. Please see the attached letter from the owners of The Grain Yard LLC, who will be the tenants of the building and site. Please note that the managing partners of the Grain Yard LLC are also partners in the ownership of the property as part of Louisville Mill Site LLC/Louisville's Living Room LLC ownership group.

The design for the Grain Yard redevelopment retains all of the original features of this historic landmark and provides for reconstructing the original porte cochere, wagon ramp and wagon scales, which were an integral part of the original building design and function. We have proposed a small addition on the back of the building which will emulate a boxcar, in the location of the railroad siding that used to run behind the building. The proposed design for this first phase is consistent with the original PUD and SRU that was approved in 2015. This amendment to that PUD is intended to allow for some minor changes to the original approval, but is mainly a separation of this first phase from the rest of the development that is not currently moving forward. The grain elevator building will be fully renovated inside in the areas that will accommodate this new use, while preserving the historic fabric of the wooden structure, (even preserving evidence of the major fire that occurred in the past). The building will be ADA accessible, and energy upgrades will be provided as well as structural upgrades and new mechanical and electrical systems. New electrical service will be provided as well as new water and sewer services.

The site will be improved with landscaping, fencing and lighting for the open space in front of the grain elevator, which will be an area for community gathering, events and relaxing at this historic site, with spaces for food trucks. We envision interpretive historic signage and displays documenting the agrarian history of Louisville's early years and this building and site. We would like to work with the City of Louisville and the Museum to bring this history to life on this site. We would also like to move a small private granary from the Warembourg farm to the Grain Yard as a demonstration of how farmers stored grain on their private land versus the commercial grain elevator. We will utilize that small structure as a tap house for the Grain Yard in good weather. We will also propose landmark status for this structure.

We truly envision this project as a significant community benefit from an experiential and educational perspective. Again, the ability to have this type of a tenant utilize the building is perfect to sustain the

history of this site, and Louisville's history into the future. It will activate the site and give people access inside this amazing wooden agricultural cathedral. The revenue from the commercial use of the building will provide the ability to properly maintain the property, which is not possible without a significant revenue stream and private investment into the building and the business.

As we will demonstrate with our grant assistance submittals to the LRC and the HPC, the redevelopment of this site and the renovation and adaptive reuse of this unique historic structure will not be possible without significant public assistance. Such assistance will be an investment together with a private venture for economic revitalization of this area, and also an investment in preserving and maintaining one of the most significant (if not the most significant) remaining structures from Louisville's early history. We look forward to accomplishing this project together with the City of Louisville, the Historic Preservation Commission and the Louisville Revitalization Commission. This one truly takes a village.

We are sensitive to possible concerns related to this proposed use at this site as they were expressed during the original PUD and SRU hearings. Parking is always a concern in downtown Louisville, and we have addressed this issue similar to the originally approved PUD and SRU. There are three commercial properties within this subdivision, which have entered into shared access, maintenance and parking agreements. As part of this development, we will be providing parking on site as required per the Downtown parking regulations, as well as providing 20 shared spaces on Lot 1 (including BNSF leased ROW) and Lot 3 with formalized access lanes through the combined site. We are also showing potential for approximately 30 additional parking spaces in the adjacent BNSF ROW leased area that is controlled by the City of Louisville. We would like to work with the city and the LRC to provide additional parking spaces for downtown in this area, which has been leased by the city for parking. Please note that there are 6 street-parking spaces directly in front of the site on County Road and a city parking lot is about ½ block from the site.

The submittal also includes an amendment to the previously approved SRU, which is intended to provide for specified outdoor activity areas on Lot 2 as well as the Outlot 'A', including the potential for food and beverage service, (subject to other applicable regulations). The SRU is also intended to provide for the potential of a governmental use on Lot 2 and/or Outlot 'A' which would include a potential historic interpretive site, and similar uses within the building which could be private, public, or a combination thereof. Again, this SRU amendment is substantially the same as approved in 2015, with the phasing changed as indicated. An area for outdoor music is proposed in the southwest corner of the Grain Yard, which would be oriented towards the northeast, away from the adjacent residential neighborhoods. Landscape screening, fencing around the outdoor activity area and an acoustical barrier behind the performance area will help to mitigate off-site sound migration.

Concurrently with this Final PUD amendment and SRU, we are also submitting an amended application to the HPC for our previously approved Landmark Alteration Certificate.

We anticipate that construction will begin after final City Council approval of the PUD/SRU and any LRC and HPC funding is approved. We are hoping to get the approvals by approximately the fourth quarter of 2025, with building permit issuance subsequent to that. Ideally, we would like to have the construction complete by mid-summer 2026.

Please see the attached supplemental graphic information regarding the proposed project. Also attached are excerpts from the Louisville Mill Site Subdivision Plat, showing the access, drainage and utility easement areas. Please note that the exterior of the rehabilitated Grain Elevator structure will

appear as it did in the early 1900's, as much as possible. Obviously, there will be significant historically sensitive improvements and modifications on the interior for the proposed adaptive reuse. Those improvements will be described in more detail with our presentations to Planning Commission, HPC, City Council, and the LRC.

Please consider this request for approval of the Final PUD Amendment attached herein. Let us know if you have any questions regarding this proposal.

Sincerely,

A handwritten signature in blue ink, appearing to read "J. Erik Hartnoff", with a long horizontal line extending to the right.

J. Erik Hartnoff, Manager, LMSLLC

City of Louisville,

The ownership group of The Grain Yard, LLC is excited to begin the process of working with the City to bring the grain elevator back to the community.

We are proud to be the catalyst for the Restoration, Rehabilitation, and continued Preservation of the most historic commercial building in Louisville. It is our intention to work alongside the building owner to utilize the inherent strengths of the building and honor the history of the space.

Our concept as tenants of the building is to create a community gathering space. We will be open all day, every day as a place for people to gather, talk, and learn. Beyond the casual hangout moments, we plan to host pop up events, yoga classes, business meetings, private parties and public events, like museum tours. We will utilize lots of the cool spaces inside the building and also the yard between the building and the street.

We plan to sell all sorts of beverages from coffee and tea to kombucha and mocktails to beer and cocktails. We do not plan on having a kitchen, but rather we will partner with local restaurants like Azul Fuego and Lucky Pie during their slow hours and bring in food trucks during busy times. We will need to apply for a liquor license that includes the building and the outlot. The outlot will be fenced in to create a boundary for the license, but will be minimal in design to honor the conservation easement that requires the building not be obstructed.

We will also be coming to the City for a Special Review Use for outdoor dining and live music. The live music will be limited in frequency and size, with the sound directed to the North East, away from the residential neighbors.

Finally, we intend on submitting an application for a Business Assistance Package with the City prior to signing any lease agreement with the building owners. We hope for some use tax rebates for the tenant improvements that are quite complicated in this old building and a sales tax rebate for our first few years to help us get off to a profitable beginning.

We can't wait to work with a great team of building owners, architects, builders, City staff, boards and commissions, neighbors, and all residents to bring this idea to life and return the grain elevator to the community.

Sincerely,

Ownership Group of the The Grain Yard

EXCERPT Boulder County Reception #03563028



Exhibit A

EXHIBIT B
Lease Exhibit – Caranci Inc. & BNSF Railway Company

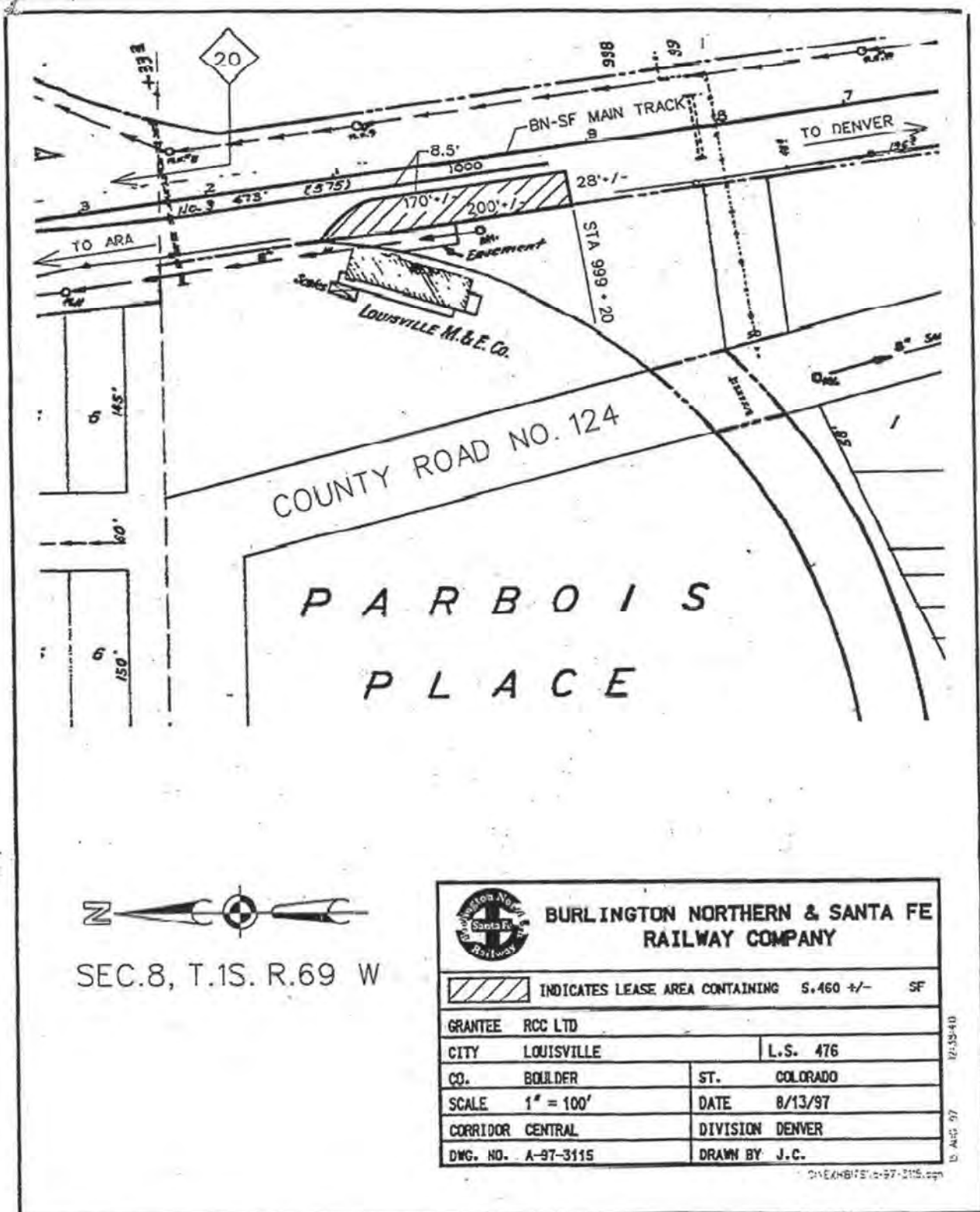


EXHIBIT C Common Area Easement Depiction

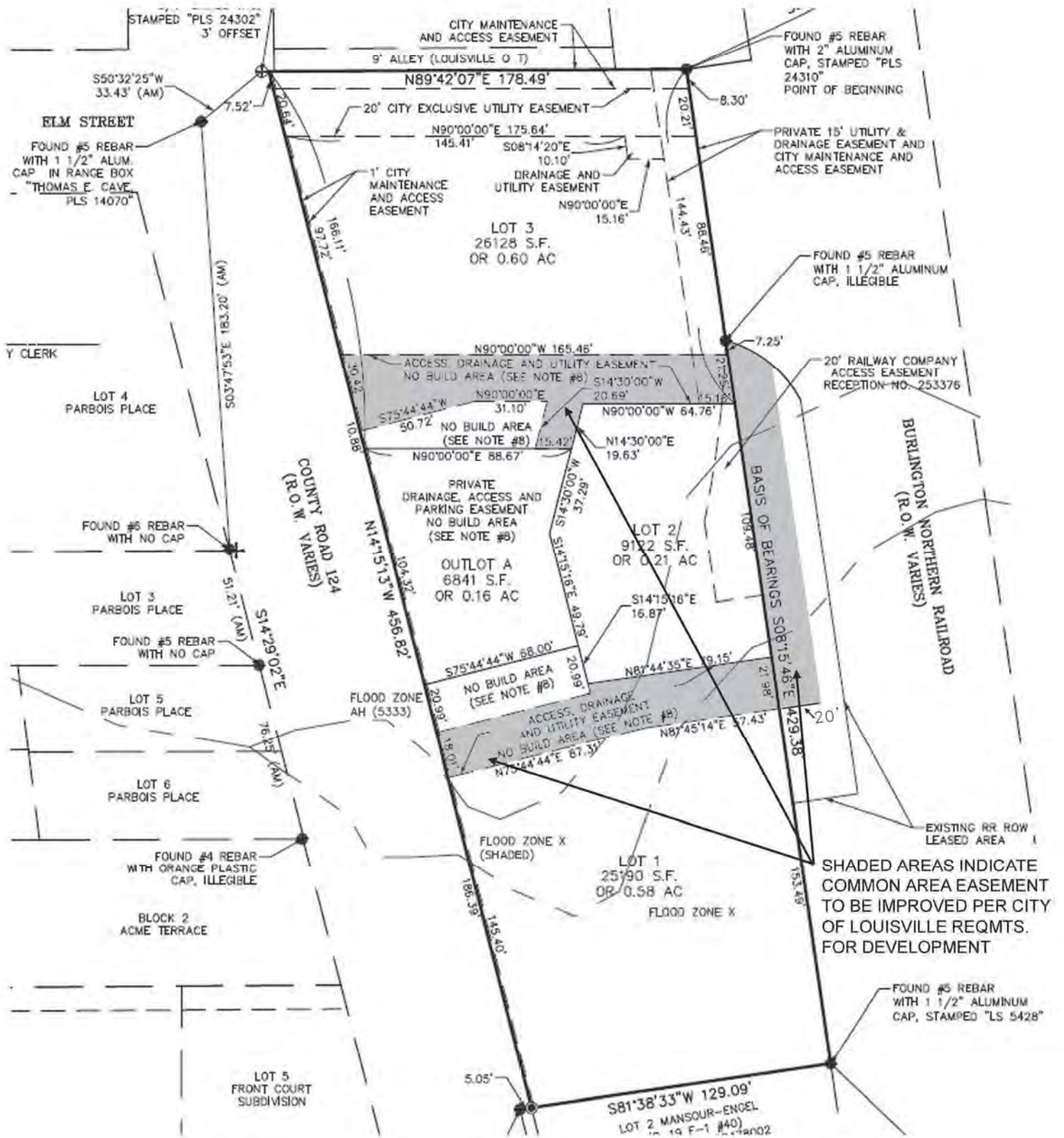


Exhibit C

Utility and Drainage Easement

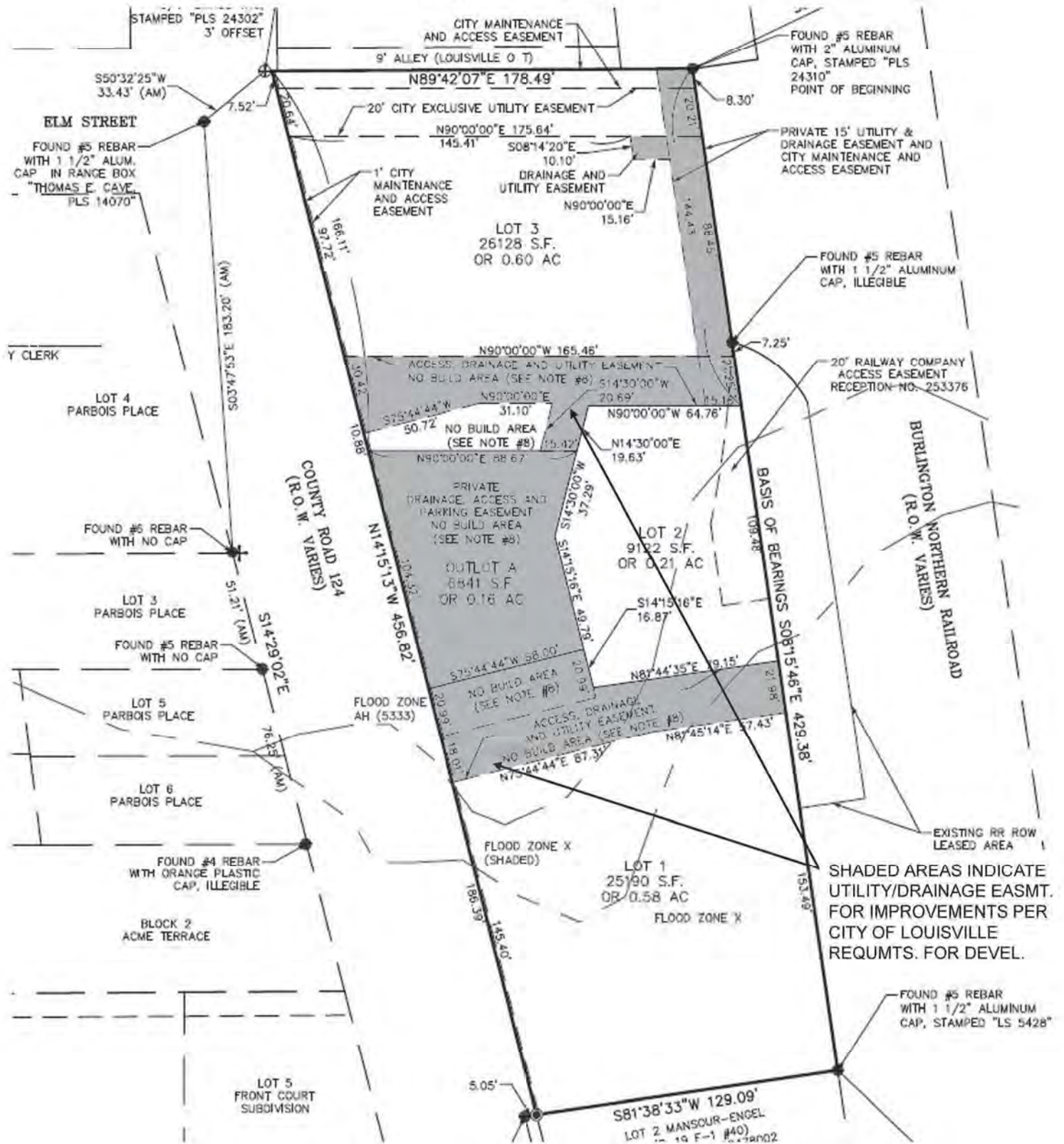


Exhibit D

LOUISVILLE MILL SITE LLC



950 Spruce Street, Suite 2C, Louisville, CO 80027 303.673.9304

Mr. Rob Zuccaro, Planning Director
City of Louisville, Colorado
749 Main Street
Louisville, CO 80027

16 May 2025

Re: Louisville Mill Site Redevelopment
Special Review Use - Phase 1
520, 540 County Road (Front Street)

Rob,

Attached please find the SRU Plan indicating the proposed Special Review Use for the Louisville Mill Site Subdivision. The SRU is intended to provide for specified outdoor activity areas on Lot 2 as well as the Outlot 'A', including the potential for food and beverage service, (subject to other applicable regulations). The SRU is also intended to provide for the potential of a governmental use on Lot 2 and/or Outlot 'A' which would include a potential historic interpretive site, and similar uses in the building which could be private, public, or a combination thereof. Below is the formal written response addressing the SRU criteria.

- 1) The proposed uses / development is consistent in all respects with the spirit and intent of the comprehensive plan and of chapter 17, and it is not contrary to the general welfare and economic prosperity of the city or the immediate neighborhood;
- 2) The proposed uses / development will lend economic stability, compatible with the character of any surrounding established areas;
- 3) The proposed uses / development are adequate for internal efficiency of the proposal, considering the functions of residents, recreation, public access, safety and such factors including storm drainage facilities, sewage and water facilities, grades, dust control and such other factors directly related to public health and convenience;
- 4) The external effects of the proposal are controlled, considering compatibility of land use; movement or congestion of traffic; services, including arrangement of signs and lighting devices as to prevent the occurrence of nuisances; landscaping and other similar features to prevent the littering or accumulation of trash, together with other factors deemed to effect public health, welfare, safety and convenience;
- 5) An adequate amount and proper location of pedestrian walks, malls and landscaped spaces are provided to prevent pedestrian use of vehicular ways and parking spaces and to separate pedestrian walks, malls and public transportation loading places from general vehicular circulation facilities.

Please consider this request for approval of the Special Review Use attached herein. Also refer to our Final PUD Amendment for this project which contains additional information regarding parking, landscaping, screening, etc. Let us know if you have any questions regarding this proposal.

Sincerely,


J. Erik Hartnoff, Manager, LMSLLC



Planning
Architecture
Interior Design

Old Square Court, #2C
Lawrence, KS 66077
TEL: 303-673-9304
FAX: 303-673-9339



DONORSHIP SIGNATURE BOOK By signing this <u>LSD-1</u> the donor acknowledges and accepts all the requirements and intent set forth in this <u>LSD-1</u> . Witness my hand(s) here) this _____ day of _____ 20____	PLANNING COMMISSION CERTIFICATE Approved this _____ day of _____ 20____ by the Planning Commission of the City of Louisville, Colorado: Resolution No. _____ Series _____
J. E. H. Hickman Owner Name and Signature Lot 2 & 3 S.E. QUMA <i>(sign here)</i> Owner Name and Signature Lot 2 & 3 Sub A Randal C. Canino Owner Name and Signature Lot 1 & 3	CITY COUNCIL CERTIFICATE Approved this _____ day of _____ 20____ by the City Council of the City of Louisville, Colorado: Resolution No. _____ Series _____
Notary Name (print) _____ (Notary Seal) Notary Signature _____ My Commission Expires _____	_____ (City Seal) Mayor Signature _____ City Clerk Signature _____

SHORT DESCRIPTION	OWNER-EXCLUSIONS
ARCHITECTURE	OWNER-EXCLUSIONS
A1 Cover Sheet, Project Data & Rendering	10/23/2004 10:58 AM Loretta, Calhoun 802021
A2 Site Plan	Current: 2004/03/23 09:47:33 Loretta, Calhoun 802021 305.663.4389
A3 Landscape Plan & Parking Plan	
A4 Site Photographs	ARCHITECT PLANS
A5 Building Elevations	10/23/2004 10:58 AM Loretta, Calhoun 802021
A6 Site Plan	Current: 2004/03/23 09:47:33 Loretta, Calhoun 802021 305.663.4389
A7 SPECIAL REVIEW USE	
CIVIL	CIVIL EXCLUSIONS
C1 Grading & Drainage Plan	2/13/2005 12:00 PM Buckley, Calhoun 80502
C2 Utility Plan	Current: 2004/03/23 09:47:33 Loretta, Calhoun 802021 305.616.7859
C3 Tree & Shrub Turning Analysis	
C101 Utility Plan - Future Phase	

Carmichael Branch Library for Local History / Boulder Historical Society Collection



Louisville Mill Site - Use and Zoning Information				Time P/LD First Assessment							
Project Description:											
This project of the Louisville Mill Site Redevelopment will encompass Lot 2 and Outlot A of the Mill Site Subdivision. Lot 1 and Lot 3 of the subdivision are now proposed for redevelopment at this phase. However, utility associated with common access easements, utilities and common parking areas located on Lots 1 and 3 is included in the plans to be ordered initiated herein. Lot 2 currently contains the historic Louisville District Elementary building, which is on the National Register of Historic Places; it has been designated as a Louisville local landmark, which will be rehabilitated for commercial use with minor additions. The proposed new Lot 2 and Outlot A Commercial, retail, neighborhood and/or office development is intended to complement the existing historic Louisville District Elementary building and the great exterior structure at Lot 1. The outlot is proposed to be an outdoor activity area for the business in the adjacent parking, including outdoor sales located on approved 20'x20'. The proposed development also includes rehabilitating a seasonal wood-framed primary from the Warehousing form, north of Community Park, to the site by re-establishing its status as a seasonal park "vacant for the traditional outdoor market."											
Building Size and Density Standards:				Parking:							
Suggested setbacks:	R-4C	AD	Proposed Setbacks:	See either the "Transition Area of the George Hancock for Development-Louisville"							
Front:	20'	20'	Variance req. to lot for R-4C	Mid-site Subdivision							
Side:	20'	20'	Variance req. to lot for R-4C SR	Adrian Avenue - County Road							
Lot (overall):	10'	10'	Variance req. to lot for SR	Address and Legal Descriptions:							
Vehicle Access Points @ or nearest corner	10'	10'	for SR	See Final Survey by Large Geographers							
Maximum Lot Cover: 40%	44%	44%	Proposed Setbacks:								
Allocated height:	3 stories; 36'-0"	Existing	Mid-site Subdivision	RCC	Grain	Yard	SA/RH				
2 story + 5'	Ingress: 36'-0"	Existing	Adrian Avenue - County Road	100'	14'-0"	Outlot A	100'				
	Ingress: 17'-0"	East Access		500'	50'	120'	500'				
	Exit: 17'-0"	Accessory Drive									
Louisville Mill Site - Lot 1-Building Area and Parking Calculations - Lot 2 and Outlot A				[RUD Areas From Redevelopment]							
Building Area and Parking Calculations - Lot 2 and Outlot A				RCC	Grain	Yard	SA/RH				
Existing Grain Building	4,204		Mid-site Subdivision	100'	14'-0"	Outlot A	100'				
New vehicle storage (unimproved)	(1,204)		Adrian Avenue - County Road	500'	50'	120'	500'				
Fresh fruit of working inventory		3W	250'								
Mechanisms and Parts											
Ease Access											
Main Level	1,261										
Rampway	7,051										
Total Area Existing	2,338	SR	2,347	Existing Building Coverage	2,404						
				Existing Building Coverage	2,404						
				Total Building Footprint Coverage	3,961	140'	4,001'				
Accessory Top Floor (new) (proposed)			N Lot No Coverage								
Total Existing Area	2,338	SR	2,347								
Total Building Area on Site			6,331								
Parking Calculations				Notes:							
All Building Area for Parking Calculation:	New Area:	2,837		• Existing parking lots of Grain Elevator and its vacates.							
New vehicle storage expansion:	Coverage:	(1,204)		• One space in RCC allocated parking spaces leaving space a leading street view.							
Other New Vehicle Storage Expansion:	Coverage:	(1,204)		• Shared parking agreement and access/maintenance agreement has been developed by all Mill Site Subdivision projects owners. This project will develop 14 shared spaces directly adjacent to Outlot A, and 14 shared spaces directly adjacent to Lot 2.							
Total New Area for Parking Calculation:		-22		• Regarding public parking meters, note that if public parking spaces on County Road are removed in favor of Outlot A, there will be no loss of 14 spaces. An existing 10 parking lot is less than one block from the site. The City of Louisville has issued land loan the \$10K HOV for future public parking which currently serves as an "ad hoc" temporary parking spaces.							
Parking required at 100' x 20'	1 Space			There is a least 100' of area available for approximately 30 additional parking spaces adjacent to and north of the Mill Site Subdivision.							
Parking provided (net, shared = 2A Space total developed as part of this project).											

LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC

FINAL COPY
FIRST ANSWERS

PROJECT # 125250
DATE 05/16/20
DRAWN BY: HAPG
CHECKED BY: JSH
REVISIONS: TPC 05/15/20

© 1999 by John Wiley & Sons, Inc.

COVER SHEET
PROJECT DATA
RENDERING
SIGNATURES

Sheet

A1

of Sheets



**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC

FINAL COPY
FIRST APPROVAL

PROJECT # 1252.50
DATE 05/16/25
DRAWN BY: HAPC
CHECKED BY: JEH
REVISIONS: TTC 04/15/25

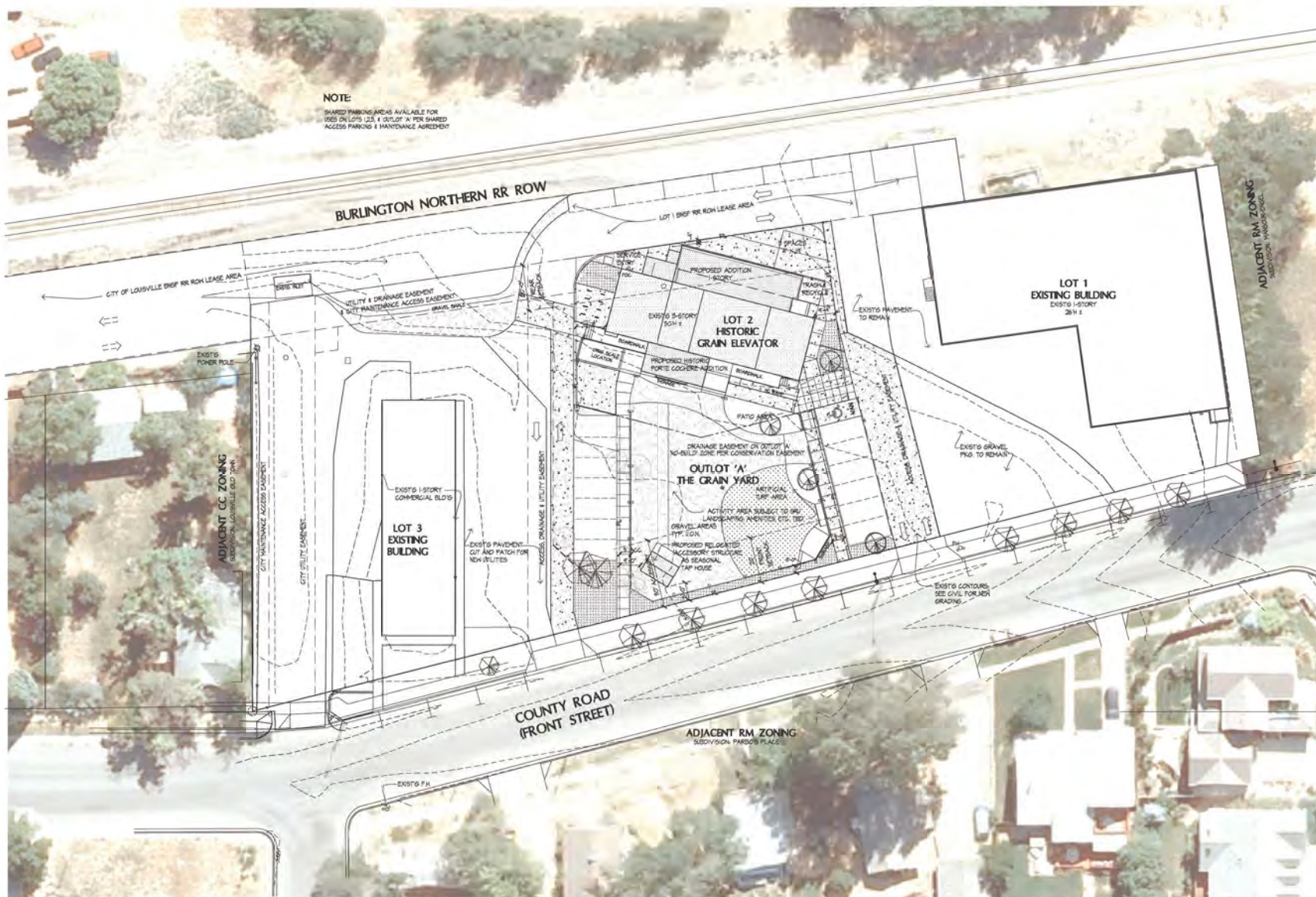
©1997 JVC
All other trademarks and registered
trademarks are the property of their
respective owners. All other
rights reserved.

SITE PLAN

Sheet

A2

2 of 8 Sheets

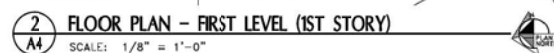


1 ARCHITECTURAL SITE PLAN
A2 1" = 20'

$$1'' = 20'$$

0 10 20 30 40 50 60 70 80 90 100 FCE (%)





FINAL RPD
FIRST AID

PROJECT # 1252.50
DATE: 05/16/25
DRAWN BY: HAPC
CHECKED BY: JEH
REVISIONS: FPG 04/15

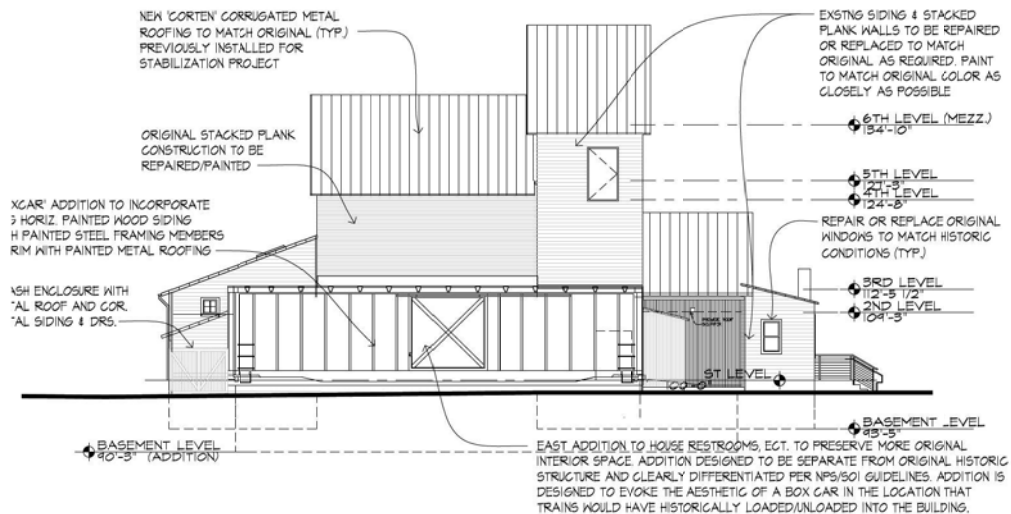
COPYRIGHT 2025
All (r)own and written information
duplicated disclosed or otherwise
appearing herein shall not be
used without written consent
Horowitz Associates, p.c.

FLOOR FLANS

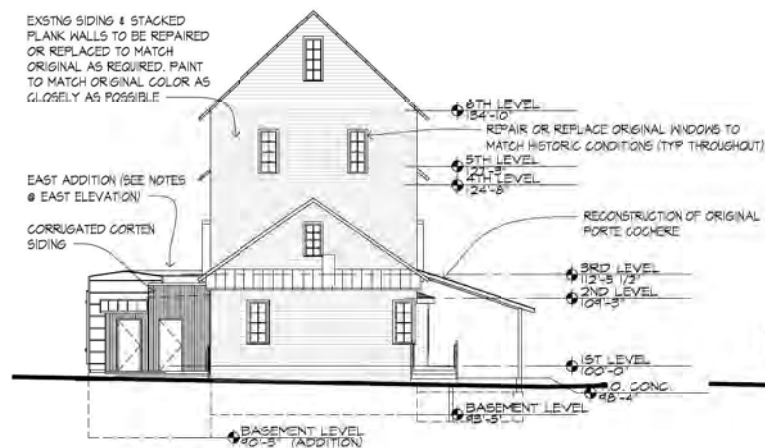
Sheet

A4

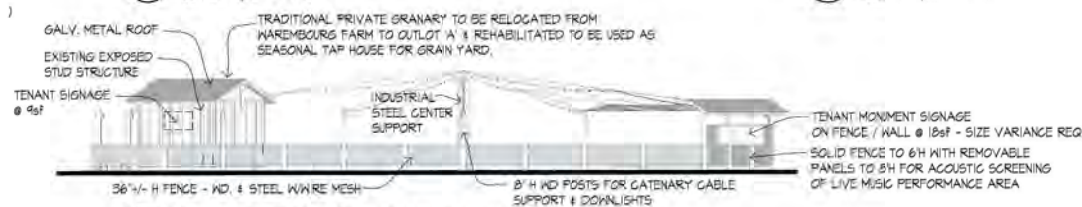
4 of 11 Sheets



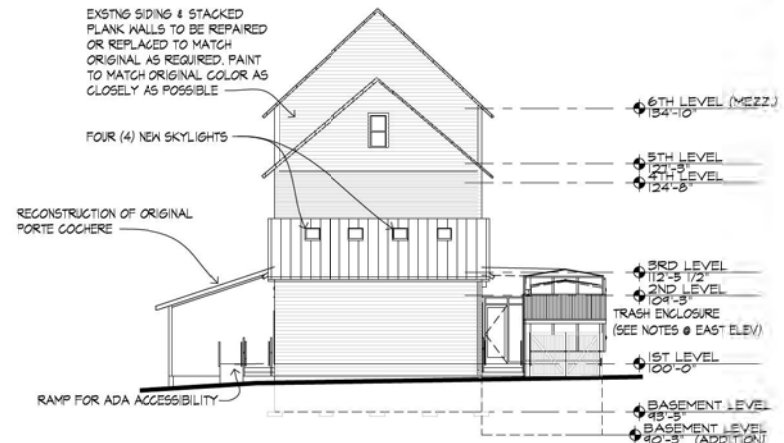
5 EAST ELEVATION
SCALE: 1/8" = 1'-0"



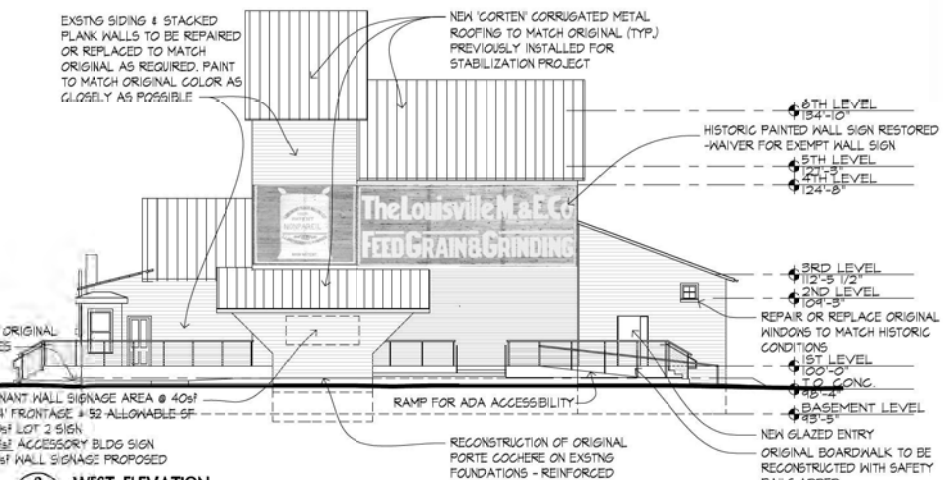
3 NORTH ELEVATION
SCALE: 1/8" = 1'-0"



1 WEST SITE ELEVATION - GRANARY & FENCE
SCALE: 1/8" = 1'-0"



4 SOUTH ELEVATION
SCALE: 1/8" = 1'-0"



2 WEST ELEVATION
SCALE: 1/8" = 1'-0"

NOTE: HISTORIC LOUISVILLE GRAIN ELEVATOR TO BE RENOVATED FOR COMMERCIAL USE PER THE NATIONAL PARK SERVICE AND SECRETARY OF THE INTERIOR (NPS/SOI) STANDARDS FOR THE TREATMENT OF HISTORIC PROPERTIES ACCORDING TO THE GUIDELINES FOR REHABILITATION OF HISTORIC BUILDINGS.



HARTROUT ASSOCIATES
A Hartrout Company

Principal: *Ann Hartrout*
Principal: *Matthew Hartrout*

1700 Sunset Street, S.W.
Lawrenceville, GA 30046
TEL: (770) 962-9330
FAX: (770) 962-9335

**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC

Final 2D
Pre-Construction

PROJECT # 125250
DATE: 01/16/25
DRAWN BY: HAPC
CHECKED BY: JH
REVISION: TFC 01/16/25

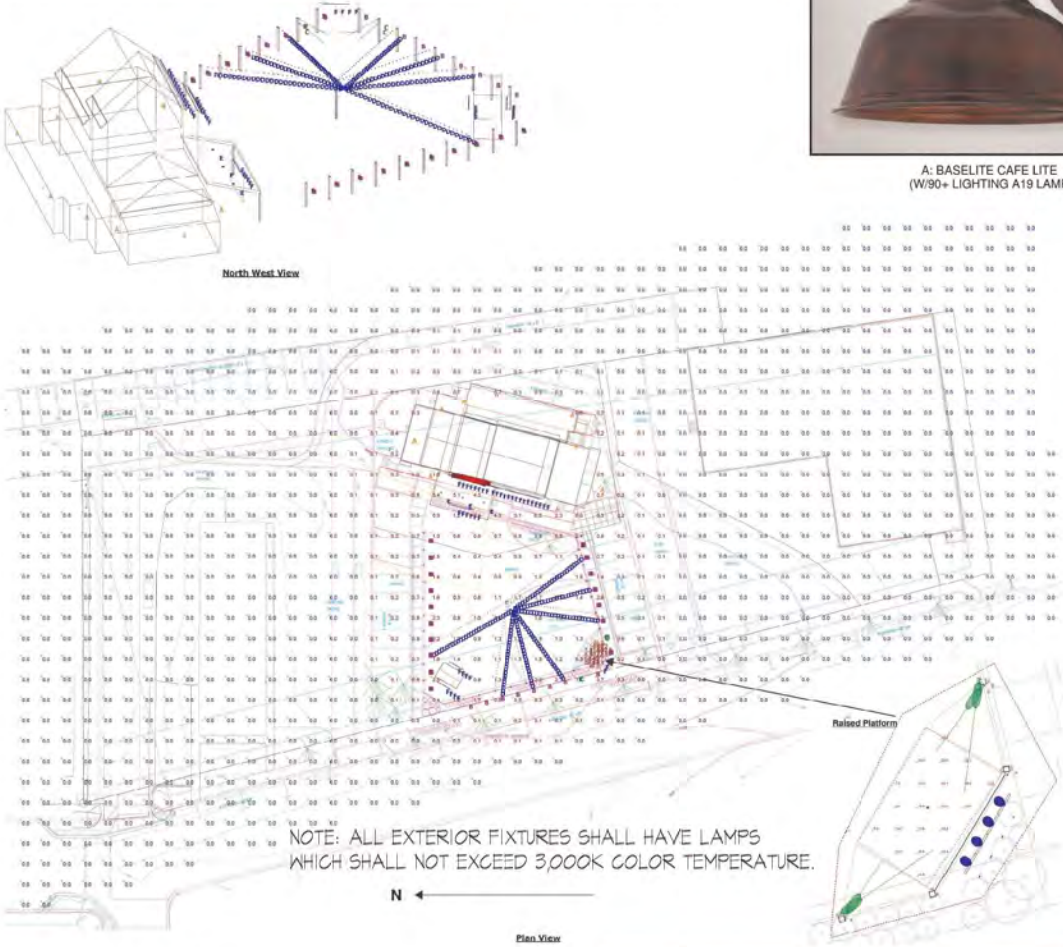
COPYRIGHT 2025
All (drawn and written information) depicted herein is the property of Hartrout Associates, p.c.
No part of this drawing may be reproduced or transmitted in any form or by any means electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written consent of Hartrout Associates, p.c.

**BUILDING
ELEVATIONS**

Sheet
A5

5 of 1 Sheets

Luminaire Schedule									
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Fixture Name	Luminaire Per Foot
	A	9	90+ LIGHTING			A19 80W E26/26 3000K PSE PF 0.7	24	90+ TRO DALI A19 10 10 3000K 3000K E26 PF 0.7 400	1
	B	43	WAC LIGHTING	WS-414931-00	Surface-mounted Luminaire		1	WS-414931 183P 30 200	1
	C	4	LUMINIS	OC203-L1110-PLD-40K	Slope 3	(1) Bridgelux BR100-400203-0-73 CIE #1840-400203-0-73V400K110	1	OC203-L1110-PLD-40K 400	1
	D	194	Tivoli, LLC	LSL2-B-12-V-3P-0			1	928-LSL2-B-12-V-3P-0 80	1
	E	3	Juno Lighting	JP42 70x 100W 30K 90C91 PVS0LT 27 80W	7" Square Recessed (Sloped) Surface Mount, 2000K, 90C91, 90W	N/A	1	JP42 70x 100W 30K 90C91 PVS0LT 27 80W 100	1
	F	41	LUMENPULSE	LP-120/277-5A-3-30W-20K-2600K-CL-RO-LV9	LUMENFACADE PURE This fix was created by Lumenpulse to reflect an accessories configuration.		1	LP-120/277-5A-3-30W-20K-2600K-CL-RO-LV9 80	1



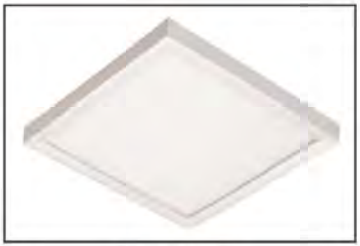
A: BASELITE CAFE LITE (W90+ LIGHTING A19 LAMP)



B: WAC SLANT



C: LUMINIS SCOPO 355



E: JUNO SLIMFORM



D: TIVOLI LITESPHERE 2.0



F: LUMENPULSE LUMENFACADE PURE

CLICK ON FIXTURE IMAGES TO LINK TO PRODUCT PAGES



Statistics							
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min	Avg/Max
RAISED PLATFORM	+	15.1 fc	25.6 fc	7.8 fc	3.3:1	1.9:1	0.6:1
SITE	+	0.1 fc	7.1 fc	0.0 fc	N/A	N/A	0.0:1

Note
Lighting calculation software is for estimating purposes only, not generating exact values.
These calculations are for the use and adoption by our clients and theirs' solely at their discretion. This includes evaluation of the calculated lighting levels and model by the Architect, Engineer, Lighting Designer or Owner for adherence to the project's lighting specifications for levels and uniformity.
We make no guarantees of meeting any subjective expectations. Calculations are based on a model only. Space characteristics and electrical supply to fixtures, along with installation details, may affect performance. Model is based on standard reflectance values unless otherwise noted.
Any variance from reflectance values, obstructions, light loss factors (including both physical and electrical in nature) or dimensional data will affect the actual light levels obtained.
Final construction drawings and calculations are the responsibility of a licensed architect or engineer.
The Lighting Agency provides these calculations as a courtesy for evaluation only.
Note
1 file=visual-files-may2025-milite3-leumville grain v2.rvt

HARTRONFT ASSOCIATES
A Professional Consulting Firm
Planning
Architecture
Interior Design
900 Spruce Street, Rm. 100
Louisville, CO 80037
TEL: 303-452-8904
FAX: 303-673-9199

LOUISVILLE MILL SITE REDEVELOPMENT & HISTORIC GRAIN ELEVATOR
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC

PROJECT # 025250
DATE 05/08/23
DRAWN BY: HAP
CHECKED BY: JH
REVISION: PPS-01/08/23

CONTRACT 0001
All work and written statements submitted hereto and not to be used without written consent of Hartronft Associates, P.C.

SITE PHOTOMETRIC

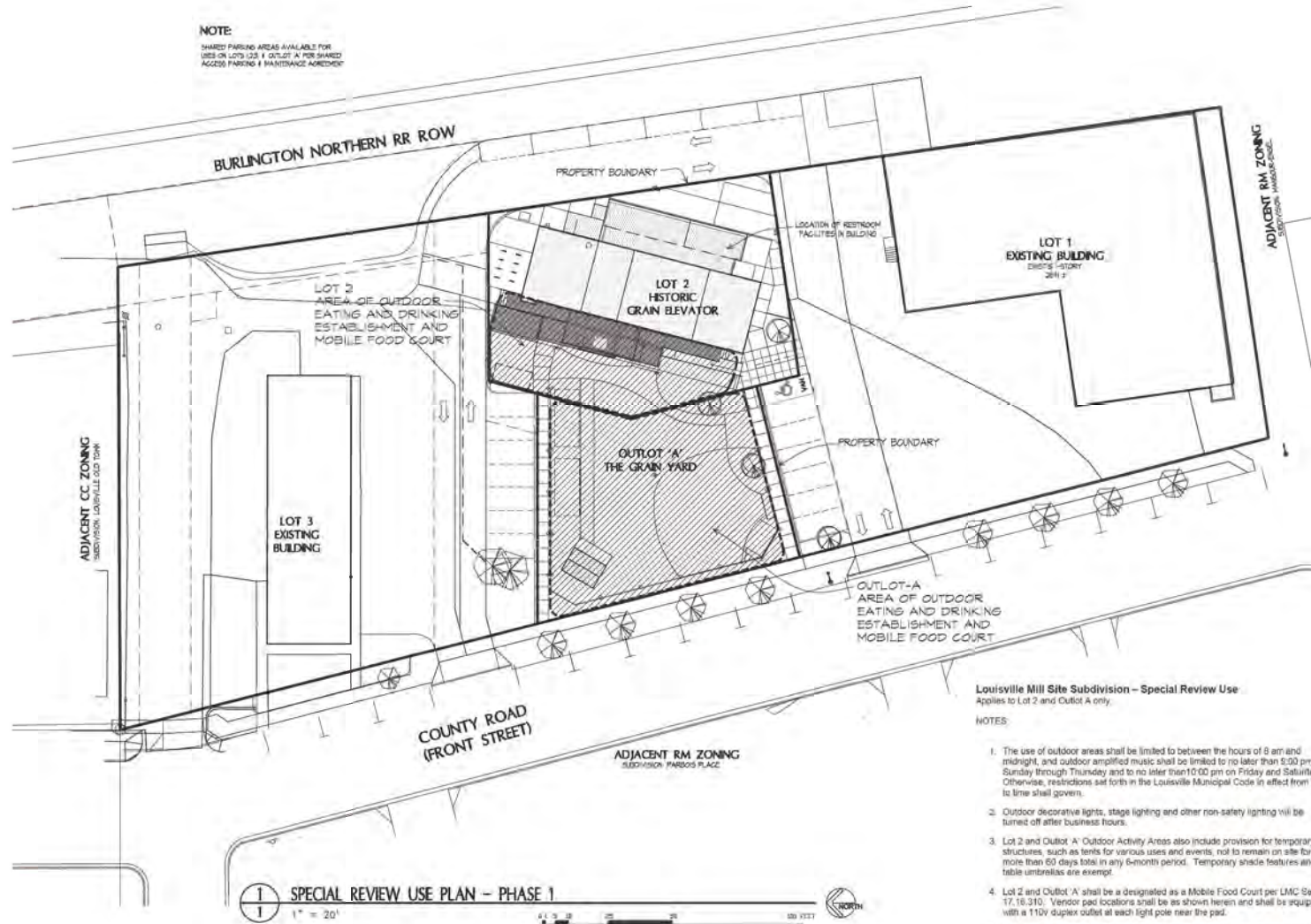
SPECIAL REVIEW USE - AMENDMENT - PHASE 1 LOUISVILLE MILL SITE REDEVELOPMENT

LOUISVILLE MILL SITE SUBDIVISION

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 8, TOWNSHIP 1 SOUTH RANGE 69 WEST OF
THE 6TH P.M., CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO

NOTE:

SHARED PARKING AREAS AVAILABLE FOR
USES ON LOTS 1, 2 & 3. OUTLOT 'A' FOR SHARED
ACCESS PARKING & PAINTED SPACE APPROVED



Louisville Mill Site Subdivision - Special Review Use
Applies to Lot 2 and Outlot A only.

NOTES

- The use of outdoor areas shall be limited to between the hours of 8 am and midnight, and outdoor amplified music shall be limited to no later than 9:00 pm Sunday through Thursday and to no later than 10:00 pm on Friday and Saturday. Otherwise, restrictions set forth in the Louisville Municipal Code in effect from time to time shall govern.
- Outdoor decorative lights, stage lighting and other non-safety lighting will be turned off after business hours.
- Lot 2 and Outlot 'A' Outdoor Activity Areas also include provision for temporary structures, such as tents for various uses and events, not to remain on site for more than 60 days total in any 6-month period. Temporary shade features and table umbrellas are exempt.
- Lot 2 and Outlot 'A' shall be a designated as a Mobile Food Court per LMC Sec. 17.18.310. Vendor pad locations shall be as shown herein and shall be equipped with a 110V duplex outlet at each light pole near the pad.
- Drawings, including a Site Plan and Landscape Plan and detailed construction documents for the Mobile Food Court shall be submitted at time of building permit indicating compliance with requirements of LMC Sec. 17.18.310.D.5, as well as compliance with applicable building codes and Boulder County Health Department requirements.



HARTRON
ASSOCIATES
A Professional Corporation

Planning
Architecture
Interior Design

100 Spruce Street, #20
Louisville, CO 80037
TEL: (303) 873-9000
FAX: (303) 673-9000

LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC

SPECIAL REVIEW USE

PROJECT # 05250
DATE: 05/16/25
DRAWN BY: HPC
CHECKED BY: JH
REVISIONS: 15 04/15/25

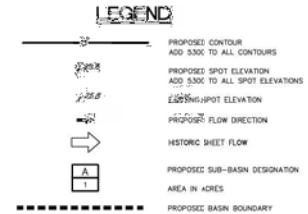
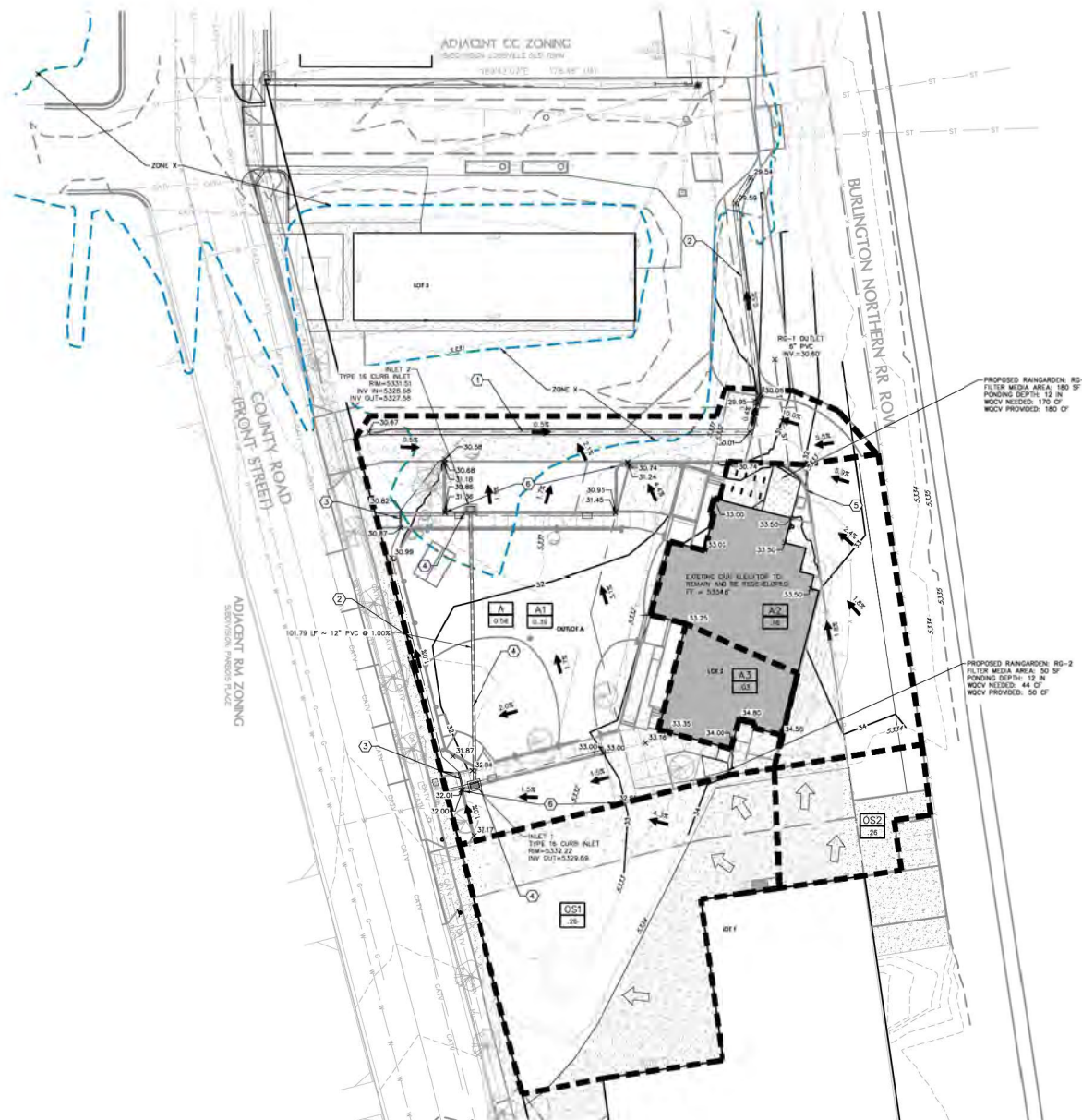
05/16/25
All plans and specifications submitted for review are the property of Hartron Associates, P.C. and shall remain confidential.

SPECIAL REVIEW USE

Sheet

A7

1 of 1 Sheets



GRADING NOTES

1. FLOOD INFORMATION: ACCORDING TO FEMA FLOOD INSURANCE MAP NO. 080330000K DATED 06/15/2010, THE NORTH OF OUTLET A IS LOCATED IN ZONE X (SHADED). AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREA LESS THAN 1 SQUARE MILE, THE ENTIRETY OF LOT 2 IS OUTSIDE OF ANY MAPPED FLOODPLAIN.
2. BENCHMARK INFORMATION: CITY OF LOUISVILLE UPS, FOUND 2.5\"
3. THE LOCATION OF THE ABOVE GROUND UTILITIES SHOWN HEREON ARE BASED ON THE FIELD SURVEY BY SITEWORKS, LLC DATED 07/26/2015. THE LOCATIONS OF THE UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON S&P SURVEY AND INFORMATION PROVIDED BY OTHERS WHICH MAY INCLUDE THE UTILITY OWNER OR UTILITY LOCATING SERVICES. SITEWORKS, LLC IS NOT RESPONSIBLE FOR UTILITY INFORMATION PROVIDED BY OTHERS. SITEWORKS, LLC RECOMMENDS THAT THE LOCATION OF THE UTILITIES BE FIELD VERIFIED PRIOR TO ANY DIGGING ON OR ADJACENT TO THE SUBJECT PROPERTY.

KEYED NOTES

1. PROPOSED 2\"
2. PROPOSED GRAVEL SWALE.
3. PROPOSED SIDEWALK CHASE.
4. PROPOSED UNDERGROUND STORM SEWER FOR FUTURE PHASE 2 DEVELOPMENT. STEEL COVER TO GO OVER STORM SEWER INLETS TO PREVENT ANY DRAINAGE UNTIL FUTURE DEVELOPMENT.
5. PROPOSED 12\"
6. PROPOSED PARKING AREAS COMPRISED OF 1\"



**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC

PHASE 1
FINAL
SUBMITTAL

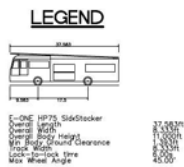
PROJECT # 2588A
DATE: 04/12/2015
DRAWN BY: JPM
CHECKED BY: JPM
REVISIONS:

COPYRIGHT 2015
All drawn and written information
disclaimer: drawings or information
appearing herein shall not be
used without written consent of
Hortons Associates, P.C.

**GRADING
& DRAINAGE
PLAN**

Sheet
C-101
1 of 4 Sheets





site works

**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC

PHASE I
FINAL PUD
MEMORANDUM

PROJECT # 25B8A
DATE: 04/12/25
DRAWN BY: DRS
CHECKED BY: DPA
REVISIONS:

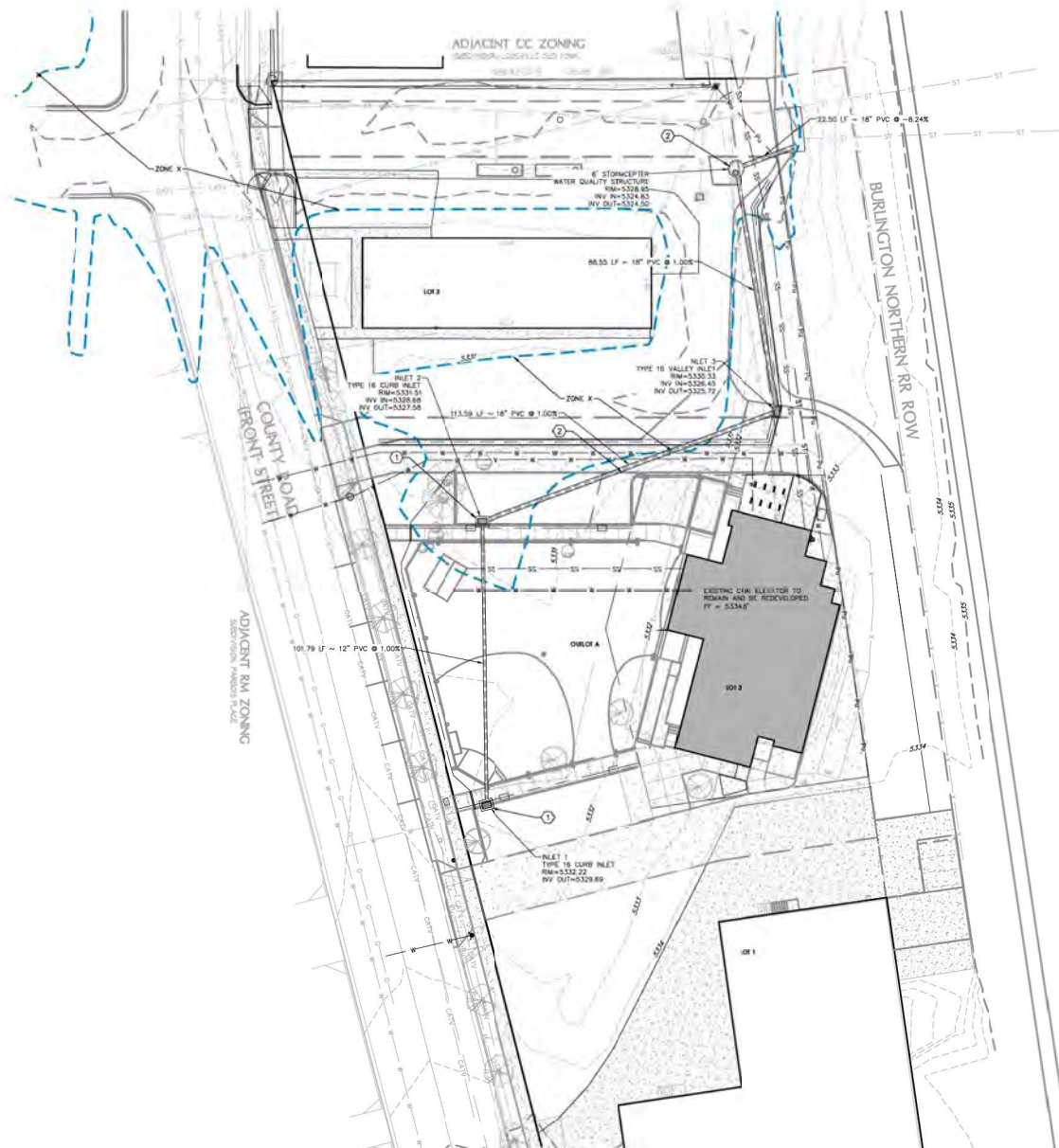
COPYRIGHT 2025
All drawn and written information
duplicated, disclosed or otherwise
appearing herein shall not be
used without written consent of
Hortnoff Associates, A.C.

TURNING ANALYSIS

Sheet

C-103

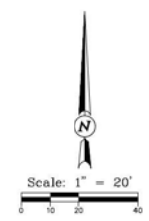
3 of 4 Sheets



LEGEND	
	EXISTING CONTOUR
	EXISTING SEWER CLEANOUT
	EXISTING WATER METER
	EXISTING STORM MANHOLE
	EXISTING WATER VALVE
	EXISTING POWER POLE
	EXISTING LIGHT POLE
	EXISTING SIGN
	EXISTING FIRE HYDRANT
	EXISTING FENCE
	EXISTING OVERHEAD POWER LINE
	EXISTING SANITARY SEWER W/MANHOLE
	EXISTING WATER W/FIRE HYDRANT
	EXISTING STORM SEWER W/MANHOLE
	PROPOSED WATER W/FIRE HYDRANT
	PROPOSED SANITARY SEWER SERVICE
	PROPOSED GAS SERVICE
	PROPOSED WATER METER

KEYED NOTES ①

1. PROPOSED UNDERGROUND STORM SEWER FOR FUTURE TIE IN. STEEL COVER TO BE REMOVED AND INLETS ALLOWED TO DRAIN.
2. PROPOSED PHASE 2 STORM SEWER IMPROVEMENT. PARKING LOT DRIVE TO DRAIN INTO STORMSEWER AND TIE INTO EXISTING TYPE 2 INLET.



**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC



PROJECT # 25188A
DATE: 01/12/25
DRAWN BY: JWB
CHECKED BY: JWB
REVISIONS:

COPYRIGHT 2025
All design and written information disclosed or otherwise appearing herein shall not be used without written consent of HARRIS ASSOCIATES, P.C.

**UTILITY
PLAN
PHASE
2**

Sheet
C-201
4 of 4 Sheets

**Grain Yard - Southwest
View From East Side of Street**



**Grain Yard - Southwest
View From West Side of Street**



**Grain Yard - West
View From West Side of Street**



**Grain Yard - Northwest
View From West Side of Street**



PARKING AGREEMENT

This Parking Agreement is made and entered into on this 21 day of FEBRUARY, 2025, by and between:

RCC, LCC, owner of 500 County Rd, Louisville, CO 80027

LMS, LLC owner of 540 County Rd, Louisville, CO 80027

LLR, LLC, owner of 540 County Rd, Louisville, CO 80027

544CR, LLC, owner of 544 County Rd, Louisville, CO 80027

This Agreement is between the property owners of 500, 540, and 544 County Road. The purpose of this Agreement is to establish shared use of parking spaces among all businesses operating on the properties owned by the parties. This Agreement remains in effect unless terminated by one of the members of the agreement in writing.

Owner of 500 County Rd, RCC, LLC:

Signature: [Signature]
Name: RANDALL C CARANCI
Date: 2-21-2025

Owner 1 - 540 County Rd, LMS, LLC:

Signature: [Signature]
Name: J. ERIK HARTMAN
Date: 2.21.25

Owner 2 - 540 County Rd, LLR, LLC:

Signature: [Signature]
Name: JAMES DICKINSON
Date: 2/21/25

Owner 1 - 544 County Rd, 544CR, LLC:

Signature: [Signature]
Name: RANDALL C CARANCI
Date: 2-21-2025

Owner 2 - 544 County Rd, 544CR, LLC:

Signature: [Signature]
Name: J. ERIK HARTMAN
Date: 2.21.25

**COMMON AREA USE, MAINTENANCE AND MANAGEMENT AGREEMENT
(LOUISVILLE MILL SITE SUBDIVISION)**

THIS COMMON AREA USE, MAINTENANCE, AND MANAGEMENT AGREEMENT ("**Agreement**") is made this 23rd day of January, 2025, by and between **R.C.C., LLC**, a Colorado limited liability company formerly known as **RCC LTD.**, a partnership ("**L1 Owner**") having an address of 441 Elk Trail, Lafayette, CO 80026 ("**L1 Owner**"), **LOUISVILLE MILL SITE LLC**, a Colorado limited liability company having an address of 950 Spruce Street, Suite 2C, Louisville, CO 80027 ("**L2 Owner**" and "**OA Owner**" or collectively "**L2/OA Owner**"), and 544CR LLC, a Colorado limited liability company having an address of 950 Spruce Street, Suite 2C, Louisville, CO 80027 ("**L3 Owner**"). L1 Owner, L2/OA Owner, and L3 Owner may be collectively referred to as the "**Owners**" or individually as an "**Owner**."

RECITALS:

A. L1 Owner is the owner of certain real property located at 500 County Road, Louisville, Colorado,, more particularly described as Lot 1, Louisville Mill Site Subdivision, County of Boulder, State of Colorado ("**Lot 1**").

B. L2/OA Owner is the owner of certain real property located at 540 and 520 County Road, Louisville, Colorado, more particularly described as Lot 2 and Outlot A, Louisville Mill Site Subdivision, County of Boulder, State of Colorado ("**Lot 2**" and "**Outlot A**" respectively).

C. L3 Owner is the owner of certain real property located at 544 County Road, Louisville, Colorado, more particularly described as Lot 3, Louisville Mill Site Subdivision, County of Boulder, State of Colorado (the "**Lot 3**").

D. L1 Owner is also the Lessee under a lease for certain land adjacent to the Louisville Mill Site Subdivision which is owned by The Burlington Northern and Santa Fe Railway Company as shown on **Exhibit B** attached hereto and incorporated herein by this reference (the "**BNSF Lease Area**").

E. Lot 1, Lot 2, Outlot A, Lot 3, and the BNSF Lease Area (for so long as any Owner under this agreement or its successors and/or assigns are lessee thereof) are collectively referred to as the "**Properties**." The legal description of the Properties are depicted on the plat shown on **Exhibit A** and incorporated herein by this reference.

F. The Owners wish to grant and receive a reciprocal perpetual easement for pedestrian and vehicular use, ingress and egress over, upon and across the parking lots, sidewalks, and other outdoor spaces within their respective owned and leased Properties generally accessible by the public shown on **Exhibit C** attached hereto and incorporated herein by this reference, or any future generally public spaces constructed, redesigned, or repurposed (the "**Common Area**"), and to grant to the other Owners a construction easement allowing the respective Owners to construct, maintain, replace, alter and repair the Common Areas, as more particularly set forth herein.

G. The Owners wish to grant and receive a reciprocal perpetual easement for providing utility and drainage facilities across and below their respective Properties, and to grant to the other Owners a construction easement allowing the respective Owners to construct, maintain, replace, alter and repair the utility and drainage easement areas, as more particularly set forth herein.

H. The Owners wish to establish certain rights relating to the use of Outlot 'A' located within the L2/OA Owner's Property, as more particularly set forth herein.

I. The Owners wish to establish certain rights related to reciprocal parking on their respective Properties, as more particularly set forth herein.

J. Additionally, the Owners desire to seek approval for a Planned Unit Development, Special Review Use, and other necessary approvals per the City of Louisville for improvements on each of the Properties, and the Owners agree to cooperate with each other regarding such approvals irrespective of which properties may be involved in such approvals.

NOW, THEREFORE, in exchange for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and the mutual covenants and promises of the parties hereto, the parties enter into this Agreement upon the following terms and conditions.

AGREEMENT

1. Recitals. The parties acknowledge that the foregoing recitals are true and correct and are incorporated herein by this reference.

2. Ingress and Egress Easements.

(a) Each of the Owners hereby grant to each of the other Owners, and their successors, assigns, tenants, their employees, customers and invitees a perpetual, non-exclusive easement appurtenant to the Owners' Properties over, upon and across the Common Area, for pedestrian and vehicular ingress and egress and required emergency access between the Properties as depicted in Exhibit C attached hereto and incorporated herein by this reference (the "**Common Area Easement**").

(b) The annual/monthly rental cost of the lease for the BNSF Lease Area shall be split evenly between the Owners of Lot 1, Lot 2, and Lot 3 and their successors and/or assigns. L1 Owner shall bill the other Owners for such cost once annually, no later than August 31 of each calendar year, and the Owners shall reimburse L1 Owner within 30 days of receipt of such rental invoice. If L1 Owner elects to discontinue the Lease for the BNSF Lease Area, L1 Owner shall notify all other Owners no less than 120 days prior to the discontinuance of the Lease to allow other Owners the opportunity to obtain the lease rights to the BNSF Lease Area. If L1 Owner becomes aware of the intent of BNSF, or any representative of the Lessor, to terminate the Lease Agreement for the BNSF Lease Area, L1 Owner shall notify all other Owners immediately.

(c) Each Owner shall be responsible for constructing improvements constituting Common Area within the property such Owner(s) own as required and approved by the City of Louisville at their own expense. However, if required Common Area improvements have not been necessary and/or provided on a given Property at such time that any of the Properties shall require access per this Agreement, the Owner of the Property requiring such access shall be responsible for construction the access improvements required by the City of Louisville at their expense, whether on their Property or another Owner's Property. Each Owner hereby grants to any other Owner and its successors and assigns a construction easement for the construction, repair, replacement and alteration of improvements within the Common Area and any related curbing, sidewalks and other similar improvements from time to time situated within the Common Area which they are necessary

or desirable to construct (the "**Construction Easement**"). Prior to beginning construction, The Owner making such improvements shall obtain the consent to its construction plans by the other affected Owners, which consent shall not be unreasonably conditioned, withheld, or delayed. If the non-construction Owners do not consent or deny consent to such plans within ten (10) days of receipt of notice by the constructing Owner, their consent will be deemed given. At such time that any other Property requires access by virtue of renovations, additions, and/or new construction valued greater than 50% of the value of the improvements on the Property as existing on the date of this Agreement, then the Owner of such Property is required to reimburse the Owner making the initial improvements one third of the cost of such access improvements actually paid by that Owner.

(d) No walls, fences or barriers of any kind shall be constructed or maintained in the Common Area which shall prevent or impair the use or exercise of any of the easements granted in this Agreement. The Common Area shall in no event be blocked, closed, altered, changed or removed and shall at all times remain in place as depicted in plans approved by the City of Louisville. There shall be maintained between the boundaries of the Properties a smooth and level grade transition to allow the use of the Common Area for pedestrian and vehicular ingress and egress. The only exception to this provision shall be (i) temporary barriers to the extent necessary for maintenance and repair of the Common Area, (ii) incidental encroachments which may occur as a result of the use of ladders, scaffolding, storefront barricades or similar facilities resulting in temporary obstruction of the Common Area, so long as their use is kept within reasonable requirements of construction work being expeditiously pursued, (iii) barriers required under applicable laws, rules, regulations or codes, and (iv) temporary closure of the Common Area Easement for construction activities on one or more of the Properties in which case the Parties agree to maintain legal access for operating businesses and required emergency access to all properties during the construction period.

(e) No facility on the Properties for vehicular drive-up or drive-through in which the stopping or standing of motor vehicles in line at a location for drop off and/or pickup is intended (as, for example, at a restaurant, car wash or bank) shall be assigned, constructed, used or operated in any manner on any of the Owners' Properties such that motor vehicles in line at such facility stop or stand onto any of the other Owners' Properties, and under no circumstances shall such stacking of vehicles extend onto the Common Area or otherwise interfere with the normal pattern and flow of pedestrian or vehicular traffic on and across the other Owners' Properties and/or the Common Area.

(f) Nothing in this Section 2 shall be deemed to create any easement for parking upon any of the Owners' properties, or within the Common Area. Owners and their customers, agents, guests, invitees, and licensees shall be required to park on such Owners' property.

3. Utility and Drainage Easements.

(a) Each of the Owners hereby grant to each of the other Owners, and their successors, and assigns, a perpetual, non-exclusive easement appurtenant to the Owners' Properties over, across and under the portion of the Owners' respective Properties as depicted in **Exhibit D** attached hereto and incorporated herein by this reference (the "**Utility and Drainage Easement Area**"), for locating utility service lines and storm water drainage and storm water quality facilities for the benefit of the Properties (the "**Utility and Drainage Easement**").

(b) At such time that any of the Properties shall require any utility service and/or drainage facilities to be placed within the Utility and Drainage Easement Area per this Agreement, the

Owner of the Property requiring such utilities and/or drainage shall be responsible for constructing the improvements as required at their expense. Each Owner hereby grants to any other Owner and its successors and assigns a construction easement for the construction, repair, replacement and alteration of such improvements within the Utility and Drainage Easement and any related surface improvements and other similar improvements from time to time situated within the Utility and Drainage Easement Area (the "**Construction Easement**"). Prior to beginning construction, The Owner making such improvements shall obtain the consent to its construction plans by the other affected Owners, which consent shall not be unreasonably conditioned, withheld, or delayed. At such time that any other Property requires the use of any of the previously constructed common utility service lines, equipment, etc. or increased stormwater drainage, by virtue of renovations, additions, and/or new construction, then the Owner of such Property is required to reimburse the Owner making the initial improvements one third of the cost of such utility(ies) or drainage facilities and similar improvements actually paid by that Owner.

4. Use of Outlot A and Other Provisions.

(a) L2/OA Owner hereby grants to each of the other Owners, and their successors, assigns, and to the benefit of their tenants, their employees, customers and invitees, a perpetual, non-exclusive license appurtenant to a portion of Outlot A located within Lot 2 (the "**License Area**"), for certain events and use as determined from time to time by L2/OA Owner and any of the other Owners. The boundaries of the License Area and schedule for the use of the License Area shall be determined at time of use and agreed to in a written License Agreement approved by L2/OA Owner, which approval shall not be unreasonably withheld, conditioned, or delayed. The Owner utilizing the License Area agrees that any alcohol consumed thereon shall be purchased from L2/OA Owner's tenant for the Property as long as that tenant (or L2/OA Owner) holds a liquor license for the License Area, and L2/OA Owner agrees that the cost to use the License Area shall not exceed \$10 per event. Other specific provisions shall be enumerated in the License Agreement executed for each event.

(b) Potential Future Underground Parking Garage. L2/OA Owner hereby grants to L3 Owner, and their successors, assigns, a perpetual, non-exclusive easement appurtenant to the subsurface and areas of the surface necessary for access to Outlot A for purposes of constructing an underground parking garage. The Owners shall have shared rights to any parking created in this location pro rata in proportion to each Owner's contribution to the costs related to the construction of the parking garage. No surface parking shall be allowed on Outlot A. Any improvements, landscaping or other fixtures or property disturbed by the construction of the underground parking garage by L3 Owner on Outlot A shall be restored to the condition existing prior to underground parking construction. Parties shall endeavor to schedule the construction for the underground parking garage to primarily occur between August and April of the following year to minimize disruption of the business of L2/OA Owner's tenant. Parties shall determine an equitable compensation for loss of revenue for any of the businesses located on the Properties during construction. Parties shall agree to which parties to this agreement, or outside this agreement shall be responsible for such loss.

(c) Right of First Offer for Outlot A.

(i) Grant of Right of First Offer. Commencing on the Effective Date and subject to the terms and conditions hereinafter provided OA Owner hereby grants to each of the other Owners a continuing and exclusive right of first offer to purchase the Outlot A.

(ii) Offer Notice. If OA Owner desires to sell, offer to sell, or otherwise transfer all or any portion of Outlot A, OA Owner shall first make an offer of the Outlot A or any portion thereof to the other Owners as follows:

(1) OA Owner shall first provide written notice (each, an "**Offer Notice**") thereof to the other Owners stating: (i) its bona fide intention to sell the Outlot A or a portion thereof; (ii) a description of the Outlot A or portion thereof to be offered or sold together with any other real or personal property owned or controlled by OA Owner that is a part of the subject offer or proposed sale (collectively, the "**Offered Property**"); and (iii) the price and terms upon which OA Owner proposes to offer the Offered Property. Such price cannot exceed a 3rd party appraiser's valuation by more than 10%.

(2) The other Owners (or any of the them individually) may elect to acquire all of the Offered Property identified in an Offer Notice in accordance with the terms contained in an Offer Notice by providing written notice (an "**Election Notice**") to OA Owner, within fifteen (15) days after receipt of the Offer Notice, of the other Owners' willingness to enter into a contract for the purchase of the Offered Property upon the terms in the Offer Notice. The other Owners' failure to deliver an Election Notice within such fifteen-day period the other Owners shall be deemed to have rejected the Offered Property. If multiple other Owners elect to acquire the Offered Property, they shall have the option to either: (a) acquire the party as tenants-in-common; or (b) upon the written request of either of the acquiring Owners provided to all Owners, elect to bid for Outlot A (the "**Bid Election Notice**"), in which case each of the acquiring owners shall submit a bid at or above the price in the Offer Notice within five (5) days to OA Owner, and the higher bid shall have the right to proceed with purchase of Outlot A under this Agreement.

(iii) Recurring Right. The rights of the other Owners hereunder with respect to the Outlot A are recurring rights, however, if the other Owners rejects the terms of any particular Offer Notice or otherwise fails to exercise its exclusive right of first offer with respect to a particular Offer Notice as provided herein then OA Owner shall be entitled to offer the applicable Outlot A to other prospective purchasers; provided however, if either: (a) OA Owner desires to offer the applicable Offered Property to a prospective purchaser on economic terms more favorable than those in the applicable Offer Notice by a factor of ten percent (10%) or more; or (b) OA Owner does not close on a sale of the applicable Offered Property within one hundred eighty (180) days of the other Owners' Election Notice, then The other Owners' right of first offer with respect to such portion of the Outlot A shall be re-instated and OA Owner shall be required to comply with the terms of this First Offer Agreement prior to sale of the such portion of the Outlot A.

(iv) Contract Format. Upon delivery of the other Owners' Election Notice to OA Owner, the other Owners and OA Owner shall use commercially reasonable efforts (each party to pay its own expenses incurred with respect thereto, including legal fees and costs) to prepare, execute and mutually deliver a purchase and sale agreement consistent with the offered terms and otherwise substantially consistent with the Offer Notice (each a "**Contract**") with respect to the Offered Property within twenty (20) days after OA Owner's receipt of the Election Notice.

(v) Closing. If The other Owners elects to purchase the Outlot A, the closing shall occur pursuant to the terms of the Contract.

5. Reciprocal Parking Provisions.

(a) Each of the Owners may grant to any or all of the other Owners, by separate agreement, an easement, license, or lease to park upon that Owner's property as deemed to be desirable by the parties.

6. Miscellaneous Provisions

(a) The easements herein above granted shall be used and enjoyed by the Owners respectively, and their respective successors, assigns, tenants, their employees, customers and invitees (collectively, "**Permittees**"), in such a manner so as not to unreasonably interfere with, obstruct or delay the conduct and operations of the business of any other Owner or its Permittees at any time conducted on its property, including, without limitation, public access to and from said business, and the receipt or delivery of merchandise in connection therewith. Once commenced, any construction undertaken in reliance upon the Construction Easement granted herein shall be diligently prosecuted to completion, so as to minimize any interference with the business of any Owner and its Permittees. Except in cases of emergency, the right of any Owner to enter upon the property of another Owner for the exercise of any right pursuant to the easements set forth, or to prosecute work on such Owner's own property if the same interferes with utility or drainage easements or easements of ingress, egress or access to or in favor of another party, shall be undertaken only in such a manner so as to minimize any interference with the business of the other Owner and its Permittees. In such case, no affirmative monetary obligation shall be imposed upon the other Owner(s), and the Owner undertaking such work shall, with due diligence, repair, at its sole cost and expense, any and all damage caused by such work and restore the affected portion of the property upon which such work is performed to a condition which is equal to or better than the condition which existed prior to the commencement of such work. In addition, the Owner undertaking such work shall pay all costs and expenses associated therewith and shall indemnify and hold harmless the other affected Owner(s) and its Permittees from all damages, losses, liens or claims attributable to the performance of such work.

(b) Once one of the Owners has constructed the applicable improvements within the Common Area and/or the Utility and Drainage Easement Area per City of Louisville approved plans, no Owner shall make any changes to the location or configuration of such improvements without the prior written consent of the other Owners, such consent not to be unreasonably withheld, conditioned or delayed.

7. Indemnification. Each Owner having rights with respect to an easement granted hereunder shall indemnify and hold the Owner whose property is subject to the easement harmless from and against all claims, liabilities and expenses (including reasonable attorneys' fees) relating to accidents, injuries, loss, or damage of or to any person or property arising from the exercise by an Owner of its easement rights granted hereunder or arising from the construction of the Easement Area as provided in this Agreement, which are caused by the negligent, intentional or willful acts or omissions of such Owner, its contractors, employees, agents, or others acting on behalf of such Owner.

8. Exculpation. Notwithstanding any other provisions of this Agreement, whether express or implied, or any obligation or duty at law or in equity, no members, officers, directors, stockholders, partners, managers, employees, affiliates, representatives or agents of any Owner (individually, a

"Covered Person" and, collectively, the "Covered Persons") shall be liable to any other party or person for any act or omission taken or omitted by a Covered Person in good faith reliance on the provisions of this Agreement, provided such act or omission does not constitute willful misconduct, gross negligence, or a knowing violation of law.

9. Maintenance and Repair. Each Owner shall maintain and repair those portions of the Common Area on their respective property in good condition and repair to permit the reasonable use of the Common Area Easement granted herein. Regular maintenance such as snow removal within the Common Area shall be split evenly between all Owners. The cost of any repairs to the Common Area shall be split evenly between all Owners. If maintenance and repairs are required for the utility and drainage facilities within the Utility and Drainage Easement Area, the cost of such repair and maintenance shall be split evenly between all Owners.

10. Insurance.

(a) Throughout the term of this Agreement, each Owner shall procure and maintain general and/or comprehensive public liability and property damage insurance against claims for personal injury (including contractual liability arising under the indemnity contained in paragraph 7 above), death, or property damage occurring upon such Owner's Property, with single limit coverage of not less than an aggregate of One Million Dollars (\$1,000,000.00) including umbrella coverage, if any, and naming the other Owners (provided the Owner obtaining such insurance has been supplied with the name of such other Owners in the event of a change thereof) as additional insureds. Any insurance coverage required herein may be included in general or blanket policies of insurance. Each Owner shall furnish evidence of such insurance to another Owner within fifteen (15) days following written request.

(b) To the extent of insurance proceeds actually received, each Owner hereby waives and releases the other Owners from any and all liability (to each other and anyone claiming under any of them by subrogation or otherwise) for matters insured or required to be insured hereunder.

11. Non-Conflicting Uses. Nothing in this Agreement shall be construed to prevent an Owner from the reasonable use of the property owned by such Owner, provided such use does not interfere with the other Owners' rights hereunder.

12. Performance of Other Party's Obligations.

(a) In the event of an emergency requiring maintenance or repair to or of the Common Area or the Utility and Drainage Easement Area described herein, if the Owner who is responsible for such maintenance and repair (the "**Responsible Party**") does not, upon reasonable advance notice under the circumstances, undertake the same within a period of time that is reasonable under the circumstances or it does not appear that the Responsible Party will, or will be able to, undertake such maintenance or repair, the other Owner(s) may, at any of their option, perform such maintenance or repair and pay the costs associated therewith (subject to reimbursement from the Responsible Party as described below).

(b) In the event a failure by an Owner hereto to maintain or repair the easement area for which such party is responsible for maintenance and repair results in a material interference with the rights granted to the other Owners by this Agreement or with the use or operation of another

Owner's property, but does not result in an emergency, the other Owner(s) may notify the party in default in writing of such failure. In the event the Owner in default fails to remedy the default within ten (10) days after receipt of such notice or, if such default cannot reasonably be cured within ten (10) days, in the event the Owner in default fails to commence the cure of such default within such ten (10) day period and diligently pursue such cure to completion, the other Owner, or Owners may, at their option, perform the obligation which the Owner in default has failed to properly perform hereunder and pay any and all costs and charges associated therewith.

(c) In any event described in subparagraphs 12(a) or 12(b) above, the performing Owner(s) shall be entitled to recover from the Responsible Party the charges, fees, costs and expenses incurred by the performing Owner(s) in connection therewith (including reasonable attorneys' fees), together with interest thereon at a rate of fifteen percent (15%) per annum from the date of payment. Such charges, fees, costs, expenses and interest shall be paid by the other party within fifteen (15) days from receipt of a statement thereof from the performing Owner(s) (accompanied by reasonable documentation substantiating such statement).

(d) Notwithstanding the foregoing, in the event of (i) a blockage or material impairment of the easement rights, and/or (ii) the unauthorized parking of vehicles on any Owner's property, an Owner may immediately cure the same and be reimbursed by the other party upon demand for the reasonable cost thereof together with interest at the rate of fifteen percent (15%) per annum.

(e) In the event of a violation or threat thereof of any of the provisions of Section 2 of this Agreement, each Owner agrees that such violation or threat thereof shall cause the nondefaulting Owner(s) and/or its Permittees to suffer irreparable harm and such nondefaulting Owner(s) and its Permittees shall have no adequate remedy at law. As a result, in the event of a violation or threat thereof of any of the provisions of paragraphs 2 or 4 of this Agreement, the nondefaulting Owner(s), in addition to all remedies available at law or otherwise under this Agreement, shall be entitled to injunctive or other equitable relief to enjoin a violation or threat thereof of Section 2 of this Agreement. Notwithstanding anything to the contrary, however, in no event shall any Owner become liable to another Owner for, and each Owner hereby waives, consequential, indirect, incidental, punitive, special and/or other speculative damages arising out of, relating to or in connection with any breach of this Agreement by another Owner.

13. Notices. All notices and demands which may or are to be required or permitted to be given by either party to the other hereunder shall be in writing. All notices and demands shall be sent by personal delivery, receipted overnight delivery, email (if provided), or registered or certified mail, postage prepaid, and to the applicable address below:

To L1 Owner:

R.C.C. LLC
441 Elk Trail
Lafayette, Colorado 80026
Attn: Randy Caranci
Email randy@carancicorp.com

To L2/OA Owner:

Louisville Mill Site, LLC
950 Spruce Street, Suite 2C
Louisville, Colorado 80027

Attn: Erik Hartronft and Caleb Dickinson
Email: erik@hapcdesign.com
caleb@foxpropertymgmt.com

To L3 Owner: 544CR LLC
950 Spruce Street, Suite 2C
Louisville, Colorado 80027
Attn: Erik Hartronft and Randy Caranci
Email: erik@hapcdesign.com
randy@carancicorp.com

Any Owner may at any time change its respective address by sending written notice of the change to the other Owners in the manner hereinabove prescribed. Notices shall be deemed to be given (a) upon receipt (or refusal thereof) if by personal delivery or email, (b) on the first (1st) business day after deposit with a receipted overnight delivery service, or (c) on the third (3rd) business day after mailing, if sent by registered or certified mail, postage prepaid.

14. Attorneys' Fees and Costs. In the event of any dispute arising out of this Agreement, or in the event of enforcement of any of the provisions of this Agreement, the prevailing party shall be entitled to recover its reasonable costs and attorneys' fees from the non-prevailing party.

15. Term and Amendment. This Agreement shall become effective upon its recordation in the Office of the Clerk and Recorder for Boulder County, Colorado, and shall run with the land, regardless of whether specifically mentioned in any subsequent deed or conveyance of all or a part of any of the Properties, and shall be binding on all persons subsequently acquiring all or a part thereof and any tenant or licensee. This Agreement may be amended or modified only by an instrument signed by all Owners. No amendment shall become effective prior to being recorded in the Office of the Clerk and Recorder for Boulder County, Colorado.

16. Applicable Law. This Agreement shall be construed and enforced under the laws of the State of Colorado.

17. Estoppel Certificates. Each Owner, within twenty (20) day of its receipt of a written request from another Owner, shall from time to time provide the requesting Owner, a certificate binding upon such Owner stating: (a) to the best of such Owner's knowledge, whether any party to this Agreement is in default or violation of this Agreement and if so identifying such default or violation; and (b) that this Agreement is in full force and effect and identifying any amendments to the Agreement as of the date of such certificate.

18. Severability. Invalidation of any term or provision of this Agreement, by judgment or court order, shall not affect any of the other provisions hereof which shall remain in full force and effect.

19. Entire Agreement. This Agreement contains all the provisions and terms between the Owners relating to the matters set forth herein, and supersedes all prior or contemporaneous agreement or understanding, written or oral, pertaining to the same.

20. Counterparts. This Agreement may be executed in one or more counterparts, each of which will be deemed an original, and all of which together will constitute one single document.

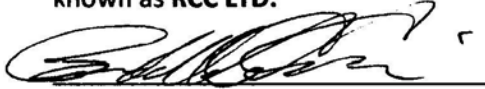
[SIGNATURES ON FOLLOWING PAGE]

IN WITNESS HEREOF, the foregoing instrument has been executed by the parties effective as of the date set forth above.

L1 OWNER:

R.C.C. LLC

a Colorado limited liability company formerly
known as **RCC LTD.**



By: Randall C. Caranci, Manager

STATE OF COLORADO)

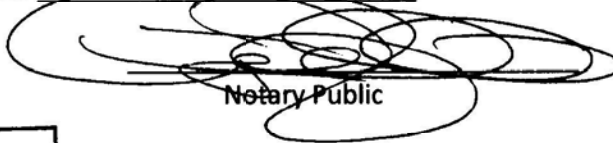
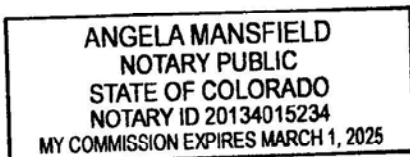
COUNTY OF Boulder) ss
)

The foregoing instrument was acknowledged before this 23rd day of January, 2025, by Randall C. Caranci, Manager of R.C.C. LLC, a Colorado limited liability company formerly known as RCC LTD., a partnership.

Witness my hand and official seal.

My commission expires:

31.2025


Notary Public

L2/OA OWNER:

LOUISVILLE MILL SITE LLC,
Colorado limited liability company


By: J. Caleb Dickinson, Manager

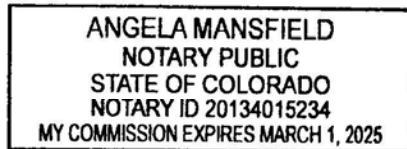

By: J. Erik Hartronft, Manager

STATE OF COLORADO)
COUNTY OF Boulder) ss
)

The foregoing instrument was acknowledged before this 23rd day of January 2025, by J. Caleb Dickinson, Manager of Louisville Mill Site LLC, a Colorado limited liability company.

Witness my hand and official seal.

My commission expires: 3-1-2025



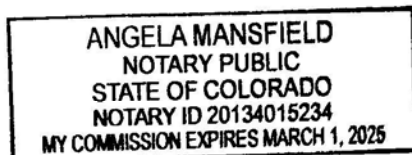

Notary Public

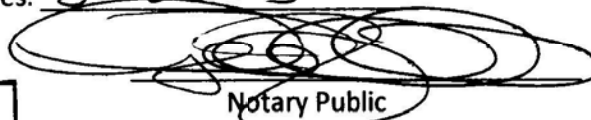
STATE OF COLORADO)
COUNTY OF Boulder) ss
)

The foregoing instrument was acknowledged before this 23rd day of January 2025, by J. Erik Hartronft, Manager of Louisville Mill Site LLC, a Colorado limited liability company.

Witness my hand and official seal.

My commission expires: 3-1-2025



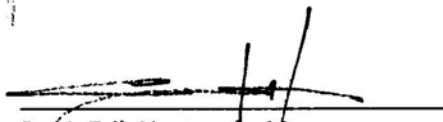

Notary Public

L3 OWNER:

544CR LLC,
a Colorado limited liability company



By: Randall C. Caranci, Manager



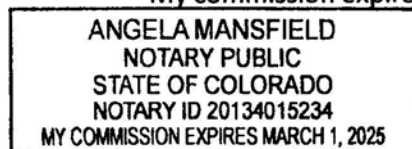
By: J. Erik Hartronft, Manager

STATE OF COLORADO)
COUNTY OF Boulder) ss
)

The foregoing instrument was acknowledged before this 23rd day of January, 2025, by Randall C. Caranci, Manager of 544CR LLC, a Colorado limited liability company.

Witness my hand and official seal.

My commission expires: 3-1-2025



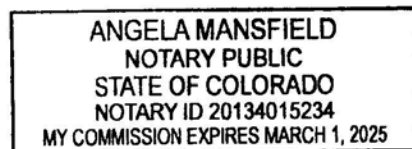
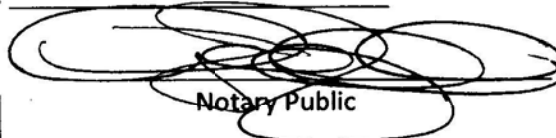

Notary Public

STATE OF COLORADO)
COUNTY OF Boulder) ss
)

The foregoing instrument was acknowledged before this 23rd day of January, 2025, by J. Erik Hartronft, Manager of 544CR LLC, a Colorado limited liability company.

Witness my hand and official seal.

My commission expires: 3-1-2025

Notary Public

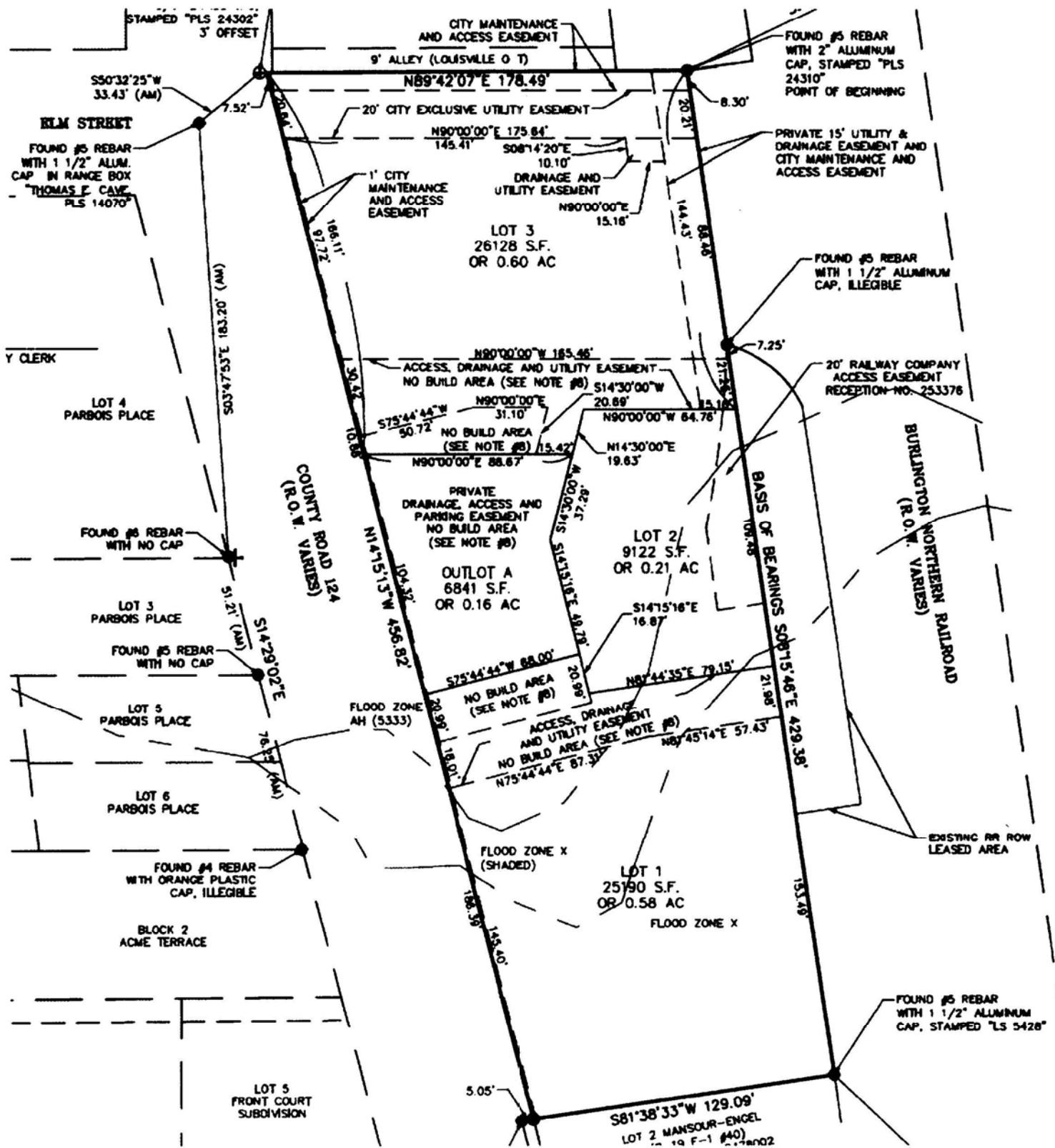


Exhibit A

EXHIBIT B
Lease Exhibit – Caranci Inc. & BNSF Railway Company

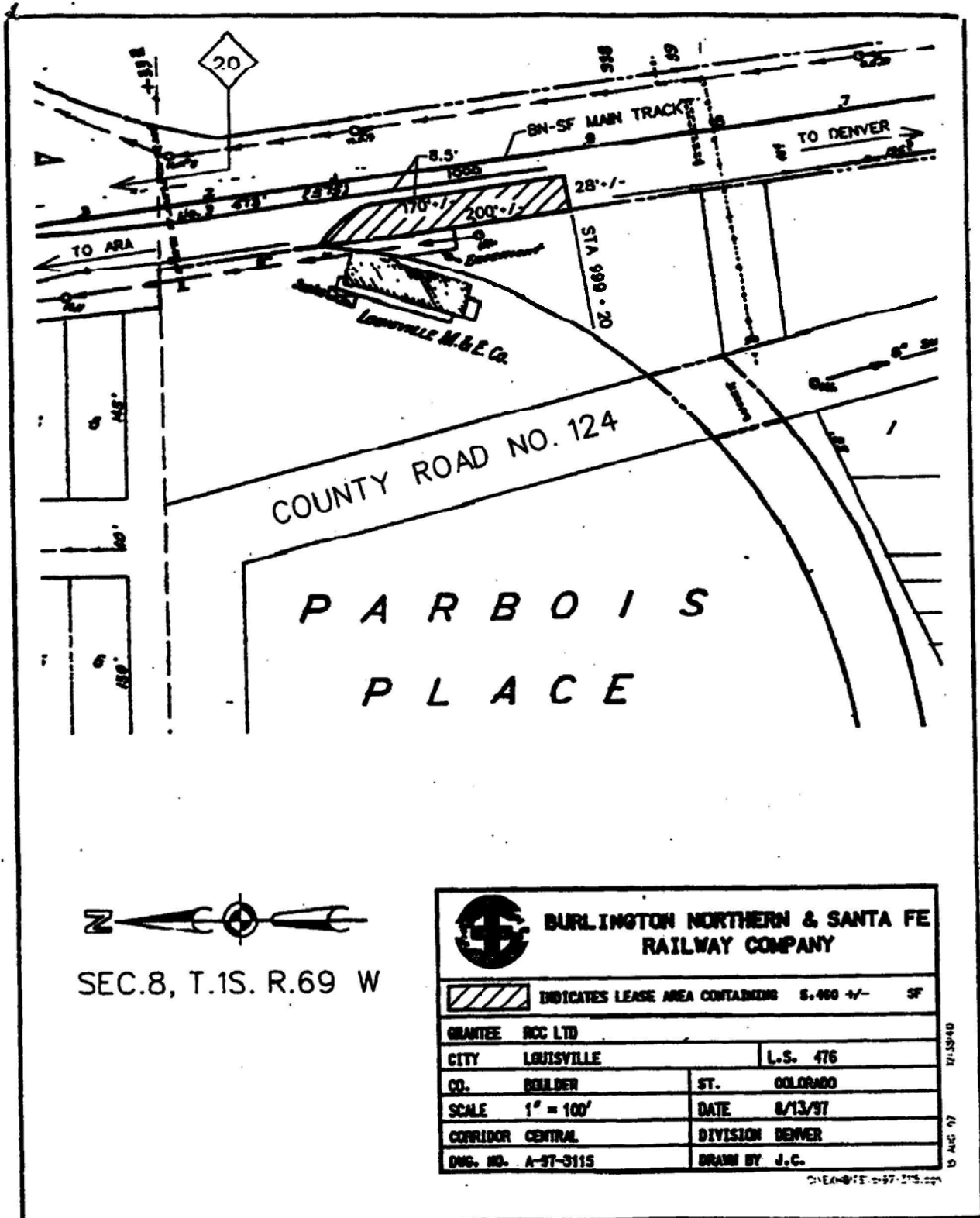


Exhibit C

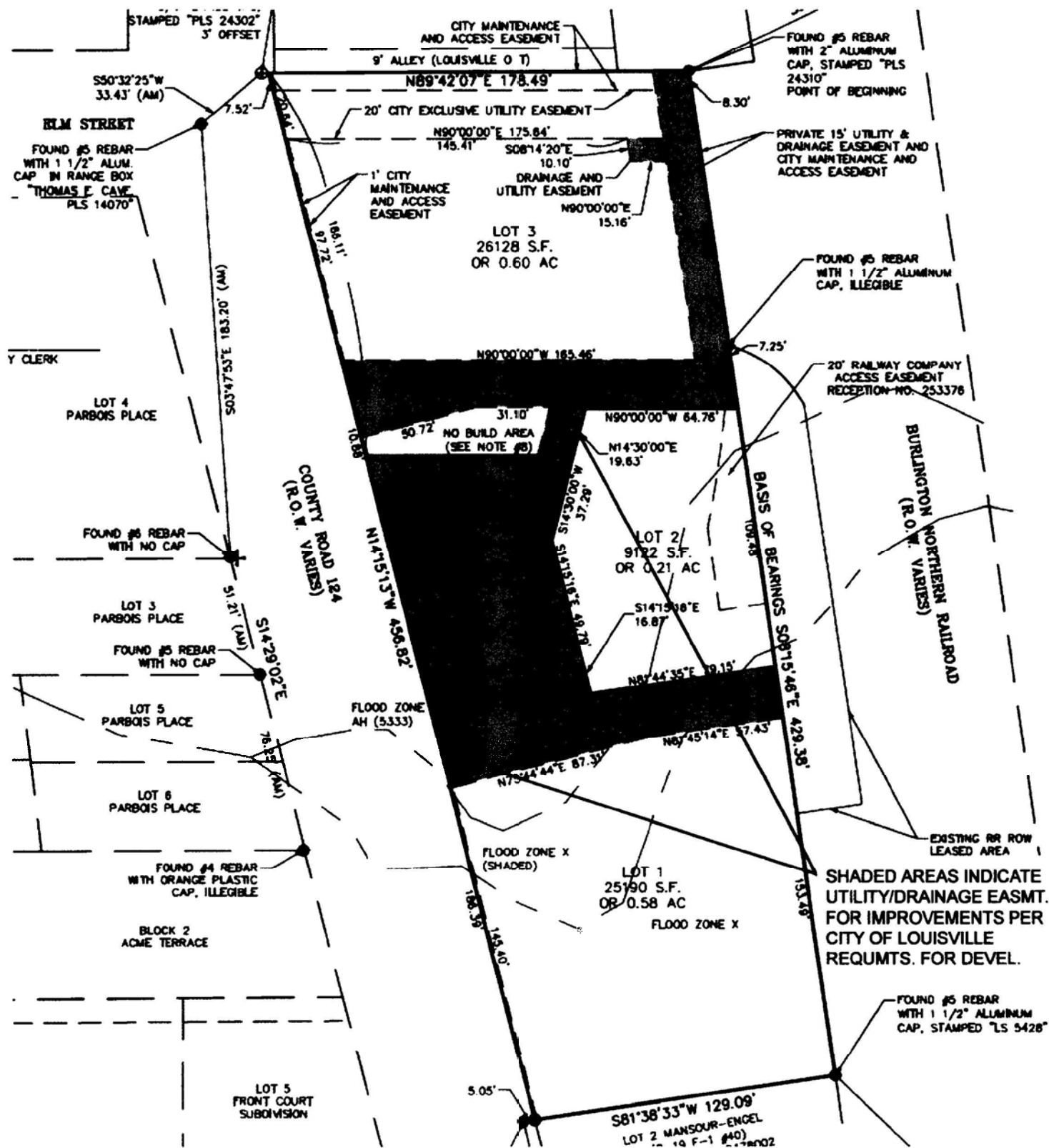
EXHIBIT D**Utility and Drainage Easement**

Exhibit D

LEGAL DESCRIPTION (PER TITLE COMMITMENT)

LOT 1, LOUISVILLE MILL SITE SUBDIVISION, COUNTY OF BOULDER, STATE OF COLORADO.

TITLE COMMITMENT NOTES

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY SITESURVEYS LLC. FIRST AMERICAN TITLE COMMITMENT NO. 3509-433016, EFFECTIVE DATE 08/19/2025 AT 8:00 A.M. WAS SOLELY RELIED UPON FOR INFORMATION REGARDING EASEMENTS, RIGHTS-OF-WAY, AND ENCUMBRANCES OF RECORD IN THE PREPARATION OF THIS SURVEY.

THE FOLLOWING ITEMS ARE AS ENUMERATED IN SCHEDULE B-2 EXCEPTIONS. [SURVEYOR'S NOTES]

ITEMS 1-7 STANDARD EXCEPTIONS REFER TO TITLE COMMITMENT.

B- ANY WATER RIGHTS, CLAIMS OR TITLE TO WATER, IN, ON OR UNDER THE LAND, WHETHER OR NOT THE MATTERS EXCEPTED ARE SHOWN BY THE PUBLIC RECORDS. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

B- ANY INTEREST IN ALL OIL, GAS AND OTHER MINERALS AS RESERVED BY UNION PACIFIC COAL COMPANY IN DEED RECORDED AUGUST 31, 1905 IN BOOK 296 AT PAGE 53, TOGETHER WITH ANY RIGHTS OF MINERS AND EGRESS THEREIN AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

NOTE: REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT RECORDED MAY 11, 2002 AT RECEPTION NO. 228849. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE. RAILROAD SHOWN]

10- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN EASEMENT DEED BY COURT ORDER IN SETTLEMENT OF LANDOWNER ACTION RECORDED MARCH 14, 2013 AT RECEPTION NO. 329705. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

11- NOTES AND EASEMENTS AS SHOWN ON THE PLAT OF LOUISVILLE MILL SITE SUBDIVISION RECORDED DECEMBER 13, 2016 AT RECEPTION NO. 3563028. [AFFECTS THE PROPERTY AND IS SHOWN]

12- COVENANTS, CONDITIONS, RESTRICTIONS AND EASEMENTS, IF ANY, WHICH DO NOT CONTAIN A FORTITURE OR REVERTER CLAUSE, DECLARING ANY RESTRICTIONS INDICATING ANY PREFERENCE, LIMITATION OR DISCRIMINATION BASED ON RACE, COLOR, RELIGION, SEX, HANDICAP, FAMILIAL STATUS OR NATIONAL ORIGIN, AS CONTAINED IN INSTRUMENT RECORDED DECEMBER 13, 2016 AT RECEPTION NO. 3563028 AND ANY AND ALL AMENDMENTS AND/OR SUPPLEMENTS THERETO. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

13- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN SUBDIVISION AGREEMENT RECORDED DECEMBER 13, 2016 3563035. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

14- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN FINAL P.L.O.D. LOUISVILLE MILL SITE REDEVELOPMENT RECORDED DECEMBER 13, 2016 AT RECEPTION NO. 3563036. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

15- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN SPECIAL REVIEW USE LOUISVILLE MILL SITE REDEVELOPMENT RECORDED DECEMBER 13, 2016 AT RECEPTION NO. 3563038. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

16- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN COMMON AREA USE, MAINTENANCE AND MANAGEMENT AGREEMENT RECORDED JANUARY 29, 2025 AT RECEPTION NO. 407473. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

17- ANY EXISTING LEASES OR TENANCIES.

LEGAL DESCRIPTION (PER TITLE COMMITMENT)

LOT 2 AND 3 AND OUTLOT A, LOUISVILLE MILL SITE SUBDIVISION, COUNTY OF BOULDER, STATE OF COLORADO.

TITLE COMMITMENT NOTES

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY SITESURVEYS LLC. FIRST AMERICAN TITLE COMMITMENT NO. 3509-433069A, EFFECTIVE DATE 01/13/2025 AT 8:00 A.M. WAS SOLELY RELIED UPON FOR INFORMATION REGARDING EASEMENTS, RIGHTS-OF-WAY, AND ENCUMBRANCES OF RECORD IN THE PREPARATION OF THIS SURVEY.

THE FOLLOWING ITEMS ARE AS ENUMERATED IN SCHEDULE B-2 EXCEPTIONS. [SURVEYOR'S NOTES]

ITEMS 1-7 STANDARD EXCEPTIONS REFER TO TITLE COMMITMENT.

B- ANY WATER RIGHTS, CLAIMS OR TITLE TO WATER, IN, ON OR UNDER THE LAND, WHETHER OR NOT THE MATTERS EXCEPTED ARE SHOWN BY THE PUBLIC RECORDS. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

B- RESERVATIONS MADE BY THE UNION PACIFIC RAILWAY COMPANY IN DEED RECORDED AUGUST 31, 1905 IN BOOK 296 AT PAGE 53, PROVIDING SUBSTANTIALLY AS FOLLOWS: RESERVING UNTO THE COMPANY AND ITS ASSIGNS ALL COAL THAT MAY BE FOUND UNDERNEATH SURFACE OF LAND HEREIN DESCRIBED AND THE EXCLUSIVE RIGHT TO PROSPECT AND MINE FOR SAME, ALSO SUCH RIGHT OF WAY AND OTHER GROUNDS AS MAY APPEAR NECESSARY FOR PROPER WORKING OF ANY COAL MINES THAT MAY BE DEVELOPED UPON SAID PREMISES, AND FOR TRANSPORTATION OF COAL FROM SAME, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTEREST THEREIN. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT IN CONNECTION WITH THE ABOVE RESERVATION RECORDED MAY 17, 2002 AT RECEPTION NO. 228849. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE. RAILROAD SHOWN]

10- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN EASEMENT DEED BY COURT ORDER IN SETTLEMENT OF LANDOWNER ACTION RECORDED MARCH 14, 2013 AT RECEPTION NO. 329705. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

11- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN RESOLUTION NO. 30 SERIES 2015 RECORDED MAY 29, 2015 AT RECEPTION NO. 3448801 AND RE- RECORDED DECEMBER 13, 2016 AT RECEPTION NO. 3563033. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

12- NOTES AND EASEMENTS AS SHOWN ON THE PLAT OF LOUISVILLE MILL SITE SUBDIVISION RECORDED DECEMBER 13, 2016 AT RECEPTION NO. 3563028. [AFFECTS THE PROPERTY AND IS SHOWN]

13- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN SUBDIVISION AGREEMENT RECORDED DECEMBER 13, 2016 3563035. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

14- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN GRANT OF CONSERVATION EASEMENT IN GRASS RECORDED DECEMBER 13, 2016 AT RECEPTION NO. 3563036. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE. LOT 2]

15- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN FINAL P.L.O.D. LOUISVILLE MILL SITE REDEVELOPMENT RECORDED DECEMBER 13, 2016 AT RECEPTION NO. 3563038. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

16- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN SPECIAL REVIEW USE LOUISVILLE MILL SITE REDEVELOPMENT RECORDED DECEMBER 13, 2016 AT RECEPTION NO. 3563038. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

17- ANY EXISTING LEASES OR TENANCIES.

18- TERMS, AGREEMENTS, PROVISIONS, CONDITIONS, OBLIGATIONS, EASEMENTS, AND RESTRICTIONS, IF ANY, AS CONTAINED IN COMMON AREA USE, MAINTENANCE AND MANAGEMENT AGREEMENT RECORDED JANUARY 29, 2025 AT RECEPTION NO. 407473. [AFFECTS THE PROPERTY BUT IS BLANKET IN NATURE]

SURVEY NOTES

- THE BASIS OF BEARINGS IS THE NORTH LINE OF LOT 3 BETWEEN THE FOUND MONUMENTS SHOWN HEREON AND BEARS 089°42'07"W, PER THE PLAT.
- ORIGIN BENCH MARK: CITY OF LOUISVILLE LPS, FOUND 2.5" ALUMINUM CAP IN A RANGE BOX IN SOUTH ST. BEING THE CENTER E 1/6 CORNER OF SECTION 8. ELEVATION=5448.49' (NAD83). SITE BENCHMARKS AS SHOWN. CONTOURS SHOWN ARE FROM A GROUND SURVEY.
- THE SIZE AND TYPE OF MONUMENTS FOUND ARE SHOWN HEREON. ALL MONUMENTS AT GRADE UNLESS NOTED.
- BUILDING MEASUREMENTS ARE AT GROUND LEVEL. ROOF OVERHANGS AND ARCHITECTURAL PROJECTIONS OF THE BUILDINGS ARE WITHIN THE BOUNDARY OF THE SITE BUT ARE NOT SHOWN ON THIS SURVEY UNLESS NOTED.
- NOTICE: ACCORDING TO COLORADO LAW, YOU MUST COMMENCE ANY LEGAL ACTION BASED ON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVERED SUCH DEFECT. IN NO EVENT, MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON. CRS-13-80-105 (2)(a)
- FLOOD PLAIN DESIGNATION OF THE SURVEYED PROPERTY PER FIRM MAP NUMBER 08030282C, 08/19/2019 IS ZONE X, BEING AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. AREAS OF ZONE X SHOWN AS SHOWN.
- THE LOCATION OF THE ABOVE GROUND UTILITIES SHOWN HEREON ARE BASED ON THE FIELD SURVEY BY SITESURVEYS LLC. A PRIVATE UTILITY LOCATE WAS DONE BY LSC UNDERGROUND CONSULTING SOLUTIONS ON 09/16/2025. THE LOCATIONS OF THE UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON SAID SURVEY AND INFORMATION PROVIDED BY LSC. CITY OF LOUISVILLE, ICD, AND GIST MAPING. SITESURVEYS LLC IS NOT RESPONSIBLE FOR UTILITY INFORMATION PROVIDED BY OTHERS. SITESURVEYS LLC RECOMMENDS THAT THE LOCATION OF THE UTILITIES BE FIELD VERIFIED PRIOR TO ANY DIGGING ON, OR ADJACENT TO THE SUBJECT PROPERTY.
- LAND SURVEY PLATS OR PLATS, REFERENCED OR USED FOR THIS SURVEY: LS-13-093, ALTA/ACSM SURVEY BY SCOTT COX & ASSOCIATES, PLS 24302.
- ALL ADJOINING STREETS ARE PUBLIC.
- NO OBSERVABLE EVIDENCE OF CURRENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS, NO OBSERVED EVIDENCE OF PROPOSED STREET RIGHT OF WAY LINES, RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS, NO RECORD OF OFFSITE EASEMENTS OR SERVITUDES BENEFITING THE SURVEYED PROPERTY.

CERTIFICATION

TO: FIRST AMERICAN TITLE; LOUISVILLE MILL SITE LLC, A COLORADO LIMITED LIABILITY COMPANY

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1-15, 71(1)(b), 8, 9, 11(a)(b), AND 13 OF TABLE A THEREOF. THE FIELDWORK WAS COMPLETED 09/26/2025.

A. JOHN BURL, PLS 24308
FOR AND ON BEHALF OF
SITESURVEYS LLC



LEGEND

	EXISTING DECEDUOUS TREE
	EXISTING CONTOUR
	EXISTING STAKE
	SET 40 REBAR WITH 1" RED PLASTIC CAP STAMPED PLS 24302 (PACS) (UNLESS NOTED)
	SET NAIL AND 1.5" ALUMINUM TAG STAMPED PLS 24302 (NAIL/TAG) AS NOTED
	FOUND MONUMENT AS NOTED
	EXISTING ELECTRIC METER
	EXISTING MANHOLE
	EXISTING WATER VALVE
	EXISTING CLEANOUT
	EXISTING GAS METER
	EXISTING WATER METER
	CONTROL POINT
	EXISTING POWER POLE
	EXISTING LIGHT POLE
	EXISTING SIGN
	EXISTING FIRE HYDRANT
	EXISTING SPRINKLER VALVE BOX
	EXISTING FENCE
	EXISTING UNDERGROUND POWER LINE
	EXISTING OVERHEAD POWER LINE
	EXISTING GAS LINE
	EXISTING SANITARY SEWER W/MANHOLE
	EXISTING WATER W/FIRE HYDRANT
	EXISTING STORM SEWER W/MANHOLE
	RECORD COURSE PER PLAT
	MEASURED COURSE PER THIS SURVEY

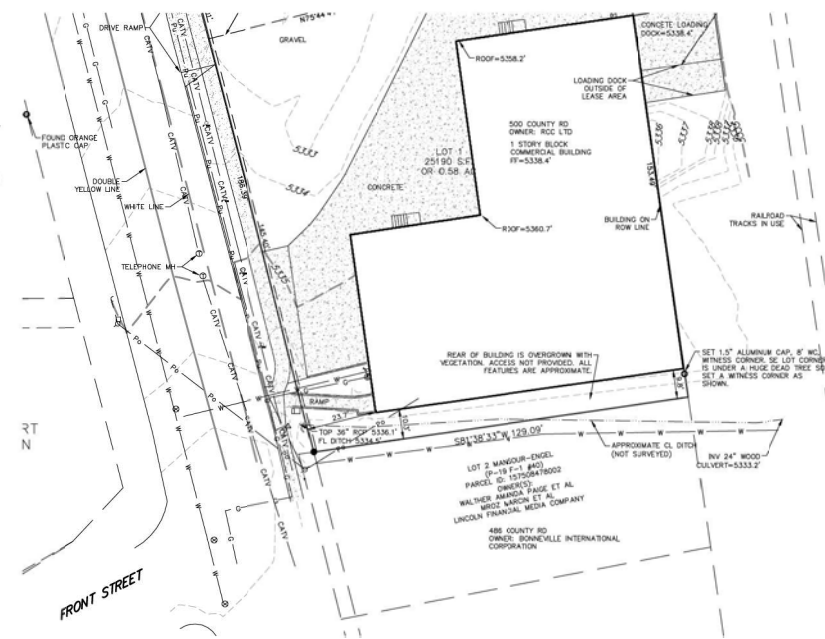
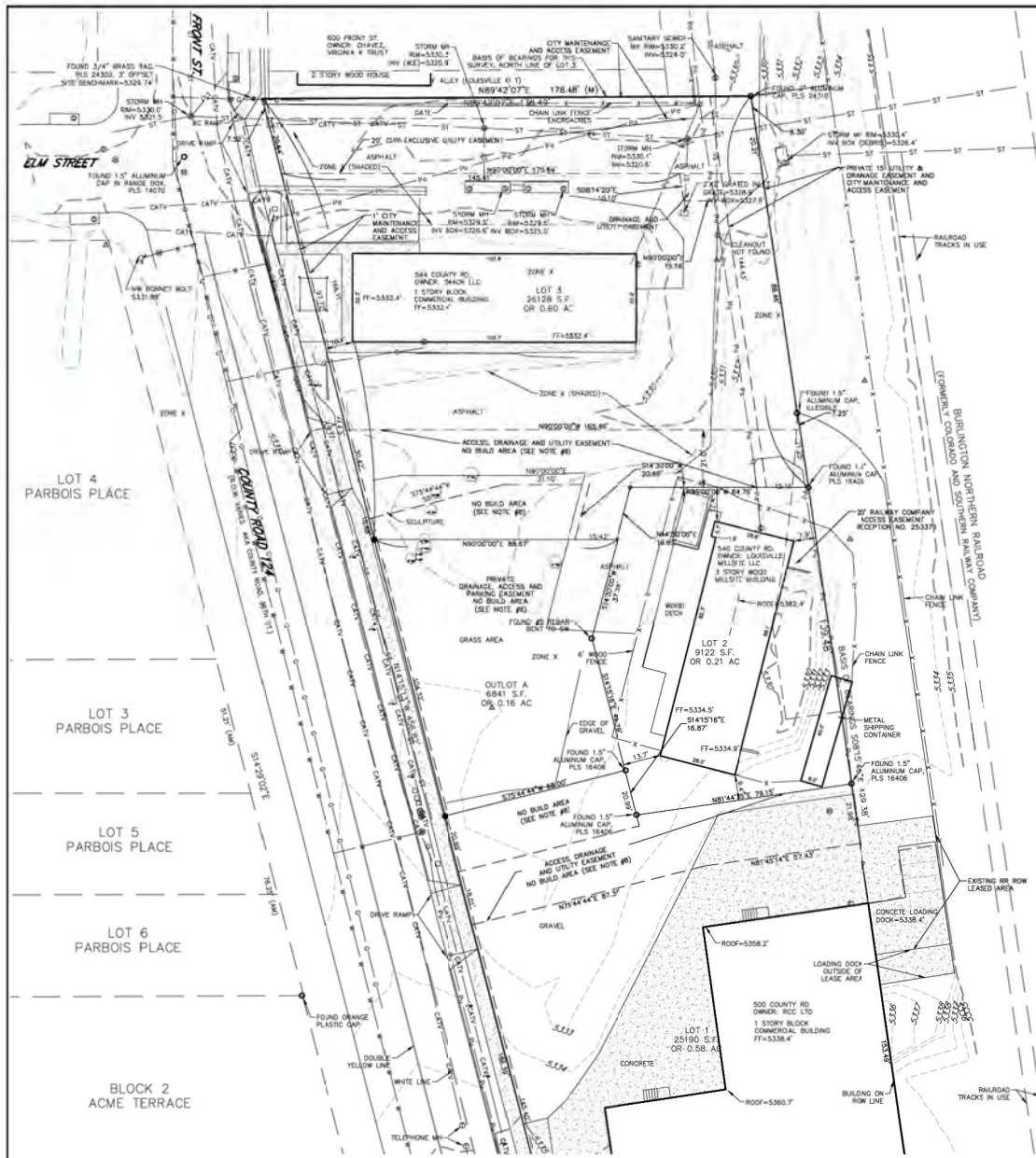
Scale: 1" = 20'
U.S. SURVEY FEET

ALTA/NSPS LAND TITLE SURVEY
LOCATED IN THE SE 1/4 OF SEC. 8,
T1S R69W OF THE 6TH P.M.
CITY OF LOUISVILLE
COUNTY OF BOULDER
STATE OF COLORADO
500, 540, 544 COUNTY RD.

SITESURVEYS LLC

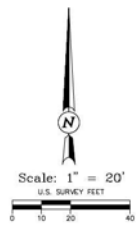
Land Surveyors
186 Wrensch Court • Louisville, Colorado 80027
(303) 616-7831 • info@sitesurveys.com

Designed by	AJB	Date	09/03/25	Scale	1"=20'	Growing no.	25438-2	Sheet	1
Drawn by	JAS	Revision		Description		Date		Project no.	25438
Checked by	AJB								



LEGEND

- EXISTING DECIDUOUS TREE
- EXISTING CONTOUR
- EXISTING SWALE
- SET 4" REBAR WITH 1" RED PLASTIC CAP
- STAMPED PLS 24302 (P&G) (UNLESS NOTED)
- SET NAIL AND 1.5" ALUMINUM TAG
- STAMPED PLS 24302 (NAILTAG) AS NOTED
- FOUND MONUMENT AS NOTED
- EXISTING ELECTRIC METER
- EXISTING WALDOX
- EXISTING WATER VALVE
- EXISTING CLEANOUT
- EXISTING GAS METER
- EXISTING WATER METER
- CONTROL POINT
- EXISTING POWER POLE
- EXISTING LIGHT POLE
- EXISTING SIGN
- EXISTING FIRE HYDRANT
- EXISTING SPRINKLER VALVE BOX
- EXISTING FENCE
- EXISTING UNDERGROUND POWER LINE
- EXISTING OVERHEAD POWER LINE
- EXISTING GAS LINE
- EXISTING SANITARY SEWER W/MANHOLE
- EXISTING WATER W/FIRE HYDRANT
- EXISTING STORM SEWER W/MANHOLE
- RECORD COURSE PER PLAT
- MEASURED COURSE PER THIS SURVEY



ALTA/NSPS LAND TITLE SURVEY
 LOCATED IN THE SE 1/4 OF SEC. 8,
 T1S R69W OF THE 6TH P.M.
 CITY OF LOUISVILLE
 COUNTY OF BOULDER
 STATE OF COLORADO
 500, 540, 544 COUNTY RD.

SITESURVEYS LLC				
Land Surveyors				
186 W. 1st Street • Louisville, Colorado 80027				
(303) 915-1800 • info@sitesurveys.com				
Designed by	Date	Scale	Growing no.	Sheet
AJB	09/03/25	1"=20'	25438-2	2
Drawn by	Revision	Description	Date	Project no.
JAS				25438
Checked by	Revision	Description	Date	Project no.
AJB				25438

siteworks

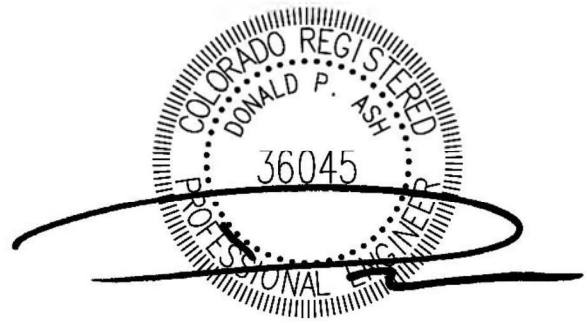
Phase I
Drainage Report

Louisville Mill Site Redevelopment
540 County Road
Louisville, CO

09/12/2025

ENGINEER'S STATEMENT

I hereby certify that this Phase I Drainage Report for 540 County Road was prepared by me, or under my direct supervision, in accordance with sound engineering practice and all applicable state, federal and local regulations.



Donald P. Ash
Registered Professional Engineer
State of Colorado No. 36045

TABLE OF CONTENTS

I.	GENERAL LOCATION AND DESCRIPTION.....	1
A.	Location	1
B.	Description of Property	1
II.	HISTORIC DRAINAGE	2
A.	Major Basin Description	2
B.	Sub-Basin Description.....	2
III.	DRAINAGE DESIGN CRITERIA.....	3
A.	Development Criteria Reference and Constraints.....	3
B.	Hydrological Criteria.....	3
C.	Hydraulic Criteria.....	4
D.	Adaptions from Criteria	4
IV.	DRAINAGE FACILITY DESIGN	5
A.	General Concepts.....	5
B.	Specific Details.....	5
V.	SUMMARY.....	7
A.	Compliance with Standards.....	7
B.	Drainage Concept	7
VI.	REFERENCES.....	8
VII.	APPENDICES	
A.	LOCATON MAP	
B.	DRAINAGE PLAN	
C.	HYDROLOGIC CALCULATIONS	
D.	WATER QUALITY CALCULATIONS	
E.	RELEVANT DOVUMENTS	

I. GENERAL LOCATION AND DESCRIPTION

A. Location

1. This report is submitted as the Phase I Drainage Report of the existing and proposed conditions for the property located at 540 County Road in Louisville, Colorado.
2. The site is located in the southeast quarter of Section 8, Township 1 South, Range 69 West of the 6th Principal Meridian in the City of Louisville, Boulder County, State of Colorado.
3. The site is bounded by Burlington Northern Railway to the east, commercial lots to the south and north, County Road to the West, and residential lots on the west side of County Road. A Vicinity Map is included in Appendix A.

B. Description of Property

1. The existing .58-acre site is currently developed with an existing mill building.
2. Existing ground cover consists of grass, a gravel driveway and existing mill building.
The site generally flows to the north and surface drains into an existing asphalt parking lot and into a 2'x2' inlet located in Lot 3. Existing drainage patterns are shown on the Drainage Plan that is included with this report.
3. The United States Department of Agriculture (USGS) Natural Resources Conservation Service (NRCS) Soil Survey for the site identifies the majority of the existing site soils as Ascalon Sandy Loam (AcA) with a hydrologic soil group of B.
4. There are no major or minor drainageways located on or near the property.
5. There are no irrigation facilities located on or near the site.
6. The proposed land use will be commercial. A Planned Unit Development (PUD) Zoning overlay will control the specific zoning on the subject property.
7. There are no wetland areas located on the property.
8. There are no drainage easements that are affected by the proposed improvements.

II. HISTORIC DRAINAGE

A. Major Basin Description

1. This site is not located within any drainageways.
2. FEMA LOMR effective: March 8, 2018 reduced the mapped flooding potential on the site from Zone AH to Zone X (shaded) and the site is now mostly outside of any mapped flood zone.
3. Based on the FEMA Flood Insurance Rate Map (FIRM) - Map Number 08013C0582K dated August 15, 2019. The north of Outlot A is located in Zone X (shaded), areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage area less than 1 square mile. The entirety of Lot 2 is outside of any mapped floodplain.
4. The majority of the site generally slopes from the south to north to the northeast at an approximate slope of 1%-3%. Existing ground cover consists of grass, a gravel driveway and an existing mill building. The site drainage discharges via surface drainage to the asphalt drive on the south side of Lot 3, where it drains through the parking lot to the east and north into an existing 2'x2' graded inlet.
5. There are no irrigation ditches or facilities which will be affected by the proposed development.
6. There are no lakes or ponds which influence or may be influenced by the local drainage. There are no dams on or adjacent to the subject property.

B. Sub-Basin Description

1. For the purposes of this report, the existing site has been broken into one (1) sub-basin, Basin H. Basin H consists of the entire site. Runoff from within this basin flows to the north where the site drainage discharges via surface drainage to the asphalt drive on the south side of Lot 3, where it drains through the parking lot to the east and north into an existing 2'x2' graded inlet.
2. There is no offsite drainage that affects the site.
3. The runoff from the existing site is summarized in Table 1. Existing runoff calculations have been included in Appendix B.

III. DRAINAGE DESIGN CRITERIA

A. Development Criteria Reference and Constraints

1. A Preliminary Drainage Report was submitted by JVA Consulting Engineers, dated April 3, 2014. This report has been included in appendix E.
2. The site drainage was generally constrained by the existing conditions. Grading was constrained by the existing grades along the existing asphalt drives on lots 1 and 3, and the existing grain elevator. The site was also constrained by the existing curb and gutter elevations along County Road to the west.
3. There are no wetland areas located on the property.
4. The following reports, files and drawings form the basis of this report: 1) City of Louisville Municipal Code; 2) City of Louisville Manual of Design Criteria & Standard. 3) Urban Drainage and Flood Control District (UDFCD) Urban Storm Drainage Criteria Manual, Volumes 1-3 (USDCM). Relevant sections, as required, can be found in the Appendix located at the back of this report.
5. This drainage plan is in general conformance with the City of Louisville Manual of Design Criteria & Standard Specifications, the UD&FCD Storm Drainage Criteria Manual and the Stormwater Masterplan.
6. This report details the Phase 1 plan of the Mill site development and designs Lot 2 and Outlot A. A Phase 2 drawing has been included in this report in Appendix B, outlining the drainage plan for future development. Future development will connect the storm sewer on Outlot A to a stormceptor unit located on Lot 3, the stormceptor will provide water quality treatment for the entirety of the Mill Site Development.

B. Hydrological Criteria

1. The design rainfall data used in this study was taken from the CRITERIA, Volume 2 – Chapter 5 – Rainfall, Section 2.O – Rainfall Depth-Duration Frequency and Section 4.O – Intensity-Duration Curves for Rational Method. One-hour rainfall depth was taken from Table 1 and used in conjunction with the intensity equation listed under Section 4.O. This was correlated to the Intensity-Duration Frequency Curve from Figure 1.

As required in the CRITERIA, for all land uses, hydrologic information was developed for an initial storm return period of 2-years and major storm return period of 100-years. The criteria and methodology used in determining the storm runoff peaks and volumes were those outlined in the USDCM as directed by the CRITERIA.

2. Runoff calculations were obtained using the Rational Method as outlined in the Manual for basins having less than 130 acres.

Rational Formula is:

$$Q = CIA$$

Where: Q = Peak Discharge (cfs)
 C = Runoff Coefficient (USDCM)
 I = Rainfall Intensity (in/hr) (USDCM)
 A = Drainage Basin Tributary Area (acres)

C. Hydraulic Criteria

1. The proposed site ultimately drains to the north. The mill building and the road to the east of the mill building drain flow into rain gardens located on the north and south side of the mill building. The west portion of the site flows into a concrete drainage pan and swale and flows to the existing type R inlet located in Lot 3, north of the site.
2. Water quality volumes, discharges and storage calculations are based on the USDCM Volume 2, Storage. Detention and water quality facilities have been designed in accordance with the USDCM Volume 3, Best Management Practices. The UDFCD detention worksheets were used for calculations of the detention and water quality facilities.

D. Adaptions from Criteria

1. There are no adaptations or variances requested from the Criteria.

IV. DRAINAGE FACILITY DESIGN

A. General Concepts

1. Developed runoff from the site drains either to the north to an existing storm sewer or to the west on to County Road. Runoff from the roof will be drained in to two raingardens and treated for water quality.
2. Offsite basins will be unaffected by the redevelopment.
3. Proposed drainage patterns are shown on the Drainage Plan. Proposed runoff from the site is shown in Table 1.

B. Specific Details

1. The Drainage Plan shows the proposed site plan, on-site grading and overland flow directions. Under the proposed conditions, the site will be broken into three (3) sub-basins, Basins A1 through A3 as well as two (2) off-site basins, Basins OS1 and OS2.

Drainage from Basin A1 comprises of the western portion of the site. It includes lawn, the southern and northern parking spaces. Runoff from within this basin flows to the northwest corner of the southern parking lot via overland flow, into a swale running along the west edge of the site which eventually flows into the existing Type R inlet located in Lot 3. All runoff in this basin will drain into the gravel swale or concrete drain pan.

Water quality for Basin A1 will be provided during the phase 2 improvements. Currently, the basin contains large amounts of landscaping and some existing asphalt parking areas. The imperviousness of the basin will increase slightly but the overall impact to the drainageway will be negligible. Therefore, water quality for this basin will be delayed until phase 2 to accommodate future improvements and increased impervious areas.

Drainage from Basin A2 comprises of the east portion of the site and the north half of the Mill Building roof. Runoff from within this basin flows north into proposed Rain Garden 1 (RG-1) This rain garden has been designed to treat the Water Quality Capture Volume and pass the 100-year storm.

Drainage from Basin A3 comprises the south half of the roof. Runoff from this site will be piped into Rain Garden 2 (RG-2). This rain garden has been designed to treat the Water Quality Capture Volume and pass the 100-year storm.

Drainage from Basin OS1 comprises the west portion of the parking area of Lot 1. Runoff from this basin follows existing drainage patterns and flows into Basin A1 where is runoff follows the proposed routing for that basin.

Drainage from Basin OS2 comprises the east portion of the parking area of Lot 1. Runoff from this basin flows into Basin A2.

The existing and proposed conditions for the entire site were analyzed for the 5 and 100-year storm events. The results are shown in the following Table 1 and the relevant calculation sheets are provided in Appendix B.

TABLE 1
RUNOFF CALCULATIONS SUMMARY

Drainage Basin	Area (acres)	C ₂	C ₁₀₀	2-Year Peak Runoff (cfs)	100-Year Peak Runoff (cfs)
Basin H	0.58	0.22	0.59	0.25	2.22
Basin A	0.58	0.39	0.60	0.44	2.15
Basin A1	0.34	0.53	0.73	0.26	1.28
Basin A2	0.16	0.43	0.70	0.15	0.82
Basin A3	0.03	0.80	0.90	0.06	0.23
Basin OS1	0.21	0.63	0.81	0.33	1.36
Basin OS2	0.05	0.73	0.84	0.10	0.35

2. The rain gardens have been designed for the Water Quality Capture Volume per the recommended approach in the USDCM and will accommodate the Water Quality Capture Volume (WQCV).

TABLE 1
DETENTION POND SUMMARY

Pond	Basin Area (ac)	WQCV (CF) Needed	WQCV (CF) Provided
RG-1	0.16	170	180
RG-2	0.03	44	50

3. Maintenance of the water quality rain garden will be provided by the property owner.

V. SUMMARY

A. Compliance with Standards

1. This drainage report and plan are in general conformance with the City of Louisville Municipal Code.
2. This drainage report and plan are in general conformance with the Town of Lyons Storm Drainage Criteria Addendum to Urban Drainage Storm Drainage Criteria Manuals, Volumes 1, 2 and 3 (CRITERIA)
3. This drainage report and plan are in general conformance with the Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual.

B. Drainage Concept

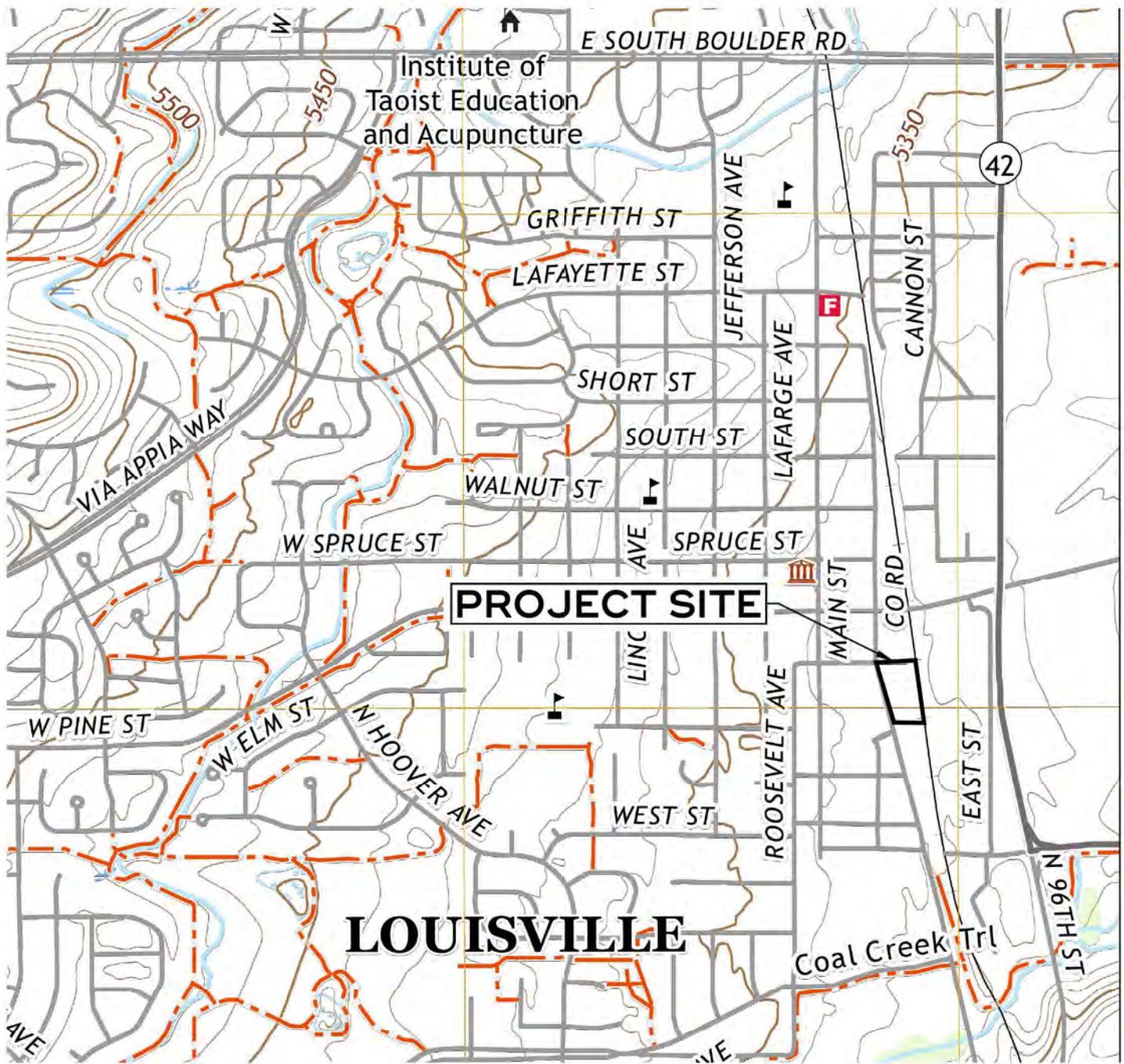
1. The primary consideration for this project was to design a drainage plan to offset the impact of the proposed construction. The drainage plan accommodates on-site runoff and off-site flows. The drainage will not negatively affect any upstream or downstream properties.
2. While this report is focused on the current redevelopment of Lot 2 and Outlot A, the drainage plan for the entire Mill Site development has also been included in a Phase 2 drawing, included in Appendix B. The Phase 2 drainage plan will include additional storm sewer lines to tie the parking lot cut off storm sewer to the existing type R inlet in the northeast corner of lot 3. Water quality will be provided in the form of a stormceptor that will treat runoff from Basins A1 and OS1

VI. REFERENCES

1. Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual, Volumes 1-3, dated August 2018.
2. FEMA LOMR 17-08-0625P, City of Louisville, dated March 8, 2018.
3. Preliminary Drainage Report for Louisville Mill Site, by JVA Consulting Engineers, dated April 3, 2015.

APPENDIX A

LOCATION MAP



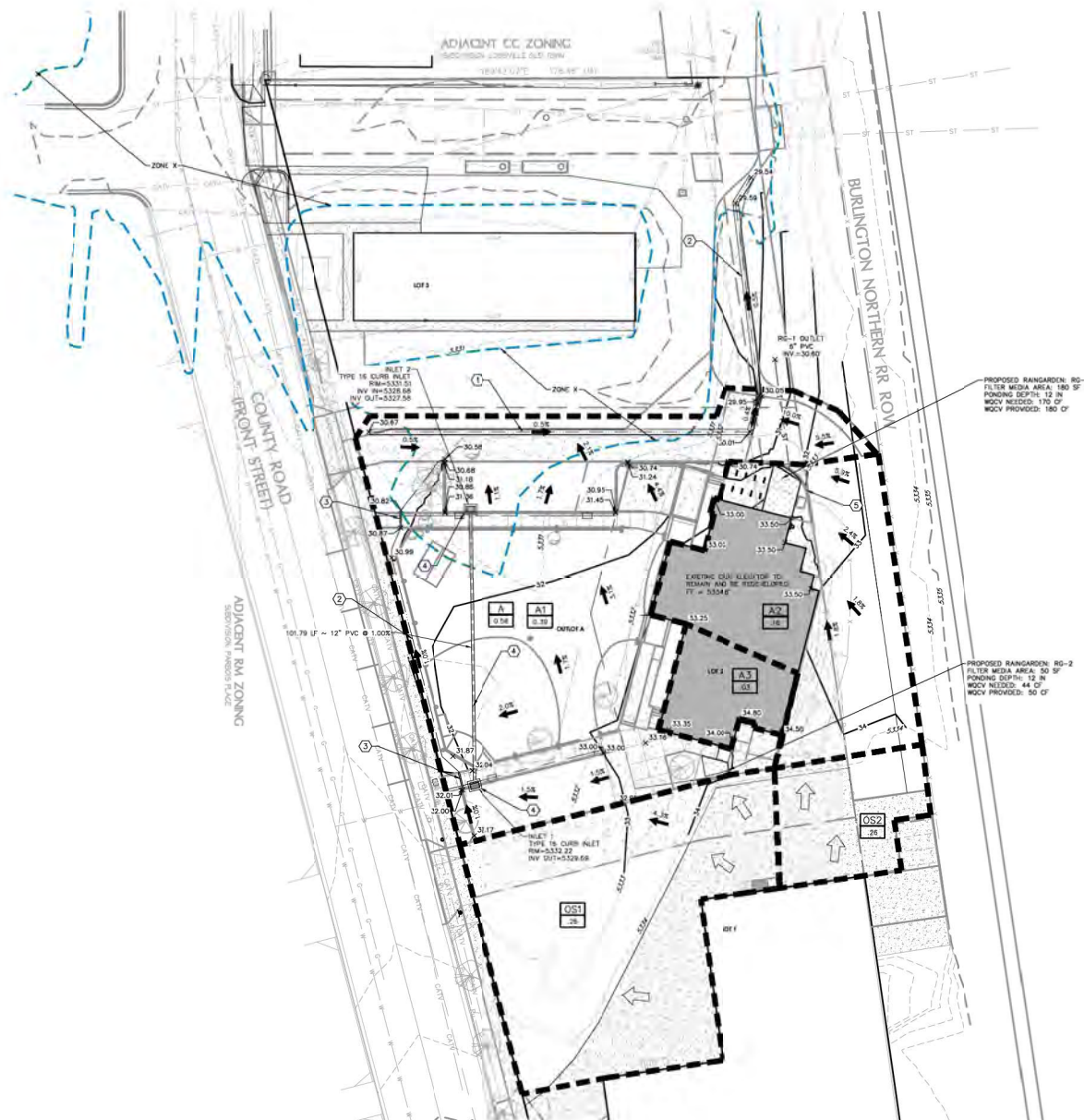
1 LOCATION MAP

SCALE: 1" = 1000'



APPENDIX B

DRAINAGE PLAN



LEGEND

- PROPOSED CONTOUR
ADD 5.00' TO ALL CONTOURS
- x 25.8 PROPOSED SPOT ELEVATION
ADD 5.00' TO ALL SPOT ELEVATIONS
- EXISTING SPOT ELEVATION
- PROPOSED FLOW DIRECTION
- HISTORIC SHEET FLOW
- A PROPOSED SUB-BASIN DESIGNATION
- 1 AREA IN ACRES
- PROPOSED BASIN BOUNDARY

GRADING NOTES

1. FLOOD INFORMATION: ACCORDING TO FEMA FLOOD INSURANCE MAP NO. 080330000K DATED 06/15/2018, THE NORTH OF OUTLET A IS LOCATED IN ZONE X (SHADED). AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREA LESS THAN 1 SQUARE MILE, THE ENTIRETY OF LOT 2 IS OUTSIDE OF ANY MAPPED FLOODPLAIN.
2. BENCHMARK INFORMATION: CITY OF LOUISVILLE UPS, FOUNDED 2.5" ALUMINUM CAP IN A RANGE BOX IN SOUTH ST. BEING THE CENTER E & CORNER OF SECTION 8 ELEVATION=344.45 (NAVD83). SITE BENCHMARKS AS SHOWN, CONTOURS SHOWN ARE FROM A GROUND SURVEY.
3. THE LOCATION OF THE ABOVE GROUND UTILITIES SHOWN HEREON ARE BASED ON THE FIELD SURVEY BY SITEWORKS, LLC DATED 07/26/2018. THE LOCATIONS OF THE UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON S&B SURVEY AND INFORMATION PROVIDED BY OTHERS WHICH MAY INCLUDE THE UTILITY OWNER OR UTILITY LOCATING SERVICES. SITEWORKS, LLC IS NOT RESPONSIBLE FOR UTILITY INFORMATION PROVIDED BY OTHERS. SITEWORKS, LLC RECOMMENDS THAT THE LOCATION OF THE UTILITIES BE FIELD VERIFIED PRIOR TO ANY DIGGING ON OR ADJACENT TO THE SUBJECT PROPERTY.

KEYED NOTES

1. PROPOSED 2" CONCRETE SWALE.
2. PROPOSED GRAVEL SWALE.
3. PROPOSED SIDEWALK CHASE.
4. PROPOSED UNDERGROUND STORM SEWER FOR FUTURE PHASE 2 DEVELOPMENT. STEEL COVER TO GO OVER STORM SEWER INLETS TO PREVENT ANY DRAINAGE UNTIL FUTURE DEVELOPMENT.
5. PROPOSED 15' CURB CUT TO ALLOW RUNOFF TO DRAIN INTO RAINGARDEN THROUGH SLOTTED CURB.



**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC

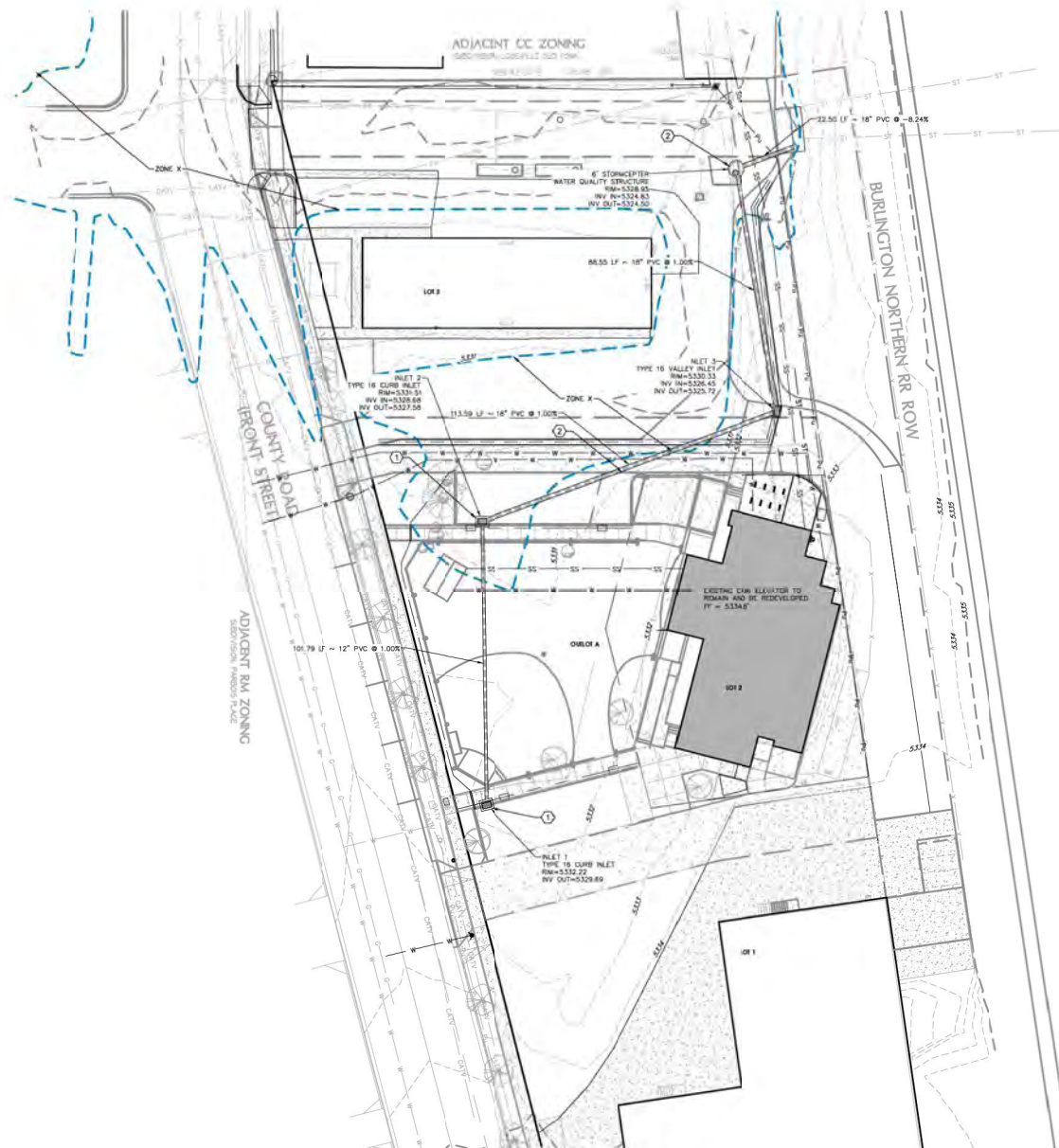
PHASE 1
FINAL
SUBMITTAL

PROJECT # 2588A
DATE 04/12/2019
DRAWN BY: JMM
CHECKED BY: JMM
REVISIONS:

COPYRIGHT 2019
All drawn and written information
herein is the property of SiteWorks,
LLC. No part of this drawing may be
reproduced or transmitted in any
form or by any means electronic or
mechanical, including photocopying,
recording, or by any information
storage and retrieval system, without
written permission from SiteWorks,
LLC.

**GRADING
& DRAINAGE
PLAN**

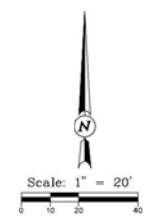
Sheet
C-101
1 of 4 Sheets



LEGEND	
	EXISTING CONTOUR
	EXISTING SEWER CLEANOUT
	EXISTING WATER METER
	EXISTING STORM MANHOLE
	EXISTING WATER VALVE
	EXISTING POWER POLE
	EXISTING LIGHT POLE
	EXISTING SIGN
	EXISTING FIRE HYDRANT
	EXISTING FENCE
	EXISTING OVERHEAD POWER LINE
	EXISTING SANITARY SEWER W/MANHOLE
	EXISTING WATER W/FIRE HYDRANT
	EXISTING STORM SEWER W/MANHOLE
	PROPOSED WATER W/FIRE HYDRANT
	PROPOSED SANITARY SEWER SERVICE
	PROPOSED GAS SERVICE
	PROPOSED WATER METER

KEYED NOTES ①

1. PROPOSED UNDERGROUND STORM SEWER FOR FUTURE TIE IN. STEEL COVER TO BE REMOVED AND INLETS ALLOWED TO DRAIN.
2. PROPOSED PHASE 2 STORM SEWER IMPROVEMENT. PARKING LOT SILVER TO DRAIN INTO STORMSEWER AND RE INTO EXISTING TYPE 2 INLET.



**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
520 & 540 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Louisville's Living Room LLC



PROJECT # 25188A
DATE: 05/16/2015
DRAWN BY:
CHECKED BY:
REVISIONS:

COPYRIGHT 2015
All design and written information
disclosed or otherwise
appearing herein shall not be
used without written consent of
Hartman Associates, P.C.

**UTILITY
PLAN
PHASE
2**

Sheet
C-201
4 of 4 Sheets

APPENDIX C

HYDROLOGIC CALCULATIONS

	Runoff Coefficients						Initial Overland Time (t _i) t _i =1.8(1.1-C _s)L ^{1/2} S ^{-1/3}			Travel Time (t _t) t _t =Length/(Velocity*60)				t _c Computed	t _c Urbanized Check	t _c Final	Rainfall Intensities (in/hr)				Flow Rates (cfs)					
Municipality: Boulder	Parcel Size (sf)						Overland Flow (L _v) Slope (ft/ft) t _i (min)			Length Slope (ft/ft) C _v Velocity (ft/s) t _t (min)				Time of Conc t _i + t _t = t _c	Total Length (ft) t _c =(L/180)+10 (min)		Minimum t _c =5 min	I ₂ I ₅ I ₁₀ I ₁₀₀				Q ₂ Q ₅ Q ₁₀ Q ₁₀₀				
Parcel Name	C ₂	C ₅	C ₁₀	C ₁₀₀	% Impervious																					
Basin H	25,429	0.22	0.29	0.37	0.59	53.65	175.0	0.015	17.1	40	0.0200	7	0.99	0.7	17.8	215	11.2	11.2	2.01	2.69	3.36	6.41	0.25	0.46	0.73	2.22
Basin A	25,265	0.39	0.42	0.47	0.60	55.59	320.0	0.020	17.6	40	0.0200	7	0.99	0.7	18.3	360	12.0	12.0	1.95	2.61	3.26	6.23	0.44	0.64	0.89	2.15
Basin A1	16,988	0.34	0.36	0.40	0.53	47.18	320.0	0.020	19.2	40	0.0150	7	0.86	0.8	20.0	360	12.0	12.0	1.95	2.61	3.26	6.23	0.26	0.37	0.51	1.28
Basin A2	6,970	0.43	0.49	0.55	0.70	68.72	100.0	0.030	7.8	20	0.0150	7	0.86	0.4	8.2	120	10.7	8.2	2.26	3.03	3.79	7.24	0.15	0.24	0.34	0.82
Basin A3	1,307	0.80	0.85	0.90	0.90	95.00	50.0	0.010	3.2	20	0.0150	7	0.86	0.4	3.6	70	10.4	5.0	2.63	3.53	4.41	8.41	0.06	0.09	0.12	0.23
Basin OS1	9,148	0.63	0.66	0.70	0.81	83.33	100.0	0.030	5.5	20	0.0150	7	0.86	0.4	5.9	120	10.7	5.9	2.51	3.36	4.21	8.02	0.33	0.47	0.62	1.36
Basin OS2	2,178	0.73	0.75	0.77	0.84	88.00	100.0	0.030	4.5	20	0.0150	7	0.86	0.4	4.9	120	10.7	5.0	2.63	3.53	4.41	8.41	0.10	0.13	0.17	0.35

APPENDIX D

WATER QUALITY CALCULATIONS

Site Layout

SCM Design, Version 4.00 (April 2024)

Designer: DRS

Company: Siteworks, LLC

Date: September 12, 2025

Project: Louisville Mill Site Redevelopment

Location: 540 County Road

SITE LAYOUT INFO (User Input in Blue Cells)

Water Quality Event (WQE) 0.60 inches

Outfall ID	1	2										
Total Tributary Area (ft ²)	1,469	7,048										
Imperviousness (%)	95.0%	85.0%										
MS4 Design Standard	WQCV	WQCV										
SCM Type	BR	BR										

Notes:

OUTFALL RESULTS

SCM Worksheet Name	BR_1	BR_2										
Untreated Area (ft ³)	0	0										
Default WQCV (ft ³)	44	170										
WQCV Reduction (ft ³)	0	0										
Remaining WQCV (ft ³)	44	170										
WQCV Reduction (%)	0%	0%										
Design WQCV of SCM (ft ³)	50	180										
Pollutant Removal (ft ³)	0	0										
Untreated WQCV (ft ³)	0	0										

TOTAL SITE RESULTS (Sums results from all Outfalls)

Total Site Area	8,517	ft ²	0.20	acres
Treated Area	8,517	ft ²	0.20	acres
Untreated Area	0	ft ²	0.00	acres
Total Site Imperviousness	86.7%	%		
Default WQCV	214	ft ³	0.005	acre-feet
Remaining WQCV	214	ft ³	0.005	acre-feet
WQCV Reduction	0%	%		
Design WQCV	230	ft ³	0.005	acre-feet
Untreated WQCV	0	ft ³	0.000	acre-feet

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: **DRS**

Company: **Siteworks, LLC**

Date: **September 12, 2025**

Project: **Louisville Mill Site Redevelopment**

Location: **540 County Road**

Outfall ID: **2**

1. Subsurface Exploration and Infiltration System Selection

A) Identify Site Constraints

- i) Is subgrade depth to bedrock < 3 feet?
- ii) Is subgrade depth to seasonal high groundwater table < 3 feet?

B) Identify Site Risks

- i) Are expansive/collapsible soils present?
- ii) Are highly concentrated pollutant sources present (hotspot)?
- iii) Is site located above contaminated soils or groundwater?
- iv) Is SCM located at top of steep slope? (> 3H:1V)
- v) Is SCM located adjacent to building, hardscape, or pavement?
- vi) Is SCM located above building foundation wall backfill?
- vii) Are there other concerns that indicate high risk for infiltration?

C) Preliminary Infiltration/Percolation Tests of underlying soils

- i) Were preliminary infiltration/percolation tests conducted?
- ii) Preliminary estimate of infiltration rate

$F_{\text{prelim}} =$ in/hr

D) Final Design Infiltrometer Test

- i) Were infiltrometer tests conducted?
- ii) Select type of infiltrometer test performed:
- iii) How many locations were tested?
- iv) Describe test locations relative to borings/pits

$N_{\text{Tests}} =$

- v) What was the maximum infiltration rate tested?
- vi) What was the minimum infiltration rate tested?
- vii) Design Infiltration Rate

$F_{\text{Max}} =$ in/hr
 $F_{\text{Min}} =$ in/hr
 $F_{\text{Design}} =$ in/hr

E) Recommended Infiltration System

F) Select Infiltration System to use for Design

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: DRS
Company: Siteworks, LLC
Date: September 12, 2025
Project: Louisville Mill Site Redevelopment
Location: 540 County Road
Outfall ID: 2

2. Inlet Design and Pretreatment

A) Is RPA (GB/GS) used for Runoff Reduction upstream of SCM?

NO

Define inflow points for all areas tributary to the SCM below.

B) Inflow Points contributing to SCM (max 8)

Inflow Design Point ID	1	2						
Tributary Area to Inflow Point (ft ²)	2,415	4,632						
Imperviousness above Inflow Point (%)	85.0%	85.0%						
Default WQCV for Inflow Point (ft ³)	58	112						
WQCV Reduction above Inflow Point (ft ³)	0							
Remaining WQCV at Inflow Point (ft ³)	58	112						
Will pretreatment be provided with a Sedimentation MTD (HDS)	NO	NO						
Paired Pretreatment HDS Worksheet Name	--	--						
Sheet or Concentrated Flow	Conc	Sheet						

C) Sheet Flow

Select sheet flow inflow feature	--	Slotted						
Is Concrete Edger used?	--	--						
Spacing between slots, recommend ≤ 2 ft on center (ft)	--	0.50						
Slot Opening Length, recommend 1.5 (in)	--	1.50						
Select type of blind swale used to distribute flow	--	--						
Select energy dissipation method for level spreader	--	--						
Height of drop, recommend 2 to 3 (in)	--	2.00						
Is concrete mowing strip provided to facilitate maintenance?	--	NO						

D) Concentrated Flow

Select concentrated flow inflow feature	Downspout	--						
Is downspout extension needed to bridge backfill zone?	--	--						
Depth of gutter flow line depression for curb opening, recommend 3 (in)	--	--						
Curb opening inlet width (ft)	--	--						
Height of drop to sediment pad/forebay, recommend ≥ 1 (in)	--	--						
Select energy dissipation method for downspouts and/or curb openings.	--	--						
Select energy dissipation method for swales, channels, and piped outfalls	--	--						

v) Forebay

Impervious area tributary to concentrated inflow location (ft ²)	--	--						
Forebay Type (Concrete Sediment Pad sufficient for Imp Area ≤ 2 acre)	--	--						
Minimum Forebay Volume (ft ³)	--	--						
Design Forebay Volume (ft ³)	--	--						
Maximum Forebay Depth (in)	--	--						
Design Forebay Depth (in)	--	--						
Rectangular Weir Notch Width to Empty Forebay in 5-minutes (in)	--	--						
Design Notch Width (in)	--	--						
Forebay Drain Time (minutes)	--	--						

Provide pretreatment to remove coarse sediment, trash and debris. This is especially critical for roadway runoff to bioretention systems.

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: DRS
Company: Siteworks, LLC
Date: September 12, 2025
Project: Louisville Mill Site Redevelopment
Location: 540 County Road
Outfall ID: 2

3. Design Storage Volume

- A) Contributing Watershed Area (including bioretention area)
 B) Imperviousness of Tributary Area
 C) Default WQCV
 D) WQCV Reduction resulting from Upstream RPA (GB/GS)
 E) Remaining WQCV

Inflow Points above should be fully defined before proceeding below

Area = 7,048 ft²

i = 85.0% %

V_{WQCV Default} = 170 ft³

WQCV Reduction = 0

V_{WQCV Remaining} = 170

4. Bioretention System Basin Geometry

- A) Minimum Filter Media Surface Area
 B) Design Filter Media Surface Area
 C) WQCV Ponding Depth (recommend max. 12-inch)
 D) Media Surface Slope (typically flat or mild slope < 0.01 ft/ft)
 E) Max. Side Slope (Z = 4:1 or flatter, horiz. dist per unit vertical)
 (Use "0" if bioretention has vertical walls)
 F) Media Surface Length-to-Width Ratio
 G) Calculated WQCV (based on A_{F Design}, D_{WQCV}, and Z)
 H) Design WQCV (based on actual design geometry)
 I) If basin geometry is irregular, design volume differs, or media pore space is being utilized, please provide description.

A_{F Min} = 120 ft²

A_{F Design} = 180 ft²

D_{WQCV} = 12.00 in

S_{Surface} = 0.000 ft / ft

Z = 0.00 ft / ft

R_{LW} = 1.8

V_{WQCV Calculated} = 180 ft³

V_{WQCV Design} = 180 ft³

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: **DRS**
Company: **Siteworks, LLC**
Date: **September 12, 2025**
Project: **Louisville Mill Site Redevelopment**
Location: **540 County Road**
Outfall ID: **2**

5. Underdrain System, Impermeable Liner, and Geotextile

- A) Are underdrains provided?
- B) Is a Drain Trench provided consistent with Figure 4-2?
- Trench Bottom Width $\geq$ 12 inches, Trench Depth $\geq$ 15 inches
 - Drain gravel satisfies gradation specifications for AASHTO M 43 No. 8 coarse aggregate
 - Filter sand above drain gravel satisfies gradation specifications for AASHTO M 43 fine aggregate
 - Filter sand depth above drain trench $\geq$ 6 inches
 - Filter sand extends $\geq$ 12 inches beyond trench top width
- C) Select Factory-Slotted Pipe Size and Material
- D) Does the specified pipe material meet the specifications for slot configurations shown in Table 4-6 and Figure 4-3.
- E) Are cleanouts provided for inspection and maintenance?
- F) Is an impermeable geomembrane liner provided?
- G) Are details provided regarding sealing at underdrain penetrations similar to Figure 4-6?
- H) Are geomembrane connections to vertical concrete surfaces consistent with Figure 4-7?
- I) Do the plans specify thermal welding and air lance testing of joints?

6. Bioretention Media

- A) Depth of Media (18-inch minimum, 36-inch when trees planted)
- B) Do construction documents specify media testing requirements?

$D_{Media} =$ in

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer:	DRS
Company:	Siteworks, LLC
Date:	September 12, 2025
Project:	Louisville Mill Site Redevelopment
Location:	540 County Road
Outfall ID:	2

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: DRS
Company: Siteworks, LLC
Date: September 12, 2025
Project: Louisville Mill Site Redevelopment
Location: 540 County Road
Outfall ID: 2

7. Vegetation

A) Select the method of vegetation planting (pulldown list).
Consult with vegetation specialist to consider shade, heat island effects, application of deicers in the watershed, and other site-specific factors.

B) Has a landscape/vegetation management plan been developed?

C) Describe vegetation/landscaping considerations:

- Stability issues (steep slopes, high erosion potential)?
- Topsoil management (assessment, stockpiling, and placement)?
- Community benefits with place-making approach?
- Biodiversity of the site including pollinator species?
- Environmental stewardship through conservation?
- Inundation frequency and depth impacts on vegetation?
- Required maintenance activities and intervals?

8. Irrigation

A) How will irrigation be provided for vegetation establishment?

9. Outlet

A) Underdrain Orifice Diameter for 12-hour drain time

i) Underdrain Orifice Invert Depth
(distance from filter media surface to orifice invert)

y = in

ii) Calculated Underdrain Orifice Diameter
Simplified Equation (when not using MHFD-Detention)
MHFD-Detention Calculation (if used)

Dia. Simplified = in

Dia. MHFD-Detention = in

iii) Underdrain Orifice Diameter specified on construction plans

Orifice Dia. Design = in

B) Describe Underdrain Orifice Outlet Configuration.

C) Describe Outlet Structure(s) for events larger than WQCV.
(full-spectrum detention, overflow spillway, etc.)

Notes:

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: **DRS**

Company: **Siteworks, LLC**

Date: **September 12, 2025**

Project: **Louisville Mill Site Redevelopment**

Location: **540 County Road**

Outfall ID: **1**

1. Subsurface Exploration and Infiltration System Selection

A) Identify Site Constraints

- i) Is subgrade depth to bedrock < 3 feet?
- ii) Is subgrade depth to seasonal high groundwater table < 3 feet?

NO

B) Identify Site Risks

- i) Are expansive/collapsible soils present?
- ii) Are highly concentrated pollutant sources present (hotspot)?
- iii) Is site located above contaminated soils or groundwater?
- iv) Is SCM located at top of steep slope? (> 3H:1V)
- v) Is SCM located adjacent to building, hardscape, or pavement?
- vi) Is SCM located above building foundation wall backfill?
- vii) Are there other concerns that indicate high risk for infiltration?

C) Preliminary Infiltration/Percolation Tests of underlying soils

- i) Were preliminary infiltration/percolation tests conducted?
- ii) Preliminary estimate of infiltration rate

$F_{\text{prelim}} =$ in/hr

D) Final Design Infiltrometer Test

- i) Were infiltrometer tests conducted?
- ii) Select type of infiltrometer test performed:
- iii) How many locations were tested?
- iv) Describe test locations relative to borings/pits

$N_{\text{Tests}} =$

- v) What was the maximum infiltration rate tested?
- vi) What was the minimum infiltration rate tested?
- vii) Design Infiltration Rate

$F_{\text{Max}} =$ in/hr
 $F_{\text{Min}} =$ in/hr
 $F_{\text{Design}} =$ in/hr

E) Recommended Infiltration System

--

F) Select Infiltration System to use for Design

--

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: DRS
Company: Siteworks, LLC
Date: September 12, 2025
Project: Louisville Mill Site Redevelopment
Location: 540 County Road
Outfall ID: 1

2. Inlet Design and Pretreatment

A) Is RPA (GB/GS) used for Runoff Reduction upstream of SCM?

NO

Define inflow points for all areas tributary to the SCM below.

B) Inflow Points contributing to SCM (max 8)

Inflow Design Point ID	1							
Tributary Area to Inflow Point (ft ²)	1,469							
Imperviousness above Inflow Point (%)	95.0%							
Default WQCV for Inflow Point (ft ³)	44							
WQCV Reduction above Inflow Point (ft ³)	0							
Remaining WQCV at Inflow Point (ft ³)	44							
Will pretreatment be provided with a Sedimentation MTD (HDS)								
Paired Pretreatment HDS Worksheet Name								
Sheet or Concentrated Flow	Conc							

C) Sheet Flow

Select sheet flow inflow feature	--							
Is Concrete Edger used?	--							
Spacing between slots, recommend ≤ 2 ft on center (ft)	--							
Slot Opening Length, recommend 1.5 (in)	--							
Select type of blind swale used to distribute flow	--							
Select energy dissipation method for level spreader	--							
Height of drop, recommend 2 to 3 (in)	--							
Is concrete mowing strip provided to facilitate maintenance?	--							

D) Concentrated Flow

Select concentrated flow inflow feature	Downspout							
Is downspout extension needed to bridge backfill zone?	NO							
Depth of gutter flow line depression for curb opening, recommend 3 (in)	--							
Curb opening inlet width (ft)	--							
Height of drop to sediment pad/forebay, recommend ≥ 1 (in)	--							
Select energy dissipation method for downspouts and/or curb openings.	Concrete							
Select energy dissipation method for swales, channels, and piped outfalls	--							

v) Forebay

Impervious area tributary to concentrated inflow location (ft ²)	--							
Forebay Type (Concrete Sediment Pad sufficient for Imp Area ≤ 2 acre)	--							
Minimum Forebay Volume (ft ³)	--							
Design Forebay Volume (ft ³)	--							
Maximum Forebay Depth (in)	--							
Design Forebay Depth (in)	--							
Rectangular Weir Notch Width to Empty Forebay in 5-minutes (in)	--							
Design Notch Width (in)	--							
Forebay Drain Time (minutes)	--							

Provide pretreatment to remove coarse sediment, trash and debris. This is especially critical for roadway runoff to bioretention systems.

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: DRS
 Company: Siteworks, LLC
 Date: September 12, 2025
 Project: Louisville Mill Site Redevelopment
 Location: 540 County Road
 Outfall ID: 1

3. Design Storage Volume

- A) Contributing Watershed Area (including bioretention area)
 B) Imperviousness of Tributary Area
 C) Default WQCV
 D) WQCV Reduction resulting from Upstream RPA (GB/GS)
 E) Remaining WQCV

Inflow Points above should be fully defined before proceeding below

Area = ft²

i = %

V_{WQCV Default} = ft³

WQCV Reduction =

V_{WQCV Remaining} =

4. Bioretention System Basin Geometry

- A) Minimum Filter Media Surface Area
 B) Design Filter Media Surface Area
 C) WQCV Ponding Depth (recommend max. 12-inch)
 D) Media Surface Slope (typically flat or mild slope < 0.01 ft/ft)
 E) Max. Side Slope (Z = 4:1 or flatter, horiz. dist per unit vertical)
 (Use "0" if bioretention has vertical walls)
 F) Media Surface Length-to-Width Ratio
 G) Calculated WQCV (based on A_{F Design}, D_{WQCV}, and Z)
 H) Design WQCV (based on actual design geometry)
 I) If basin geometry is irregular, design volume differs, or media pore space is being utilized, please provide description.

A_{F Min} = ft²

A_{F Design} = ft²

D_{WQCV} = in

S_{Surface} = ft / ft

Z = ft / ft

R_{LW} =

V_{WQCV Calculated} = ft³

V_{WQCV Design} = ft³

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: DRS
Company: Siteworks, LLC
Date: September 12, 2025
Project: Louisville Mill Site Redevelopment
Location: 540 County Road
Outfall ID: 1

5. Underdrain System, Impermeable Liner, and Geotextile

A) Are underdrains provided?

YES

B) Is a Drain Trench provided consistent with Figure 4-2?

- Trench Bottom Width $\geq$ 12 inches, Trench Depth $\geq$ 15 inches
- Drain gravel satisfies gradation specifications for AASHTO M 43 No. 8 coarse aggregate
- Filter sand above drain gravel satisfies gradation specifications for AASHTO M 43 fine aggregate
- Filter sand depth above drain trench $\geq$ 6 inches
- Filter sand extends $\geq$ 12 inches beyond trench top width

C) Select Factory-Slotted Pipe Size and Material

D) Does the specified pipe material meet the specifications for slot configurations shown in Table 4-6 and Figure 4-3.

E) Are cleanouts provided for inspection and maintenance?

F) Is an impermeable geomembrane liner provided?

G) Are details provided regarding sealing at underdrain penetrations similar to Figure 4-6?

H) Are geomembrane connections to vertical concrete surfaces consistent with Figure 4-7?

I) Do the plans specify thermal welding and air lance testing of joints?

6. Bioretention Media

A) Depth of Media (18-inch minimum, 36-inch when trees planted)

$D_{Media} =$ in

B) Do construction documents specify media testing requirements?

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer:	DRS
Company:	Siteworks, LLC
Date:	September 12, 2025
Project:	Louisville Mill Site Redevelopment
Location:	540 County Road
Outfall ID:	1

Bioretention System (BR)

SCM Design, Version 4.00 (April 2024)

Designer: DRS
Company: Siteworks, LLC
Date: September 12, 2025
Project: Louisville Mill Site Redevelopment
Location: 540 County Road
Outfall ID: 1

7. Vegetation

A) Select the method of vegetation planting (pulldown list).
Consult with vegetation specialist to consider shade, heat island effects, application of deicers in the watershed, and other site-specific factors.

B) Has a landscape/vegetation management plan been developed?

C) Describe vegetation/landscaping considerations:

- Stability issues (steep slopes, high erosion potential)?
- Topsoil management (assessment, stockpiling, and placement)?
- Community benefits with place-making approach?
- Biodiversity of the site including pollinator species?
- Environmental stewardship through conservation?
- Inundation frequency and depth impacts on vegetation?
- Required maintenance activities and intervals?

8. Irrigation

A) How will irrigation be provided for vegetation establishment?

9. Outlet

A) Underdrain Orifice Diameter for 12-hour drain time

i) Underdrain Orifice Invert Depth
(distance from filter media surface to orifice invert)

y = in

ii) Calculated Underdrain Orifice Diameter
Simplified Equation (when not using MHFD-Detention)
MHFD-Detention Calculation (if used)

Dia. Simplified = in

Dia. MHFD-Detention = in

iii) Underdrain Orifice Diameter specified on construction plans

Orifice Dia. Design = in

B) Describe Underdrain Orifice Outlet Configuration.

C) Describe Outlet Structure(s) for events larger than WQCV.
(full-spectrum detention, overflow spillway, etc.)

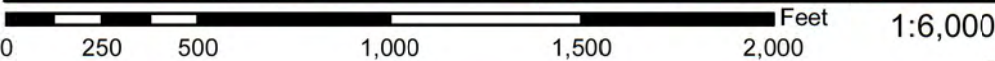
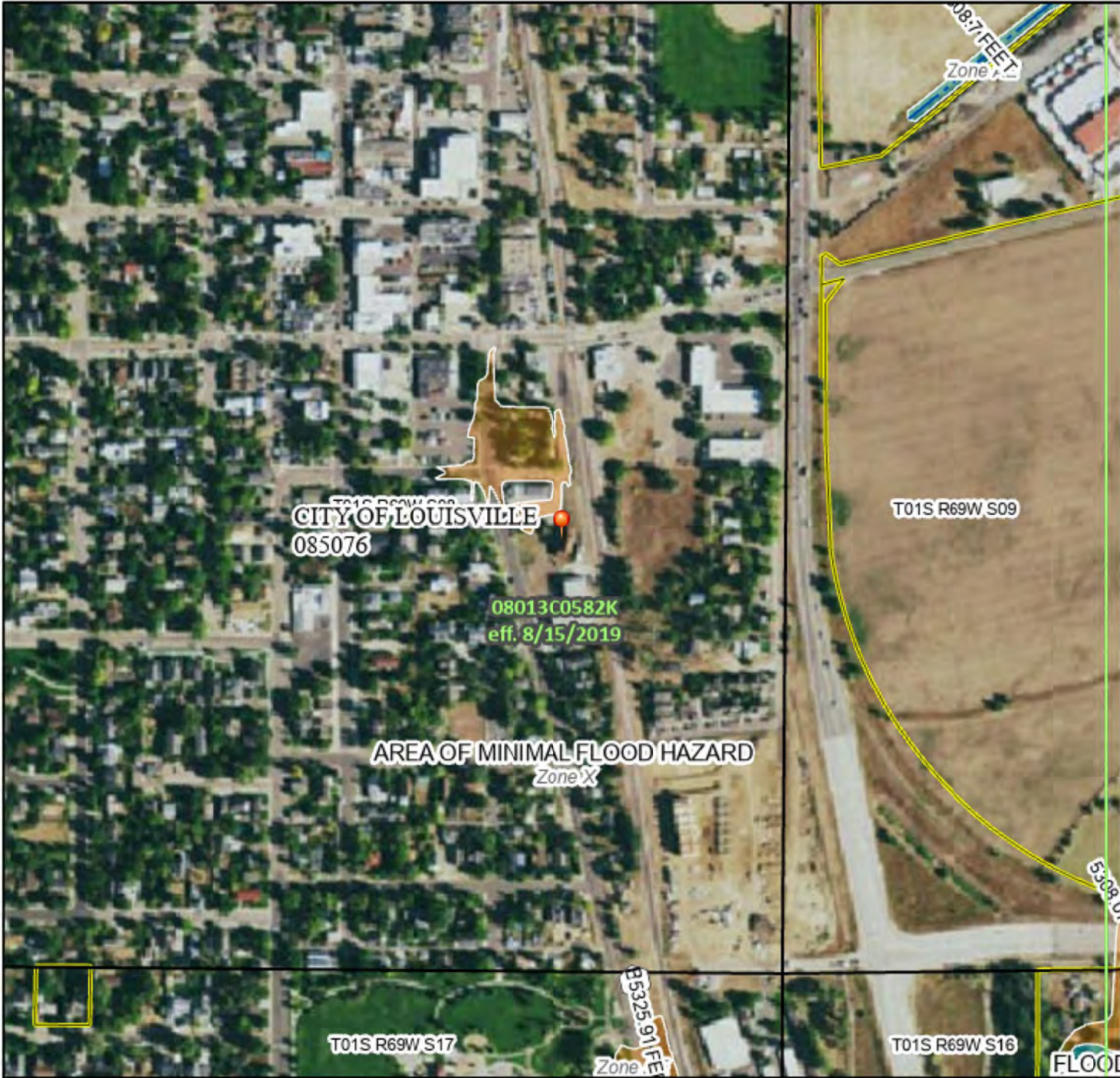
Notes:

APPENDIX E

RELEVANT DOCUMENTS

National Flood Hazard Layer FIRMette

105°8'7"W 39°58'45"N



Basemap Imagery Source: USGS National Map 2023

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, A0, 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 |
| | | Levee, Dike, or Floodwall |
| OTHER FEATURES | | Cross Sections with 1% Annual Chance Water Surface Elevation |
| | | Coastal Transect |
| | | Base Flood Elevation Line (BFE) |
| | | Limit of Study |
| | | Jurisdiction Boundary |
| | | Coastal Transect Baseline |
| MAP PANELS | | Profile Baseline |
| | | Hydrographic Feature |
| | | Digital Data Available |
| | | 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 5/16/2025 at 4:56 AM 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.



Federal Emergency Management Agency

Washington, D.C. 20472

October 25, 2017

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Bob Muckle
Mayor, City of Louisville
749 Main Street
Louisville, CO 80027

IN REPLY REFER TO:

Case No.: 17-08-0625P
Community Name: City of Louisville, CO
Community No.: 085076
Effective Date of
This Revision: March 8, 2018

Dear Mayor Muckle:

The Flood Insurance Study report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed that provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Denver, Colorado, at (303) 235-4830, or the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

Sincerely,

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: The Honorable Deb Gardner
Chair, Boulder County
Board of Commissioners

Mr. Aaron Asquith P.E.
City Engineer
City of Lafayette

The Honorable Christine Berg
Mayor, City of Lafayette

Ms. Deb Ohlinger, P.E. CFM
Project Engineer
Olsson Associates

Mr. Robert Zuccaro, AICP
Planning & Building Safety Director
City of Louisville

Ms. Varda Blum, CFM
Floodplain Program Manager
Boulder County



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Louisville Boulder County Colorado	CHANNELIZATION	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS UPDATED TOPOGRAPHIC DATA
	COMMUNITY NO.: 085076		
IDENTIFIER	Lafayette-Louisville Boundary Area Drainage Improvements Project	APPROXIMATE LATITUDE AND LONGITUDE: 39.982, -105.120 SOURCE: USGS QUADRANGLE DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM* NO.: 08013C0601J DATE: December 18, 2012 TYPE: FIRM* NO.: 08013C0582J DATE: December 18, 2012		DATE OF EFFECTIVE FLOOD INSURANCE STUDY: December 18, 2012 PROFILES: 381P-383P SUMMARY OF DISCHARGES TABLE: 4	

Enclosures reflect changes to flooding sources affected by this revision.

* FIRM - Flood Insurance Rate Map

FLOODING SOURCES AND REVISED REACHES

See Page 2 for Additional Flooding Sources

Drainageway A-2 - From the confluence with Drainageway A to approximately 1,170 feet upstream of the confluence with Drainageway A

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Drainageway A-2	Zone X (unshaded)	Zone AE	YES	NONE
	No BFEs*	BFEs	YES	NONE
	Zone AE	Zone X (unshaded)	NONE	YES
	Zone AH	Zone X (shaded)	NONE	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3801 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

17-08-0625P

102-I-A-C



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

OTHER FLOODING SOURCES AFFECTED BY THIS REVISION

FLOODING SOURCE AND REVISED REACH

Drainageway A-2 - From the confluence with Drainageway A to approximately 1,170 feet upstream of the confluence with Drainageway A
Drainageway A - From the confluence with Drainageway 7 to approximately 800 feet upstream of the confluence with Drainageway A-2

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Drainageway A-2	BFEs*	No BFEs	NONE	YES
	Zone A	Zone AE	NONE	YES
	Zone X (shaded)	Zone X (unshaded)	NONE	YES
Drainageway A	Zone X (shaded)	Zone X (unshaded)	NONE	YES
	Zone AH	Zone X (unshaded)	NONE	YES
	Zone AE	Zone X (unshaded)	NONE	YES
	Zone X (shaded)	Zone AE	YES	YES
	No BFEs	BFEs	YES	NONE
	BFEs	No BFEs	NONE	YES

* BFEs - Base Flood Elevations

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

17-08-0625P

102-I-A-C



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 080023 **Name:** Boulder County, Colorado

AFFECTED MAP PANELS			AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM*	NO.: 08013C0601J	DATE: December 18, 2012	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: December 18, 2012 PROFILES: 381P-386P SUMMARY OF DISCHARGES TABLE: 4
TYPE: FIRM*	NO.: 08013C0582J	DATE: December 18, 2012	

CID Number: 080026 **Name:** City of Lafayette, Colorado

AFFECTED MAP PANELS			AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM*	NO.: 08013C0601J	DATE: December 18, 2012	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: December 18, 2012 PROFILES: 384P SUMMARY OF DISCHARGES TABLE: 4

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Jeanine D. Petterson
Director, Mitigation Division
Federal Emergency Management Agency, Region VIII
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267
(303) 235-4830

STATUS OF THE COMMUNITY NFIP MAPS

We are processing a revised FIRM and FIS report for Boulder County in our countywide format; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the countywide FIRM and FIS report, which present information from the effective FIRMs and FIS reports for your community and incorporated communities in Boulder County, were submitted to your community for review on February 16, 2017. We will incorporate the modifications made by this LOMR into the countywide FIRM and FIS report before they become effective.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

PUBLIC NOTIFICATION OF REVISION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below, and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/bfe_status/bfe_main.asp

LOCAL NEWSPAPER

Name: *The Daily Camera*

Dates: November 1, 2017 and November 8, 2017

Within 90 days of the second publication in the local newspaper, any interested party may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional information about the NFIP is available on our website at <http://www.fema.gov/national-flood-insurance-program>.

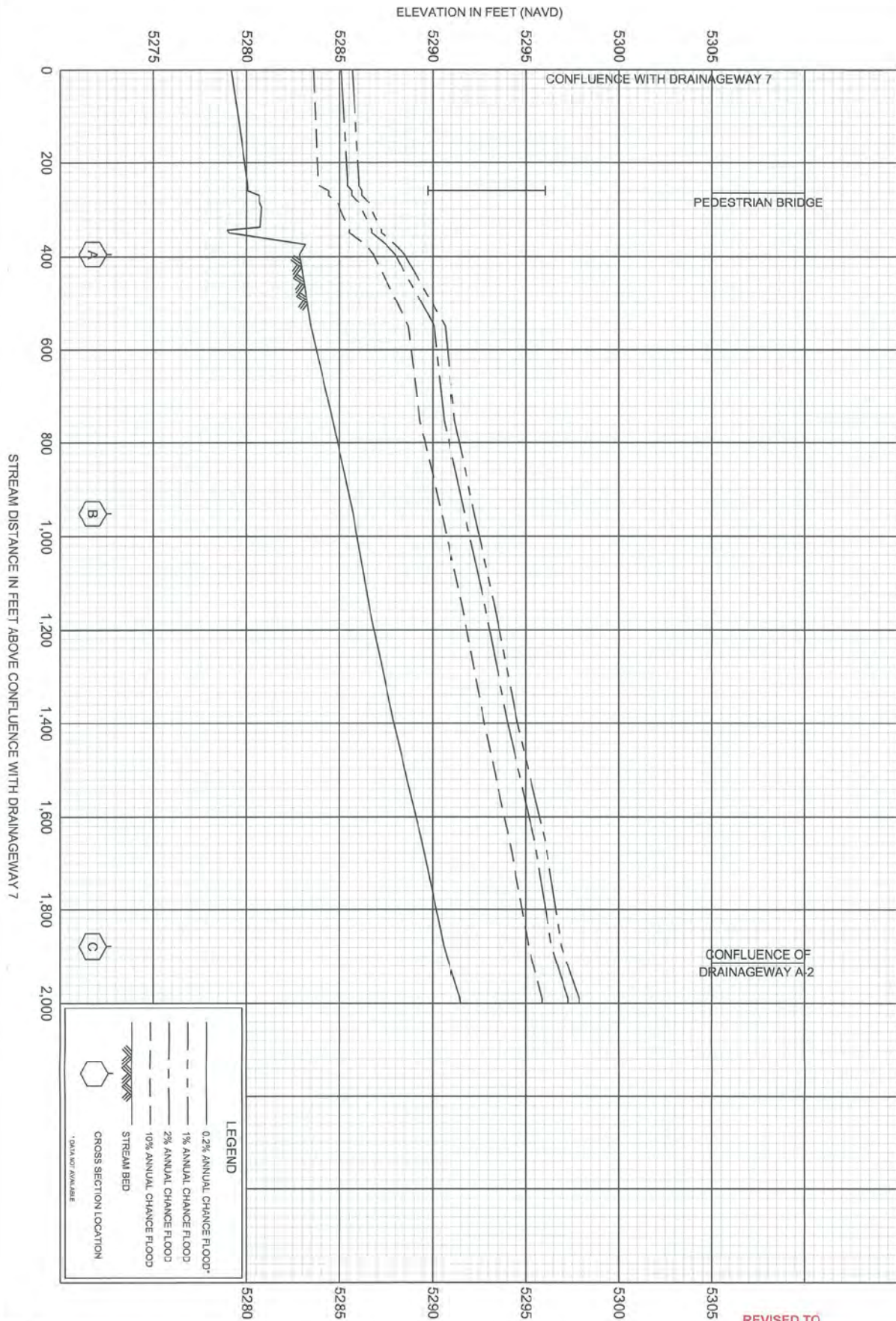
Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Table 4 - Summary of Discharges (Continued)

<u>Flooding Source and Location</u>	<u>Drainage Area (Square Miles)</u>	<u>10-Percent Annual Chance</u>	<u>Peak Discharges (cfs)</u>		
			<u>2-Percent Annual Chance</u>	<u>1-Percent Annual Chance</u>	<u>0.2-Percent Annual Chance</u>
Drainageway A Upstream of Confluence with Drainageway 7	1.39	400	724	894	— ¹
Upstream of Confluence with Drainageway A-2	1.13	157	281	367	— ¹
Drainageway A-2 Upstream of Confluence with Drainageway A	0.21	266	457	566	— ¹
Drainageway 7-2 Upstream of Confluence with Drainageway 7	0.39	181	315	383	— ¹
Drainageway 7 Upstream of Confluence with Coal Creek	1.92	647	1,238	1,544	— ¹

¹ Data Not Available

**REVISED TO
REFLECT LOMR
EFFECTIVE: March 8, 2018**

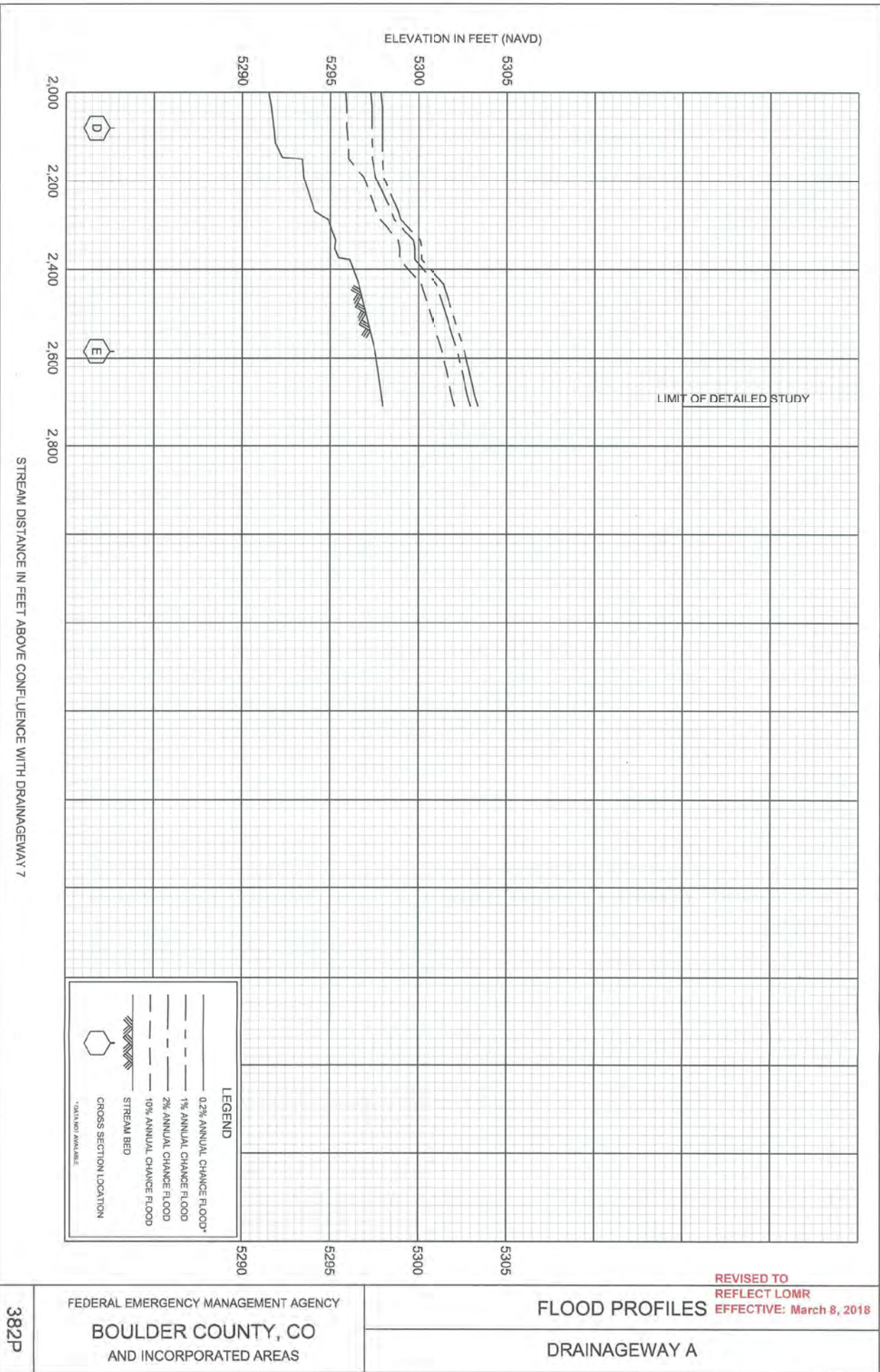


REVISED TO
REFLECT LOMR
EFFECTIVE: March 8, 2018

FLOOD PROFILES

DRAINAGEWAY A

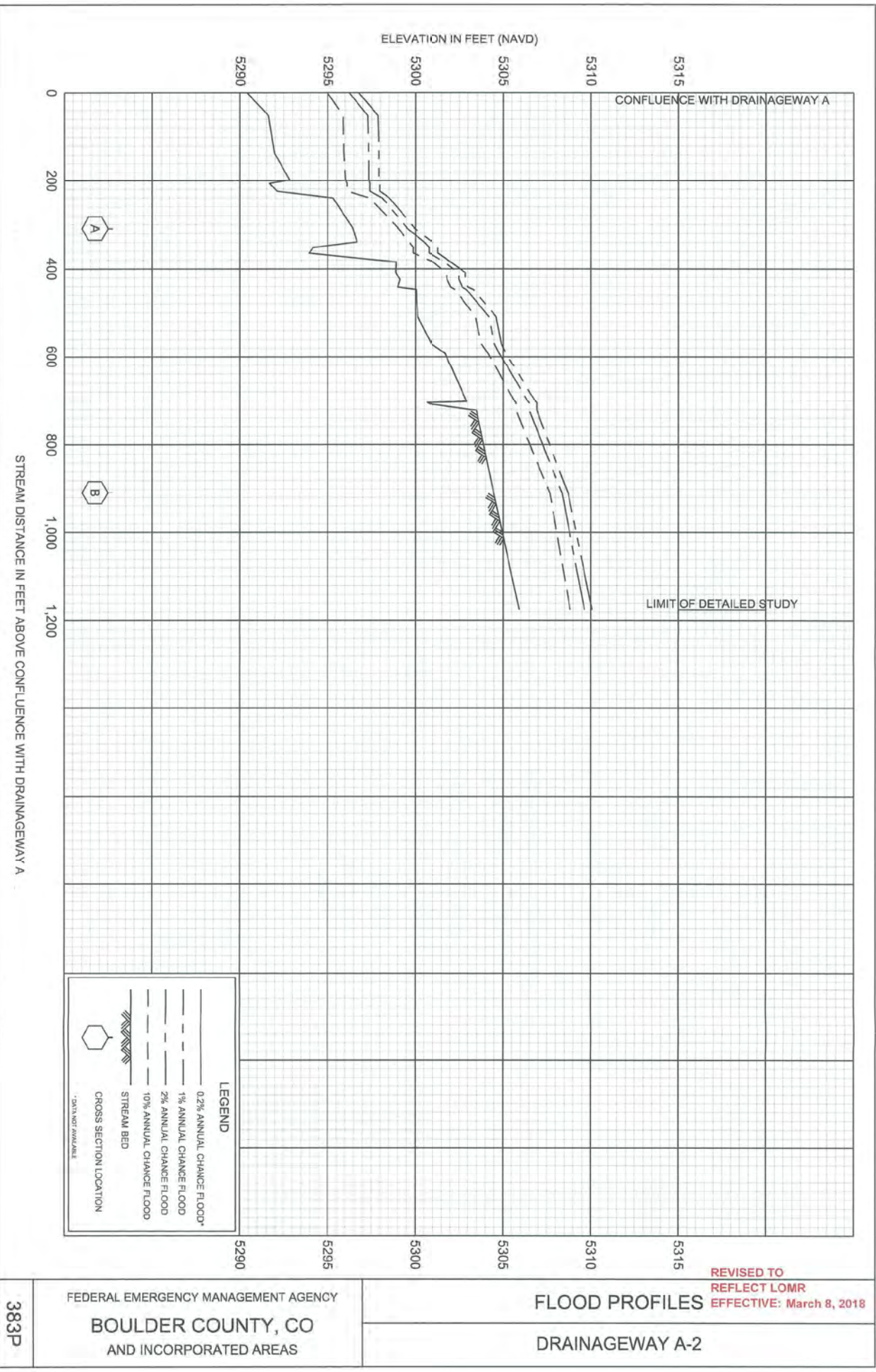
FEDERAL EMERGENCY MANAGEMENT AGENCY
BOULDER COUNTY, CO
AND INCORPORATED AREAS



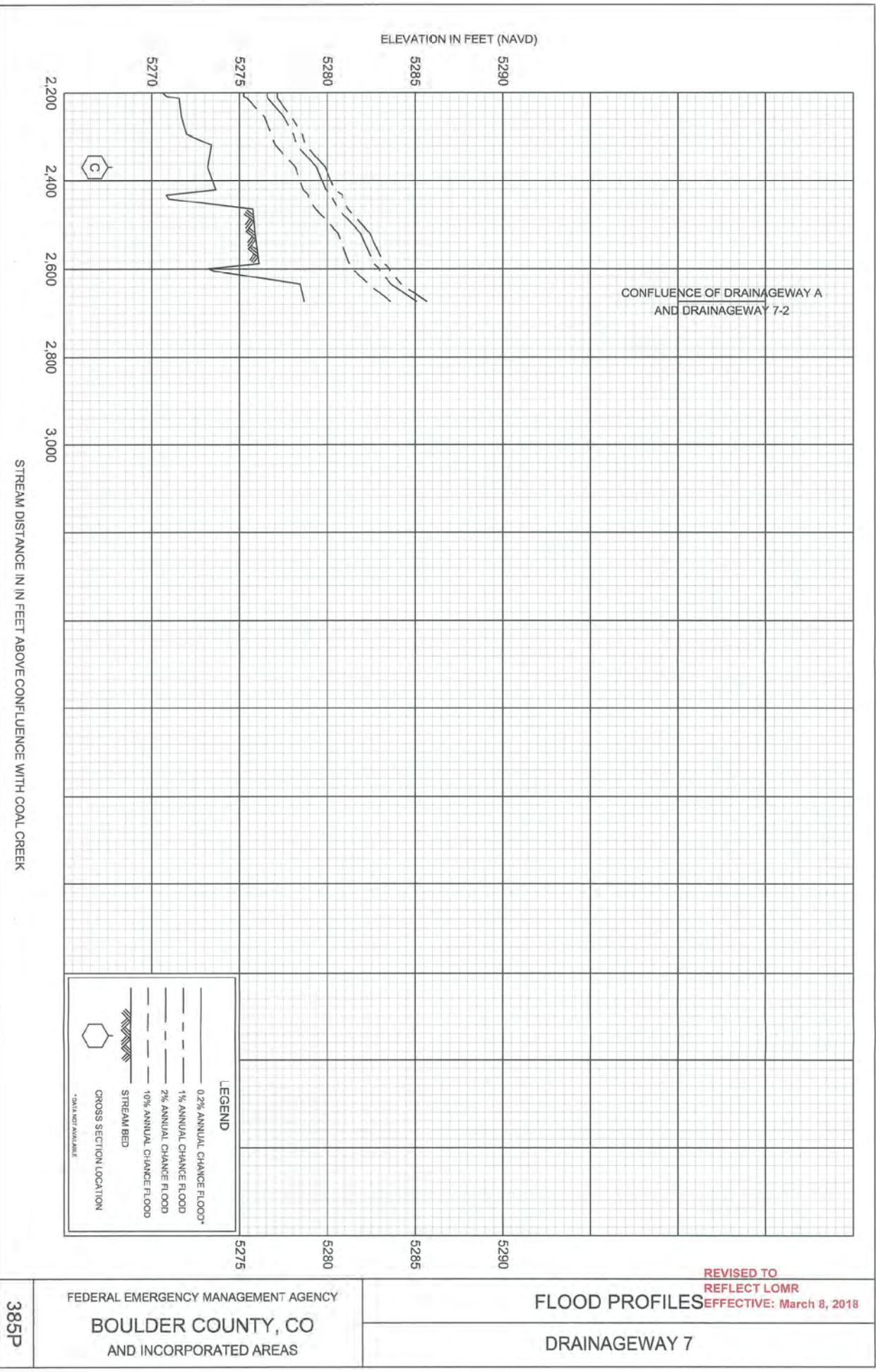
REVISED TO
REFLECT LOMR
EFFECTIVE: March 8, 2018

FLOOD PROFILES

DRAINAGEWAY A







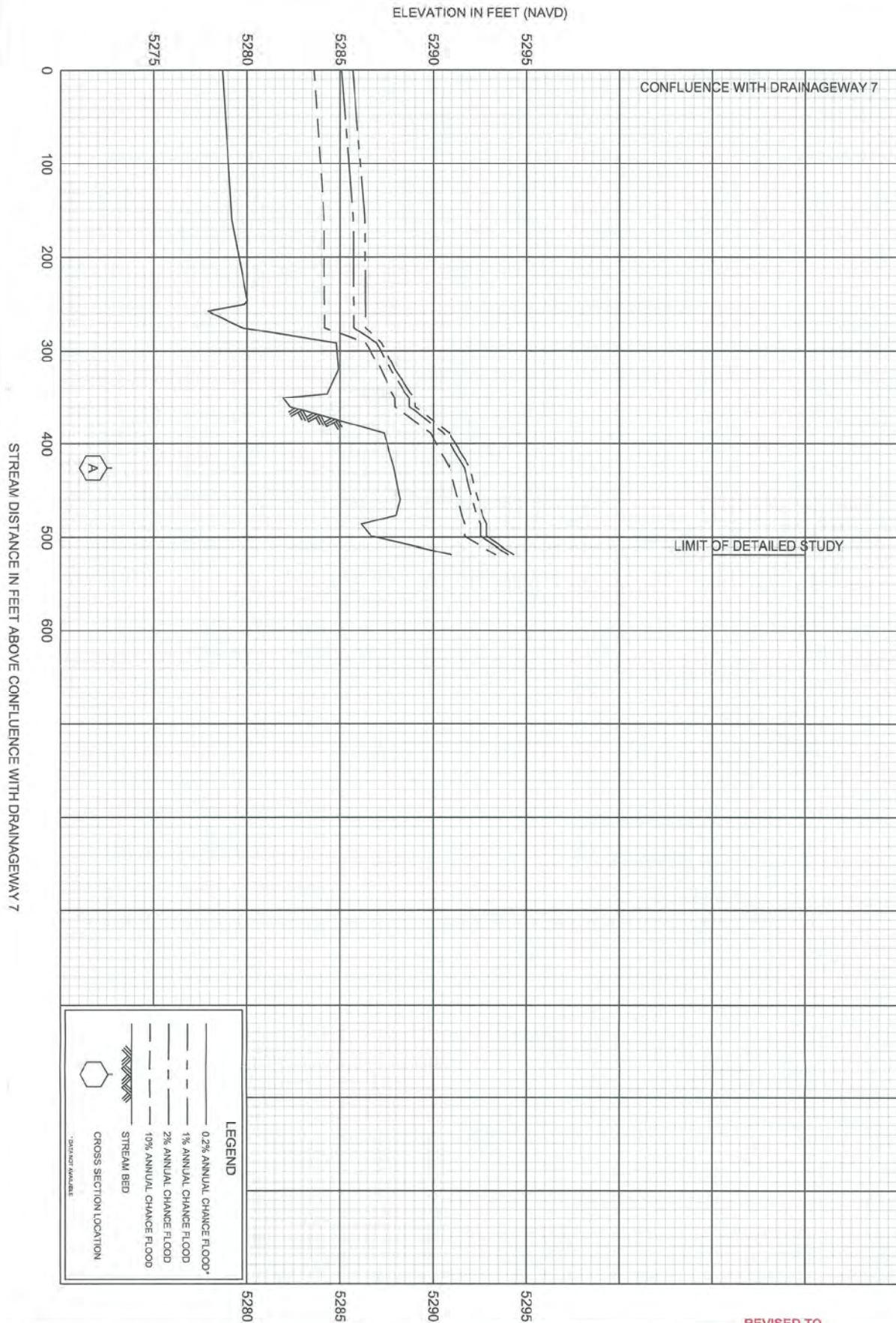
385P

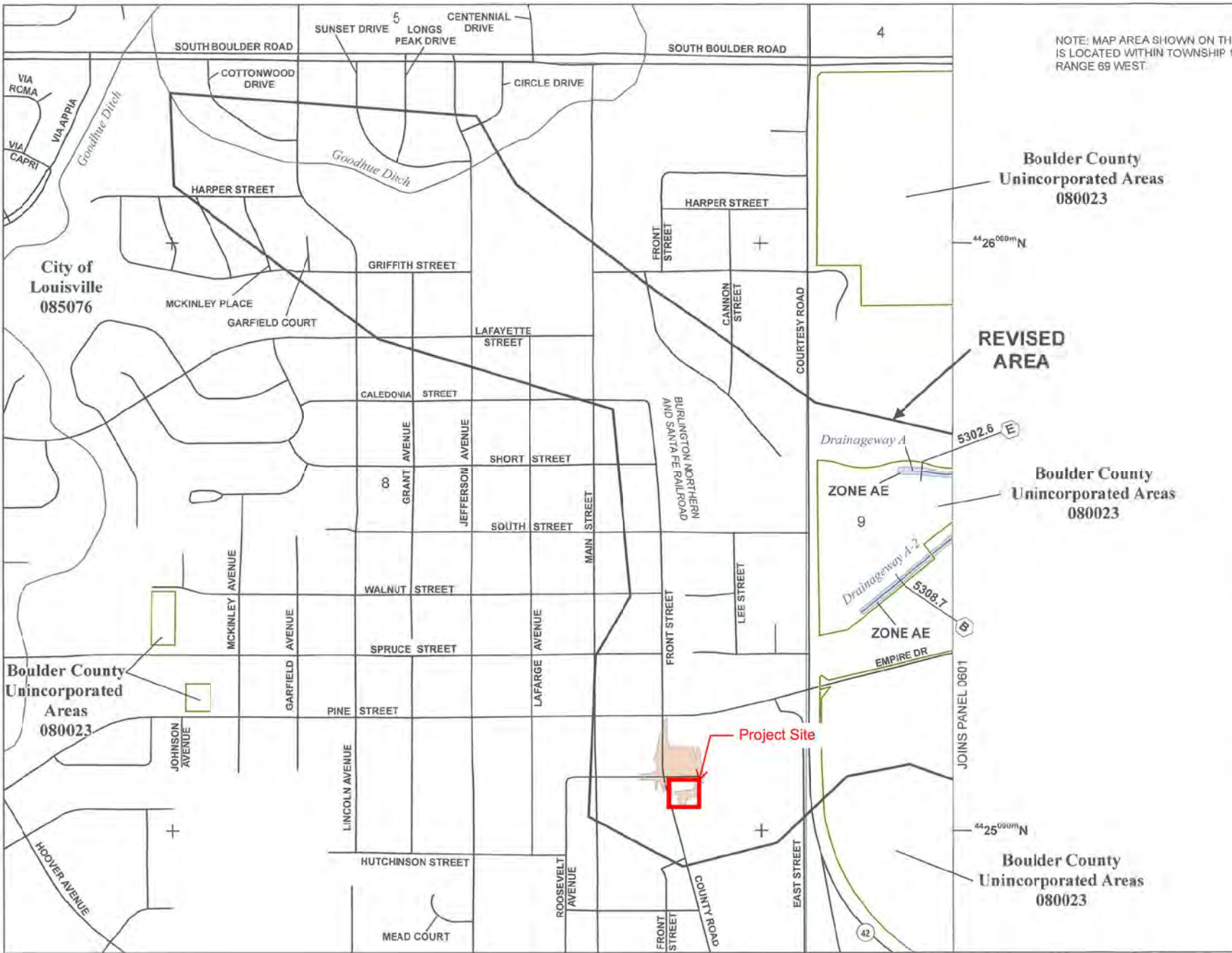
FEDERAL EMERGENCY MANAGEMENT AGENCY
BOULDER COUNTY, CO
AND INCORPORATED AREAS

REVISED TO
REFLECT LOMR
EFFECTIVE: March 8, 2018

FLOOD PROFILES

DRAINAGEWAY 7





NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 1 SOUTH, RANGE 69 WEST.

Boulder County Unincorporated Areas 080023

REVISED AREA

Boulder County Unincorporated Areas 080023

Boulder County Unincorporated Areas 080023

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) Zone A, X, AE-1
- With BFE or Depth Zone AE, AE-1, XE, XE-1
- Regulatory Floodway
- 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 A
- Future Conditions 1% Annual Chance Flood Hazard Zone A
- Area with Reduced Flood Risk due to Levees See Notes, 2012

OTHER AREAS OF FLOOD HAZARD

- Area with Reduced Flood Risk due to Levees See Notes, 2012

SCALE

Map Projection: Universal Transverse Mercator (UTM) 18N UTM Zone 18N
Datum: North American Datum of 1983
Scale: 1 inch = 500 feet

0 250 500 1,000 Feet
0 62.5 125 250 Meters

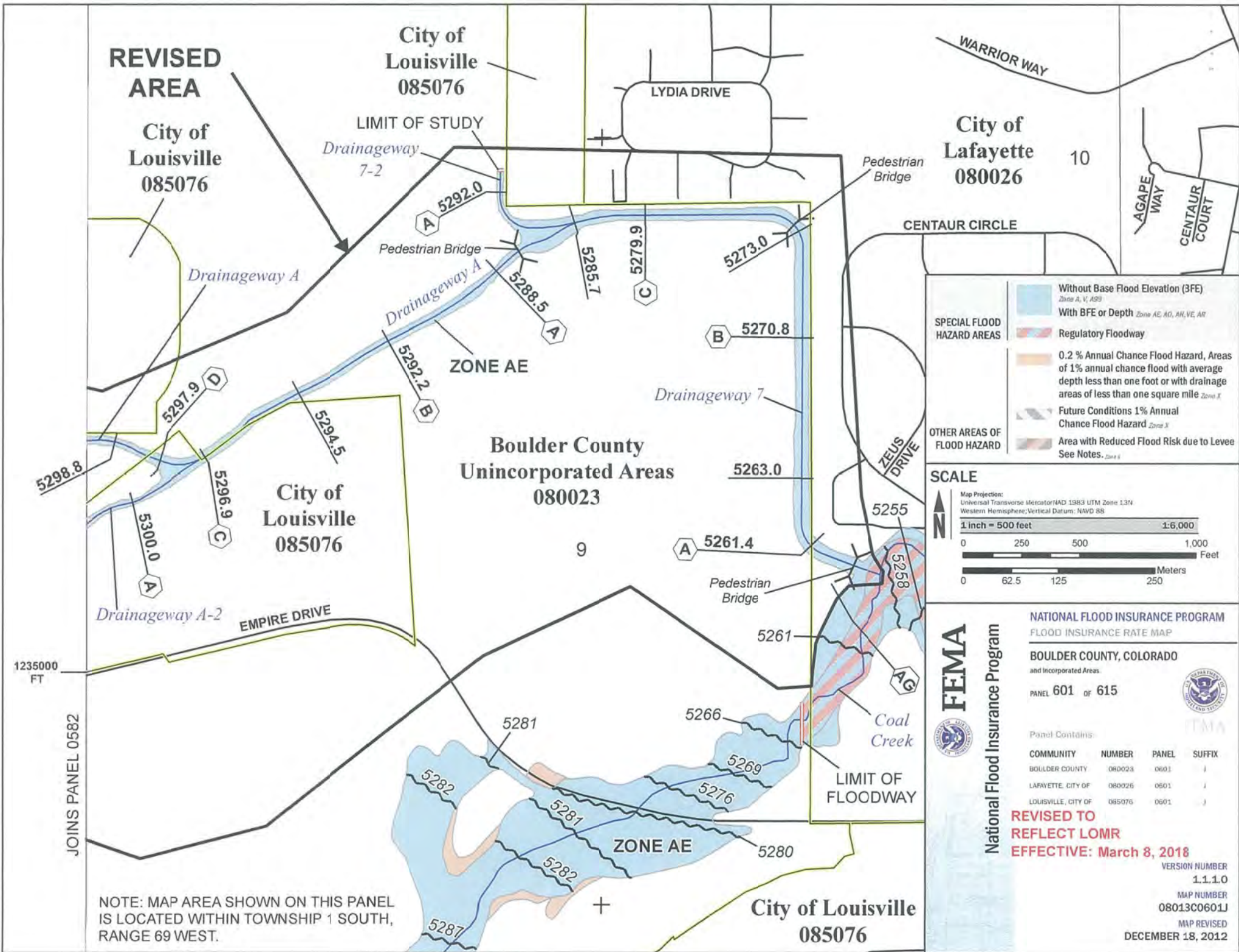
FEMA
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
BOULDER COUNTY, COLORADO
and Incorporated Areas
PANEL 582 OF 615

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOULDER COUNTY	080023	582	1
LARIMER COUNTY	080024	583	1
WYOMING	080025	584	1

REVISED TO REFLECT LOMR
EFFECTIVE: March 8, 2019
VERSION NUMBER 11.1.0
MAP NUMBER 08013C0582J
MAP REVISED DECEMBER 18, 2012



SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (3FE)
Zone A, V, A99
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway
- 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*

OTHER AREAS OF FLOOD HAZARD

SCALE

Map Projection:
Universal Transverse Mercator (NAD 1983 UTM Zone 13N)
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 62.5 125 250 Meters

FEMA
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

BOULDER COUNTY, COLORADO
and Incorporated Areas

PANEL 601 of 615

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOULDER COUNTY	080023	0601	J
LAFAYETTE, CITY OF	080026	0601	J
LOUISVILLE, CITY OF	085076	0601	J

REVISED TO REFLECT LOMR
EFFECTIVE: March 8, 2018

VERSION NUMBER
11.10

MAP NUMBER
08013C0601J

MAP REVISED
DECEMBER 18, 2012

T-3 BIORETENTION SYSTEMS

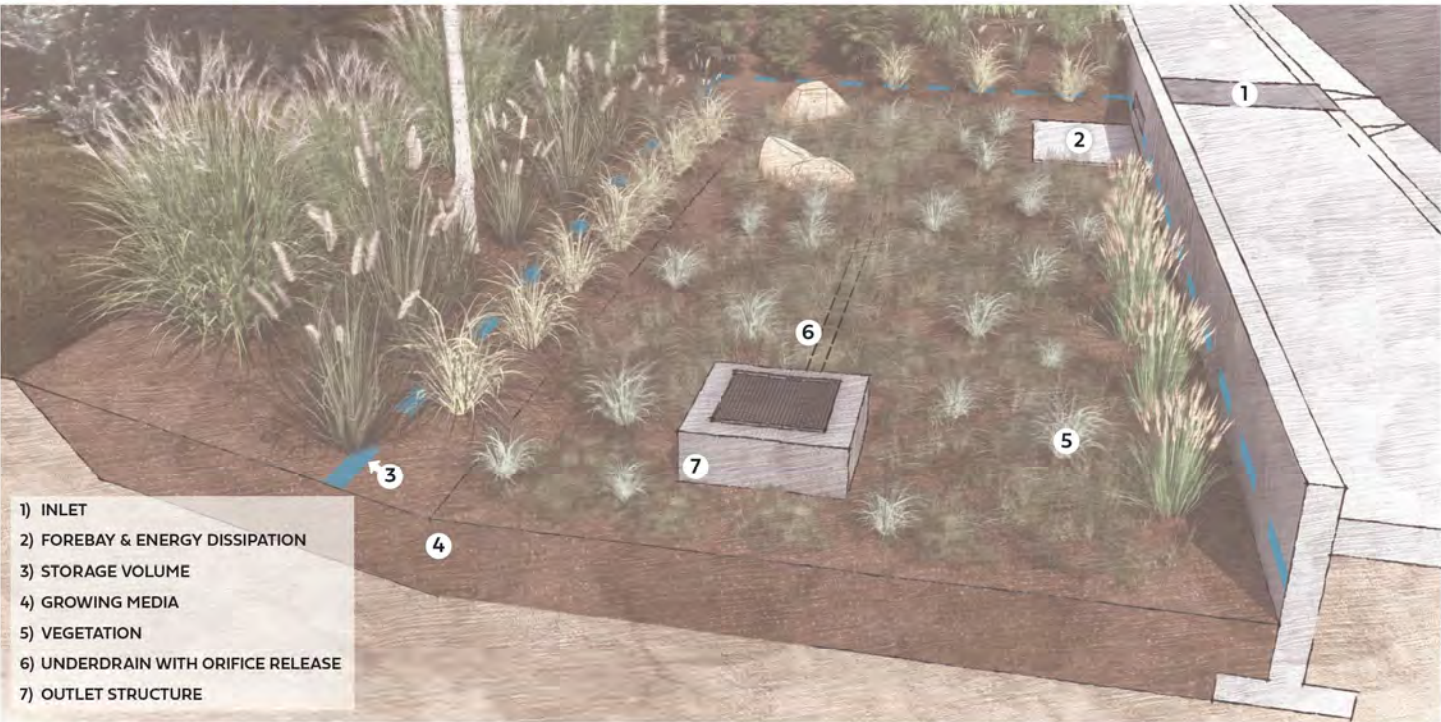


Figure BR-1. Bioretention System Components

DESCRIPTION

Bioretention systems are vegetated, engineered, depressed landscape areas designed to capture and filter and/or infiltrate the water quality capture volume (WQCV). Engineered media and vegetation facilitate filtration, adsorption, absorption, and biological processes that retain stormwater pollutants and enhance infiltration capabilities. The terms porous landscape detention (PLD), rain garden, and bioretention are often used interchangeably in the MHFD region. The term rain garden is sometimes used to describe smaller engineered bioretention systems or non-engineered installations and when describing this SCM to the public. Bioretention can be configured in several ways in urban areas and may be described as streetside planters, curbside bioretention, bump-out stormwater planters. Ultra-urban adaptations of bioretention can also include tree trenches and tree pits (although not described in this fact sheet). Local jurisdictions may have additional or different requirements for various types of bioretention systems.

MHFD strongly encourages use of bioretention as a stormwater control measure (SCM) because properly designed, constructed and maintained bioretention systems provide effective stormwater treatment, reduce runoff volume and erosive flow rates, and provide community connection benefits and green space in the urban environment.

Bioretention systems can be designed to provide detention for events exceeding the WQCV by incorporating storage of the Excess Urban Runoff Volume (EURV) and 100-year detention storage volumes above the WQCV, with drain times and release rates in accordance with the *Storage* chapter.

TABLE BR-1. BR OVERVIEW

BIORETENTION SYSTEMS	
MS4 Permit Applicability (Dependent on design and level of treatment)	
Meets Runoff Reduction Standard	Potential ¹
Meets WQCV Capture Standard	Yes
Meets Pollutant Removal Standard	Yes
Typical Effectiveness for Targeted Pollutants	
Sediment/Solids	High
Total Phosphorus	Low-Medium ¹
Total Nitrogen	Low-Medium ¹
Total Metals	High
Bacteria	Medium
Common Applications	
Runoff Reduction (General)	Potential ¹
Used for Pretreatment	No
Integrated with Flood Control	Yes

¹ Depends on design including full-infiltration, partial infiltration or no-infiltration section.

SCM COMPONENTS

The primary components of bioretention include inlet(s), energy dissipation and forebay(s), a surcharge volume, engineered media, vegetation, an underdrain (for no- or partial-infiltration designs), and an outlet structure (Figure BR-1). The primary outflow for the WQCV is typically an underdrain or infiltration into the underlying soil. When bioretention is designed to provide full spectrum detention, design the outlet to release the EURV and 100-year volumes in accordance with the EURV drain time and 100-year release rates. Even if the bioretention system is only designed to treat the WQCV, an emergency overflow (outlet or spillway) is necessary to safely convey flows from larger events.

See Section 3.0 *Site Assessment* and Section 4.0 *Filtration and Infiltration Systems* of this chapter for guidance and criteria on determining the appropriate type of bioretention system and designing underdrain and liner systems as needed based on site-specific conditions. Section 5.0 *SCM Inflow Features* and Section 6.0 *SCM Outflow Features* of this chapter provide guidance on creative ways to drain runoff into the SCM and release the treated runoff.

Check bioretention media sourcing and composition is important. MHFD recommends confirming the gradation and nutrient content in the field. The engineered media and vegetation are the core water quality treatment

TABLE BR-2. BR COMPONENTS

COMPONENT	INTENT
Inlet	Allows stormwater to enter the SCM.
Forebay	Facilitates removal of trash and coarse sediments, providing pretreatment for the SCM.
Energy Dissipation	Minimizes potential for erosion of media surface.
Storage Volume	Provides temporary storage needed to attenuate design flows.
Engineered Media	Supports plant growth and reduces pollutants by filtering and through other biological treatment processes.
Vegetation	Helps maintain infiltration over time through root penetration of media, increases evapotranspiration and biological uptake of pollutants, aerates media, catalyzes soil ecology, and creates an attractive SCM.
Underdrain with Orifice Release	For partial and no infiltration systems, collects and slowly releases the WQCV over 12 hours to reduce erosion in the receiving stream and enhance treatment by increasing contact time with the media.
Outlet Structure	Safely conveys stormwater flows that exceed the design volume. For bioretention systems that detain the EURV and/or 100-year flow, surface outlet structures will have additional orifice controls for surface discharge rather than infiltration through the media.

BENEFITS OF BIORETENTION

- When designed and constructed correctly, routine maintenance is straightforward consisting of sediment/debris removal from the forebay and vegetation management.
- Incorporates multiple treatment processes including sedimentation, filtering, adsorption, evapotranspiration, and biological uptake of constituents.
- Stormwater features are integrated with landscaping.
- Decreases urban heat island effects.
- Can be integrated into space-constrained urban areas in a variety of shapes and sizes.
- Avoids problems with clogging of small orifices common with some EDBs.

LIMITATIONS OF BIORETENTION

- Vegetation requires management.
- Requires additional steps when near a building foundation or when expansive soils exist.
- In a developing or otherwise erosive watershed, sediment loads can clog the system.
- Trash and sediment can block inlets and cause bypass of flows, if not maintained.



Photograph BR-1. This bioretention area treats runoff from the roof and lot, while serving as an aesthetically pleasing landscape feature. Photo: Wright Water Engineers.



Photograph BR-2. Bioretention system treating urban stormwater during runoff event. Photo: Wright Water Engineers.

elements of bioretention. The media must balance good infiltration capabilities with properties needed to support vegetation. MHFD has conducted significant testing of different mixes for bioretention media to develop the recommended specifications in this fact sheet. Additionally, national research has included media amendments targeting specific pollutants (Tirpak et al. 2021, Pitt and Clark 2010, Clark and Pitt 2012, Erickson et al. 2012 & 2021, Hunt et al. 2012, Chandrasena 2014, Mohanty and Boehm 2015, O'Neil and Davis 2012a&b, Mohanty et al. 2018, Herrera 2020, among many others). This fact sheet focuses on a basic engineered media design suitable for broad use in the MHFD jurisdiction, but does not preclude consideration of media amendments designed to target specific pollutants, provided that they maintain the intended functions of MHFD's media.

Other bioretention design variations in the underdrain configuration, such as use of an upturned underdrain elbow to create an internal water storage zone (Brown et al. 2009) to reduce nitrogen, are discussed further in Section 4.3.3 of this chapter.

SITE CONSIDERATIONS

Bioretention is an excellent choice for small sites because it treats the WQCV and serves as a landscape feature. It is typically a much better choice for small sites than an extended detention basin (EDB) because EDBs treating small drainage areas have outlet structures with small orifices that are prone to clogging. Bioretention can also be incorporated into larger sites and can be designed to provide full spectrum detention.

Bioretention systems typically are installed in locations such as:

- Plazas
- Parks
- Parking lot islands
- Street medians



Photograph BR-3. Terraced bioretention SCM in recreation center parking lot. Photo: MHFD

- Landscape areas between the road and a detached walk
- Planter boxes that collect roof drain flows

To avoid clogging of media, bioretention requires a stable watershed. When the watershed includes phased construction, sparsely vegetated areas, or steep slopes, consider another SCM that is less susceptible to clogging or provide pretreatment to facilitate sedimentation before runoff from these areas reaches the bioretention media surface. Additionally, bioretention is intended to dry out between runoff events; therefore, it should not be used when a baseflow is anticipated.

The surface of the bioretention media should be flat or at a mild slope. For this reason, bioretention can be more difficult to incorporate into steeply sloping terrain; however, terracing can be used to create flat areas suitable for bioretention even with sloped topography.

When bioretention areas are located adjacent to structures or infrastructure that could be adversely affected by infiltrating runoff or in areas with expansive soils, consult with a geotechnical engineer. A geotechnical engineer can evaluate the suitability of soils, identify potential impacts, and establish minimum distances or other physical barriers to implement between the bioretention system and structures. See Section 3.0 *Site Assessment* and Section 4.0 *Filtration and Infiltration Systems* for guidance and criteria on geotechnical considerations and testing requirements, underdrain and filter layers, perimeter barriers, and other aspects common to infiltration-based SCMs including bioretention.

COMMUNITY VALUES

Bioretention provides opportunities to provide a high level of treatment for stormwater while also creating landscape features that add value to a site by enhancing the landscape aesthetics and experience. Bioretention areas that are an integral part of the site's landscape provide far more benefits than areas dedicated solely to stormwater treatment, such as small EDBs, because bioretention areas are multifunctional and can serve other purposes including meeting landscape area requirements, providing attractive pockets of interesting plants, aesthetic screening of parking lots, and others.

It is important to establish pre-design planning objectives to facilitate a successful design. At an early stage, determine the aesthetic design approach that best meets the overall project objectives. There are many opportunities for creativity in grading, plant selection, and design of inflow and outflow features for bioretention. Design approaches typically endeavor either to integrate the SCM into its surroundings with a “contextual design,” or consciously contrast with the surroundings to highlight the SCM as a “stand-alone element,” providing a counterpoint to the context of the site.

In a contextual design, the design responds to and builds on the character of the surroundings. Forms and shapes are related to and harmonious with surrounding structures and site improvements and fit into their environment through use of similar or complementary materials, scale, and design detailing. Materials used in this approach may directly reflect materials used in the surrounding architectural and engineering improvements. Coordinate design details for the bioretention area, such as concrete or stone edgers and retaining walls, with the surrounding site improvements to provide a unifying effect with the surroundings. Plant materials should also relate to surrounding landscape in overall character, massing, and degree of formal or naturalistic arrangement, while selecting drought-tolerant plants that will also thrive in the periodically wet environment.

A “stand-alone” or counterpoint design aims to create a feature that contrasts with its surroundings through uses of form, scale, materials, color, and other features. A counterpoint design can create a strong dramatic effect, but to be successful, it must be done in a way that creates an overall balanced site design.

Of these two approaches, contextual design is more common and is generally easier to accomplish. With either approach, the emphasis should be on creating a feature that adds value to the site while effectively treating the WQCV. Maintenance is critical for ensuring long-term function of bioretention and community acceptance, so planning for maintenance and selecting plants that are suitable for the hydrologic conditions in the SCM are important design aspects to avoid burdensome maintenance.

Appropriate plant selection enhances the community value of bioretention systems. Considerations for plant selection from a community-values perspective include:

- Select plants that thrive and perform over the long-term without excessive maintenance. For bioretention to be accepted by the community, it should be attractive (Davis, Traver and Hunt 2022), which requires healthy plants and routine maintenance.
- Select plants appropriate for the site’s unique micro-climatic conditions and bioretention design features, construction techniques, and expected maintenance levels of service. Microclimate, including solar aspect, exposure to wind, and shading or sun reflections from adjacent buildings, can have a significant effect on the conditions that plants must tolerate. Visiting the site during different times of the day in summer months prior to design is very informative for understanding sun and shading as well as urban heat island effects.
- Small trees can provide significant added value to bioretention areas, including runoff reduction and mitigation of urban heat island effects. When considering trees for bioretention systems, assess the compatibility of different species with the hydrologic, soil, and solar aspect of the SCM. Healthy trees also require adequate above and belowground space (Davis et al. 2022). (See additional considerations for trees in the Design section of this fact sheet.)
- Use natives plant species when feasible. Native species tend to tolerate the region’s hot summers and cold winters better than most non-natives. Native grasses have deep roots that can reach residual moisture in the bioretention media during times of drought.
- Select plants that are drought tolerant but that can also tolerate prolonged periods of inundation or media saturation, particularly during sequential storms.
- Consider planting vegetation in groupings or masses of single or similar species. Generally, large masses of plants grouped relatively close together create dense stands of vegetation that grow together to out-compete weed growth, while enhancing infiltration through root penetration that creates macropores as roots die and decay.

MAINTENANCE

Routine maintenance of bioretention is similar to landscape maintenance, consisting of trash and sediment removal from the forebay and care for vegetation. Chapter 6 of this manual provides recommended maintenance practices for all SCMs. During design, consider the following during design to ensure ease of maintenance over the long-term:

- Consider how the SCM will be accessed for routine and restorative maintenance, what equipment will be required, and how routine maintenance activities can be performed in a way that minimizes impacts to vegetation.
- Understand the level of maintenance that will be needed over the long term. Bioretention features designed as aesthetic amenities in public areas may require more frequent maintenance than those with more naturalized designs in suburban settings. Do not select plantings that require frequent maintenance if the owner does not have the resources to perform such maintenance. Poorly maintained bioretention areas can become weedy eye sores that contribute to poor public acceptance.
- Make the bioretention surface area (bowl) as shallow as needed. Increasing the depth unnecessarily can create erosive side slopes and complicate maintenance. Shallow bioretention areas are also more attractive.
- The best surface cover for bioretention is full vegetation, in part because it reduces weeding and various mulch-related maintenance issues. Use rock mulch sparingly because it limits infiltration, is more difficult to maintain and can also increase urban heat island effects. Wood mulch handles sediment build-up better than rock mulch; however, wood mulch floats and can settle unevenly or clog the overflow depending on the configuration of the outlet. Some municipalities may not allow wood mulch for this reason. When specifying mulch, look for shredded varieties. Also, increase density of grasses at the interface of the forebay and vegetation to slow flows entering the basin.
- Provide pretreatment when it will reduce the extent and frequency of maintenance necessary to maintain function over the life of the SCM. Provide a forebay for any concentrated inflows. For small inflows, the forebay may consist of a pad for sediment accumulation and removal surrounded by grasses to help keep sediment from migrating onto the filter area.
- Note that research shows that deicers can cause reduced infiltration rates in media and soils with clay content (Sileshi, Pitt and Clark 2017). Understand the composition of the media and the underlying soils in this respect and develop the planting plan accordingly. Deicers in runoff can stress vegetation, which may result in increased maintenance and vegetation replacement requirements. Conifers are particularly sensitive to salt.
- Establishing healthy vegetation is critical for this SCM to properly function. Design and adjust the irrigation system (temporary or permanent) to provide appropriate water for the establishment and maintenance of selected vegetation.
- Consider maintenance access and requirements for tree pruning and frequency of raking, if trees are included in bioretention systems. Do not operate heavy equipment on the media surface (e.g., cherry picker lifts) for tree pruning.
- Do not put a filter sock on the underdrain. This is not necessary and can cause the underdrain to clog.
- Never use bioretention systems for snow storage. Designate a location for snow storage elsewhere.

DESIGN PROCEDURES & CRITERIA

Criteria and guidance for bioretention components including inlets, forebays, underdrains, liners, and outlets are provided in the front section of this chapter. Reference this section for design of these specific features.

The SCM Design workbook, available at www.mhfd.org, is an Excel-based workbook that steps through the criteria listed below and performs design calculations for bioretention. Use this workbook to ensure designs meet criteria for treating the WQCV. Use a separate tool, MHFD-Detention, to develop and route storm hydrographs for a range of events through bioretention systems.

The following steps outline the design procedures and criteria for designing bioretention for water quality:

1. **Subsurface Exploration and Determination of a Full Infiltration, Partial Infiltration or No-Infiltration Section:** See Section 3.0 *Site Assessment* and Section 4.0 *Filtration and Infiltration Systems* of this chapter to determine the most appropriate type of filtration and/or infiltration system for the bioretention area based on site conditions.
2. **Inlet Design and Pretreatment:** See Section 5.0 *SCM Inflow Features* of this chapter for guidance and criteria for inlets, energy dissipation, and forebays. Provide pretreatment with a properly designed forebay or other device designed to remove coarse sediment, trash, and debris. Pretreatment of roadway runoff to remove sediment is especially critical for bioretention systems receiving roadway runoff.

Where feasible, inlets set above the WQCV elevation will reduce maintenance requirements related to sediment deposition in the inflow pipe due to backwater conditions.
3. **Design Storage Volume:** Provide a storage volume equal to the WQCV¹ based on a 12-hour drain time, after accounting for runoff-reduction SCMs in the contributing watershed. Determine the required WQCV (watershed inches of runoff) using Equation 3-2 of Chapter 3 of this manual (for WQCV). Always size SCMs based on their tributary area. When sizing the basin for EURV or larger detention volumes, see the *Storage* chapter of Volume 2. Where needed to meet the required volume, also consider the available void storage capacity of the media at 15 percent.
4. **Bioretention System Basin Geometry:** Basin geometry considerations include surface area, filter surface slopes and ponding depth.
 - **Media Surface Area:** Equation BR-1 provides a minimum media surface area for the WQCV allowing for some of the volume to be stored beyond the flat area of the media (i.e., above the side slopes of the bioretention basin). Additional surface area beyond this minimum may be necessary to meet the maximum recommended ponding depth.

$$A_F = 0.02 \cdot A \cdot I$$

Equation BR-1

Where:

A_F = minimum filter area (ft²)

A = area tributary to the SCM (ft²)

I = imperviousness of tributary area draining to the SCM (percent expressed as a decimal)

Use vertical walls or slope the sides of the basin to achieve the required volume. Side slopes should be no steeper than 4:1.

- **Ponding Depths:** Maximum ponding depths vary depending on the bioretention design, with a maximum recommended WQCV ponding depth of 12 inches stored above the surface to minimize stress to vegetation for frequent inundation and to manage the hydraulic loading. When the bioretention basin is designed for the WQCV only, locate the overflow spillway crest at or above the elevation associated with the maximum ponding depth for the WQCV measured vertically from the flat filter media surface.
- **Media Surface Slopes:** The media surface of the bioretention area typically should be flat. The exception to this is when a mild slope (e.g., < 1%) from the inlet to the outlet will help distribute runoff to the vegetation and reduce sediment deposited at the inlet. Linear systems, such as streetside stormwater planters, may benefit from a mild slope from inlet to outlet. When the flow path is long, consider level grade beams to maintain sheet flow. The intent is to fully use the filter area to avoid higher sediment deposition in lower areas of the basin.

¹MHFD's standard design procedure is based on treatment of the WQCV, which corresponds to the Colorado's MS4 WQCV design standard. In some cases, bioretention systems may be designed to meet a volume reduction target, particularly where underlying soils allow for infiltration. In this case, conduct site-specific analysis to determine whether the volume reduction target can be met for site conditions.

TABLE BR-3. BIORETENTION MEDIA PROPERTIES

SOIL PARAMETERS	TEST NAME	BIORETENTION MEDIA PROPERTIES
Texture/Gradation	ASTM D7928 Sedimentation (Hydrometer) Method	<u>Particle Size Distribution:</u> 70-80% Sand (0.05-2.0 mm diameter) 5-25% Silt (0.002-0.05 mm diameter) 5-15% Clay (<0.002 mm diameter) <u>Notes:</u> Sand, silt and clay percentages are by dry weight. Particle sizes are based on the USDA soil classification system. Distribution is measured after gravel > 2 mm is removed from sample. Media should have no more than 25% material > 2 mm. Equivalent sieve sizes for the upper and lower limit of sand are #10 and #240, respectively.
Organic Matter	ASTM D2974	1-5% by dry weight
pH	ASA/AASHTO	6.0 - 8.5
Salinity/Salts (EC) dS/m or mmhos/cm	Saturated Paste	<3
Nitrate Nitrogen (ppm)	ASA2 33-3	<30
Phosphorus (ppm)	Use Olsen when pH>6.2, otherwise use Mehlich-3	Olsen: <20 or Mehlich-3: <30

5. **Underdrain System, Impermeable Liner, and Geotextile Separator Fabric:** See Section 4.0 *Filtration and Infiltration Systems* of this chapter for guidance and criteria based on the type of filtration and infiltration system selected. Underdrain systems in bioretention basins consist of a slotted PVC pipe placed within a layer of drain gravel beneath the bioretention media. A 6-inch layer of sand is also specified above the drain gravel in Section 4.0. Research (Herrera 2020) indicates that a sand layer below the media can serve as a polishing layer for the effluent.
6. **Bioretention Media:** Provide a minimum of 18 inches of bioretention media to enable establishment of the roots of the vegetation. If trees are planted, increase the media depth to 36 inches.

MHFD’s bioretention media is intended to balance high infiltration capacity with properties needed to support healthy vegetation. Table BR-1 outlines recommended parameters for bioretention media. MHFD’s media recommendation begins with topsoil that can be amended as needed, typically with sand, until it meets the specifications in Table BR-1. See *Availability of Bioretention Media in the MHFD Region (MHFD 2023)* for more information. It is important that the media contain organic material with living soil organisms such as earthworms, bacteria, and fungi to enhance agronomic and infiltration properties and create a healthy, living media. Do not add compost to the bioretention media; instead, other forms of organic matter such as mulch, peat or woodchips should be used if needed because they have lower nitrogen and phosphorus content and are more resistant to microbial degradation (Davis, Hunt and Traver 2022).

The media texture in Table BR-1 has a slightly higher proportion of silts and clays and a lower sand percentage compared to prior MHFD media specifications. The purpose of this change is to increase moisture and nutrient holding capacity to aid in the establishment of a dense vegetation cover, which ultimately helps to sustain infiltration capacity.

A high level of quality control for the media is critical. Quality control measures include reviewing media particle size distribution data, media chemistry data, and results of nutrient analysis to ensure that the media meets specifications. The media can either be sampled after delivery and prior to placement, or sampled by the supplier just prior to site delivery. In any case, the samples should be collected within several days of placement of the media so that the results are representative of the media placed.

7. **Vegetation:** The media must be vegetated. MHFD recommends drought-tolerant species that thrive in sandy soils. Approaches to vegetating bioretention areas can include planting sod-forming native grasses from seed, installing sand-grown sod, and/or planting container-grown plants or small trees. Consult with a vegetation specialist to understand which types of vegetation will be successful in a given location, considering shade, heat island effects, application of deicers in the watershed, and other site-specific factors. Recommendations for vegetation established from seed, planted in containers or plugs, and trees follow. While establishment from seed typically costs less than container-grown plants, container-grown plants establish more quickly and are less susceptible to being washed away during establishment. A mixture of container-grown plants and seed may help with initial vegetation cover and media stabilization.

Table BR-4 provides a suggested seed mix for sites that typically will not need to be irrigated after the grass has been established, except for periods of extended drought. Guidelines for establishing vegetation from seed include:

- Mix seed well and broadcast, followed by hand raking to cover seed.
- Immediately after seeding, install a biodegradable 100-percent coconut erosion control blanket over the media to keep seed and media in place during runoff and irrigation events during establishment.
- Consider seasonality when planting to ensure establishment. Both frequent storms and extended hot, dry periods can affect seed establishment.
- Do not place seed when standing water or snow is present or if the ground is frozen.
- Weed control is critical in the first two to three years, especially when starting with seed.

When using sod, specify sand-grown sod which is available in Colorado, although not as common as conventional sod. Do not use conventional sod. Conventional sod is grown in clay soil that can seal the filter area, greatly reducing overall function of the SCM. Be aware that local jurisdictions may restrict use of turf varieties with high irrigation requirements (e.g., Kentucky bluegrass) and may require native grasses for water conservation reasons.

TABLE BR-4. NATIVE SEED MIX FOR BIORETENTION

COMMON NAME	SCIENTIFIC NAME	VARIETY	PURE LIVE SEED (PLS)	
			POUNDS/ACRE	OUNCES/ACRE
Sand bluestem	<i>Andropogon hallii</i>	Garden	3.5	
Sideoats grama	<i>Bouteloua curtipendula</i>	Butte	3	
Prairie sandreed	<i>Calamovilfa longifolia</i>	Goshen	3	
Indian ricegrass	<i>Oryzopsis hymenoides</i>	Paloma	3	
Switchgrass	<i>Panicum virgatum</i>	Blackwell	4	
Western wheatgrass	<i>Pascopyrum smithii</i>	Ariba	3	
Little bluestem	<i>Schizachyrium scoparium</i>	Patura	3	
Alkali sacaton	<i>Sporobolus airoides</i>		3	
Sand dropseed	<i>Sporobolus cryptandrus</i>		3	
Pasture sage ¹	<i>Artemisia frigida</i>			2
Blue aster ¹	<i>Aster laevis</i>			4
Blanket flower ¹	<i>Gaillardia aristata</i>			8
Prairie coneflower ¹	<i>Ratibida columnifera</i>			4
Purple Prairie Clover ¹	<i>Dalea (Petalostemum) purpurea</i>			4
Sub-Totals:			27.5	22
Total pounds/acre			28.9	

¹ Wildflower seed (optional) for a more diverse and natural look.

TABLE BR-5. CONTAINER-GROWN PLANTS AND PLUGS FOR BIORETENTION (SOURCE: CITY & COUNTY OF DENVER 2016)

COMMON NAME	SCIENTIFIC NAME
Grasses	
Dancing Wind Big Bluestem	<i>Andropogon gerardii</i> 'Dancing Wind'
Windwalker Big Bluestem	Winter <i>Andropogon gerardii</i> 'P003S'
Feather Reed Grass	Winter <i>Calamagrostis x acutiflora</i> 'Karl Forester'
Tufted Hair Grass	<i>Deschampsia caespitosa</i>
Blonde Ambition Grama Grass	<i>Bouteloua gracilis</i> 'Blonde Ambition'
Hot Rod Switchgrass	<i>Panicum virgatum</i> 'Hot Rod'
Northwind Switchgrass	<i>Panicum virgatum</i> 'Northwind'
Prairie Sky	<i>Panicum virgatum</i> 'Prairie Sky'
Prairie Blues Little Bluestem	<i>Schizachirium scoparium</i> 'Prairie Blues'
Undaunted Ruby Muhly	<i>Muhlenbergia reverchoni</i> 'Undaunted'
Prairie dropseed	<i>Sporobolus heterolepis</i>
Herbaceous Perennials	
Pearly Everlasting	<i>Anaphalis margaritacea</i>
Prairie Bluebell	<i>Mertensia lanceolata</i>
Dakota Sunshine Sunflower	<i>Helianthus maximiliani</i> 'Dakota Sunshine'
Western Blue Flag Iris	<i>Iris missouriensis</i>
Rocky Mountain Gayfeather	<i>Liatris ligulistylis</i>
Wild Bergamont	<i>Monarda fistulosa</i>
Eastern Bergamont	<i>Monarda bradburiana</i>
Evening Primrose	<i>Oenothera fruticose</i> 'Fireworks' / Fyrveckeri
Husker Red Penstemon	<i>Penstemon digitalis</i> 'Husker Red'
Garden Phlox	<i>Phlox paniculate</i> 'Blue Paradise'
Border Phlox	<i>Phlox paniculate</i> 'David'
Prairie coneflower	<i>Ratibida pinnata</i>
Bluebird smooth aster	<i>Symphyotrichum laeve</i> 'Bluebird' smooth aster
Bulbs	
Blue Danube Wild Hyacinth	<i>Camassia leichtlinii</i> 'Blue Danube'
Shrubs	
Leadplant	<i>Amorpha canescens</i>
Prairie Snow White Cinquefoil	<i>Dasiphora</i> (Potentilla) <i>fruticosa</i> var. <i>dahurica</i> 'Prairie Snow'
Apache Plume	<i>Fallugia paradoxa</i>
Pawnee Buttes Sand Cherry	<i>Prunus besseyi</i> 'Pawnee Buttes'
Autumn Amber Skunkbush Sumac	<i>Rhus trilobata</i> 'Autumn Amber'
Glow Girl Spirea	<i>Spirea betulifolia</i> 'Tor Gold'

When selecting a container-grown plant palette, consider water needs, exposure (sun/shade), plant height and spread, recommended container sizes, plant spacing and future maintenance requirements. Common container-grown plants or plugs suitable for bioretention systems in urban areas are listed in Table BR-3 (City and County of Denver 2016). Other drought-tolerant plants may also be considered.

When using an impermeable liner, select plants with diffuse (or fibrous) root systems, not taproots. Taproots can damage the liner and/or underdrain pipe.

Small trees may be considered in bioretention areas, provided that adequate media, irrigation, and space are available. Trees are generally better suited for larger bioretention areas. Recommendations for planting trees in bioretention areas include:

- Do not install trees in bioretention systems with an impermeable liner.
- Provide irrigation for trees.
- Consider planting trees on side slopes, above the more frequently inundated areas.
- Select trees that can withstand periods of inundation.
- Avoid conifers in areas exposed to deicing chemicals.
- Provide access for tree maintenance, which may include pruning, removal of bioretention media removal and replacement, tree removal and replacement, and incidental removal of other vegetation.
- Install trees at least 5 feet away from inlets, outlets, and underdrains because tree roots may obstruct inlets and outlets or damage the underdrain. Consider limiting the length of the underdrain to allow for placement of trees where desired.
- For deciduous trees, plan for additional seasonal maintenance to remove leaf litter and avoid media clogging.
- Avoid trees with fruit litter.
- Select shade-tolerant species for tree understory plants.
- When considering trees for bioretention systems located in easements, check local requirements regarding allowed vegetation types and replacement requirements.
- Be aware that some jurisdictions may not allow trees in bioretention.
- See Denver's Ultra-Urban Guidelines (Denver 2016) for tree pit/trench bioretention variations.

8. **Irrigation:** Irrigation is required for vegetation establishment, for supplemental water during extended dry periods, and may be needed on a routine basis depending on plant selection. During establishment, all plants should receive approximately 1 inch of moisture (combined rain and irrigation) per week for the first growing season to promote establishment. Some plants may require more than one growing season to become fully established. Providing a permanent irrigation system at the time of SCM installation provides greater flexibility in plant selection and aesthetics, even if regular irrigation is not routinely required after plant establishment.

Install spray irrigation at or above the WQCV elevation when permanent irrigation is provided or place temporary irrigation on top of the bioretention media surface. Do not place sprinkler heads on the flat media surface as they can become buried over time. Remove temporary irrigation pipes that are laid on the surface once vegetation is established.

VEGETATION ESTABLISHMENT AND INFILTRATION RATES

During vegetation establishment, water applied to bare media can mobilize and rearrange fine silt and clay particles on the surface to create a lower permeability layer. For this reason, vegetation is a critical component in maintaining infiltration in the bioretention system over time. When establishing vegetation from seed, install seed and blanket immediately after media is placed to reduce the mobilization of fines and facilitate germination of the seed.

If left in place, temporary irrigation will become buried over time and will be damaged during maintenance operations.

Adjust irrigation schedules during the growing season to provide the minimum amount of water necessary to maintain plant health, while maintaining free pore space for infiltration.

9. **Outlet:** For partial and no-infiltration configurations, drain the underdrain to the outlet structure and use an orifice plate to drain the WQCV over approximately 12 hours. Section 6.0 *SCM Outflow Features* of this chapter includes conceptual details for the underdrain and orifice outlet both for attenuating the WQCV and larger volumes. When designing for EURV and/or 100-year attenuation, flows greater than the WQCV are controlled and released at the outlet structure, rather than forced through the filter area of the bioretention basin. Provide a spillway for larger events that will convey overflows to the receiving drainage system without adversely affecting adjacent structures or infrastructure. Use the simplified equation in Section 6.1 of this chapter or the MHFD-Detention workbook to size the orifice. MHFD-Detention also aids with design of outlet controls for larger runoff events.

CONSTRUCTION CONSIDERATIONS

Proper construction of bioretention areas involves careful attention to material specifications, final grades, and construction details. For a successful project, implement the following practices:

- Protect the bioretention area from excessive sediment loading during construction. This is the most common cause of clogging of bioretention systems. The portion of the site draining to the SCM must be stabilized before allowing flow into the bioretention area. This includes completion of paving operations.
- Avoid over-compaction of the bioretention area to preserve infiltration rates (for partial and full infiltration sections).
- Provide construction observation to ensure compliance with design specifications. It is important to avoid improper installation, particularly related to elevations of the inlet, underdrain and outlet. Observation/oversight is recommended for the following:
 - » Conformance of subgrade with design assumptions.
 - » Installation of impermeable liner (for no infiltration sections).
 - » Construction of underdrain and installation of media layer.
 - » Review of bioretention media test data to verify conformance with specifications prior to installation.
- Provide adequate construction staking to ensure that the site properly drains into the SCM, particularly with respect to surface drainage away from adjacent buildings.

REFERENCES

- Brown, R.A., Hunt, W.F., and S.G. Kennedy. 2009. Designing Bioretention with and Internal Water Storage (IWS) Layer. Urban Waterways. North Carolina State University, Department of Biological and Agricultural Engineering. North Carolina Cooperative Extension and NCSU College of Agricultural & Life Sciences: Raleigh, NC.
- Chandrasena, G.I., Pham T., Payne, E.G., Deletic A., and D.T. McCarthy. 2014. E. coli removal in laboratory scale stormwater biofilters: Influence of vegetation and submerged zone. *Journal of Hydrology*. August 5.
- City and County of Denver. 2016. Ultra-Urban Green Infrastructure Guidelines. Prepared by Muller Engineering, Stream and Tetra Tech for Denver Public Works and the Mile High Flood District.
- Clark, S. and R. Pitt. 2012. Targeting treatment technologies to address specific stormwater pollutants and numeric discharge limits. *Water Research*. 46(20). <http://dx.doi.org/10.1016/j.watres.2012.07.009>.

- Davis, A., Traver, R., and W. Hunt. 2022. *Green Stormwater Infrastructure Fundamentals and Design*. John Wiley and Sons: Hoboken, NJ.
- Erickson, A.J., Gulliver, J.S., and P.T. Weiss. 2012. Capturing phosphates with iron enhanced sand filtration. *Water Research*, 46(9): 3032-3042. <https://doi.org/10.1016/j.watres.2012.03.009>
- Erickson, A.J., Kozarek, J.L., Kramarczuk, K.A., and L. Lewis. 2021. Biofiltration Media Optimization – Phase 1 Final Report. Project Report No. 593, St. Anthony Falls Laboratory, University of Minnesota, Minneapolis, MN. January 2021.
- Geosyntec Consultants. 2021. Bioretention Media Literature Review. Prepared for Mile High Flood District.
- Herrera Environmental Consultants. 2020. Bioretention Media Blends to Improve Stormwater Treatment: Final Phase of Study to Develop New Specifications, Final Report. Prepared for King County. January.
- Hunt, W., Davis, A., and R. Traver. 2012. Meeting Hydrologic and Water Quality Goals through Targeted Bioretention Design. *J. Environ. Eng.*, 138(6): 698–707.
- Mile High Flood District (MHFD). 2021. MHFD Detention Version 4.04, February 2021. MHFD: Denver, CO. Accessible at www.MHFD.org.
- Mile High Flood District (MHFD). n.d. SCM Design Version 4.0. MHFD: Denver, CO. Accessible at www.mhfd.org.
- Mile High Flood District (MHFD). 2023. Availability of Bioretention Media in the MHFD region. Accessible at www.MHFD.org.
- Mohanty, S.K., and A.B. Boehm. 2015. Effect of weathering on mobilization of biochar particles and bacterial removal in a stormwater biofilter. *Water Res.*, 85: 208–215.
- Mohanty, S.K., Valenca, R., Berger, A.W., Yu, I.K.M., Xiong, X., Saunders, T.M., and D.C.W. Tsang. 2018. Plenty of room for carbon on the ground: Potential applications of biochar for stormwater treatment. *Sci. of the Tot. Environ.*, 625: 1644–1658.
- O'Neill, S.W., and A.P. Davis. 2012a. Water treatment residual as a bioretention amendment for phosphorus. I. Evaluation studies. *J. Environ. Eng.*, 138(3): 318–327.
- O'Neill, S.W., and A.P. Davis. 2012b. Water treatment residual as a bioretention amendment for phosphorus. II. long-term column studies. *J. Environ. Eng.*, 138(3): 328–336.
- Pitt, R., Clark, S., 2010. Evaluation of Biofiltration media for Engineered Natural Treatment Systems. Prepared for Geosyntec Consultants and The Boeing Co. Report Website: https://www.boeing.com/assets/pdf/aboutus/environment/santa_susana/water_quality/tech_reports/techreports_10-10-19_FinalMediaReport051010.pdf.
- Pitt, R., Clark, S. E., Sileshi, R. and J. Voorhees. 2021. Stormwater Biofilter Media Performance Updates for WinSLAMM: Data Summary for Unit Process Components, Example Calculations and Model Use. *Journal of Water Management Modeling*, 29: C477. <https://doi.org/10.14796/JWMM.C477>.
- Sileshi, R., Pitt, R., and Clark, S. 2017. Impacts of Soil Media Characteristics on Stormwater Biofiltration System Performance. *International Advanced Research Journal in Science, Engineering and Technology*, 4 (3), March.
- Tirpak, A., Afrooz, N., Winston, R., Valenca, R., Schiff, K., and Mohanty, S. 2021. Conventional and amended bioretention soil media for targeted pollutant treatment: A critical review to guide the state of the practice, *Water Research*, 189 (2021): 116648.



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Boulder County Area, Colorado



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....	2
How Soil Surveys Are Made.....	5
Soil Map.....	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	11
Map Unit Descriptions.....	11
Boulder County Area, Colorado.....	13
AcA—Ascalon sandy loam, 0 to 3 percent slopes.....	13
References.....	15

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units).

Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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 1:20,000.

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: Boulder County Area, Colorado
Survey Area Data: Version 21, Sep 6, 2024

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

Date(s) aerial images were photographed: Jul 1, 2020—Jul 2, 2020

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
AcA	Ascalon sandy loam, 0 to 3 percent slopes	1.7	100.0%
Totals for Area of Interest		1.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Boulder County Area, Colorado

AcA—Ascalon sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2swl3
Elevation: 3,870 to 5,960 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ascalon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind-reworked alluvium and/or calcareous sandy eolian deposits

Typical profile

Ap - 0 to 6 inches: sandy loam
Bt1 - 6 to 12 inches: sandy clay loam
Bt2 - 12 to 19 inches: sandy clay loam
Bk - 19 to 35 inches: sandy clay loam
C - 35 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R067BY024CO - Sandy Plains
Hydric soil rating: No

Minor Components

Olnest

Percent of map unit: 10 percent

Landform: Interfluves

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R067BY024CO - Sandy Plains

Hydric soil rating: No

Vona

Percent of map unit: 5 percent

Landform: Interfluves

Landform position (two-dimensional): Summit

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R067BY024CO - Sandy Plains

Hydric soil rating: No

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf



PRELIMINARY DRAINAGE REPORT

FOR THE

LOUISVILLE MILL SITE

AT

**500, 540, AND 544 COUNTY ROAD
LOUISVILLE, COLORADO 80027**

FOR

LOUISVILLE MILL SITE, LLC

April 3, 2014
Revised September 30, 2014
Revised March 12, 2015



JVA, Incorporated
1319 Spruce Street
Boulder, CO 80302
Ph: 303.444.1951
Fax: 303.444.1957
Toll Free: 877.444.1951

Web site:
www.jvajva.com

E-mail:
info@jvajva.com

March 12, 2015

Mr. Craig Duffin, Assistant City Engineer
City of Louisville – Engineering Development Review
749 Main Street
Louisville, CO 80027

RE: Preliminary Drainage Report
Louisville Mill Site
Louisville, CO 80027
JVA No. 2221c

Dear Craig:

The following *Preliminary Drainage Report* and enclosed drainage figures for this project have been prepared for the above referenced project. The stormwater report and figures have been produced in accordance with the "City of Louisville, Storm Drainage Design and Technical Criteria, 2013 Edition" and comply with provisions thereof. Revisions have been made to this report based on comments received from the Final PUD submittal on December 31, 2014.

It is our understanding that the information provided herein meets all requirements of the City of Louisville.

Please contact us if you have any questions regarding this submission.

Sincerely,
JVA, Inc.

A handwritten signature in blue ink, appearing to read 'Darren Stewart', is written over a horizontal line.

Darren Stewart
Project Manager

A handwritten signature in blue ink, appearing to read 'Charlie R. Hager, IV, P.E.', is written over a horizontal line.

Charlie R. Hager, IV, P.E.
Vice President



ENGINEER'S STATEMENT:

"I hereby certify that this report (plan) for the final drainage design of Louisville Mill Site was prepared by me (or under my direct supervision) in accordance with the provisions of City of Louisville Storm Drainage Design and Technical Criteria for the owners thereof."

Charlie R. Hager
Registered Professional Engineer
State of Colorado No. 37146

PRELIMINARY DRAINAGE REPORT
LOUISVILLE MILL SITE
AT
500, 540, AND 544 COUNTY ROAD
LOUISVILLE, COLORADO 80027
FOR
LOUISVILLE MILL SITE, LLC

JVA, Inc.
1319 Spruce Street
Boulder, CO 80302
phone (303) 444-1951
fax (303) 444-1957

JVA Project No. 2221c

April 3, 2014
Revised September 30, 2014
Revised March 12, 2015

CONTENTS

PRELIMINARY DRAINAGE REPORT	
INTRODUCTION	1
HISTORIC DRAINAGE	1
PROPOSED (DEVELOPED) DRAINAGE	2
STORMWATER MANAGEMENT PLAN	4
WETLAND IMPACTS	5
CONCLUSION.....	5

APPENDIX A - SITE MAPS

APPENDIX B - SOIL INFORMATION

APPENDIX C – HYDROLOGY

APPENDIX D – CALCULATIONS

FIGURE 1 – HISTORIC DRAINAGE MAP

FIGURE 2 – DEVELOPED DRAINAGE MAP

PRELIMINARY DRAINAGE REPORT

INTRODUCTION

GENERAL LOCATION AND DESCRIPTION

Louisville Mill Site, LLC, is proposing the redevelopment of the existing historic Louisville Mill Site located at the southeast corner of the intersection of County Road and Elm Street in Louisville, Colorado. The subject property is approximately 1.54 acres of previously developed land located in the Southeast Quarter of the Southeast Quarter of Section 8, Township 1 South, Range 69 West of the 6th Principal Meridian in Boulder County, City of Louisville, State of Colorado. More specifically, the site is bound by County Road 124 to the west, a railroad right-of-way for BNSF Railway Company to the east, and residential properties to the north and south. A vicinity map is included in Appendix A of this report.

PROPOSED PROJECT

The proposed development will include the preservation and restoration of the existing historic mill building, an addition to an existing warehouse building on the south side of the site, and a new commercial and office building on the north side of the site. The areas surrounding these buildings within the site will be redeveloped with parking, access drives, utility infrastructure and landscaping. The right-of-way along County Road will be redeveloped out to the edge-of-roadway and includes curb and gutter replacement, sidewalk replacement, site drive ramps, street lighting upgrades, and landscape improvements.

HISTORIC DRAINAGE

MAJOR DRAINAGE BASIN DESCRIPTION

The site's ultimate outfall is Coal Creek southeast of the property.

According to the FEMA Flood Insurance Rate Map Number 08013C0582J, dated December 18, 2012, the north end of the site is located within Flood Zone AH, with an elevation of NAVD88 5333. A portion of the referenced flood map is included in Appendix A.

EXISTING SITE DRAINAGE AND FACILITIES

Stormwater detention and water quality enhancements are not provided in the existing condition. The existing site consists of a one story commercial building, the historic mill building and the existing warehouse building. The site generally lies between 5335 feet and 5330 feet on the NAVD88 datum with existing grades generally sloping south to north. The existing site is approximately 60% impervious, with pervious areas consisting of irrigated turf and landscape and gravel parking areas. An additional 0.48 acres of offsite flows enter the site from the railroad ROW to the east. Refer to the Historic Drainage Map (see enclosed Figure 1).

The soils found onsite are Ascalon sandy loam with a NRCS hydrologic soils group rating of B. Soils with a rating of B have a moderate infiltration rate when thoroughly wet and therefore have moderate runoff potential. A copy of the NRCS soils classification map is included in the Appendix.

Runoff from the site currently flows overland to the northeast corner of the site where an existing Type R curb inlet is located in the BNSF Railroad ROW and a small catch basin is located within the property limits. The catch basin is connected to a 54" diameter City storm drain that comes from County Road and has an outfall on the east side of Highway 42. The Type R inlet outlets into a ditch on the other side of the railroad. The Type R sits slightly above grade, therefore most likely only works in a ponding condition. Drainage flows from the existing Type R inlet are conveyed by open channel and culverts to State Highway 42, then is conveyed south by sheet flow through CDOT ROW to Coal Creek.

During smaller storm events, runoff is conveyed through the catch basin. Per discussions with City staff, this storm sewer system is planned to be improved to convey flood flows out of this area and under the railroad with work possibly starting in 2015.

PROPOSED (REDEVELOPED) DRAINAGE

DRAINAGE DESIGN CRITERIA

The proposed private storm drainage facilities for the project are designed to comply with the "City of Louisville, Storm Drainage Design and Technical Criteria," 2013 Edition, and the Urban Drainage and Flood Control District's Urban Storm Drainage Criteria Manual (USDCM), June 2001 Edition.

HYDROLOGIC METHOD AND DESIGN STORM FREQUENCIES

Design storm recurrence intervals for this project are consistent with the City of Louisville requirements for residential and commercial areas: the minor or initial storm will be the 2-year event (for onsite private storm systems), and the major storm will be the 100-year event (for overland and street conveyance).

The Rational Method ($Q=CIA$) was used to determine the storm runoff (Q) from the site, with composite runoff coefficients (C) and contributing areas (A) given for design points in sub-basins. Intensities (I) were determined using the Time-Intensity-Frequency Curves for Louisville, Colorado (Table 2) and a calculated Time of Concentration (t_c). Post-development Time of Concentration calculations for each sub-basin, corresponding rainfall intensities, and composite runoff coefficients for each sub-basin are provided in the Appendix.

PROPOSED SITE BASINS

The development is divided into four overall onsite basins that contribute to the primary storm drain system which provides water quality treatment. Two smaller basins flow offsite without water quality treatment. Three offsite basins east of the site currently flow across the existing site, and these will be routed to the proposed storm drainage system. As requested by the City as part of their flood improvement project, two 15-ft Type R curb inlets are proposed along the northern access drive. These inlets will be in a sump condition and connect directly to the existing 54" storm drain. As proposed, all basins free release runoff, undetained.

Basin Descriptions:

- Basin A: 0.06 acres – Basin A is located in the northern portion of the site and is comprised of an asphalt parking lot and landscaping. Runoff from this basin will flow overland to be captured by inlets and conveyed into the proposed storm drain system and water quality device.
- Basin B: 0.20 acres – Basin B consists of the roof drainage from the commercial building on Lot 3. This drainage will be connected directly to the proposed storm drainage system and water quality device.
- Basin C: 0.14 acres – Basin C consists of asphalt parking, sidewalks, roof drainage from the existing mill building and landscape areas. Runoff will be conveyed via curb inlet to the proposed storm sewer and water quality device.
- Basin D: 0.28 acres – Basin D is located on the western perimeter of the site adjacent to the public right-of-way. Runoff from the basin will flow overland into the right-of-way and into gutters on County Road. Flows will be intercepted by an existing Type R inlet at the corner of the existing north access to the property and County Road on the northern edge of the project.
- Basin E: 0.38 acres – Basin E is located in the southern end of the property and consists of asphalt parking, sidewalks, and roof drainage from the existing warehouse building and landscape areas. Runoff will be conveyed via curb and gutter to the Type 16 curb inlet and conveyed to the water quality device.
- Basin F: 0.18 acres – Basin F lies on the southern perimeter of the site and will maintain the historic drainage pattern that conveys flows south into an existing irrigation ditch. No changes are proposed in this basin as part of this development. Currently, the owner of 500 County Road is in contact with the irrigation ditch owner for approval.
- Basin G: 0.11 acres – Basin G lies north of the proposed building on Lot 3 and consists primarily of paved roadway. This basin will convey flow to the 2- 15-ft Type R inlets and directly into the existing 54" storm drain.
- Basin H: 0.20 acres – Basin H lies west of the mill building and consists of primarily landscaped areas. This basin will drain to an area drain that connects to the proposed storm sewer.
- Basin OS1: 0.24 acres – Basin OS1 is located on the southeast corner of the site in the railroad ROW. This area has historically drained through the property and consists of gravel parking and dirt and grass areas. This basin will be conveyed via curb and gutter curb inlet located in Basin E.
- Basin OS2: 0.07 acres – Basin OS2 is located on the eastern edge of the site in the railroad ROW. This area has historically drained through the property and consists of gravel parking and dirt and grass areas. This basin will be conveyed via curb and gutter to the Type 13 inlet at Design Point 8.

- Basin OS3: 0.15 acres – Basin OS3 is located on the northeast edge of the site in the railroad ROW. This area has historically drained through the property and consists of gravel parking and dirt and grass areas. This basin will be conveyed via a concrete pan to the Type 13 inlet at Design Point 9. The existing Type R inlet located in this basin is approximately 12-inches above grade and will only function in a flooding event. If this basin is developed for parking, improvements will incorporate this inlet and not negatively impact it's flood overflow functionality.

RUNOFF AND STORMWATER QUALITY ENHANCEMENT/DETENTION FACILITIES

Due to the developed nature of the site, constraints of working around the historic grain elevator, limited amount of landscaped area, and location within the shallow flooding Zone, a water quality capture volume BMP and detention are not provided for the redevelopment project, as discussed with the City. An underground water quality unit (hydronic separator type) will be provided prior to connecting the proposed storm sewer to the existing City storm sewer to provide water quality for the developed site. This unit is located adjacent to an access road for maintenance access. The proposed project will increase imperviousness from 57% to 67%, therefore post developed flows will show a small increase from historic levels. The overall 10-year design flow rate from the site will increase from 4.4 cfs to 6.0 cfs. The overall 100-year design flow rate from the site will increase from 8.8 cfs to 11.2 cfs.

Water quality will be provided for the majority of the site as well as some off-site basins including Basins A, B, C, H, E, OS-1, OS-2 and OS-3 by an underground water quality unit (Contech CDS Unit). This unit will be sized to provide treatment for the 2-year developed storm event and bypass the 100-yr event.

As requested, detention and water quality capture volume calculations are provided for the developed site in the appendix for reference.

STREETS

No street improvements are proposed with this development, however walks will be installed along the east side of County Road.

OPEN CHANNEL FLOW

No open channel flow is proposed with this development.

STORM SEWERS

All onsite inlets and storm pipes are designed to capture and carry the minor (2-year) and major (100-year) storm events to the existing storm sewer system.

STORMWATER MANAGEMENT PLAN

The Stormwater Management Plan (SWMP) will be included in the final engineering plans, with all structural and non-structural Best Management Practices (BMP's) shown as required.

STRUCTURAL BMP'S

Temporary structural erosion control features will be established during overlot grading and prior to the building construction. All erosion control measures will be maintained until vegetation becomes established. Vehicle tracking control and inlet protection BMP's will be included on the construction plans. Silt fencing will be installed at critical locations on the site with respect to current and proposed drainage.

NON-STRUCTURAL BMP'S

Non-structural erosion controls, including project schedule, surface roughening and other pollution prevention measures, will be detailed in the construction activities of the SWMP. Permanent, perennial, native seeding will be established onsite in locations specified by the SWMP and Landscape Architect. The seed mix will be provided in the SWMP reference.

WETLAND IMPACTS

No wetland impacts are proposed with this development.

CONCLUSION

20 The drainage facilities for the development of the Louisville Mill Site have been designed in accordance with the City of Louisville, Storm Drainage Design and Technical Criteria, 2013 Edition. Stormwater detention and water quality enhancements are not provided in the existing condition. An underground treatment unit is proposed to provide water quality for the majority of the developed area. The proposed redevelopment will result in a small increase in flow rate as a result of increased imperviousness over the entirety of the site.

The drainage report for the redevelopment project is non-conforming to the City of Louisville Storm Drainage Design and Technical Criteria Manual. A variance from the City of Louisville Storm Drainage Design and Technical Criteria Manual is being requested for no onsite detention due to lack of landscaped areas, as well as the interest to preserve the historic mill site grounds. In addition, a variance is being requested for the release of runoff into the irrigation ditch from a portion of the existing warehouse building on Lot 1, preserving historic conditions. Currently, the owner of 500 County Road is requesting approval from the irrigation ditch owner to continue historic drainage conditions.

REFERENCES

1. "City of Louisville, Storm Drainage Design and Technical Criteria," 2013 Edition.
2. "Urban Storm Drainage Criteria Manual," Urban Drainage and Flood Control District, Revised June 2001.

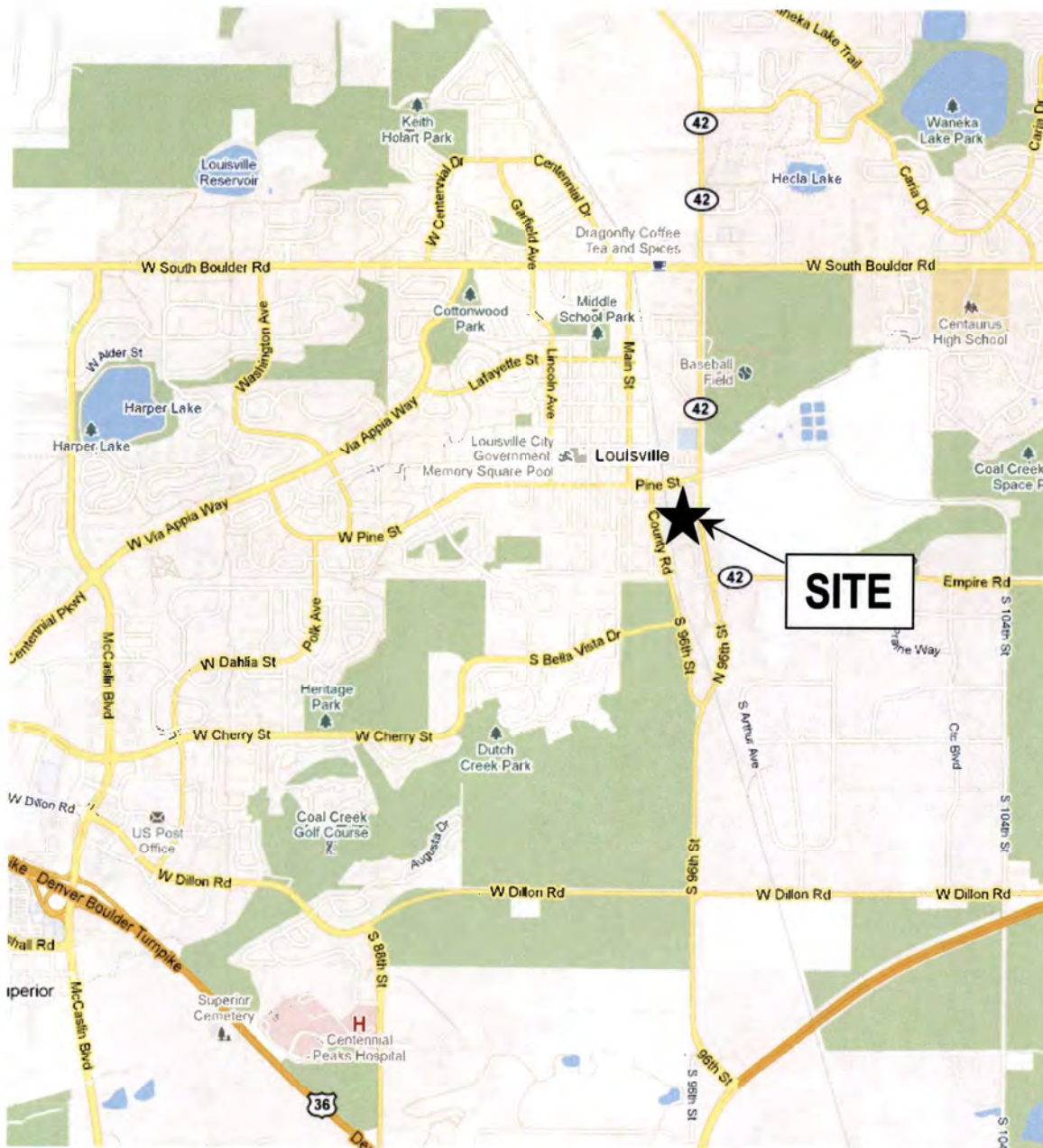
APPENDIX A – SITE MAPS

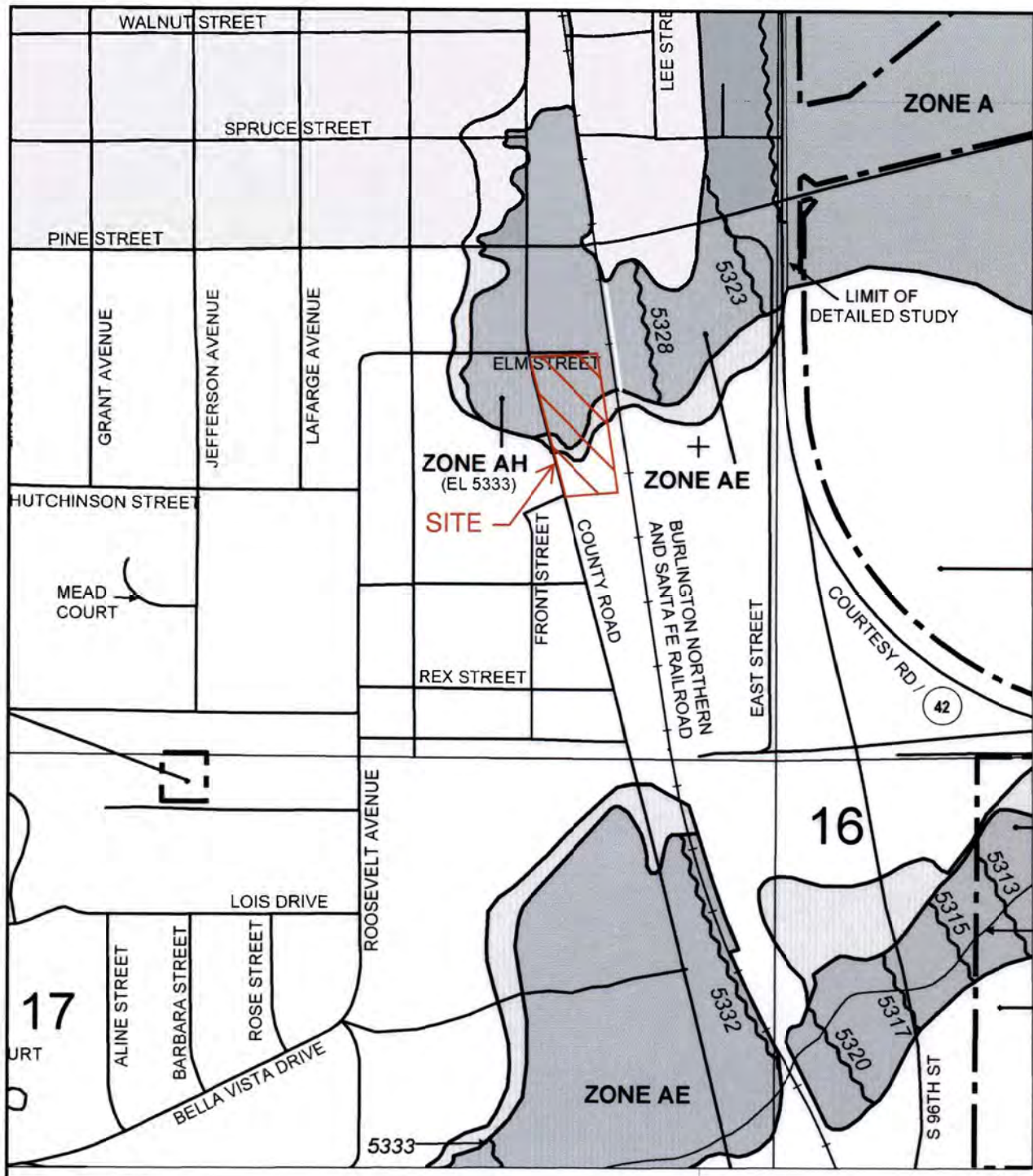
LOUISVILLE MILL SITE

AT

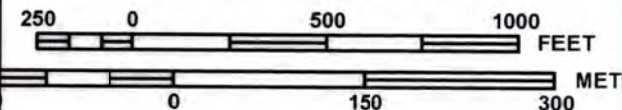
500, 540, AND 544 COUNTY ROAD
LOUISVILLE, COLORADO 80027

VICINITY MAP – NOT TO SCALE





MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0582J

FIRM

**FLOOD INSURANCE RATE MAP
BOULDER COUNTY,
COLORADO
AND INCORPORATED AREAS**

PANEL 582 OF 615

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOULDER COUNTY	080023	0582	J
LAFAYETTE, CITY OF	080026	0582	J
LOUISVILLE, CITY OF	085076	0582	J

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



**MAP NUMBER
08013C0582J**

**MAP REVISED
DECEMBER 18, 2012**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

APPENDIX B— SOIL INFORMATION



United States
Department of
Agriculture



NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Boulder County Area, Colorado



April 1, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....	2
How Soil Surveys Are Made.....	5
Soil Map.....	7
Soil Map.....	8
Legend.....	9
Map Unit Legend.....	10
Map Unit Descriptions.....	10
Boulder County Area, Colorado.....	12
AcA—MLRA 67B - Ascalon sandy loam, 0 to 3 percent slopes.....	12
AcC—Ascalon sandy loam, 3 to 5 percent slopes.....	13
References.....	14

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

Custom Soil Resource Report

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Boulder County Area, Colorado
Survey Area Data: Version 10, Dec 30, 2013

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

Date(s) aerial images were photographed: Apr 28, 2011—Aug 29, 2012

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

Map Unit Legend

Boulder County Area, Colorado (CO643)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AcA	MLRA 67B - Ascalon sandy loam, 0 to 3 percent slopes	15.6	87.2%
AcC	Ascalon sandy loam, 3 to 5 percent slopes	2.3	12.8%
Totals for Area of Interest		17.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Boulder County Area, Colorado

AcA—MLRA 67B - Ascalon sandy loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 3,870 to 5,960 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Ascalon and similar soils: 85 percent

Description of Ascalon

Setting

Landform: Paleoterraces, plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind-reworked alluvium and/or calcareous sandy eolian deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline (0.1 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Moderate (about 7.7 inches)

Interpretive groups

Farmland classification: Prime farmland if irrigated
Land capability classification (irrigated): 3e
Land capability (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: Sandy Plains (R067BY024CO)

Typical profile

0 to 6 inches: Sandy loam
6 to 12 inches: Sandy clay loam
12 to 19 inches: Sandy clay loam
19 to 35 inches: Sandy clay loam
35 to 80 inches: Sandy loam

AcC—Ascalon sandy loam, 3 to 5 percent slopes

Map Unit Setting

Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 140 to 155 days

Map Unit Composition

Ascalon and similar soils: 90 percent

Description of Ascalon

Setting

Landform: Terraces
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed loamy alluvium and/or eolian deposits

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Very high (about 16.5 inches)

Interpretive groups

Farmland classification: Prime farmland if irrigated
Land capability classification (irrigated): 3e
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Sandy (R067XB026CO)

Typical profile

0 to 8 inches: Sandy loam
8 to 19 inches: Sandy clay loam, sandy loam
19 to 60 inches: Fine sandy loam, loamy fine sand, sandy loam

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/forestry/pub/>
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX C – HYDROLOGY

TIME - INTENSITY - FREQUENCY TABULATION

TIME OF CONCENT. (min)	INTENSITY - IN/HR			
	FREQUENCY - YEARS			
	2	5	10	100
5	3.35	4.90	5.85	9.40
10	2.58	3.88	4.65	7.30
15	2.20	3.25	3.88	6.20
20	1.90	2.83	3.35	5.40
25	1.68	2.43	2.95	4.78
30	1.53	2.23	2.63	4.25
35	1.38	2.02	2.38	3.85
40	1.28	1.84	2.18	3.53
45	1.18	1.68	2.02	3.25
50	1.10	1.58	1.87	3.03
55	1.02	1.46	1.76	2.85
60	0.96	1.38	1.68	2.70

- NOTE: 1. The minimum time-of-concentration for use with the Rational Method is 5 minutes.
2. Refer to Figure-1 for a plot of the data
3. Refer to Text Section 4.3 "Rational Method"

WRC, Inc.

Date: Dec, 1981

Reference:

NOAA Atlas 2, Precipitation - Frequency Atlas of the Western United States, Volume III - Colorado

CITY OF LOUISVILLE
STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA

TABLE 3

RUNOFF COEFFICIENTS FOR RATIONAL METHOD

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	FREQUENCY			
		2	5	10	100
<u>Business:</u>					
Commercial Areas	95	.87	.88	.90	.93
Neighborhood Areas	65	.60	.65	.70	.80
<u>Residential:</u>					
Single-Family	40	.40	.45	.50	.70
Multi-Unit (detached)	50	.50	.55	.60	.75
Multi-Unit (attached)	70	.65	.70	.70	.80
1/2 Acre Lot or Larger	30	.30	.40	.45	.65
Apartments	70	.65	.70	.70	.80
<u>Industrial:</u>					
Light Areas	80	.75	.80	.80	.85
Heavy Areas	90	.80	.80	.85	.90
<u>Parks, Cemeteries</u>	7	.15	.25	.35	.60
<u>Playgrounds</u>	13	.20	.30	.40	.70
<u>Schools</u>	50	.50	.55	.60	.75
<u>Railroad Yard Areas</u>	40	.40	.45	.50	.70
<u>Undeveloped Areas:</u>					
Historic Flow Analysis	2	.10	.20	.30	.60
Greenbelts, Agricultural					
Offsite Flow Analysis	45	.45	.50	.55	.72
(when land use not defined)					
<u>Streets:</u>					
Paved	100	.87	.88	.90	.93
Gravel	7	.15	.25	.35	.65
<u>Drives and Walks</u>	96	.85	.87	.90	.92
<u>Roofs</u>	90	.80	.85	.90	.90
<u>Lawns, Sandy Soil</u>	0	.00	.10	.20	.50
<u>Lawns, Clayey Soil</u>	0	.10	.20	.30	.60

NOTE: These Rational Formula coefficients do not apply for larger basins where the time-of-concentration exceeds 60 minutes.

WRC, Inc.

Reference:

Urban Drainage & Flood Control District Rational
 Formula Procedure, Hydrology Research Program, August
 1979.

Date: Dec, 1981

APPENDIX D – CALCULATIONS



JVA Incorporated
1319 Spruce Street
Boulder, CO 80302
Ph: 303.444.1951
Fax: 303.444.1957

Job Name: Louisville Mill Site
Job Number: 2221c
Date: 9/3/14
By: MDE

Louisville Mill Site

Historic Runoff Coefficient & Time of Concentration Calculations

Location: Louisville
Minor Design Storm: 10
Major Design Storm: 100
Soil Type: C/D

$$CA = KA + (1.31i3 - 1.44i2 + 1.135i + 0.12)$$

$$CCD = KCD + (0.858i3 - 0.786i2 + 0.774i + 0.04)$$

$$CB = (CA + CCD)/2$$

Basin Design Data

	I (%) =	100%	90%	90%	40%	10%	25%	0%	0%		I (%)	Runoff Coeff's				Initial Overland Time (t) $t=0.395(1.1-C_p)L^{1/2}S^{-1/3}$			Travel Time (t) x 60				t _c =Length/(Velocity)			t _c Comp	tc Urbanized Check ON		t _c Final
Basin Name	Design Point	A _{paved streets} (sf)	A _{driveway/co nc} (sf)	A _{roof} (sf)	A _{grass} (sf)	A _{plyand} (sf)	A _{art. turf} (sf)	A _{escape (B soil)} (sf)	A _{escape (C/D soil)} (sf)	A _{Total} (sf)	A _{Total} (ac)	Imp (%)	C2	C5	C10	C100	Upper most Length (ft)	Slope (%)	t _c (min)	Length (ft)	Slope (%)	Type of Land Surface	C _v	Velocity (fps)	t _c (min)	Time of Conc t + t _c = t _c	Total Length (ft)	t _c =(L/180)+ 10 (min.)	Min t _c
H1	1		2,840					325		3,165	0.07	80.8%	0.60	0.63	0.67	0.75	62	1.5%	5.9			Paved areas & shallow paved swales	20	0.0	0.0	5.9	62	10.3	5.9
H2	2		3,570		4,555			800		8,925	0.20	56.4%	0.38	0.43	0.49	0.62	125	2.2%	10.5			Paved areas & shallow paved swales	20	0.0	0.0	10.5	125	10.7	10.5
H3	3			6,525				1,295		7,820	0.18	75.1%	0.54	0.58	0.62	0.71	119	2.0%	8.3			Paved areas & shallow paved swales	20	0.0	0.0	8.3	119	10.7	8.3
H4 OFF	4				19,812					19,812	0.45	40.0%	0.28	0.35	0.42	0.58	420	2.0%	22.4			Paved areas & shallow paved swales	20	0.0	0.0	22.4	420	12.3	12.3
H4 ON	5		17065	10173	8,353			11,785		47,376	1.09	58.8%	0.40	0.45	0.50	0.63	313	1.8%	17.4			Paved areas & shallow paved swales	20	0.0	0.0	17.4	313	11.7	11.7
TOTAL SITE		0	23,475	16,698	32,720	0	0	14,205	0	87,098	2.00	56.5%	0.38	0.43	0.49	0.62													

$$I = (28.5 P^1) / ((10 + TC) 0.786)$$

Basin Name	Design Point	Time of Conc (t _c)	Runoff Coeff's				Rainfall Intensities (in/hr)				Area		Flow Rates (cfs)			
			C2	C5	C10	C100	2	5	10	100	A _{Total} (sf)	A _{Total} (ac)	Q2	Q5	Q10	Q100
H1	1	5.9	0.60	0.63	0.67	0.75	3.11	4.47	5.44	8.75	3,165	0.07	0.14	0.21	0.26	0.48
H2	2	10.5	0.38	0.43	0.49	0.62	2.55	3.66	4.46	7.16	8,925	0.20	0.20	0.33	0.45	0.91
H3	3	8.3	0.54	0.58	0.62	0.71	2.79	4.00	4.87	7.83	7,820	0.18	0.27	0.41	0.54	1.00
H4 OFF	4	12.3	0.28	0.35	0.42	0.58	2.38	3.43	4.17	6.71	19,812	0.45	0.30	0.54	0.79	1.78
H4 ON	5	11.7	0.40	0.45	0.50	0.63	2.44	3.50	4.26	6.85	47,376	1.09	1.05	1.71	2.33	4.68
TOTAL SITE											87,098	2.00	1.96	3.20	4.37	8.84



JVA Incorporated
 1319 Spruce Street
 Boulder, CO 80302
 Ph: 303.444.1951
 Fax: 303.444.1957

Job Name: Louisville Mill Site
 Job Number: 2221c
 Date: 3/12/15
 By: MDE

Louisville Mill Site

Composite Runoff Coefficient Calculations

Location: Louisville
 Minor Design Storm: 2
 Major Design Storm: 100
 Soil Type: C/D

$$CA = KA + (1.31/3 - 1.44/2 + 1.135i + 0.12)$$

$$CCD = KCD + (0.858/3 - 0.786/2 + 0.774i + 0.04)$$

$$CB = (CA + CCD)/2$$

Basin Design Data												CB = (C2 + C5)/2				
	I (%) =	100%	90%	90%	40%	10%	25%	0%	0%			I (%)	Runoff Coeff's			
Basin Name	Design Point	A _{paved streets} (sf)	A _{drives/c onc} (sf)	A _{roof} (sf)	A _{gravel} (sf)	A _{piygnd} (sf)	A _{art. turf} (sf)	A _{yscape (B soil)} (sf)	A _{yscape (C/D soil)} (sf)	A _{Total} (sf)	A _{Total} (ac)	Imp (%)	C2	C5	C10	C100
A	1		2,550					195		2,745	0.06	83.6%	0.64	0.67	0.70	0.77
B	2			8,625						8,625	0.20	90.0%	0.73	0.75	0.77	0.83
C	3		4,985					1,000		5,985	0.14	75.0%	0.54	0.57	0.62	0.71
D	4		5,532					5,850		11,382	0.26	43.7%	0.30	0.37	0.43	0.59
E	5		8,125	7,610				945		16,680	0.38	84.9%	0.66	0.68	0.71	0.78
F	6			6,525				1,345		7,870	0.18	74.6%	0.54	0.57	0.61	0.71
G	10		4,395					275		4,670	0.11	84.7%	0.65	0.68	0.71	0.78
H	11		2,370	3,435				3,164		8,969	0.21	58.3%	0.39	0.45	0.50	0.63
OS1	7		2,965		7,310					10,275	0.24	54.4%	0.37	0.42	0.48	0.61
OS2	8		1,670		1,355					3,025	0.07	67.6%	0.47	0.51	0.56	0.67
OS3	9		225		6,475					6,700	0.15	41.7%	0.29	0.36	0.42	0.59



JVA Incorporated
 1319 Spruce Street
 Boulder, CO 80302
 Ph: 303.444.1951
 Fax: 303.444.1957

Job Name: Louisville Mill Site
 Job Number: 2221c
 Date: 3/12/15
 By: MDE

Louisville Mill Site

Time of Concentration Calculations

Location: Louisville
 Minor Design Storm: 2
 Major Design Storm: 100
 Soil Type: C/D

Sub-Basin Data				Initial Overland Time (t_i)			Travel Time (t_t) $t_t = \text{Length} / (\text{Velocity} \times 60)$							t_c Comp	t_c Urbanized Check ON	t_c Final
Basin Name	Design Point	A_{Total} (ac)	C5	Upper most Length (ft)	Slope (%)	t_i (min)	Length (ft)	Slope (%)	Type of Land Surface	C_v	Velocity (fps)	t_t (min)	Time of Conc $t_i + t_t = t_c$	Total Length (ft)	$t_c = (L/180) + 10$ (min)	Min t_c
A	1	0.06	0.67	123	1.5%	7.7			Paved areas & shallow paved swales	20	0.0	0.0	7.7	123	10.7	7.7
B	2	0.20	0.75	120	2.0%	5.7			Paved areas & shallow paved swales	20	0.0	0.0	5.7	120	10.7	5.7
C	3	0.14	0.57	80	4.0%	5.4	35	5.0%	Grassed waterway	15	3.4	0.2	5.6	115	10.6	5.6
D	4	0.26	0.37	67	1.5%	9.6			Paved areas & shallow paved swales	20	0.0	0.0	9.6	67	10.4	9.6
E	5	0.38	0.68	143	2.5%	6.8	45	5.0%	Grassed waterway	15	3.4	0.2	7.0	188	11.0	7.0
F	6	0.18	0.57	119	2.0%	8.4			Paved areas & shallow paved swales	20	0.0	0.0	8.4	119	10.7	8.4
G	10	0.11	0.68	0	2.0%	0.0	75	2.0%	Paved areas & shallow paved swales	20	2.8	0.4	0.4	75	10.4	5.0
H	11	0.21	0.45	40	2.0%	6.0	45	2.0%	Grassed waterway	15	2.1	0.4	6.4	85	10.5	6.4
OS1	7	0.24	0.42	114	0.5%	16.7	117	1.0%	Paved areas & shallow paved swales	20	2.0	1.0	17.7	231	11.3	11.3
OS2	8	0.07	0.51	30	0.5%	7.4	56	1.5%	Paved areas & shallow paved swales	20	2.4	0.4	7.8	86	10.5	7.8
OS3	9	0.15	0.36	130	2.0%	12.3			Paved areas & shallow paved swales	20	0.0	0.0	12.3	130	10.7	10.7



JVA Incorporated
1319 Spruce Street
Boulder, CO 80302
Ph: 303.444.1951
Fax: 303.444.1957

Job Name: Louisville Mill Site
Job Number: 2221c
Date: 3/12/15
By: MDE

Louisville Mill Site

Developed Storm Runoff Calculations

Design Storm :

2 Year

Point Hour Rainfall (P₁) : **0.96**

$$I = (28.5 P_1) / ((10 + TC)^{0.786})$$

Basin Name	Direct Runoff							Total Runoff				Inlets			Pipe					Pipe/Swale Travel Time		Total Time (min)	
	Design Point	Area (ac)	Runoff Coeff	tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Total tc (min)	ΣC*A (ac)	I (in/hr)	Q (cfs)	Inlet Type	Q intercepted	Q carryover	Pipe Size (in) or equivalent	Pipe Material	Slope (%)	Pipe Flow (cfs)	Max Pipe Capacity (cfs)	Length (ft)	Velocity (fps)		tt (min)
A	1	0.06	0.64	7.70	0.04	2.86	0.12	7.70	0.04	2.86	0.12							0.1					
B	2	0.20	0.73	5.70	0.14	3.14	0.45	5.70	0.14	3.14	0.45							0.5					
C	3	0.14	0.54	5.60	0.07	3.16	0.23	5.60	0.07	3.16	0.23							0.2					
D	4	0.26	0.30	9.60	0.08	2.64	0.21	9.60	0.08	2.64	0.21							0.2					
E	5	0.38	0.66	7.00	0.25	2.95	0.74	7.00	0.25	2.95	0.74							0.7					
F	6	0.18	0.54	8.40	0.10	2.77	0.27	8.40	0.10	2.77	0.27							0.3					
G	10	0.11	0.65	5.00	0.07	3.26	0.23	5.00	0.07	3.26	0.23												
H	11	0.21	0.39	6.40	0.08	3.04	0.25	6.40	0.08	3.04	0.25												
OS1	7	0.24	0.37	11.30	0.09	2.47	0.21	11.30	0.09	2.47	0.21							0.2					
OS2	8	0.07	0.47	7.80	0.03	2.85	0.09	7.80	0.03	2.85	0.09							0.1					
OS3	9	0.15	0.29	10.70	0.04	2.53	0.11	10.70	0.04	2.53	0.11							0.1					
TOTAL SITE		2.00							TOTAL SITE		2.91					TOTAL SITE		2.9					



JVA Incorporated
 1319 Spruce Street
 Boulder, CO 80302
 Ph: 303.444.1951
 Fax: 303.444.1957

Job Name: Louisville Mill Site
 Job Number: 2221c
 Date: 3/12/15
 By: MDE

Louisville Mill Site

Developed Storm Runoff Calculations

Design Storm :

10 Year

Point Hour Rainfall (P₁) : **1.68**

$$I = (28.5 P_1) / ((10 + TC)^{0.786})$$

Basin Name	Design Point	Area (ac)	Runoff Coeff	Direct Runoff				Total Runoff				Inlets			Pipe					Pipe/Swale Travel Time			Total Time (min)	
				tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Total tc (min)	ΣC*A (ac)	I (in/hr)	Q (cfs)	Inlet Type	Q intercepted	Q carryover	Pipe Size (in) or equivalent	Pipe Material	Slope (%)	Pipe Flow (cfs)	Max Pipe Capacity (cfs)	Length (ft)	Velocity (fps)	tt (min)		
A	1	0.06	0.70	7.70	0.04	5.00	0.22	7.70	0.04	5.00	0.22							0.2						
B	2	0.20	0.77	5.70	0.15	5.50	0.84	5.70	0.15	5.50	0.84							0.8						
C	3	0.14	0.62	5.60	0.08	5.53	0.47	5.60	0.08	5.53	0.47							0.5						
D	4	0.26	0.43	9.60	0.11	4.62	0.52	9.60	0.11	4.62	0.52							0.5						
E	5	0.38	0.71	7.00	0.27	5.16	1.41	7.00	0.27	5.16	1.41							1.4						
F	6	0.18	0.61	8.40	0.11	4.85	0.54	8.40	0.11	4.85	0.54							0.5						
G	10	0.11	0.71	5.00	0.08	5.70	0.43	5.00	0.08	5.70	0.43							0.4						
H	11	0.21	0.50	6.40	0.10	5.31	0.55	6.40	0.10	5.31	0.55							0.5						
OS1	7	0.24	0.48	11.30	0.11	4.33	0.49	11.30	0.11	4.33	0.49							0.5						
OS2	8	0.07	0.56	7.80	0.04	4.98	0.19	7.80	0.04	4.98	0.19							0.2						
OS3	9	0.15	0.42	10.70	0.07	4.42	0.29	10.70	0.07	4.42	0.29							0.3						
TOTAL SITE		2.00							TOTAL SITE			5.94					TOTAL SITE		5.9					



JVA Incorporated
 1319 Spruce Street
 Boulder, CO 80302
 Ph: 303.444.1951
 Fax: 303.444.1957

Job Name: Louisville Mill Site
 Job Number: 2221c
 Date: 3/12/15
 By: MDE

Louisville Mill Site

Developed Storm Runoff Calculations

Design Storm :

100 Year

Point Hour Rainfall (P₁) : **2.70**

$$I = (28.5 P_1) / ((10 + TC)^{0.786})$$

Basin Name	Design Point	Area (ac)	Runoff Coeff	Direct Runoff				Total Runoff				Inlets			Pipe					Pipe/Swale Travel Time		Total Time (min)	
				tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Total tc (min)	ΣC*A (ac)	I (in/hr)	Q (cfs)	Inlet Type	Q intercepted	Q carryover	Pipe Size (in) or equivalent	Pipe Material	Slope (%)	Pipe Flow (cfs)	Max Pipe Capacity (cfs)	Length (ft)	Velocity (fps)		tt (min)
A	1	0.06	0.77	7.70	0.05	8.04	0.39	7.70	0.05	8.04	0.39							0.4					
B	2	0.20	0.83	5.70	0.17	8.84	1.46	5.70	0.17	8.84	1.46							1.5					
C	3	0.14	0.71	5.60	0.10	8.88	0.86	5.60	0.10	8.88	0.86							0.9					
D	4	0.26	0.59	9.60	0.15	7.42	1.14	9.60	0.15	7.42	1.14							1.1					
E	5	0.38	0.78	7.00	0.30	8.30	2.49	7.00	0.30	8.30	2.49							2.5					
F	6	0.18	0.71	8.40	0.13	7.80	0.99	8.40	0.13	7.80	0.99							1.0					
G	10	0.11	0.78	5.00	0.08	9.16	0.77	5.00	0.08	9.16	0.77							0.8					
H	11	0.21	0.63	6.40	0.13	8.54	1.10	6.40	0.13	8.54	1.10							1.1					
OS1	7	0.24	0.61	11.30	0.14	6.95	1.01	11.30	0.14	6.95	1.01							1.0					
OS2	8	0.07	0.67	7.80	0.05	8.01	0.37	7.80	0.05	8.01	0.37							0.4					
OS3	9	0.15	0.59	10.70	0.09	7.11	0.64	10.70	0.09	7.11	0.64							0.6					
TOTAL SITE		2.00							TOTAL SITE		11.23					TOTAL SITE		11.2					



JVA Incorporated
 1319 Spruce Street
 Boulder, CO 80302
 Ph: 303.444.1951
 Fax: 303.444.1957

Job Name: Louisville Mill Site
 Job Number: 2221c
 Date: 3/12/15
 By: MDE

Louisville Mill Site

Detention Pond Volume Calculations: $V = K \cdot A$ Method

ALLOWABLE RELEASE RATE

Table SO-1 - Maximum Unif Flow Release Rates (cfs/ac)

Design Frequency	NRCS Hydrologic Soil Group		
	A	B	C & D
5-year	0.07	0.13	0.17
10-year	0.13	0.23	0.30
100-year	0.50	0.85	1.00

Q release = Area * Max Unit Flow Release Rate

Soil Type: C/D

Release Rates:

Q10 = 0.46 CFS

Q100 = 1.54 CFS

DETENTION POND SIZING

$$V = K \cdot A$$

(UDFCD, Vol 2, Chapter 10, Equation SO-1)

10 Year Pond Volume

$$K = (0.95 \cdot I - 1.9) / 1000$$

(UDFCD, Vol 2, Chapter 10, Equation SO-3)

100 year Pond Volume:

$$K = (1.78 \cdot I - 0.002 \cdot I^2 - 3.56) / 900$$

(UDFCD, Vol 2, Chapter 10, Equation SO-2)

I = 68.1%

I = Percent Impervious

A = 1.5 acres

A = Tributary Area

V = Required Volume

K10 = 0.0628

K100 = 0.1204

V10 = 4,210 CF

V100 = 8,075 CF

TOTAL DETENTION POND VOLUME

Water Quality Capture Volume (WQCV) =		1,266 CF
Volume Minor =	V10 + 0% WQCV =	4,210 CF
Volume Major =	V100 + 0% WQCV =	8,075 CF

Design Procedure Form: Rain Garden (RG)

Sheet 1 of 2

Designer: REP
 Company: JVA, Inc.
 Date: March 12, 2015
 Project: Louisville Mill (Developed Site-Basins A-H)- For reference only, no WQCV provided for site
 Location: Louisville, Colorado

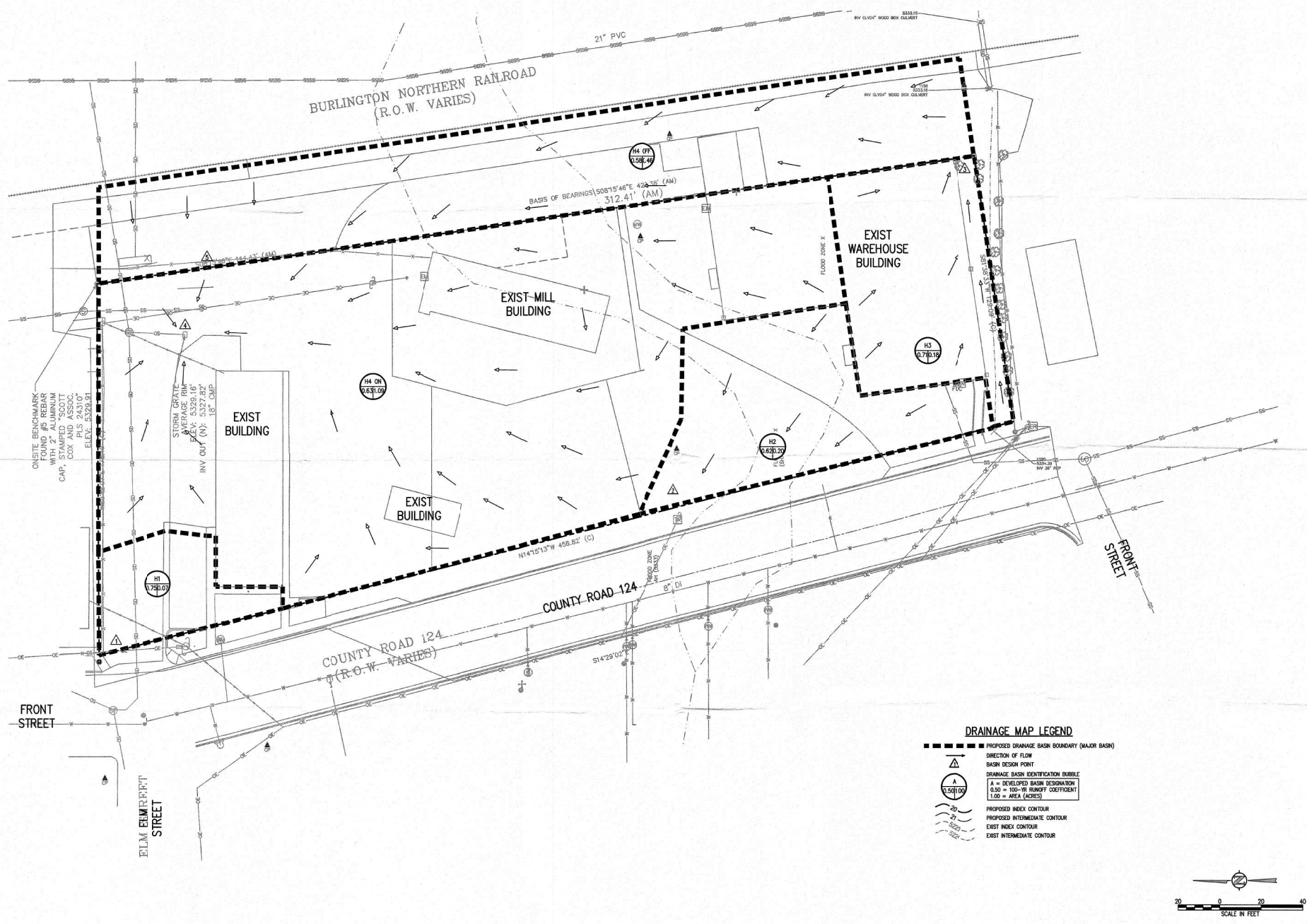
1. Basin Storage Volume A) Effective Imperviousness of Tributary Area, I_e (100% if all paved and roofed areas upstream of rain garden) B) Tributary Area's Imperviousness Ratio ($I = I_e/100$) C) Water Quality Capture Volume (WQCV) for a 12-hour Drain Time ($WQCV = 0.8 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)$) D) Contributing Watershed Area (including rain garden area) E) Water Quality Capture Volume (WQCV) Design Volume $Vol = (WQCV / 12) * Area$ F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$I_e =$ <u>71.5</u> % $I =$ <u>0.715</u> WQCV = <u>0.23</u> watershed inches Area = <u>67,285</u> sq ft $V_{WQCV} =$ <u>1,266</u> cu ft $d_s =$ _____ in $V_{WQCV \text{ OTHER}} =$ _____ cu ft $V_{WQCV \text{ USER}} =$ _____ cu ft
2. Basin Geometry A) WQCV Depth (12-inch maximum) B) Rain Garden Side Slopes ($Z = 4$ min., horiz. dist per unit vertical) (Use "0" if rain garden has vertical walls) C) Minimum Flat Surface Area D) Actual Flat Surface Area E) Area at Design Depth (Top Surface Area) F) Rain Garden Total Volume ($V_T = ((A_{Top} + A_{Actual}) / 2) * Depth$)	$D_{WQCV} =$ <u>12</u> in $Z =$ <u>4.00</u> ft / ft $A_{Min} =$ <u>844</u> sq ft $A_{Actual} =$ <u>844</u> sq ft $A_{Top} =$ <u>1700</u> sq ft $V_T =$ <u>1,272</u> cu ft
3. Growing Media	Choose One ☒ 18" Rain Garden Growing Media ☐ Other (Explain): _____
4. Underdrain System A) Are underdrains provided? B) Underdrain system orifice diameter for 12 hour drain time i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice ii) Volume to Drain in 12 Hours iii) Orifice Diameter, 3/8" Minimum	Choose One ☐ YES ☒ NO $y =$ <u>N/A</u> ft $Vol_{12} =$ <u>N/A</u> cu ft $D_o =$ <u>N/A</u> in

NO.	DATE	REVISION DESCRIPTION

DESIGNED BY:
DRAWN BY:
CHECKED BY:
JOB # 2221c
DATE: APRIL 03, 2014
© JGA INC

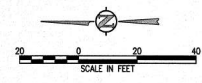
LOUISVILLE MILL SITE
LOUISVILLE, COLORADO
HISTORIC DRAINAGE MAP

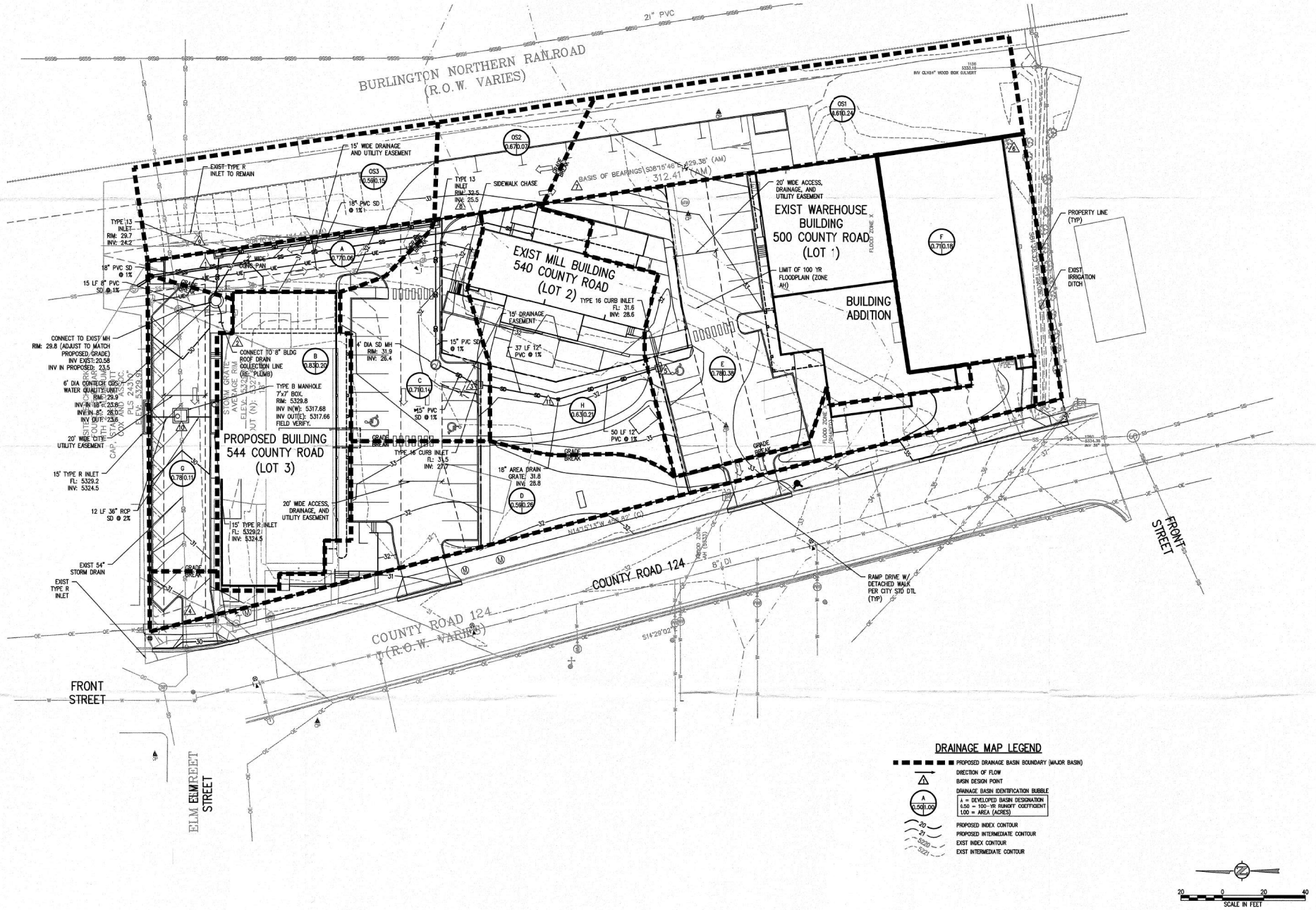
SHEET NO.
FIG 1

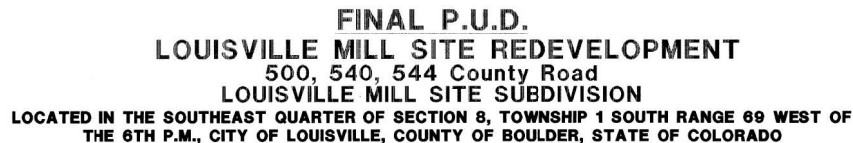
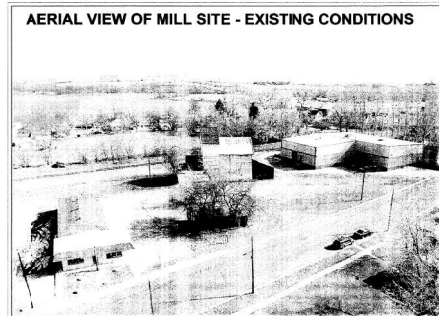
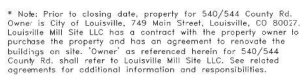


DRAINAGE MAP LEGEND

- PROPOSED DRAINAGE BASIN BOUNDARY (MAJOR BASIN)
- DIRECTION OF FLOW
- BASIN DESIGN POINT
- DRAINAGE BASIN IDENTIFICATION RUBRIC
- A = DEVELOPED BASIN DESIGNATION
- 0.50 = 100-YR RUNOFF COEFFICIENT
- 1.00 = AREA (ACRES)
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- EXIST INDEX CONTOUR
- EXIST INTERMEDIATE CONTOUR







Ownership Structure Block By signing this P.U.D., the owner acknowledges and accepts of the requirements and intent set forth in the P.U.D. (Which myriad hands) seek(s) this ___ day of ___, 20__ J. Erik Hartwig, Member Louisville Mill Site, LLC Owner Name and Signature _____ Randall C. Caranci, Member Louisville Mill Site, LLC Owner Name and Signature _____ Randall C. Caranci, Member RCC Ltd. Owner Name and Signature	CLERK AND REGISTRATION CERTIFICATE (COUNTY OF BOULDER, STATE OF COLORADO) I hereby certify that this instrument was filed in my office at <u>1:21</u> o'clock, <u>P.</u> M., this <u>15</u> day of <u>December</u>, 20<u>15</u>, and is recorded in Paid File # <u>03662058</u> and in the Unpaid File # _____ <u>\$10.00</u> paid _____ Filing No. _____ <u>03662058</u> _____ Reception _____
(Notary Seal) Notary Name (print) _____ Notary Signature _____ My Commission Expires _____	CITY/COUNTY CLERK CERTIFICATE Approved this <u>15</u> day of <u>May</u>, 20<u>15</u> by the City/Council of the City of <u>LOUISVILLE, Colorado</u> Registration No. <u>29</u> Series <u>2015</u> _____ (City Seal) Mayor Signature _____ _____ City Clerk Signature _____

[illegible]

A black and white photograph of a large, multi-story wooden building, likely a mill or warehouse. The building has a complex roofline with multiple gables and a prominent chimney on the left side. Several people are standing near the entrance on the left, and a horse-drawn carriage is visible in the foreground on the right. The building appears to be made of wood and has some areas of siding missing or peeling. The overall scene suggests a historical industrial or commercial setting.

Louisville Mill Site - Use and Zoning Information

Project Description:

The Louisville Mill Site Redevelopment project will combine two adjacent properties, and subdivide the combined land into 3 building lots and one outdoor for common use. The northern property currently contains the historic Louisville Grain Elevator building which will be landmarked and rehabilitated for commercial use as a restaurant, and a 3500 sq ft building, and small shed which will be both be removed. The southern property currently contains a commercial structure, formerly used as a warehouse, now home to a fitness-studio. An addition is planned for this building. The proposed uses for all buildings on the property are retail, restaurant, and office space. The site is located on the ground level, with offices anticipated on upper levels. There is a potential for some public or private museum space in the grain elevator structure.

Building Bulk and Density Standards:

Required Setbacks:	Proposed Setbacks:
Front 0-25'	0' minimum
Side 10'	15' minimum
Side (rear) 5'	10' minimum

Address and Legal Descriptions:
See Plat and Survey for Legal Descriptions.

	Caraceti	Grain	Green	Mill Site
Lot 1	308	540	200	Lot A
Lot 2	308	540	200	Lot B

Allowed Use:

	Caraceti	Grain	Green	Mill Site
2 story - 30'	308	540	200	Lot A
2 story - 35'	308	540	200	Lot B

2 story - 35' for Main Level FFE for full roof with allowance for rooftop screening
 2 story - 35' for Main Level FFE for full roof with lower roof screening to 41.5'

Louisville Mill Site - Plat Areas & PUD Yield Per Lot Including Parking

Existing Property Areas:			PUD Yield From Redevelopment					
Existing Mill Site Land Area	48,546 +/-	69.18%	Caranci	Grain	Green	Mill Site	Total	
Existing Caranci Property Land Area	20,793 +/-	30.82%	15,190	9,122	8,041	3,481	36,834	
Total Plot Area	69,339 +/-	100.00%	5,298				67,288	
RR ROW Lease Area (1 Caranci)	5,298 +/-	acquiring	Lot Area	Additional RR ROW Area				
RR ROW Lease Area (2 Proposed-Mill Site)	3,576 +/-	acquire	5,298			3,576	8,787	
Total Plot Area plus RR ROW	76,155 +/-		10,000	4,094			17,450	
			Additional Building Area / Lot	16,550	15,660	15,660	47,870	
			Total Proposed Usable Building Area	33,560	0	0	33,560	
			Bldg Area Percentage of total	12.24%	91.18%	48.64%	100.00%	
			Total Unconditioned in Grain Elev.	2,034 +/-				
Proposed Plot Areas:			Net Area (1st-4th, old +/-) 9.13950 14.4					
Lot 1 - Caranci	25,190 +/-	37.44%	Parking Required	500	28	3	37,440	
Lot 2 - Grain Elevator	9,122 +/-	13.56%	On Site					
Outlot A - Mill Site Elevator	6,941 +/-	10.17%	Existing RR ROW	19	3	0	34,548	
Combined Lot 2 +/- Outlot	15,863			9				
Lot 3 - Mill Site Building	26,126 +/-	38.83%	Potential add on-site spaces**					
Total Plot Area	69,339 +/-	100.00%	Potential add RR ROW		9	5	14,400	
					12	shanderson	12	

Notes:
 * Existing bldg. area of Grain Elevator not all usable/not all counted "proposed usable"
 ** Existing Lot 3 commercial (former Napco) to be removed, total is all new construction
 *** 9 net acres if green space replaced by parking, 5 potential space truck storage bldg
 **** Dependent upon successful negotiation with BNSF for extended lease area



**HARTROFT
ASSOCIATES**
A Professional Corporation

Planning
Architecture
Interior Design

Louisville, CO 80027
TÉL: 303.673.9304
FAX: 303.673.9319

**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
500, 540 & 544 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Caranci / Hartrnft



PROJECT # 1252 10

DATE: 04/03/14

DRAWN BY: HAPC

CHECKED BY: JEH
REVISIONS:

PPC/PCC - (6/13/1

FINAL - 11/06/1
FPC - 03/13/1

FCC - 05/06/1

COPYRIGHT 2015

All drawn and written information duplicated disclosed or otherwise

appearing herein shall not be
used without written consent of

Hartnoff Associates, p.c.

[illegible]COVER SHEET
PROJECT DATA

PROJECT DATA RENDERINGS

SIGNATURES

100

114 JOURNAL OF DOCUMENTATION

114 JOURNAL OF DOCUMENTATION

[illegible]

Sheet

Sheet

41

At

11

of 9 Sheets

Unofficial Copy



1 ARCHITECTURAL SITE PLAN
A2 1" = 20'



HARTRONFT ASSOCIATES
A Professional Engineering
Planning
Architecture
Interior Design
950 Spruce Street, #11A
Louisville, CO 80007
TEL: 303.673.9304
FAX: 303.673.9319

**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
500, 540 & 544 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Carand / Hartonft



PROJECT # 125210
DATE 04/03/14
DRAWN BY: HAFG
CHECKED BY: JH
REVISIONS
REV. 01 06/13/14
REV. 02 11/06/14
REV. 03 03/13/15
REV. 04 05/06/15

COPYRIGHT 2015
All drawn and written information
disseminated without written consent of
Hartonft Associates, p.c.

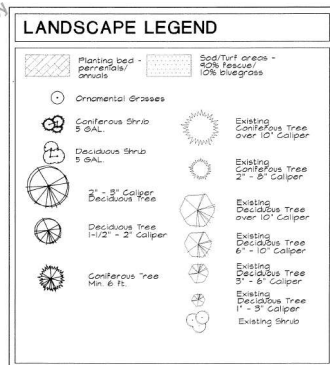
SITE PLAN

Sheet

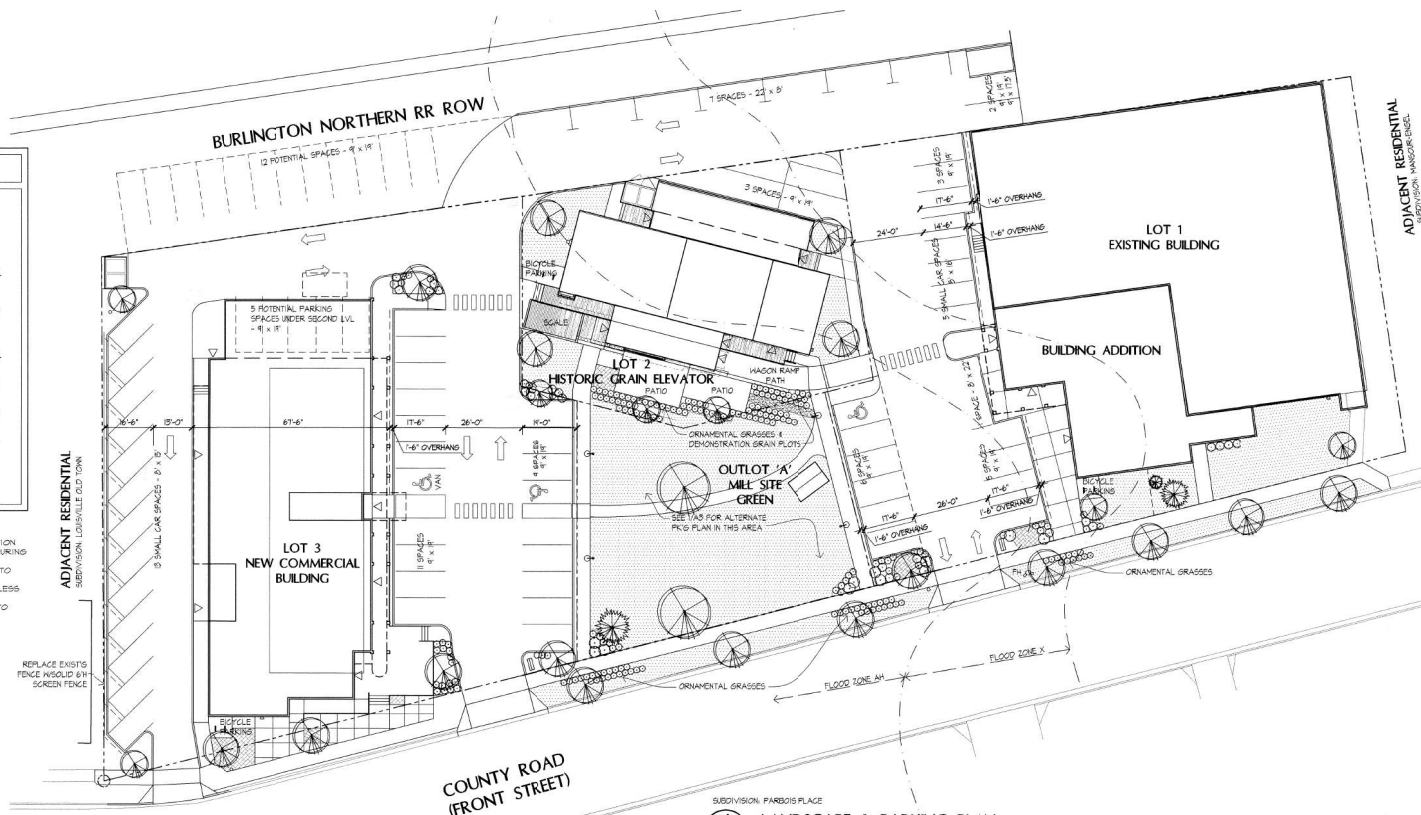
A2

2 of 6 Sheets

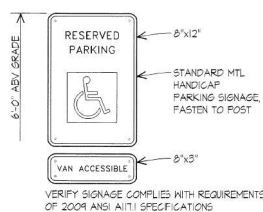
Unofficial Copy



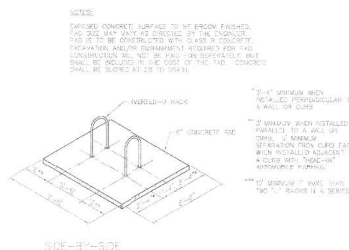
- NOTES:
1. APPLICANT TO PROVIDE DETAILED LANDSCAPE & IRRIGATION DRAWINGS TO PUBLIC WORKS FOR REVIEW & APPROVAL DURING THE CIVIL PLAN REVIEW
 2. PARKWAY TREES SHALL BE PLANTED NO CLOSER THAN 5' TO CURB OR WALK
 3. THE USE OF ROOT BARRIER IS REQUIRED FOR ALL TREES LESS THAN 5' FROM CURB OR WALK
 4. THE PARKWAY IRRIGATION SYSTEM SHALL NOT SPRAY ONTO PAVED SERVICES



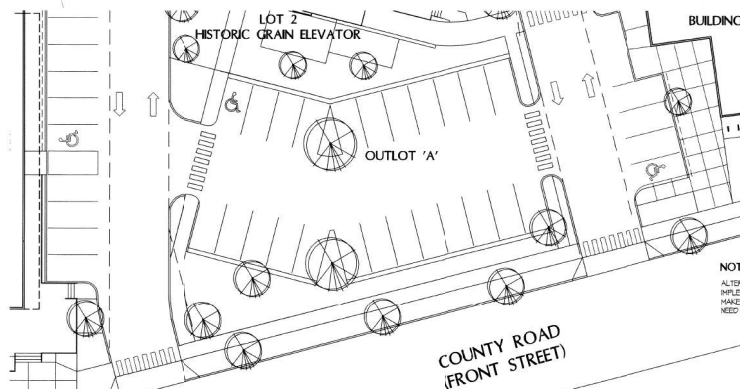
SUBDIVISION: PARBOIS PLACE
 4 LANDSCAPE & PARKING PLAN
 A3 1" = 20'



3 H.C. PK'G SIGN DETAIL
A3 N.T.S.



2 U-RACK DETAIL @BICYCLE PK'G
A3 N.T.S.



1
A3

ALTERNATE PARKING PLAN

1" = 20'

NOTE:
ALTERNATE PARKING PLAN SHALL ONLY BE
IMPLEMENTED BY THE OWNER IF THE CITY
MAKES A DETERMINATION THAT THERE IS A
NEED FOR ADDITIONAL PARKING ON SITE.

**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
6500, 540 & 544 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC Caranci / Hartrampf



PROJECT # 125210
DATE: 04/03/14
DRAWN BY: HAPC
CHECKED BY: JEH
REVISIONS:
PPC/PCC - 06/13/14
FINAL - 11/06/14
FPC - 03/13/15
FCC - 05/06/15

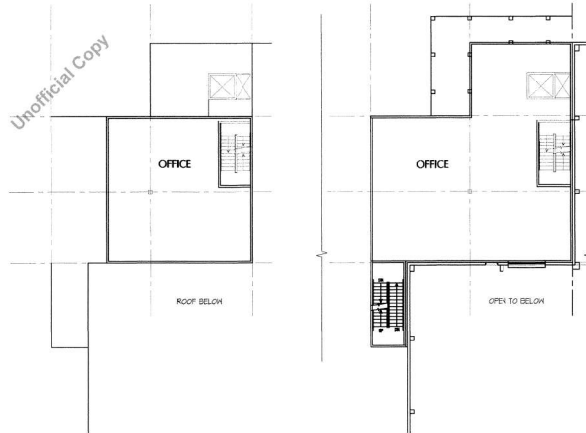
COPYRIGHT 2015
All drawn and written information
duplicated, disclosed or otherwise
appearing herein shall not be
used without written consent of
Hortons Associates, p.c.

LANDSCAPE &
PARKING PLAN
ALT PARKING PLAN

Sheet

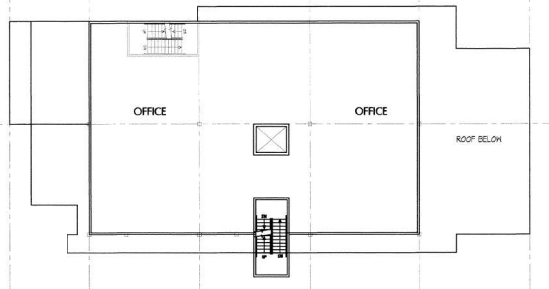
A3

3 of 4 Sheets

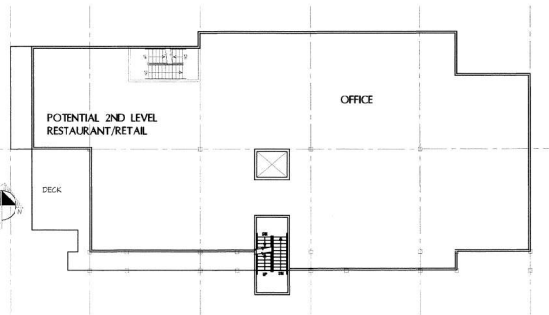


C4 FLOOR PLAN - THIRD LEVEL
A4 SCALE: 1/16" = 1'-0"

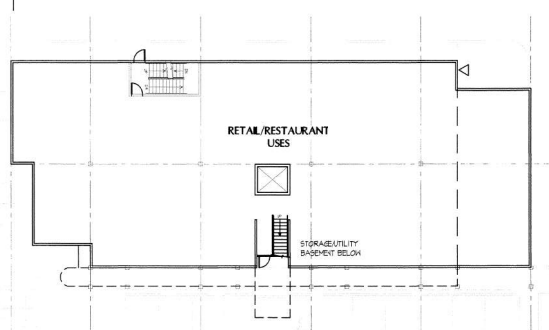
C3 FLOOR PLAN - SECOND LVL
A4 SCALE: 1/16" = 1'-0"



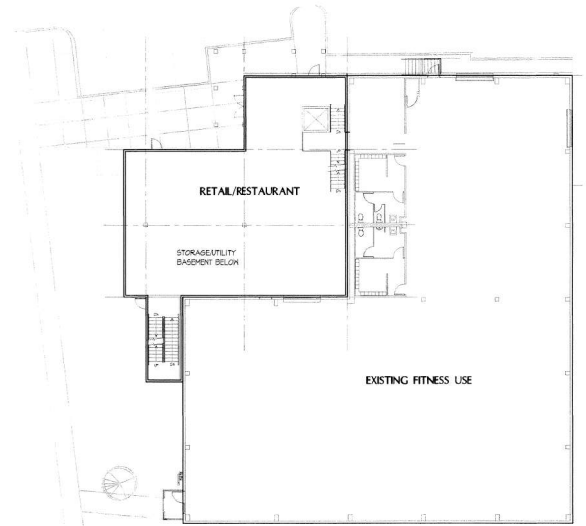
C2 FLOOR PLAN - THIRD LEVEL
A4 SCALE: 1/16" = 1'-0"



B2 FLOOR PLAN - SECOND LEVEL
A4 SCALE: 1/16" = 1'-0"



A2 FLOOR PLAN - MAIN LEVEL
A4 SCALE: 1/16" = 1'-0"



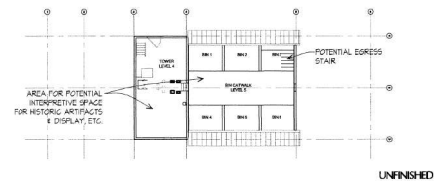
A4 FLOOR PLAN - MAIN LEVEL
A4 SCALE: 1/16" = 1'-0"

LOT 1 - CARANCI BUILDING

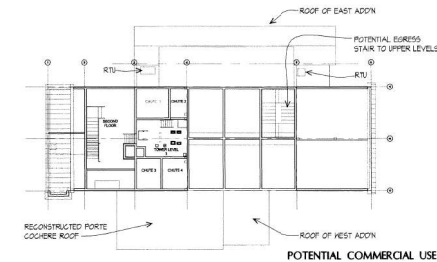
LOT 3 - MILL SITE BUILDING

COMMERCIAL USE NOTES:

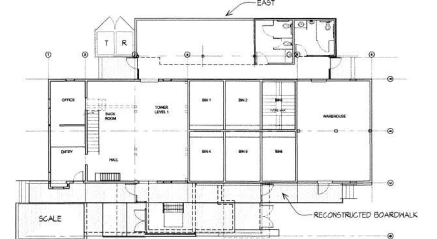
USE DESIGNATIONS ARE INTENDED TO DESCRIBE THE INTENDED CHARACTER OF THE SPACE TO BE CONSTRUCTED & DO NOT LIMIT ANY PERMITTED USE PER ZONING REGULATIONS OR AS OTHERWISE APPROVED, TYP.



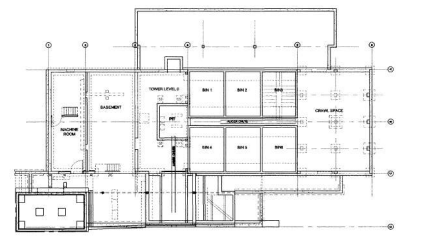
D1 FLOOR PLAN - FOURTH/FIFTH LEVEL (3RD STORY)
A4 SCALE: 1/16" = 1'-0"



C1 FLOOR PLAN - SECOND/THIRD LEVEL (2ND STORY)
A4 SCALE: 1/16" = 1'-0"



B1 FLOOR PLAN - FIRST LEVEL (1ST STORY)
A4 SCALE: 1/16" = 1'-0"



A1 FLOOR PLAN - BASEMENT/CRAWL SPACE
A4 SCALE: 1/16" = 1'-0"

LOT 2 - HISTORIC GRAIN ELEVATOR

HARTRONFT ASSOCIATES
A Professional Corporation
Planning
Architecture
Interior Design
950 Spruce Street, #11A
Louisville, CO 80027
TEL: 303.673.9304
FAX: 303.673.9119

**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR, CO**
500, 540 & 544 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Caranci / Hartonft



PROJECT # 1252.10
DATE: 04/05/14
DRAWN BY: HARG
CHECKED BY: JH
REVISIONS:
REV. NO. DATE BY
1 06/13/14
2 11/06/14
3 03/12/15

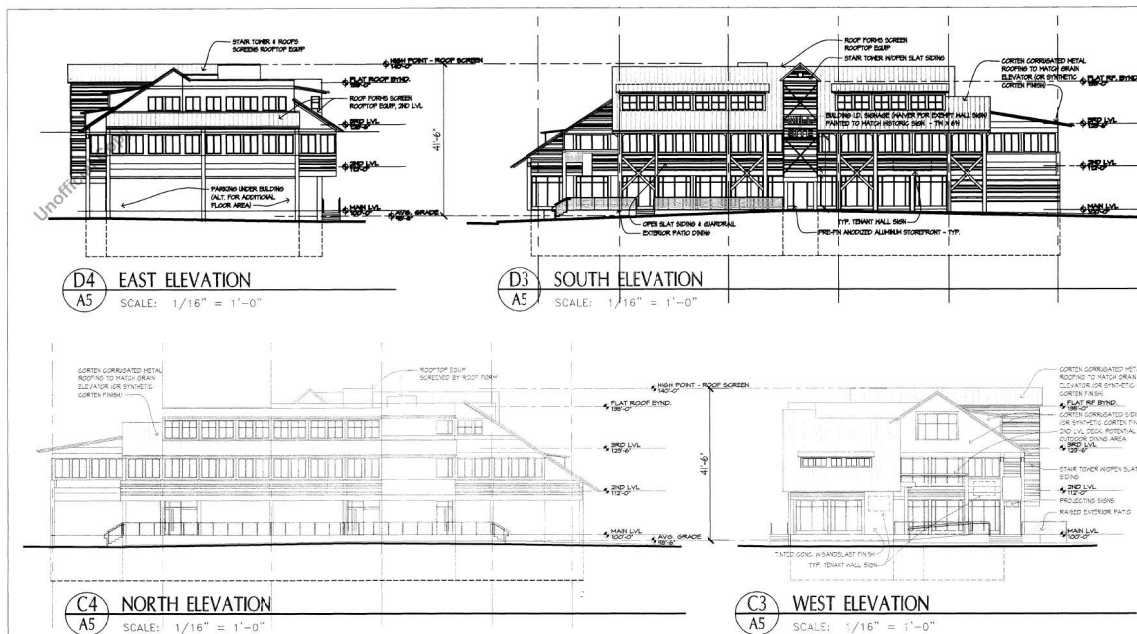
COPYRIGHT 2015
All drawn and written information
herein is the property of Hartonft
Associates, p.c. and shall not be
used without written consent of
Hartonft Associates, p.c.

PLANS

Sheet

A4

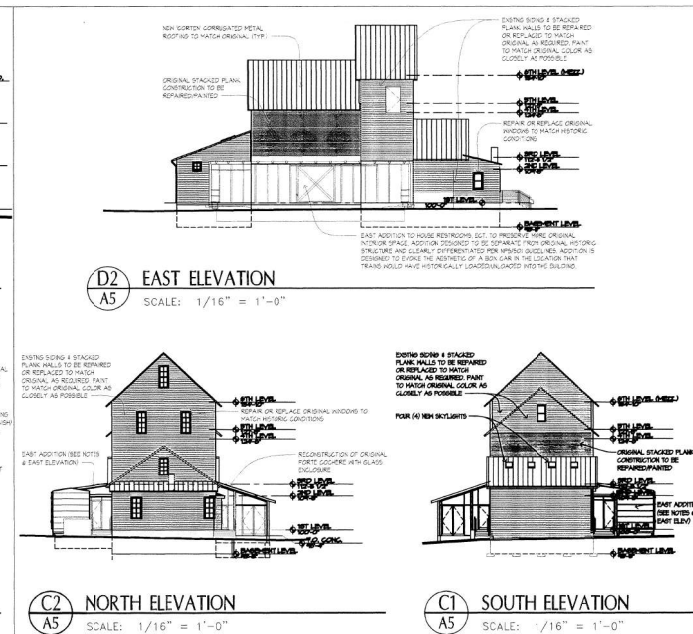
4 of 4 Sheets



LOT 3 - NEW MILL SITE BUILDING

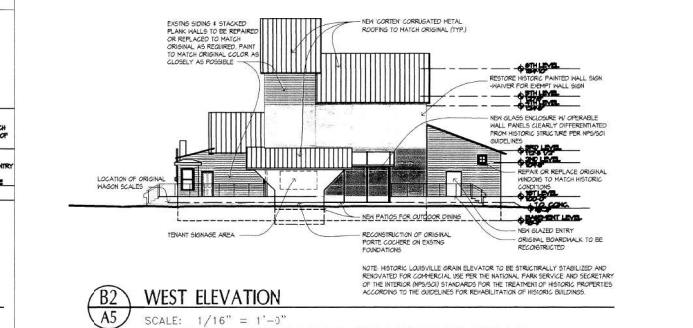


LOT 1 - CARANCI BUILDING ADDITION / RENOVATION



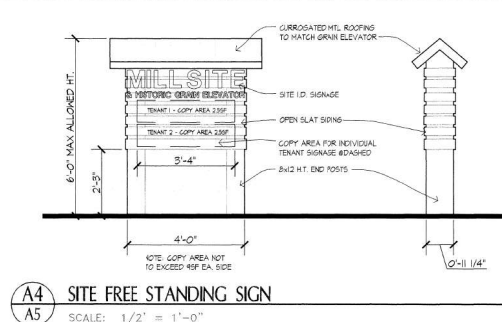
NORTH ELEVATION

C1 SOUTH ELEVATION



(B2) WEST ELEVATION

LOT 2 - HISTORIC GRAIN ELEVATOR



A4 SITE FREE STANDING SIGN
A5 SCALE: 1/2" = 1'-0"

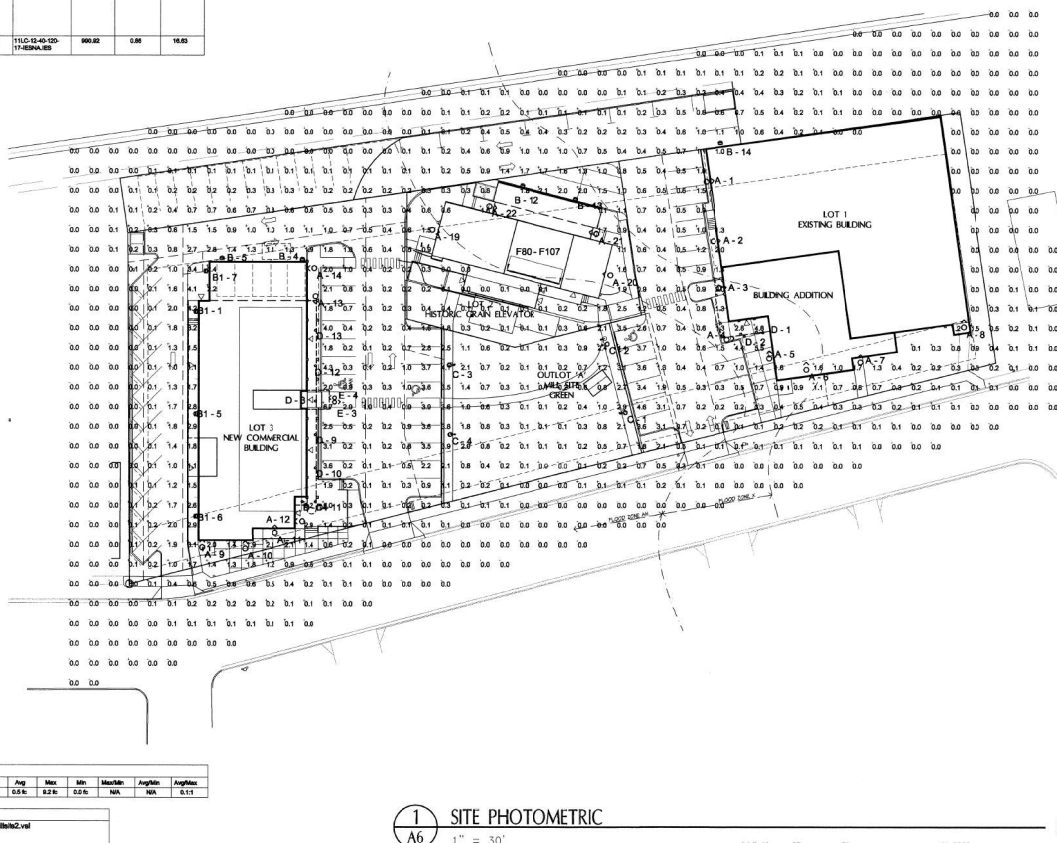
SIGN AREA CALCULATIONS			NOTE: SIGN AREA LOCATIONS ON BLDG ELEVATIONS ARE GENERAL. SUBMITTER IS NOT PROVIDING SIGNAGE. AS SHOWN, PLANT DESIGN DESIGN, SIZE & LOCATION WILL BE DETERMINED DURING PERMIT PROCESS.		
LOT 1	LOT 2	LOT 3			
HALLWAY SIGN COPY AREA HALLWAY ALLOWED FOR COMBINATION OF ANY HALL, MARQUEE, ANNEXING-CANOPY, & FREE STANDING SIGNS PRIMARY FRONTAGE PACINGS (COUNT IN) 120 L.P. x 25P PER L.P. = 2437 SF SECONDARY FRONTAGE PACINGS (COUNT IN) 122 L.P. x 15P PER L.P. = 1264 SF HALL SIGN COPY AREA HALL SIGN ALLOWED AREA OF HALL SIGNS PRIMARY FRONTAGE PACINGS (COUNT IN) 120 L.P. x 25P PER L.P. = 2437 SF SECONDARY FRONTAGE PACINGS (COUNT IN) 122 L.P. x 15P PER L.P. = 1264 SF ANNEX & CANOPY SIGN COPY AREA TOTAL ALLOWED COPY AREA OF ANNEX & CANOPY SIGNS PRIMARY FRONTAGE PACINGS (COUNT IN) 120 L.P. x 25P PER L.P. = 2437 SF SECONDARY FRONTAGE PACINGS (COUNT IN) 122 L.P. x 15P PER L.P. = 1264 SF PROJECTING SIGNS TOTAL ALLOWED COPY AREA OF PROJECTING SIGNS THE HALLWAY COPY AREA OF EACH PROJECTING SIGN ALONG ALL BLDG FRONTAGES IS 10 SF PER SIDE MULTI TENANT BUILDING MAY UTILIZE ONE PROJECTING SIGN PER TENANT	HALLWAY SIGN COPY AREA HALLWAY ALLOWED FOR COMBINATION OF ANY HALL, MARQUEE, ANNEXING-CANOPY, & FREE STANDING SIGNS PRIMARY FRONTAGE PACINGS (COUNT IN) 88.0 L.P. x 25P PER L.P. = 1760 SF HALL SIGN COPY AREA TOTAL ALLOWED COPY AREA OF HALL SIGNS PRIMARY FRONTAGE PACINGS (COUNT IN) 88.0 L.P. x 25P PER L.P. = 1760 SF ANNEX & CANOPY SIGN COPY AREA TOTAL ALLOWED COPY AREA OF ANNEX & CANOPY SIGNS PRIMARY FRONTAGE PACINGS (COUNT IN) 88.0 L.P. x 15P PER L.P. = 880 SF PROJECTING SIGNS TOTAL ALLOWED COPY AREA OF PROJECTING SIGNS THE HALLWAY COPY AREA OF EACH PROJECTING SIGN ALONG ALL BLDG FRONTAGES IS 10 SF PER SIDE MULTI TENANT BUILDING MAY UTILIZE ONE PROJECTING SIGN PER TENANT	HALLWAY SIGN COPY AREA HALLWAY ALLOWED FOR COMBINATION OF ANY HALL, MARQUEE, ANNEXING-CANOPY, & FREE STANDING SIGNS PRIMARY FRONTAGE PACINGS (COUNT IN) 56.0 L.P. x 25P PER L.P. = 1280 SF SECONDARY FRONTAGE PACINGS (COUNT IN) 42.0 L.P. x 15P PER L.P. = 1020 SF HALL SIGN COPY AREA TOTAL ALLOWED COPY AREA OF HALL SIGNS PRIMARY FRONTAGE PACINGS (COUNT IN) 56.0 L.P. x 25P PER L.P. = 1280 SF SECONDARY FRONTAGE PACINGS (COUNT IN) 42.0 L.P. x 15P PER L.P. = 1020 SF ANNEX & CANOPY SIGN COPY AREA TOTAL ALLOWED COPY AREA OF ANNEX & CANOPY SIGNS PRIMARY FRONTAGE PACINGS (COUNT IN) 56.0 L.P. x 15P PER L.P. = 560 SF SECONDARY FRONTAGE PACINGS (COUNT IN) 42.0 L.P. x 15P PER L.P. = 560 SF PROJECTING SIGNS TOTAL ALLOWED COPY AREA OF PROJECTING SIGNS THE HALLWAY COPY AREA OF EACH PROJECTING SIGN ALONG ALL BLDG FRONTAGES IS 10 SF PER SIDE MULTI TENANT BUILDING MAY UTILIZE ONE PROJECTING SIGN PER TENANT			
FREE STANDING SIGNS TWO FREE STANDING SIGNS FOR THE 3 LOTS ARE PROPOSED TO ACCOMMODATE MAJOR TRAVELERS & PROJECT IDENTIFICATION (SEE DETAIL & SITE PLAN). MAX 6' COPY AREA PER SIDE. HEIGHT COUNTS TOWARDS MAX SIGN COPY AREA.					
GENERAL NOTE: ALL SIGNAGE SHALL COMPLY WITH THE DOWNTOWN SIGN MANUAL, UNLESS SPECIFIC WAIVER IS NOTICED OR REQUESTED					

The image displays six different lighting fixture designs, each labeled with a type designation:

- TYPE A:** A small, bell-shaped pendant light with a simple, tapered design.
- TYPE B:** A modern, angular pendant light with a wide, flat, disc-like shade and a short, thick stem.
- TYPE C:** A large, dome-shaped pendant light with a smooth, rounded surface and a short, thick stem.
- TYPE D:** A small, adjustable desk lamp with a flexible gooseneck and a conical shade.
- TYPE E:** A large, adjustable desk lamp with a flexible gooseneck and a conical shade, similar to Type D but larger.
- TYPE F:** A long, rectangular, linear light fixture with a series of small, square light sources along its length.

Statistics	
Description	Sy
Calc Zone #1	

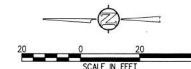
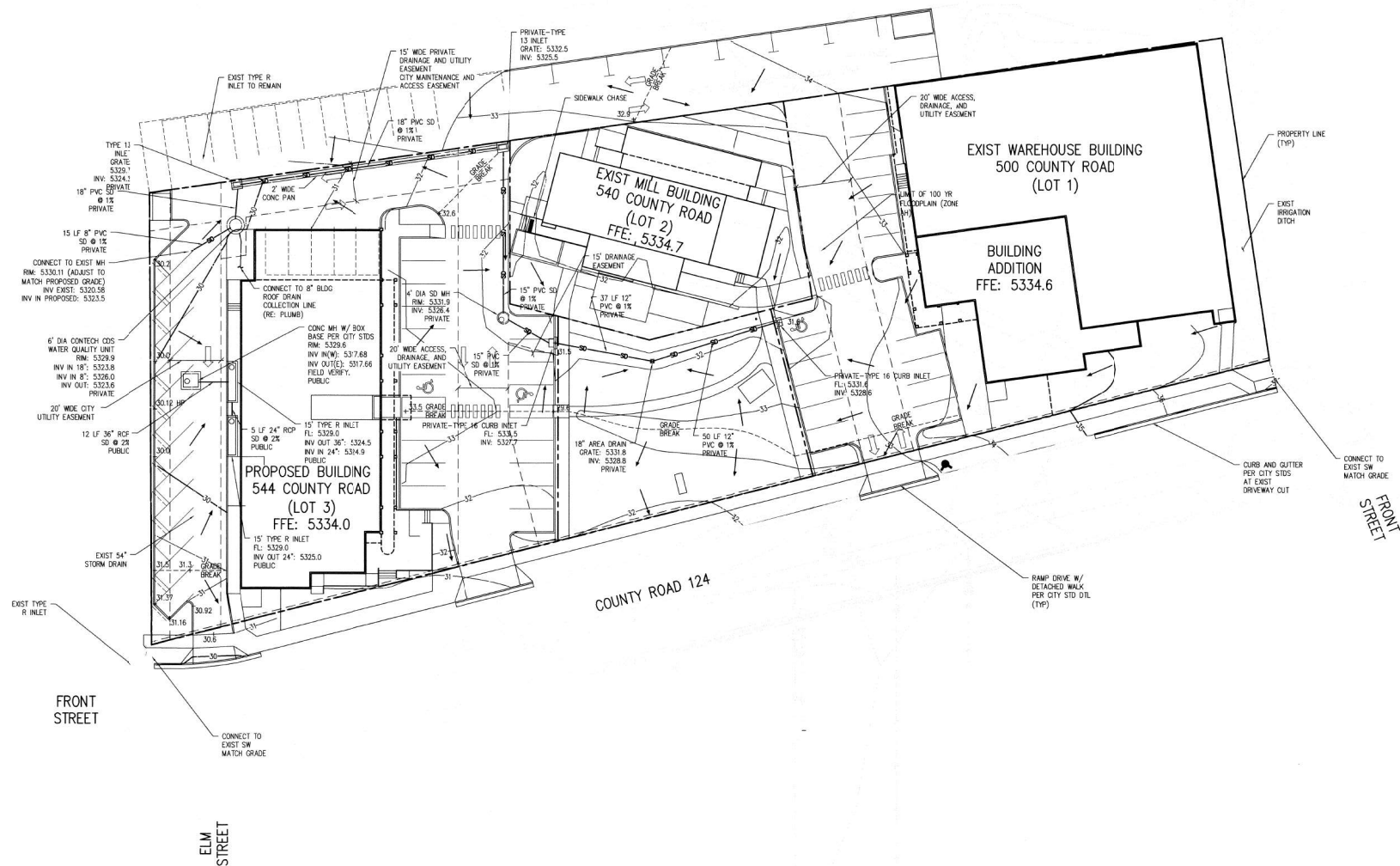
Note
1. file=visual-files-sept2014-milb-h2.xls



1 SITE PHOTOMETRIC
A6 1" = 30'



Unofficial Copy



Planning
Architecture
Interior Design

950 Spruce Street, #1A
Louisville, CO 80027
TEL: 303.673.9304
FAX: 303.673.9319

**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
5500, 540 & 544 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Caranci / Hartrouff



PROJECT # 125210
DATE 04/13/14
DRAWN BY: --
CHECKED BY: --
REVISIONS:
PPC/PCC - 06/13/14
FINAL - 11/06/14
FPC - C3/13/14
ECC - C5/06/14

COPYRIGHT
All drawn and written information duplicated, disclosed or otherwise appearing herein shall not be used without written consent of Hartson Associates, p.c.

DRAINAGE PLAN

Sheet

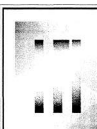
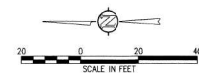
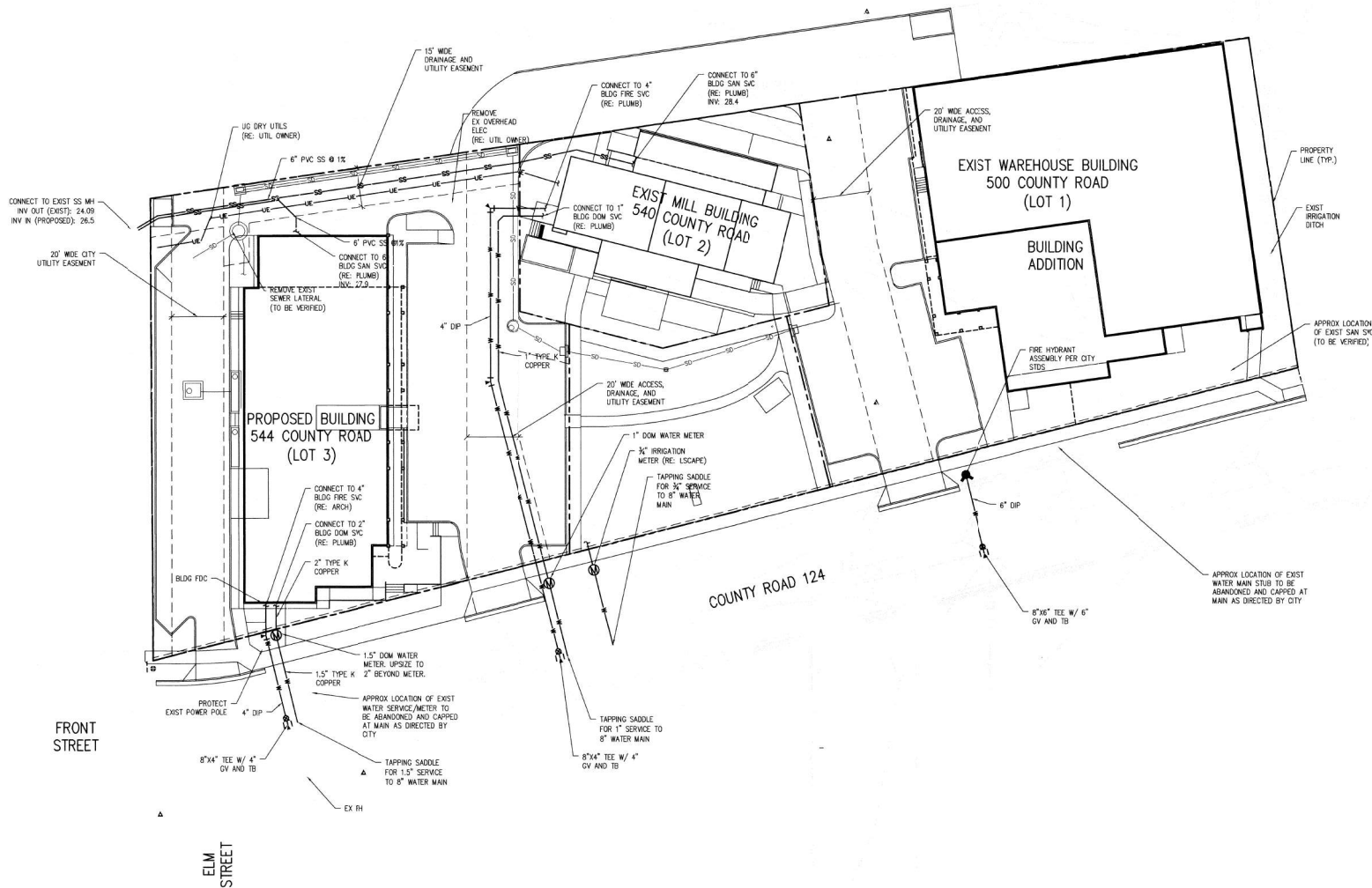
SHEET NO.

C1.0

of Sheets

Unofficial Copy

- NOTES:**
1. OLD WATER AND SEWER SERVICES SHALL BE ABANDONED AS DIRECTED BY THE CITY.
 2. CURB STOP VALVES AND METER PITS SHALL BE LOCATED AND INSTALLED AS DIRECTED BY THE CITY.
 3. FIRE LINES ARE PRIVATELY OWNED/MAINTAINED DOWNSTREAM OF WATER MAIN GATE VALVES.
 4. LIMITED UTILITY SURVEY INFORMATION WAS PROVIDED. PORTIONS OF SHOWN UTILITIES ARE BASED ON CITY UTILITY MAPPING. ALL UTILITY LOCATIONS, INVERTS, SIZES, ETC. TO BE FIELD LOCATED AND SURVEYED PRIOR TO CONSTRUCTION.



HARTNOFF ASSOCIATES
A Professional Corporation
Planning
Architecture
Interior Design
950 Spruce Street, F1A
Louisville, CO 80027
TEL: 303.673.9004
FAX: 303.673.9119

**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR, CO
500, 540 & 544 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Carand / Hartnoff**



PROJECT # 125210
DATE: 04/13/14
DRAWN BY: --
CHECKED BY: --
REVISIONS:
PFC/PCS - 06/3/14
FINAL - 11/06/14
PFC - 03/15/15
FCC - 05/06/15

COPYRIGHT
All drawn and written information
duplicate, disclosed, or otherwise
reproduced, stored, or used, in
any form, without written consent of
Hartnoff Associates, Inc.

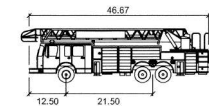
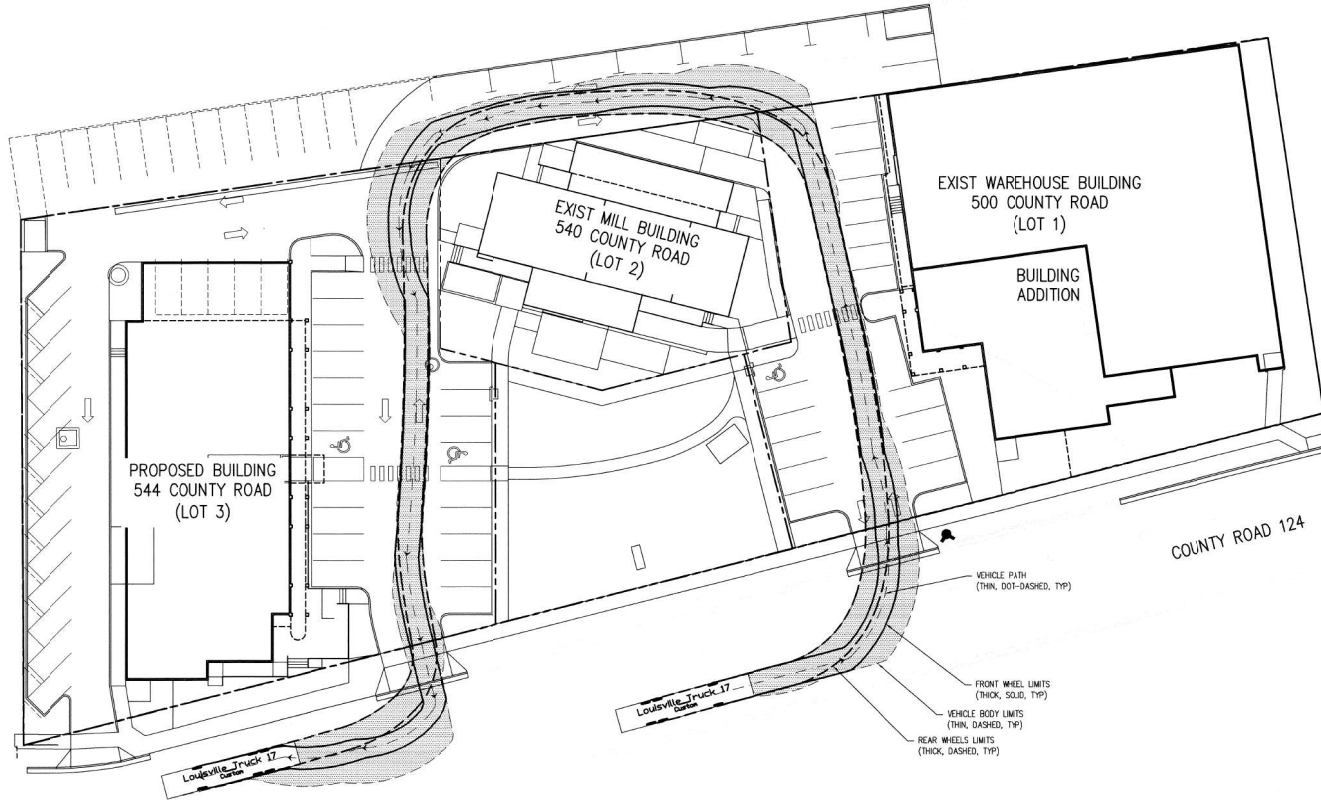
UTILITY PLAN

Sheet

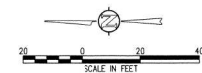
C2.0

of Sheets

Unofficial Copy



Louisville Truck 17 feet
Width : 8.00
Track : 8.00
Lock to Lock Time : 5.0
Steering Angle : 45.0



LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR CO
500, 540 & 544 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Caranci / Hartmont



PROJECT # 125210
DATE 04/2014
DRAWN BY: --
CHECKED BY: --
REVISIONS:
REV. NO. DATE
1 06/13/14
2 11/06/14
3 05/13/15

COPYRIGHT
All drawn and written information
is the property of Hartmont Associates, P.C.
and shall not be reproduced or
transmitted in any form or by any
means, electronic, mechanical, or
otherwise, without written consent of
Hartmont Associates, P.C.

AUTOTURN
FIRE TRUCK
EXHIBIT

Sheet

EX-1

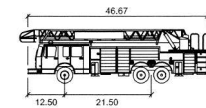
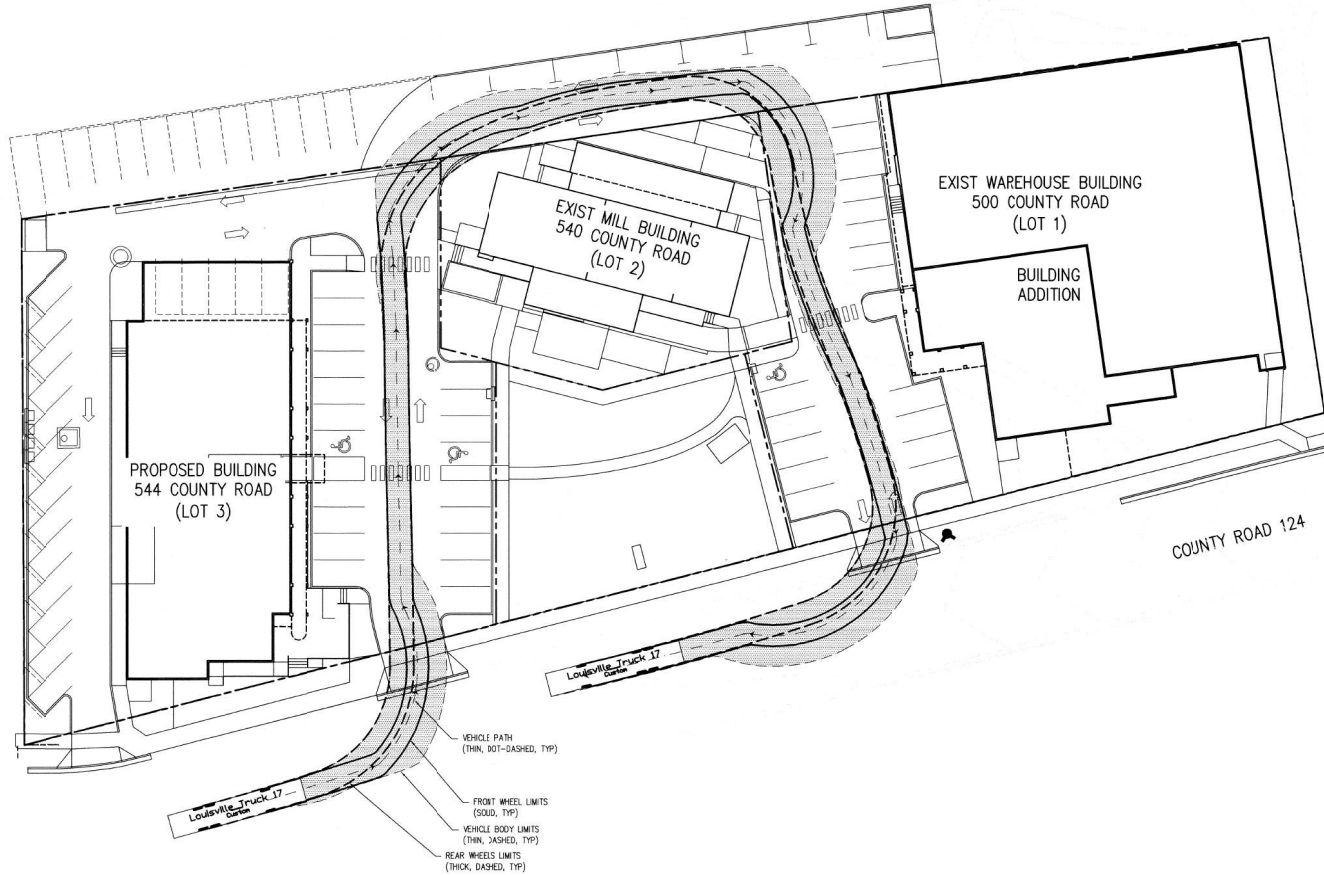
of Sheets

Unofficial Copy

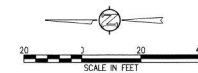
• D:\PROGRAM FILES\JCU2020\JUB_24364\F0317.DWG • 01/01/2008 • 22:00 • 7:06/7:06 •

FRONT STREET

ELM STREET



Louisville Truck 17 feet
Width : 8.00
Track : 8.00
Lock to Lock Time : 5.0
Steering Angle : 45.0



HARTRONFT ASSOCIATES
A Professional Corporation
Planning
Architecture
Interior Design
950 Spruce Street, #1A
Louisville, CO 80027
TEL: 303.673.9304
FAX: 303.673.9319

**LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR**
500, 540 & 544 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Caranci / Harttronft



PROJECT # 1252.10
DATE: 04/05/14
DRAWN BY: --
CHECKED BY: --
REVISIONS:
REV. NO. : 06/13/14
FINAL : 11/06/14
FPC : 03/13/15
FCC : 05/06/15

COPYRIGHT
All design and written information
herein is the property of Harttronft
Associates, Inc. and shall not be
used without written consent of
Harttronft Associates, Inc.

**AUTOTURN
FIRETRUCK
EXHIBIT**

Sheet
EX-2
of Sheets

03563039
12/20/2015 12:21 PM
Boulder County, CO
Boulder County, CO

SIGNATURES

Owner/Signer Block
By signing this PLU, the owner acknowledges and accepts all the requirements and intent set forth in this PLU. Witness my hand(s) on this ____ day of _____, 20__.

J. Erik Hartrnft, Member
Louisville Mill Site, LLC
Owner Name and Signature

Randall C. Caranci, Member
Louisville Mill Site, LLC
Owner Name and Signature

RCC LM
Owner Name and Signature

REBECCA RINGMAN
(Notary Seal)
REBECCA RINGMAN
NOTARY PUBLIC
STATE OF COLORADO
NOTARY # 1996401896
MY COMMISSION EXPIRES JUNE 20, 2016

My Commission Expires

PLANNING COMMISSION CERTIFICATE
Approved this 21st day of APRIL
2015 by the Planning Commission of the City of Louisville, Colorado.
Resolution No. 19, Series 12/15

CLERK AND RECORDER CERTIFICATE
(COUNTY OF BOULDER, STATE OF COLORADO)
I hereby certify that this instrument was filed in my office at 1201 E. 10th Ave., Suite 100, on the 18th day of December 2015. Fee \$1180.00, said _____, File No. G3863047. Reception.

Hilary Hall
Clerk & Recorder

Positive Matting
Deputy

CITY COUNCIL CERTIFICATE
Approved this 18th day of May
2015 by the City Council of the City of Louisville, Colorado.
Resolution No. 29, Series 2015

Mayor Signature
City Clerk Signature

PROJECT DIRECTORY

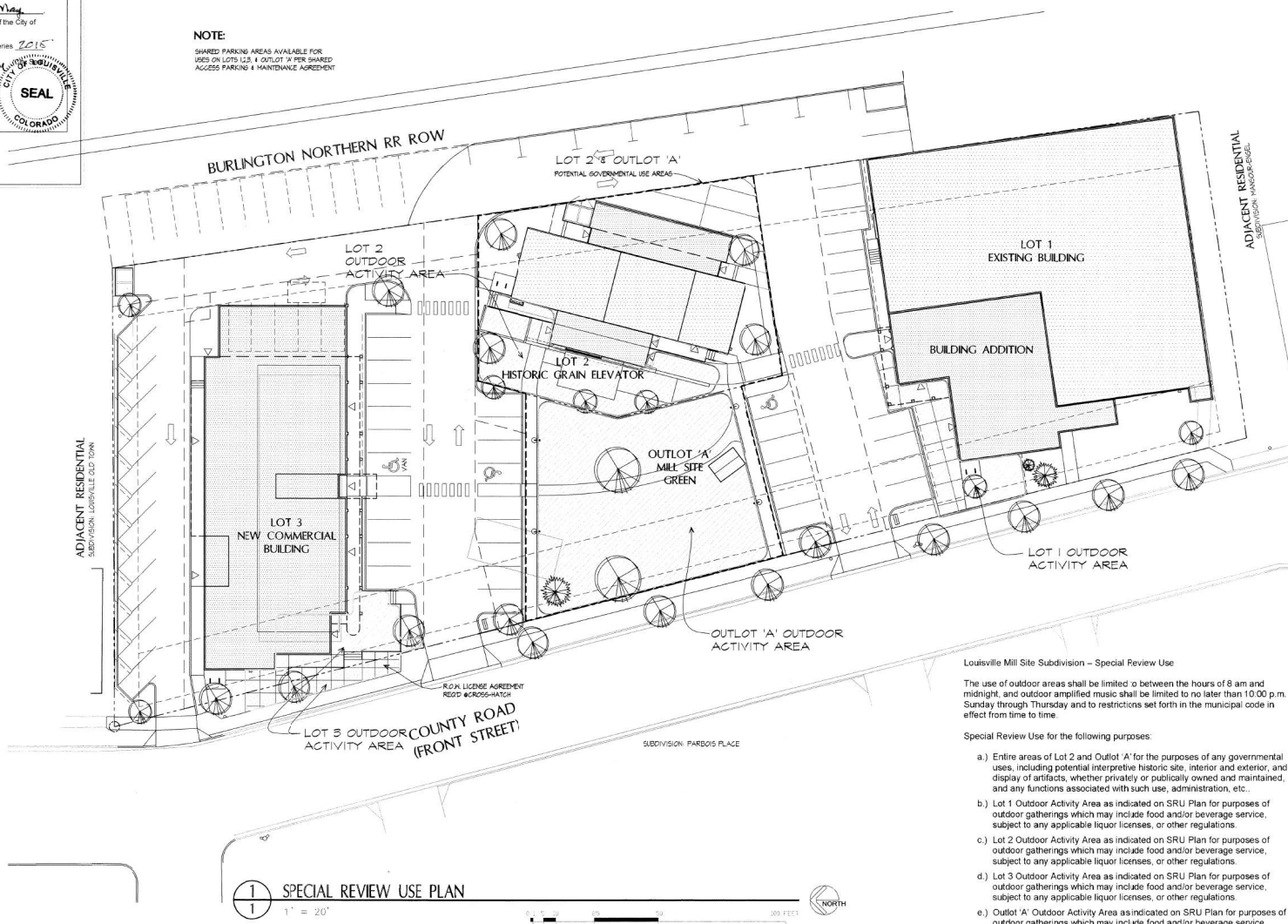
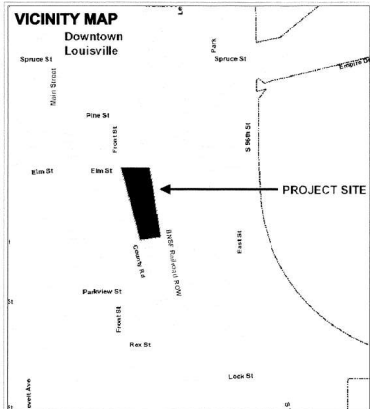
OWNER
Louisville Mill Site, LLC
950 Spruce Street, Suite 1A
Louisville, Colorado 80027
Contact: Erik Hartrnft
303-473-9350

ARCHITECT/PLANNER
Hartrnft Associates, P.C.
950 Spruce Street, Suite 1A
Louisville, Colorado 80027
Contact: Erik Hartrnft, AIA
303-473-9350

* Note: Prior to closing date, property for 540/544 County Rd. Owner is City of Louisville, 745 Main Street, Louisville, CO 80027. Louisville Mill Site LLC has a contract with the property owner to purchase the property and has an agreement to renovate the buildings on site. 'Owner' as referenced herein for 540/544 County Rd. shall refer to Louisville Mill Site LLC. See related agreements for additional information and responsibilities.

NOTE:

SHARED PARKING AREAS AVAILABLE FOR USES ON LOTS 1-2 & OUTLOT 'A' PER SHARED ACCESS PARKING & MAINTENANCE AGREEMENT



1
1
SPECIAL REVIEW USE PLAN
1" = 20'



SPECIAL REVIEW USE LOUISVILLE MILL SITE REDEVELOPMENT 500, 540, 544 County Road LOUISVILLE MILL SITE SUBDIVISION LOCATED IN THE SOUTHEAST QUARTER OF SECTION 8, TOWNSHIP 1 SOUTH RANGE 69 WEST OF THE 6TH P.M., CITY OF LOUISVILLE, COUNTY OF BOULDER, STATE OF COLORADO

HARTRONFT ASSOCIATES
PLANNING ARCHITECTS
950 Spruce Street, Suite 1A
Louisville, CO 80027
TEL: 303-473-9350
FAX: 303-473-9349

LOUISVILLE MILL SITE REDEVELOPMENT
& HISTORIC GRAIN ELEVATOR
500, 540 & 544 COUNTY ROAD, LOUISVILLE, CO
Louisville Mill Site LLC - Caranci / Hartrnft



PROJECT # 1252.10
DATE: 1/26/14
DRAWN BY: HARC
CHECKED BY: JEH
REVISIONS: 05/15/15

COPYRIGHT 2015
All drawn and written information is the property of Hartrnft Associates, P.C. and shall remain confidential and shall not be reproduced or transmitted in any form or by any means electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written consent of Hartrnft Associates, P.C.

SPECIAL REVIEW USE

Louisville Mill Site Subdivision - Special Review Use

The use of outdoor areas shall be limited to between the hours of 8 am and midnight, and outdoor amplified music shall be limited to no later than 10:00 p.m. Sunday through Thursday and to restrictions set forth in the municipal code in effect from time to time.

Special Review Use for the following purposes:

- Entire areas of Lot 2 and Outlot 'A' for the purposes of any governmental uses, including potential interpretive historic site, interior and exterior, and display of artifacts, whether privately or publicly owned and maintained, and any functions associated with such use, administration, etc.
- Lot 1 Outdoor Activity Area as indicated on SRU Plan for purposes of outdoor gatherings which may include food and/or beverage service, subject to any applicable liquor licenses, or other regulations.
- Lot 2 Outdoor Activity Area as indicated on SRU Plan for purposes of outdoor gatherings which may include food and/or beverage service, subject to any applicable liquor licenses, or other regulations.
- Lot 3 Outdoor Activity Area as indicated on SRU Plan for purposes of outdoor gatherings which may include food and/or beverage service, subject to any applicable liquor licenses, or other regulations.
- Outlot 'A' Outdoor Activity Area as indicated on SRU Plan for purposes of outdoor gatherings which may include food and/or beverage service, subject to any applicable liquor licenses, or other regulations.

Sheet

1

1 of 1 Sheets

Rob Zuccaro

Subject: FW: Grain Yard PUD Amendment and SRU

From: Mona Ferrera <nonar47@gmail.com>

Sent: Monday, October 27, 2025 7:29 AM

To: Planning <planning@Louisvilleco.gov>

Subject: Grain Yard PUD Amendment and SRU

[EXTERNAL EMAIL] From outside of City of Louisville DO NOT CLICK links or attachments unless you validate the sender and know the content is safe.

Good morning,

I'm not able to attend the meeting on Thursday November 13, 2025.

My question is, will there be a parking lot for the Outdoor Eater and Mobile Food Court?

I live at 600 1/2 Lafarge Avenue, Louisville, CO 80027.

When there's big events in Louisville there isn't enough parking for all the cars that come in. Usually No Parking Signs are ignored or people are parking too close to intersections or alleys.

Thank you for taking the time to address this issue.

Respectfully,

Mona Ferrera

Rob Zuccaro

Subject: FW: 540 Front St. Grainyard PUD and SRU

From: Patricia Lucey <luceype@gmail.com>
Sent: Sunday, November 2, 2025 5:58 AM
To: Rob Zuccaro <rzuccaro@louisvilleco.gov>
Subject: 540 Front St. Grainyard PUD and SRU

[EXTERNAL EMAIL] From outside of City of Louisville DO NOT CLICK links or attachments unless you validate the sender and know the content is safe.

To the Louisville Planning Commission,

I am writing to express my support for the proposed **Grainyard PUD and SRU application**.

I have lived at **527 Front Street** for over twenty years, directly across from the E-bike warehouse. From my home office overlooking Front Street, I see the Grain Mill, the E-bike buildings, and—over this past year—a run-down food truck every day. I drive and walk past this site multiple times each day.

The site at **540 Front Street** has been a blighted property for most of my years here in Louisville. The City of Louisville sold the property to private owners with the intent of restoring this historic structure. While the initial restoration efforts were promising, unfortunately the building has since fallen back into disrepair.

As a very close neighbor to this site, I have several ongoing concerns. Parking in this area is already limited, and additional commercial activity could worsen the shortage. Noise after 8 p.m. would be disruptive in what is primarily a residential and mixed-use corridor. I also hope the City will ensure that any approvals include **clear, enforceable limits** on food truck operations and other outdoor uses so that the property remains orderly and consistent with the agreements made by the developers. Past projects have not always received adequate follow-up or enforcement once approved, and I urge the City to maintain active oversight to ensure compliance with all conditions.

Despite these concerns, I **support the overall plans** to redevelop the property under the Grainyard PUD and SRU. This is a crucial opportunity to finally bring this landmark site back into productive use, preserve an important piece of Louisville's history, and revitalize the Front Street corridor.

Thank you for your consideration.

Patricia Lucey

527 Front St., Louisville, CO