DOUGLAS COUNTY
COLORADO

Minor Development
Staff Report

DATE: NOVEMBER 6, 2024

TO: DOUGLAS COUNTY BOARD OF COUNTY COMMISSIONERS

THROUGH: DOUGLAS J. DEBORD, COUNTY MANAGER

FROM: TERENCE T. QUINN, AICP, DIRECTOR OF COMMUNITY DEVELOPMENT

CC: HEATHER SCOTT, AICP, PRINCIPAL PLANNER
CURTIS J. WEITKUNAT, AICP, LONG RANGE PLANNING MANAGER
STEVEN E. KOSTER, AICP, ASSISTANT DIRECTOR OF PLANNING SERVICES

SUBJECT: **RIVER CANYON FILING 2, 4TH AMENDMENT – MINOR DEVELOPMENT PLAT**

PROJECT FILE: SB2024-019

OWNER:
KEVIN COLLINS
RIVER CANYON REAL ESTATE INVESTMENTS
11118 CARETAKER ROAD
LITTLETON, CO 80125

REPRESENTATIVE:
KYNAN FRANKE
SAGE DESIGN
1500 S. PEARL STREET, SUITE 200
DENVER, CO 80210

PLANNING COMMISSION HEARING:	**AUGUST 19, 2024 @ 6:00 p.m.**
PLANNING COMMISSION HEARING CONTINUED:	**SEPTEMBER 9, 2024 @ 6:00 p.m.**
PLANNING COMMISSION HEARING CONTINUED:	**OCTOBER 7, 2024 @ 6:00 p.m.**
PLANNING COMMISSION HEARING CONTINUED:	**NOVEMBER 4, 2024 @ 6:00 p.m.**
BOARD OF COUNTY COMMISSIONERS HEARING:	**AUGUST 27, 2024 @ 2:30 p.m.**
BOARD OF COUNTY COMMISSIONERS HEARING CONTINUED:	**SEPTEMBER 24, 2024 @ 2:30 p.m.**
BOARD OF COUNTY COMMISSIONERS HEARING CONTINUED:	**NOVEMBER 19, 2024 @ 2:30 p.m.**

I. EXECUTIVE SUMMARY

The applicant is requesting approval of a minor development final plat for subdivision of 6.02-acre parcel into eight single-family detached lots, three tracts, and private ROW. The site is located within the River Canyon Planned Development (RCPD). The site contains frontage on Caretaker Road and is located approximately 1,000 feet south of the intersection of Dante Drive and Waterton Road. The property is currently developed with the Ravenna sales center and a golf course maintenance facility.

Proposed single family detached residential lots range from approximately 0.25 acres to 0.30 acres. The applicant is proposing access to Lots 1 through 8 from Caretaker Road via a new private road, Dolce Vita Place. Proposed Tracts A, B, and C will be dedicated to the future HOA for open space, floodplain, utility easements, drainage, and landscaping

purposes. Caretaker Road is maintained in accordance with a separate agreement between the applicant, Ravenna Metropolitan District, and Denver Water.

The Planning Commission recommended approval of the minor development plat by a vote of 5 to 0 at its November 4, 2024, public hearing.

II. REQUEST

A. Request

This request is for approval of a minor development final plat consisting of 8 single-family residential lots, three tracts, and one private road on 6.02 total acres.

B. Process

A residential minor development application is processed pursuant to Article 6 of the *Douglas County Subdivision Resolution (DCSR).* Article 6 states the intent of the process is "to provide a streamlined review process for the creation of ten or fewer single-family residential lots.

Per Section 604.08 of the *DCSR*, "The Board shall evaluate the minor development final plat, staff report, referral agency comments, applicant responses, the Planning Commission recommendation, and public comment and testimony, and shall approve, approve with conditions, continue, table for further study, remand to the Planning Commission, or deny the minor development final plat. The Board's action shall be based on the evidence presented; compliance with adopted County standards, regulations, and policies; and other guidelines."

C. Location

The River Canyon Subdivision (dba Ravenna) lies in the northwestern portion of the County; in the Pike National Forest and Foothills Subarea of the *2040 Comprehensive Master Plan (the "2040 CMP")*. Planning Area AC-3 is accessed via the private Caretakers Road in the northern portion of the River Canyon Planned Development (RCPD), south of the intersection of Waterton Road and Dante Drive. The Vicinity map, Zoning map, Aerial map, and 2040 CMP map highlighting site location and existing conditions are in the attachments.

D. Project Description

The applicant is requesting approval of a minor development final plat to subdivide a 6.02-acre parcel within Planning Area AC-3 of the RCPD into 8 single-family detached residential lots, three open space tracts, and one private roadway tract. Planning Area AC-3 allows for attached or clustered housing up to a maximum of 5 units per acre. The lots range in size from 0.25 acres to 0.3 acres in size. Site access for Lots 1 through 8 is proposed from Caretaker Road. A private road, Dolce Vita Place, will connect to Caretaker Road to provide direct access to Lots 1 through 8.

The applicant is establishing three open space tracts via the plat. Tract A (1.987 acres) is to be dedicated for ownership and maintenance by the HOA for drainage and open space purposes. Tract B (0.659 acres) is to be dedicated for ownership and maintenance by the HOA for utility easements and open space purposes. Tract C (0.526 acres) is to be dedicated for ownership and maintenance by the HOA for utility easements and open space purposes. Dolce Vita Place (0.584) is designated as a private roadway and includes utility and drainage easements. There is a Public Service Company (PSCo) easement traversing a majority of the site that will need to be vacated by separate document prior to issuance of building permits for the lots. In addition, there are two easements, a 20-foot wide water easement and a 10-foot wide utility easement, that need to be vacated prior to issuing building permits on Lots 7 and 8.

Open space Tract A is intended to provide buffering between the proposed residential lots and the wastewater treatment facilities to the west. This tract includes floodplain and native vegetation which will be preserved and further enhanced with landscaping. Tract B includes landscaping and a wall to buffer the neighboring residence to the north. Tracts A and C separate the lots from the High Line Canal along the eastern boundary of this site.

The applicant has indicated that they will provide a sales disclosure to future lot owners alerting them to the presence of the wastewater treatment plant. The upgraded wastewater treatment plant will be designed to meet all current water quality and other environmental standards and include measures to limit potential odors.

Project Details	
Zoning	River Canyon PD PA AC-3
Gross Site Acreage	6.02 acres
Residential Lots	8 single-family residential lots
Tracts	3 tracts for open space, utility, drainage, and landscaping purposes
ROW	Dolce Vita Place
Gross Density	1 unit per ¾ acre

III. CONTEXT

A. Background

The approximately 650-acre River Canyon Planned Development (RCPD) was rezoned from Agricultural One (A-1) and General Industrial (GI) to Planned Development in 2001 for residential, golf course, open space, and community uses. A sketch plan, preliminary plan, minor development plat, two final plats, and multiple administrative replats have been approved to establish 236 platted lots, 20 open space tracts, nine

golf course tracts, and rights-of-way. At that time, the PD was designated as part of the Nonurban Area. The PD, with a gross residential density of 1 du per 2.6 acres was determined to be consistent with 2040 CMP policies in place at the time which allowed for transitional densities between existing urban and nonurban areas in the northwest portion of the County. One of the PD's commitments was the preservation of approximately 117 acres of open space immediately adjacent to the Pike National Forest in the 2040 CMP's Pike National Forest and Foothills Subarea. This commitment was accomplished with the dedication of a conservation easement over the property to the Douglas Land Conservancy in 2006.

In 2014, the developer requested, and the County approved, a CMP Amendment to include a large portion of the RCPD within the Roxborough Separated Urban Area. The small area north of the High Line Canal remained non-urban, connecting areas in the Pike National Forest Subarea immediately to the west and east of the RCPD. The RCPD allowed for open space, golf course, and light industrial uses within this area. The Roxborough wastewater treatment plant and lift station are also located within the area north of the High Line Canal. The treatment plant was subsequently purchased by Dominion Water and Sanitation District to serve Sterling Ranch and other areas within the northwest portion of the County.

In 2006, the County approved a site plan for the golf course maintenance facility on Lot 1. The site includes multiple structures, outdoor storage, parking, landscaping, and drainage. The sales center for Ravenna was constructed in 2007. Lot 2 was developed with a wastewater treatment plant.

In 2023, the County amended one of the planning areas north of the High Line Canal as part of the River Canyon Planned Development 9th Amendment. The staff report at that time incorrectly indicated this site was in the Nonurban Chatfield Valley Subarea, when the site is actually in the Nonurban Pike National Forest Subarea. Planning Area 1, Golf Course, was changed to Planning Area AC-3, Attached Clustered Residential. This amendment allowed for up to 5 dwelling units per acre to be located between the High Line Canal and Caretaker Road. The River Canyon Planned Development 10th Amendment was an administrative amendment to enlarge the AC-3 planning area to include two lots.

River Canyon Filing 2 was approved by the County in 2004 and included 5 lots and 4 tracts north of the High Line Canal. River Canyon Filing 2, 1st Amendment was approved in 2015 to add acreage to Lot 2. River Canyon Filing 2, 3rd Amendment was approved in April of 2024, to subdivided Lot 2A into two lots; Lot 2A-2 was created to buffer the treatment facility from the residential development. This new Lot 2A-2 includes a floodplain and natural vegetation.

B. Adjacent Land Uses and Zoning

The site is in the attached clustered residential area of the River Canyon PD undergoing development. The existing Ravenna maintenance facility is proposed to be relocated across Caretaker Road, northwest of the site. Existing and proposed wastewater treatment facilities are located to the southwest. The High Line Canal directly abuts the southern boundary of the proposed subdivision.

	Zoning	Land Use
North	River Canyon PD: Planning Areas 3, 4, 5, and 8	Residential, golf course, and open space including Chatfield State Park and the South Platte River
South	River Canyon PD General Industrial (GI)	Denver Water caretaker residence, Chatfield Basin Wastewater Reclamation Facility, golf course, and residential
East	River Canyon PD Agricultural One (A-1)	High Line Canal, residential, clay mine
West	River Canyon PD General Industrial (GI)	Golf course maintenance, South Platte River, and residential

IV. PHYSICAL SITE CHARACTERISTICS

A. Site Characteristics and Constraints

The site is currently developed with the sales center for the Ravenna community (aka River Canyon) and the maintenance yard for the Ravenna golf club. The northern portion of the site is vegetated with grasses and trees. Site topography includes a gradual downward slope to the southwest. There is a floodplain along the southern boundary which connects west to the South Platte River. No significant site constraints are present.

Existing Roxborough Water and Sanitation District and Dominion Water and Sanitation District wastewater treatment facilities are located southwest of the site. A lift station is currently in use. The wastewater treatment plant is inactive but is planned to be upgraded over the next three years to provide permanent wastewater services to Sterling Ranch and other properties within northwest Douglas County.

B. Access

The site is located approximately 1,000 feet from the intersection of Waterton Road and Dante Drive. Caretaker Road is adjacent to the site along the north and west sides. A private road, Dolce Vita Place, will provide direct access to Lots 1 through 8. Caretaker Road is owned by Denver Water. The developer and metro district have recently agreed to improvements to the road and new terms for ongoing maintenance with Denver Water.

C. Soils and Geology

The Class 3 Geologic Hazards map as described within the 2040 CMP indicates that there are no known Class 3 geologic hazards on the property. The applicant submitted a geotechnical report, which was reviewed by the Colorado Geological Survey (CGS). The applicant will complete investigation and analysis of individual building sites at building permit to implement the recommendations from the geotechnical report.

D. Drainage and Erosion

A Phase III Drainage Report and Grading Erosion Sediment Control Plan (GESC) and Report were submitted by the applicant and reviewed by Douglas County Engineering Services. This subdivision will be served by drainage improvements to be constructed on the adjacent lot which is under review for the relocated golf club maintenance yard. As will be noted in the Subdivision Improvements Agreement (SIA), drainage and access improvements must be in place prior to lots within the subdivision being sold. Douglas County will accept a blanket access and backup maintenance easement for the drainage improvements on and connecting to the adjacent lot. Due to the off-site drainage improvements, proposed condition #1 captures the requirement that the adjacent SIP be approved prior to the Board of County Commissioners' hearing on the minor development plat.

E. Floodplain

There is a 100-year floodplain located on the southern portion of this site. No portion of a platted lot is within the floodplain, and all development has been restricted to 60 or more feet from the floodplain in accordance with the final plat. The Mile High Flood District provided no objection to the proposal.

F. Wildlife

The 2040 CMP Wildlife Resources map shows the site as moderate habitat value for wildlife. The site is not located within an overland connection, wildlife movement corridor, or wildlife crossing area.

A wildlife report prepared for the River Canyon Subdivision in 1996 does not include any notable wildlife planning recommendations for this area. The areas of greatest wildlife movement are to the south within the golf course and open space planning areas OS-1 and GC-1, which include more than 300 acres of open spaces tracts and the Ravenna Golf Course, which is south of the site in Filing No. 1.

G. Historic Preservation

Douglas County Historic Preservation (DCHP) provided referral comments on the previous application for this site. DCHP requested that the applicant take care during excavation to monitor for subsurface artifacts. If artifacts are discovered, DCHP recommends completion of the appropriate Colorado Office of Archaeology and Historic Preservation Data Management and Historic and/or Prehistoric Component forms.

H. Wildland Fire Mitigation

Douglas County Wildfire Mitigation reviewed this application and had no objection to this proposal.

V. PROVISION OF SERVICES

A. Schools

The Douglas County School District (DCSD) reviewed the proposal. The applicant has previously provided cash-in-lieu of land dedication and school capacity fees for 243 lots. This proposal will bring the lot count up to 244 lots, therefore per Article 10 of the Douglas County Subdivision Resolution (DCSR) and the River Canyon PD commitments, cash-in-lieu of land and school capacity fees for one additional lot shall be paid prior to plat recordation.

B. Fire Protection

West Metro Fire Rescue provides fire and emergency medical services to the site and provided comments on the proposal, and the applicant accommodated all comments.

C. Sheriff Services

The Douglas County Sheriff's Office (DCSO) provides emergency services to the site. The Office of Emergency Management had no comment on the application. No response was received from DCSO E911 or DCSO.

D. Water

Water service is provided by the Roxborough Water and Sanitation District. In a January 5, 2024, letter, the District acknowledged water availability and its willingness and ability to serve 8 single-family lots. The application has also been reviewed by the Colorado Division of Water Resources (CDWR) who determined that the water supply is adequate and can be legally provided without causing injury to decreed water rights.

E. Sanitation

Sanitation service for 8 single-family lots is provided by the Roxborough Water and Sanitation District as indicated in a January 5, 2024, sanitary will serve letter. Douglas-County Health reviewed the application and provided a favorable recommendation regarding the proposed method of wastewater disposal.

F. Utilities

Xcel Energy provides natural gas and electrical service to the property. An existing utility easement will be vacated by separate instrument and replaced by an 8-foot utility easement on the front and rear of each lot. Lumen (aka CenturyLink) cautioned that there may be facilities in Caretaker Road and to work with their engineers prior

to construction which will occur as part of the SIP for the golf course maintenance facility. Comcast provided no response to the referral request.

G. Dedications

The County will accept general purpose utility easements and secondary drainage easements via the plat. Three easements, including a 20-foot wide water easement (Rec No. 2005073807); a 10-foot wide utility easement (Rec No. 2005073807); and a blanket PSCo easement (Book 1317, Page 496), are to be vacated by separate document prior to building permits on the lots.

The following table lists the dedications occurring with the minor development final plat:

Drainage and Utilities	• 20-foot drainage easement are dedicated to the HOA. • General purpose utility easements and secondary drainage easements are dedicated to Douglas County.
Roadway, Utilities, Landscaping	• Tracts A, B and C are dedicated to the HOA for utilities, landscaping, floodplain, and open space purposes. • The HOA will own and maintain the private 40-foot wide private road, Dolce Vita Place.

H. Parks, Trails, and Open Space

Park land dedication requirements for 243 lots were satisfied lots at the time of previous River Canyon plat approvals. With the additional lots proposed with this request, the total number of platted lots within River Canyon will increase to 244. Therefore, cash-in lieu of park land dedication is owed for one lot. Per Article 1003.06 of the DCSR, $250 per lot is established for cash-in-lieu of park land dedication for minor development final plats.

The RCPD was recently amended to remove the locational reference to a regional trail as originally shown on the PD exhibit. The High Line Canal Conservancy is currently designing improvements to the High Line Canal trailhead north of this subdivision and it is anticipated that the applicant will contribute to this improvement in lieu of building a separate trail on its property.

VI. PUBLIC NOTICE AND INPUT

Courtesy notices were mailed to abutting property owners and referral response requests were sent to the Roxborough Park Foundation, Arrowhead Shores, Chatfield Community Association, the Ravenna Homeowners Master Association, and the Roxborough Village First Homeowners Association during the referral period of May 22, 2024, through June 12, 2024. No response was received from Arrowhead Shores, the Chatfield Community Association, the Ravenna Homeowners Master Association, or the Roxborough Village First Homeowners Association. Roxborough Park Foundation had no comment on the

application. One neighbor had concerns regarding drainage runoff on Caretaker Road and requested the privacy wall extend the entire length of frontage of Caretaker Road. The applicant is providing a privacy wall for a portion abutting Caretaker Road and a privacy fence for the remainder of the site.

All referral agency comments are outlined in the Referral Agency Response Report attached to the staff report. The applicant has provided responses to referral comments within a separate letter included in the staff report attachments.

VII. PLANNING COMMISSION HEARING

The public hearing before the Planning Commission was held on November 4, 2024. No public testimony was provided. The Commission recommended approval of the minor development by a vote of 5 to 0 stating that it believes all approval standards had been met.

VIII. STAFF ANALYSIS

Per Article 603 of the *DCSR*, a minor development final plat may be approved upon the finding by the Board of County Commissioners that the following standards have been met:

603.01 Conforms with the goals, objectives, and policies of the Master Plan.
Staff Comment: *The property is within the Nonurban Pike National Forest and Foothills Subarea as identified in Section 3 of the 2040 CMP. While approval criteria for most land use applications require a finding of compliance, consistency, or conformance with the 2040 CMP, "The competing values of the Plan must be balanced through the public review process to achieve the larger vision of the community." As such, the 2040 CMP acknowledges its own competing values, and that implementation can only be achieved through the balancing of community values during the review process.*

Article 1, Section 106.05 of the DCSR makes clear that "the individual goals, objectives, and policies of the Master Plan are not, themselves, approval standards." It goes on to state that "The Board will consider the diversity of community values, applicable laws and regulations, private property rights, and unique characteristics of each application when balancing the goals, objectives, and policies set forth in the Master Plan."

The River Canyon Planned Development was approved under the 1992 Douglas County Master Plan (the "1992 Plan"), *as part of the Nonurban Area, in 2001. The 1992 Plan included policies allowing for transitioning of densities from urban to nonurban levels within this part of the County. The overall, gross density approved for River Canyon was one dwelling unit per 2.6 acres, with over 300 acres set aside for open space and wildlife movement. Both the 1992 Plan and the 2040 CMP consider this gross density to be nonurban in nature. In 2014, the River Canyon developer requested an amendment to the*

CMP to add most of the PD to the Roxborough Separated Urban Area. The five lots located north of the High Line Canal were not part of this request and remained within the Pike National Forest and Foothills Subarea. The entire PD remains at a nonurban density of 1 dwelling unit per 2.6 acres. In July of 2023, a PD Amendment was approved by the Board of County Commissioners shifting a limited amount of the already approved residential development allocation to this portion of the PD.

Consistent with Objective 3-2A, the minor development is of an intensity and character appropriate for the nonurban area. This site is currently developed with the Ravenna sales center and the Ravenna golf course maintenance facility. The redevelopment of the site for 8 single family residential lots is limited in scale and provides a layout which is compatible with the golf course maintenance, open space, and residential uses located within the surrounding nonurban area north of the High Line Canal. Services such as water, sewer, and roads are available to serve the limited number of lots proposed.

Objective 3-2B calls for development to conserve and showcase important natural and rural features. The floodplain traversing the site will be set aside in Tract A for open space. Existing vegetation and natural drainages in the southern portion of the site will help screen the residential development and allow for wildlife movement consistent with this objective and its policies.

Per Policy 3-2B.1, development in this area should provide clustering and other site design techniques to direct buildings away from environmentally and visually sensitive lands. This minor development plan clusters 8 lots away from the floodplain found on the southern end of this site. Tracts A through C are intended for open space, drainage and utility purposes and will allow continued opportunities for wildlife movement. Native vegetation and supplemental landscaping will provide visual buffering at the subdivision perimeter.

Policy 3-2C.1 encourages houses and utilities be located away from important ridgeline and horizon lines. This site is located behind the hogback and below ridgelines in the area. The site design tucks the 8 lots below the High Line Canal, while Tracts A, B, and C buffer the development from the surrounding lots. Tract A creates 1.98 acres of open space to buffer.

At the time of its approval, the River Canyon PD's density of 1 dwelling unit per 2.6 acres was found to be consistent with the Master Plan in place. Policy 3-3I.1 of the 2040 CMP states that new development in the Pike National Forest and Foothills Subarea at densities greater than 1 dwelling unit per 35 acres is not consistent with the 2040 CMP, but it does not preclude buildout of planned developments approved under prior iterations of the Master Plan.

603.02 Addresses the design elements established in Section 404 – Preliminary Plan, herein.

Staff Comment: The minor development is in conformance with the design elements. Each of the proposed lots are accessible to roads providing opportunities for vehicular and pedestrian access. Lots can meet the RCPD Development Standards for minimum lot size and setbacks. Off-street parking requirements can be met. Geotechnical recommendations from the applicant's geotechnical report will be implemented, and individual building analysis will occur at building permit for proposed dwellings. Drainage plans have not yet been approved but are anticipated to be prior to the Board hearing on the minor development plat. The applicant will assure archaeological, paleontological, or historic resources are identified during construction.

Per design element, 404.03 "Conflicts between proposed and surrounding land uses are minimized through lot and tract orientation, setbacks, landscaping, or other buffering techniques," the subdivision layout includes open space tracts, existing vegetation and topography, and supplemental landscaping to create buffers between the new residential lots and the abutting residence, High Line Canal, and wastewater treatment facilities. The applicant will provide potential buyers notification of the adjacent wastewater treatment plant located to the south as part any real estate transactions for Lots 1 through 8.

603.03 Conforms with Section 18A, Water Supply Overlay District, of the Zoning Resolution.

Staff Comment: DCZR Section 1803A establishes approval standards to be used in the evaluation of land use applications reviewed under Section 18A. CDWR reviewed the minor development request and water documentation and have determined that the water supply is adequate to serve the subdivision.

1803A.01 The applicant has demonstrated that the water rights can be used for the proposed use(s).

Staff comment: The applicant has submitted a water report and documentation that demonstrates the Roxborough Water and Sanitation District can adequately serve the 8 single-family lots proposed within the subdivision. CDWR reviewed the application and indicated that the amount of water is adequate to annually serve the subdivision without injuring to decreed water rights.

1803A.02 The reliability of a renewable right has been analyzed and is deemed sufficient by the County based on its priority date within the Colorado System of Water Rights Administration.

Staff comment: No new renewable water rights are proposed to serve the development. The District has access to the City of Aurora's renewable water supplies through a 90-year agreement.

1803A.03 The Water Plan is deemed adequate and feasible by the County to ensure that water supply shortages will not occur due to variations in the hydrologic cycle.

Staff comment: A Water Plan is not required for review of proposed water service by a District.

1803A.04 The Water Plan is sufficient to meet the demand applicable to the project based on the minimum water demand standards in Section 1805A herein.

Staff comment: A Water Plan is not required for review of proposed water service by a District. The District has established minimum water demand standards applicable to this project as a condition of service.

603.04 Provides for a public wastewater collection and treatment system, and, if other methods of wastewater collection and treatment are proposed, such systems shall comply with State and local laws and regulations.

Staff Comment: The Roxborough Water and Sanitation District will provide sanitary service to the 8 single-family lots. Douglas County Health provided a favorable recommendation regarding the proposed method of wastewater disposal for the project.

603.05 Identifies all areas of the proposed subdivision which may involve soil or topographical conditions presenting hazards or requiring special precautions and that the proposed uses of these areas are compatible with such conditions.

Staff Comment: The applicant will implement the recommendations of the geotechnical analysis per CGS's request. In addition, standard geotechnical explorations of individual building sites will be required as part of the building permit process.

603.06 Provides adequate drainage improvements.

Staff Comment: Drainage improvements for the minor development plat will be located on an adjacent lot. The applicant is responsible for these improvements as part of the relocated golf course maintenance facility. The SIP for the adjacent lot has not yet been approved however it is anticipated to be received prior to the Board's hearing on the minor development plat. The County will accept a blanket access and backup maintenance.

603.07 Provides adequate transportation improvements.

Staff Comment: The applicant submitted a traffic letter that has been reviewed and accepted as adequate by Douglas County Engineering Services. Improvements to Caretaker Road will be made as part of the golf course maintenance facility. A new maintenance agreement between the applicant and Denver Water has been approved.

603.08 Protects significant cultural, archaeological, natural, and historical resources, and unique landforms.

Staff Comment: The existing sales office, maintenance facilities, and parking were approved in 2006. A*rcheological or paleontological resources were reviewed and watch*

during the construction of the existing structures onsite. The applicant will take care to look for any such items during redevelopment and further construction of the site.

603.09 Demonstrates the extraction of any known commercial mining deposit shall not be impeded.
Staff Comment: There are no known commercial mining deposits or significant mineral deposits on site per the Douglas County Mineral Extraction Plan.

603.10 Has available all necessary services, including fire and police protection, recreation facilities, utility service facilities, streets, and open space to serve the proposed subdivision.
Staff Comment: All such services are available to the parcel. Fire protection is provided by West Metro, and the Douglas County Sheriff's Office provides police protection. Utility service facilities are provided by Xcel, Comcast, and Century Link.

IX. STAFF ASSESSMENT

Staff has evaluated the minor development final plat request in accordance with Article 6 of the *DCSR*. Should the Board find that the approval standards for the minor development final plat are met; the following proposed conditions should be considered for inclusion in the motion:

1. Prior to the Board hearing on the minor development final plat, the SIP for the adjacent lot (River Canyon Filing 2, Lot 3, 1st Amendment, SP2022-075) shall be approved and drainage improvements secured within an approved SIA for the plat.

2. Prior to recordation of the minor development final plat, an HOA shall be formed to accept ownership and maintenance of the tracts and private road within the subdivision.

3. Prior to recordation of the minor development final plat, the applicant shall pay $250 to Douglas County for cash-in-lieu of park land dedication.

4. Prior to recordation of the minor development final plat, the applicant shall pay $500 for cash-in-lieu or land dedication and $592 for school capacity to the Douglas County School District.

5. Prior to building permit issuance for Lots 1 through 8, evidence shall be provided that the PSCo easement has been vacated.

6. Prior to building permit issuance for Lots 7 and 8, evidence shall be provided that the 20-foot wide water easement and 10-foot wide utility easements have been vacated.

7. During construction activity within the development, the applicant, its successors, and assigns shall take all reasonable care to watch for historic resources, paleontological resources, and other cultural history resources and shall immediately notify Douglas County in the event of such discovery.

8. Disclosures shall be provided to prospective homeowners and homebuyers regarding the proposed Chatfield Basin Wastewater Reclamation Facility as part of any real estate transactions for Lots 1 through 8.

9. Prior to recordation of the minor development final plat, technical corrections to the plat exhibit shall be made to the satisfaction of Douglas County.

10. All commitments and promises made by the applicant or the applicant's representative during the public hearing and/or agreed to in writing and included in the public record have been relied upon by the Board of County Commissioners in approving the application; therefore, such approval is conditioned upon the applicant's full satisfaction of all such commitments and promises.

ATTACHMENTS **PAGE**

RIVER CANYON
FILING 2, 4TH AMENDMENT

SB2024-019
VICINITY MAP

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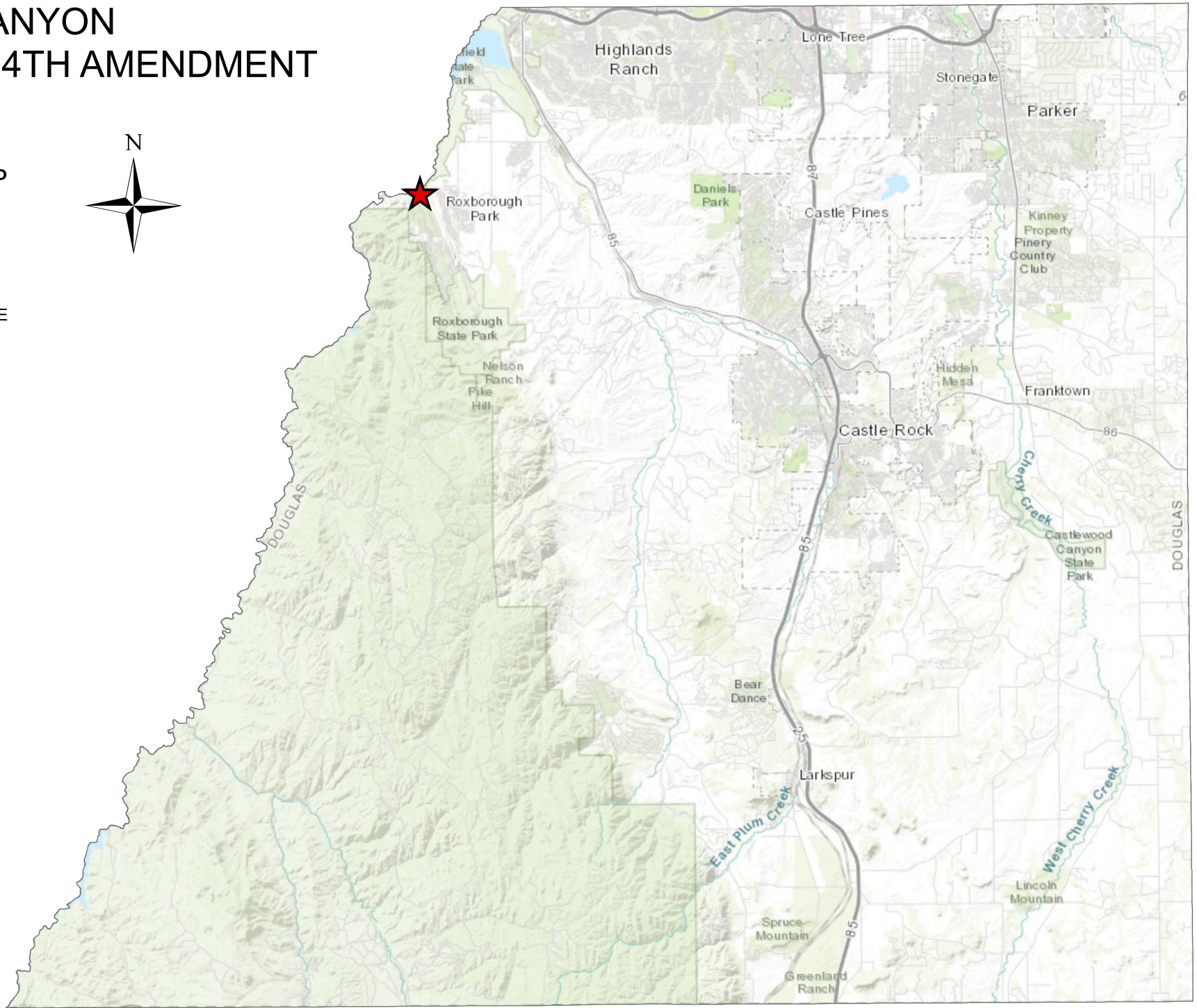
LEGEND

PROJECT SITE



RIVER CANYON FILING 2, 4TH AMENDMENT

SB2024-019
ZONING MAP

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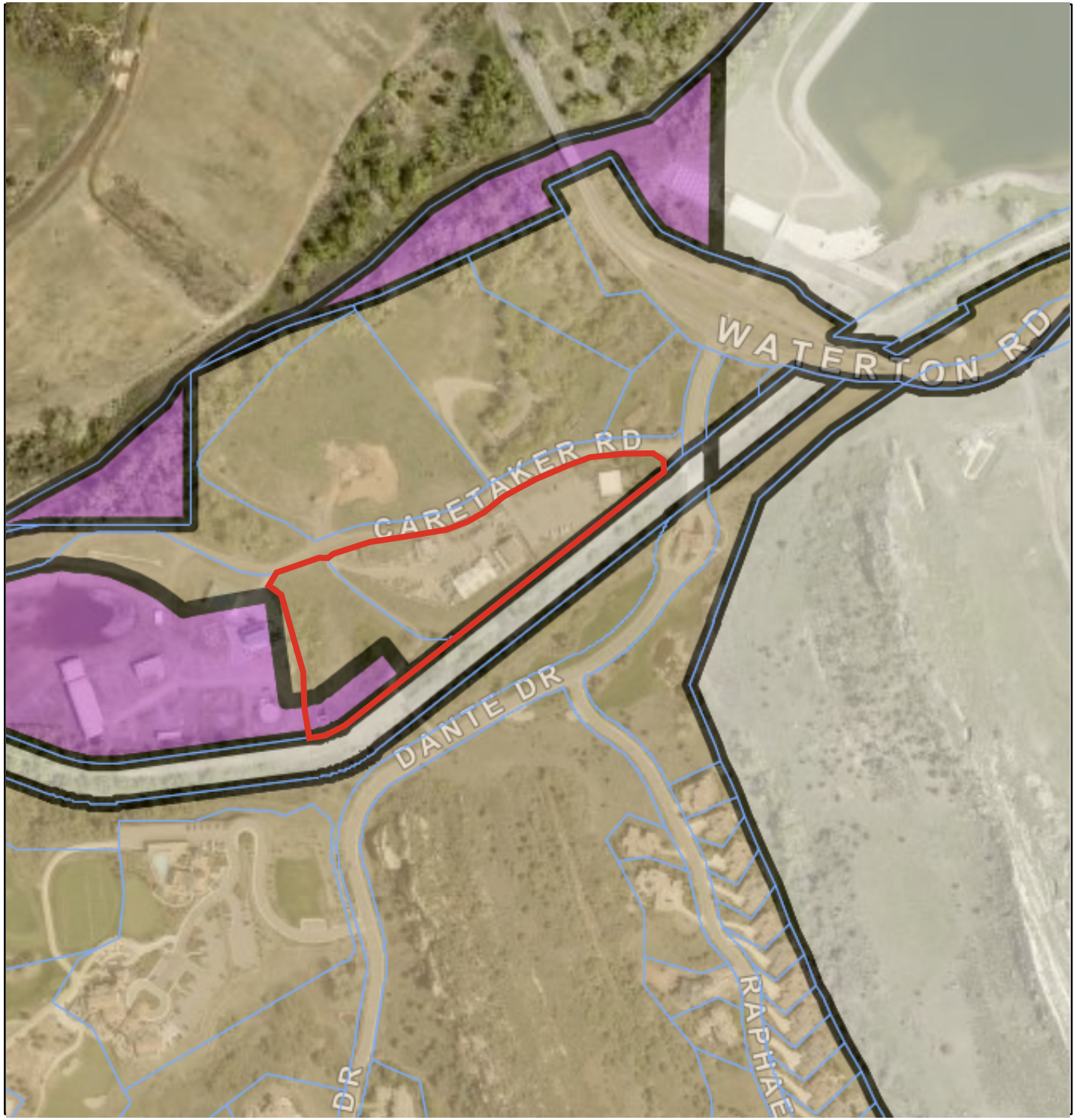
LEGEND

- PLANNED DEVELOPMENT
- GENERAL INDUSTRIAL
- AGRICULTURAL ONE



RIVER CANYON FILING 2, 4TH AMENDMENT

SB2024-019
AERIAL MAP

N

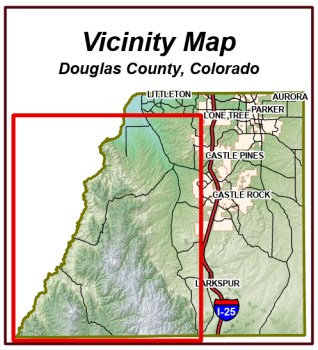
LEGEND

- PLANNING AREA AC-3
- MAJOR ROADS
- OTHER ROADS

Map 3.8 Pike National Forest & Foothills Subarea

Comprehensive Master Plan 2040

DOUGLAS COUNTY COLORADO



Pike National Forest & Foothills Subarea

Chatfield State Park
CHATFIELD FARMS
RIVER CANYON
STERLING RANCH
ROXBOROUGH VILLAGE
ROXBOROUGH PARK NORTH
STONEHENGE AT ROXBOROUGH
Roxborough State Park
Louviers
Castle Pines
Daniels Park
Sedalia
Castle Rock
Larkspur
Highlands Gulch
ELK RUN
DUPONT FEE
DUPONT SOUTH
DOW WOODHOUSE
SHARPTAIL RIDGE
PLATEAU RANCH
RED MESA RANCH
YOUNG
NELSON RANCH
PIKE HILL
NELSON RANCH FEE
LAMBERT RANCH
BELFIELD
DUNCAN RANCH
SOLITUDE PROPERTY
PINE CLIFF
SCHMIDT
KEENE RANCH PRESERVE
DAWSON BUTTE LIFE ESTATE
BROOKS RANCH
BEAR DANCE
PERRY PARK GATEWAY
BIG "D"
SPRUCE MOUNTAIN
TROUT CREEK RANCH
THUNDER BUTTE
WESTCREEK LAKES
BACKCOUNTRY WILDERNESS AREA OF HIGHLANDS RANCH
HENRY PARCEL - CHEROKEE RANCH
CHEROKEE RANCH
SANCTUARY
Pike National Forest
Cheesman Reservoir
Teller County
Jefferson County
R 71 W
R 70 W
R 69 W
R 68 W
To Woodland Park
To Palmer

Pike National Forest & Foothills Subarea
Subdivisions
Thirty-five Acre Divisions
Zoned, Unsubdivided
Rural Streams
Divisions Without Subdivision Process
Municipalities
Open Space
Parks
Pike National Forest
Douglas County Boundary
Parcels
Lakes
Streams
US Highway
State Highway
Major Road

Note:
For information pertaining to Douglas County GIS Data, see Land Use Map 1.1 for disclaimer.

0 1.5 3
Miles

Path: S:\PROJECTS\CMP2040\CMP2040.aprx Date : 8/16/2019 3:19 PM

DOUGLAS COUNTY
COLORADO

Department of Community Development

www.douglas.co.us

Planning Services

LAND USE APPLICATION

Please fill in this application form completely. An incomplete application will not be processed.

Note: Neither the Planning Commission nor the Board of County Commissioners should be contacted regarding an open application.

OFFICE USE ONLY

PROJECT FILE #: SB2024-019

PROJECT NAME: River Canyon Filing 2, 4th Amendment

PROJECT TYPE: Minor Development Plat

MARKETING NAME: Dolce Vita Estates

SITE ADDRESS: 11122 Caretaker Rd. Littleton, 80125

OWNER(S):

Name(s): River Canyon Real Estate Investments LLC.

Address: 11118 Caretaker Rd, Littleton, CO. 80125

Phone: 303-489-7633

Email: kcollins@ravennagolf.com and geoff@ravennagolf.com

AUTHORIZED REPRESENTATIVE *(requires notarized letter of authorization if other than owner)*

Name: Kynan M. Franke / Sage Design Group

Address: 1500 S. Pearl St. STE. 200 Denver, CO. 80210

Phone: 720-358-9519

Email: kynan@sagedesigngroup.com

PLANNING FEES: $2,600.00

ENGINEERING FEES: $5,000.00

TOTAL FEES: $7,600.00

RELATED PROJECTS: ZR2022-033

LEGAL DESCRIPTION:

Subdivision Name: River Canyon 2

Filing #: 2 Lot #: 1 & 2A-2 Block #: N/A Section #: 34 Township: 6S Range: 69W

STATE PARCEL NUMBER(S): Lot 1: 2227-344-01-001/ Lot 2A-2: To be determined.

ZONING: Please see the exhibit included with this application for further reference.

Present Zoning: Residential Proposed Zoning: N/A Gross Acreage: 4.55

Gross Site Density (DU per AC): 1.75 # of Lots or Units Proposed: 8

SERVICE PROVIDERS:

Fire District: West Metro Fire District Metro District: Ravenna Metro District Gas: XCEL Energy

Water: Roxborough Water and Sanitation Sewer: Roxborough Water and Sanitation Electric: XCEL Energy

Roads: ☐ Public ☒ Private (please explain): Access to area will require the use of an access easement along Caretaker Rd.

To the best of my knowledge, the information contained on this application is true and correct. ***I have received the County's information sheet regarding the Preble's Meadow Jumping Mouse.***

Kynan M Franke KYNAN M. FRANKE April 5, 2024

Applicant Signature *Date*

April 5th, 2024

PROJECT PS2023-138 MINOR DEVELOPMENT PLAT NARRATIVE

Statement of Request: Minor Development Plat

Land Owner: River Canyon Real Estate Investments LLC.

Representative: Kynan Franke / Sage Design Group

Site Summary

Current Zoning:	Residential
Lot Size:	Lot 1: 2227-344-01-001 / 4.55 Acres | Lot 2A-2 : SPN not determined / 2.27 Acres

Infrastructure and Services

Fire: West Metropolitan Fire Department
Gas: XCEL Energy
Water: Roxborough Water and Sanitation District
Sewer: Roxborough Water and Sanitation District
Electric: XCEL Energy
Metropolitan District: Ravenna Metropolitan District

General Project Concept – River Canyon Real Estate Investments LLC. intends to subdivide the land at 11118 Caretaker into 8 residential lots. Currently, part of the site is used for the existing maintenance facility and its operations, both of which are being relocated, while the other part is for the parking lot of the sales center for The Club at Ravenna, which is being removed. The proposed subdivision will include the residential lots, a private road, a private golf cart path, a privacy wall/fence around the area, and landscaping that will further enhance the appearance of Caretaker Road and blend in with the overall character of the Club.

Additional information per. Article 6 of the Douglas County Zoning Resolution

605.02.1 The total land area to be subdivided.
Response: 4.55 Acres

605.02.2 The total number of lots and proposed use.
Response: There will be a total of 8 lots, all of which will be for residential use.

605.02.3 The residential density.
Response: 1 lot every 0.6 Acres

605.02.4 The total land area to be preserved as open space.
Response: Currently there is little open space to preserve as the land has been used for the existing maintenance facility(which is being relocated) and the parking lot for the sales center (which is being removed). The main open space is to the west that contains the floodplain which the developer has no intention of disturbing.

605.02.5 Roads, tracts, and easements, including ownership and maintenance responsibility.
Response: All roads, tracts, and easements will be owned by the developer. The maintenance responsibility for each one will fall under an established HOA.

605.02.6 Land dedications for parks and schools.
Response: Land dedications for parks and schools will be cash-in-lieu.

605.02.7 Provision of water, sewer, and other utilities.
Response: The site will be utilizing Roxborough Water and Sanitation for water and sewer services and XCEL Energy for gas and electric services.

Project Name: River Canyon Filing 2, 4th Amendment
Project File #: SB2024-019
Date Sent: 05/22/2024 **Date Due:** 06/12/2024

Agency	Date Received	Agency Response	Response Resolution
Addressing Analyst	05/29/2024	Received: There are several existing structures on this property. The addresses for those structures will be deleted after demolition. Please inform DCAddressing@douglas.co.us when demolition is complete (not at the time of demo permit, but when the structures are actually gone). The proposed street name, DOLCE VITA, is approved and reserved. The suffix of Lane requires revision. Please revise to PLACE or POINT. Please include the private drive with the final street name (Dolce Vita Place/Point) in the Land Summary Chart. Consider adding a plat note referring to the private drive. New addresses will be recorded for each residential lot following approval and recordation of the plat. Contact DCAddressing@douglas.co.us or 303.660.7411 with questions.	The applicant acknowledges the address changes and has changed the suffix and named the private road tract to be Dolce Vita Place.
Arrowhead Shores HOA		No Response Received	No response necessary
Assessor	06/03/2024	Received: Description under title should say "East half of section 34…" instead of "North half...". Lot 2A-2 will require a deed to clear title - needs to be conveyed to River Canyon Real Estate Investments LLC. If no conveyance is occurring, Dominion Water and Sanitation District will need to sign the plat under the Owner block.	The applicant provided documentation for clear title. An updated title commitment will be required to be provided prior to plat recordation.
AT&T Long Distance - ROW	05/22/2024	Received: Based on the address and/or map you provided, there should be NO conflicts with the AT&T Long Line facilities.	No response necessary
Building Services	05/31/2024	No Comment	No response necessary
CenturyLink	05/29/2024	Received: Our engineer has reviewed this plat and their comments are:	The applicant will call utility locate prior to any grading or construction.

Agency	Date Received	Agency Response	Response Resolution
		"Reservations - Proposed plans have a 40' utility easement set where Lumen facility exist but could cause an issue with MH, HH and FSAI at 11120 Caretaker Rd." If you require signatures or have any further questions, please contact the engineer at Kalan.Weimer@lumen.com to schedule	
Chatfield Community Association		No Response Received	No response necessary
Colorado Division of Water Resources	06/13/2024	Received: The State Engineer finds, pursuant to section 30-28-136(1)(h)(I) and section 30-28-136(1)(h)(II), C.R.S., that with the Roxborough Water and Sanitation District as the water provider the proposed water supply is physically adequate and can be provided without causing injury to decreed water rights.	No response necessary
Colorado Geological Survey	06/09/2024	Received: A.G. Wassenaar's Geotechnical Study, Ravenna Maintenance Facility/1151 Caretaker Road, Douglas County, Colorado (Project Number 232540, August 29, 2023) was prepared for the proposed maintenance facility and parking lot located north of the River Canyon Filing 2, 4th Amendment area, not the currently proposed residential development south of Caretaker Road. The NRCS Soil Survey data submitted as "Geotechnical Maps" is valid for only the uppermost 5 to 6 feet below the ground surface, and is not valid for residential development, especially for structures with basements. The eastern portion of the site is within the Douglas County steeply dipping bedrock zone. CGS recommends that the county require a site-specific preliminary geotechnical report with recommendations regarding overexcavation, subsurface drainage,	The applicant provided a Geotechnical Study for the site and CGS concurs with the findings. Site specific geotechnical investigations will be required at the time of building permit.

Agency	Date Received	Agency Response	Response Resolution
		etc., based on current development plans. -- Jill Carlson, Engineering Geologist, Colorado Geological Survey, carlson@mines.edu	
Comcast		No Response Received	No response necessary
CORE Electric Cooperative	06/07/2024	Received: We have received the above-referenced referral request. We have reviewed our records and find that this property is not in our service territory.	No response necessary
Denver Water	06/12/2024	Received: Denver Water's comments: 1. Caretaker Road, labeled as " public 46.5' ROW" is incorrect. This road has not been publicly dedicated and is held in fee simple title by Denver Water. Adjacent users have been granted access by separate document. Change label on plat to 46.5' wide private ROW, or "Caretaker Road-Denver Water 46.5' roadway". 2. Denver Water Easement Book 270 Page 895 should be removed. This easement has been released. 3. Any new utilities serving this development in adjacent Caretaker Road, or High Line Canal must be reviewed and approved by Denver Water prior to installation. Utility design and construction plans should be sent to Denver Water Property Management for review. 4. Can you show sidewalk path (golf carts use) in Tract A? Install stop signs on both sides of Caretaker Road so golf carts crossings can be safer. Send photos of existing permanent speed bumps for review, or we may want to see a gate extended across path on south side of Caretaker Road to reduce speeds, ensure safe crossings. 5. River Canyon and Denver Water are working on an updated IGA for Maintenance. This needs to be	The applicant worked with Denver Water to resolve their issues including labeling the road correctly, removing the released easement, and updating the IGA. The applicant will continue to work with Denver Water regarding utility design and golf cart safety.

Agency	Date Received	Agency Response	Response Resolution
		finalized before final approval but both parties are actively working on negotiating terms and discussions are on-going. 6. Canal comment-High Line is two words, remove that this is "public ROW". Cannot find reception no.70569 in our files or online, provide for review or remove from label.	
Douglas County Conservation District		No Response Received	No response necessary
Douglas County Health Department	06/12/2024	Received	No response necessary
Douglas County School District RE 1		No Response Received	No response necessary
Engineering Services	06/13/2024	Received: Engineering has reviewed the Minor Development Plat and has the following comments: Plat: 1. A private SIPIA is required 2. Please number the proposed lots consecutively 1-8. 3. Private roads A & B will require legal street names. 4. Provide a legal description for all the "bump outs" and curved segments in the proposed access easement. 5. Label the sight distance easement shown on the plat and define in the notes that no obstacles over 36" shall be placed within the easement. 6. Add the secondary drainage easements notes. 7. Submit an updated Traffic Impact Analysis that addressed the intersection of Caretaker Road and Dante Drive. 8. Provide written confirmation from the fire district that the centerline radius at the access to Private Street A and the hammerhead configuration are acceptable.	Engineering reports, studies, and plans has been reviewed with only minor technical corrections remaining. The SIP for the adjacent lot must be approved as drainage improvements for the subdivision will be constructed offsite as part of a separate project (also owned by the applicant). The SIA will need to be approved prior to the Board hearing on the minor development plat.

Agency	Date Received	Agency Response	Response Resolution
		Construction Plans and GESC plans have red-marked comments that need to be addressed.	
High Line Canal Conservancy		No Response Received	No response necessary
Jefferson County Planning and Zoning		No Response Received	No response necessary
Mile High Flood District		No Response Received	No response necessary
Office of Emergency Management	05/29/2024	Received: OEM has no concerns with this project.	No response necessary
Ravenna Homeowners Master Association		No Response Received	No response necessary
Roxborough Park Foundation	05/22/2024	No Comment	No response necessary
Roxborough Village First HOA		No Response Received	No response necessary
Roxborough Water & Sanitation District	06/12/2024	No Comment	No response necessary
Sheriff's Office		No Response Received	No response necessary
Sheriff's Office E911		No Response Received	No response necessary
West Metro Fire Protection District	06/12/2024	Received: Fire service will be provided as long as provisions of the currently adopted edition of the International Fire Code, including Douglas County amendments are met in development. • Where gates cross fire department access minimum unobstructed widths are required (20 feet for single gate or 12 feet per gate on divided roadway) in addition an approved means of operating the gates in an emergency situation is required (Knox lock or method approved by WMFR) IFC D103.5 • It appears that the roadway widths and turnaround meet the requirements of IFC D103 and table D103.4 for road width (26 feet or more), hammerhead turnaround due to dead end road length in excess of 501 feet o The turns will need to be evaluated for turning radius requirements (25'	The applicant worked with WMFPD to resolve their issues. The private road was revised to accommodate turnaround requirements and fire hydrant locations have been approved. Any necessary permits will be obtained at the time of building permit.

Agency	Date Received	Agency Response	Response Resolution
		inside and 50' outside) for fire department apparatus • Fire hydrant placement and spacing will need to be evaluated • WMFPD requires that proposed buildings/homes over 8,500 square feet constructed within the Ravenna Development have an automatic fire suppression system installed. o Square footage is determined by total floor area of all floor levels within exterior walls and under the horizontal projections of the roof of a building including garages o Permits shall be obtained from WMFPD for all work on automatic fire suppression systems Permits are required from the fire district for new and core/shell buildings, tenant improvement projects, all work on automatic fire protection systems, all work on automatic fire detection systems, solar photovoltaic systems, underground fire line, radio amplification, and for the storage of hazardous materials. WMFPD reserves the right to provide additional comments/requirements if there are any changes to the application or at the time plans are submitted and reviewed per applicable codes and amendments	
Wildfire Mitigation		No Response Received	No response necessary
Xcel Energy-Right of Way & Permits	06/05/2024	Received: River Canyon 2 Filing, 4th Amendment and has several conflicts. Please be aware PSCo owns and operates existing natural gas and electric distribution facilities along and within property boundaries. In addition to eight-foot (8') utility easements adjacent to front lot line, for these single-family residential lots and to ensure that adequate utility easements are available within this development and per state statutes,	To resolve noted conflicts, PSCo easements will be vacated and utilities relocated prior to issuance of any building permits within the subdivision as noted on the plat and in the proposed conditions of approval. Tract table has been updated. Standard easement encroachment prohibition note has been added to the plat.

Agency	Date Received	Agency Response	Response Resolution
		Public Service Company requests an eight-foot (8') wide dry utility easements abutting rear lot line of each lot in the subdivision. The asterisk * note in the snippet below is it is confusing and contradictory to the use of Tract A in the Tract Summary Chart. Public Service Company requests that the following language or plat note is placed on the preliminary and final plats for the subdivision: Permanent structures, improvements, objects, buildings, wells, water meters and other objects that may interfere with the utility facilities or use thereof (Interfering Objects) shall not be permitted within said utility easements and the utility providers, as grantees, may remove any Interfering Objects at no cost to such grantees, including, without limitation, vegetation. Public Service Company of Colorado (PSCo) and its successors reserve the right to require additional easements and to require the property owner to grant PSCo an easement on its standard form.	

From: annb cwc64.com
To: Heather Scott
Cc: Pam Choy (pc2914@att.com); duanew cwc64.com; jt cwc64.com
Subject: RE: Douglas County eReferral (SB2024-019) Is Ready For Review
Date: Wednesday, May 22, 2024 12:53:45 PM

Hi Heather,

This is in response to your eReferral with a utility map showing any buried AT&T Long Line Fiber Optics near Caretaker Rd Littleton, Colorado. The Earth map shows the project area in red and the buried AT&T Long Line Fiber Optics in yellow. Based on the address and/or map you provided, there should be NO conflicts with the AT&T Long Line facilities.

Please feel free to contact us with any questions or concerns.

Ann Barnowski
Clearwater Consulting Group Inc
120 9th Avenue South
Suite 140
Nampa, ID 83651
Annb@cwc64.com

The attached google earth maps are intended to show approximate locations of the buried AT&T long line fiber optic cable. The maps are provided for informational purposes only. In no way should the maps be used for anything other than general guidelines as to where the fiber is or is not and any other use of these maps is strictly prohibited.

REFERRAL RESPONSE REQUEST

Date sent: May 22, 2024 Comments due by: **June 12, 2024**

Project Name:	River Canyon Filing 2, 4th Amendment
Project File #:	SB2024-019
Project Summary:	This request is for a Minor Development Final Plat to the River Canyon Filing 2 subdivision to create eight separate lots from Lot 1, which is currently 4.55 acres. The eight lots will take access off Caretaker Road and the average lot size is ¼ of an acre.

Information on the identified development proposal located in Douglas County is enclosed. Please review and comment in the space provided.

☒	No Comment	
☐	Please be advised of the following concerns:	
☐	See letter attached for detail.	
Agency: Castle Rock Water		**Phone #:** 720-733-6040
Your Name: Matthew Hayes		**Your Signature:**
(please print)		**Date:**

Agencies should be advised that failure to submit written comments prior to the due date, or to obtain the applicant's written approval of an extension, may result in written comments being accepted for informational purposes only.

Sincerely,

Heather Scott, AICP
Project Planner
303-919-4801
hscott@douglas.co.us

7/13/2024

Heather Scott
100 3rd Street
Castle Rock, CO, 80104

P862089
No Reservations/No Objection

SUBJECT: Request for approval of an Encroachment at 11122 Caretaker Rd, Littleton, CO.

To Whom It May Concern:

CenturyLink of Colorado, Inc. d/b/a CENTURYLINK ("CenturyLink") has reviewed the request for the subject vacation and has determined that it has no objections with respect to the areas proposed for vacation as shown and/or described on Exhibit "A", said Exhibit "A" attached hereto and incorporated by this reference.

It is the intent and understanding of CenturyLink that this Vacation shall not reduce our rights to any other existing easement or rights we have on this site or in the area.

This vacation response is submitted WITH THE STIPULATION that if CenturyLink facilities are found and/or damaged within the vacated area as described, the Applicant will bear the cost of relocation and repair of said facilities.

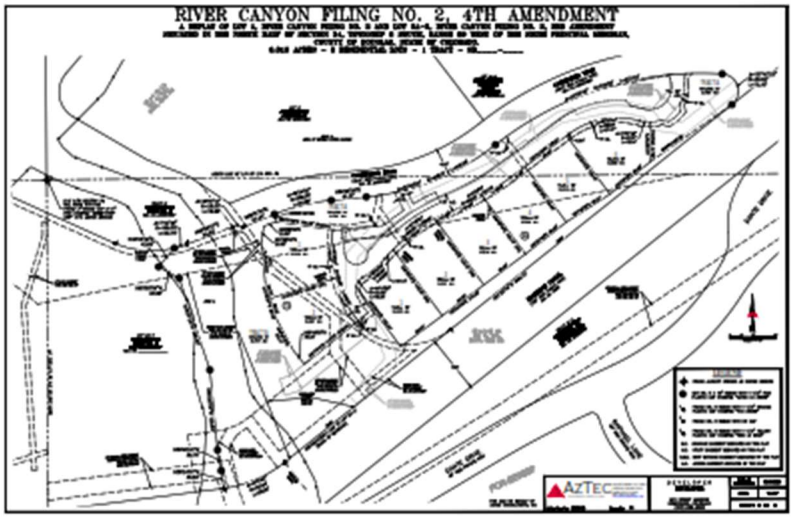
If you have any questions please contact Phil Hackler at (432) 288-08418 or Phil.Hackler@lumen.com.

Sincerely yours,

/s/

CenturyLink Right of Way Team

EXHIBIT A



COLORADO
Division of Water Resources
Department of Natural Resources

June 12, 2024

Heather Scott, AICP, Project Planner
Department of Community Development, Planning Services
Transmission via email: hscott@douglas.co.us

Re: River Canyon Filing 2, 4th Amendment
File Number SB2024-019
Pt. N ½ of the SE ¼ and the S ½ of the NE ¼ of
Section 34, Township 6 South, Range 69 West, 6th P.M
Water Division 1, Water District 8

Dear Ms. Scott:

We have reviewed the above-referenced proposal to subdivide an approximately 4.55-acre parcel into eight (8) residential lots. The property is currently used for an existing maintenance facility and a parking lot which are being relocated. Water is to be provided by the Roxborough Water and Sanitation District ("District"). Our office previously provided an opinion regarding this application in a letter dated February 29, 2024.

Water Supply Demand

According to a letter dated January 5, 2024 from the District ("Letter"), the proposed water demand is 3.52 acre-feet/year for residential purposes with a demand of 8 equivalent residential units (EQRs).

Source of Water Supply

The proposed water supply for the eight lots is service provided by the District. The January 5, 2024 letter commits to providing service to the proposed development.

According to the Letter, the District leases 2,235 acre-feet of raw water from the City of Aurora, of which 1,950 acre-feet is potable and 285 acre-feet is non-potable irrigation water. According to information available to this office, the lease with the City of Aurora is for 90 years with automatic 90-year extensions. Therefore, based on 0.44 acre-feet/year per EQR, the District has the capacity to serve up to 4,431 EQRs.

As of December 31, 2023, the District's current demand is 3,974 EQRs with an anticipated demand of 4,326 EQRs at full buildout. Therefore, it appears that the District's supply of 4,431 EQRs exceeds its commitments.

Stormwater Detention

The application materials indicate that a storm water detention structure will be constructed

as a part of this project. The applicant should be aware that unless the structure can meet the requirements of a "storm water detention and infiltration facility" as defined in section 37-92-602(8), C.R.S., the structure may be subject to administration by this office. The applicant should review *DWR's Administrative Statement Regarding the Management of Storm Water Detention Facilities and Post-Wildland Fire Facilities in Colorado, attached, to ensure that the notification*, construction and operation of the proposed structure meets statutory and administrative requirements. The applicant is encouraged to use Colorado Stormwater Detention and Infiltration Facility Notification Portal to meet the notification requirements, located at https://maperture.digitaldataservices.com/gvh/?viewer=cswdif.

State Engineer's Office Opinion

Based on the above, the State Engineer finds, pursuant to section 30-28-136(1)(h)(I) and section 30-28-136(1)(h)(II), C.R.S., that with the Roxborough Water and Sanitation District as the water provider the proposed water supply is physically adequate, and can be provided without causing injury to decreed water rights. Should you or the applicant have any questions regarding this matter, please contact me at 303-866-3581 ext. 8245 or kathleen.fuller@state.co.us.

Sincerely,

K. Fuller

Kate Fuller, P.E.
Water Resources Engineer

Cc: Referral file no. 31157

COLORADO GEOLOGICAL SURVEY

1801 Moly Road
Golden, Colorado 80401

Matthew L. Morgan
State Geologist and
Director

August 5, 2024

Heather Scott, AICP
Principal Planner
Douglas County Department of Community Development
hscott@douglas.co.us

Location:
39.4853, -105.0942

Subject: **SB2024-019 River Canyon Filing 2, 4th Amendment**
Douglas County, CO; CGS Unique No. DU-24-0024-2

Dear Heather:

CTL|Thompson's Preliminary Geotechnical Investigation, River Canyon, Lot 1, Filing No. 2, Southwest of Dante Drive and Caretaker Road, Littleton, Colorado (Project No. DN52,267.000-115-R1, June 19, 2024) contains a valid preliminary characterization of subsurface conditions and preliminary site development recommendations, and satisfactorily addresses the concerns discussed in our previous (June 9, 2024) review of SB2024-019.

Thank you for the continued opportunity to review and comment on this project. If you have questions or require further review, please call me at (303) 384-2643, or e-mail carlson@mines.edu.

Sincerely,

Jill Carlson, C.E.G.
Engineering Geologist

From: Begly, Gina
To: Al Peterson
Cc: Heather Scott; Jeanette Bare; Geoff Collins; Alexander, John-Paul
Subject: RE: [EXTERNAL]: FW: Caretaker Road Section.
Date: Tuesday, September 3, 2024 12:49:31 PM
Attachments: image001.png

Yes, these additions look good to us.
To clarify, this is a variance to Douglas County's Urban Local Roadway, Type II, correct?
I got that info from Page 3 of the standards. Can you confirm?

Gina Begly | Real Estate Sr Specialist
1600 W 12TH Ave
Denver, CO 80204-3412
Denver Water | t: 303-628-6219
denverwater.org | denverwater.org/TAP

DENVER WATER

From: Al Peterson <APeterso@douglas.co.us>
Sent: Tuesday, September 3, 2024 10:26 AM
To: Begly, Gina <Gina.Begly@denverwater.org>
Cc: Heather Scott <hscott@douglas.co.us>; Jeanette Bare <JBare@douglas.co.us>; Geoff Collins <geoff@ravennagolf.com>; Alexander, John-Paul <JOHN-PAUL.ALEXANDER@denverwater.org>
Subject: RE: [EXTERNAL]: FW: Caretaker Road Section.

Gina,

Here is the revised Caretaker Rd cross section with the revisions as you requested. Please confirm this is acceptable to Denver Water.

Thanks AP

From: Begly, Gina <Gina.Begly@denverwater.org>
Sent: Thursday, August 29, 2024 1:52 PM
To: Al Peterson <APeterso@douglas.co.us>
Cc: Heather Scott <hscott@douglas.co.us>; Jeanette Bare <JBare@douglas.co.us>; Geoff Collins <geoff@ravennagolf.com>; Alexander, John-Paul <JOHN-PAUL.ALEXANDER@denverwater.org>
Subject: RE: [EXTERNAL]: FW: Caretaker Road Section.

Yes, I like the idea of labeling the surface as asphalt and adding minimum typical thickness with note (or similar) to state TBD by pavement design report.
I noticed these items were not defined, so thanks for letting us add a few more details.

Gina Begly | Real Estate Sr Specialist
1600 W 12TH Ave
Denver, CO 80204-3412

Denver Water | t: 303-628-6219
denverwater.org | denverwater.org/TAP

DENVER WATER

From: Al Peterson <APeterso@douglas.co.us>
Sent: Thursday, August 29, 2024 1:41 PM
To: Begly, Gina <Gina.Begly@denverwater.org>
Cc: Heather Scott <hscott@douglas.co.us>; Jeanette Bare <JBare@douglas.co.us>; Geoff Collins <geoff@ravennagolf.com>; Alexander, John-Paul <JOHN-PAUL.ALEXANDER@denverwater.org>
Subject: RE: [EXTERNAL]: FW: Caretaker Road Section.

Gina,

Typically we let the required Pavement Design Report define the pavement thickness as it is yet to be determined what the subgrade characteristics are. You'll notice none of the other road sections define a pavement thickness.
We can label a minimum pavement thickness if you prefer and define that the final section will be determined by the pavement design report. We can certainly label the pavement as Asphalt so as to match the existing section of Caretaker.

Let me know your thoughts.

AP

From: Begly, Gina <Gina.Begly@denverwater.org>
Sent: Thursday, August 29, 2024 1:22 PM
To: Al Peterson <APeterso@douglas.co.us>
Cc: Heather Scott <hscott@douglas.co.us>; Jeanette Bare <JBare@douglas.co.us>; Geoff Collins <geoff@ravennagolf.com>; Alexander, John-Paul <JOHN-PAUL.ALEXANDER@denverwater.org>
Subject: RE: [EXTERNAL]: FW: Caretaker Road Section.

In the profile, the surface is unspecified. Can we add a pavement type and thickness? We like the soft shoulders but we hope to see some call outs/labels for surface and thickness.
Thank you,

Gina Begly | Real Estate Sr Specialist
1600 W 12TH Ave
Denver, CO 80204-3412
Denver Water | t: 303-628-6219
denverwater.org | denverwater.org/TAP

DENVER WATER

From: Al Peterson <APeterso@douglas.co.us>
Sent: Thursday, August 22, 2024 1:15 PM
To: Begly, Gina <Gina.Begly@denverwater.org>
Cc: Heather Scott <hscott@douglas.co.us>; Jeanette Bare <JBare@douglas.co.us>
Subject: RE: [EXTERNAL]: FW: Caretaker Road Section.

Gina,

Here are the executed revised Road Standards made to the existing River Canyon Road Standards. Please verify that Denver Water is accepting of this revision.
Notice on page 3 the Engineer's, Fire District's and County's signatures. The Caretaker Road section has been attached as the last page.

AP

From: Begly, Gina <Gina.Begly@denverwater.org>
Sent: Monday, August 19, 2024 12:07 PM
To: Heather Scott <hscott@douglas.co.us>
Cc: Al Peterson <APeterso@douglas.co.us>; Jeanette Bare <JBare@douglas.co.us>; Geoff Collins <geoff@ravennagolf.com>
Subject: RE: [EXTERNAL]: FW: Caretaker Road Section.

Hi Heather,
I'm not sure how this works. Is this a County standard that you want us to accept for Caretaker Road?
Would this be a variance to the existing standards? How will it be made of record if we agree to it?
Thank you,

Gina Begly | Real Estate Sr Specialist
1600 W 12TH Ave
Denver, CO 80204-3412
Denver Water | t: 303-628-6219
denverwater.org | denverwater.org/TAP

DENVER WATER

From: Heather Scott <hscott@douglas.co.us>
Sent: Tuesday, August 6, 2024 2:51 PM
To: Begly, Gina <Gina.Begly@denverwater.org>
Cc: Al Peterson <APeterso@douglas.co.us>; Jeanette Bare <JBare@douglas.co.us>
Subject: [EXTERNAL]: FW: Caretaker Road Section.

Hello Gina,

Attached, please find the road section the county will accept for Caretaker Road. Let me know if you have any questions.

Thank you,
Heather Scott, AICP | Principal Planner
Douglas County Department of Community Development
Address | 100 Third St., Castle Rock, CO 80104
Direct | 303-814-4358 **Mobile** | 303-919-4801
Email | hscott@douglas.co.us

From: Al Peterson <APeterso@douglas.co.us>
Sent: Tuesday, August 6, 2024 1:15 PM
To: Heather Scott <hscott@douglas.co.us>
Subject: Caretaker Road Section.

Heather, do you want to send this road section to Gina at Denver Water to get her feedback. I have not communicated with her just yet.

AP

From: Begly, Gina
To: Heather Scott
Cc: Geoff Collins
Subject: RE: [EXTERNAL]: SB2024-019 River Canyon Filing 2, 4th Amendment revised documents
Date: Monday, July 22, 2024 4:01:44 PM
Attachments: image001.png

Hi Heather,
Thanks for sending this info-I will review the TIA.
We do need some help and a quick meeting might be best.
We are working on updating the access/maintenance agreement for Caretaker Road related to the replat and SIP for maintenance yard.
Our agreement states the road shall meet a certain County standard.
Douglas County (Chuck Smith) has stated Caretaker Road would be Rural Local Roadway, but Caretaker as constructed does not fit this standard/profile.
Can you help coordinate a meeting so that we can understand the correct road standard?
We want to be sure we are pointing to the right standard and need some guidance.

We see that the Dolce Vita got a variance. Perhaps Caretaker Road may be in the same situation.
Thank you,

Gina Begly | Real Estate Sr Specialist
1600 W 12TH Ave
Denver, CO 80204-3412
Denver Water | t: 303-628-6219
denverwater.org | denverwater.org/TAP

DENVER WATER

From: Heather Scott <hscott@douglas.co.us>
Sent: Monday, July 22, 2024 12:24 PM
To: Begly, Gina <Gina.Begly@denverwater.org>
Subject: [EXTERNAL]: SB2024-019 River Canyon Filing 2, 4th Amendment revised documents

Hello Gina,

I hope you are doing well and have been able to enjoy summer! River Canyon revised documents including the TIA report. Please review the revised documents and let me know if you have any other questions or concerns.

Thank you,
Heather Scott, AICP | Principal Planner
Douglas County Department of Community Development
Address | 100 Third St., Castle Rock, CO 80104

From: Begly, Gina
To: Heather Scott
Subject: RE: [EXTERNAL]: RE: Caretaker Road-minor Development Plat SB2024-019
Date: Wednesday, June 12, 2024 2:32:10 PM
Attachments: image001.png

Hi Heather,
Here are Denver Water's comments on SB2024-019.

1. Caretaker Road, labeled as " public 46.5' ROW" is incorrect. This road has not been publicly dedicated and is held in fee simple title by Denver Water. Adjacent users have been granted access by separate document.
   Change label on plat to 46.5' wide private ROW, or "Caretaker Road-Denver Water 46.5' roadway".
2. Denver Water Easement Book 270 Page 895 should be removed. This easement has been released.
3. Any new utilities serving this development in adjacent Caretaker Road, or High Line Canal must be reviewed and approved by Denver Water prior to installation. Utility design and construction plans should be sent to Denver Water Property Management for review.
4. Can you show sidewalk path (golf carts use) in Tract A? Install stop signs on both sides of Caretaker Road so golf carts crossings can be safer. Send photos of existing permanent speed bumps for review, or we may want to see a gate extended across path on south side of Caretaker Road to reduce speeds, ensure safe crossings.
5. River Canyon and Denver Water are working on an updated IGA for Maintenance. This needs to be finalized before final approval but both parties are actively working on negotiating terms and discussions are on-going.
6. Canal comment-High Line is two words, remove that this is "public ROW". Cannot find reception no.70569 in our files or online, provide for review or remove from label.

Gina Begly | Property Management | Real Estate Sr Specialist
Denver Water t: 303-628-6219
1600 West 12th Avenue Denver, CO 80204
denverwater.org

DENVER WATER

From: Heather Scott <hscott@douglas.co.us>
Sent: Thursday, May 16, 2024 12:06 PM
To: Begly, Gina <Gina.Begly@denverwater.org>
Subject: RE: [EXTERNAL]: RE: Caretaker Road-minor Development Plat

Hello Gina,

SB2024-019 has not gone out on referral yet. I sent my initial comments on April 24th and am waiting on revised documents.

Hope you have a great day,

Heather Scott, AICP | Principal Planner
Douglas County Department of Community Development
Address | 100 Third St., Castle Rock, CO 80104
Direct | 303-814-4358 **Mobile** | 303-919-4801
Email | hscott@douglas.co.us

From: Begly, Gina <Gina.Begly@denverwater.org>
Sent: Thursday, May 16, 2024 11:06 AM
To: Heather Scott <hscott@douglas.co.us>
Subject: RE: [EXTERNAL]: RE: Caretaker Road-minor Development Plat

Hi Heather,
I'm just checking that this referral didn't go our yet for River Canyon Filing 2, Amdt 4, SB2024-019.
Thanks,

Gina Begly | Property Management | Real Estate Sr Specialist
Denver Water t: 303-628-6219
1600 West 12th Avenue Denver, CO 80204
denverwater.org

DENVER WATER

From: Begly, Gina
Sent: Monday, April 8, 2024 2:37 PM
To: Heather Scott <hscott@douglas.co.us>
Subject: RE: [EXTERNAL]: RE: Caretaker Road-minor Development Plat

HI Heather,
Wow that design has really changed. Yes, please email me a referral when this is ready to go out for review so I have a little more time to complete those comments.
Thanks!

Gina Begly | Property Management | Real Estate Sr Specialist
Denver Water t: 303-628-6219
1600 West 12th Avenue Denver, CO 80204
denverwater.org

DENVER WATER

From: Heather Scott <hscott@douglas.co.us>
Sent: Monday, April 8, 2024 2:27 PM
To: Begly, Gina <Gina.Begly@denverwater.org>
Subject: RE: [EXTERNAL]: RE: Caretaker Road-minor Development Plat

Hello Gina,

Sorry for the misunderstanding. PS2023-183 was just formally submitted today and assigned case number SB2024-019. I have 5 days to review the application to make sure it is complete and either sending it back to the applicant to fix or prepare the application for referral. I have attached the proposal which is for 8 lots. Let me know if you want me to send you an email once the application is sent out on referral.

Have a great day,

Heather Scott, AICP | Principal Planner
Douglas County Department of Community Development
Address | 100 Third St., Castle Rock, CO 80104
Direct | 303-814-4358 **Mobile** | 303-919-4801
Email | hscott@douglas.co.us

From: Begly, Gina <Gina.Begly@denverwater.org>
Sent: Monday, April 8, 2024 12:50 PM
To: Heather Scott <hscott@douglas.co.us>
Subject: RE: [EXTERNAL]: RE: Caretaker Road-minor Development Plat

Thank you Heather, but I was looking an update for project PS2023-183, another River Canyon project for residential lots, 10-15?.

Gina Begly | Property Management | Real Estate Sr Specialist
Denver Water t: 303-628-6219
1600 West 12th Avenue Denver, CO 80204
denverwater.org

From: Heather Scott <hscott@douglas.co.us>
Sent: Friday, April 5, 2024 12:47 PM
To: Begly, Gina <Gina.Begly@denverwater.org>
Subject: [EXTERNAL]: RE: Caretaker Road-minor Development Plat

Hello Gina and happy Friday to you as well!

Here is River Canyons updated plat. Chuck Smith sent the road template by separate email. Please let me know if you need anything else.

Have a great weekend,

Heather Scott, AICP | Principal Planner
Douglas County Department of Community Development
Address | 100 Third St., Castle Rock, CO 80104
Direct | 303-814-4358 **Mobile** | 303-919-4801

Email | hscott@douglas.co.us

From: Begly, Gina <Gina.Begly@denverwater.org>
Sent: Friday, April 5, 2024 9:11 AM
To: Heather Scott <hscott@douglas.co.us>
Subject: Caretaker Road-minor Development Plat

Hi Heather,
Happy Friday!
Do you know that status of **Minor Development Residential (PS2023-183)?**

The last version I have is a presubmittal with a color graphic. I haven't seen a plat to review yet.
Can I get an update?

Also, we have been reviewing an update to the maintenance agreement on Caretaker Road with Ravenna/River Canyon Real Estate Investments LLC.
What is the County standard that will cover Caretaker Road?
Can you let me know?

Thanks!

Gina Begly | Property Management | Real Estate Sr Specialist
Denver Water t: 303-628-6219
1600 West 12th Avenue Denver, CO 80204
denverwater.org

DENVER WATER

DOUGLAS COUNTY
HEALTH DEPARTMENT COLORADO

06/12/2024

Heather Scott
Planning Services
100 Third Street
Castle Rock, CO 80104
303-660-7460

RE: SB2024-019

Dear Heather Scott,

Thank you for the opportunity to review and comment on the to create 8 single family residential lots. Douglas County Health Department (DCHD) staff have reviewed the application for compliance with applicable environmental and public health regulations. After reviewing the application, DCHD has the following comments:

Water and Sewer Service
A will-serve letter has been provided by Roxborough Water and Sanitation District. Based on this letter, DCHD is providing a favorable recommendation regarding the proposed method of sewage disposal.

Sincerely,

Jacob Deitz

cc: Skyler Sicard

DOUGLAS COUNTY
COLORADO

www.douglas.co.us

DV 24-184

Department of Community Development
Planning Services

REFERRAL RESPONSE REQUEST

Date sent: May 22, 2024 Comments due by: **June 12, 2024**

Project Name: River Canyon Filing 2, 4th Amendment

Project File #: SB2024-019

Project Summary: This request is for a Minor Development Final Plat to the River Canyon Filing 2 subdivision to create eight separate lots from Lot 1, which is currently 4.55 acres. The eight lots will take access off Caretaker Road and the average lot size is ¼ of an acre.

Information on the identified development proposal located in Douglas County is enclosed. Please review and comment in the space provided.

☐ No Comment	
☐ Please be advised of the following concerns:	
☒ See letter attached for detail.	
Agency: ENGINEERING	**Phone #:** 4318
Your Name: AL PETERSON *(please print)*	**Your Signature:** Al Peterson
	Date: 6/12/24

Agencies should be advised that failure to submit written comments prior to the due date, or to obtain the applicant's written approval of an extension, may result in written comments being accepted for informational purposes only.

Sincerely,

Heather Scott, AICP
Project Planner
303-919-4801
hscott@douglas.co.us

DOUGLAS COUNTY
COLORADO

June 12, 2024 DV 24-184

Heather Scott, AICP
Douglas County Planning
100 Third St.
Castle Rock, CO. 80104

RE: River Canyon Filing 2, 4th Amendment – Minor Development Plat

Dear Heather,

Engineering has reviewed the Minor Development Plat for the above referenced project and the following items have been noted:

Plat

1. This project will require a Site Improvements Agreement (SIA Private). This agreement is to provide for the completion of the improvements proposed by all construction plans and supporting documents. Please submit an executed SIA to Engineering for review and processing. The SIA Document may be downloaded from the County website at www.douglas.co.us

2. Please number the proposed lots consecutively 1 thru 8, rather than having two Lot 1s and two Lot 2s.

3. Private Roads A and B will require legal street names.

4. Please provide a legal description for all the "bump outs" and curved segments in the proposed access easement.

5. Please label the sight distance easement shown on this plat and define in the notes that no obstacles over 36" shall be placed within the easement.

6. Please attach the following note to this plat in regard to all the secondary drainage easements (Tract A and onsite storm sewer): "A secondary drainage easement across Tract A and the drainage easements as shown hereon is hereby granted to Douglas County for the purposes of accessing, maintaining and repairing storm water management improvements, including, but not limited to, inlets, pipes, culverts, channels, ditches, hydraulic structures, riprap, detention basins, forebays, micro-pools and water quality facilities (collectively, the "facilities") in the event the River Canyon Real Estate Investments, LLC., its successors, and assigns ("system owner") fails to satisfactorily maintain or repair said facilities. a blanket access easement over the River Canyon Filing 2, 4th Amendment (the "subdivision") is also hereby granted to Douglas County, but only for the purpose of accessing the facilities in the event that the drainage easements do not provide adequate access. The maintenance and repair of the facilities located within the subdivision, as shown on the construction plans accepted by Douglas County or on the plat for the subdivision, shall be the responsibility of the system owner. in the event such maintenance and repairs are not performed by the system owner to the satisfaction of Douglas County, then Douglas County shall have the right, but not the obligation, to enter said subdivision, after ten (10) days prior written notice to the system owner, unless there is an emergency, in which case Douglas County shall give notice as soon as practicable, to perform all necessary work, the cost of which shall be paid by the system owner upon billing. in the event the system owner fails to reimburse Douglas County within thirty (30) days after submission of the bill for the costs incurred, Douglas County will have the right to enforce such obligation by appropriate legal action. it is the system owner's responsibility to construct, maintain, and repair the facilities in a manner consistent with all applicable plans approved by Douglas County.

7. Please submit an updated Traffic Impact Analysis (TIA) that addresses the intersection of Caretaker Rd and Dante Dr.

8. Please provide written confirmation from the Fire District that the centerline radius at the access to Private Street A and the hammerhead configuration are acceptable.

Construction Plans

9. The County supports a 28' FL-FL road section for the entirety of Private Road A from the access to Private Road B. Due to the extremely tight centerline radius (50') at the access the additional 8' lane width will better accommodate emergency vehicles on a single point of access.

10. Please attach a signage and striping plan along with the County's Standard Signage and Striping Detail sheets to this set of Construction Plans.

11. This roadway project will require a set of Alternate Private Roadway Standards. Those standards should include, but not be limited to, road width for Private Road B, K-Values and centerline radii. The Cover Sheet of these Standards shall include signature lines for the Design Engineer, Fire District and Douglas County.

12. Please define the centerline length along Caretaker Rd from the flowline Dante Dr to the centerline of Private Road A.

13. Please clarify if any improvements are being proposed to Caretaker Road other than the curb returns for Private Road A.

14. Drop manhole STRC-1 is required to be a box base manhole to 12" above the crown of highest in bound pipe section. Please define this requirement in the profile and plan view.

GESC

15. Please limit the sediment basin (SB) to the Interim GESC Plan. The Initial GESC plan is generally for those perimeter BMPs that required little to no grading or excavation.

    Additionally provide the basin dimensions required per the County detail.

16. Please provide some rough horizontal dimensions for the Stabilized Staging Area (SSA).

17. On the Interim GESC Plan, please provide the cut/fill earthwork quantities.

18. Will any temporary stockpiled material be required? If so, please show that location on the Interim GESC Plan with the appropriate BMPs.

Engineering cannot support the approval of this Plat until these issues have been addressed. With the next submittal, please enclose a written response to these comments. Should you have any questions in regard to these comments, I can be reached at 303-660-7490 or apeterso@douglas.co.us

Respectfully,

Al Peterson
Senior Development Review Engineer

C: Brad Jackson, P.E., Development Review Supervisor
DV File

From: PlatReview
To: Heather Scott
Cc: Weimer, Kalan
Subject: RE: Douglas County eReferral (SB2024-019) Is Ready For Review
Date: Wednesday, May 29, 2024 9:48:04 AM

Requester,

Our engineer has reviewed this plat and their comments are: "Reservations

Proposed plans have a 40' utility easement set were Lumen facility exist but could cause an issue with MH, HH and FSAI at 11120 Caretaker Rd."

If you require signatures or have any further questions, please contact the engineer at Kalan.Weimer@lumen.com to schedule.

Thank you!
Lumen Plat Review
platreview@lumen.com

-----Original Message-----
From: hscott@douglas.co.us <hscott@douglas.co.us>
Sent: Wednesday, May 22, 2024 2:01 PM
To: PlatReview <PlatReview@lumen.com>
Subject: Douglas County eReferral (SB2024-019) Is Ready For Review

CAUTION: This email originated outside of Lumen Technologies. Do not click links or open attachments unless you recognize the sender and know the content is safe.

There is an eReferral for your review. Please use the following link to log on to your account:
https://urldefense.com/v3/__https://apps.douglas.co.us/planning/projects/Login.aspx__;!!CdLFVIQ!TYdVYb1gmHejR3knfNQGB8lMQZCr6HjLOU2T2Z2lbslTkldlAKXdSXdcNoG369_2GRq0xezHsE3Fwe2bfgS

Project Name: River Canyon 2 Filing, 4th Amendment

Project File #: SB2024-019

Project Summary:

This request is for a Minor Development Final Plat to the River Canyon Filing 2 subdivision to create eight separate lots from Lot 1, which is currently 4.55 acres. The eight lots will take access off Caretaker Road and the average lot size is ¼ of an acre.

This referral will close on Wednesday, June 12, 2024.

If you have any questions, please contact me.

Sincerely,

Heather Scott
Planning Services
100 Third Street
Castle Rock, CO 80104
303-660-7460 (main)

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From: Brian Lence
To: Heather Scott
Subject: RE: Douglas County eReferral (SB2024-019) Is Ready For Review
Date: Wednesday, May 22, 2024 1:17:00 PM
Attachments: RPF_ReferralResponse_SB2024-019.pdf

Hi Heather,

The Foundation has no comment - thanks!

Brian Lence, CMCA®, AMS®, PCAM®
General Manager
Roxborough Park Foundation
6237 Roxborough Drive
Roxborough, CO 80125
Phone 303-979-7860
Fax 303-979-0624
Email blence@roxboroughparkco.com
Website www.roxboroughparkco.com

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-----Original Message-----
From: hscott@douglas.co.us <hscott@douglas.co.us>
Sent: Wednesday, May 22, 2024 12:01 PM
To: Brian Lence <blence@roxboroughparkco.com>
Subject: Douglas County eReferral (SB2024-019) Is Ready For Review

There is an eReferral for your review. Please use the following link to log on to your account:
https://apps.douglas.co.us/planning/projects/Login.aspx

Project Name: River Canyon 2 Filing, 4th Amendment

Project File #: SB2024-019

Project Summary:

This request is for a Minor Development Final Plat to the River Canyon Filing 2 subdivision to create eight separate lots from Lot 1, which is currently 4.55 acres. The eight lots will take access off Caretaker Road and the average lot size is ¼ of an acre.

This referral will close on Wednesday, June 12, 2024.

If you have any questions, please contact me.

Sincerely,

Heather Scott
Planning Services

REFERRAL RESPONSE REQUEST

Date sent: May 22, 2024 Comments due by: **June 12, 2024**

Project Name:	River Canyon Filing 2, 4th Amendment
Project File #:	SB2024-019
Project Summary:	This request is for a Minor Development Final Plat to the River Canyon Filing 2 subdivision to create eight separate lots from Lot 1, which is currently 4.55 acres. The eight lots will take access off Caretaker Road and the average lot size is ¼ of an acre.

Information on the identified development proposal located in Douglas County is enclosed. Please review and comment in the space provided.

☒ No Comment	
☐ Please be advised of the following concerns:	
☐ See letter attached for detail.	
Agency: Roxborough Water & Sanitation District	**Phone #:** 303.979.7286
Your Name: Mike Marcum	**Your Signature:**
(please print)	**Date: 06/12/2024**

Agencies should be advised that failure to submit written comments prior to the due date, or to obtain the applicant's written approval of an extension, may result in written comments being accepted for informational purposes only.

Sincerely,

Heather Scott, AICP
Project Planner
303-919-4801
hscott@douglas.co.us

West Metro Fire Protection District

433 S. Allison Parkway
Lakewood, CO 80226
Bus: (303) 989-4307
Fax: (303) 989-6725
www.westmetrofire.org

July 18, 2024

Boston Blake, PE
Terracina Design
10200 E Girard Ave, Suite A-314
Denver, CO 80231
bblake@terracinadesign.com
303-632-8867

RE: River Canyon Filing 2 - 4th Amendment

This property is within the West Metro Fire Protection District (WMFPD). Fire service will be provided as long as provisions of the currently adopted edition of the International Fire Code, including Douglas County amendments are met in development.

- West Metro Fire Protection District accepts the road widths, turn angles and hammerhead turnaround
- Fire hydrant placement and spacing meets the minimum requirements for WMFPD

WMFPD reserves the right to provide additional comments/requirements if there are any changes to the application or at the time plans are submitted and reviewed per applicable codes and amendments.

If you have any questions contact me at 303-539-9558 or e-mail: jbrennan@westmetrofire.org.

Respectfully,

Captain John Brennan
Deputy Fire Marshall
L https://westmetrofire.colorado.gov/fire-marshals-office/plan-review-submittal-processife Safety Division

West Metro Fire Protection District

433 S. Allison Parkway
Lakewood, CO 80226
Bus: (303) 989-4307
Fax: (303) 989-6725
www.westmetrofire.org

June 12, 2024

Heather Scott
Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104
hscott@douiglas.co.us
303-660-7460

RE: SB2024-019

Heather Scott,

This property is within the West Metro Fire Protection District (WMFPD). Fire service will be provided as long as provisions of the currently adopted edition of the International Fire Code, including Douglas County amendments are met in development.

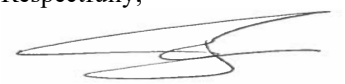
- Where gates cross fire department access minimum unobstructed widths are required (20 feet for single gate or 12 feet per gate on divided roadway) in addition an approved means of operating the gates in an emergency situation is required (Knox lock or method approved by WMFR) **IFC D103.5**
- It appears that the roadway widths and turnaround meet the requirements of **IFC D103** and **table D103.4** for road width (26 feet or more), hammerhead turnaround due to dead end road length in excess of 501 feet
    - The turns will need to be evaluated for turning radius requirements (25' inside and 50' outside) for fire department apparatus
- Fire hydrant placement and spacing will need to be evaluated
- WMFPD requires that proposed buildings/homes over 8,500 square feet constructed within the Ravenna Development have an automatic fire suppression system installed.
    - Square footage is determined by total floor area of all floor levels within exterior walls and under the horizontal projections of the roof of a building including garages
    - Permits shall be obtained from WMFPD for all work on automatic fire suppression systems

Permits are required from the fire district for new and core/shell buildings, tenant improvement projects, all work on automatic fire protection systems, all work on automatic fire detection systems, solar photovoltaic systems, underground fire line, radio amplification, and for the storage of hazardous materials.

WMFPD reserves the right to provide additional comments/requirements if there are any changes to the application or at the time plans are submitted and reviewed per applicable codes and amendments.

If you have any questions contact me at 303-989-4307 extension 558 or e-mail: jbrennan@westmetrofire.org.

Respectfully,



Captain John Brennan
Deputy Fire Marshall
Life Safety Division
West Metro Fire Protection District

*"Whatever It Takes"…**To Serve***

Right of Way & Permits

1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: 303.285.6612
violeta.ciocanu@xcelenergy.com

June 5, 2024

Douglas County Planning Services
100 Third Street
Castle Rock, CO 80104

Attn: Heather Scott

Re: River Canyon 2 Filing, 4th Amendment, Case # SB2024-019

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the documents for **River Canyon 2 Filing, 4th Amendment** and **has several conflicts**. Please be aware PSCo owns and operates existing natural gas and electric distribution facilities along and within property boundaries.

In addition to eight-foot (8') utility easements adjacent to front lot line, for these single-family residential lots and to ensure that adequate utility easements are available within this development and per state statutes, Public Service Company requests an eight-foot (8') wide dry utility easements abutting rear lot line of each lot in the subdivision.

The asterisk * note in the snippet below is it is confusing and contradictory to the use of Tract A in the Tract Summary Chart.

TRACT SUMMARY CHART

TRACT	AREA (SF)	AREA (AC)	OWNERSHIP	MAINTENANCE	USE*
A	164,092	3.767	R.C.R.E.I.	R.C.R.E.I.	OPEN SPACE/UTILITIES/DRAINAGE/LANDSCAPING/SIGHT DISTANCE
TRACTS TOTAL	164,092	3.767			

R.C.R.E.I. = RIVER CANYON REAL ESTATE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY

THIS SUBDIVISION PLAT CONTAINS 8 RESIDENTIAL LOTS AND 1 TRACT

* THE "USE" LISTED FOR UTILITIES IS NOT A GRANT OF BLANKET EASEMENT OVER THE TRACTS, BOUNDARIES OF ANY UTILITY EASEMENTS ARE SHOWN HEREON OR AS DEFINED BY SEPARATE INSTRUMENT)

Public Service Company requests that the following language or plat note is placed on the preliminary and final plats for the subdivision:

> *Permanent structures, improvements, objects, buildings, wells, water meters and other objects that may interfere with the utility facilities or use thereof (Interfering Objects) shall not be permitted within said utility easements and the utility providers, as grantees, may remove any Interfering Objects at no cost to such grantees, including, without limitation, vegetation. Public Service Company of Colorado (PSCo) and its successors reserve the right to require additional easements and to require the property owner to grant PSCo an easement on its standard form.*

For the PSCo easement vacation (Book 1317, Page 496), the developer should contact the Right of Way Agent Robyn Martinez at robyn.m.martinez@xcelenergy.com.

Additional easements may need to be acquired by separate document (i.e. transformers) – be sure to ask the Designer to contact a Right-of-Way & Permits Agent in this event.

The property owner/developer/contractor must complete the application process for any new natural gas or electric service, or modification to existing facilities via xcelenergy.com/InstallAndConnect. It is then the responsibility of the developer to contact the Designer assigned to the project for approval of design details.

As a safety precaution, PSCo would like to remind the developer to call the Utility Notification Center by dialing 811 for utility locates prior to construction.

Violeta Ciocanu (Chokanu)
Right of Way and Permits
Public Service Company of Colorado dba Xcel Energy
Office: 303-285-6612 – Email: violeta.ciocanu@xcelenergy.com

SAGE DESIGN GROUP
ENTITLEMENT PLANNING LANDSCAPE ARCHITECTURE

July 23rd, 2024

Heather Scott
Douglas County
Department of Community Development
100 Third Street
Castle Rock, CO 80104

RE: River Canyon Filing 2, 4th Amendment (SB2024-019)

Dear Ms. Scott,

Please see the responses below to the Comments made on June 24th , 2024

Referral Agency Responses to note:

- *While the proposed street name, DOLCE VITA, is approved and reserved, the suffix of Lane requires revision. Please revise to PLACE or POINT. Please include the private drive with the final street name (Dolce Vita Place/Point) in the Land Summary Chart. Consider adding a plat note referring to the private drive.*

  Response: We have changed the street name from Dolce Vita Lane to Dolce Vita Place. We have included the private drive with the street name in the land summary chart as well.

- *According to the Assessor's office, description under title should say "East half of section 34…" instead of "North half...". Lot 2A-2 will require a deed to clear title - needs to be conveyed to River Canyon Real Estate Investments LLC. If no conveyance is occurring, Dominion Water and Sanitation District will need to sign the plat under the Owner block.*

  Response: Duly noted and thank you.

- *The Colorado Division of Water Resources stated that application materials indicate that a storm water detention structure will be constructed as a part of this project. The applicant should be aware that unless the structure can meet the requirements of a "storm water detention and infiltration facility" as defined in section 37-92-602(8), C.R.S., the structure may be subject to administration by this office.*

  Response: Duly noted and thank you.

- *CGS recommends that the county require a site-specific preliminary geotechnical report with recommendations regarding over excavation, subsurface drainage, etc., based on current*

development plans as the submitted plan is for the maintenance facility and not for single family development.

Response: We have provided an updated Geotech report for the 8 single family lots for review.

- *Denver Water stated that Caretaker Road is a private road and should be labeled as such. They are still working on a maintenance agreement which will need to be finalized prior to approval. There is an easement that should be removed and any new utilities serving this development adjacent to Caretaker Road or the Highline Canal must be reviewed and approved by Denver Water prior to installation. They would like to see the sidewalk path (golf carts use) in Tract A, and may require the installation of stop signs on both sides of Caretaker Road so golf carts crossings can be safer. Send photos of existing permanent speed bumps for review, or they may want to see a gate extended across path on south side of Caretaker Road to reduce speeds, ensure safe crossings.*

  Response: *The abandoned easement has been removed, the plat is not the appropriate document to show golf cart paths.*

- *Public Works Engineering has comments on both the plat document as well as the construction documents. Please reference their response letter for details*

  Response: Duly noted and thank you.

- *West Metro Fire Protection District states the hammerhead turns will need to be evaluated for turning radius requirements (25' inside and 50' outside) for fire department apparatus. The fire hydrant placement and spacing will need to be evaluated and where gates cross fire department access minimum unobstructed widths are required (20 feet for single gate or 12 feet per gate on divided roadway) in addition an approved means of operating the gates in an emergency situation is required (Knox lock or method approved by WMFR) IFC D103.5*

  Response: Duly noted and thank you. Fire District has reviewed and has provided a written confirmation.

- *Public Service Company requests an eight-foot (8') wide dry utility easements abutting rear lot line of each lot in the subdivision. They are asking for clarification on the asterisk * note in the snippet below the Tract Summary chart as it is. Please review the county proposed changes to the tract and utility details on the red marked plat drawings.*

  Response: A revised plat drawing has been provided for review that has included an 8' dry utility easement abutting the rear lot line of each lot in this subdivision.

- *Be sure to review all comments to ensure all requests are captured.*

  Response: Duly noted and thank you.

Engineering Comments

Plat

1. This project will require a Site Improvements Agreement (SIA Private). This agreement is to provide for the completion of the improvements proposed by all construction plans and supporting documents. Please submit an executed SIA to Engineering for review and processing. The SIA Document may be downloaded from the County website at www.douglas.co.us

Response: SIA Private Agreement has been filled out and submitted with cost estimates included.

2. Please number the proposed lots consecutively 1 thru 8, rather than having two Lot 1s and two Lot 2s.

Response: Lots have been labeled consecutively.

3. Private Roads A and B will require legal street names.

Response: Private roads A and B have been labeled as Dolce Vita Place

4. Please provide a legal description for all the "bump outs" and curved segments in the proposed access easement.

Response: The access easement with its bump outs is dimensioned within the plat document. No legal description is required.

5. Please label the sight distance easement shown on this plat and define in the notes that no obstacles over 36" shall be placed within the easement.

Response: Sight distance easement has been shown and dimensioned on sheet 3 of the plat. In the past with Douglas County we have only had to specify 24” instead of 36”. We have added a note saying the following “no object within the sight distance easement shall be more than twenty-four (24) inches above the flowline of the adjacent street”

6. Please attach the following note to this plat in regard to all the secondary drainage easements (Tract A and onsite storm sewer): "A secondary drainage easement across Tract A and the drainage easements as shown hereon is hereby granted to Douglas County for the purposes of accessing, maintaining and repairing storm water management improvements, including, but not limited to, inlets, pipes, culverts, channels, ditches, hydraulic structures, riprap, detention basins, forebays, micro-pools and water quality facilities (collectively, the "facilities") in the event the River Canyon Real Estate Investments, LLC., its successors, and assigns ("system owner") fails to satisfactorily maintain or repair said facilities. a blanket access easement over the River Canyon Filing 2, 4th Amendment (the "subdivision") is also hereby granted to Douglas County, but only for the purpose of accessing the facilities in the event that the drainage easements do not provide adequate access. The maintenance and repair of the facilities located within the subdivision, as shown on the construction plans accepted by Douglas County or on the plat for the subdivision, shall be the responsibility of the system owner. in the event such maintenance and repairs are not performed by the system owner to the satisfaction of Douglas County, then Douglas County shall have the right, but not the obligation, to enter said subdivision, after ten (10) days prior written notice to the system owner, unless there is an emergency, in which case Douglas County shall give notice as soon as practicable, to perform all necessary work, the cost of which shall be paid by the system owner upon billing. in the event the system owner fails to reimburse Douglas County within thirty (30) days after submission of the bill for the costs incurred, Douglas County will have the right to enforce such obligation by appropriate legal action. it is the system owner's responsibility to construct, maintain, and repair the facilities in a manner consistent with all applicable plans approved by Douglas County.

Response: Note has been added.

7. Please submit an updated Traffic Impact Analysis (TIA) that addresses the intersection of Caretaker Rd and Dante Dr.

Response: An updated Traffic Impact Analysis has been provided for review.

8. Please provide written confirmation from the Fire District that the centerline radius at the access to Private Street A and the hammerhead configuration are acceptable.

Response: Fire District has reviewed and has provided a written confirmation.

Construction Plans

9. The County supports a 28' FL-FL road section for the entirety of Private Road A from the access to Private Road B. Due to the extremely tight centerline radius (50') at the access the additional 8' lane width will better accommodate emergency vehicles on a single point of access.

Response: Dolce Vita Place has been widened to 28’ FL-FL for the entirety of the road.

10. Please attach a signage and striping plan along with the County's Standard Signage and Striping Detail sheets to this set of Construction Plans.

Response: Signage and striping plan have been added to the construction documents.

11. This roadway project will require a set of Alternate Private Roadway Standards. Those standards should include, but not be limited to, road width for Private Road B, K-Values and centerline radii. The Cover Sheet of these Standards shall include signature lines for the Design Engineer, Fire District and Douglas County.

Response: An alternate private roadway standard has been provided for review.

12. Please define the centerline length along Caretaker Rd from the flowline Dante Dr to the centerline of Private Road A.

Response: Centerline length along Caretaker Road from flowline of Dante Dr to the center of Dolce Vita Place.

13. Please clarify if any improvements are being proposed to Caretaker Road other than the curb returns for Private Road A.

Response: There are no improvements to Caretaker Road being proposed with this construction set.

14. Drop manhole STRC-1 is required to be a box base manhole to 12" above the crown of highest in bound pipe section. Please define this requirement in the profile and plan view.

Response: Storm sewer has been lowered to eliminate drop manhole.

<u>GESC</u>

15. Please limit the sediment basin (SB) to the Interim GESC Plan. The Initial GESC plan is generally for those perimeter BMPs that required little to no grading or excavation. Additionally provide the basin dimensions required per the County detail.

Response: Sediment basin has been shown only on the interim GESC plans and dimensions have been added.

16. Please provide some rough horizontal dimensions for the Stabilized Staging Area (SSA).

Response: Dimension have been added to the plans.

17. On the Interim GESC Plan, please provide the cut/fill earthwork quantities.

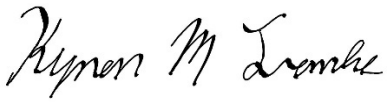
Response: Cut/Fill quantities have been added to the interim plan set

18. Will any temporary stockpiled material be required? If so, please show that location on the Interim GESC Plan with the appropriate BMPs.

Response: A temporary stockpile location has been located on the interim plan sheet.

Sincerely,

Kynan M. Franke



Sage Design Group
Office: 303-470-2855 ext 1007
Direct: 720-358-9519
Cell: 720-486-8995
Kynan@SageDesignGroup.com

1500 South Pearl Street, Suite 200
Denver, Colorado 80210
Sagedesigngroup.com

PHASE III DRAINAGE REPORT

FOR

River Canyon Filing 2, 4th Amendment
Douglas County, Colorado

Prepared for:

River Canyon Real Estate Investments, LLC
11118 Caretaker Rd.
Littleton, Colorado 80125
Contact: Kevin Collins
Phone: 720-956-1600

Prepared by:

Terracina Design
10200 E. Girard Ave., Suite A-314
Denver, CO 80231
Contact: Boston Blake, PE
Phone: 303-632-8867

July 19, 2024

Certification Statement:

I affirm that this report and plan for the Phase III drainage design of River Canyon Filing 2, 4th Amendment was prepared by me (or under my direct supervision) in accordance with the provisions of Douglas County Drainage Design and Technical Criteria for the owners thereof. I understand that Douglas County does not and will not assume liability for drainage facilities designed by others.

_____

Boston Blake, P.E.
Colorado Professional Engineer
License #55963

Owner/Developer's Statement:

River Canyon Real Estate Investments, LLC hereby certifies that the drainage facilities for River Canyon Filing 2, 4th Amendment will be constructed according to the design presented in this report. I understand that Douglas County does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that Douglas County reviews drainage plans pursuant to Colorado Revised Statutes Title 30, Article 28; but cannot, on behalf of River Canyon Filing 2, 4th Amendment guarantee that final drainage design review will absolve River Canyon Real Estate Investments, LLC and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

_____

River Canyon Real Estate Investments, LLC

_____

Printed Name

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Appendix C - Hydraulic Calculations
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Inlet Calculations
StormCAD Keymap
StormCAD Output Tables

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Proposed Drainage Map

I. GENERAL LOCATION AND DESCRIPTION

A. Site Location

This Phase III Drainage Report provides remediation for changes in the drainage patterns resulting from the construction of the infrastructure components for River Canyon Filing 2, 4th Amendment, from here on known as "Site". The Site currently has multiple buildings and parking lot for The Club at Ravenna maintenance facility and old sales office. The future development will include single-family lots, a private drive, and utility infrastructure.

The Site is bound to the east by Dante Drive, to the north by Caretaker Road, to the south by Highline Canal, and to the west by Dominion Water & Sanitation lift station. It is located within Section 34, Township 6 South, Range 69 West of the 6th Principal Meridian, Douglas County, Colorado. A vicinity map for the Site can be found in Appendix A.

B. Description of Property

The Site is approximately 6.02 acres which currently consists of the old sales building, parking lot, and maintenance facility for the Club at Ravenna and will be redeveloped to single-family residential with a private drive. The Site is primarily Blakeland-Orsa and sandy west alluvial land. These soil types are a part of the Type A and D hydrologic soil groups, respectively. A soils map has been provided and can be found in Appendix A.

The Site currently flows to a temporary sediment basin on the west side of the Site. The pond releases to the north into the adjacent lot, eventually making its way to the South Platte River where it is conveyed to Chatfield Reservoir.

The Site falls within Zone X, as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel 08035C0127F and 08035C0130F. A FIRM map can be found in Appendix A.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

The existing drainage patterns within the major basin will generally follow the historic patterns. The development lies within the South Platte River Basin which extends from Chatfield Reservoir to the west into Waterton Canyon up to Strontia Springs Reservoir. Once the overland discharge from the water quality pond reaches the South Platte, the flows will be conveyed to Chatfield Reservoir.

The redevelopment of the site will have minor impact on the existing drainage as the runoff will be detained on the adjacent property Lot 3, River Canyon Filing No. 2 at the new maintenance facility for The Club at Ravenna.

B. Minor Drainage Basins

The Minor Drainage Basins for the Site will ultimately be conveyed to the west and then north via a subsurface storm sewer system. The system will convey the runoff under Caretaker Road, where it will tie into a storm sewer system located in Lot 3, River Canyon Filing No. 2. The existing storm sewer and sediment basin are expected to be removed during the demolition phase.

Sub-Basin A1
Sub-basin A1 is 1.99 acres comprised of single-family lots, open space, and private drive. Runoff generated within the basin will drain north and west, where it will be captured by an on-grade Type R Inlet at Design Point A1. Bypass flows will continue southwest to a sump Type R inlet at Design Point A3. The runoff will be conveyed north via a subsurface storm sewer system under Caretaker Road and ultimately to the detention pond on Lot 3, River Canyon Filing No. 2.

Sub-Basin A2
Sub-basin A2 is 0.41 acres comprised of single-family lots, open space, and private drive. Runoff generated within the basin will drain north, where it will be captured by a sump Type R inlet at Design Point A2. The runoff will be conveyed east to Design Point A3 and then north via a subsurface storm sewer system under Caretaker Road and ultimately to the detention pond on Lot 3, River Canyon Filing No. 2.

Sub-Basin A3
Sub-basin A3 is 1.20 acres comprised of single-family lots, open space, and private drive. Runoff generated within the basin will drain north, where it will be captured by a sump Type R Inlet at Design Point A3. All runoff will then be conveyed north via a subsurface storm sewer system under Caretaker Road and ultimately to the detention pond on Lot 3, River Canyon Filing No. 2.

Sub-Basin OS1
Sub-basin OS1 is 0.86 acres comprised of the back half of a single-family lot, open space, and cart path. Runoff generated within the basin will drain west, where it will follow existing drainage patterns to the unnamed tributary to the west of the Site. Once the overland discharge reaches the unnamed tributary, it will be conveyed to the South Platte and eventually flow into Chatfield Reservoir.

Sub-Basin OS2
Sub-basin OS2 is 0.93 acres comprised of half of a single-family lot, open space, and cart path. Runoff generated within the basin will drain north, where it will follow existing drainage patterns across Caretaker, where the runoff will be captured on the maintenance facility site and ultimately conveyed to the detention pond.

III. DRAINAGE DESIGN CRITERIA

A. Regulations

This Phase III Drainage Report is in accordance with the Douglas County Storm Drainage Design and Technical Criteria Manual (Ref. A), and the Mile High Flood District (MHFD) Storm Drainage Criteria Manual (Ref. B, C, D). These manuals were used as a basin of design for the Site. The drainage design also complied with the Chatfield Watershed Authority's regulations. All EDBs have been designed in accordance with regulation 73 of the Chatfield Watershed Authority to provide adequate WQWC for the entire site. All applicable figures, tables, and graphs from these manuals have been included in the Appendices. The report will analyze the minor (5-year) and major (100-year) storm events.

B. Drainage Studies, Master Plans, Site Constraints

The drainage design complies with the drainage report for Lot 3, River Canyon Filing 2 to accommodate the storage necessary for the Site, see Appendix D for references to drainage report.

C. Hydrology

All the proposed minor drainage basins within The Project are less than 160 acres; therefore, the rational method can be used in determining the flow rates for the Site. The sub-basins were delineated based on the existing and proposed topography developed for the project. Flow rates for each basin can be found in Appendix B.

The intensity-frequency curves used in the rational method calculations were taken from the Douglas County Storm Drainage Design and Technical Criteria Manual. All drainage facilities were analyzed and designed for both the minor (5-year) and major (100-year) storm events. Time of concentration calculations were used to determine the rainfall intensity. These calculations can also be found in Appendix B.

D. Hydraulics

Street and inlet capacity design were performed and based on Chapter 8 of the City's Drainage Criteria, and design spreadsheets provided by the MHFD which can be found in Appendix C. Hydraulic grade lines and storm pipe capacities were designed and modeled using StormCAD and can be found in Appendix C.

E. Water Quality Enhancement

The site will utilize the extended detention basin (EDB) located on Lot 3, River Canyon Filing 2 for water quality and detention.

IV. STORMWATER MANAGEMENT FACILITY DESIGN

A. Stormwater Conveyance Facilities

The runoff will sheet flow to the private drives where it will be conveyed to Type R Inlets. The Type R inlets will be located on-grade and sump locations within the roadways. The runoff will then be conveyed via a subsurface system toward the detention pond located on Lot 3, River Canyon Filing 2.

B. Stormwater Storage Facilities

The Site will convey runoff to the north to Lot 3, River Canyon Filing 2 via a subsurface storm sewer system. From there, the runoff will be conveyed to its on-site detention and water quality pond. The detention pond was sized for Filing 2, 4th Amendment as Basin F-1 at 4.65 acres @ 35% imperviousness.

Basins A1, A2, A3, & OS2 have been calculated at 4.53 acres @ 35.2% imperviousness. The detention pond has been sized adequately to store the runoff from Filing 2, 4th Amendment. See Appendix D for references from Lot 3, River Canyon Filing 2 drainage report.

C. Water Quality Enhancement Control Measures

The site will utilize the EDB located on Lot 3, River Canyon Filing 2 for water quality and detention.

D. Floodplain Modification

It is anticipated that the redevelopment of the Site will not have an impact and there will not be any floodplain modifications.

E. Additional Permitting Requirements

The Site is anticipated to not require any local, State, or Federal permitting.

V. CONCLUSIONS

A. Compliance with Standards

The drainage design for the Site conforms to the Douglas County Storm Drainage Design and Technical Criteria Manual and the Mile High Flood Districts' Drainage Criteria Manual where applicable. The report conforms to Regulation 73 of the Chatfield Watershed Authority.

B. Variances

No variances associated with the proposed drainage design have been requested.

C. Drainage Concept

The rational method was used to determine the developed runoff values for the minor drainage basins throughout the Site. These basins were delineated based on the natural Site topography and the developed Site plan. The storm sewer system will be designed to capture the minor (5-year) and major (100-year) storm events.

VI. REFERENCES

A) Douglas County. July 2008. Storm Drainage Design and Technical Criteria Manual for Douglas County, Colorado. Department of Public Works. https://www.douglas.co.us/water/stormwater/storm-drainage-design-and-technical-criteria-manual/.

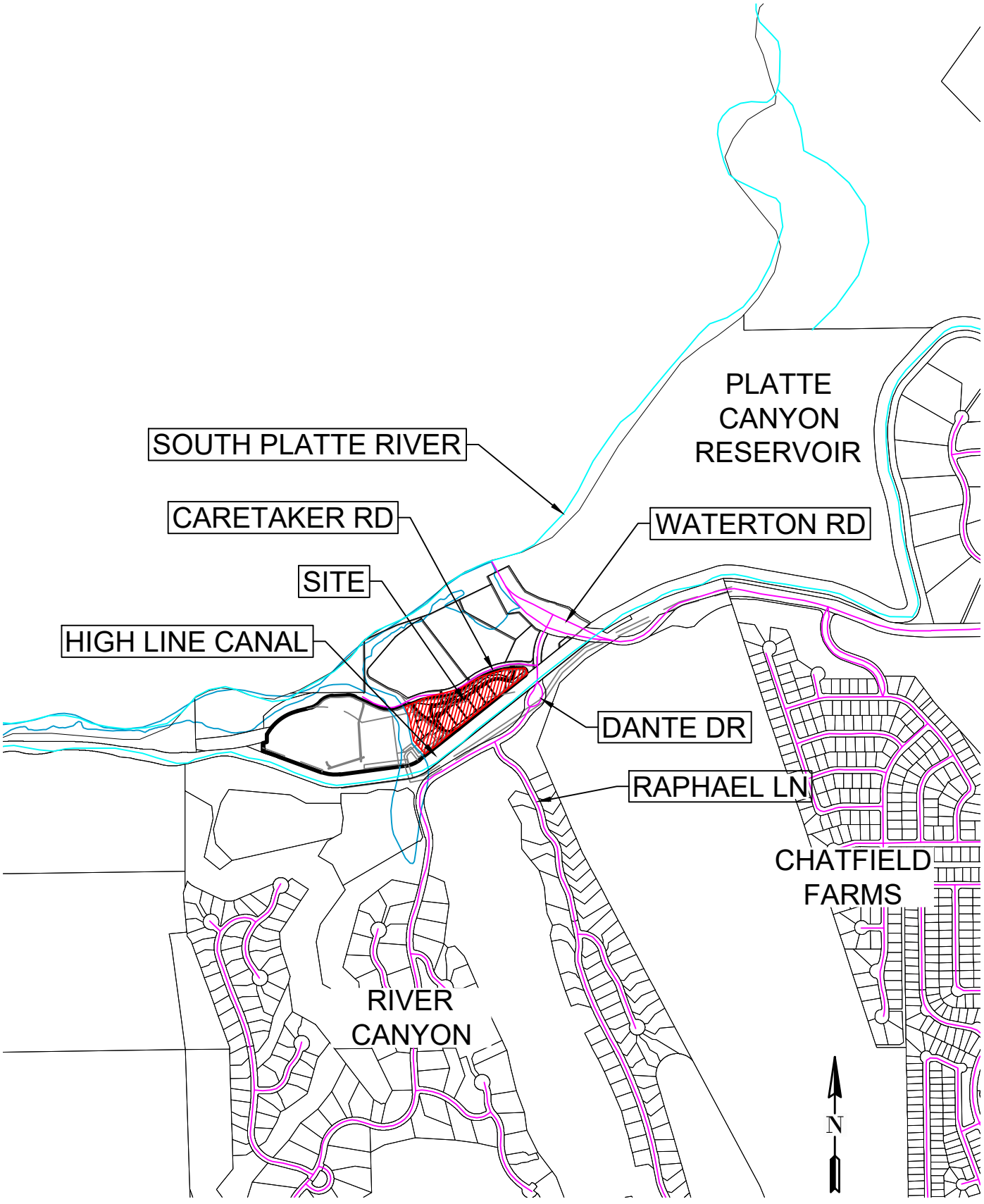
B) MHFD (Mile High Flood District). 2018. Urban Storm Drainage Criteria Manual. Volume 1: Management, Hydrology and Hydraulics. Revised August 2018. https://mhfd.org/resources/criteria-manual.

C) MHFD. 2017. Urban Storm Drainage Criteria Manual. Volume 2: Structures, Storage and Recreation. Revised September 2017. https://mhfd.org/resources/criteria-manual.

D) MHFD. 2010. Urban Storm Drainage Criteria Manual. Volume 3: Stormwater Best Management Practices. Revised November 2010. https://mhfd.org/resources/criteria-manual.

APPENDIX A
GENERAL MAPS

Vicinity Map
Firm Map
Soil Map



2/26/2024 10:12 AM ; X:\RAVENNA\DOCUMENTS\REPORTS\DRAINAGE\01 - RIVER CANYON F2, LOT 1\PHASE III\A-MAP ATTACHMENTS\VICINITY MAP.DWG;

terracina design
10200 E. Girard Ave, A-314
Denver, CO 80231
ph: 303.632.8867

0 1000'

1" = 1000'

RIVER CANYON F2, LOT 1
VICINITY MAP

CREATED BY: BAB DATE: 2024-02-26

National Flood Hazard Layer FIRMette

FEMA

105°5'53"W 39°29'23"N

105°5'16"W 39°28'55"N

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

1:6,000

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/14/2022 at 9:53 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.

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

Hydrologic Soil Group—Castle Rock Area, Colorado; and Golden Area, Colorado, Parts of Denver, Douglas, Jefferson, and Park Counties
(River Canyon Filing 2 - Lot 1)

105° 5' 58" W 105° 5' 19" W

39° 29' 18" N 39° 29' 18" N

39° 28' 59" N 39° 28' 59" N

105° 5' 58" W 105° 5' 19" W

Map Scale: 1:4,230 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84

USDA Natural Resources Conservation Service

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 14, Aug 31, 2021

Soil Survey Area: Golden Area, Colorado, Parts of Denver, Douglas, Jefferson, and Park Counties
Survey Area Data: Version 16, Aug 31, 2021

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Jul 4, 2010—Oct 16, 2017

MAP LEGEND

MAP INFORMATION

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Bo	Blakeland-Orsa association, 1 to 4 percent slopes	A	9.1	26.8%
Lu	Loamy alluvial land, dark surface	C	12.3	36.0%
NsE	Newlin-Satanta complex, 5 to 20 percent slopes	B	4.0	11.9%
RtG	Rock land-Lonetree complex, 10 to 100 percent slopes	D	0.0	0.0%
Se	Sandy wet alluvial land	D	6.6	19.5%
Subtotals for Soil Survey Area			**32.1**	**94.2%**
Totals for Area of Interest			**34.1**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
50	Fluvaquents, sandy, 0 to 2 percent slopes	B	2.0	5.8%
Subtotals for Soil Survey Area			**2.0**	**5.8%**
Totals for Area of Interest			**34.1**	**100.0%**

Rating Options

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX B
HYDROLOGIC COMPUTATIONS

Percent Imperviousness
Runoff Coefficient
Time of Concentration
Minor Storm Rational Method
Major Storm Rational Method

terracina design
10200 E. Girard Ave, A-314
Denver, CO 80231
ph. 303.632.8867

Project Name: River Canyon F2 - Lot 1
Prepared By: Terracina Design

Percent Impervious Calculations

Basin Id	Design Point	Total Basin	Historic Area	Paved Street Area	Roofs, Drives, Walks Area	Gravel Area	Single Family Lot Area						Weighted % Impervious
			2%	100%	90%	40%	45%						
A1	A1	1.99	0.64	0.34			1.00						40.6%
A2	A2	0.41	0.04	0.08			0.29						51.2%
A3	A3	1.20	0.38	0.17			0.65						39.0%
OS1	OS1	0.86	0.61	0.10			0.15						20.7%
OS2	OS2	0.93	0.75	0.03			0.15						11.8%
EX1	EX1	3.95	2.31	0.70		0.94							28.4%
EX2	EX2	1.67	1.60	0.07									6.2%
A Basins to Pond		4.53	1.82	0.62			2.09						35.2%

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Project Name: River Canyon F2 - Lot 1
Prepared By: Terracina Design

Runoff Coefficent (C)

Runoff Coefficient calculations based on MHFD Volume 1: Chapter 6, Table 6-4 equations

Basin Id	Weighted % Impervious	i	Soil Type	Soil Type Area	Basin Area	Runoff Coefficients, C		Weighted Coefficients, C	
						5-Year	100-Year	5-Year	100-Year
A1	40.6%	0.41	A	0.00	1.99	0.27	0.43	0.37	0.65
			B	0.00		0.32	0.62		
			C/D	1.99		0.37	0.65		
A2	51.2%	0.51	A	0.00	0.41	0.37	0.51	0.45	0.69
			B	0.00		0.42	0.67		
			C/D	0.41		0.45	0.69		
A3	39.0%	0.39	A	0.00	1.20	0.26	0.41	0.35	0.64
			B	0.00		0.31	0.61		
			C/D	1.20		0.35	0.64		
OS1	20.7%	0.21	A	0.00	0.86	0.11	0.27	0.20	0.57
			B	0.00		0.15	0.52		
			C/D	0.86		0.20	0.57		
OS2	11.8%	0.12	A	0.00	0.93	0.06	0.20	0.13	0.53
			B	0.00		0.08	0.48		
			C/D	0.93		0.13	0.53		
EX1	28.4%	0.28	A	0.00	3.95	0.17	0.33	0.27	0.60
			B	0.00		0.22	0.56		
			C/D	3.95		0.27	0.60		
EX2	6.2%	0.06	A	0.00	1.67	0.02	0.16	0.09	0.51
			B	0.00		0.04	0.46		
			C/D	1.67		0.09	0.51		

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Time of Concentration Calculations (T_C)

Sub-Basin Data			Initial or Overland Flow Time				Channelized Flow Time				T_c Check (Urbanized Basins)					
Basin Id	Total Basin	C(5)	Length (ft)	Elev Change	Slope (%)	T_i (min)	Length (ft)	Elev Change	Slope (%)	NRCS Coeff. K	Velocity (FPS)	T_t (min)	Comp. T_c	Percent Imperv.	MHFD Eq. 6.5	$Final\ T_c$ (min)
A1	1.99	0.37	125	9	7.2	7.71	442	16	3.6	20.0	3.78	1.9	9.7	40.6%	21.8	9.7
A2	0.41	0.45	148	12	8.1	7.10	128	4	3.5	20.0	3.73	0.6	7.7	51.2%	18.0	7.7
A3	1.20	0.35	168	17	10.2	8.11	196	5	2.6	20.0	3.21	1.0	9.1	39.0%	20.8	9.1
OS1	0.86	0.20	119	14	12.2	7.73	211	14	6.5	20.0	5.08	0.7	8.4	20.7%	23.7	8.4
OS2	0.93	0.13	110	6	5.8	10.28	10	1	8.0	20.0	5.66	0.0	10.3	11.8%	24.0	10.3
EX1	3.95	0.27	183	12	6.6	10.93	55	4	7.3	20.0	5.39	0.2	11.1	28.4%	21.4	11.1
EX2	1.67	0.09	68	3	4.7	9.06	10	1	10.0	20.0	6.32	0.0	9.1	6.2%	25.0	9.1

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Peak Runoff Rational Method (5-Year Storm)

			Rainfall Depth-Duration-Frequency (1-hr) =				1.43
Design Point	**Basin ID**	**Basin Area (Ac)**	**Runoff Coeff (5-Year)**	T_c **(min)**	**C X A**	**I (in/hr)**	**Q (cfs)**
A1	A1	1.99	0.37	9.7	0.73	3.92	2.87
A2	A2	0.41	0.45	7.7	0.19	4.26	0.80
A3	A3	1.20	0.35	9.1	0.43	4.01	1.71
OS1	OS1	0.86	0.20	8.4	0.18	4.13	0.73
OS2	OS2	0.93	0.13	10.3	0.12	3.82	0.47
EX1	EX1	3.95	0.27	11.1	1.06	3.71	3.93
EX2	EX2	1.67	0.09	9.1	0.14	4.01	0.57

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Project Name: River Canyon F2 - Lot 1

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Peak Runoff Rational Method (100-Year Storm)

			Rainfall Depth-Duration-Frequency (1-hr) =				2.60
Design Point	**Basin ID**	**Basin Area (Ac)**	**Runoff Coeff (100-Year)**	T_c **(min)**	**C X A**	**I (in/hr)**	**Q (cfs)**
A1	A1	1.99	0.65	9.7	1.29	7.13	9.22
A2	A2	0.41	0.69	7.7	0.29	7.75	2.21
A3	A3	1.20	0.64	9.1	0.77	7.29	5.63
OS1	OS1	0.86	0.57	8.4	0.49	7.50	3.69
OS2	OS2	0.93	0.53	10.3	0.50	6.95	3.45
EX1	EX1	3.95	0.60	11.1	2.37	6.75	16.00
EX2	EX2	1.67	0.51	9.1	0.85	7.30	6.21

APPENDIX C
HYDRAULIC CALCULATIONS

Inlet Management
Inlet Calculations

StormCAD Key Map
StormCAD Output Tables

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	Inlet 01 (A1)	Inlet 02 (A2)	Inlet 03 (A3)
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET
Hydraulic Condition	On Grade	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.8	0.8	1.7
Major Q_{Known} (cfs)	9.1	2.2	5.6

Bypass (Carry-Over) Flow from Upstream Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	Inlet 01 (A1)
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	2.4

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

Overland Slope (ft/ft)			
Overland Length (ft)			
Channel Slope (ft/ft)			
Channel Length (ft)			

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**2.8**	**0.8**	**1.7**
Major Total Design Peak Flow, Q (cfs)	**9.1**	**2.2**	**8.0**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	2.4	N/A	N/A

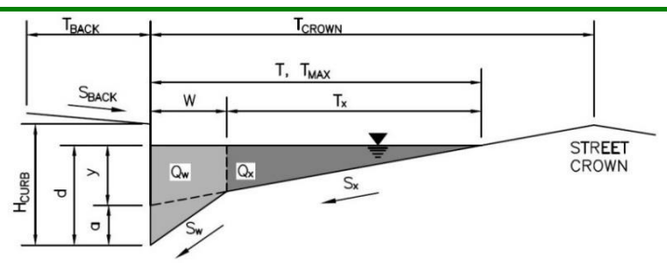
MHFD-Inlet, Version 5.03 (August 2023)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Ravenna Filing 2, Lot 1**

Inlet ID: **Inlet 01 (A1)**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	28.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.018	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	28.0	28.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

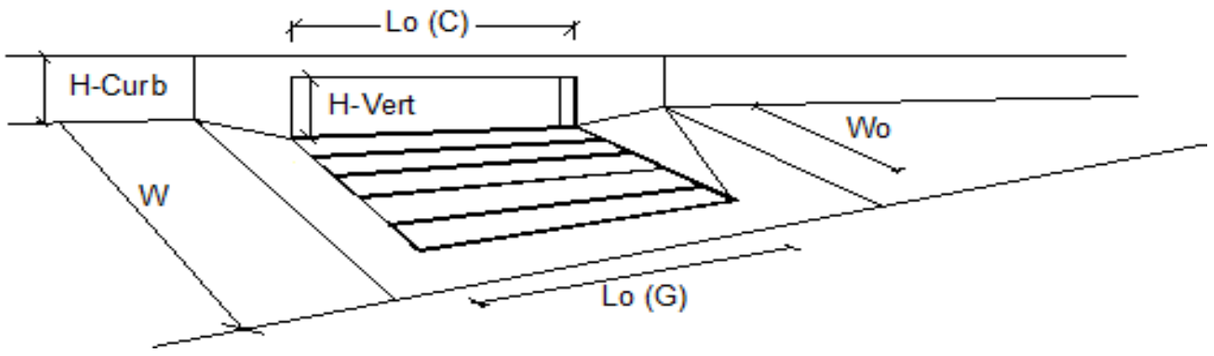
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**18.4**	**18.4**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.81 cfs on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design peak flow of 9.11 cfs on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f (G) =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f (C) =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.8**	**6.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.4**	**cfs**
Capture Percentage = Q_a/Q_o	**C% =**	**100**	**74**	**%**

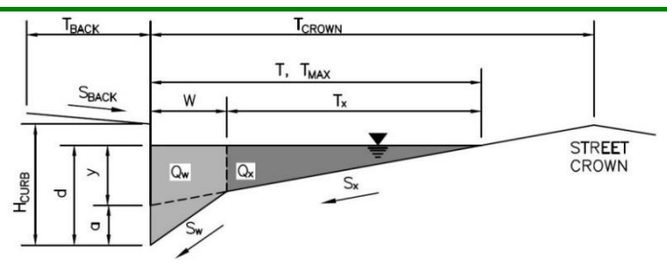
MHFD-Inlet, Version 5.03 (August 2023)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Ravenna Filing 2, Lot 1**

Inlet ID: **Inlet 02 (A2)**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	28.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	28.0	28.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

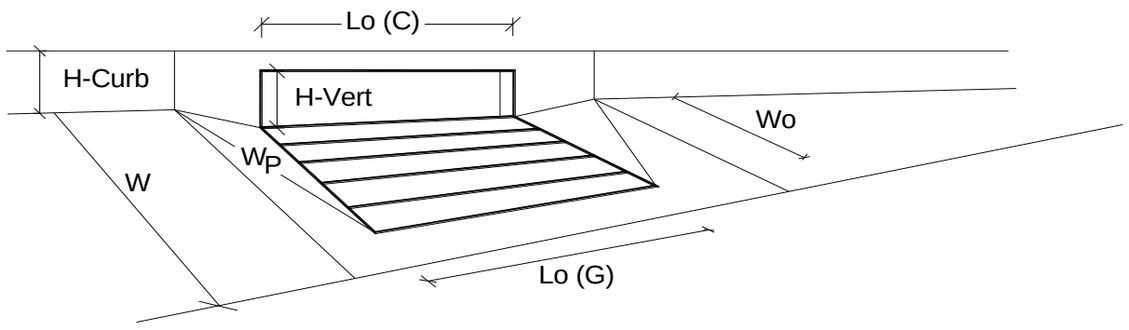
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.03 (August 2023)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.4**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	0.8	2.2	cfs

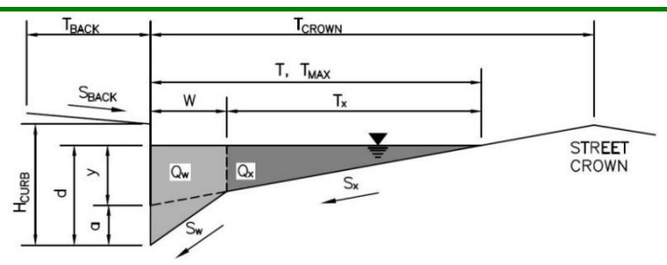
MHFD-Inlet, Version 5.03 (August 2023)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Ravenna Filing 2, Lot 1

Inlet ID: Inlet 03 (A3)



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	0.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =		ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	20.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is not applicable to Sump Condition				
MAJOR STORM Allowable Capacity is not applicable to Sump Condition	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

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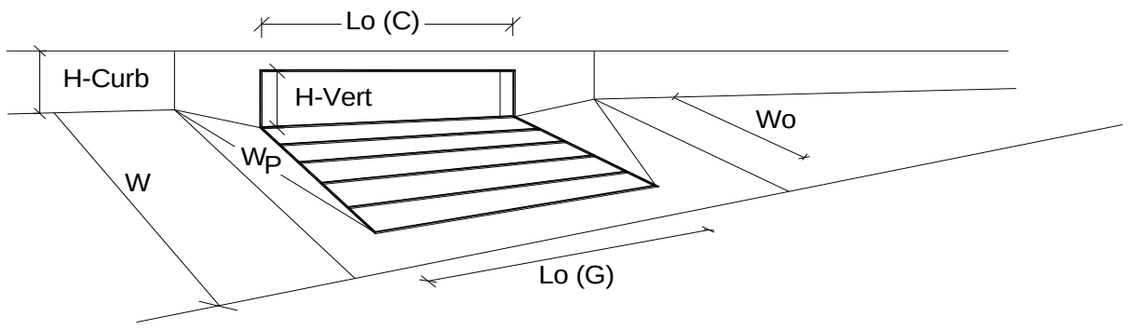

Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	6.0	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.33	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.93	0.93	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**8.3**	**8.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.7	8.0	cfs

CARETAKER RD

PRIVATE ROAD A

PRIVATE ROAD B

STRC-1

INLET 01

INLET 03

SD MH-01

INLET 02

P-1

P-2

P-3

P-4

LOT 1

LOT 2

LOT 3

LOT 4

0 20'

1" = 20'

STORMCAD KEY MAP

RIVER CANYON FILING 2, LOT 1

2/29/2024

1 OF 1

terracina design
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Denver, CO 80231
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9/31/2021 1:15 PM BOSTON BLAKE X:\RAVENNA\DOCUMENTS\REPORTS\DRAINAGE\01 - RIVER CANYON F2, LOT 1\PHASE III\C-HYDRAULIC CALCS\STORMCAD\STORMCAD KEY MAP.DWG

STORMCAD OUTPUT TABLES

River Canyon Filing 2, Lot 1 - 5-Year

Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (acres)	Runoff Coeff.	Time of C (min)	Catchment CA (acres)	Intensity (in/h)	Flow (cfs)
A1	INLET 01	1.990	0.370	9.700	0.736	3.915	2.91
A2	INLET 02	0.410	0.450	7.700	0.185	4.259	0.79
A3	INLET 03	1.200	0.350	9.100	0.420	4.011	1.70

Catch Basin Table - Time: 0.00 hours

Label	Rim (ft)	Invert (ft)	Flow (cfs)	HGL (In) (ft)	HGL (Out) (ft)	Notes	Inlet Location
INLET 01	5,532.62	5,524.34	2.91	5,524.99	5,524.99	10' TYPE R INLET	In Sag
INLET 02	5,531.89	5,521.67	0.79	5,522.00	5,522.00	5' TYPE R INLET	In Sag
INLET 03	5,532.28	5,518.87	5.27	5,519.82	5,519.75	10' TYPE R INLET	In Sag

Conduit Table - Time: 0.00 hours

ID	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (ft)	Slope (%)	Dia. (in)	Mann.	Flow (cfs)	Velocity (ft/s)	Depth (ft)	Capacity (cfs)	Froude Number	HGL (In) (ft)	HGL (Out) (ft)
P-1	INLET 01	INLET 03	5,524.34	5,523.66	33.5	2.03	18.0	0.013	2.91	6.55	0.65	14.96	2.034	5,524.99	5,524.12
P-2	SD MH-01	INLET 03	5,520.10	5,519.07	51.7	1.99	18.0	0.013	0.78	4.45	0.33	14.83	1.948	5,520.43	5,519.82
P-3	INLET 02	SD MH-01	5,521.67	5,520.30	68.5	2.00	18.0	0.013	0.79	4.47	0.33	14.86	1.952	5,522.00	5,520.54
P-4	INLET 03	STRC-1	5,518.87	5,517.20	31.5	5.31	18.0	0.013	5.27	10.95	0.88	24.20	3.289	5,519.75	5,517.71

Manhole Table - Time: 0.00 hours

Label	Flow (cfs)	Headloss (ft)	Elevation (Rim) (ft)	Elevation (Ground) (ft)	HGL (In) (ft)	HGL (Out) (ft)	Notes	Headloss Method	AASHTO Shaping Method
SD MH-01	0.78	0.09	5,532.77	5,532.77	5,520.52	5,520.43	5' DIA MH	AASHTO	Full

STORMCAD OUTPUT TABLES

River Canyon Filing 2, Lot 1 - 100-Year

Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (acres)	Runoff Coeff.	Time of C (min)	Catchment CA (acres)	Intensity (in/h)	Flow (cfs)
A1	INLET 01	1.990	0.650	9.700	1.294	7.118	9.28
A2	INLET 02	0.410	0.690	7.700	0.283	7.743	2.21
A3	INLET 03	1.200	0.640	9.100	0.768	7.293	5.65

Catch Basin Table - Time: 0.00 hours

Label	Rim (ft)	Invert (ft)	Flow (cfs)	HGL (In) (ft)	HGL (Out) (ft)	Notes	Inlet Location
INLET 01	5,532.62	5,524.34	9.28	5,525.52	5,525.52	10' TYPE R INLET	In Sag
INLET 02	5,531.89	5,521.67	2.21	5,522.23	5,522.23	5' TYPE R INLET	In Sag
INLET 03	5,532.28	5,518.87	16.78	5,520.56	5,520.31	10' TYPE R INLET	In Sag

Conduit Table - Time: 0.00 hours

ID	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (ft)	Slope (%)	Dia. (in)	Mann.	Flow (cfs)	Velocity (ft/s)	Depth (ft)	Capacity (cfs)	Froude Number	HGL (In) (ft)	HGL (Out) (ft)
P-1	INLET 01	INLET 03	5,524.34	5,523.66	33.5	2.03	18.0	0.013	9.28	8.92	1.18	14.96	1.878	5,525.52	5,524.56
P-2	SD MH-01	INLET 03	5,520.10	5,519.07	51.7	1.99	18.0	0.013	2.19	6.01	0.56	14.83	2.013	5,520.66	5,520.56
P-3	INLET 02	SD MH-01	5,521.67	5,520.30	68.5	2.00	18.0	0.013	2.21	6.03	0.56	14.86	2.017	5,522.23	5,520.69
P-4	INLET 03	STRC-1	5,518.87	5,517.20	31.5	5.31	18.0	0.013	16.78	14.79	1.44	24.20	2.958	5,520.31	5,518.24

Manhole Table - Time: 0.00 hours

Label	Flow (cfs)	Headloss (ft)	Elevation (Rim) (ft)	Elevation (Ground) (ft)	HGL (In) (ft)	HGL (Out) (ft)	Notes	Headloss Method	AASHTO Shaping Method
SD MH-01	2.19	0.10	5,532.77	5,532.77	5,520.76	5,520.66	5' DIA MH	AASHTO	Full

APPENDIX D
REFRENCES

Ravenna Maintenance Facility Phase III Drainage Report

PHASE III DRAINAGE REPORT

Ravenna Maintenance Facility

11151 Caretaker Road
Littleton, CO 80125

Prepared for:

Mesa Properties

44 Inverness Drive East, Building D, Suite 100

Englewood, CO 80112

Prepared by:

Kimley-Horn and Associates, Inc.

6200 S. Syracuse Way, Suite 300

Greenwood Village, CO 80111

(303) 228-2300

Developer:

River Canyon Real Estate Investments, LLC

11118 Caretaker Road

Littleton, CO 80125

720-228-2300

Project #: 096796003
Prepared: March 1, 2024

Kimley»Horn

- Sub-Basin A-7 (1.06 acres) consists of the gravel parking area, landscaped area south and west of the pond, and the proposed detention pond. Stormwater runoff in Sub-Basin A-7 surface flows directly into the detention pond (reference drainage map in **Appendix B**). The proposed sub-basin is 12% impervious. The peak flow rate at design point A7 is 4.11 cfs.
- Sub-Basin F-1 (4.65 acres) consists of the Future Development area containing single-family homes, roads, sidewalk, and landscaping. Stormwater runoff in Sub-Basin F-1 will be collected by a future storm inlet (Design Point F1) which conveys runoff to the proposed stormwater manhole along the north side of Caretaker Road and into the proposed storm main (reference drainage map in **Appendix B**). The peak flow rate at design point F1 is 19.18 cfs. It has been assumed that this basin is 4.65 acres with an average imperviousness of 35%. Hydrologic calculations for peak flows have been based off these values. See **Appendix C** for future development runoff calculations.
- Sub-Basin OS-1 (0.38 acres) consists of existing landscaping. Stormwater runoff in Sub-Basin OS-1 surface flows off-site (Design Point OS1) which conveys runoff into the South Platte River floodplain (reference drainage map in **Appendix B**). The proposed sub-basin is 2% impervious. The peak flow rate at design point OS1 is 1.28 cfs.
- Sub-Basin OS-2 (0.44 acres) consists of proposed landscaping along the eastern edge of the Site. Stormwater runoff in Sub-Basin OS-2 surface flows off-site (Design Point OS2) which conveys runoff to the east and eventually to the South Platte River floodplain (reference drainage map in **Appendix B**). The proposed sub-basin is 5% impervious. The peak flow rate at design point OS2 is 1.68 cfs.
- Sub-Basin OS-3 (0.08 acres) consists of proposed landscaping along the western boundary of the Stie. Stormwater runoff in Sub-Basin OS-3 surface flows off-site (Design Point OS3) which conveys runoff to the South Platte River floodplain (reference drainage map in **Appendix B**). The proposed sub-basin is 2% impervious. The peak flow rate at design point OS3 is 0.36 cfs.
- Sub-Basin OS-4 (0.44 acres) consists of a portion of Caretaker Road and the adjacent landscaping on the bank of the floodplain. Stormwater runoff in Sub-Basin OS-4 surface flows off-site (Design Point OS4) into the FEMA floodplain which conveys runoff to the South Platte River (reference drainage map in Appendix B). The proposed sub-basin is 54% impervious. The peak flow rate at design point OS4) is 2.92 cfs.

The Drainage Map outlining the sub-basins is provided in **Appendix B** and detailed runoff calculations are included in **Appendix B**.

STORMWATER STORAGE FACILITIES

Existing drainage patterns are un-detained and release un-controlled from the Site. The proposed detention pond, with associated controlled release rates, represents an improvement over the existing conditions. The detention was calculated using MHFD-Detention Version 4.03 and used a total watershed (including the proposed Site, Caretaker Road future improvements, and the Future Development at Lot 1) imperviousness of 35%. Calculations included in **Appendix D** provide details regarding the water quality and detention pond design. The calculations include determination of the storage volume required for full spectrum detention. Overall, 0.86 AC-FT of detention storage volume is required. The water quality capture volume (WQCV) and excess urban rainfall volume (EURV) for the pond were determined to be 0.15 AC-FT and 0.22 AC-FT respectively. The provided total 100-year volume for the pond is 1.08 AC-FT.

The pond outfalls through an outlet structure and into an 18” sewer main that discharges at-grade through a flared-end section into the South Platte River floodplain. Emergency outfall from the pond will be through the emergency spillway at the northeast side of the pond and will discharge north towards the South Platte River floodplain; rip rap will be used to stabilize the emergency spillway and prevent soil erosion.

Kimley»Horn

STANDARD FORM SF-3
STORM DRAINAGE DESIGN - RATIONAL METHOD 5 YEAR EVENT

PROJECT NAME: Ravenna Maintenance Facility
PROJECT NUMBER: 096796003
CALCULATED BY: ACW
CHECKED BY: WFK

DATE: 2/28/2024

P_1 (1-Hour Rainfall) = 1.43

STORM LINE	DESIGN POINT	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		DESIGN BASIN	AREA (AC)	RUNOFF COEFF C5	tc (min)	C*A(ac)	I (in/hr)	Q (cfs)	tc(ti+tt)	S(C*A) (ac)	I (in/hr)	Q (cfs)	SLOPE (%)	STREET FLOW(cfs)	DESIGN FLOW(cfs)	SLOPE (%)	PIPE SIZE (in)	LENGTH (ft)	VELOCITY	tt (min)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	A6	R-1	0.23	0.80	5.00	0.18	4.85	0.89													
	A5	R-2	0.03	0.80	5.00	0.02	4.85	0.11													
	A7	R-3	0.16	0.80	5.00	0.13	4.85	0.62													
	A1	A-1	0.96	0.08	12.18	0.08	3.57	0.28													
	A2	A-2	0.68	0.68	7.22	0.46	4.35	2.01													
	A3	A-3	1.02	0.44	8.30	0.45	4.15	1.87													
	A4	A-4	0.24	0.54	9.05	0.13	4.02	0.52													
	A5	A-5	0.40	0.46	8.97	0.18	4.03	0.73													
	A6	A-6	0.42	0.81	5.00	0.34	4.85	1.65													
	A7	A-7	1.06	0.16	10.67	0.17	3.77	0.63													
	F1	F-1	4.65	0.41	10.65	1.92	3.77	7.23													
	OS1	OS-1	0.38	0.07	12.00	0.03	3.59	0.09													
	OS2	OS-2	0.44	0.10	9.59	0.04	3.93	0.17													
	OS3	OS-3	0.08	0.07	5.49	0.01	4.73	0.03													
	OS4	OS-4	0.44	0.52	5.00	0.23	4.85	1.10													
	TOTAL		11.183			4.363		17.9383													

Kimley»Horn

STANDARD FORM SF-3
STORM DRAINAGE DESIGN - RATIONAL METHOD 5 YEAR EVENT

PROJECT NAME: Ravenna Maintenance Facility
PROJECT NUMBER: 096796003
CALCULATED BY: ACW
CHECKED BY: WFK

DATE: 2/28/2024

P_1 (1-Hour Rainfall) = **2.60**

STORM LINE	DESIGN POINT	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		DESIGN BASIN	AREA (AC)	RUNOFF COEFF C100	tc (min)	C*A(ac)	I (in/hr)	Q (cfs)	tc(ti+tt)	S(C*A) (ac)	I (in/hr)	Q (cfs)	SLOPE (%)	STREET FLOW(cfs)	DESIGN FLOW(cfs)	SLOPE (%)	PIPE SIZE (in)	LENGTH (ft)	VELOCITY (fps)	tt (min)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	A6	R-1	0.23	0.91	5.00	0.21	8.82	1.84													
	A5	R-2	0.03	0.91	5.00	0.03	8.82	0.23													
	A7	R-3	0.16	0.91	5.00	0.15	8.82	1.28													
	A1	A-1	0.96	0.53	12.18	0.51	6.49	3.28													
	A2	A-2	0.68	0.83	7.22	0.57	7.91	4.49													
	A3	A-3	1.02	0.71	8.30	0.73	7.54	5.48													
	A4	A-4	0.24	0.76	9.05	0.18	7.31	1.35													
	A5	A-5	0.40	0.72	8.97	0.29	7.33	2.10													
	A6	A-6	0.42	0.90	5.00	0.38	8.82	3.35													
	A7	A-7	1.06	0.57	10.67	0.60	6.86	4.11													
	F1	F-1	4.65	0.60	10.65	2.80	6.86	19.18													
	OS1	OS-1	0.38	0.52	12.00	0.20	6.53	1.28													
	OS2	OS-2	0.44	0.54	9.59	0.24	7.15	1.68													
	OS3	OS-3	0.08	0.52	5.49	0.04	8.60	0.36													
	OS4	OS-4	0.44	0.75	5.00	0.33	8.82	2.91													
	TOTAL		11.183			7.227		52.9048													

5-YR

Conduit Table - Time: 0.00 hours

Label	Diameter (in)	Start Node	Invert (Start) (ft)	Invert (Stop) (ft)	Stop Node	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
MH A-5 TO MH A-4 (1) (STRM)	24.0	MH A-6 (STRM)	5,508.01	5,506.99	MH A-5 (STRM)	82.1	0.012	0.013	5.10	6.30	5,508.81	5,508.08
MH A-3 TO INLET A3-1 (STRM)	18.0	INLET A3-1 (STRM)	5,509.36	5,505.18	MH A-3 (STRM)	59.9	0.070	0.013	1.71	8.71	5,509.85	5,505.80
MH A-4 TO MH A-3 (STRM)	24.0	MH A-4 (STRM)	5,505.17	5,504.68	MH A-3 (STRM)	39.4	0.012	0.013	8.16	7.18	5,506.19	5,505.48
MH A-3 TO MH A-2 (STRM)	30.0	MH A-3 (STRM)	5,504.18	5,502.47	MH A-2 (STRM)	85.4	0.020	0.013	10.54	8.98	5,505.26	5,503.76
MH A-5 TO MH A-4 (STRM)	24.0	MH A-5 (STRM)	5,506.79	5,505.37	MH A-4 (STRM)	113.4	0.012	0.013	6.81	6.83	5,507.71	5,506.58
MH A-4 TO INLET A4-1 (STRM)	18.0	INLET A4-1 (STRM)	5,506.98	5,506.17	MH A-4 (STRM)	16.2	0.050	0.013	1.50	7.45	5,507.44	5,506.44
PIPE -10 (STRM)	18.0	INLET A5-1 (STRM)	5,507.31	5,506.99	MH A-5 (STRM)	16.2	0.020	0.013	1.89	5.76	5,508.11	5,508.13
PIPE -11 (STRM)	18.0	INLET A2-3 (STRM)	5,507.12	5,506.87	MH A2-2 (STRM)	17.0	0.015	0.013	0.52	3.55	5,507.39	5,507.07
PIPE -12 (STRM)	18.0	MH A2-2 (STRM)	5,506.67	5,505.00	MH A2-1 (STRM)	111.2	0.015	0.013	0.51	3.55	5,506.93	5,505.21
PIPE -13 (STRM)	18.0	MH A2-1 (STRM)	5,504.80	5,503.47	MH A-2 (STRM)	88.7	0.015	0.013	0.51	3.54	5,505.06	5,503.87
MH A-2 TO INLET A-1 (STRM)	30.0	MH A-2 (STRM)	5,502.27	5,501.12	INLET A-1 (STRM)	57.3	0.020	0.013	10.97	9.08	5,503.38	5,502.65
INLET A-1 TO POND Discharge (STRM)	30.0	INLET A-1 (STRM)	5,500.92	5,499.60	POND OUTFALL (STRM)	33.2	0.040	0.013	12.44	12.05	5,502.11	5,500.33

100-YR

Conduit Table - Time: 0.00 hours

Label	Diameter (in)	Start Node	Invert (Start) (ft)	Invert (Stop) (ft)	Stop Node	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
MH A-5 TO MH A-4 (1) (STRM)	24.0	MH A-6 (STRM)	5,508.01	5,506.99	MH A-5 (STRM)	82.1	0.012	0.013	17.38	5.53	5,510.73	5,510.25
MH A-3 TO INLET A3-1 (STRM)	18.0	INLET A3-1 (STRM)	5,509.36	5,505.18	MH A-3 (STRM)	59.9	0.070	0.013	4.76	11.74	5,510.20	5,507.69
MH A-4 TO MH A-3 (STRM)	24.0	MH A-4 (STRM)	5,505.17	5,504.68	MH A-3 (STRM)	39.4	0.012	0.013	25.43	8.10	5,507.65	5,507.15
MH A-3 TO MH A-2 (STRM)	30.0	MH A-3 (STRM)	5,504.18	5,502.47	MH A-2 (STRM)	85.4	0.020	0.013	31.41	12.05	5,506.09	5,505.16
MH A-5 TO MH A-4 (STRM)	24.0	MH A-5 (STRM)	5,506.79	5,505.37	MH A-4 (STRM)	113.4	0.012	0.013	22.28	7.09	5,509.52	5,508.42
MH A-4 TO INLET A4-1 (STRM)	18.0	INLET A4-1 (STRM)	5,506.98	5,506.17	MH A-4 (STRM)	16.2	0.050	0.013	3.57	2.02	5,508.87	5,508.85
PIPE -10 (STRM)	18.0	INLET A5-1 (STRM)	5,507.31	5,506.99	MH A-5 (STRM)	16.2	0.020	0.013	5.45	3.08	5,510.49	5,510.44
PIPE -11 (STRM)	18.0	INLET A2-3 (STRM)	5,507.12	5,506.87	MH A2-2 (STRM)	17.0	0.015	0.013	1.33	4.70	5,507.55	5,507.20
PIPE -12 (STRM)	18.0	MH A2-2 (STRM)	5,506.67	5,505.00	MH A2-1 (STRM)	111.2	0.015	0.013	1.33	4.70	5,507.10	5,505.54
PIPE -13 (STRM)	18.0	MH A2-1 (STRM)	5,504.80	5,503.47	MH A-2 (STRM)	88.7	0.015	0.013	1.31	4.68	5,505.53	5,505.53
MH A-2 TO INLET A-1 (STRM)	30.0	MH A-2 (STRM)	5,502.27	5,501.12	INLET A-1 (STRM)	57.3	0.020	0.013	32.54	12.16	5,504.71	5,504.36
INLET A-1 TO POND Discharge (STRM)	30.0	INLET A-1 (STRM)	5,500.92	5,499.60	POND OUTFALL (STRM)	33.2	0.040	0.013	35.48	16.10	5,502.95	5,500.98

APPENDIX E
DRAINAGE MAPS

Existing Drainage Map
Proposed Drainage Map

OWNER:
RIVER CANYON REAL ESTATE
INVESTMENTS LLC
LOT 3, RIVER CANYON 2

OWNER:
RIVER CANYON REAL ESTATE
INVESTMENTS LLC
LOT 5-A, RIVER CANYON 2, 2ND AMD

CARETAKER RD

DANTE DR

HIGH LINE CANAL

UNNAMED TRIBUTARY

EX-1
3.95 | 28.4%

EX-2
1.67 | 6.2%

LEGEND

- PROPOSED MAJOR CONTOUR (4880)
- PROPOSED MINOR CONTOUR (1 FT) (4879)
- EXISTING MAJOR CONTOUR (4880)
- EXISTING MINOR CONTOUR (1 FT) (4879)
- PROPOSED DRAINAGE BASIN MINOR
- EXISTING DRAINAGE BASIN MINOR
- PROPOSED STORM (FES, MH, & INLET) — EXISTING / PROPOSED
- BASIN DESIGNATION — EX-1 / PR-1 (AREA X.XX (AC) | 00.0%)
- BASIN IMPERVIOUS
- DIRECTIONAL FLOW ARROW
- DESIGN POINT — EX-1 / PR-1
- EMERGENCY OVERFLOW ROUTE

N

0 40'
1" = 40'

terracina design
10200 E. Girard Ave, A-314
Denver, CO 80231
ph. 303.632.8867

EXISTING DRAINAGE MAP

RIVER CANYON FILING 2, LOT 1

7/17/2024

1 OF 1

JOSH SHARPE

X:\RAVENNA\DOCUMENTS\REPORTS\DRAINAGE\01 - RIVER CANYON F2, LOT 1\PHASE III\E-DRAINAGE MAPS\DRAINAGE MAPS-RC-F2.DWG

7/17/2024 3:08 PM

OWNER:
ROBERT CHARLES GRESKA
LOT 4-A, RIVER CANYON 2, 2ND AMD

OWNER:
RIVER CANYON REAL ESTATE
INVESTMENTS LLC
LOT 5-A, RIVER CANYON 2, 2ND AMD

OWNER:
RIVER CANYON REAL ESTATE
INVESTMENTS LLC
LOT 3, RIVER CANYON 2

CARETAKER RD

DANTE DR

DOLCE VITA LANE

HIGH LINE CANAL

UNNAMED TRIBUTARY

LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7

STRC-1
INLET 01
INLET 02
INLET 03
SD MH-01

OS1
0.86
0.73
3.69

OS2
0.93
0.47
3.45

A1
1.99
2.87
9.22

A2
0.41
0.80
2.21

A3
1.20
1.71
5.63

LEGEND

- PROPOSED MAJOR CONTOUR (4880)
- PROPOSED MINOR CONTOUR (4879)
- EXISTING MAJOR CONTOUR (4880)
- EXISTING MINOR CONTOUR (4879)
- PROPOSED DRAINAGE BASIN MINOR
- EXISTING DRAINAGE BASIN MINOR
- PROPOSED STORM (FES, MH, & INLET) — EXISTING / PROPOSED
- EX-1 / PR-1 — BASIN DESIGNATION (AREA X.XX (AC), 0.XX, X.XX, 0.XX)
- DIRECTIONAL FLOW ARROW
- DESIGN POINT
- EMERGENCY OVERFLOW ROUTE

Runoff Summary Table

Design Point	Basin ID	Basin Area (Ac.)	5-Year Runoff (CFS)	100-Year Runoff (CFS)
A1	A1	1.98	2.81	9.11
A2	A2	0.41	0.79	2.20
A3	A3	1.19	1.68	5.57
OS1	OS1	0.87	0.73	3.70
OS2	OS2	0.96	0.46	3.52

N

0 40'

1" = 40'

terracina design
10200 E. Girard Ave, A-314
Denver, CO 80231
ph. 303.632.8867

PROPOSED DRAINAGE MAP

RIVER CANYON FILING 2, LOT 1

2/26/2024

1 OF 1

7/17/2024 3:08 PM JOSH SHARPE X:\RAVENNA\DOCUMENTS\REPORTS\DRAINAGE\01 - RIVER CANYON F2, LOT 1\PHASE III\E-DRAINAGE MAPS\DRAINAGE MAPS-RC-F2.DWG

RIVER CANYON FILING NO. 2, LOT 1

Traffic Impact Analysis

Prepared for:

Mr. Geoff Collins, Development Manager
River Canyon Real Estate Investments, LLC
11118 Caretaker Road
Littleton, CO 80125

Prepared by:

Felsburg Holt & Ullevig
6400 S. Fiddlers Green Circle, Suite 1500
Greenwood Village, CO 80111
303.721.1440

Project Manager: Richard R. Follmer, PE, PTOE

FELSBURG HOLT & ULLEVIG
connecting & enhancing communities

FHU Reference No. 122216-01

July 2022

Revised May 17, 2024

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List of Tables

I. INTRODUCTION

River Canyon Real Estate. LLC is proposing to construct eight (8) residential homes in the River Canyon Planned Development area, specifically in Planning Area 1 (PA-1) which is located between Caretaker Road (to the north) and the Highline Canal to the south). This 3.8 acre parcel is currently identified as part of the Golf Course which encompasses a total of almost 160 acres of the entire development site. It's currently being used for The Club at Ravenna sales office and for golf course maintenance facilities. These existing uses will be relocated to other parts of the Ravenna site upon construction of the eight homes.

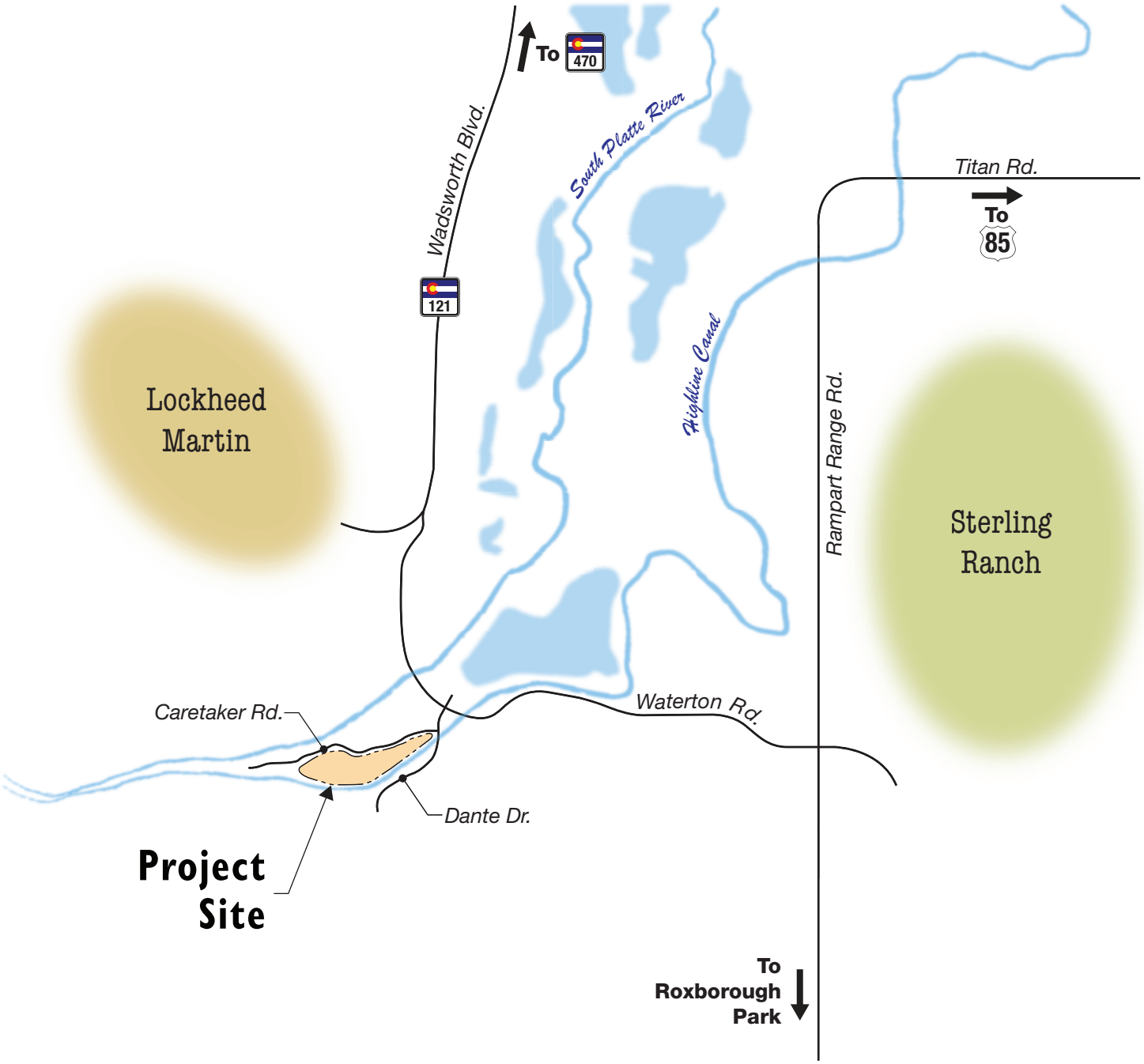
Vehicular access will be provided along Caretaker Road, which is currently a long cul-de-sac street. It intersects with Dante Drive, the main access road into River Canyon. Dante Drive, in turn, intersects with Waterton Road, a major travel route in northwestern Douglas County. New street connections are not planned; the eight residential dwelling units will use existing Caretaker Road and Dante Drive to access the regional street network. **Figure 1** shows the location of the project site in relation to the surrounding roadway network.

The purpose of this Traffic Impact Analysis (TIA) is to determine the anticipated traffic impacts associated with the proposed development and the impact to the roadway network. Per discussions with Douglas County staff, operational analyses will be concentrated at the Waterton Road/Dante Drive and Dante Drive/Caretaker Road intersections.

The following specific elements are included in this TIA:

- Daily traffic volume data along Waterton Road to the east and west of Dante Drive
- AM and PM peak hour turning movements at the subject intersections
- Evaluation of existing operational conditions
- Estimates of background traffic volumes for the Build-Out (2025) year
- Evaluation of projected background operational conditions for the Build-Out (2025) timeframe
- Estimates of trip generation for the proposed land uses
- Analysis of project impacts and access evaluation for the Build-Out (2025) timeframe
- Evaluation of potential auxiliary lane requirements
- Recommendations for improvements

The following sections of this report provide specific information on each of these issues.



NORTH

FELSBURG HOLT & ULLEVIG

NOTE: Drawing Not to Scale

FIGURE 1
Vicinity Map

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II. EXISTING CONDITIONS

II.A. Land Use

River Canyon Filing 2, Lot 1 is proposed to be constructed on a plot of land along Caretaker Road, which is currently being used for golf course maintenance facilities and for The Club at Ravenna sales office. Surrounding Lot 1 is The Club at Ravenna golf course and single family homes adjacent the golf course. Outside of River Canyon are varying land uses. Directly to the north along Waterton Road across the South Platte River are several recreational amenities that include the Denver Audubon Nature Center and access to the Waterton Canyon Trailhead. The Lockheed Martin aerospace company lies to the west along the extension of Wadsworth Boulevard at the Waterton Road intersection. Chatfield State Park is farther north along Wadsworth Boulevard. To the east and south of the project site are existing and developing residential areas including Roxborough Park, Sterling Ranch, and Chatfield Farms Park. Other large lot residential homes exist along Rampart Range Road and Titan Road.

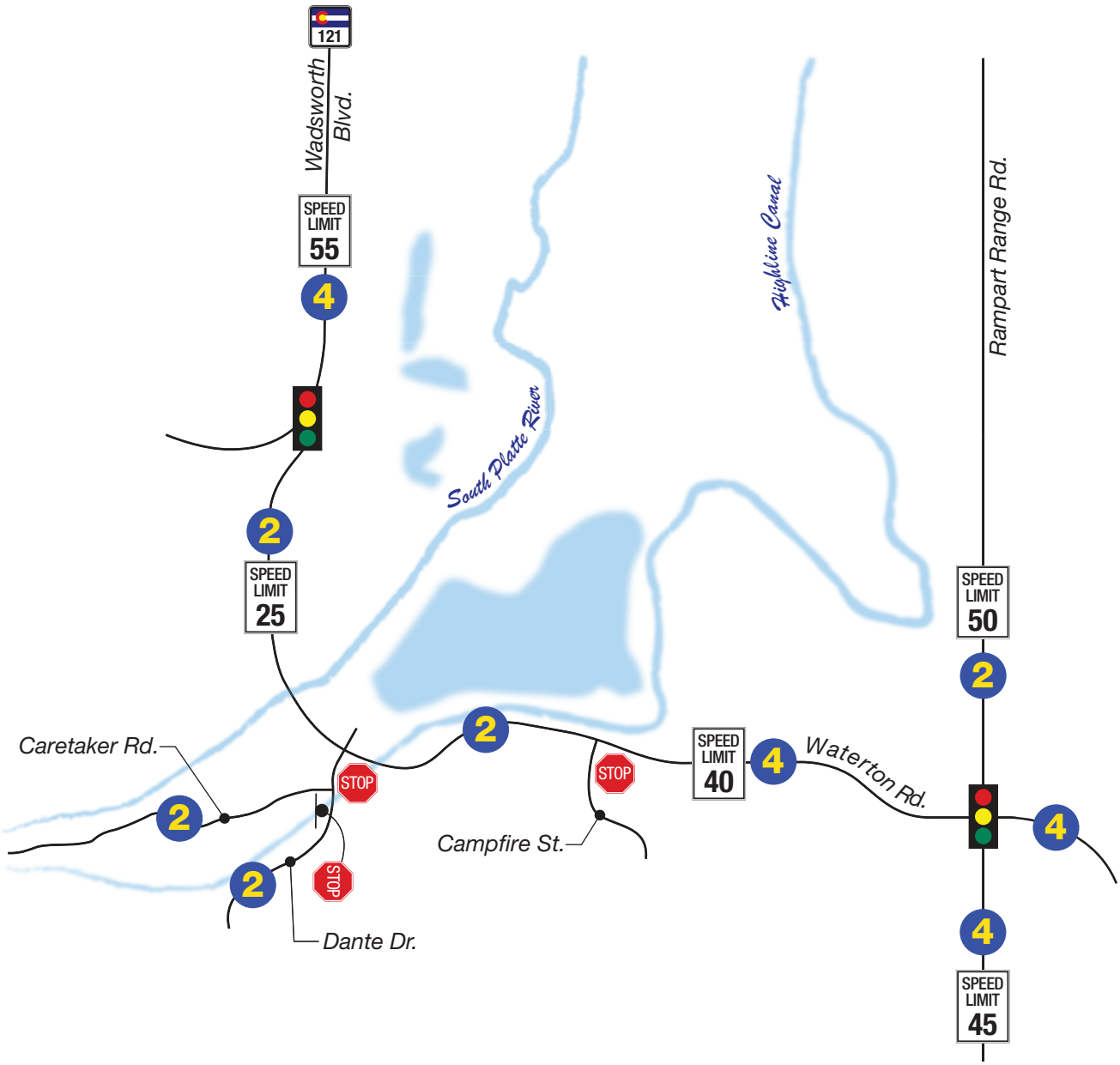
II.B. Roadway System

The existing roadway system in the study area includes the following primary facilities:

- The Douglas County *2040 Transportation Master Plan* identifies **Waterton Road a**s a Major Arterial roadway. As it traverses the Dante Drive intersection, it has two through lanes for vehicles movements along with left turn and right turn auxiliary lanes at the Dante Drive intersection. Waterton Road is split into a one-way couplet for about 900' as it passes Dante Drive. Waterton Road continues to the northwest towards Wadsworth Boulevard into Jefferson County. The posted speed limit is 25 miles per hour (mph) to the west of Dante Drive.

  Towards the east, the roadway cross-section increases to four lanes until it connects with Rampart Range Road. Waterton Road is planned to proceed through the Sterling Ranch development with ultimate access to US 85 at Airport Road. The posted speed limit in this section is 40 mph.
- **Wadsworth Boulevard (SH 121),** a state highway to the north of its intersection with Waterton Road, is classified as a Regional Highway (R-A) by the Colorado Department of Transportation (CDOT). Wadsworth Boulevard, a 4-lane facility, provides access to C-470 and into the Denver metropolitan area. There is some residential development access along Wadsworth Boulevard (Trail Mark), but most of the adjacent land is vacant or is within the Chatfield State Park boundary. The posted speed limit along Wadsworth Boulevard is 55 mph.
- **Rampart Range Road** is classified as a 4-lane Minor Arterial by Douglas County to the north of Waterton Road and as a 4-lane Collector to the south of Waterton Road. To the north, Rampart Rand Road connects with Titan Road with ultimate access to US 85 also, while to the south, it primarily serves for access into the Roxborough Park subdivision and state park, as well as to the Arrowhead Golf Course. The posted speed limits to the north and south of Waterton Road are 50mph and 45mph, respectively.
- Access for the new dwelling units will be along **Caretaker Road**, a two-lane roadway that extends from Dante Drive towards the west/southwest and provides access to existing maintenance facilities and the Club at Ravenna golf course. This roadway is stop-controlled at its intersection with Dante Drive. A posted speed limit is not evident.

Figure 2 shows the adjacent roadway network, laneage, and speed limit characteristics of the site vicinity.



LEGEND

X	=	Number of Through Lanes
SPEED LIMIT XX	=	Posted Speed Limit
	=	Traffic Signal
STOP	=	Stop Sign

NORTH

FIGURE 2
Existing Roadway Characteristics

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NOTE: Drawing Not to Scale

II.C. Traffic Volumes

Peak hour traffic volumes were recorded at the Waterton Road/Dante Drive intersection (both directions of the one-way couplet) and at the Dante Drive/Caretaker Road intersection, as well as 24-hour traffic data along Waterton Road to the east and west of Dante Drive. Peak hour traffic volumes are shown on **Figure 3**. Hourly vehicle movements along Waterton Road range from 330 vehicles per hour (vph) to 765 vph depending on the peak hour and direction. Of note, peak hour traffic volumes are very directional with a higher level of flow toward the west during the AM peak hour, with a higher flow toward the east in the PM peak hour. This directional skewing is likely related to work-related movements to/from the Lockheed-Martin facility located to the west of the project site or to other employment opportunities along Wadsworth Boulevard. Vehicle movements to/from Dante Drive are less than 70 vph during either peak hour, while movements to/from the High Line Canal Trailhead are almost nonexistent. Vehicle trips to/from Caretaker Road are significantly less than the levels along Danta Drive, being six (6) or less during either peak hour for any movement.

On a daily volume basis, Waterton Road is currently carrying approximately 13,075 vehicles per day (vpd) to the east of Dante Drive and about 13,820 vpd to the west of Dante Drive. **Appendix A** presents the recorded traffic data.

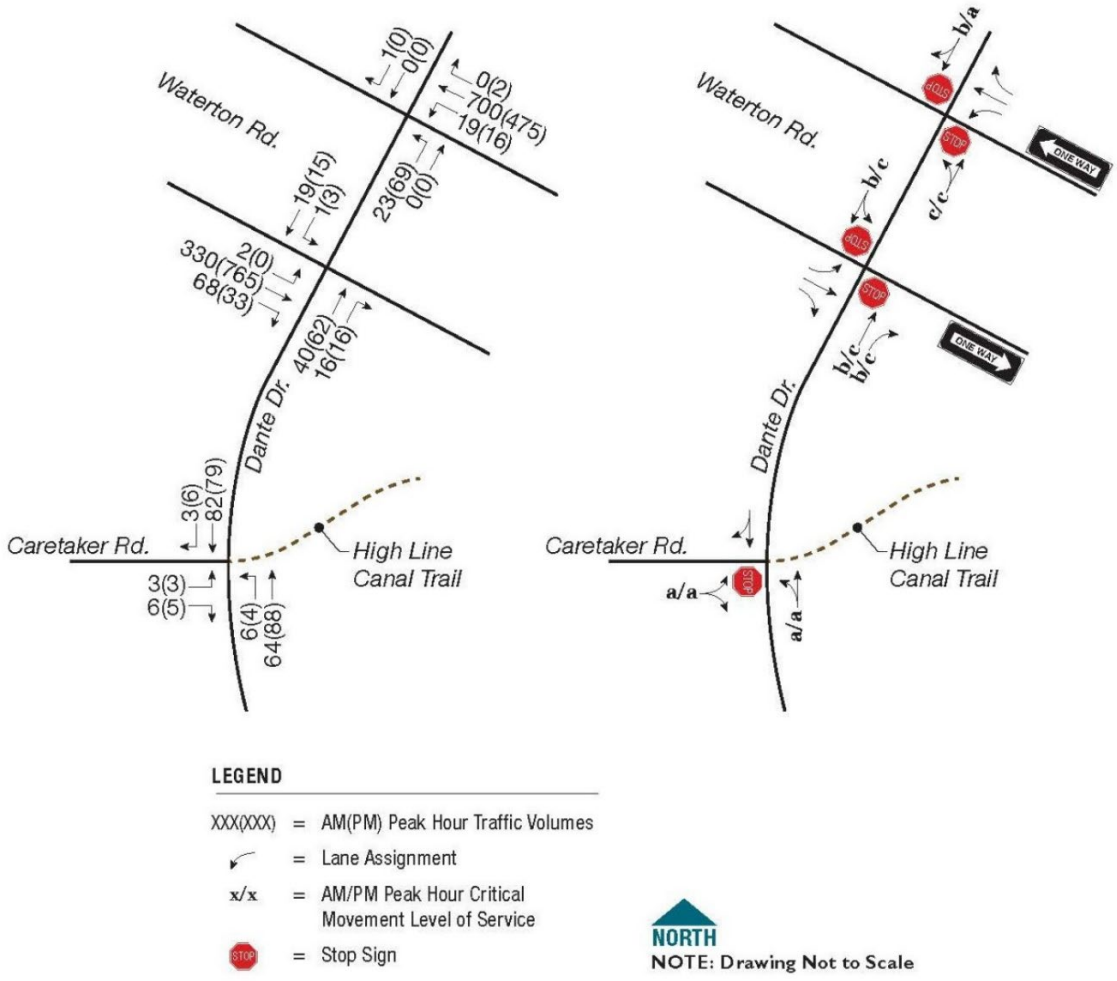


Figure 3. Existing Traffic Conditions

II.D. Traffic Operations

Traffic operational analyses were conducted for the study area intersections using procedures documented in the *Highway Capacity Manual*, HCM 2022. From these analyses, a key measure or "level of service" rating, of the traffic operational conditions is obtained. Level of service (LOS) is a qualitative assessment of traffic operational conditions within a travel stream in terms of the average stopped delay per vehicle at a controlled intersection.

Levels of service are described by a letter designation ranging from LOS A to F, with LOS A representing essentially uninterrupted flow, while LOS F represents a breakdown of traffic flow with noticeable congestion and delay. Unsignalized, or stop sign-controlled, intersection capacity analyses produce LOS results for each movement that must yield to conflicting traffic at the intersection, while intersections with traffic signals can identify LOS for individual movements, as well as an entire intersection. **Appendix B** summarizes LOS criteria for both stop sign-controlled intersections and signalized intersections.

The Synchro traffic analysis software program was used to analyze traffic operations at the study intersections. **Figure 3** also shows the lane geometry, traffic control, and LOS results for existing traffic conditions.

Analysis results find that all of the critical movements controlled by stop signs currently operate at LOS C or better during both peak periods. Waterton Road movements operate at LOS A during both peak hours since motorists are not required to stop, while side street movements operate at LOS C during both peak hours. Vehicle movements at the Dante Drive/Caretaker Road intersection currently operate at LOS A during the AM and PM peak hours. Capacity analysis worksheets for existing traffic conditions are included in **Appendix C.**

III. BACKGROUND CONDITIONS

III.A. Projected Build-Out Timeframe

The construction of this project is expected to be completed by 2025. This section includes projected traffic volume and operational conditions for the Build-Out (2025) timeframe.

III.B. Roadway Network

A review of the Douglas County *2040 Transportation Master Plan* (*Master Plan*) was conducted to understand if there are any roadway construction projects planned for the near future, i.e., before completion of the eight residential dwelling units. The *Master Plan* identifies only one project along Waterton Road near the project site, but one or two others are also noted:

- **Waterton Road (Project #74)** – Widen from 2 to 4 lanes between Wadsworth Boulevard (SH 121) and Rampart Range Road. ***Timeframe = 2021 through 2030***
- **Titan Road (Project #9)** – Widen from 2 to 4 lanes between Rampart Range Road and Moore Road. ***Timeframe = 2031 through 2040***
- **Rampart Range Road (Project #11)** – Widen from 2 to 4 lanes between Waterton Road and Titan Road. ***Timeframe = 2031 through 2040***
- **Waterton Road (Project #12)** – Initial construction as a 2-lane roadway through the Sterling Ranch development ***(Completed)***; widen from 2 to 4 lanes from Rampart Range Road to Moore Road. ***Timeframe = 2021 through 2030***

While the widening of Waterton Road between Wadsworth Boulevard and Rampart Range Road is planned for the 2021 through 2030 timeframe, it is not anticipated that the Waterton Road widening will occur before completion of the eight single family homes. As such, the operational analyses contained in **Section III.D** are based on the existing roadway laneage, which is a conservative approach to operational analyses.

III.C. Future Traffic Volumes

The Background traffic volumes projected for the Build-Out (2025) timeframe are based on the traffic volumes shown on **Figure 3** as a starting point. Information contained in the *Master Plan* indicates that the segment of Waterton Road adjacent to the project is projected to have 20,000 vpd or less by 2040.

If the level of 2040 traffic is considered to be exactly 20,000 vpd, the level of traffic growth can be calculated as a 7.25% compounded annual growth rate. As such, when considering that River Canyon Filing 2, Lot 1 will be completed by 2025, the resultant level of growth over the three years since the original publication of this report will be about 23%.

While this level of growth may seem somewhat excessive, the continued development of Sterling Ranch will cause traffic volumes along Waterton Road to increase at a relatively high rate for many years. As such, it is believed that a 23% growth is reasonable to use for estimating purposes for this project. If nothing else, the evaluation results will be conservative.

Using this growth rate, the Background traffic volume projections for the Build-Out (2025) time period are reflected on **Figure 4**. Of note, this level of growth is applied only to the eastbound and westbound movements on Waterton Road. For vehicle movements along Dante Drive, growth is based on information provided by River Canyon that identifies the number of occupied homes versus the number of allowable homes. Dante Drive and Caretaker Road movements have been increased by 40% based on this relationship.

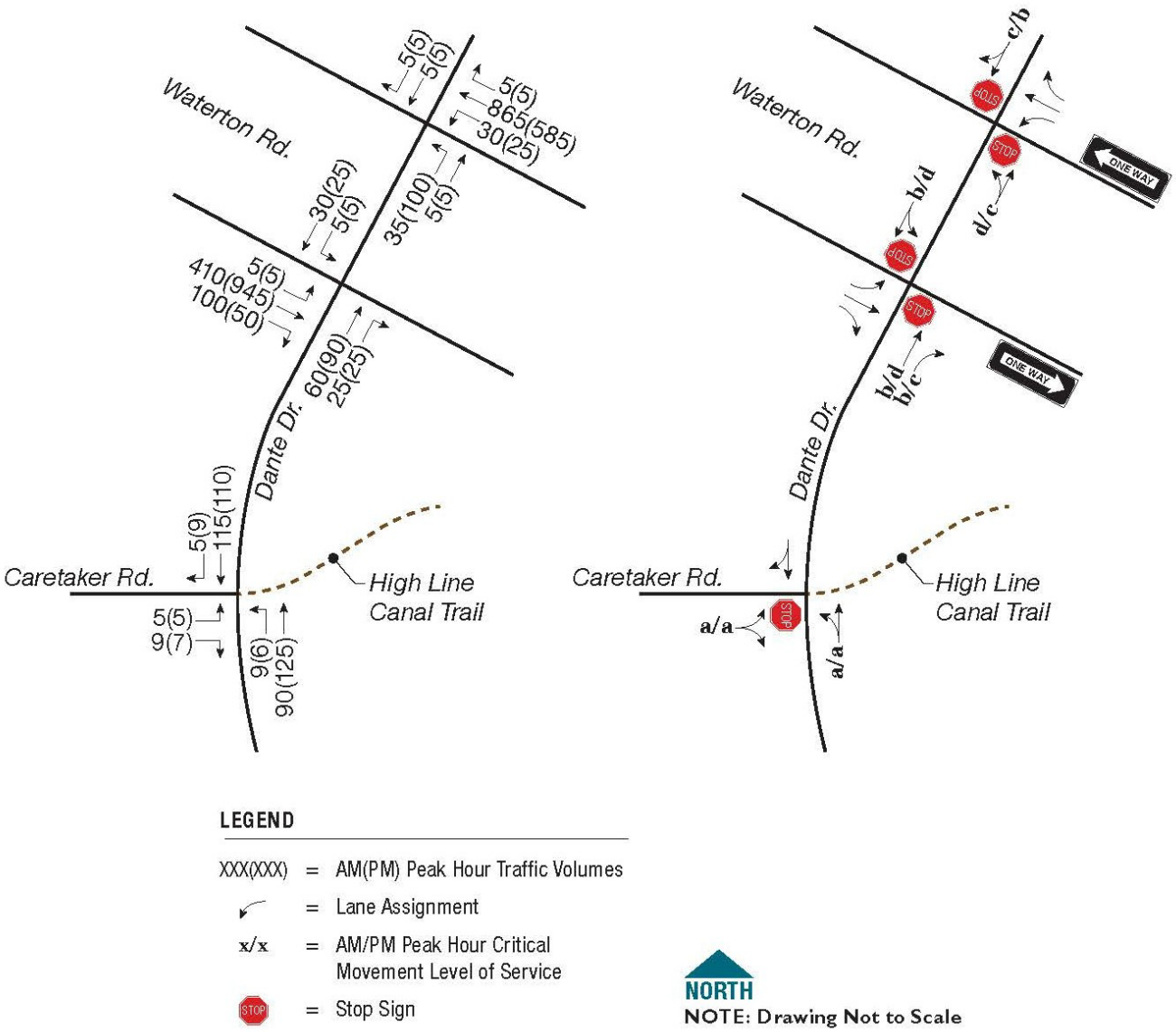


Figure 4. Build-Out (2025) Background Traffic Conditions

III.D. Traffic Control and Intersection Operations

Background traffic conditions are based on HCM methodologies as outlined in **Section II.D** and on existing intersection geometry since roadway improvements are not anticipated by 2025.

Vehicle turning movements at the Waterton Road/Dante Drive intersections are projected to continue to operate well at LOS D or better during both the AM and PM peak hours. Only a few movements operate at LOS D and only during one peak hour for any intersection approach. Movements at the Dante Drive/Caretaker Road intersection are projected to continue operating at LOS A by 2025. See **Figure 4** also for the LOS results and **Appendix D** for the analysis worksheets.

IV. PROPOSED CONDITIONS

This section summarizes the proposed land use, the daily and peak hour traffic volume projections, the Build-Out (2025) operational analyses, and the recommended infrastructure improvements for the completion of River Canyon Filing 2, Lot 1.

IV.A. Land Use

River Canyon Filing 2, Lot 1 is planning to construct a total of eight single family dwelling units on a 3.8-acre parcel of land along Caretaker Road which is located to the west of Dante Drive and south of Waterton Road in Douglas County, Colorado. The current uses on this parcel are a residential home sales office, a maintenance facility, and their associated parking lots.

Figure 5 represents the proposed site plan.

IV.B. Project Access

Access for River Canyon Filing 2, Lot 1 will only be along Caretaker Road, with almost all vehicles anticipated to use Waterton Road (95%). A small number (5%) are projected to proceed south along Dante Drive for the purpose of playing golf or for other activities offered for residents of River Canyon.

IV.C. Trip Generation Estimates and Trip Assignment

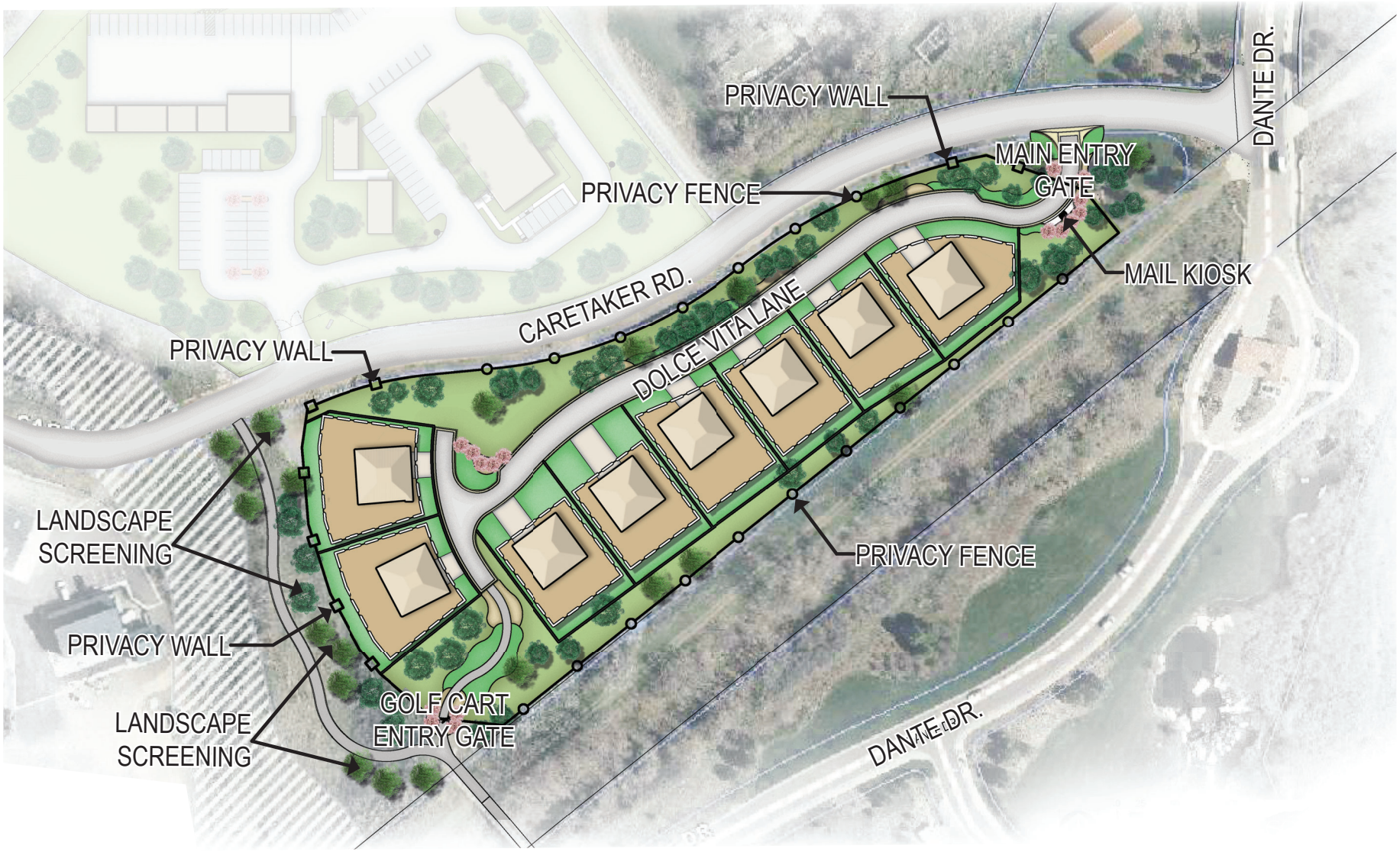
Trip Generation – **Table 1** includes the trip generation estimates for the construction of River Canyon Filing 2, Lot 1, and these estimates are based on information contained in *Trip Generation*, 11th Edition, by the Institute of Transportation Engineers (ITE), 2021.

As indicated in **Table 1**, the residential dwelling units are projected to generate about 100 vehicle-trips on a daily basis, with about 7 and 9 trips during the AM and PM peak hours, respectively.

Table 1. River Canyon Filing 2, Lot 1 Trip Generation Estimates

Land Use	Unit	Size	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Single Family Residential[1]	DU	8	99	2	5	7	6	3	9

[1] Land Use Code 210 (Single-Family Detached Housing).



NORTH

FIGURE 5
Site Plan

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NOTE: Drawing Not to Scale

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Trip Assignment – The assignment of vehicle-trips through Dante Drive is based on the existing travel patterns recorded at the subject intersections. As noted previously, more vehicles on Waterton Road are oriented westbound during the AM peak hour and more eastbound during the PM peak hour. The vehicle trips associated with Filing 2, Lot 1 are anticipated to have the same orientation, and they have been assigned to the two Dante Drive intersections accordingly. **Figure 6** includes the distribution percentages estimated for this project, along with the assignment of the Filing 2, Lot 1 vehicle-trips.

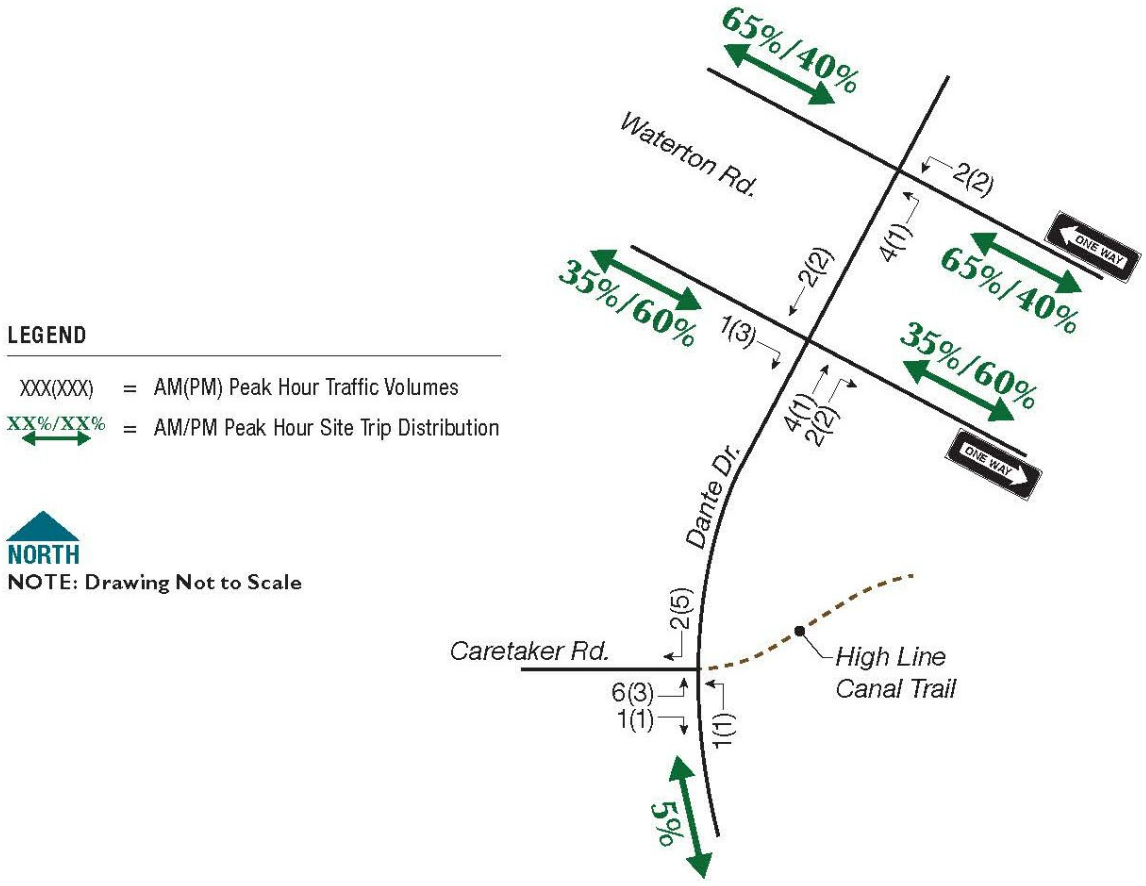


Figure 6. Site Generated Traffic Volumes

IV.D. Total Traffic Volumes

Figure 7 represents the compilation of the site generated traffic volumes (**Figure 6**) and the Build-Out Background traffic volumes (**Figure 4**).

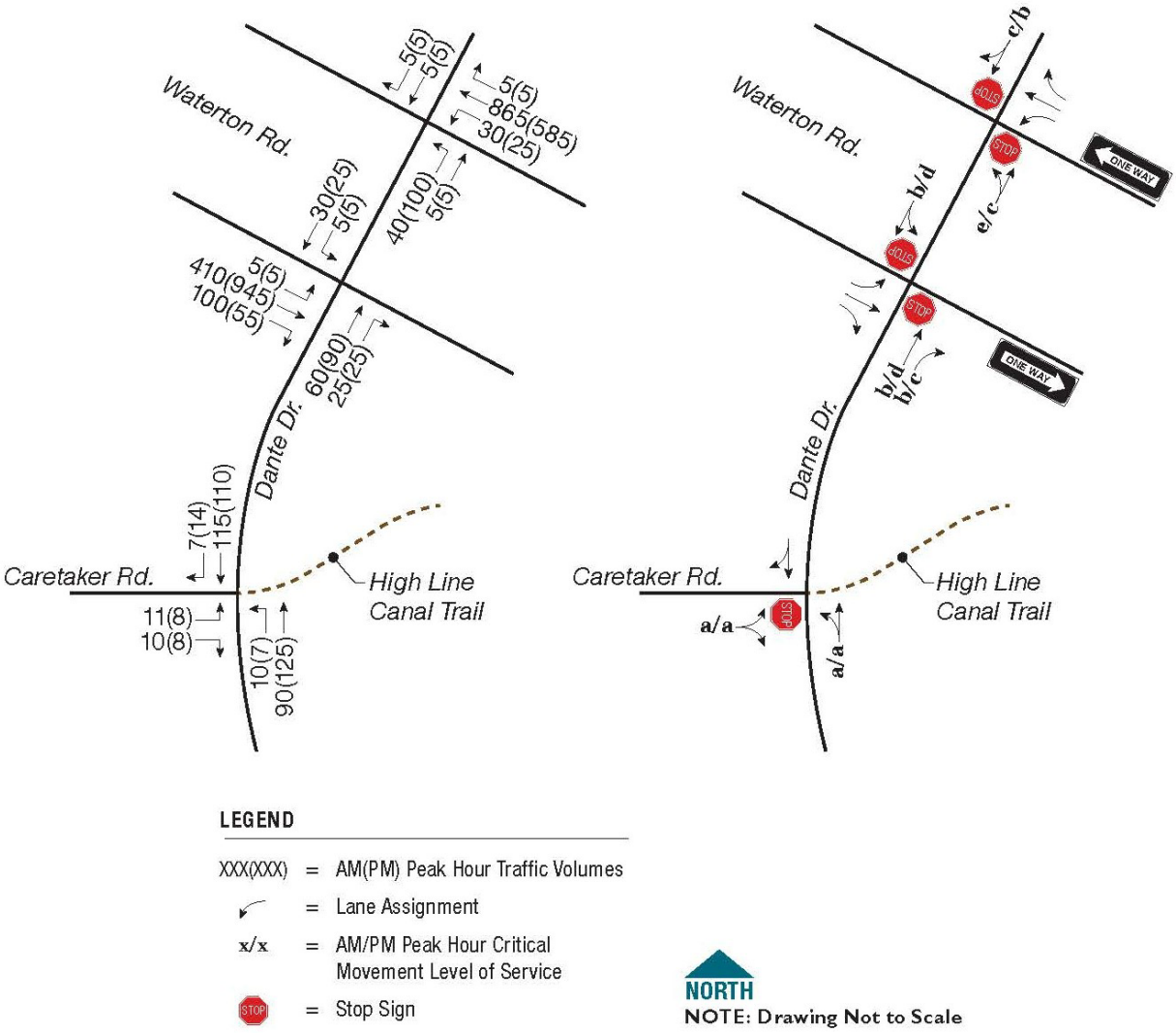


Figure 7. Year 2025 Total Traffic Conditions

IV.E. Auxiliary Lane Requirements

In Section 4.13, Auxiliary Lanes, in the Douglas County *Roadway Design and Construction Standards*, reference is made to using the CDOT *Roadway Design Guide* for auxiliary lane criteria or the *State Highway Access Code* for two-lane roads. These criteria provide information on deceleration lane and taper lengths for left turn and right turn deceleration lanes, and they also provide vehicle storage recommendations for left turn lanes based on the projected number of vehicle turning movements.

Since roadways that River Canyon Filing 2, Lot 1 will access are not state highways, an assessment of the CDOT classification must first be made to understand when the *Access Code* suggests an auxiliary lane should be installed. It is estimated that Waterton Road best matches the criteria of a Regional Highway (R-A). As such, auxiliary lanes should be installed when the number of turning vehicles meet the following thresholds:

- Left Turn Deceleration Lane = >10 vph
- Right Turn Deceleration Lane = > 25 vph
- Right Turn Acceleration Lane = > 50 vph when posted speed is greater than 40 mph; criterion implies that a right turn acceleration lane is not required at a signalized intersection unless a free-right turn lane is needed to maintain appropriate level of service
- Left Turn Acceleration Lane = Required when it benefits safety and roadway operation

As noted in **Section II** of this report, left turn and right turn deceleration lanes exist on Waterton Road on both the eastbound and westbound approaches to the Dante Drive intersections. An exclusive northbound right turn lane also exists on Dante Drive at the Waterton Road (South) intersection with an accompanying acceleration lane on Waterton Road. As such, and given the projected additional traffic volumes related to Filing 2, Lot 1, these existing auxiliary lanes are deemed appropriate to accommodate the vehicle trips that the eight residential dwelling units will contribute to the Dante Drive intersections.

Vehicle movements at the Dante Drive/Caretaker Road intersection are of such a level that the projected turning movements to/from Caretaker Road do not meet any of the Douglas County criteria for the installation of auxiliary lanes.

IV.F. Traffic Control and Intersection Operations

Traffic Signalization Warrants – A traffic signalization warrant assessment was conducted based on information contained in the *Manual on Uniform Traffic Control Devices* (MUTCD) to understand whether either of the Dante Drive intersections may meet the criteria for the installation of a traffic signal by Build-Out of Filing 2, Lot 1.

Only Warrant 3, Peak Hour was evaluated since it is the only one to use with any level of confidence when predicting future intersection turning movements. For this evaluation, Waterton Road is considered to have two lanes, while northbound Dante Drive is considered to have one lane given the existing intersection geometry. The results of this analysis finds that neither peak hour will have traffic volumes sufficient for the installation of a traffic signal. This result is supported by the operational analysis results included in the next section.

Build-Out (2025) Operational Analyses

Operational analyses were conducted following the HCM methodologies noted previously in this report. Movements controlled by stop signs are projected to continue to operate at LOS D or better during both peak hours except for one condition. During the AM peak hour, the northbound through/left lane at the north Dante Drive intersection is projected to include a few additional seconds of delay per vehicle which results in the LOS calculations crossing the boundary between LOS D and E operations such that LOS E will result.

The Dante Drive/Caretaker Road intersection is projected to continue to operate similarly to Existing and Background conditions since very little traffic will be added. As such, intersection movements are projected to operate at LOS A during both peak hours. Refer to **Figure 7** and **Appendix E** for the analysis worksheets for Build-Out conditions.

IV.G. Improvement Recommendations

When considering existing operational conditions, along with a 40% increase in background traffic volumes, and an increase in movements related to River Canyon, the two Waterton Road/Dante Drive intersections are projected to operate with acceptable peak hour LOS with the continued use of stop signs to control vehicle movements. Existing auxiliary lanes are also deemed adequate. As such, intersection infrastructure improvements are not needed to accommodate the change in land use to add the eight additional residential dwelling units. Similarly, intersection improvements are not required at the Dante Drive/Caretaker Road intersection to accommodate the addition of the eight dwelling units.

As noted in **Section II.B**, Douglas County is planning to widen Waterton Road between Wadsworth Boulevard and Rampart Range Road from two to four through lanes by 2030. An assessment of potential laneage revisions and/or traffic control changes at the Dante Drive intersections along Waterton Road should occur as that project is being designed.

V. SUMMARY AND RECOMMENDATIONS

River Canyon Real Estate. LLC is proposing to construct eight (8) residential homes in the River Canyon Planned Development area, specifically in Planning Area 1 (PA-1), located between Caretaker Road (to the north) and the Highline Canal (to the south). This 3.8-acre parcel is currently identified as part of the Golf Course, which encompasses a total of almost 160 acres of the entire development site. It's currently being used for The Club at Ravenna sales office and for golf course maintenance facilities. These existing uses will be relocated to other parts of the Ravenna site upon construction of these eight homes.

Vehicular access will be provided along Caretaker Road, which is currently a long cul-de-sac street that serves varying golf course maintenance buildings and The Club at Ravenna sales office. Caretaker Road intersects with Dante Drive, the main access road into River Canyon. Dante Drive, in turn, intersects with Waterton Road, a major travel route in northwestern Douglas County. New street connections are not planned; the eight residential dwelling units will use existing Caretaker Road and Dante Drive to access the regional street network.

Projected vehicle-trips for River Canyon Filing 2, Lot 1 indicate that there will be about 100 new vehicle-trips on a daily basis, coupled with approximately seven new trips during the AM peak hour and about nine during the PM peak hour.

These traffic volumes were added to projections of Background conditions to create the Build-Out scenario, understood to be in 2025. The resultant level of traffic will not cause any undue congestion or operational issues at Dante Drive intersections along Waterton Road. The Dante Drive intersections are projected to operate at LOS D or better during both the AM and PM peak hours except for the northbound shared through/left movement at the north Dante Drive intersection. This movement is projected to operate at LOS E during the AM peak hour. Vehicle movements at the Dante Drive/Caretaker Road intersection are projected to operate at LOS A during both peak hours.

The Douglas County *2040 Transportation Master Plan* (*Master Plan*) indicates that Waterton Road will be widened from two to four lanes between Wadsworth Boulevard and Rampart Range Road by 2030. Other than these improvements, no other roadway or traffic control improvements are proposed adjacent to River Canyon. An assessment of potential laneage revisions and/or traffic control changes should occur at the Dante Drive intersections as that project is being designed.

APPENDIX A. RECORDED TRAFFIC VOLUMES

All Traffic Data Services

SITE 1_E - WATERTON RD EAST OF DANTE DR

Time	EB	WB	Total
5/24/2022	8	4	12
5/24/2022 12:15:00 AM	4	3	7
5/24/2022 12:30:00 AM	8	3	11
5/24/2022 12:45:00 AM	6	1	7
5/24/2022 1:00:00 AM	4	2	6
5/24/2022 1:15:00 AM	5	0	5
5/24/2022 1:30:00 AM	5	5	10
5/24/2022 1:45:00 AM	5	0	5
5/24/2022 2:00:00 AM	2	0	2
5/24/2022 2:15:00 AM	0	2	2
5/24/2022 2:30:00 AM	0	1	1
5/24/2022 2:45:00 AM	0	6	6
5/24/2022 3:00:00 AM	0	1	1
5/24/2022 3:15:00 AM	0	2	2
5/24/2022 3:30:00 AM	2	8	10
5/24/2022 3:45:00 AM	4	3	7
5/24/2022 4:00:00 AM	2	7	9
5/24/2022 4:15:00 AM	5	5	10
5/24/2022 4:30:00 AM	5	22	27
5/24/2022 4:45:00 AM	5	25	30
5/24/2022 5:00:00 AM	3	38	41
5/24/2022 5:15:00 AM	5	41	46
5/24/2022 5:30:00 AM	18	54	72
5/24/2022 5:45:00 AM	22	95	117
5/24/2022 6:00:00 AM	13	93	106
5/24/2022 6:15:00 AM	30	117	147
5/24/2022 6:30:00 AM	50	156	206
5/24/2022 6:45:00 AM	65	186	251
5/24/2022 7:00:00 AM	67	200	267
5/24/2022 7:15:00 AM	73	231	304
5/24/2022 7:30:00 AM	67	210	277
5/24/2022 7:45:00 AM	96	150	246
5/24/2022 8:00:00 AM	89	173	262
5/24/2022 8:15:00 AM	82	162	244
5/24/2022 8:30:00 AM	80	131	211
5/24/2022 8:45:00 AM	83	133	216
5/24/2022 9:00:00 AM	71	131	202
5/24/2022 9:15:00 AM	74	131	205
5/24/2022 9:30:00 AM	76	107	183
5/24/2022 9:45:00 AM	66	98	164
5/24/2022 10:00:00 AM	68	86	154
5/24/2022 10:15:00 AM	75	86	161
5/24/2022 10:30:00 AM	79	94	173
5/24/2022 10:45:00 AM	79	91	170
5/24/2022 11:00:00 AM	73	97	170
5/24/2022 11:15:00 AM	92	85	177
5/24/2022 11:30:00 AM	107	101	208
5/24/2022 11:45:00 AM	93	102	195
Total	1,866	3,479	5,345
Percentage	34.9%	65.1%	
Peak Hour	11:00 AM	6:45 AM	6:45 AM
Volume	365	827	1,099
PHF	0.853	0.895	0.904

All Traffic Data Services

SITE 1_E - WATERTON RD EAST OF DANTE DR

Time	EB	WB	Total
5/24/2022 12:00:00 PM	90	97	187
5/24/2022 12:15:00 PM	103	84	187
5/24/2022 12:30:00 PM	104	106	210
5/24/2022 12:45:00 PM	67	93	160
5/24/2022 1:00:00 PM	99	81	180
5/24/2022 1:15:00 PM	91	103	194
5/24/2022 1:30:00 PM	85	83	168
5/24/2022 1:45:00 PM	102	95	197
5/24/2022 2:00:00 PM	104	75	179
5/24/2022 2:15:00 PM	92	96	188
5/24/2022 2:30:00 PM	108	113	221
5/24/2022 2:45:00 PM	101	111	212
5/24/2022 3:00:00 PM	141	118	259
5/24/2022 3:15:00 PM	169	98	267
5/24/2022 3:30:00 PM	179	111	290
5/24/2022 3:45:00 PM	107	49	156
5/24/2022 4:00:00 PM	179	102	281
5/24/2022 4:15:00 PM	174	124	298
5/24/2022 4:30:00 PM	184	109	293
5/24/2022 4:45:00 PM	183	121	304
5/24/2022 5:00:00 PM	208	139	347
5/24/2022 5:15:00 PM	209	125	334
5/24/2022 5:30:00 PM	175	100	275
5/24/2022 5:45:00 PM	173	75	248
5/24/2022 6:00:00 PM	163	94	257
5/24/2022 6:15:00 PM	132	79	211
5/24/2022 6:30:00 PM	117	64	181
5/24/2022 6:45:00 PM	101	37	138
5/24/2022 7:00:00 PM	110	47	157
5/24/2022 7:15:00 PM	74	49	123
5/24/2022 7:30:00 PM	87	34	121
5/24/2022 7:45:00 PM	85	37	122
5/24/2022 8:00:00 PM	74	31	105
5/24/2022 8:15:00 PM	70	29	99
5/24/2022 8:30:00 PM	68	13	81
5/24/2022 8:45:00 PM	56	22	78
5/24/2022 9:00:00 PM	42	26	68
5/24/2022 9:15:00 PM	48	14	62
5/24/2022 9:30:00 PM	48	15	63
5/24/2022 9:45:00 PM	40	10	50
5/24/2022 10:00:00 PM	28	8	36
5/24/2022 10:15:00 PM	18	7	25
5/24/2022 10:30:00 PM	27	6	33
5/24/2022 10:45:00 PM	18	7	25
5/24/2022 11:00:00 PM	19	3	22
5/24/2022 11:15:00 PM	15	4	19
5/24/2022 11:30:00 PM	10	1	11
5/24/2022 11:45:00 PM	8	1	9
Total	4,685	3,046	7,731
Percentage	60.6%	39.4%	
Peak Hour	4:30 PM	4:30 PM	4:30 PM
Volume	784	495	1,279
PHF	0.938	0.890	0.921
Grand Total	6,551	6,525	13,076
Percentage	50.1%	49.9%	

All Traffic Data Services

SITE 1_W - WATERTON RD WEST OF DANTE DR

Time	EB	WB	Total
5/24/2022	8	4	12
5/24/2022 12:15:00 AM	4	3	7
5/24/2022 12:30:00 AM	7	5	12
5/24/2022 12:45:00 AM	6	1	7
5/24/2022 1:00:00 AM	5	2	7
5/24/2022 1:15:00 AM	5	0	5
5/24/2022 1:30:00 AM	4	5	9
5/24/2022 1:45:00 AM	6	0	6
5/24/2022 2:00:00 AM	2	0	2
5/24/2022 2:15:00 AM	0	2	2
5/24/2022 2:30:00 AM	0	1	1
5/24/2022 2:45:00 AM	0	6	6
5/24/2022 3:00:00 AM	0	1	1
5/24/2022 3:15:00 AM	0	2	2
5/24/2022 3:30:00 AM	2	8	10
5/24/2022 3:45:00 AM	4	3	7
5/24/2022 4:00:00 AM	2	7	9
5/24/2022 4:15:00 AM	5	6	11
5/24/2022 4:30:00 AM	7	22	29
5/24/2022 4:45:00 AM	5	25	30
5/24/2022 5:00:00 AM	3	38	41
5/24/2022 5:15:00 AM	6	42	48
5/24/2022 5:30:00 AM	24	56	80
5/24/2022 5:45:00 AM	25	95	120
5/24/2022 6:00:00 AM	15	97	112
5/24/2022 6:15:00 AM	34	125	159
5/24/2022 6:30:00 AM	50	157	207
5/24/2022 6:45:00 AM	76	185	261
5/24/2022 7:00:00 AM	81	201	282
5/24/2022 7:15:00 AM	93	227	320
5/24/2022 7:30:00 AM	91	210	301
5/24/2022 7:45:00 AM	110	157	267
5/24/2022 8:00:00 AM	102	183	285
5/24/2022 8:15:00 AM	97	160	257
5/24/2022 8:30:00 AM	92	134	226
5/24/2022 8:45:00 AM	98	126	224
5/24/2022 9:00:00 AM	79	134	213
5/24/2022 9:15:00 AM	84	131	215
5/24/2022 9:30:00 AM	88	107	195
5/24/2022 9:45:00 AM	80	101	181
5/24/2022 10:00:00 AM	83	89	172
5/24/2022 10:15:00 AM	74	96	170
5/24/2022 10:30:00 AM	84	102	186
5/24/2022 10:45:00 AM	83	97	180
5/24/2022 11:00:00 AM	78	107	185
5/24/2022 11:15:00 AM	94	94	188
5/24/2022 11:30:00 AM	111	109	220
5/24/2022 11:45:00 AM	94	109	203
Total	2,101	3,572	5,673
Percentage	37.0%	63.0%	
Peak Hour	7:45 AM	6:45 AM	7:15 AM
Volume	401	824	1,175
PHF	0.911	0.907	0.918

All Traffic Data Services

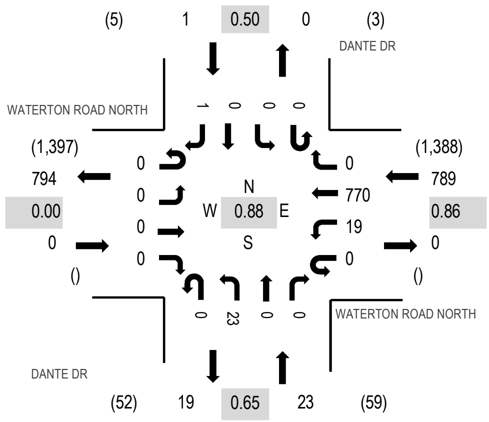
SITE 1_W - WATERTON RD WEST OF DANTE DR

Time	EB	WB	Total
5/24/2022 12:00:00 PM	103	100	203
5/24/2022 12:15:00 PM	101	87	188
5/24/2022 12:30:00 PM	102	111	213
5/24/2022 12:45:00 PM	73	97	170
5/24/2022 1:00:00 PM	99	80	179
5/24/2022 1:15:00 PM	88	111	199
5/24/2022 1:30:00 PM	96	85	181
5/24/2022 1:45:00 PM	107	100	207
5/24/2022 2:00:00 PM	106	81	187
5/24/2022 2:15:00 PM	99	107	206
5/24/2022 2:30:00 PM	118	119	237
5/24/2022 2:45:00 PM	104	121	225
5/24/2022 3:00:00 PM	147	138	285
5/24/2022 3:15:00 PM	173	111	284
5/24/2022 3:30:00 PM	185	126	311
5/24/2022 3:45:00 PM	113	59	172
5/24/2022 4:00:00 PM	189	113	302
5/24/2022 4:15:00 PM	177	135	312
5/24/2022 4:30:00 PM	188	122	310
5/24/2022 4:45:00 PM	186	137	323
5/24/2022 5:00:00 PM	214	150	364
5/24/2022 5:15:00 PM	212	135	347
5/24/2022 5:30:00 PM	184	118	302
5/24/2022 5:45:00 PM	179	80	259
5/24/2022 6:00:00 PM	163	102	265
5/24/2022 6:15:00 PM	135	82	217
5/24/2022 6:30:00 PM	121	65	186
5/24/2022 6:45:00 PM	105	47	152
5/24/2022 7:00:00 PM	108	52	160
5/24/2022 7:15:00 PM	77	52	129
5/24/2022 7:30:00 PM	89	32	121
5/24/2022 7:45:00 PM	88	38	126
5/24/2022 8:00:00 PM	78	27	105
5/24/2022 8:15:00 PM	74	38	112
5/24/2022 8:30:00 PM	71	12	83
5/24/2022 8:45:00 PM	59	23	82
5/24/2022 9:00:00 PM	44	25	69
5/24/2022 9:15:00 PM	49	16	65
5/24/2022 9:30:00 PM	50	15	65
5/24/2022 9:45:00 PM	44	10	54
5/24/2022 10:00:00 PM	29	8	37
5/24/2022 10:15:00 PM	19	8	27
5/24/2022 10:30:00 PM	30	6	36
5/24/2022 10:45:00 PM	19	8	27
5/24/2022 11:00:00 PM	21	3	24
5/24/2022 11:15:00 PM	15	4	19
5/24/2022 11:30:00 PM	10	1	11
5/24/2022 11:45:00 PM	8	1	9
Total	4,849	3,298	8,147
Percentage	59.5%	40.5%	
Peak Hour	4:30 PM	4:15 PM	4:30 PM
Volume	800	545	1,345
PHF	0.935	0.908	0.924
Grand Total	6,950	6,870	13,820
Percentage	50.3%	49.7%	

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

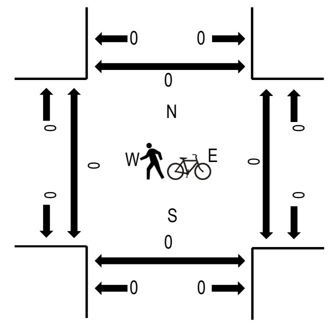
Location: 1 DANTE DR & WATERTON ROAD NORTH AM
Date: Tuesday, May 24, 2022
Peak Hour: 07:00 AM - 08:00 AM
Peak 15-Minutes: 07:15 AM - 07:30 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



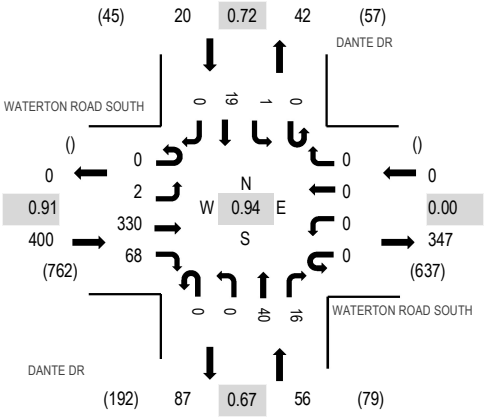
Traffic Counts

Interval Start Time	WATERTON ROAD NORTH Eastbound U-Turn	Left	Thru	Right	WATERTON ROAD NORTH Westbound U-Turn	Left	Thru	Right	DANTE DR Northbound U-Turn	Left	Thru	Right	DANTE DR Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour	Pedestrian Crossings West	East	South	North
7:00 AM	0	0	0	0	0	4	196	0	0	5	0	0	0	0	0	0	205	813	0	0	0	0
7:15 AM	0	0	0	0	0	5	224	0	0	3	0	0	0	0	0	0	232	798	0	0	0	0
7:30 AM	0	0	0	0	0	7	203	0	0	5	0	0	0	0	0	1	216	736	0	0	0	0
7:45 AM	0	0	0	0	0	3	147	0	0	10	0	0	0	0	0	0	160	662	0	0	0	0
8:00 AM	0	0	0	0	0	4	166	3	0	17	0	0	0	0	0	0	190	639	0	0	0	0
8:15 AM	0	0	0	0	0	8	154	0	0	6	0	0	0	0	2	0	170		0	0	0	0
8:30 AM	0	0	0	0	0	8	123	0	0	11	0	0	0	0	0	0	142		0	0	0	0
8:45 AM	0	0	0	0	0	9	124	0	0	2	0	0	0	0	2	0	137		0	0	0	0
Count Total	0	0	0	0	0	48	1,337	3	0	59	0	0	0	0	4	1	1,452		0	0	0	0
Peak Hour	0	0	0	0	0	19	770	0	0	23	0	0	0	0	0	1	813		0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

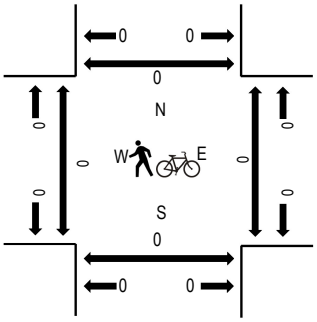
Location: 2 DANTE DR & WATERTON ROAD SOUTH AM
Date: Tuesday, May 24, 2022
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



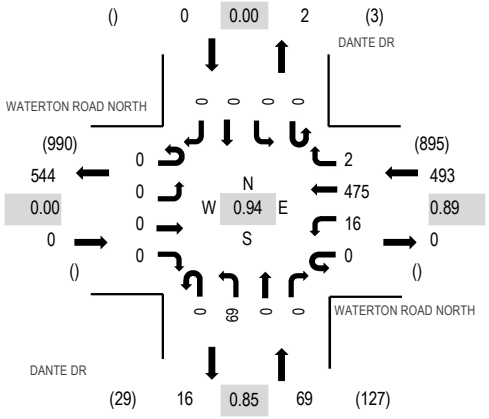
Traffic Counts

Interval Start Time	WATERTON ROAD SOUTH Eastbound				WATERTON ROAD SOUTH Westbound				DANTE DR Northbound				DANTE DR Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	0	62	19	0	0	0	0	0	0	5	4	0	1	3	0	94	425	0	0	0	0
7:15 AM	0	0	71	22	0	0	0	0	0	0	3	1	0	1	5	0	103	457	0	0	0	0
7:30 AM	0	0	66	24	0	0	0	0	0	0	5	1	0	0	6	0	102	467	0	0	0	0
7:45 AM	0	0	93	17	0	0	0	0	0	0	10	3	0	0	3	0	126	476	0	0	0	0
8:00 AM	0	0	84	18	0	0	0	0	0	0	16	5	0	0	3	0	126	461	0	0	0	0
8:15 AM	0	2	77	18	0	0	0	0	0	0	5	4	0	1	6	0	113		0	0	0	0
8:30 AM	0	0	76	15	0	0	0	0	0	0	9	4	0	0	7	0	111		0	0	0	0
8:45 AM	0	2	79	17	0	0	0	0	0	0	0	4	0	0	9	0	111		0	0	0	0
Count Total	0	4	608	150	0	0	0	0	0	0	53	26	0	3	42	0	886		0	0	0	0
Peak Hour	0	2	330	68	0	0	0	0	0	0	40	16	0	1	19	0	476		0	0	0	0

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

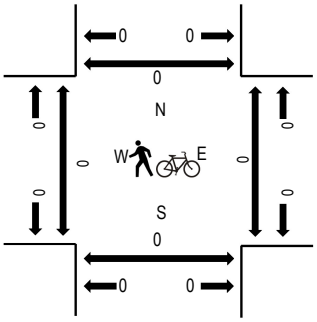
Location: 1 DANTE DR & WATERTON ROAD NORTH PM
Date: Tuesday, May 24, 2022
Peak Hour: 04:15 PM - 05:15 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



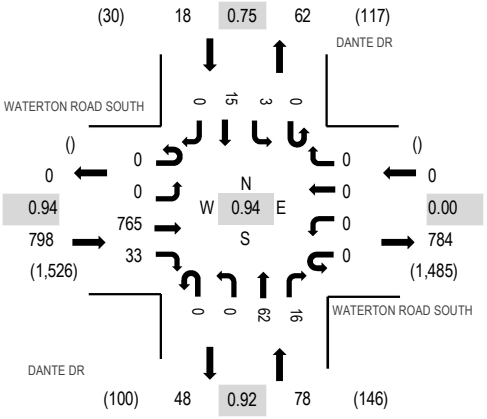
Traffic Counts

Interval Start Time	WATERTON ROAD NORTH Eastbound				WATERTON ROAD NORTH Westbound				DANTE DR Northbound				DANTE DR Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	0	0	0	0	5	96	1	0	17	0	0	0	0	0	0	119	531	0	0	0	0
4:15 PM	0	0	0	0	0	5	118	1	0	17	0	0	0	0	0	0	141	562	0	0	0	0
4:30 PM	0	0	0	0	0	5	103	1	0	19	0	0	0	0	0	0	128	561	0	0	0	0
4:45 PM	0	0	0	0	0	6	115	0	0	22	0	0	0	0	0	0	143	553	0	0	0	0
5:00 PM	0	0	0	0	0	0	139	0	0	11	0	0	0	0	0	0	150	491	0	0	0	0
5:15 PM	0	0	0	0	0	5	120	0	0	15	0	0	0	0	0	0	140		0	0	0	0
5:30 PM	0	0	0	0	0	2	98	0	0	20	0	0	0	0	0	0	120		0	0	0	0
5:45 PM	0	0	0	0	0	1	74	0	0	6	0	0	0	0	0	0	81		0	0	0	0
Count Total	0	0	0	0	0	29	863	3	0	127	0	0	0	0	0	0	1,022		0	0	0	0
Peak Hour	0	0	0	0	0	16	475	2	0	69	0	0	0	0	0	0	562		0	0	0	0

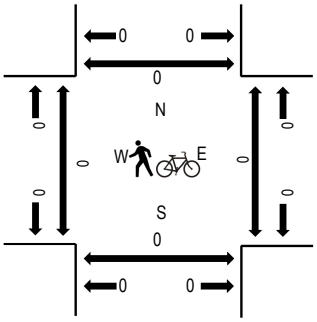
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 2 DANTE DR & WATERTON ROAD SOUTH PM
Date: Tuesday, May 24, 2022
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 05:15 PM - 05:30 PM

Peak Hour - All Vehicles



Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

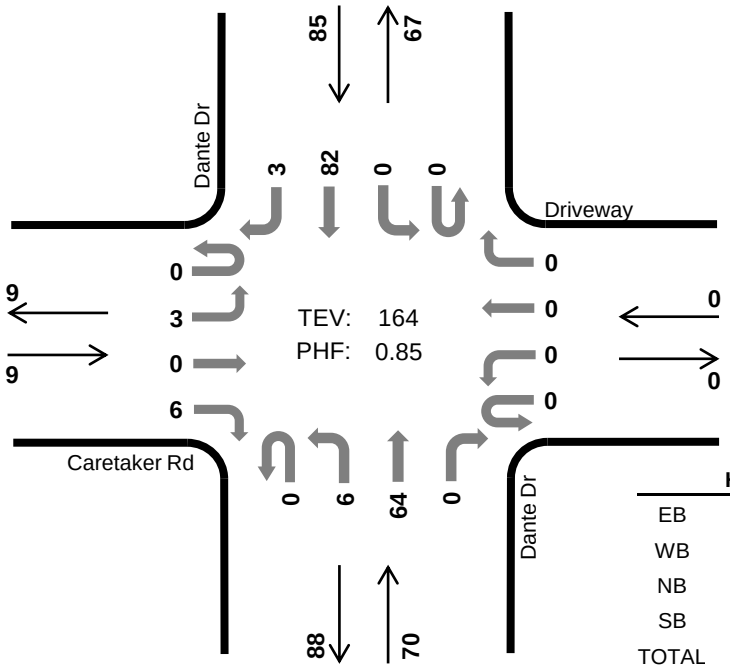
Traffic Counts

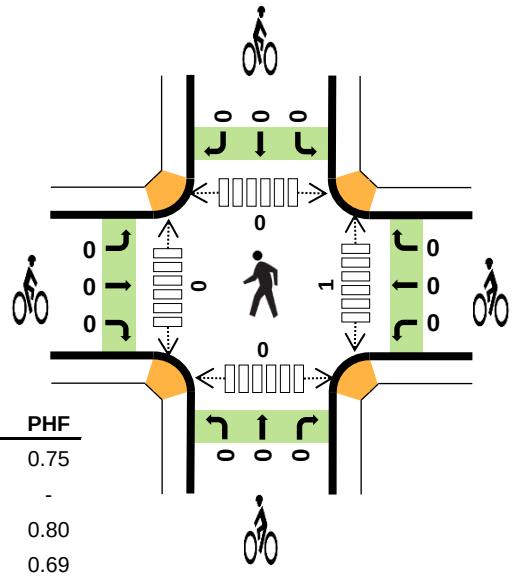
Interval Start Time	WATERTON ROAD SOUTH Eastbound				WATERTON ROAD SOUTH Westbound				DANTE DR Northbound				DANTE DR Southbound					Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:00 PM	0	0	174	15	0	0	0	0	0	0	17	5	0	0	5	0	216	848	0	0	0	0
4:15 PM	0	0	171	6	0	0	0	0	0	0	17	3	0	0	5	0	202	857	0	0	0	0
4:30 PM	0	0	180	7	0	0	0	0	0	0	18	4	0	0	4	0	213	894	0	0	0	0
4:45 PM	0	0	178	8	0	0	0	0	0	0	20	4	0	1	6	0	217	885	0	0	0	0
5:00 PM	0	0	205	8	0	0	0	0	0	0	9	3	0	0	0	0	225	854	0	0	0	0
5:15 PM	0	0	202	10	0	0	0	0	0	0	15	5	0	2	5	0	239		0	0	0	0
5:30 PM	0	0	171	12	0	0	0	0	0	0	16	4	0	0	1	0	204		0	0	0	0
5:45 PM	0	0	172	7	0	0	0	0	0	0	5	1	0	0	1	0	186		0	0	0	0
Count Total	0	0	1,453	73	0	0	0	0	0	0	117	29	0	3	27	0	1,702		0	0	0	0
Peak Hour	0	0	765	33	0	0	0	0	0	0	62	16	0	3	15	0	894		0	0	0	0

Dante Dr
Caretaker Rd

Peak Hour

Date: 05/08/2024
Count Period: 6:30 AM to 8:30 AM
Peak Hour: 7:30 AM to 8:30 AM





	HV %:	PHF
EB	0.0%	0.75
WB	-	-
NB	5.7%	0.80
SB	2.4%	0.69
TOTAL	3.7%	0.85

Two-Hour Count Summaries

Interval Start	Caretaker Rd Eastbound				Driveway Westbound				Dante Dr Northbound				Dante Dr Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
6:30 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	3	9	18	0
6:45 AM	0	2	0	2	0	0	0	0	0	0	10	0	0	0	9	8	31	0
7:00 AM	0	1	0	11	0	0	0	0	0	0	6	0	0	0	14	2	34	0
7:15 AM	0	3	0	0	0	0	0	0	0	0	14	0	0	0	19	2	38	121
7:30 AM	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**1**	**21**	**0**	**0**	**0**	**16**	**1**	**42**	145
7:45 AM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**16**	**0**	**0**	**0**	**16**	**1**	**35**	149
8:00 AM	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**3**	**14**	**0**	**0**	**0**	**19**	**1**	**39**	154
8:15 AM	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**1**	**13**	**0**	**0**	**0**	**31**	**0**	**48**	**164**
Count Total	0	9	0	19	0	0	0	0	0	6	100	0	0	0	127	24	285	0
Peak Hour All	**0**	**3**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**6**	**64**	**0**	**0**	**0**	**82**	**3**	**164**	**0**
Peak Hour HV	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**2**	**0**	**6**	**0**
Peak Hour HV%	**-**	**0%**	**-**	**0%**	**-**	**-**	**-**	**-**	**-**	**0%**	**6%**	**-**	**-**	**-**	**2%**	**0%**	**4%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

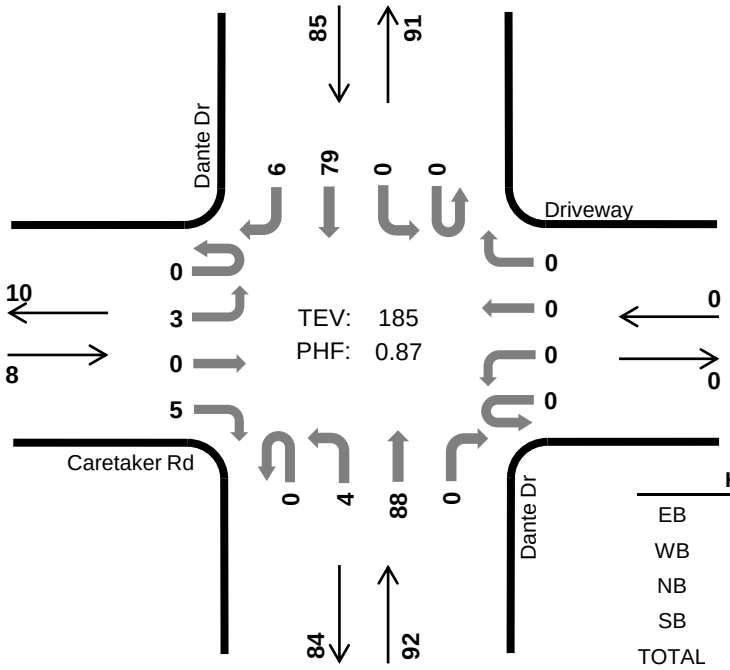
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
6:30 AM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	0	*0*
6:45 AM	0	0	0	1	*1*	0	0	0	0	*0*	0	0	0	0	*0*
7:00 AM	1	0	0	1	*2*	0	0	0	0	*0*	0	0	0	0	*0*
7:15 AM	0	0	1	3	*4*	0	0	0	0	*0*	0	0	0	0	*0*
7:30 AM	**0**	**0**	**1**	**0**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
7:45 AM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
8:00 AM	**0**	**0**	**3**	**1**	***4***	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**0**	*1*
8:15 AM	**0**	**0**	**0**	**1**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
Count Total	1	0	5	7	*13*	0	0	0	0	*0*	1	0	0	0	*1*
Peak Hour	**0**	**0**	**4**	**2**	***6***	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**0**	***1***

TJ Wethington
720-646-1008
tj.wethington@idaxdata.com

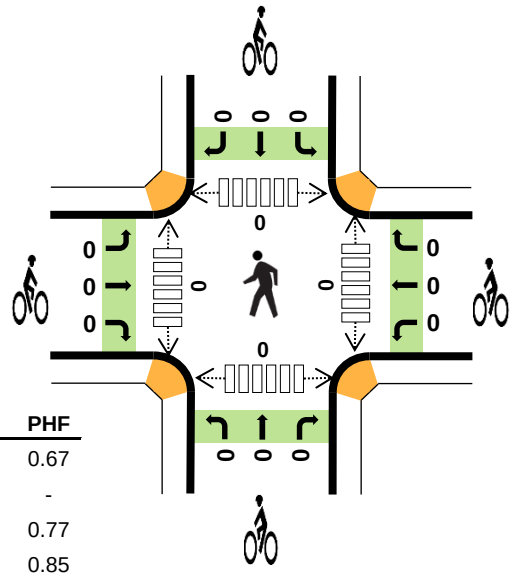
Dante Dr
Caretaker Rd

Peak Hour

Date: 05/08/2024
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM



	HV %:	PHF
EB	0.0%	0.67
WB	-	-
NB	3.3%	0.77
SB	0.0%	0.85
TOTAL	1.6%	0.87



Two-Hour Count Summaries

Interval Start	Caretaker Rd Eastbound				Driveway Westbound				Dante Dr Northbound				Dante Dr Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**28**	**0**	**0**	**0**	**18**	**2**	**53**	0
4:15 PM	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**23**	**0**	**0**	**0**	**23**	**2**	**51**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**0**	**0**	**0**	**18**	**1**	**38**	0
4:45 PM	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**18**	**0**	**0**	**0**	**20**	**1**	**43**	**185**
5:00 PM	0	1	0	1	0	0	0	0	0	0	29	0	0	0	20	0	51	183
5:15 PM	0	0	0	1	0	0	0	0	0	1	17	0	0	0	9	1	29	161
5:30 PM	0	0	0	0	0	0	0	0	0	0	18	0	0	0	15	0	33	156
5:45 PM	0	0	0	1	0	0	0	0	0	0	20	0	0	0	9	1	31	144
Count Total	0	4	0	8	0	0	0	0	0	5	172	0	0	0	132	8	329	0
Peak Hour All	**0**	**3**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**4**	**88**	**0**	**0**	**0**	**79**	**6**	**185**	**0**
Peak Hour HV	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**3**	**0**
Peak Hour HV%	**-**	**0%**	**-**	**0%**	**-**	**-**	**-**	**-**	**-**	**0%**	**3%**	**-**	**-**	**-**	**0%**	**0%**	**2%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**0**	**1**	**0**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:15 PM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:30 PM	**0**	**0**	**1**	**0**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**0**	**0**	**1**	**0**	***1***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:00 PM	0	0	4	0	*4*	0	0	0	0	*0*	0	0	0	0	*0*
5:15 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	0	0	1	0	*1*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	0	0	8	0	*8*	0	0	0	0	*0*	0	0	0	0	*0*
Peak Hour	**0**	**0**	**3**	**0**	***3***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***

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APPENDIX B. LEVEL OF SERVICE CRITERIA

TABLE B1
LEVEL OF SERVICE CRITERIA FOR TWO-WAY STOP-CONTROLLED (TWSC) INTERSECTIONS, ALL-WAY STOP-CONTROLLED (AWSC) INTERSECTIONS, AND ROUNDABOUTS

Level of Service	Delay Range (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	> 50

Adapted from: *Highway Capacity Manual*, Transportation Research Board, 2022.

TABLE B2
LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service	Control Delay (sec/veh)	Qualitative Description
A	≤ 10	Good progression, short cycles, very few vehicle-stops.
B	>10 - 20	Good progression, and/or short cycle lengths, more vehicle-stops.
C	>20 - 35	Fair progression and/or longer cycle lengths, some individual cycle failures, many vehicle-stops
D	>35 - 55	Noticeable congestion and cycle failures, unfavorable progression, high v/c ratios, several stops.
E	>55 - 80	Limit of acceptable delay, poor progression, long cycles, high v/c ratios, frequent cycle failures.
F	> 80	Delay is unacceptable to most drivers, volume exceeds capacity, breakdown of traffic flow.

Adapted from: *Highway Capacity Manual*, Transportation Research Board, 2022.

APPENDIX C. ANALYSIS WORKSHEETS – EXISTING CONDITIONS

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	19	700	0	23	0	0	0	0	1
Future Vol, veh/h	0	0	0	19	700	0	23	0	0	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	150	-	360	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	86	86	86	65	65	92	92	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	22	814	0	35	0	0	0	0	2

Major/Minor	Major2			Minor1			Minor2			
Conflicting Flow All	0	0	0	859	858	-	-	858	814	
Stage 1	-	-	-	0	0	-	-	858	-	
Stage 2	-	-	-	859	858	-	-	0	-	
Critical Hdwy	4.12	-	-	7.12	6.52	-	-	6.52	6.22	
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.52	-	
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-	-	-	-	
Follow-up Hdwy	2.218	-	-	3.518	4.018	-	-	4.018	3.318	
Pot Cap-1 Maneuver	-	-	-	277	294	0	0	294	378	
Stage 1	-	-	-	-	-	0	0	374	-	
Stage 2	-	-	-	351	374	0	0	-	-	
Platoon blocked, %		-	-							
Mov Cap-1 Maneuver	-	-	-	276	294	-	-	294	378	
Mov Cap-2 Maneuver	-	-	-	276	294	-	-	294	-	
Stage 1	-	-	-	-	-	-	-	374	-	
Stage 2	-	-	-	349	374	-	-	-	-	

Approach	WB	NB	SB
HCM Control Delay, s		20	14.6
HCM LOS		C	B

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	276	-	-	-	378
HCM Lane V/C Ratio	0.128	-	-	-	0.005
HCM Control Delay (s)	20	-	-	-	14.6
HCM Lane LOS	C	-	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	-	0

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	330	68	0	0	0	0	40	16	1	19	0
Future Vol, veh/h	2	330	68	0	0	0	0	40	16	1	19	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	115	-	-	-	-	-	65	-	-	-
Veh in Median Storage, #	-	0	-	-	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	92	92	92	92	67	67	72	72	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	363	75	0	0	0	0	60	24	1	26	0

Major/Minor	Major1			Minor1			Minor2			
Conflicting Flow All	0	0	0	-	367	363	447	442	-	
Stage 1	-	-	-	-	367	-	0	0	-	
Stage 2	-	-	-	-	0	-	447	442	-	
Critical Hdwy	4.12	-	-	-	6.52	6.22	7.12	6.52	-	
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	-	4.018	3.318	3.518	4.018	-	
Pot Cap-1 Maneuver	-	-	-	0	562	682	522	510	0	
Stage 1	-	-	-	0	622	-	-	-	0	
Stage 2	-	-	-	0	-	-	591	576	0	
Platoon blocked, %		-	-							
Mov Cap-1 Maneuver	-	-	-	-	562	682	462	510	-	
Mov Cap-2 Maneuver	-	-	-	-	562	-	462	510	-	
Stage 1	-	-	-	-	622	-	-	-	-	
Stage 2	-	-	-	-	-	-	516	576	-	

Approach	EB	NB	SB
HCM Control Delay, s		11.7	12.5
HCM LOS		B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	562	682	-	-	-	507
HCM Lane V/C Ratio	0.106	0.035	-	-	-	0.055
HCM Control Delay (s)	12.2	10.5	-	-	-	12.5
HCM Lane LOS	B	B	-	-	-	B
HCM 95th %tile Q(veh)	0.4	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	16	475	2	69	0	0	0	0	0
Future Vol, veh/h	0	0	0	16	475	2	69	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	150	-	360	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	89	89	89	85	85	85	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	18	534	2	81	0	0	0	0	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	571	572	-	-	570	534
Stage 1	-	-	-	0	0	-	-	570	-
Stage 2	-	-	-	571	572	-	-	0	-
Critical Hdwy	4.12	-	-	7.12	6.52	-	-	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.52	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-	-	-	-
Follow-up Hdwy	2.218	-	-	3.518	4.018	-	-	4.018	3.318
Pot Cap-1 Maneuver	-	-	-	432	430	0	0	431	546
Stage 1	-	-	-	-	-	0	0	505	-
Stage 2	-	-	-	506	504	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	432	430	-	-	431	546
Mov Cap-2 Maneuver	-	-	-	432	430	-	-	431	-
Stage 1	-	-	-	-	-	-	-	505	-
Stage 2	-	-	-	506	504	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		15.3	0
HCM LOS		C	A

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	432	-	-	-	-
HCM Lane V/C Ratio	0.188	-	-	-	-
HCM Control Delay (s)	15.3	-	-	-	0
HCM Lane LOS	C	-	-	-	A
HCM 95th %tile Q(veh)	0.7	-	-	-	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	765	33	0	0	0	0	62	16	3	15	0
Future Vol, veh/h	0	765	33	0	0	0	0	62	16	3	15	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	115	-	-	-	-	-	65	-	-	-
Veh in Median Storage, #	-	0	-	-	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	92	92	92	92	92	92	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	814	35	0	0	0	0	67	17	4	20	0

Major/Minor	Major1			Minor1			Minor2			
Conflicting Flow All	0	0	0	-	814	814	874	849	-	
Stage 1	-	-	-	-	814	-	0	0	-	
Stage 2	-	-	-	-	0	-	874	849	-	
Critical Hdwy	4.12	-	-	-	6.52	6.22	7.12	6.52	-	
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	-	4.018	3.318	3.518	4.018	-	
Pot Cap-1 Maneuver	-	-	-	0	312	378	270	298	0	
Stage 1	-	-	-	0	391	-	-	-	0	
Stage 2	-	-	-	0	-	-	344	377	0	
Platoon blocked, %		-	-							
Mov Cap-1 Maneuver	-	-	-	-	312	378	215	298	-	
Mov Cap-2 Maneuver	-	-	-	-	312	-	215	298	-	
Stage 1	-	-	-	-	391	-	-	-	-	
Stage 2	-	-	-	-	-	-	272	377	-	

Approach	EB	NB	SB
HCM Control Delay, s	0	18.7	19.1
HCM LOS		C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	312	378	-	-	-	280
HCM Lane V/C Ratio	0.216	0.046	-	-	-	0.086
HCM Control Delay (s)	19.7	15	0	-	-	19.1
HCM Lane LOS	C	C	A	-	-	C
HCM 95th %tile Q(veh)	0.8	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	6	6	64	82	3
Future Vol, veh/h	3	6	6	64	82	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	80	80	69	69
Heavy Vehicles, %	0	0	6	6	3	3
Mvmt Flow	4	8	8	80	119	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	217	121	123	0	-	0
Stage 1	121	-	-	-	-	-
Stage 2	96	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.16	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.254	-	-	-
Pot Cap-1 Maneuver	776	936	1440	-	-	-
Stage 1	909	-	-	-	-	-
Stage 2	933	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	771	936	1440	-	-	-
Mov Cap-2 Maneuver	771	-	-	-	-	-
Stage 1	904	-	-	-	-	-
Stage 2	933	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1440	-	874	-	-
HCM Lane V/C Ratio	0.005	-	0.014	-	-
HCM Control Delay (s)	7.5	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	5	4	88	79	6
Future Vol, veh/h	3	5	4	88	79	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	67	67	77	77	85	85
Heavy Vehicles, %	0	0	4	4	0	0
Mvmt Flow	4	7	5	114	93	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	221	97	100	0	-	0
Stage 1	97	-	-	-	-	-
Stage 2	124	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	772	965	1480	-	-	-
Stage 1	932	-	-	-	-	-
Stage 2	907	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	769	965	1480	-	-	-
Mov Cap-2 Maneuver	769	-	-	-	-	-
Stage 1	928	-	-	-	-	-
Stage 2	907	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.1	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1480	-	881	-	-
HCM Lane V/C Ratio	0.004	-	0.014	-	-
HCM Control Delay (s)	7.4	0	9.1	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

APPENDIX D. ANALYSIS WORKSHEETS – BUILD-OUT (2025) BACKGROUND CONDITIONS

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	410	100	0	0	0	0	60	25	5	30	0
Future Vol, veh/h	5	410	100	0	0	0	0	60	25	5	30	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	115	-	-	-	-	-	65	-	-	-
Veh in Median Storage, #	-	0	-	-	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	92	92	92	92	67	67	72	72	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	451	110	0	0	0	0	90	37	7	42	0

Major/Minor	Major1			Minor1			Minor2			
Conflicting Flow All	0	0	0	-	461	451	580	571	-	
Stage 1	-	-	-	-	461	-	0	0	-	
Stage 2	-	-	-	-	0	-	580	571	-	
Critical Hdwy	4.12	-	-	-	6.52	6.22	7.12	6.52	-	
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	-	4.018	3.318	3.518	4.018	-	
Pot Cap-1 Maneuver	-	-	-	0	497	608	426	431	0	
Stage 1	-	-	-	0	565	-	-	-	0	
Stage 2	-	-	-	0	-	-	500	505	0	
Platoon blocked, %		-	-							
Mov Cap-1 Maneuver	-	-	-	-	497	608	345	431	-	
Mov Cap-2 Maneuver	-	-	-	-	497	-	345	431	-	
Stage 1	-	-	-	-	565	-	-	-	-	
Stage 2	-	-	-	-	-	-	395	505	-	

Approach	EB	NB	SB
HCM Control Delay, s		13.1	14.8
HCM LOS		B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	497	608	-	-	-	416
HCM Lane V/C Ratio	0.18	0.061	-	-	-	0.117
HCM Control Delay (s)	13.8	11.3	-	-	-	14.8
HCM Lane LOS	B	B	-	-	-	B
HCM 95th %tile Q(veh)	0.7	0.2	-	-	-	0.4

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	30	865	5	35	5	0	0	5	5
Future Vol, veh/h	0	0	0	30	865	5	35	5	0	0	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	150	-	360	-	-	-	-	-	-
Veh in Median Storage, #	-3	2768	0	-	-	0	-	-	0	-	-	0
Grade, %	-	0	-	-	-	0	-	-	0	-	-	0
Peak Hour Factor	92	92	92	86	86	86	65	65	92	92	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	35	1006	6	54	8	0	0	10	10

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	1089	1082	-	-	1076	1006
Stage 1	-	-	-	0	0	-	-	1076	-
Stage 2	-	-	-	1089	1082	-	-	0	-
Critical Hdwy	4.12	-	-	7.12	6.52	-	-	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.52	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-	-	-	-
Follow-up Hdwy	2.218	-	-	3.518	4.018	-	-	4.018	3.318
Pot Cap-1 Maneuver	-	-	-	193	217	0	0	219	293
Stage 1	-	-	-	-	-	0	0	296	-
Stage 2	-	-	-	261	294	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	180	217	-	-	219	293
Mov Cap-2 Maneuver	-	-	-	180	217	-	-	219	-
Stage 1	-	-	-	-	-	-	-	296	-
Stage 2	-	-	-	244	294	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		34.1	20.6
HCM LOS		D	C

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	184	-	-	-	251
HCM Lane V/C Ratio	0.334	-	-	-	0.08
HCM Control Delay (s)	34.1	-	-	-	20.6
HCM Lane LOS	D	-	-	-	C
HCM 95th %tile Q(veh)	1.4	-	-	-	0.3

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	945	50	0	0	0	0	90	25	5	25	0
Future Vol, veh/h	5	945	50	0	0	0	0	90	25	5	25	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	115	-	-	-	-	-	65	-	-	-
Veh in Median Storage, #	-	0	-	-	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	92	92	92	92	92	92	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	1005	53	0	0	0	0	98	27	7	33	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	0	0	0	-	1015	1005	1104	1068	-
Stage 1	-	-	-	-	1015	-	0	0	-
Stage 2	-	-	-	-	0	-	1104	1068	-
Critical Hdwy	4.12	-	-	-	6.52	6.22	7.12	6.52	-
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	-	4.018	3.318	3.518	4.018	-
Pot Cap-1 Maneuver	-	-	-	0	238	293	188	222	0
Stage 1	-	-	-	0	316	-	-	-	0
Stage 2	-	-	-	0	-	-	256	298	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	238	293	116	222	-
Mov Cap-2 Maneuver	-	-	-	-	238	-	116	222	-
Stage 1	-	-	-	-	316	-	-	-	-
Stage 2	-	-	-	-	-	-	160	298	-

Approach	EB	NB	SB
HCM Control Delay, s		27.7	28.5
HCM LOS		D	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	238	293	-	-	-	193
HCM Lane V/C Ratio	0.411	0.093	-	-	-	0.207
HCM Control Delay (s)	30.3	18.5	-	-	-	28.5
HCM Lane LOS	D	C	-	-	-	D
HCM 95th %tile Q(veh)	1.9	0.3	-	-	-	0.8

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	25	585	5	100	5	0	0	5	5
Future Vol, veh/h	0	0	0	25	585	5	100	5	0	0	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	150	-	360	-	-	-	-	-	-
Veh in Median Storage, #	-3	2768	0	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	89	89	89	85	85	85	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	28	657	6	118	6	0	0	5	5

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	721	719	-	-	713	657
Stage 1	-	-	-	0	0	-	-	713	-
Stage 2	-	-	-	721	719	-	-	0	-
Critical Hdwy	4.12	-	-	7.12	6.52	-	-	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.52	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-	-	-	-
Follow-up Hdwy	2.218	-	-	3.518	4.018	-	-	4.018	3.318
Pot Cap-1 Maneuver	-	-	-	343	354	0	0	357	465
Stage 1	-	-	-	-	-	0	0	435	-
Stage 2	-	-	-	419	433	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	335	354	-	-	357	465
Mov Cap-2 Maneuver	-	-	-	335	354	-	-	357	-
Stage 1	-	-	-	-	-	-	-	435	-
Stage 2	-	-	-	409	433	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		21.8	14.2
HCM LOS		C	B

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	336	-	-	-	404
HCM Lane V/C Ratio	0.368	-	-	-	0.027
HCM Control Delay (s)	21.8	-	-	-	14.2
HCM Lane LOS	C	-	-	-	B
HCM 95th %tile Q(veh)	1.6	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	9	9	90	115	5
Future Vol, veh/h	5	9	9	90	115	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	80	80	69	69
Heavy Vehicles, %	0	0	6	6	3	3
Mvmt Flow	7	12	11	113	167	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	306	171	174	0	-	0
Stage 1	171	-	-	-	-	-
Stage 2	135	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.16	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.254	-	-	-
Pot Cap-1 Maneuver	690	878	1379	-	-	-
Stage 1	864	-	-	-	-	-
Stage 2	896	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	684	878	1379	-	-	-
Mov Cap-2 Maneuver	684	-	-	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	896	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	0.7	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1379	-	797	-	-
HCM Lane V/C Ratio	0.008	-	0.023	-	-
HCM Control Delay (s)	7.6	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	7	6	125	110	9
Future Vol, veh/h	5	7	6	125	110	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	67	67	77	77	85	85
Heavy Vehicles, %	0	0	4	4	0	0
Mvmt Flow	7	10	8	162	129	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	313	135	140	0	-	0
Stage 1	135	-	-	-	-	-
Stage 2	178	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	684	919	1431	-	-	-
Stage 1	896	-	-	-	-	-
Stage 2	858	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	680	919	1431	-	-	-
Mov Cap-2 Maneuver	680	-	-	-	-	-
Stage 1	891	-	-	-	-	-
Stage 2	858	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1431	-	802	-	-
HCM Lane V/C Ratio	0.005	-	0.022	-	-
HCM Control Delay (s)	7.5	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

APPENDIX E. ANALYSIS WORKSHEETS – BUILD-OUT (2025) CONDITIONS

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	410	100	0	0	0	0	60	25	5	30	0
Future Vol, veh/h	5	410	100	0	0	0	0	60	25	5	30	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	115	-	-	-	-	-	65	-	-	-
Veh in Median Storage, #	-	0	-	-	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	92	92	92	92	67	67	72	72	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	451	110	0	0	0	0	90	37	7	42	0

Major/Minor	Major1			Minor1			Minor2			
Conflicting Flow All	0	0	0	-	461	451	580	571	-	
Stage 1	-	-	-	-	461	-	0	0	-	
Stage 2	-	-	-	-	0	-	580	571	-	
Critical Hdwy	4.12	-	-	-	6.52	6.22	7.12	6.52	-	
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	-	4.018	3.318	3.518	4.018	-	
Pot Cap-1 Maneuver	-	-	-	0	497	608	426	431	0	
Stage 1	-	-	-	0	565	-	-	-	0	
Stage 2	-	-	-	0	-	-	500	505	0	
Platoon blocked, %		-	-							
Mov Cap-1 Maneuver	-	-	-	-	497	608	345	431	-	
Mov Cap-2 Maneuver	-	-	-	-	497	-	345	431	-	
Stage 1	-	-	-	-	565	-	-	-	-	
Stage 2	-	-	-	-	-	-	395	505	-	

Approach	EB	NB	SB
HCM Control Delay, s		13.1	14.8
HCM LOS		B	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	497	608	-	-	-	416
HCM Lane V/C Ratio	0.18	0.061	-	-	-	0.117
HCM Control Delay (s)	13.8	11.3	-	-	-	14.8
HCM Lane LOS	B	B	-	-	-	B
HCM 95th %tile Q(veh)	0.7	0.2	-	-	-	0.4

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	30	865	5	40	5	0	0	5	5
Future Vol, veh/h	0	0	0	30	865	5	40	5	0	0	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	150	-	360	-	-	-	-	-	-
Veh in Median Storage, #	-3	2768	0	-	-	0	-	-	0	-	-	0
Grade, %	-	0	-	-	-	0	-	-	0	-	-	0
Peak Hour Factor	92	92	92	86	86	86	65	65	92	92	50	50
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	35	1006	6	62	8	0	0	10	10

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	1089	1082	-	-	1076	1006
Stage 1	-	-	-	0	0	-	-	1076	-
Stage 2	-	-	-	1089	1082	-	-	0	-
Critical Hdwy	4.12	-	-	7.12	6.52	-	-	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.52	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-	-	-	-
Follow-up Hdwy	2.218	-	-	3.518	4.018	-	-	4.018	3.318
Pot Cap-1 Maneuver	-	-	-	193	217	0	0	219	293
Stage 1	-	-	-	-	-	0	0	296	-
Stage 2	-	-	-	261	294	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	180	217	-	-	219	293
Mov Cap-2 Maneuver	-	-	-	180	217	-	-	219	-
Stage 1	-	-	-	-	-	-	-	296	-
Stage 2	-	-	-	244	294	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		36.2	20.6
HCM LOS		E	C

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	183	-	-	-	251
HCM Lane V/C Ratio	0.378	-	-	-	0.08
HCM Control Delay (s)	36.2	-	-	-	20.6
HCM Lane LOS	E	-	-	-	C
HCM 95th %tile Q(veh)	1.6	-	-	-	0.3

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	945	55	0	0	0	0	90	25	5	25	0
Future Vol, veh/h	5	945	55	0	0	0	0	90	25	5	25	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	115	-	115	-	-	-	-	-	65	-	-	-
Veh in Median Storage, #	-	0	-	-	-	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	92	92	92	92	92	92	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	1005	59	0	0	0	0	98	27	7	33	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	0	0	0	-	1015	1005	1107	1074	-
Stage 1	-	-	-	-	1015	-	0	0	-
Stage 2	-	-	-	-	0	-	1107	1074	-
Critical Hdwy	4.12	-	-	-	6.52	6.22	7.12	6.52	-
Critical Hdwy Stg 1	-	-	-	-	5.52	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	-	4.018	3.318	3.518	4.018	-
Pot Cap-1 Maneuver	-	-	-	0	238	293	188	220	0
Stage 1	-	-	-	0	316	-	-	-	0
Stage 2	-	-	-	0	-	-	255	296	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	238	293	116	220	-
Mov Cap-2 Maneuver	-	-	-	-	238	-	116	220	-
Stage 1	-	-	-	-	316	-	-	-	-
Stage 2	-	-	-	-	-	-	160	296	-

Approach	EB	NB	SB
HCM Control Delay, s		27.7	28.8
HCM LOS		D	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	238	293	-	-	-	191
HCM Lane V/C Ratio	0.411	0.093	-	-	-	0.209
HCM Control Delay (s)	30.3	18.5	-	-	-	28.8
HCM Lane LOS	D	C	-	-	-	D
HCM 95th %tile Q(veh)	1.9	0.3	-	-	-	0.8

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	25	585	5	100	5	0	0	5	5
Future Vol, veh/h	0	0	0	25	585	5	100	5	0	0	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	150	-	360	-	-	-	-	-	-
Veh in Median Storage, #	-3	2768	0	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	89	89	89	85	85	85	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	28	657	6	118	6	0	0	5	5

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	721	719	-	-	713	657
Stage 1	-	-	-	0	0	-	-	713	-
Stage 2	-	-	-	721	719	-	-	0	-
Critical Hdwy	4.12	-	-	7.12	6.52	-	-	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.52	-
Critical Hdwy Stg 2	-	-	-	6.12	5.52	-	-	-	-
Follow-up Hdwy	2.218	-	-	3.518	4.018	-	-	4.018	3.318
Pot Cap-1 Maneuver	-	-	-	343	354	0	0	357	465
Stage 1	-	-	-	-	-	0	0	435	-
Stage 2	-	-	-	419	433	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	335	354	-	-	357	465
Mov Cap-2 Maneuver	-	-	-	335	354	-	-	357	-
Stage 1	-	-	-	-	-	-	-	435	-
Stage 2	-	-	-	409	433	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		21.8	14.2
HCM LOS		C	B

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	336	-	-	-	404
HCM Lane V/C Ratio	0.368	-	-	-	0.027
HCM Control Delay (s)	21.8	-	-	-	14.2
HCM Lane LOS	C	-	-	-	B
HCM 95th %tile Q(veh)	1.6	-	-	-	0.1

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	10	10	90	115	7
Future Vol, veh/h	11	10	10	90	115	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	80	80	69	69
Heavy Vehicles, %	0	0	6	6	3	3
Mvmt Flow	15	13	13	113	167	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	311	172	177	0	-	0
Stage 1	172	-	-	-	-	-
Stage 2	139	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.16	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.254	-	-	-
Pot Cap-1 Maneuver	686	877	1375	-	-	-
Stage 1	863	-	-	-	-	-
Stage 2	893	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	679	877	1375	-	-	-
Mov Cap-2 Maneuver	679	-	-	-	-	-
Stage 1	854	-	-	-	-	-
Stage 2	893	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.9	0.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1375	-	761	-	-
HCM Lane V/C Ratio	0.009	-	0.037	-	-
HCM Control Delay (s)	7.6	0	9.9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	8	7	125	110	14
Future Vol, veh/h	8	8	7	125	110	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	67	67	77	77	85	85
Heavy Vehicles, %	0	0	4	4	0	0
Mvmt Flow	12	12	9	162	129	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	317	137	145	0	-	0
Stage 1	137	-	-	-	-	-
Stage 2	180	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.236	-	-	-
Pot Cap-1 Maneuver	680	917	1425	-	-	-
Stage 1	895	-	-	-	-	-
Stage 2	856	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	675	917	1425	-	-	-
Mov Cap-2 Maneuver	675	-	-	-	-	-
Stage 1	889	-	-	-	-	-
Stage 2	856	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	0.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1425	-	778	-	-
HCM Lane V/C Ratio	0.006	-	0.031	-	-
HCM Control Delay (s)	7.5	0	9.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

DV04-229

ALTERNATE PRIVATE ROAD STANDARDS
for
RIVER CANYON SUBDIVISION

PRIVATE ROADS ARE OWNED AND MAINTAINED BY RAVENNA METROPOLITAN DISTRICT

Prepared for:

The Board of County Commissioners

Prepared by:

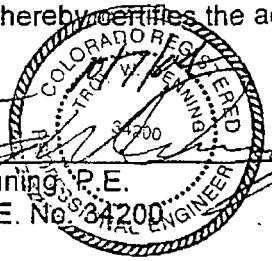
High Country Engineering, Inc.
14 Inverness Drive East, F-120
Englewood, CO 80112
Office: (303) 925-0544 Fax: (303) 925-0547
tdenning@hceng.com

Project No. 2042016.00

March 19, 2002
Revised August 5, 2002
Revised September 11, 2002
Revised October 1, 2003
Revised October 27, 2004
Revised October 5, 2004
Revised August 24, 2024

ENGINEER'S STATEMENT:

These Alternate Standards are based on sound engineering practices, and Troy W. Denning hereby certifies the adequacy and safety of the Alternate Standards.



Troy W. Denning, P.E.
Colorado P.E. No. 34200

FIRE DEPARTMENT ACCEPTANCE:

West Metropolitan Fire District

DOUGLAS COUNTY ACCEPTANCE:

All Douglas County Roadway Design and Construction Standards shall apply to this project, except as otherwise detailed and accepted in the "Alternate Design Standards: for the River Canyon Project".

Douglas County Director of Public Works

Douglas County Engineer

PRIVATE ROAD STATEMENT:

Private roads not built to County standards and/or not containing adequate rights-of-way shall not be maintained or assumed for maintenance by the County unless they are brought to County standards at the applicant's expense.

August 6th, 2024

Mr. Al Peterson
Senior Development Review Engineer
Douglas County

RE: River Canyon Filing 2, 4th Amendment – Caretaker Road – Road Variance

Mr. Peterson,

On behalf of The Club at Ravenna., this Road Standard is submitted for your consideration. Caretaker Road is a private road being proposed with River Canyon Filing 2, 4th Amendment. The request is to modify the Douglas County Urban Local (Type II) with the following changes:

- Road Width = 24' EOP-EOP
- Centerline Radius = 100'
- Curb Return = 20'
- Crest K Value = 15
- Sag K Value = 26
- Minimum Slope = 1%
- Cross Slope = 2%
- Posted Speed = 20 mph

Thank you for your consideration of this road variance request. We are available at your convenience to answer any questions and to provide additional information if needed. Please contact me at bblake@terracinadesign.com, or 303-632-8867.

08/20/2024

Project Manager — Date
Boston Blake, PE #55963

08.22.2024

West Metro Fire District — Date
Captain John Brennan
Deputy Fire Marshal

8/24/2024

Douglas County — Date

TABLE OF CONTENTS

ROADWAY DESIGN STANDARD SUMMARY

General: Proposed Standards

These alternate road standards adopt all Douglas County roadway standards except as detailed in this report. The adopted standards are described in the "Douglas County Roadway Design and Construction Standards" manual. Changes to the criteria are driven by the nature of the existing terrain in combination with environmental impact reduction. The site has steep slopes, well defined ridges and draws and is classified as "mountainous" per Douglas County standards. Criteria that will ensure construction feasibility for the River Canyon Subdivision are described below.

Maximum Street Grade: The maximum slope for all roads shall be 8% with several isolated locations that have 10%. General location of the 10% roadways are the Emergency Vehicle Access roads and at cul-de-sacs that closely match the existing terrain. Specific locations for all slopes exceeding 6% are shown in **Table 1**.

Justification: By introducing residential homes and local streets to this site some of the streets require larger slopes to best match the steep existing terrain. These new street slope standards are comparative to the standards of other counties with similar mountainous terrain. For example, Pitkin County, Colorado allows up to 12% slopes on some of their roads.

Intersection Grades: The maximum grade at intersections, for the intersecting street, shall be 4% for a minimum distance of 75' from the point of centerline intersection.

Justification: Because of the mountainous terrain it is difficult to continue a 4% slope for any distance greater than 75' and still match existing grades. Deviation of the roadway vertical from the existing terrain greatly increases the disturbed area and earthwork volume.

Intersection Angles: Intersection angles up to 17° are allowed for the intersections of Bramante Lane and Cicero Court, Beatrice Court and Dante Drive, and Donatello Court and Raphael Street. The intersection of Galileo Way

and Palladio Street has an angle of nearly 25° and will be accepted on a single case basis.

Justification: The streets have been designed so as to keep the natural terrain intact as well as meet the standards as closely as possible. The traffic volume on these streets will be very low and include almost exclusively local traffic. This is because they are all connecting to cul-de-sacs.

Curb Return Slopes: The maximum slope allowed for curb returns is 12%.

Justification: In cases where the through street has a slope of 8% or greater and the connecting street is at the maximum down slope from the intersection, it is impossible for both of the curb returns to have a slope less than 11%.

Intersection Cross Slopes: Cross slope at intersections shall not exceed the slope of the though street.

Justification: The grade of the through street largely determines the cross slope of the intersecting street. Limiting the cross slope by the through street insures that the intersection will be warp properly and that the cross slope will not be excessive.

Intersection Spacing: The intersection spacing criteria for Douglas County is followed in all cases streets except the loop lane on Dante Drive. This street creates an intersection spacing of 80' on both sides of the Dante Drive and Galileo Way intersection.

Justification: The purpose of this street is to minimize the affects of light from traffic on Galileo Way driving towards the lots along Dante Drive by adding a barrier of vegetation in the open area. Because this street will only be used by the homeowners that live along it; there will be minimal local traffic and no thru traffic.

Non-Standard Road Sections:

Minor Collector (See Exhibit 1)

The entry road into River Canyon will be similar to the Douglas County Minor Collector. The minor collector will not have the 5-foot detached sidewalk on the one side of the road. A 3' to 5' shoulder with 2% grades will be constructed adjacent to the curb and gutter instead, with slopes then variable having a 3:1 maximum. A standard 5-foot detached sidewalk will remain on the other side of the proposed minor collector and will serve as a trail connection to Waterton Road. Per county standards, no parking will be allowed on either side of the street. "No Parking" signs will be installed along both sides of the roadway per MUTCD standards and specifications.

Sidewalks:	A sidewalk will be required on one side of the road only.
Justification:	The sidewalk provides pedestrian traffic access throughout the subdivision and access to the regional trail system. Handicap access ramps shall be provided at all intersections.
Pavement Width:	The pavement width is 36' from the intersection with Waterton Road to the Guard House, and 24' from the Guard House to the entrance to the golf course parking lot.
Justification:	In order to accommodate traffic turning left onto Waterton Road a 12' turn lane/striped median has been added. Therefore, to maintain two 12' driving lanes along with the 12' turning lane, a 36' paved section would be necessary. We believe this to be a safer alternative for all traffic in this area.
Tangent Length:	The minimum tangent length for reverse curves is 50'.
Justification:	The section from Waterton Road to the Guard House conforms to all Douglas County geometric criteria except tangent length. Also, due to the guard house the traffic will be in a stop condition making the tangent length of 50' at that location immaterial.

K-Values for V.C.'s:	All vertical curve K-values for the minor collector meet the standard for Douglas with one exception. This is located at the intersection of Waterton Road and Dante Drive. K-values will not be standardized at this location.
Justification:	This vertical curve exists under a temporary condition and will be brought to standard when Waterton Road is rebuilt. Also, it will be at a stop location thus the design speed from which the K-value criteria are created do not accurately apply.
Street Warping:	The rate of change in pavement cross slope, when warping side streets at intersections, shall not exceed 1% every 25' horizontally on a collector roadway.
Justification:	Due to the existing grade of Waterton Road being 9%, in order to gradually fade out the warping of the road, a horizontal distance of greater than 400' would be required. Design constraints require a warping distance within 275'. This distance can be achieved by utilizing the new standard of 25' distance per 1% grade change. This intersection design is temporary and will be redesigned when Waterton Road is rebuilt.

Rural Local Road (See Exhibit 2)

The main roadways proposed within River Canyon will be similar to the Douglas County Rural Local Type VI. On the downhill side of the proposed roadway a 5' attached sidewalk will be constructed. A 5' detached walk may be used where grading and location make it possible. On the uphill side of the proposed roadway, a 3' to 5' shoulder with 2% grade toward the road will be constructed adjacent to the curb and gutter with slopes then variable having a 3:1 maximum. Due to the minimum flow line width of 24' no parking will be allowed on either side of the street. "No Parking" signs will be installed along both sides of the roadway per MUTCD standards and specifications.

Section:	There will be a 5' attached sidewalk with a 2' section graded at 2% on the downhill side of the road. A 5' detached walk may be used where grading and location make it possible. On the uphill side of the road, a 3' to 5' section graded at 2%.

Justification:	It is anticipated that pedestrian traffic along the roads will be minimal, and one walk would be sufficient: A 2' section at 2% behind the back of walk will be sufficient for safety and stability of the walk. In combination with the 5' sidewalk, the total section will be 7' at 2%. A 3' to 5' section at 2% behind the top back of curb on the uphill side of the street will be sufficient for safety, stability of the curb, and snow storage.
Curve Radius:	The minimum curve radius is 120' for rural local roads.
Justification:	It has been of major concern that the natural characteristics of the site remain undisturbed whenever possible; therefore the streets have been designed so that minimal grading will occur. In order to accomplish this, there are some locations where the centerline radii must be less than 225'. In most areas where there are small curve radii the traffic will be almost entirely local and there will be minimal to no thru traffic with the exception of emergency vehicles. This is in part because most small radius curves are located on cul-de-sacs.
Tangent Length:	There is no minimum tangent length required between reverse curves.
Justification:	These are rural local streets serving minimal traffic and no thru traffic will be allowed with the exception of emergency vehicles. The posted speed limit will be 25mph and there is no parking allowed on either side of the streets.
K-Values for V.C.'s:	The minimum vertical curve K-value for both crest and sag curves is 25. There are some vertical curves that do not meet this standard; they are shown in **Table 2.**
Justification:	Topographic and horizontal constraints; including rock outcrops, drainage ways, and existing improvements, limit the available vertical space for roadways. The streets have been designed so that minimal grading will occur. These are rural local streets serving

minimal traffic. These streets will be local traffic only, except for the emergency access road, and will be traveled at very low speeds.

Emergency Vehicle Access Roadway (EVA)

The emergency vehicle access roadway has a maximum slope of 10%. Minimum radius and all other standards are per NFPA. The road material will be a minimum of 6" class 6 road base. (See Exhibit 3)

Signing and Lighting

The signing and lighting for River Canyon may be a custom design. They do not need to meet all county standards but they must follow all MUTCD standards.

Conclusions

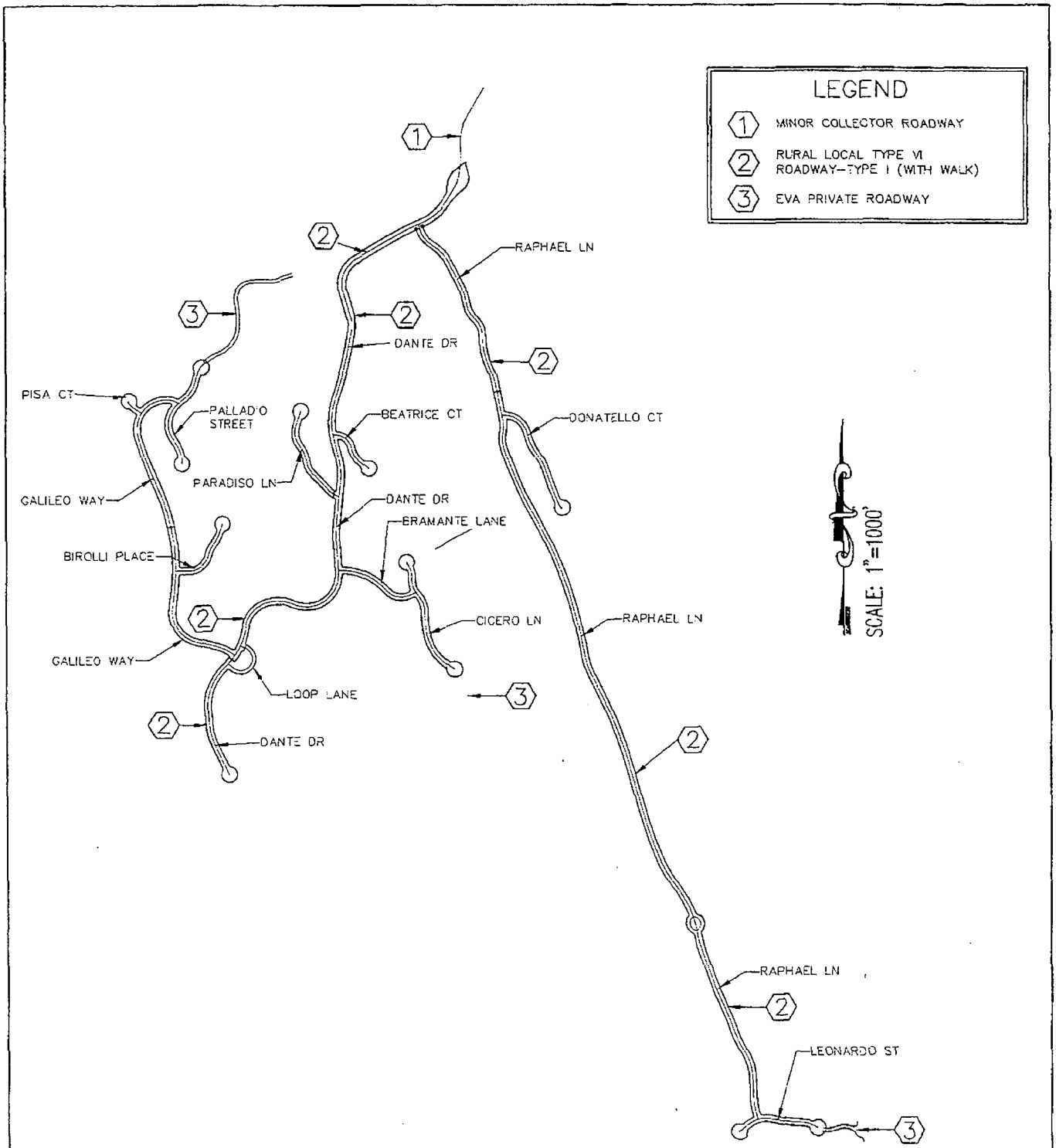
These proposed design criteria will minimize cut-full grading and maximize efficient use of the mountainous area. Also, environmental impacts will be minimal and existing land and waterscape remain largely undamaged. They will offer safe and effective roadways for the local traffic and for the private golf course.

Table 1 – Road Grades over 6% by Station

Proposed Slope	Street Name	Station Range
6.50%	Dante Drive	3+15 - 5+59
8.00%	Dante Drive	25+10 - 31+59
8.00%	Dante Drive	33+09 - 37+71
8.00%	Dante Drive	38+96 - 44+18
8.00%	Dante Drive	45+93 - 54+98
8.00%	Cicero Court	5+17 - 6+23
10.00%	Cicero Court	8+35 - 12+48
8.00%	Galileo Way	1+76 - 8+20
8.00%	Galileo Way	13+81 - 19+43
7.66%	Birolli Place	1+25 - 5+11
10.00%	Bramante Lane	0+77 - 5+51
8.00%	Raphael Street	1+59 - 6+50
8.00%	Raphael Street	7+61 - 19+04
7.00%	Raphael Street	32+31 - 39+37
7.00%	Raphael Street	44+59 - 47+73
7.00%	Raphael Street	53+61 - 59+50
10.00%	Palladio Street	1+33 - 4+95
10.00%	Palladio Street	8+93 - 14+45
6.86%	Palladio Street	18+39 - 23+59
8.00%	Donatello Court	2+00 – 3+58
6.79%	Donatello Court	6+11 – 7+67
7.95%	Leonardo Street	1+19 - 7+08
10.00%	Leonardo Street	9+10 - 11+37
7.93%	Paradiso Lane	1+15 - 2+68
7.00%	Dante turn-around	1+22 - 2+80

Table 2 – Vertical Curve K-Values

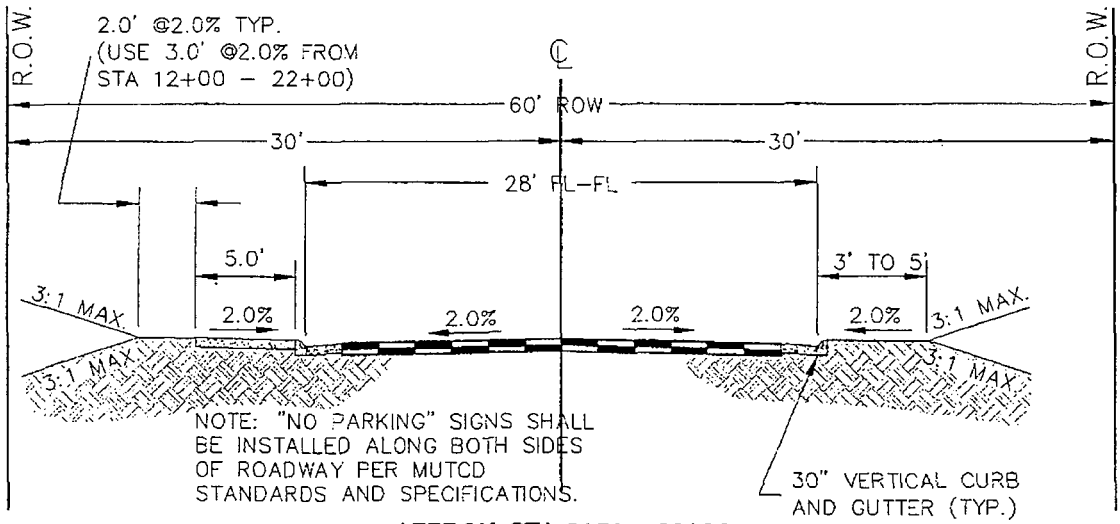
Street	Sta	K-Value	Justification
Bramante Lane	0+77.35	20	The road crosses an existing drainage channel, so the road drops down steeply then rises back up the hill on the other side. The rapid change in grade necessitates the low k-values.
Bramante Lane	2+67.87	10.96	
Palladio Street	1+33.03	7.14	(This is the EVA portion of this street) The existing ground is extremely steep and changes grade quickly. The vertical curve in question is near an intersection and at a stop condition.
Paradisio Lane	2+68.05	23.35	In trying to match the existing ground, the road rises and falls quickly making the low k-value necessary.
Loop Lane	1+21.86	11.11	The existing ground is extremely steep; the road goes through a draw then then steeply back up a hill.
Donatello Court	2+00.00	22.89	The existing ground drops quickly from the intersection then rises again steeply, making it difficult to maintain the minimum k-value standard and still follow the terrain.
Cicero Court	5+17.32	11.27	The existing ground changes grades quickly The elevation of this road, and in turn the vertical curve k-value, is controlled by Bramante Lane and the drainage channel located there.



Overall Site Map

HIGH COUNTRY ENGINEERING, INC.
14 INVERNESS DRIVE EAST, STE F-120, ENGLEWOOD, CO 80112
PHONE (303) 925-0544 FAX (303) 925-0547
1517 BLAKE AVENUE, STE 101, GLENWOOD SPRINGS, CO 81601
PHONE (970) 945-8676 FAX (970) 945-2555
WWW.HCENG.COM

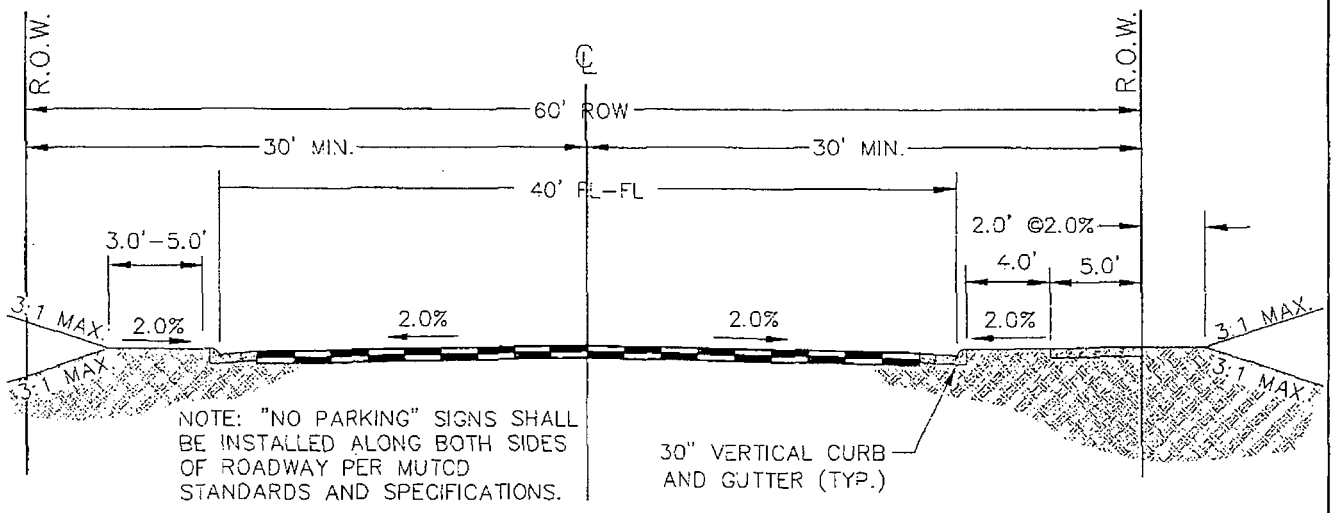
EXHIBIT 1



APPROX. STA 8+50 - 22+00

TYPICAL SECTION-RURAL LOCAL COLLECTOR ROADWAY

(N.T.S.)



APPROX. STA 1+00 - 6+00

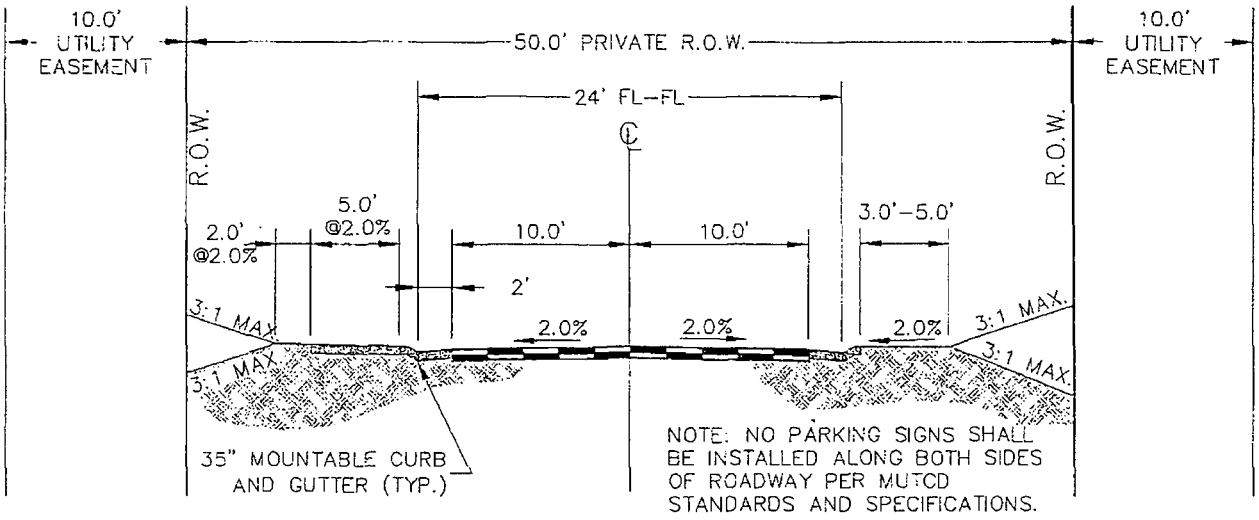
TYPICAL SECTION-MINOR COLLECTOR ROADWAY

(N.T.S.)

Minor Collector Roadway

HIGH COUNTRY ENGINEERING, INC.
14 INVERNESS DRIVE EAST, STE F-120, ENGLEWOOD, CO 80112
PHONE (303) 925-0544 FAX (303) 925-0547
1517 BLAKE AVENUE, STE 101, GLENWOOD SPRINGS, CO 81601
PHONE (970) 945-8676 FAX (970) 945-2555
WWW.HCENG.COM

EXHIBIT 2



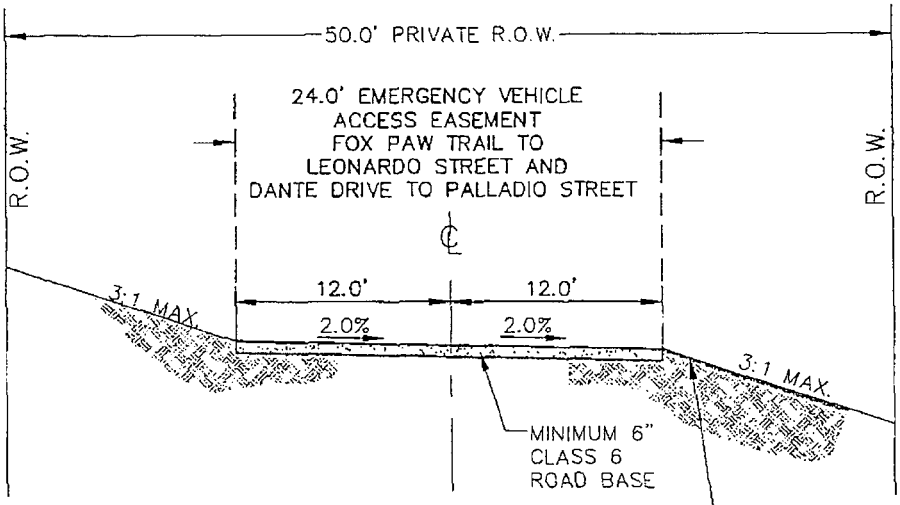
TYPICAL SECTION - RURAL LOCAL ROADWAY

(N.T.S.)

Rural Local Type VI Roadway

HIGH COUNTRY ENGINEERING, INC.
14 INVERNESS DRIVE EAST, STE F-120, ENGLEWOOD, CO 80112
PHONE (303) 925-0544 FAX (303) 925-0547
1517 BLAKE AVENUE, STE 101, GLENWOOD SPRINGS, CO 81601
PHONE (970) 945-8678 FAX (970) 945-2555
WWW.HCENG.COM

EXHIBIT 3

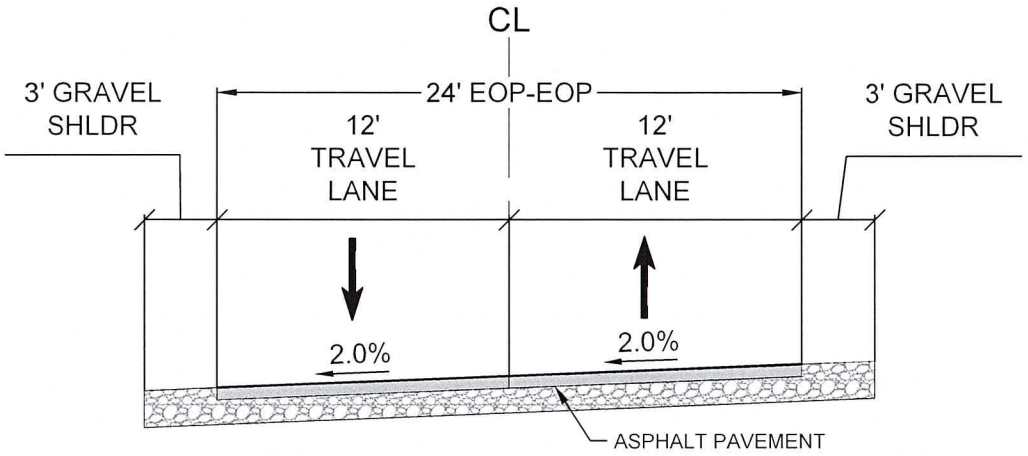


EMERGENCY VEHICLE ACCESS ROADWAY
(N.T.S.)

EVA Roadway

HIGH COUNTRY ENGINEERING, INC.
14 INVERNESS DRIVE EAST, STE F-120, ENGLEWOOD, CO 80112
PHONE (303) 925-0544 FAX (303) 925-0547
1517 BLAKE AVENUE, STE 101, GLENWOOD SPRINGS, CO 81601
PHONE (970) 945-8676 FAX (970) 945-2555
WWW.HCENG.COM

CARETAKER ROAD



ROAD WIDTH:	24' EOP-EOP
CENTERLINE RADIUS:	100'
CURB RETURN:	20'
CREST K VALUE:	15
SAG K VALUE:	26
MINIMUM SLOPE:	1%
CROSS SLOPE:	2%
POSTED SPEED:	20 MPH

THE MINIMUM PAVEMENT SECTION SHALL BE:

- COMPOSITE SECTION - 4 INCHES OF ASPHALT OVER 6 INCHES OF BASE COARSE

OR

- FULL DEPTH SECTION - 5 INCHES OF ASPHALT

PAVEMENT DESIGN REPORT SHALL DEFINE THE ACTUAL FINAL PAVEMENT SECTION.

terracina design
10200 E. Girard Ave, A-314
Denver, CO 80231
ph: 303.632.8867

RIVER CANYON F2.4A

CARETAKER ROAD SECTION

DOUGLAS COUNTY

DATE: 07/19/2024

9/3/2024 10:09 AM ; X:\RAVENNA\DOCUMENTS\VARIANCE\ROAD SECTION\CARETAKER ROAD SECTION.DWG;

ERO

Consultants in Natural Resources and the Environment

Technical Memorandum
Class I File and Literature Review
Ravenna Project
Douglas County, Colorado

Prepared for:
Geoff Collins
The Club at Ravenna
11118 Caretaker Road
Littleton, CO 80125

April 5, 2024

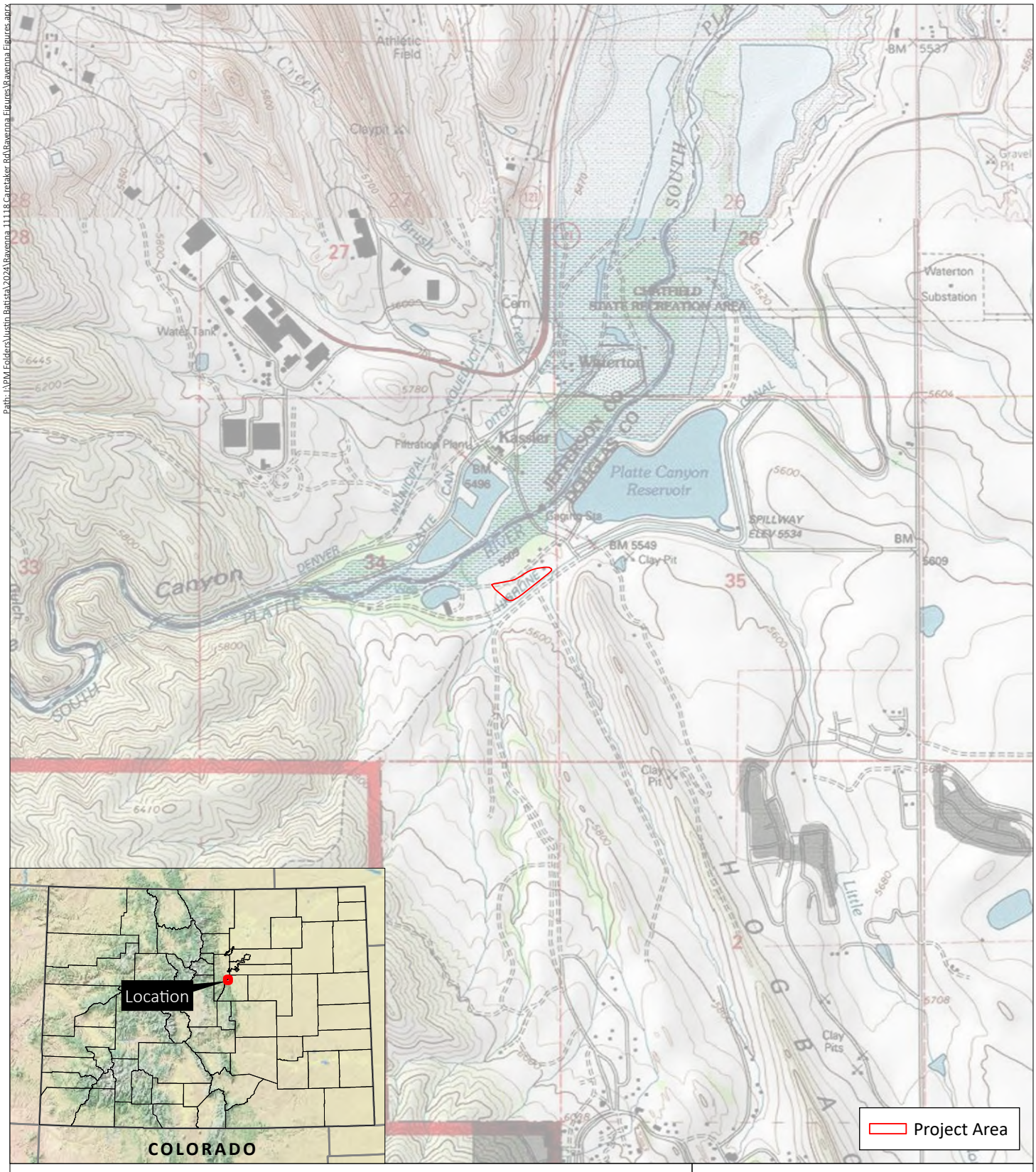
Mr. Geoff Collins (Client) contracted ERO Resources Corporation (ERO) to perform a cultural resource file and literature review for the Ravenna Project at 11118 Caretaker Road in Littleton, Colorado (project area; Figures 1 and 2). Douglas County requested a Class I file and literature review for the project pursuant to Douglas County Subdivision Resolution Stipulation 408.08, which includes a "report which discusses existing or potential cultural, archeological and historical resources of significance on site and plans for the protection of such resources." The results of the file and literature review will provide the Client and Douglas County with information regarding known and potential cultural resources, as well as a summary of potential regulatory requirements that could stipulate for additional cultural resource identification and documentation.

Project Area

The project area includes Douglas County Parcel # 2227-344-01-001. The project area contains modern structures associated with The Club at Ravenna. The project area is located in Section 34, Township 6 South, Range 69 West of the 6th Principal Meridian in Douglas County, Colorado.

Methodology

The purpose of the cultural resource file and literature review is to determine if any previously documented cultural resources listed in or eligible for listing in the National Register of Historic Places (NRHP) or State Register of Historic Places (SRHP) could be impacted by the proposed project. A "cultural resource" is defined as an archaeological site, structure, or building constructed 50 or more years ago (Little et al. 2000). A cultural resource listed in or eligible for listing in the NRHP/SRHP is a



Technical Memorandum
Class I File and Literature Review
Ravenna Project
Douglas County, Colorado

Section 34, T6S, R69W; 6th PM
USGS Kassler, CO Quadrangle (1:24,000; 1969)
Douglas County, Colorado

0 1,000 2,000 Feet

1:24,000

Figure 1
Project Location

Prepared for:
Geoff Collins
The Club at Ravenna
File: Ravenna Figures.mxd (ME)
April 5, 2024

ERO Resources Corp.

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Technical Memorandum
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Section 34, T6S, R69W; 6th PM
USGS Kassler, CO Quadrangle (1:24,000; 1969)
Douglas County, Colorado

N

0 100 200 Feet
1:2,000

Figure 2
Project Location

Prepared for:
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"historic property." To assist with project planning and potential consultation obligations under Section 106 of the National Historic Preservation Act (NHPA; Code of Federal Regulations 800) and the State Register Act (Colorado Revised Statutes 34-80.1-104), ERO reviewed the previous cultural resource surveys and resource documentation completed in the project area by conducting a file review using the Office of Archaeology and Historic Preservation (OAHP) online Compass database on March 28, 2024.

Results

The file search results indicate that the entire project area was surveyed in 2002 when SWCA conducted the *Cultural Resources Inventory for the Proposed River Canyon Development, Douglas County (SWCA No. 02-187)* (DA.LG.R22). The survey resulted in the documentation of one cultural resource that intersects the project area (5DA1929).

Site 5DA1929 (Slocum Barn – Greska Residence – River Canyon Estate) was originally documented as several structures including a stone block building (Structure 1), three connected agricultural outbuildings/sheds (Structure 2), an end-gabled barn with an associated wooden silo (Structure 3), the Greska residence at 11032 West Waterton Road (Structure 4), two modern mobile homes, and an isolated lithic scatter consisting of "a couple of chert flakes and a possible groundstone (sic) fragment" (Higgins and Retter 2004). SWCA recommended 5DA1929 eligible for listing in the NRHP under Criterion C. SWCA recommended that Structures 1 and 3 contributed to the site's eligibility because they exhibited architectural styles of the late 1800s (Late 19th and Early 20th Century American Movements). According to SWCA's site sketch map, the current project area overlaps the portion of the site that contained the isolated lithic scatter and one of the modern mobile homes.

In 2010, Cultural Resource Historians updated the site documentation which included Architectural Inventory Forms for the Slocum Barn, a stacked plank granary, and a stable/milk barn. In addition to Criterion C, Cultural Resource Historians recommended the site eligible under Criterion A due to "early associations with ranching and development of agriculture in the South Platte/Plum Creek area" (McWilliams and McWilliams 2010). The site was also recommended eligible for Local Landmark designation.

ERO reviewed aerial imagery to evaluate the potential undocumented features associated with 5DA1929 and current conditions. No new features were identified, but imagery from April 2006 to 2007 shows complete disturbance of the project area (Google, Inc. 2024) (Figure 3). The isolated lithic scatter was disturbed in 2006 and the modern trailer was removed by 2007.

Figure 3. Google Earth imagery from 2006 shows near complete disturbance of the project area. By April 2007, the modern mobile home (southwest) was removed and the remaining surrounding area was disturbed (Google Earth 2024).

Summary

The file and literature review indicates that the entire project area was surveyed in 2002 and that the project area overlaps the site boundary of 5DA1929. Although the site was most recently recommended eligible for listing in the NRHP under Criteria A and C, no contributing features of the site intersect the project area, and the entire project area was completely disturbed between 2006 and 2007.

ERO is currently unaware of any regulatory requirement that would stipulate additional efforts to identify and document cultural resources. Consideration of cultural resources is often mandated by federal agencies in compliance with Section 106 of the NHPA. NHPA compliance typically accompanies federal permits (e.g., U.S. Army Corps of Engineer Section 404 Clean Water Act permits) or funding (e.g., U.S. Department of Agriculture Farm Service Agency Conservation Reserve Programs). Colorado state agencies occasionally require compliance with the State Register Act. County and local agencies infrequently mandate cultural resource studies. If a federal, state, county, or local agency stipulates additional cultural resource requirements, the resources identified above and undocumented resources may require documentation. The agency would determine the area for review (e.g., area of potential effects) and scope of effort (e.g., Class II or Class III pedestrian survey).

Please feel free to contact ERO with any questions you may have in reference to the file and literature review results and additional work potentially needed for NHPA or State Register Act compliance.

Certification of Results

Justin Batista, Staff Archaeologist

Attachments

Figure 1. Project location (USGS 1:24,000 topographic quadrangle)
Figure 2. Project location (Aerial imagery)

References Cited

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PRELIMINARY GEOTECHNICAL INVESTIGATION

RIVER CANYON, LOT 1, FILING NO. 2
SOUTHWEST OF DANTE DRIVE AND CARETAKER ROAD
LITTLETON, COLORADO

Prepared for:

THE CLUB AT RAVENNA
11118 Caretaker Road
Littleton, Colorado 80125

Attention:
Geoffrey Collins – Director of Development

Project No. DN52,267.000-115-R1

June 19, 2024

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SCOPE

This report presents the results of our Preliminary Geotechnical Evaluation for the residential development planned for Lot 1 within River Canyon, Filing No. 2 located south-west of Dante Drive and Caretaker Road in Littleton, Colorado (Fig. 1). The purpose of this investigation was to evaluate the site geology and subsurface conditions to assist in the proposed residential development. The scope was described in a Service Agreement (DN 24-0183), dated April 29, 2024. Environmental services was outside of our scope of services.

This report is based on subsurface conditions found in our exploratory borings, results of field and laboratory tests, engineering analysis of field and laboratory data, field reconnaissance, and our experience with similar conditions. The report contains discussions of geotechnical conditions and geologic hazards, and preliminary design and construction criteria for site development, foundations, floor systems, pavements, surface and subsurface drainage. The preliminary discussions of foundation and floor system alternatives are intended for evaluation and planning purposes only. Additional building-specific investigations will be necessary to design structures and improvements. A summary of our conclusions and recommendations follows, with more detailed design criteria presented in the report.

SUMMARY

1. Strata encountered in the exploratory borings consisted of native clay, sand, and gravel to the maximum explored depth of 30 feet. Bedrock was not encountered in the two borings drilled at the site. We encountered refusal in one boring at a depth of 22 feet. The clay is low swelling, the clayey sand is potentially compressible to low swelling, and the gravelly sand is non-expansive. Based on our experience in the area, cobbles and small boulders may be encountered in the soil at the site.

2. Groundwater was encountered at a depth of about 26 feet during drilling in one boring and at a depth of 24.5 feet during delayed water check or approximate elevation 5512 feet. Groundwater may develop and rise after construction in response to development, precipitation, landscaping irrigation, changes in land use. Grading and excavations should be planned at least 3 feet, and preferably 5 feet above groundwater.

3. Our investigation indicates expansive and potentially compressible soils, steeply dipping, expansive bedrock, and existing fill are present at depths likely to influence the performance of shallow foundations, flatwork and pavements. The presence of expansive/compressible soils, steeply dipping, expansive bedrock, and existing fill constitutes a geologic hazard. There is risk that slabs-on-grade and foundations will heave or settle and be damaged. We believe the recommendations presented in this report will help to reduce risk of damage; they will not eliminate that risk. Slabs-on-grade and, in some instances, foundations may be damaged. We believe there is no geotechnical constraints at this site that would preclude development.

4. Pavement subgrade soils may consist of clay. Clay soil is considered to have poor pavement support characteristics. We suggest using site-developed sand where new fill will be placed in roadways. We preliminarily suggest planning for 1 to 3-feet of sub-excavation in roadways. No samples swelled over 2 percent from this investigation, so we anticipate 1-foot will be more widespread over the project compared the need for 3-foot of sub-excavation. Additional stabilizing layers may be required where subgrade R-values are less than 5.

5. Control of surface drainage will be critical to the performance of foundations. Overall surface drainage should be designed to provide rapid run-off of surface water away from the proposed structures and off pavements and flatwork. Water should not be allowed to pond near the crests of slopes, near structures, or on pavements and flatwork.

SITE CONDITIONS

The planned residential development is located southwest of Dante Drive and Caretaker Road in Littleton, Colorado (Fig. 1 and Photo 1). The legal address of the property is 11118 and 11122 Caretaker Road. The site is bordered by a Dominion Water and Sanitation District facility to the west, Caretaker Road to the north, Dante Drive to the east, and High Line Canal to the south. An existing building and associated paved parking lot currently occupy the east portion of the site. The Club's maintenance and equipment yard occupies the west portion of the site and includes multiple existing structures. Ground cover consists of asphalt pavement, grass, weeds, and trees. Ground cover in the maintenance and equipment yard consists of barren earth. Steep grades are located along the south boundary of the property, adjacent to the canal. The remainder of the site slopes gradually to the northwest, with total vertical relief of about 30 feet. A small detention area is located between Caretaker Road and the maintenance and equipment yard.

Photo 1: Aerial Image, Google Earth©, September 2023

PROPOSED DEVELOPMENT

A preliminary site plan prepared by Terracina Design, dated January 3, 2024, indicates the site will be split into eight single-family lots (Lots 1-2, Block 1 and Lots 1-6, Block 2) served by a paved roadway. We anticipate the residences will be single-family, one to three-story, wood framed structures. The use of basement products has not yet been determined. Foundation loads are anticipated to be relatively light. Buried sanitary and storm sewer, and water lines will be constructed beneath the streets. Based on grading plans, minimal cuts and fills are planned for the majority of the site. The western portion of the site will require cuts up to about 15 feet to achieve final grade.

CONCURRENT AND PREVIOUS INVESTIGATION

We previously conducted a Reconnaissance Geologic and Preliminary Geotechnical Investigation (Job No. 23,709; report dated December 6, 1995) and an Engineering Geologic

Evaluation of Development Plan Lot Layout (Job No. 30,431; letters dated January 14 and March 10, 2000, and September 10, 2001) for the property formerly known as Roxborough 630, which included the subject site. Our firm has also performed several Soils and Foundation Investigations for lots south of the site. In general, we have encountered sandy clay and silty sand with varying amounts of gravel underlain by steeply dipping claystone and sandstone bedrock. The clay has exhibited both compressive and expansive qualities. We are concurrently conducting a separate Preliminary Geotechnical Investigation (Project No. DN52,267.001-115) for the golf course realignment planned to the south. Our firm has also conducted various design-level report in the area for other home builders. Data from the concurrent and previous investigations were considered during preparation of this report.

INVESTIGATION

Subsurface conditions were investigated on May 14, 2024, by drilling 2 exploratory borings at the approximate locations shown on Fig. 1. Prior to drilling, we contacted the Utility Notification Center of Colorado and local sewer and water districts to clear boring locations for conflicts with buried utilities. Approximate boring location coordinates and surface elevations were estimated with limited precision using a Leica GS18 GPS unit referencing the North American Datum of 1983 (NAD83).

The borings were drilled to depths of 22 and 30 feet using 4-inch diameter, continuous-flight auger powered by truck-mounted CME-45 drill rigs. We obtained samples at approximate 2- to 5-foot intervals using 2.5-inch diameter (O.D.) modified California barrel samplers driven by blows of an automatic 140-pound hammer falling 30 inches. Our field representatives observed drilling, logged the strata encountered in the borings, and obtained samples. Graphical logs of the borings, including results of field penetration resistance tests and some laboratory test data, are presented on Figure 2.

Samples obtained during drilling were returned to our laboratory where they were visually examined, classified, and assigned testing. Laboratory testing included moisture content and dry density, swell-consolidation, Atterberg limits, percent silt and clay-sized particles (passing No. 200 sieve), and water-soluble sulfate concentrations. Swell tests were per-

formed by wetting samples under approximate overburden pressures (i.e., the pressure exerted by the overlying soil and bedrock). Results of the laboratory tests are summarized in Appendix A.

SUBSURFACE CONDITIONS

Strata encountered in the exploratory borings consisted of native clay, sand, and gravel to the maximum explored depth of 30 feet. Bedrock was not encountered in our borings. We encountered refusal in one boring at a depth of 22 feet. Based on our experience in the area, cobbles and small boulders may be encountered in the soil at the site. Groundwater was encountered at a depth of about 26 feet during drilling in one boring and at a depth of 24.5 feet during delayed water check or approximate elevation 5512 feet. Pertinent engineering characteristics of the soil are presented in the following paragraphs.

Native Soils

We encountered sandy clay, clayey to very clayey, very silty sand, and silty, gravelly sand in our borings. The clay was very stiff, the clayey sand was very loose to very dense, and the gravelly sand was dense to very dense based on field penetration resistance tests. Two clay sample compressed 0.2 percent and swelled 0.2 percent when wetted. One very clayey sand sample swelled 0.4 percent when wetted. One sand sample compressed 0.9 percent when wetted. Three sand samples contained 32 to 47 percent fines, also exhibited low plasticity. Testing indicates the clay is low swelling and the clayey sand is potentially compressible to low swelling. We judge the gravelly sand to be non-expansive.

Groundwater

Groundwater was encountered at a depth of about 26 feet during drilling in one boring (TH-1). We revisited the site on June 5, 2024, to obtain delayed groundwater readings. Water was measured about 24.5 feet below existing grade (approximate elevations 5512 feet). Groundwater may develop and rise after construction in response to development, precipitation, landscaping irrigation, changes in land use. Grading and excavations should be planned at least 3 feet, and preferably 5 feet above groundwater.

GEOLOGY

A geologic map[1] of the Kassler quadrangle indicates the site is underlain by steeply dipping sedimentary formations consisting of the Lyons Formation, Lykins Formation, Ralston Creek Formation, and the Morrison Formation (Photo 2). Since the publication of this map, the Ralston Creek Formation has been reclassified as a Member of the Morrison Formation. These units are upturned and plunge to the northeast at angles of 48 to 64 degrees and have northwest-southeast trending strikes. General descriptions of the bedrock formations are listed below, from oldest to youngest.

- Fountain Formation (PPf): Red arkosic sandstone and conglomerate sandstone interbedded with reddish-brown silty shales, unconformably overlies Precambrian metamorphic basement.
- Lyons Formation (Ply): Yellowish grey to pale red, crossbedded, fine- to medium-grained, quartzose sandstone with limonite nodules, portions of conglomerate composed of detritus as large as 2 inches, unconformably overlies the Fountain Formation, conformably underlies the Lykins Formation.
- Lykins Formation (T_rPls/Plg/Plb): Principally a reddish-brown, silty shale, includes beds of limestone, siltstone, and sandstone, conformably overlies the Lyons Formation, unconformably underlies the Ralston Creek Member.
- Ralston Creek Member (Jrc): Light grey calcareous shale interbedded with limestone and sandstone, unconformably overlies the Lykins Formation, unconformably underlies the upper members of the Morrison Formation.
- Morrison Formation (Jm): Interbedded varicolored shale, expansive claystone, limestone, and sandstone

The surficial soils that overlay the bedrock consist of eolian sand and Post-Piney Creek alluvium. The eolian sand is the youngest unit, mapped on the southern portion of the site, and is comprised of medium-grained, wind deposited sand. The older Post-Piney Creek alluvium is mapped over the majority of the site and is erratic in composition. Depositional mechanics include alluvial fan, debris fan, and river environments. These deposits can include organics and is typically associated with the presence of shallow groundwater. Both

[1] Bedrock geology of the Kassler quadrangle, Colorado, Scott, G.R., U.S. Geological Survey, Professional Paper 421-B, Geology of the Kassler quadrangle, Jefferson and Douglas Counties, Colorado, 1963, 1:24,000

mapped units likely overlie the Louviers alluvium, which is characterized by reddish-brown coarse-grained material with a cobble basal layer.

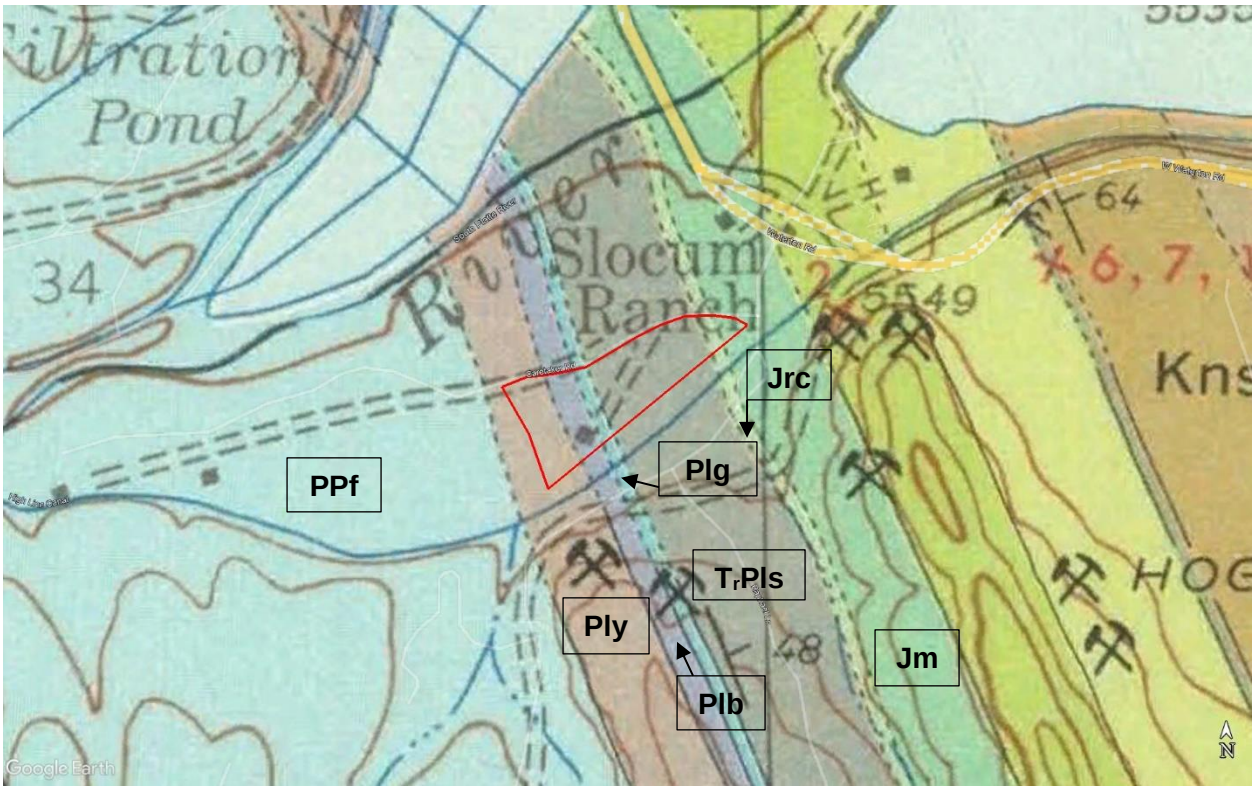

Photo 2: Geologic Map[1]

GEOLOGIC HAZARDS

Our study identified conditions on the site that constitute potential geologic hazards. Geologic hazards and geotechnical concerns can affect development risks and costs. Geologic hazards at this site include:

- Expansive and Potentially Compressible Soils
- Steeply Dipping, Expansive Bedrock
- Existing Fill
- Regional Issues of Seismicity and Radioactivity

No geologic hazards that would preclude the proposed development were noted. We believe potential hazards can be mitigated with proper engineering, design, and construction

practices as discussed in this report. These hazards and conceptual mitigation methods are discussed in the following sections.

Expansive and Potentially Compressible Soils

The presence of expansive and potentially compressible soils constitutes a geologic hazard and implies risk that ground heave or settlement will damage foundation, slab-on-grade floors, and pavements. Covering the ground with structures, streets, driveways, patios, etc., coupled with lawn irrigation and changing drainage patterns, leads to an increase in subsurface moisture conditions. Thus, some soil movement due to heave or settlement is inevitable. The bedrock surface may not be flat lying as pre-historic water flows that deposited the alluvium likely carved gauges into the bedrock. This condition has been observed in other sites in similar geologic settings and during our concurrent investigation on Holes 8 and 9 to the south. Regions of the site underlain by relatively thicker alluvial deposits are more at risk of settlement. It is critical that precautions are taken to increase the chances that proposed improvements will perform satisfactorily. Engineered design of grading, pavements, foundations, slabs-on-grade, and surface drainage can mitigate, but not eliminate, the effects of expansive soil and bedrock. Our data indicates that expansive and potentially compressible soils are unlikely a wide-spread issue on this site. There may be sporadic pockets of more expansive/compressible material which was not encountered in our widely spaced borings.

Steeply Dipping, Expansive Bedrock

The presence of steeply dipping, expansive bedrock constitutes a geological hazard. The bedrock underlaying the site is predominantly low swelling or non-expansive sandstone. The site is not mapped within Douglas County's Dipping Bedrock Overlay District (DBOD), which is east of the site. However, the formations east of the Lyons Formation may contain claystone beds which are expansive. Due to the steeply dipping nature of these sedimentary beds, major lateral variations in bedrock composition and extent occurs in a general east-west direction. The rapid horizontal change in material properties and swell potential over short distances can create excessive differential movement. Based on our widely spaced

borings, over 20 feet of overburden cover is present overlying bedrock. Although the development is not within Douglas County's DBOD and depth to bedrock is relatively deep, caution and awareness of the potential hazard is recommended.

Estimated Potential Heave

We conducted swell/consolidation tests to provide a basis to calculate potential heave of the on-site materials. The analysis involves dividing the soil profile into layers and modeling the heave of each layer from representative swell tests. A depth of wetting of 24 feet below the proposed ground surface was used for the heave evaluation. Research by Walsh, Colby, Houston and Houston[2] indicates there is a 90 percent probability that the wetting depth will not exceed 24 feet for this region, suggesting the risk of ground heave exceeding the estimated values is low. This depth of wetting is typically used for irrigated residential sites with basements.

We chose two methods to evaluate potential ground heave, the Thompson Method and the partial-wetting technique by Houston et al.[3] The latter study theorizes that the highest degree of wetting occurs near-surface with a gradually decreasing degree of wetting with depth. The Thompson method does not account for partial wetting and assigns a constant 30 percent reduced wetting factor to each layer. This typically results in higher heave estimates at greater depths. Houston, Stauffer, West, Bradford, and Houston's 2017 publication indicates that about 80 to 90 percent of the laboratory measured swell actually occurs in the field in the upper 30 to 40 percent of the depth of wetting, decreasing parabolically from that point to the maximum depth of wetting, i.e., about 50 percent of the laboratory measured swell occurs in the field at 70 percent of the depth of wetting and 10 percent occurs at 90 percent of the depth of wetting. We estimated potential heave by averaging the Thompson method and partial-wetting technique, along with using engineering judgement.

[2] "Method for Evaluation of Depth of Wetting in Residential Areas" by Walsh, Colby, Houston and Houston, Journal of Geotechnical and Geoenvironmental Engineering, ASCE February 2009.
[3] "Use of the Net Partial Wetting Factor (NPWF) Method of Computation of Remaining Heave: A Forensic Study" by Houston, Stauffer, West, Bradford, and Houston, 2017.

We estimate potential ground heave at proposed grades less than 1 inch. These estimates do not consider potential compression of the soil and represent a range of potential heave. Excessive wetting could lead to more heave or settlement.

Existing Fill

Although not encountered in our borings, existing fill is likely present throughout this site. The existing fill is considered undocumented unless records of its placement can be provided. We judge undocumented fill to be unsuitable to support new improvements. Existing fill should be removed and replaced to the criteria outlined in **Site Grading** where movement-sensitive improvements are planned. It is vital any existing fill present below building footprints is mitigated accordingly. The fill can be reused from a geotechnical standpoint, provided it is free of deleterious material. In-situ methods of soil densification can be elected if traditional over-excavation is not desired.

Radioactivity

It is normal in the Front Range of Colorado and nearby eastern plains area to measure radon gas in poorly ventilated spaces (e.g., full-depth residential basements) in contact with soil or bedrock. Radon 222 gas is considered a health hazard and is just one of several radioactive products in the chain of the natural decay of uranium into lead. Radioactive nuclides are common in the soil and bedrock underlying the subject site. Because these sources exist or will exist on most sites in the area, there is a potential for radon gas accumulation in poorly ventilated spaces. The concentration of radon is a function of many factors, including the radionuclide activity of the soil and bedrock, construction methods and materials, soil gas pathways, and accumulation areas. The only reliable method to determine if a hazard exists is to perform radon testing of completed residential structures. Typical mitigation methods consist of sealing soil gas entry areas, ventilation of below-grade spaces, and venting from foundation drain systems. Radon rarely accumulates to significant levels in above-grade living spaces. We recommend provision for ventilation of foundation drain systems if a radon problem is discovered.

Seismicity

According to the USGS, Colorado's Front Range and eastern plains are considered low seismic hazard zones. The earthquake hazard exhibits higher risk in western and southern Colorado compared to other parts of the state. The Denver Metropolitan area has experienced earthquakes within the past 100 years, shown to be related to deep drilling, liquid injection, and oil/gas extraction. Naturally occurring earthquakes along faults due to tectonic shifts are rare in this area.

The soil and bedrock at this site are not expected to respond unusually to seismic activity. The 2021 International Building Code (Section 16.13.2.2) defers the estimation of Seismic Site Classification to ASCE7-16, a structural engineering publication. The table below summarizes ASCE7-16 Site Classification Criteria.

ASCE7-16 SITE CLASSIFICATION CRITERIA

Seismic Site Class	$\bar{s}_u$, Average Undrained Shear Strength (lb/ft^2)	$\bar{N}$, Average Standard Penetration Resistance (blows/ft)	$\bar{v}_s$, Average Shear Wave Velocity (ft/s)
A. Hard Rock	N/A	N/A	>5,000
B. Rock	N/A	N/A	2,500 to 5,000
C. Very Dense Soil and Soft Rock	>2,000	>50 blows/ft	1,200 to 2,500
D. Stiff Soil	1,000 to 2,000	15 to 50 blows/ft	600 to 1,200
E. Very Loose Sand or Soft Clay Soil	<1,000	<15 blows/ft	<600
F. Soils requiring Site Response Analysis	See Section 20.3.1	See Section 20.3.1	See Section 20.3.1

Based on the results of our investigation, we judge the subsurface likely ranges between Seismic Site Classification D. The subsurface conditions indicate low to moderate susceptibility to liquefaction from a materials and groundwater perspective.

Other Considerations

We observed no evidence of unstable slopes. Erosion potential on the site is considered low due to gentle slopes. Erosion can be expected to increase during construction but

should return to preconstruction rates or less if proper grading practices, surface drainage design, and revegetation efforts are implemented. Construction sites within the Denver Metropolitan area are subject to the U.S. Environmental Protection Agency (EPA) regulations regarding the control of storm water discharge and soil erosion.

We did not identify economically recoverable, high-quality aggregate in our borings. Although the Slocum alluvium has been mapped as a “probable aggregate resource”, economically minable deposits are typically located east of the Dakota hogback. In most of the Denver area, oil and gas is present in deep formations, particularly shales that until recently were uneconomic for production. Energy resources may or may not be present in economic quantities on the property.

Development will increase the relative amount of impervious surfaces, which can lead to drainage problems and erosion if surface water flow is not adequately designed. Surface drainage design and evaluation of flood potential should be performed by a civil engineer as part of the project design.

SITE DEVELOPMENT

The primary geotechnical concerns that we believe will influence development is the presence of expansive and compressible soils. These concerns can be mitigated, but not eliminated, with proper planning, engineering, design and construction. We believe there are no geologic or geotechnical constraints that would preclude development. The following sections provide site development recommendations.

Demolition

Existing structures in the construction area will require demolition and removal. Underground features such as utilities should also be removed or properly abandoned. An Environmental Study should be performed to confirm appropriate disposal of material being excavated/demolished from the site. Excavations resulting from demolition should be backfilled with moisture-conditioned, compacted fill as outlined in **Site Grading**. If backfill is poorly compacted, improvements supported by the backfill may experience damaging settlement.

Deep root removal may cause disturbance. Tree roots larger than about 3 inches in diameter should be removed.

Excavation

We believe the soils penetrated by our exploratory borings can be excavated with typical heavy-duty equipment. We recommend the owner and contractor become familiar with applicable local, state and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Based on our investigation and OSHA standards, we anticipate the clay may classify as Type B soil and the sand, gravel, and existing fill as Type C. Based on OSHA regulations, Type B soils require maximum slope inclinations of 1:1 (horizontal: vertical) and 1½:1 for Type C soils for temporary excavations in dry conditions. Seepage and saturated soils will necessitate flatter conditions. The contractor's "competent person" is required to identify the soils encountered in the excavations and refer to OSHA standards to determine appropriate slopes. Stockpiles of soils and equipment should not be placed within a horizontal distance equal to one-half the excavation depth from the edge of the excavation. A professional engineer should design excavations deeper than 20 feet.

Site Grading

Prior to fill placement, the ground surface should be stripped of vegetation, scarified, and moisture conditioned to between optimum moisture and 3 percent above optimum moisture content for clay and within 2 percent of optimum for sand, and compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D 698).

The properties of fill will affect the performance of foundations, slabs-on-grade, utilities, pavements, flatwork, and other improvements. The on-site soils are suitable for use as site grading fill from a geotechnical standpoint, provided they are substantially free of debris, organics, and other deleterious materials. Rock particles and boulders larger than 6 inches and soil clods larger than 3 inches should be removed from the fill or be broken down. Fill should be placed in thin loose lifts, moisture conditioned and compacted prior to placement of the next lift using the criteria presented in the previous paragraph. The placement and compaction of site grading fill should be observed, and density tested by our representative

during construction. Guideline grading specifications are presented in Appendix B. If imported soil is necessary, it should ideally consist of soil having similar or better properties than on-site soils. Potential import fill materials should be submitted to our office for approval prior to importing to the site.

Our experience indicates fill will settle under its own weight. We estimate potential settlement of about 1 to 2 percent of the fill thickness even if the fill is compacted to the specified criteria. Most of this settlement usually occurs during and soon after construction; for clayey fill, it may continue for longer. Heave or additional settlement may occur after development in response to wetting.

Slopes

We recommend permanent cut and fill slopes be designed with a maximum grade of 4:1 (horizontal:vertical). If site constraints (property boundaries and streets) do not permit construction with recommended slopes, we should be contacted to evaluate the subsurface soils and steeper slopes. Slopes higher than 20 feet should be evaluated by our office on a case-by-case basis. Surface drainage should not be allowed to sheet flow across slopes or pond near the crest of slopes. All cut and fill slopes should be designed and revegetated as soon as possible after grading to reduce potential for erosion problems. Excavation contractors should evaluate ground conditions and control slopes in accordance with OSHA criteria.

Utility Construction

Water and sewer lines are usually constructed beneath paved roads. Compaction of trench backfill can have a significant effect on the life and serviceability of pavements. Compaction should be performed based on the City of Littleton’s specifications. Trench backfill should be placed in thin (8 inches or less) loose lifts. The placement and compaction of utility trench backfill should be observed and tested by a representative of our firm during construction. Our experience indicates utility trench backfill compaction by a sheepsfoot wheel attachment on a backhoe or trackhoe to be generally less successful than using self-propelled roller compactors. The trenches should be widened to allow the use of a self-propelled compactor. Attention should be paid to backfill placed adjacent to manholes as we

have seen instances where settlement in excess of 2 percent has occurred. Any improvements placed over backfill should be designed to accommodate movement.

Stabilization

Soft/loose, wet soils may be encountered at the bottom of excavations. Soft/loose excavation bottoms can likely be stabilized by crowding crushed rock into the soils until firm. Acceptable rock materials include, but are not limited to, No. 2 and No. 57 rock. Crushed rock on a layer of geosynthetic grid or woven fabric can also be used, which should reduce the amount of aggregate needed to stabilize the subgrade. Typically, a biaxially woven fabric or geogrid topped with 8 to 12 inches of 1 to 3-inch crushed rock will provide a stable working surface.

Underdrain

With long term development and subsequent irrigation, groundwater may develop and rise. Our firm typically advocates an underdrain system below sanitary sewer mains and services to control groundwater that may accumulate in response to development and provide a gravity outlet for foundation drains. If a gravity outfall for the underdrain system is not possible, an alternative would be to outfall underdrains to a wet well where water can be removed with a pump; maintenance should be expected with this option. It may not be practical to install underdrains at this site if a gravity discharge is not available. If an underdrain system is not installed, individual house foundation drains would discharge into sumps with pumps. Sump discharge can result in ponding and recycling if slopes between lots are not adequately graded and well-drained. Problems with chronic ice or algae formation on sidewalks have also developed from sump discharge.

The underdrain should consist of ¾ to 1½-inch clean, free-draining gravel surrounding rigid PVC pipe (Fig. 3). The pipe should be sized for anticipated flow by the civil engineer and may consist of 4 or 6-inch lines. The PVC pipe should be placed at a grade of at least 0.5 percent. A concrete cutoff should be constructed around the sewer pipe and underdrain pipe immediately downstream of the point where the underdrain pipe exits the sewer trench and transitions to the outlet (Fig. 4). The underdrains should be designed to discharge to a

gravity outfall and be provided with a permanent concrete headwall and trash rack. If the underdrain discharges into a detention pond, the risk of flood water backflow through the underdrain into basements should be evaluated. A check valve or backflow preventer can be considered. Where feasible, the underdrain services should be installed deep enough so that the lowest point of the basement foundation drain can be connected to the underdrain service as a gravity outlet (Fig. 5). Underdrain services can be 3-inch to avoid confusion with the 4 or 6-inch main line.

Pavements

Pavement subgrade soils will likely consist of clay, sand, or fill of similar composition. Clay soil is considered to have poor pavement support characteristics. Depending on site grading and subsurface conditions encountered at the time of the design-level investigation, some mitigation of expansive subgrade may be necessary. We preliminarily suggest planning for 1 to 3 feet of over-excavation and replacement with A-2 to A-6 soils in roadways. Since no samples swelled over 2 percent, we judge 1-foot of sub-excavation to be more probable. Additional stabilizing layers may be required where subgrade R-values are less than 5. If the pavements are constructed on A-6 or A-7 soils, trench drains will be required along both sides of the pavement, pursuant to *Douglas County's Roadway Design and Technical Criteria Manual*.

Douglas County's preliminary minimum pavement section alternatives are presented in the table below. A design-level subgrade investigation and pavement designs should be performed after grading is complete.

DOUGLAS COUNTY PRELIMINARY MINIMUM PAVEMENT SECTIONS

Roadway Classification	Hot Mix Asphalt + Cement Treated Aggregate Basecourse (or) Lime Treated Subgrade (HMA + CTABC or LTS)	Hot Mix Asphalt + Aggregate Base Course (HMA + ABC)	Full-Depth Portland Cement Concrete (PCC)
Local Residential	4" HMA + 5" CTABC or 6" LTS	4" HMA + 6" ABC	6" PCC
Collector Residential	4" HMA + 6" CTABC or 6" LTS	5" HMA + 6" ABC	7" PCC

BUILDING CONSTRUCTION CONSIDERATIONS

The following discussions are preliminary and are not intended for design or construction. After grading is completed, design-level investigations should be performed on a lot-specific basis.

Foundations

Our investigation indicates expansive clay and potentially compressible sand are present at depths likely to influence the performance of shallow foundations and slabs-on-grade. Footing or post-tensioned slab-on-grade foundation may be used for lightly loaded buildings where non-expansive and low swelling site-grading fill and native soil are present and bedrock is deeper than about 10 feet below structures. Heavier loaded buildings may require the use of drilled piers or footings on aggregate pier ground improvement.

Below-Grade Areas

Surface water can penetrate relatively permeable loose backfill soils located adjacent to structures and collect at the bottom of relatively impermeable basement or crawl space excavations, causing wet or moist conditions. Basement and crawl space foundation walls should be designed to resist lateral earth pressures. Interior or exterior foundation drains should be constructed around the lowest excavation levels of basement or crawl space areas. These drains could be connected to a sump pit where water can be removed by pumping if an underdrain is not provided.

Slab-On-Grade Construction

Slab-on-grade basement floors may be considered on low and some moderate risk sites where potential heave is acceptable to builders and home buyers. Structurally supported basement floors should be used on all sites with high or very high risk of poor basement slab performance. Structurally supported floor systems should be anticipated in all non-basement residences and finished living areas. Post-tensioned slab-on-grade foundations may also be considered where no basements or below-grade construction are planned.

The performance of garage floors, driveways, sidewalks, and other surface flatwork will likely be poor where high swell or compressible materials are shallow, unless sub-excavation is performed. The following precautions will be required to reduce the potential for damage due to movement of slabs-on-grade for this site.

1. Isolation of the slabs from foundation walls, columns and other slab penetrations;

2. Voiding of interior partition walls to allow for slab movement without transferring the movement to the structure;

3. Flexible water and gas connections to allow for slab movement. A flexible plenum above furnaces will be required; and

4. Proper surface grading and foundation drain installation to reduce water availability to sub-slab and foundation soils.

Surface Drainage

The performance of improvements will be influenced by surface drainage. When developing an overall drainage scheme, consideration should be given to drainage around each building. The ground surface around the buildings should be sloped to provide positive drainage away from the foundations. We recommend a minimum slope of at least 6 inches in the first 10 feet (5 percent) in landscape areas surrounding each building without basements, and 12 inches in the first 10 feet (10 percent) surrounding buildings with basements, where practical. If the distance between buildings is less than 20 feet, the slope in this area should be 10 percent to the swale between them. Where possible, drainage swales should slope at least 2 percent. Variation from these criteria is acceptable in some areas. Roof downspouts and other water collection systems should discharge beyond the limits of backfill around structures.

Proper control of surface runoff is also important to control the erosion of surface soils. Sheet flow should not be directed over unprotected slopes. Water should not be allowed to pond at the crest of slopes. Permanent slopes should be prepared in such a way to reduce erosion.

Attention should be paid to compaction of the soils behind curbs and gutters adjacent to streets and in utility trenches during the construction and development. If surface drainage between preliminary development and construction phases is neglected, performance of the roadways, flatwork and foundations may be poor.

Concrete

Concrete in contact with soil can be subject to sulfate attack. We measured water-soluble sulfate concentrations in one sample during this investigation. Concentrations were measured at 0.02 percent. As indicated in our tests and ACI 332-20, the sulfate exposure class *Not Applicable* or *RS0*. Deviations from the exposure class may occur as a result of additional sampling and testing.

SULFATE EXPOSURE CLASSES PER ACI 332-20

Exposure Classes		Water-Soluble Sulfate (SO_4) in Soil [A] (%)
Not Applicable	RS0	< 0.10
Moderate	RS1	0.10 to 0.20
Severe	RS2	0.20 to 2.00
Very Severe	RS3	> 2.00

A) Percent sulfate by mass in soil determined by ASTM C1580

For this level of sulfate concentration, ACI 332-20 *Code Requirements for Residential Concrete* indicates there are no cement type requirements for sulfate resistance as indicated in the table below. Additional sulfate testing is recommended during the design-level phase.

CONCRETE DESIGN REQUIREMENTS FOR SULFATE EXPOSURE PER ACI 332-20

Exposure Class	Maximum Water/ Cement Ratio	Minimum Compressive Strength [A] (psi)	Cementitious Material Types [B]			Calcium Chloride Admixtures
			ASTM C150/ C150M	ASTM C595/ C595M	ASTM C1157/ C1157M	
RS0	N/A	2500	No Type Restrictions	No Type Restrictions	No Type Restrictions	No Restrictions
RS1	0.50	2500	II	Type with (MS) Designation	MS	No Restrictions
RS2	0.45	3000	V [C]	Type with (HS) Designation	HS	Not Permitted
RS3	0.45	3000	V + Pozzolan or Slag Cement [D]	Type with (HS) Designation plus Pozzolan or Slag Cement [E]	HS + Pozzolan or Slag Cement [E]	Not Permitted

A) Concrete compressive strength specified shall be based on 28-day tests per ASTM C39/C39M
B) Alternate combinations of cementitious materials of those listed in ACI 332-20 Table 5.4.2 shall be permitted when tested for sulfate resistance meeting the criteria in section 5.5.
C) Other available types of cement such as Type III or Type I are permitted in Exposure Classes RS1 or RS2 if the C3A contents are less than 8 or 5 percent, respectively.
D) The amount of the specific source of pozzolan or slag to be used shall not be less than the amount that has been determined by service record to improve sulfate resistance when used in concrete containing Type V cement. Alternatively, the amount of the specific source of the pozzolan or slab to be used shall not be less than the amount tested in accordance with ASTM C1012/C1012M and meeting the criteria in section 5.5.1 of ACI 332-20.
E) Water-soluble chloride ion content that is contributed from the ingredients including water aggregates, cementitious materials, and admixtures shall be determined on the concrete mixture ASTM C1218/C1218M between 29 and 42 days.

Superficial damage may occur to the exposed surfaces of highly permeable concrete, even though sulfate levels are relatively low. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious materials ratio should not exceed 0.50 for concrete in contact with soils that are likely to stay moist due to surface drainage or high-water tables. Concrete should have a total air content of 6 percent ± 1.5 percent. We advocate all foundation walls and grade beams in contact with the subsoils (including the inside and outside faces of garage and crawl space grade beams) be damp-proofed.

RECOMMENDED FUTURE INVESTIGATIONS

We recommend the following investigations and services:

1. Construction testing and observation during site development and grading;
2. Subgrade Investigation and Pavement Design(s) after grading;
3. Design-level Soils and Foundation Investigation(s) for residences after grading; and
4. Foundation installation observations.

CONSTRUCTION OBSERVATIONS

We recommend CTL|Thompson, Inc. provide construction observation services to allow us the opportunity to confirm whether soil conditions are consistent with those found during this investigation. If others perform these observations, they must accept responsibility to judge whether the recommendations in this report remain appropriate.

GEOTECHNICAL RISK

The concept of risk is an important aspect with any geotechnical evaluation primarily because the methods used to develop geotechnical recommendations do not comprise an exact science. We never have complete knowledge of subsurface conditions. Our analysis must be tempered with engineering judgment and experience. Therefore, the recommendations presented in any geotechnical evaluation should not be considered risk-free. Our recommendations represent our judgment of those measures that are necessary to increase the chances that the structures will perform satisfactorily. It is critical that all recommendations in this report are followed during construction.

LIMITATIONS

This report has been prepared for the exclusive use of The Club at Ravenna and your design team for planning of the proposed project. The information, conclusions, and

recommendations presented herein are based upon consideration of many factors including, but not limited to, the type of structures proposed, the geologic setting, and the subsurface conditions encountered. The conclusions and recommendations contained in the report are not valid for use by others. Standards of practice evolve in geotechnical engineering. The recommendations provided are appropriate for about three years. If the site is not developed within about three years, we should be contacted to determine if we should update this report.

Our borings were spaced to provide a general picture of subsurface conditions for preliminary planning of development and construction. Variations from our borings should be anticipated. We believe this investigation was conducted in a manner consistent with that level of care and skill ordinarily used by geotechnical engineers practicing in this area at this time. No warranty, express or implied, is made. If we can be of further service in discussing the contents of this report or analysis of the influence of subsurface conditions on the project, please call.

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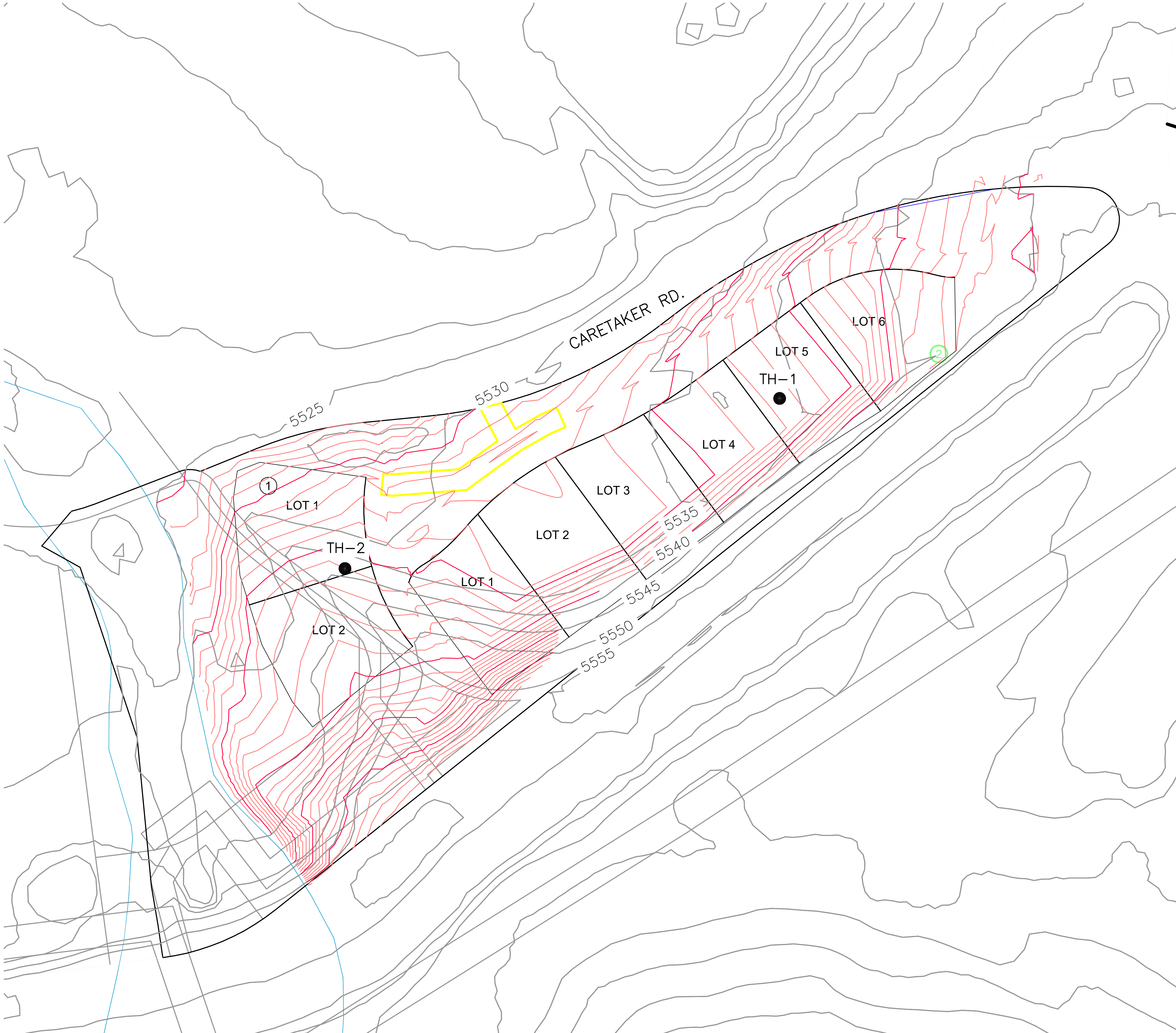
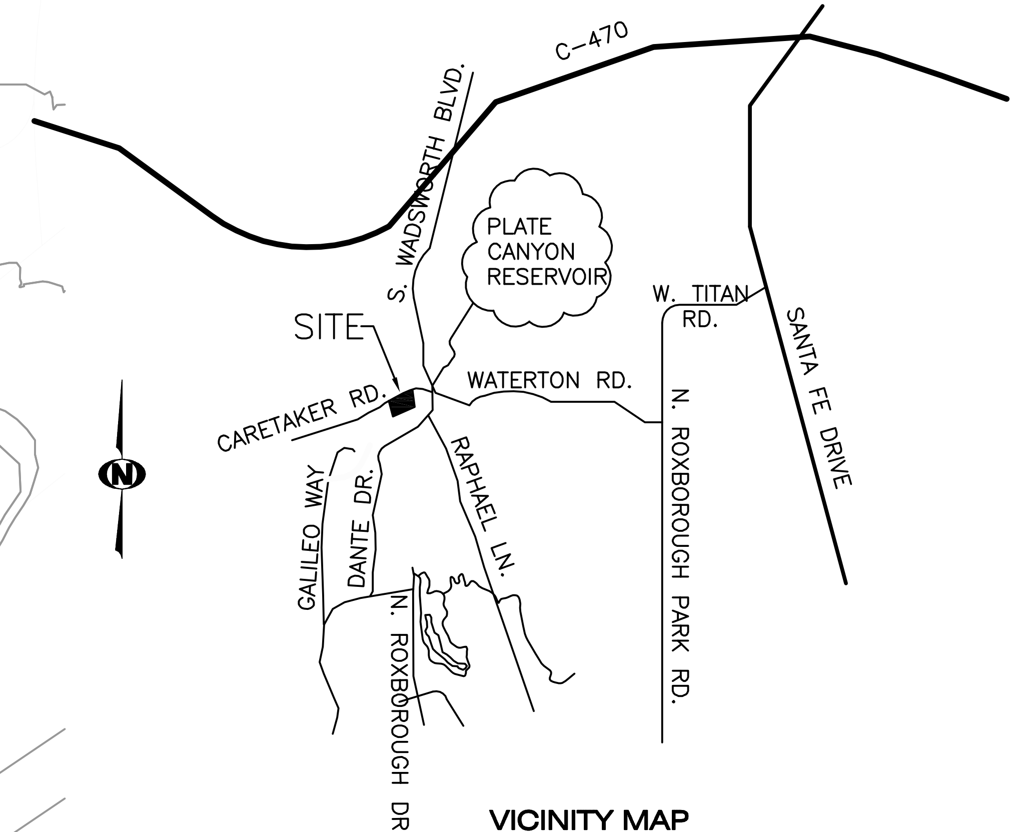
6/19/2024





VICINITY MAP
NOT TO SCALE

LEGEND:

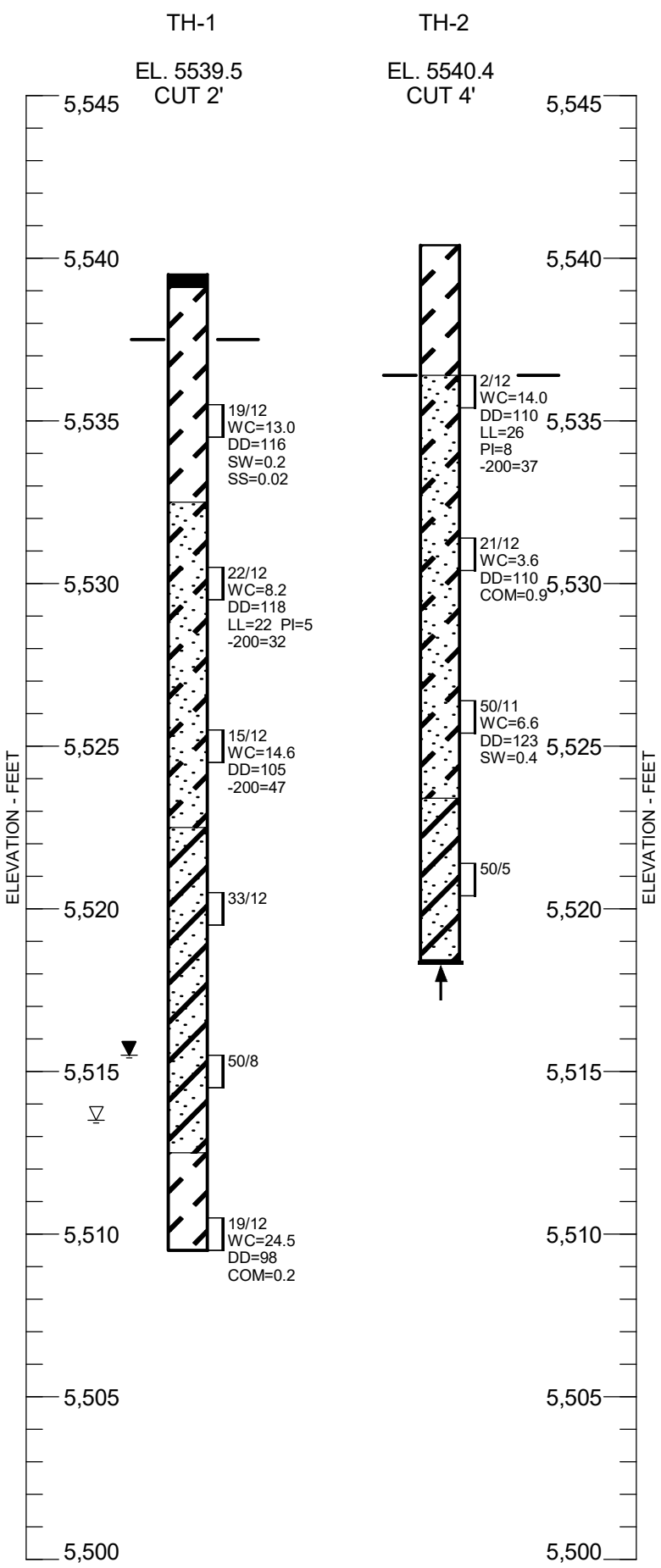
TH-1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
1	INDICATES LOT NUMBER
(1)	INDICATES BLOCK NUMBER
———	EXISTING GROUND SURFACE ELEVATION (FEET)
———	PROPOSED GROUND SURFACE ELEVATION (FEET)

0 50 100
SCALE: 1" = 100'

THE CLUB AT RAVENNA
RIVER CANYON, LOT 1, FILING NO. 2
CTL|T Project No. DN52,267.000-115-R1

Locations of Exploratory Borings

Fig. 1



LEGEND:

ASPHALT 6 INCHES.

CLAY, SANDY, VERY STIFF, MOIST, DARK BROWN, RED (CL).

SAND, CLAYEY TO VERY CLAYEY, VERY SILTY, VERY LOOSE TO VERY DENSE, MOIST, BROWN (SC, SC-SM).

SAND, SILTY, GRAVELLY, DENSE TO VERY DENSE, MOIST, BROWN, RUST, WHITE, TAN (SM).

DRIVE SAMPLE. THE SYMBOL 19/12 INDICATES 19 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

WATER LEVEL MEASURED AT TIME OF DRILLING.

WATER LEVEL MEASURED AFTER DRILLING ON JUNE 5, 2024.

INDICATES PRACTICAL DRILL RIG REFUSAL.

INDICATES APPROXIMATE PROPOSED GRADE.

NOTES:

1. THE BORINGS WERE DRILLED MAY 14, 2024 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A TRUCK-MOUNTED CME-45 DRILL RIG.

2. BORING LOCATIONS AND ELEVATIONS ARE APPROXIMATE AND WERE DETERMINED BY A REPRESENTATIVE OF OUR FIRM USING A LEICA GS18 GPS UNIT REFERENCING THE NORTH AMERICAN DATUM OF 1983 (NAD83).

3. WC - INDICATES MOISTURE CONTENT (%).
   DD - INDICATES DRY DENSITY (PCF).
   SW - INDICATES SWELL WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE (%).
   COM - INDICATES COMPRESSION WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE (%).
   LL - INDICATES LIQUID LIMIT.
   PI - INDICATES PLASTICITY INDEX.
   -200 - INDICATES PASSING NO. 200 SIEVE (%).
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT (%).

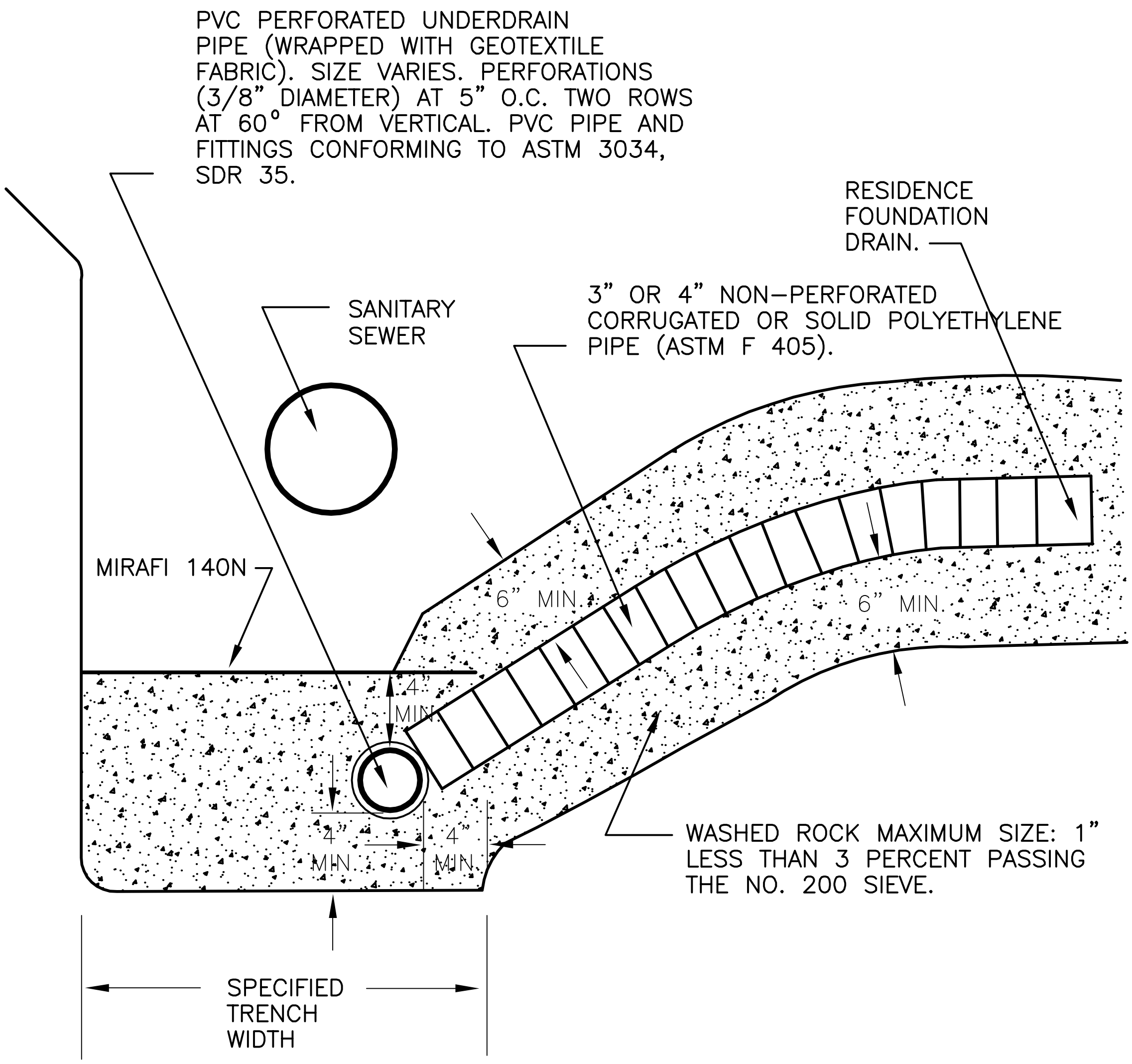
4. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.

Summary Logs of Exploratory Borings

FIG. 2

THE CLUB AT RAVENNA
RIVER CANYON, LOT 1, FILING NO. 2
CTL|T PROJECT NO. DN52,267.000-115-R1

50-UNDERDRAIN_02



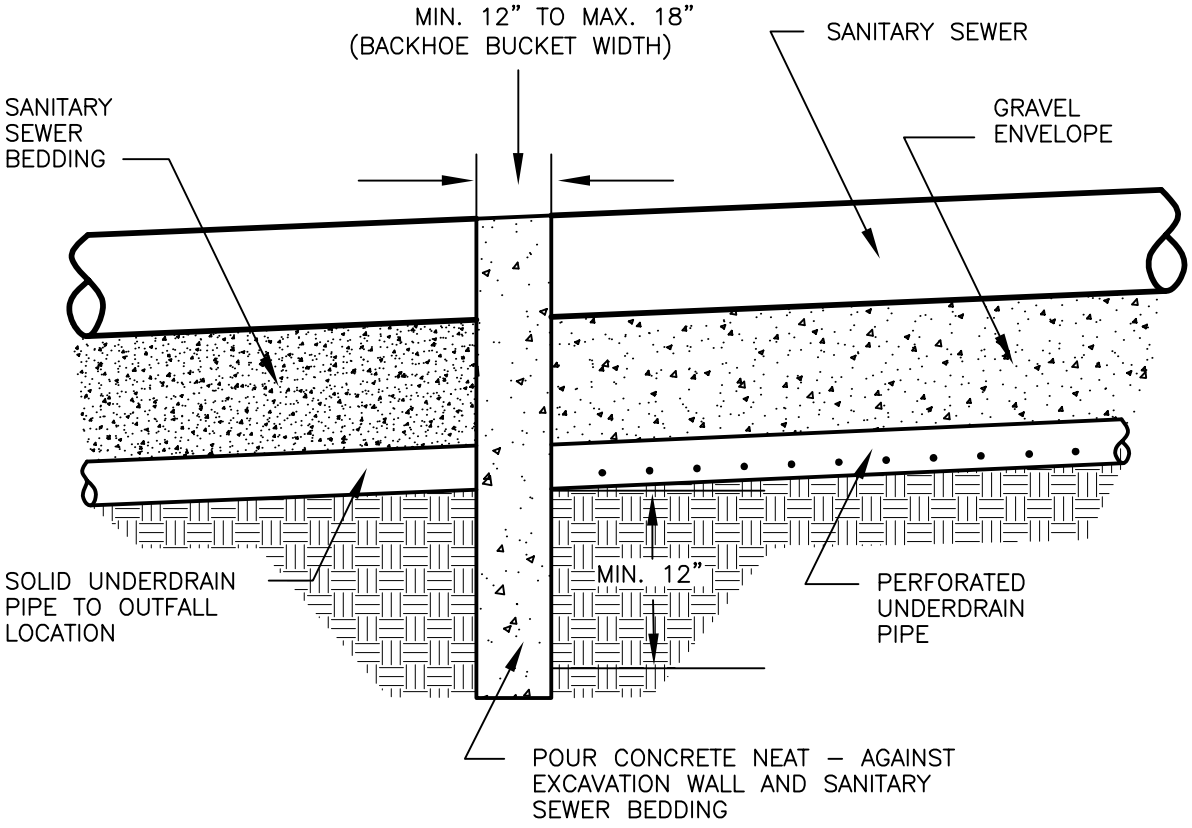
NOTE: NOT TO SCALE.

THE CLUB AT RAVENNA
RIVER CANYON, LOT 1, FILING NO. 2
CTL|T Project No. DN52,267.000-115-R1

Sewer Underdrain Detail

Fig. 3

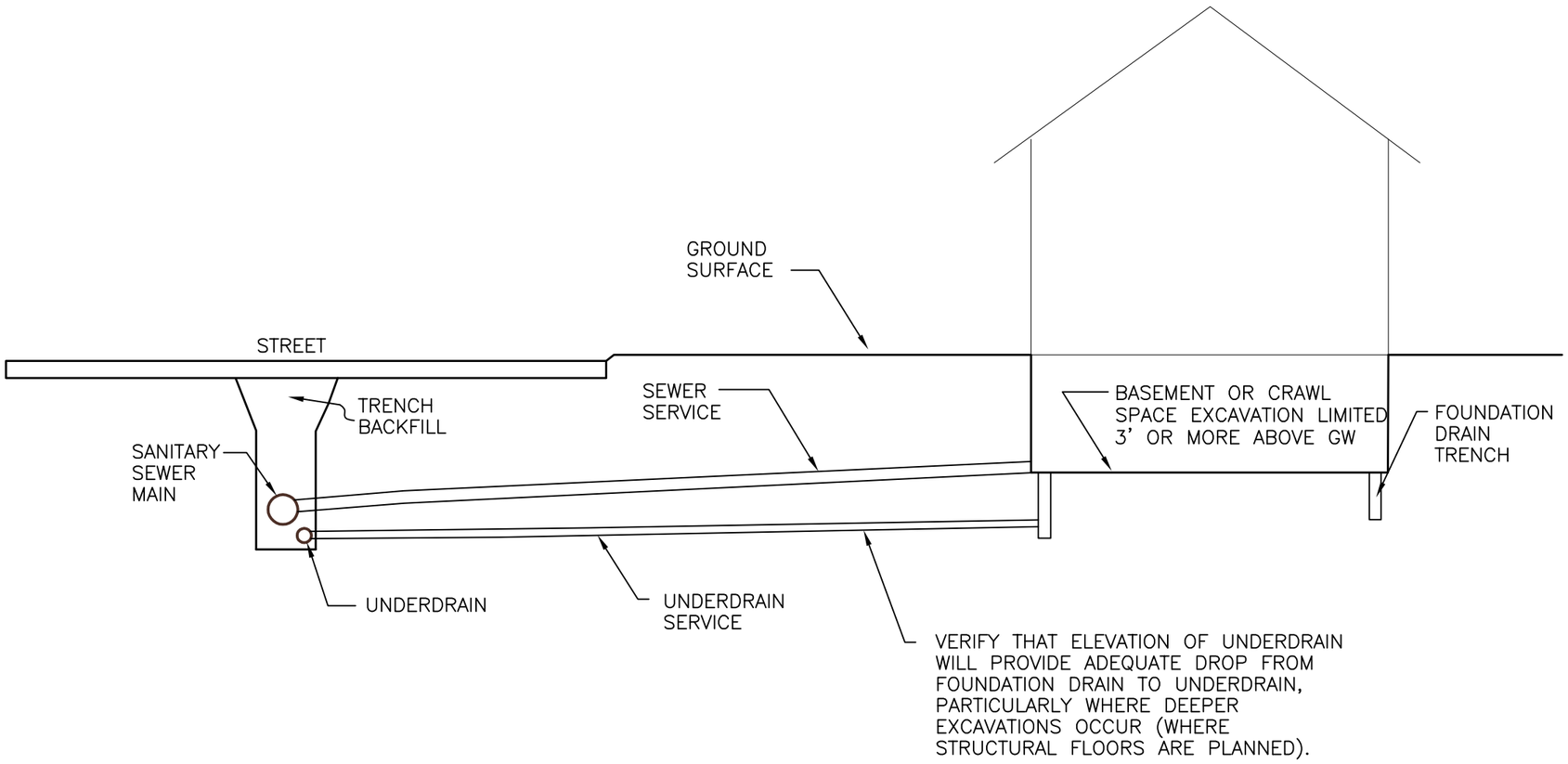
50-UNDERDRAIN_05



NOTE:
THE CONCRETE CUTOFF WALL SHOULD EXTEND INTO THE UNDISTURBED SOILS OUTSIDE THE UNDERDRAIN AND SANITARY SEWER TRENCH A MINIMUM DISTANCE OF 12 INCHES.

Underdrain Cutoff Wall Detail

Fig. 4



NOT TO SCALE

THE CLUB AT RAVENNA
RIVER CANYON, LOT 1, FILING NO. 2
CTLT Project No. DN52,267.000-115-R1

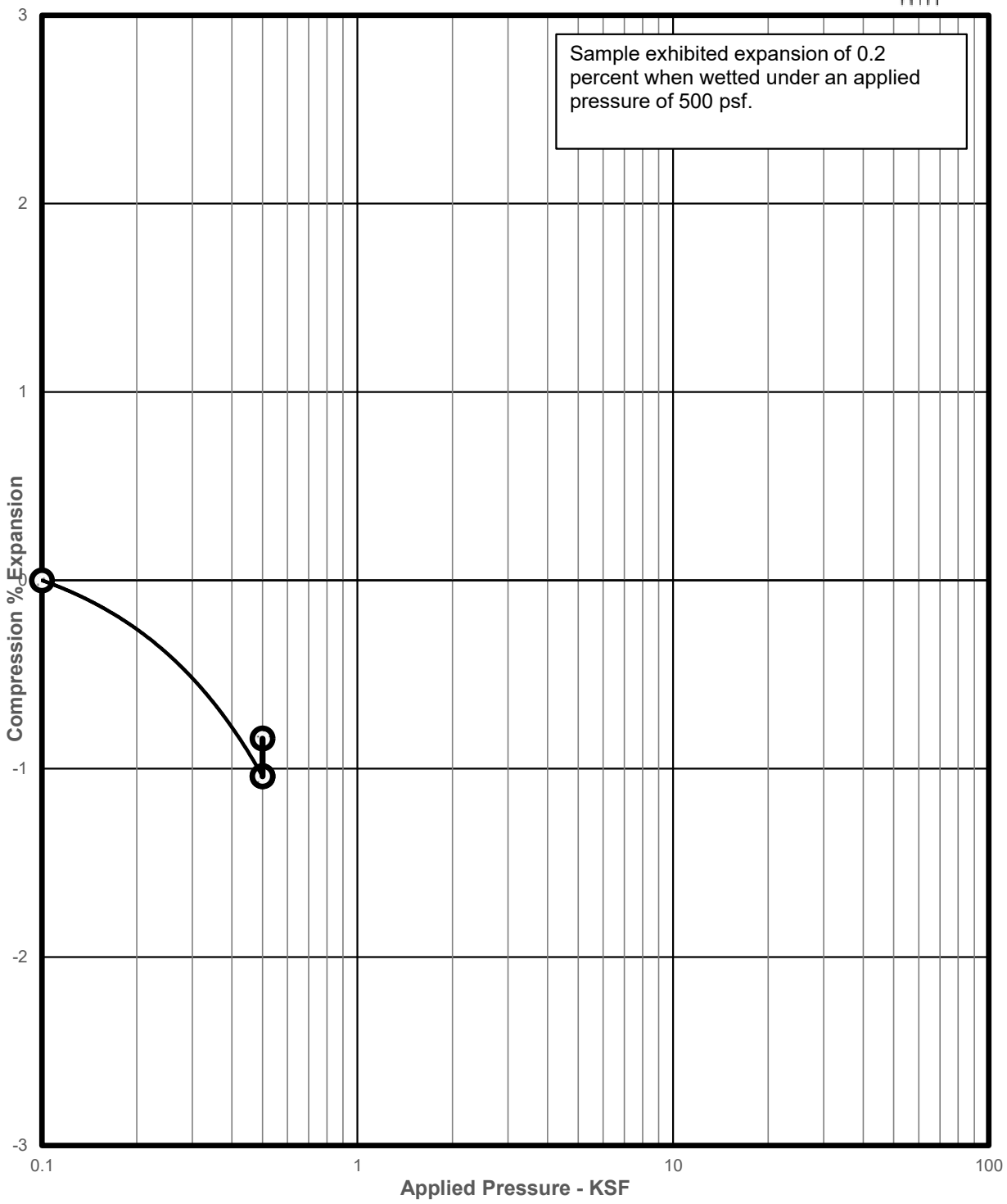
Conceptual Underdrain Profile

Fig. 5

APPENDIX A

LABORATORY TEST RESULTS

TABLE A-I – SUMMARY OF LABORATORY TESTING



SAMPLE OF: CLAY, SANDY (CL) DRY UNIT WEIGHT: 116 pcf
FROM: TH-1 AT 4 FEET MOISTURE CONTENT: 13.0 %

THE CLUB AT RAVENNA
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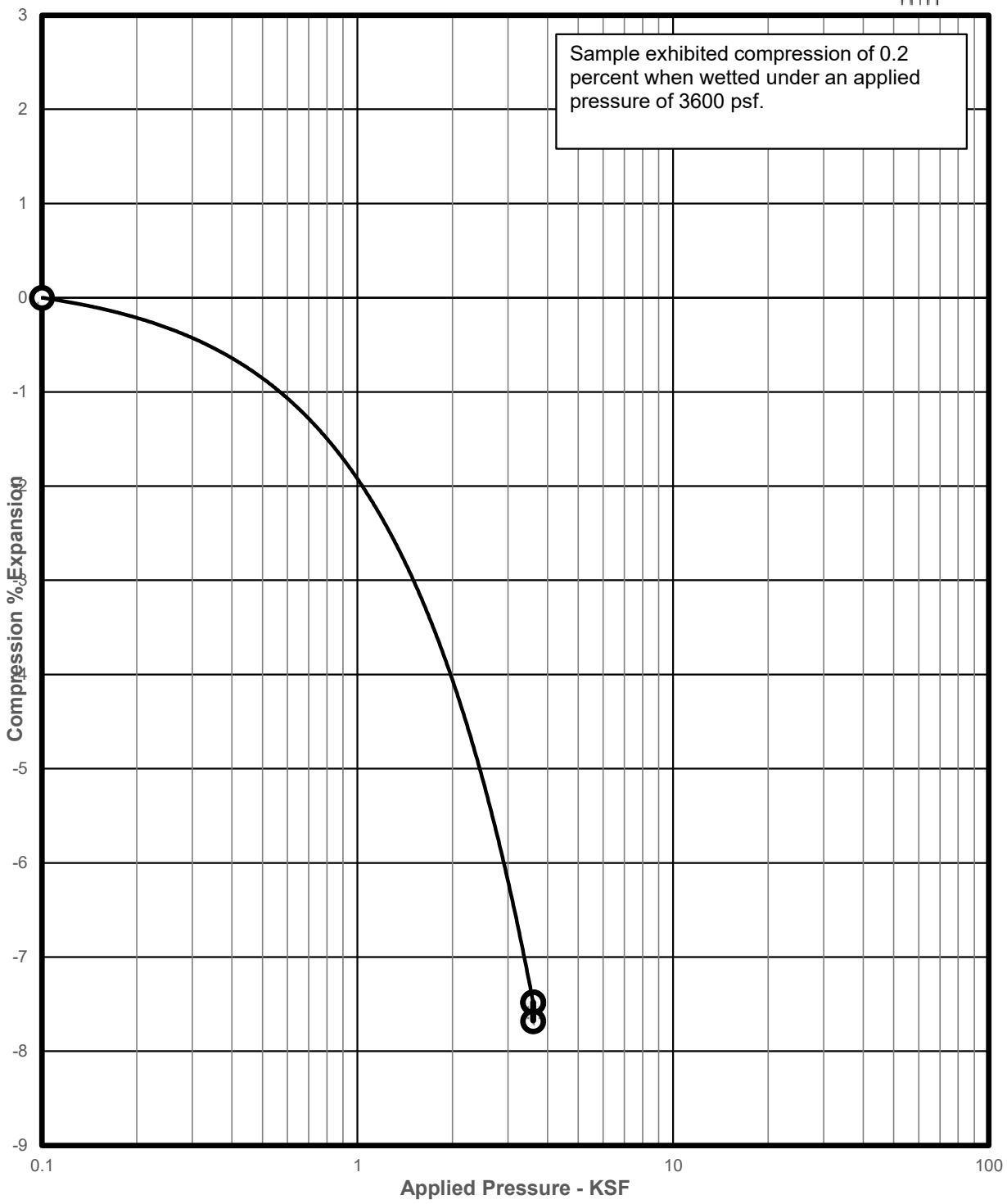
Swell Consolidation Test Results FIG. A- 1



SAMPLE OF: CLAY, SANDY (CL) DRY UNIT WEIGHT: 98 pcf
FROM: TH-1 AT 29 FEET MOISTURE CONTENT: 24.5 %

THE CLUB AT RAVENNA
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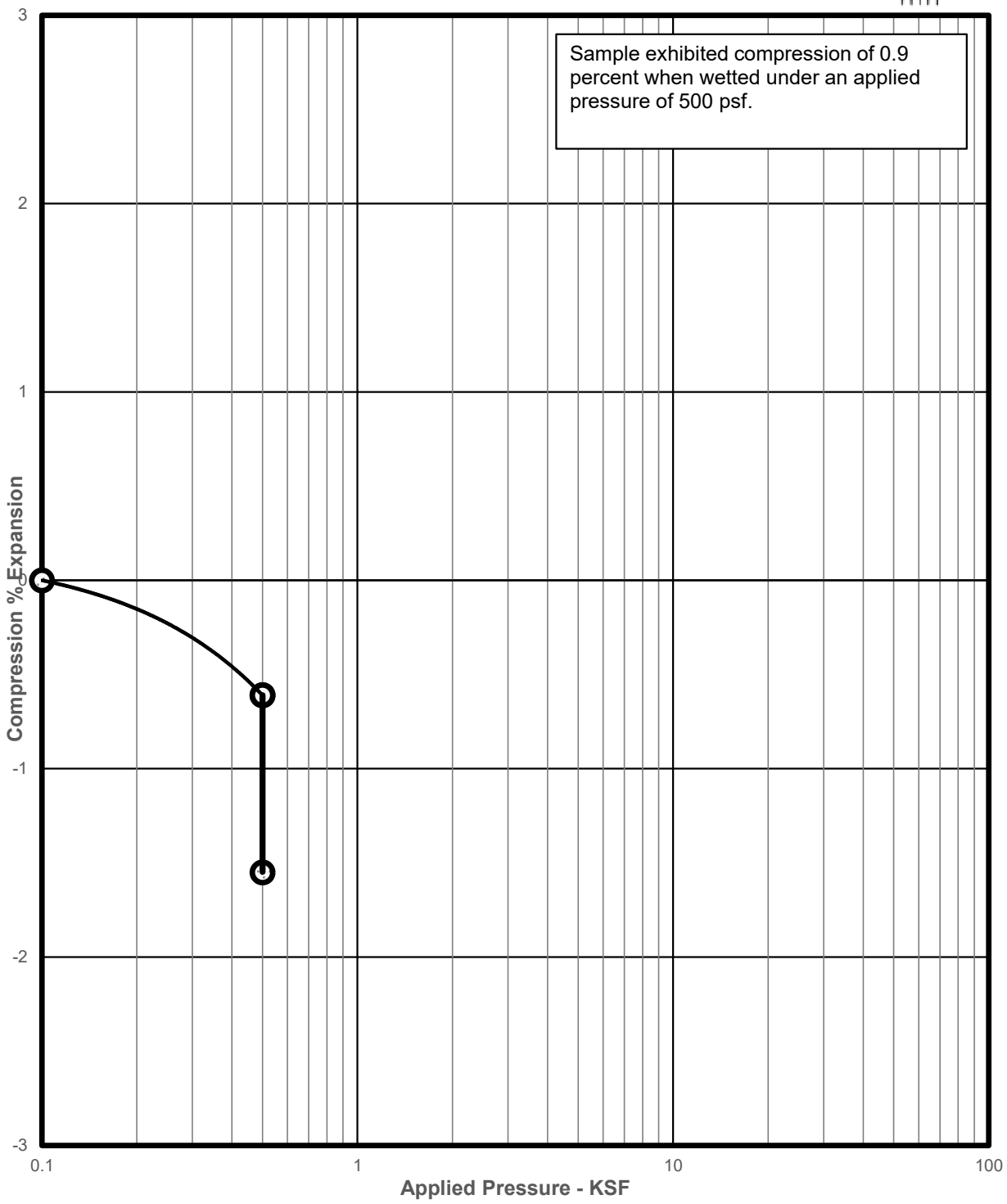
CTL|T PROJECT NO. DN52,267-115-R1

Swell Consolidation Test Results FIG. A- 2



SAMPLE OF: SAND, VERY CLAYEY (SC) DRY UNIT WEIGHT: 110 pcf
FROM: TH-2 AT 9 FEET MOISTURE CONTENT: 3.6 %

THE CLUB AT RAVENNA
RIVER CANYON, LOT 1, FILING NO. 2
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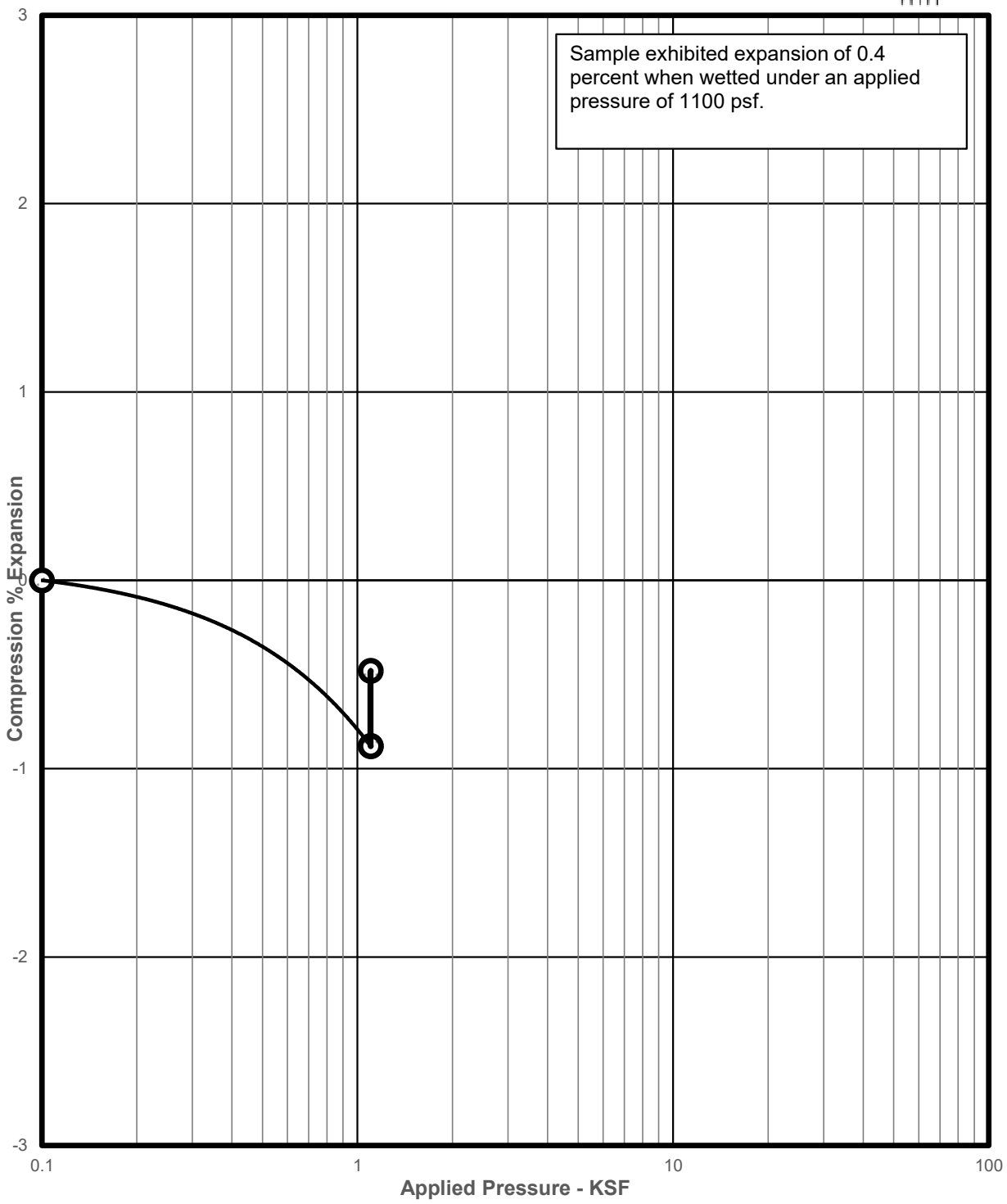
Swell Consolidation Test Results FIG. A- 3



SAMPLE OF: CLAY, SANDY (CL) DRY UNIT WEIGHT: 123 pcf
FROM: TH-2 AT 14 FEET MOISTURE CONTENT: 6.6 %

THE CLUB AT RAVENNA
RIVER CANYON, LOT 1, FILING NO. 2
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Swell Consolidation Test Results FIG. A- 4

TABLE A - I

SUMMARY OF LABORATORY TEST RESULTS

BORING	DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	SWELL TEST DATA			ATTERBERG LIMITS		SOLUBLE SULFATE CONTENT (%)	PASSING NO. 200 SIEVE (%)	SOIL TYPE
				SWELL (%)	COMPRESSION (%)	APPLIED PRESSURE (psf)	LIQUID LIMIT	PLASTICITY INDEX			
TH-1	4	13.0	116	0.2		500			0.02		CLAY, SANDY (CL)
TH-1	9	8.2	118				22	5		32	SAND, CLAYEY, SILTY (SC-SM)
TH-1	14	14.6	105							47	SAND, VERY CLAYEY (SC)
TH-1	29	24.5	98		0.2	3,600					CLAY, SANDY (CL)
TH-2	4	14.0	110				26	8		37	SAND, CLAYEY, SILTY (SC-SM)
TH-2	9	3.6	110		0.9	500					SAND, CLAYEY (SC)
TH-2	14	6.6	123	0.4		1,100					SAND, CLAYEY (SC)

THE CLUB AT RAVENNA
RIVER CANYON, LOT 1, FILING NO. 2
CTL|T PROJECT NO. DN52,267.000-115-R1

APPENDIX B

GUIDELINE SITE GRADING SPECIFICATIONS

River Canyon, Lot 1, Filing No. 2
Littleton, Colorado

GUIDELINE SITE GRADING SPECIFICATIONS

River Canyon, Lot 1, Filing No. 2
Littleton, Colorado

1. DESCRIPTION

This item shall consist of the excavation, transportation, placement and compaction of materials from locations indicated on the plans, or staked by the Engineer, as necessary to achieve preliminary street and overlot elevations. These specifications shall also apply to compaction of excess cut materials that may be placed outside of the subdivision and/or filing boundaries.

2. GENERAL

The Soils Representative shall be the Owner's representative. The Soils Representative shall approve fill materials, method of placement, moisture contents and percent compaction, and shall give written approval of the completed fill.

3. CLEARING JOB SITE

The Contractor shall remove all vegetation, trees, brush and rubbish before excavation or fill placement begins. The Contractor shall dispose of the cleared material to provide the Owner with a clean, neat appearing job site. Cleared material shall not be placed in areas to receive fill or where the material will support structures of any kind.

4. SCARIFYING AREA TO BE FILLED

Topsoil and vegetable matter shall be substantially removed from the ground surface upon which fill is to be placed. The surface shall then be plowed or scarified to a depth of 8 inches, moisture treated to above optimum moisture content, and compacted until the surface is free from ruts, hummocks or other uneven features, which would prevent uniform compaction by the equipment to be used.

5. DIFFERENTIAL FILL DEPTHS BENEATH PROPOSED FOUNDATIONS

Depth of fill below a building footprint shall not differ more than 5 feet below bottom of foundations. Where walkout basements are planned, the difference should be determined by comparing the bottom of the frost wall footings to the upper-level footings. If fill depths are to vary greater than 5 feet below proposed foundations two methods can be used to lower the risk of differential settlement:

- Bearing the foundations below fill on non-expansive soils and bedrock;
- Sub-excavating the existing ground surface to the lowest existing ground surface beneath the proposed residence footprint.

6. COMPACTING AREA TO BE FILLED

After the foundation for the fill has been cleared and scarified, it shall be disked or bladed until it is free from large clods to a depth of 8 to 12 inches, brought to the proper moisture content and compacted to not less than 95 percent of maximum density as determined in accordance with ASTM D 698. The foundation materials shall be worked, stabilized, or removed and replaced if necessary in accordance with the soils representative's recommendations in preparation for fill.

7. FILL MATERIALS

Fill soils shall be substantially free from vegetable matter or other deleterious substances, and shall not contain rocks having a diameter greater than six (6) inches and claystone pieces or soil clods larger than three (3) inches. Fill materials shall be obtained from cut areas shown on the plans or staked in the field by the Engineer.

On-site materials classifying as CL, CH, SC, SM, SW, SP, GP, GC and GM are acceptable. Concrete, asphalt, organic matter and other deleterious materials or debris shall not be used as fill.

8. MOISTURE CONTENT

For fill material classifying as CH, CL or SC, the fill shall be moisture treated to between optimum moisture and 3 percent above optimum moisture content. Soils classifying as SM, SW, SP, GP, GC and GM shall be moisture treated to within 2 percent of optimum moisture content as determined from Proctor compaction tests. Sufficient laboratory compaction tests shall be made to determine the optimum moisture content for the various soils encountered in borrow areas.

The Contractor may be required to add moisture to the excavation materials in the borrow area if, in the opinion of the Soils Representative, it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rake or disc the fill soils to provide uniform moisture content through the soils.

The application of water to embankment materials shall be made with any type of watering equipment approved by the Soils Representative, which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.

Should too much water be added to any part of the fill, such that the material is too wet to permit the desired compaction from being obtained, rolling and all work on that section of the fill shall be delayed until the material has been allowed to dry to the required moisture content. The Contractor will be permitted to rework wet material in an approved manner to hasten its drying.

9. COMPACTION OF FILL AREAS

Selected fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted to not less than the specified percentage of maximum density. Fill shall be compacted to at least 95 percent of the maximum density as determined in accordance with ASTM D 698. If fill is placed at depths

greater than 20 feet below proposed grade, fill shall be compacted to at least 98 percent of the maximum density as determined in accordance with ASTM D 698. At the option of the Soils Representative, soils classifying as SW, GP, GC, or GM may be compacted to 95 percent of maximum density as determined in accordance with ASTM D 1557 or 70 percent relative density for cohesionless sand soils. Fill materials shall be placed such that the thickness of loose materials does not exceed 8 inches and the compacted lift thickness does not exceed 6 inches.

Compaction as specified above shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved for soils classifying as CL, CH, or SC. Granular fill shall be compacted using vibratory equipment or other approved equipment. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient passes to ensure that the required density is obtained.

10. COMPACTION OF SLOPES

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, but not too dense for planting, and there is not an appreciable amount of loose soils on the slopes. Compaction of slopes may be done progressively in increments of three to five feet (3' to 5') in height or after the fill is brought to its total height. Permanent fill slopes shall not exceed 3:1 (horizontal to vertical).

11. PLACEMENT OF FILL ON NATURAL SLOPES

Where natural slopes are steeper than 20 percent in grade and the placement of fill is required, cut benches shall be provided at the rate of one bench for each 5 feet in height (minimum of two benches). Benches shall be at least 10 feet in width. Larger bench widths may be required by the Engineer. Fill shall be placed on completed benches as outlined within this specification.

12. DENSITY TESTS

Field density tests shall be made by the Soils Representative at locations and depths of his choosing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate that the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved.

13. SEASONAL LIMITS

No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Soils Representative indicates that the moisture content and density of previously placed materials are as specified.

14. NOTICE REGARDING START OF GRADING

The Contractor shall submit notification to the Soils Representative and Owner advising them of the start of grading operations at least three (3) days in advance of the starting date. Notification shall also be submitted at least 3 days in advance of any resumption dates when grading operations have been stopped for any reason other than adverse weather conditions.

15. REPORTING OF FIELD DENSITY TESTS

Density tests made by the Soils Representative, as specified under "Density Tests" above, shall be submitted progressively to the Owner. Dry density, moisture content, and percentage compaction shall be reported for each test taken.

16. DECLARATION REGARDING COMPLETED FILL

The Soils Engineer shall provide a written declaration stating that the site was filled with acceptable materials, and was placed in general accordance with the specification.

Roxborough
Water & Sanitation District

January 5, 2024

Heather Scott
Douglas County Planning
Division 100 Third Street
Castle Rock, Colorado 80104

Re: PS2023-183 Addition of 8 residential lots
off Caretaker Rd. in Ravenna

Dear Ms. Scott:

Roxborough Water and Sanitation District is providing this letter regarding water and sewer service to the referenced property, in accordance with the Rules and Regulations of the District as amended from time to time. The referenced project is within the boundaries of the District.

Development Water Demand

The referenced property will accommodate the proposed 8 residential developments with up to 1 equivalent residential unit (EQR) per lot for water and sewer. Water demand to the above-mentioned property is planned as follows:

Type of Use	Quantity	Required Water Supply (ac-ft/yr)
8 Residential Lots	8 EQR	3.52 Acre feet per year

Water Supply Availability

Roxborough Water and Sanitation District has a 90-year agreement with automatic and continuous renewals with the City of Aurora to purchase 2,235 acre feet of water annually. Under that agreement, 1,950 acre feet per year is available for potable water supply, and 285 acre feet per year is available for irrigation of Arrowhead golf course and the Roxborough Village Metro District parks.

Per the water supply agreement with Aurora, 1,950 acre feet of water, with a maximum of 0.44 ac-ft/yr/EQR, can serve a maximum of 4,431 EQRs. As of December 31, 2023, the District provided water service to 3,974 EQRs, that used a total of 985 acre feet of water in 2023, or 0.25 ac-ft/yr/EQR. Buildout within the current service area, which includes the additional 8 Ravenna lots is expected to be 4,326 EQRs with a required water supply of 1,903 ac-ft/yr, leaving 47 acre feet remaining for future inclusions in the District service area.

Water Quality

The District's water is diverted from the South Platte River at Strontia Springs Reservoir and then runs through the City of Aurora's tunnel to Rampart Range Reservoir and transmission pipelines to the District's Larry D. Moore Water Treatment Plant. Once it reaches the treatment facility, we utilize a number of treatment processes including coagulation, flocculation, sedimentation, filtration and disinfection. Roxborough Water and Sanitation District meets or exceeds all Colorado Department of Public Health and Environment testing and quality requirements and provides high quality water to its customers. The District's most recent Annual Water Quality Report can be found on our website (www.roxwater.org).

Sewer Service Availability

The District and the City of Littleton entered into an agreement under which Littleton provides wastewater treatment service to the District. To receive treatment service from Littleton, the District constructed all facilities required to connect to the Littleton system. Regionalization with the Littleton system enabled the decommissioning of the former Roxborough Water and Sanitation District and Lockheed Martin wastewater treatment facilities. In September 2007, the District completed construction of facilities, owned and operated by the District, to convey wastewater to the Littleton system.

Facilities required to connect to the Littleton wastewater system include two lift stations and approximately 14 miles of pipeline. The Waterton lift station serves the Lockheed Martin Waterton Campus; the Roxborough lift station serves the District's entire service area, including the Ravenna Maintenance Site. A pipeline conveys wastewater from Roxborough to the Littleton wastewater collection system for treatment at South Platte Renew owned by the Cities of Littleton and Englewood. The overall capacity of the wastewater conveyance system is 1.75 million gallons per day (MGD), to serve the ultimate wastewater flow condition for build out of the District's service area.

Interceptor sewers are in place to serve the ultimate development condition, and all interceptors have adequate capacity to carry the projected ultimate wastewater flows.

Roxborough
Water & Sanitation District

This letter affirms that Roxborough Water and Sanitation District has sufficient water supply and wastewater treatment capacity to serve the proposed development. For the purposes of Douglas County's concurrency management process, please accept this letter as confirmation that Roxborough Water and Sanitation District has reviewed the proposed development and determined that it meets the District's service standards. This letter does not constitute authorization to connect any of the proposed commercial properties to the District's system. Prior to connection, each proposed property will need to pay the System Development Charge in effect at that time and a Connection Permit Fee to obtain a Connection Permit.

Sincerely,

Mike Marcum
General Manager

6222 N. Roxborough Park Rd. Littleton, CO 80125
303-979-7286 | RoxWater.org

RIVER CANYON FILING NO. 2, 4TH AMENDMENT

A REPLAT OF LOT 1, RIVER CANYON FILING NO. 2 AND LOT 2A-2, RIVER CANYON FILING NO. 2, 3RD AMENDMENT
SITUATED IN THE NORTH HALF OF SECTION 34, TOWNSHIP 6 SOUTH, RANGE 69 WEST OF THE SIXTH PRINCIPAL MERIDIAN,
COUNTY OF DOUGLAS, STATE OF COLORADO.
6.019 ACRES - 8 RESIDENTIAL LOTS - 1 TRACT - SB2024-019

SHEET INDEX

LEGAL DESCRIPTION

A PARCEL OF LAND BEING A PART OF THE EAST HALF OF SECTION 34, TOWNSHIP 6 SOUTH, RANGE 69 WEST OF THE SIXTH PRINCIPAL MERIDIAN, COUNTY OF DOUGLAS, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

LOT 2A-2, RIVER CANYON FILING NO. 2, 3RD AMENDMENT, RECORDED APRIL 25, 2024 AT RECEPTION NO. 2024016275
AND
LOT 1, RIVER CANYON FILING NO. 2, RECORDED AUGUST 8, 2005 AT RECEPTION NO. 2005073807

DOUGLAS COUNTY, COLORADO

CONTAINING AN AREA OF 6.019 ACRES, (262,193 SQUARE FEET), MORE OR LESS.

DEDICATION STATEMENT

THE UNDERSIGNED, BEING ALL THE OWNERS, MORTGAGEES, BENEFICIARIES OF DEEDS OF TRUST AND HOLDERS OF OTHER INTERESTS IN THE LANDS DESCRIBED HEREIN, HAVE LAID OUT, SUBDIVIDED AND PLATTED SAID LANDS INTO LOTS, TRACTS, STREETS AND EASEMENTS AS SHOWN HEREON UNDER THE NAME AND SUBDIVISION OF **RIVER CANYON FILING NO. 2, 4TH AMENDMENT**. THE UTILITY EASEMENTS SHOWN HEREON ARE HEREBY DEDICATED FOR PUBLIC UTILITIES AND CABLE COMMUNICATION SYSTEMS AND OTHER PURPOSES AS SHOWN HEREON. THE ENTITIES RESPONSIBLE FOR PROVIDING THE SERVICES FOR WHICH THE EASEMENTS ARE ESTABLISHED ARE HEREBY GRANTED THE PERPETUAL RIGHT OF INGRESS AND EGRESS FROM AND TO ADJACENT PROPERTIES FOR INSTALLATION, MAINTENANCE AND REPLACEMENT OF UTILITY LINES AND RELATED FACILITIES. THE UTILITY EASEMENTS SHOWN HEREON ARE DEDICATED AND CONVEYED TO DOUGLAS COUNTY, COLORADO, IN FEE SIMPLE ABSOLUTE, WITH MARKETABLE TITLE, FOR PUBLIC USES AND PURPOSES.

OWNER

RIVER CANYON REAL ESTATE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY

BY: _____
ITS MANAGER

BY: _____

NAME: _____, PRESIDENT

STATE OF COLORADO)
)SS
COUNTY OF DOUGLAS)
ACKNOWLEDGED BEFORE ME THIS ____ DAY

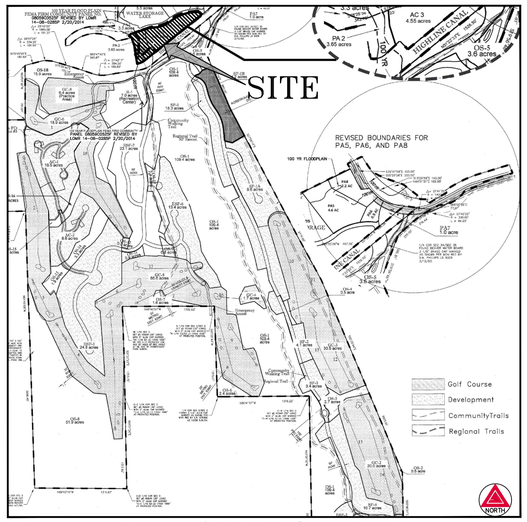
OF _____ , 2024

BY _____ AS PRESIDENT OF RIVER CANYON REAL ESTATE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY

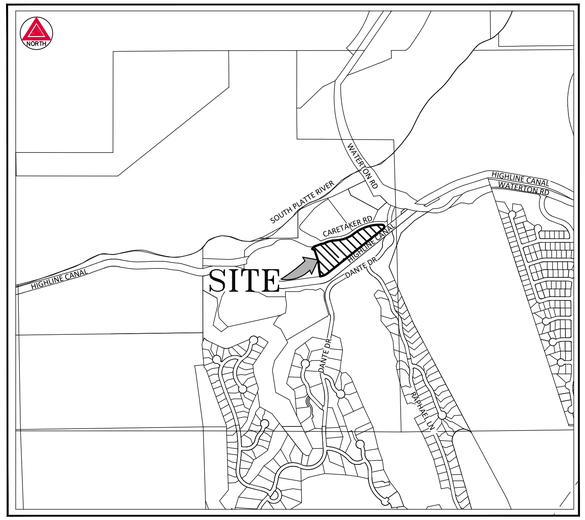
WITNESS MY HAND AND OFFICIAL SEAL:

MY COMMISSION EXPIRES: _____

NOTARY PUBLIC _____



PLANNING AREA VICINITY MAP
SCALE 1" = 1000'



VICINITY MAP
SCALE 1" = 1000'

GENERAL NOTES

1. ANY PERSON WHO KNOWINGLY REMOVES, ALTERS OR DEFACES ANY PUBLIC LAND SURVEY MONUMENT OR LAND BOUNDARY MONUMENT OR ACCESSORY COMMITS A CLASS TWO (2) MISDEMEANOR PURSUANT TO STATE STATUTE 18-4-508, COLORADO REVISED STATUTE.
2. PER C.R.S. 38-51-106, "ALL LINEAL UNITS DEPICTED ON THIS LAND SURVEY PLAT ARE U.S. SURVEY FEET. ONE METER EQUALS 39.37/12 U.S. SURVEY FEET, EXACTLY ACCORDING TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY."
3. THE FIELD WORK FOR THIS SURVEY WAS PERFORMED BY AN AZTEC CONSULTANTS, INC. SURVEY CREW AND COMPLETED ON OCTOBER 30, 2023.
4. BASIS OF BEARINGS: BEARINGS SHOWN HEREON ARE GRID BEARINGS DERIVED FROM GPS OBSERVATION BASED UPON THE COLORADO COORDINATE SYSTEM OF 1983 CENTRAL ZONE (NAD 83, 2011) REFERENCED TO THE SOUTHEASTERLY BOUNDARY OF LOT 2A-2, RIVER CANYON FILING NO. 2, 3RD AMENDMENT, BEING MONUMENTED AS SHOWN HEREON, TAKEN TO BEAR SOUTH 51°20'16" WEST, A DISTANCE OF 369.46 FEET.
5. FIRST AMERICAN TITLE'S COMMITMENT NO. 5509-4144429, EFFECTIVE MARCH 08, 2024 AT 8:00 A.M. WAS RELIED UPON FOR RECORD INFORMATION REGARDING RIGHTS-OF-WAY, EASEMENTS AND ENCUMBRANCES. THIS SURVEY DOES NOT REPRESENT A TITLE SEARCH BY AZTEC CONSULTANTS INC. TO DETERMINE OWNERSHIP, RIGHTS-OF-WAY, EASEMENTS OR OTHER MATTERS OF PUBLIC RECORD.
6. BASED ON A GRAPHICAL REPRESENTATION OF FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) NO. 08035C0130F, WITH AN EFFECTIVE DATE OF SEPTEMBER 30, 2005, THE SUBJECT PROPERTY LIES WITHIN OTHER AREAS – ZONES "X", WITH "ZONE X" BEING DEFINED AS "AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN AND WITHIN ZONE "A", WITH "ZONE A" BEING DEFINED AS AREAS WITH NO BASE FLOOD ELEVATIONS DETERMINED.
7. ALL LOT LINES ARE TO BE CONSIDERED RADIAL UNLESS OTHERWISE NOTED.
8. ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVERED SUCH DEFECT. IN NO EVENT MAY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.
9. TRACTS A, B, C & D SHALL BE OWNED AND MAINTAINED BY RIVER CANYON REAL ESTATE INVESTMENTS, LLC, A COLORADO LIMITED LIABILITY COMPANY, ITS SUCCESSORS AND ASSIGNS, FOR OPEN SPACE, UTILITIES, DRAINAGE, LANDSCAPING AND SIGHT DISTANCE. (THE "USE" LISTED FOR UTILITIES IS NOT A GRANT OF BLANKET EASEMENT OVER THE TRACTS, UTILITY EASEMENTS ARE SHOWN HEREON OR AS DEFINED BY SEPARATE INSTRUMENT).
10. SIGHT DISTANCE EASEMENTS (SDE) AS SHOWN HEREON ARE HEREBY GRANTED TO DOUGLAS COUNTY FOR SIGHT DISTANCE PURPOSES TOGETHER WITH THE FOLLOWING RESTRICTIONS OVER SAID EASEMENT: NO OBJECT WITHIN THE SIGHT DISTANCE EASEMENT SHALL BE MORE THAN TWENTY-FOUR (24) INCHES ABOVE THE FLOWLINE OF THE ADJACENT STREET. SUCH OBJECTS SHALL INCLUDE BUT ARE NOT LIMITED TO BUILDINGS, LANDSCAPING, AND UTILITY CABINETS. PARKING IS ALSO PROHIBITED WITHIN THE EASEMENT.
11. A SECONDARY DRAINAGE EASEMENT ACROSS TRACT A AND THE DRAINAGE EASEMENTS AS SHOWN HEREON IS HEREBY GRANTED TO DOUGLAS COUNTY FOR THE PURPOSES OF ACCESSING, MAINTAINING AND REPAIRING STORM WATER MANAGEMENT IMPROVEMENTS, INCLUDING, BUT NOT LIMITED TO, INLETS, PIPES, CULVERTS, CHANNELS, DITCHES, HYDRAULIC STRUCTURES, RIPRAP, DETENTION BASINS, FOREBAYS, MICRO-POOLS AND WATER QUALITY FACILITIES (COLLECTIVELY, THE "FACILITIES") IN THE EVENT THE RIVER CANYON REAL ESTATE INVESTMENTS, LLC., ITS SUCCESSORS, AND ASSIGNS ("SYSTEM OWNER") FAILS TO SATISFACTORILY MAINTAIN OR REPAIR SAID FACILITIES. A BLANKET ACCESS EASEMENT OVER THE RIVER CANYON FILING 2, 4TH AMENDMENT (THE "SUBDIVISION") IS ALSO HEREBY GRANTED TO DOUGLAS COUNTY, BUT ONLY FOR THE PURPOSE OF ACCESSING THE FACILITIES IN THE EVENT THAT THE DRAINAGE EASEMENTS DO NOT PROVIDE ADEQUATE ACCESS. THE MAINTENANCE AND REPAIR OF THE FACILITIES LOCATED WITHIN THE SUBDIVISION, AS SHOWN ON THE CONSTRUCTION PLANS ACCEPTED BY DOUGLAS COUNTY OR ON THE PLAT FOR THE SUBDIVISION, SHALL BE THE RESPONSIBILITY OF THE SYSTEM OWNER. IN THE EVENT SUCH MAINTENANCE AND REPAIRS ARE NOT PERFORMED BY THE SYSTEM OWNER TO THE SATISFACTION OF DOUGLAS COUNTY, THEN DOUGLAS COUNTY SHALL HAVE THE RIGHT, BUT NOT THE OBLIGATION, TO ENTER SAID SUBDIVISION, AFTER TEN (10) DAYS PRIOR WRITTEN NOTICE TO THE SYSTEM OWNER, UNLESS THERE IS AN EMERGENCY, IN WHICH CASE DOUGLAS COUNTY SHALL GIVE NOTICE AS SOON AS PRACTICABLE, TO PERFORM ALL NECESSARY WORK, THE COST OF WHICH SHALL BE PAID BY THE SYSTEM OWNER UPON BILLING. IN THE EVENT THE SYSTEM OWNER FAILS TO REIMBURSE DOUGLAS COUNTY WITHIN THIRTY (30) DAYS AFTER SUBMISSION OF THE BILL FOR THE COSTS INCURRED, DOUGLAS COUNTY WILL HAVE THE RIGHT TO ENFORCE SUCH OBLIGATION BY APPROPRIATE LEGAL ACTION. IT IS THE SYSTEM OWNER'S RESPONSIBILITY TO CONSTRUCT, MAINTAIN, AND REPAIR THE FACILITIES IN A MANNER CONSISTENT WITH ALL APPLICABLE PLANS APPROVED BY DOUGLAS COUNTY.

TRACT SUMMARY CHART

TRACT	AREA (SF)	AREA (AC)	OWNERSHIP	MAINTENANCE	USE*
A	86,571	1.987	H.O.A.	H.O.A.	OPEN SPACE/UTILITIES/DRAINAGE/LANDSCAPING/SIGHT DISTANCE
B	28,725	0.659	H.O.A.	H.O.A.	OPEN SPACE/UTILITIES/DRAINAGE/LANDSCAPING/SIGHT DISTANCE
C - PRIVATE DRIVE	25,455	0.584	H.O.A.	H.O.A.	PRIVATE ALLEY
D	22,901	0.526	H.O.A.	H.O.A.	OPEN SPACE/UTILITIES/DRAINAGE/LANDSCAPING/SIGHT DISTANCE
TRACTS TOTAL	163,652	3.756			

H.O.A. = HOME OWNERS ASSOCIATION

THIS SUBDIVISION PLAT CONTAINS 8 RESIDENTIAL LOTS AND 4 TRACTS

* THE "USE" LISTED FOR UTILITIES IS NOT A GRANT OF BLANKET EASEMENT OVER THE TRACTS, BOUNDARIES OF ANY UTILITY EASEMENTS ARE SHOWN HEREON OR AS DEFINED BY SEPARATE INSTRUMENT)

LAND SUMMARY CHART

TYPE	AREA (SF)	AREA (AC)	% OF TOTAL AREA
RESIDENTIAL LOTS (8)	98,541	2.263	37.60
TRACTS (3)	139,197	3.172	52.69
TRACT C-DOLCE VITA PLACE	25,455	0.584	9.71
TOTALS	262,193	6.019	100.00

SURVEYOR'S CERTIFICATE

I, ANTHONY K. PEALL, A DULY LICENSED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS PLAT TRULY AND CORRECTLY REPRESENTS THE RESULTS OF A SURVEY MADE ON OCTOBER 30, 2023 BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL MONUMENTS EXIST AS SHOWN HEREON; THAT MATHEMATICAL CLOSURE ERRORS ARE LESS THAN 1:50,000 (SECOND ORDER); AND THAT SAID PLAT HAS BEEN PREPARED IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS OF THE STATE OF COLORADO DEALING WITH MONUMENTS, SUBDIVISIONS OR SURVEYING OF LAND, AND ALL APPLICABLE PROVISIONS OF THE DOUGLAS COUNTY SUBDIVISION RESOLUTION. THIS CERTIFICATION IS BASED ON MY KNOWLEDGE, INFORMATION AND BELIEF AND IS NOT A GUARANTY OR WARRANTY, EITHER EXPRESSED OR IMPLIED.

I ATTEST THE ABOVE ON THIS _____ DAY OF _____, 2024

ANTHONY K. PEALL, COLORADO LICENSED PROFESSIONAL LAND SURVEYOR P.L.S. NO. 38636
FOR AND ON BEHALF OF AZTEC CONSULTANTS, INC.

TITLE VERIFICATION

WE, LAND TITLE GUARANTEE COMPANY, DO HEREBY CERTIFY THAT WE HAVE EXAMINED THE TITLE OF ALL LAND PLATTED HEREON AND THAT TITLE TO SUCH LAND IS IN THE DEDICATOR(S) FREE AND CLEAR OF ALL LIENS, TAXES AND ENCUMBRANCES.

FIRST AMERICAN TITLE

BY: _____

TITLE: _____

DATE: _____

STATE OF COLORADO)
)SS
COUNTY OF DOUGLAS)

ACKNOWLEDGED BEFORE ME THIS ____ DAY OF _____, 2024

BY _____ AS _____

OF FIRST AMERICAN TITLE

WITNESS MY HAND AND OFFICIAL SEAL

MY COMMISSION EXPIRES: _____

_____
NOTARY PUBLIC

PLANNING COMMISSIONERS CERTIFICATE

THE MINOR DEVELOPMENT FINAL PLAT (SB2024-019) WAS REVIEWED BY THE PLANNING COMMISSION ON

_____ _____, 2024.

_____ _____
PLANNING DIRECTOR, ON BEHALF OF THE PLANNING COMMISION DATE

BOARD OF COUNTY COMMISSIONERS CERTIFICATE

THIS PLAT WAS APPROVED FOR FILING BY THE BOARD OF COUNTY COMMISSIONERS OF DOUGLAS COUNTY, COLORADO, ON

THE _____DAY OF _____ , 2024, SUBJECT TO ANY CONDITIONS SPECIFIED HEREON. THE DEDICATIONS OF EASEMENTS ARE ACCEPTED.

ALL EXPENSES INCURRED WITH RESPECT TO IMPROVEMENTS FOR ALL UTILITY SERVICES, PAVING, GRADING, LANDSCAPING, CURBS, GUTTER, SIDEWALKS, ROAD LIGHTING, ROAD SIGNS, FLOOD PROTECTION DEVICES, DRAINAGE STRUCTURES, AND ALL OTHER IMPROVEMENTS THAT MAY BE REQUIRED SHALL BE THE RESPONSIBILITY OF THE SUBDIVIDER AND NOT DOUGLAS COUNTY.

THIS ACCEPTANCE DOES NOT GUARANTEE THAT SOIL CONDITIONS, SUBSURFACE GEOLOGY, GROUNDWATER CONDITIONS OR FLOODING CONDITIONS OF ANY LOTS SHOWN HEREON ARE SUCH THAT A BUILDING PERMIT, WELL PERMIT OR SEWAGE DISPOSAL PERMIT WILL BE ISSUED.

_____
CHAIR, BOARD OF COUNTY COMMISSIONERS

CLERK AND RECORDER'S CERTIFICATE

STATE OF COLORADO)
COUNTY OF DOUGLAS)

I HEREBY CERTIFY THAT THIS PLAT WAS FILED IN MY OFFICE ON THIS __ DAY OF _____ 2024,

A.D., AT _____ A.M./P.M. AND WAS RECORDED AT RECEPTION NO. _____

DOUGLAS COUNTY CLERK AND RECORDER

LAST REVISED: 07/22/2024

AzTec Consultants, Inc.
300 East Mineral Ave., Suite 1
Littleton, Colorado 80122
Phone: (303) 713-1898
Fax: (303) 713-1897
www.aztecconsultants.com

AzTec Proj. No.: 125823-02 Drawn By: TP

DEVELOPER
THE CLUB AT RAVENNA
11118 CARETAKER ROAD
LITTLETON, CO 80125
(720)927-9909

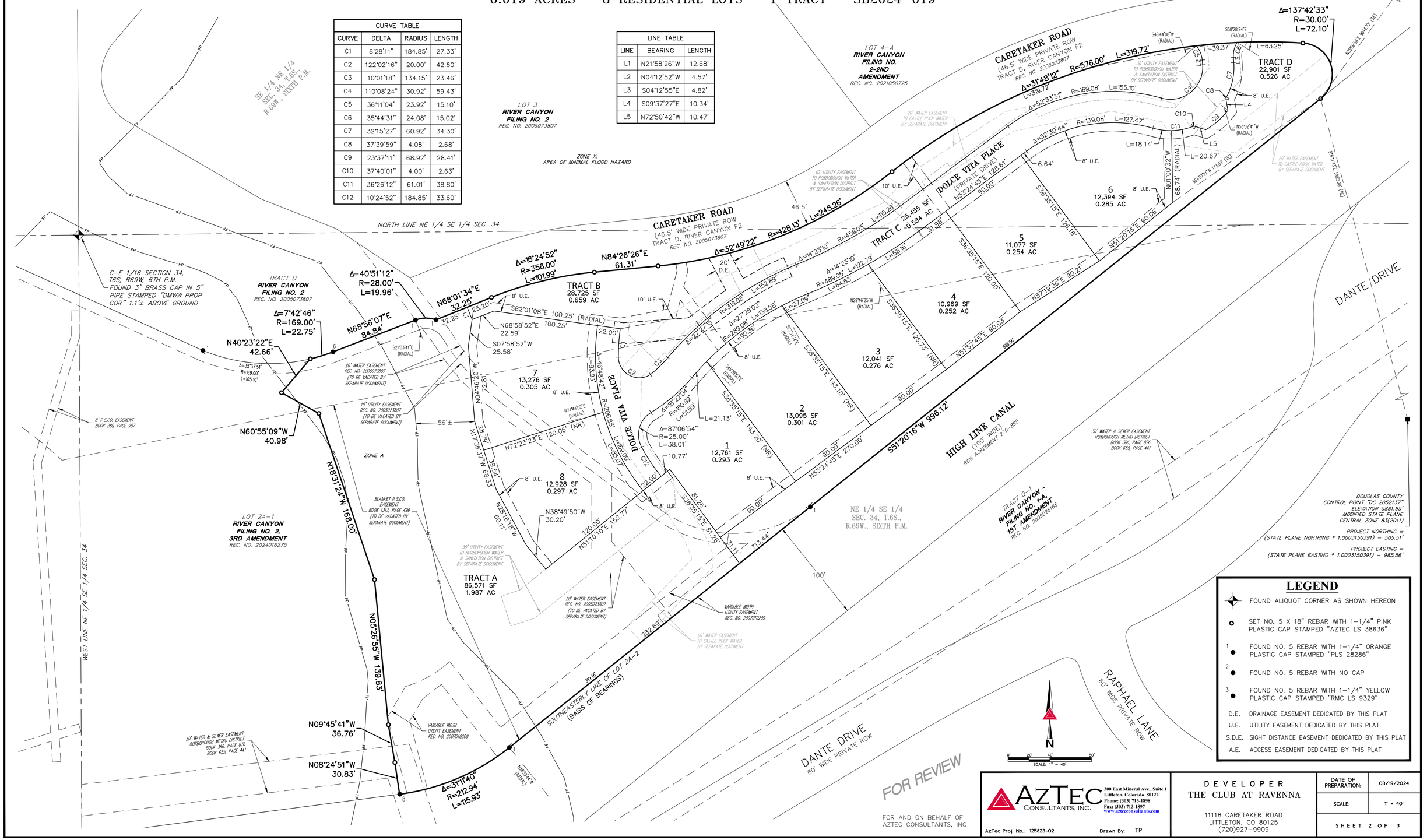
DATE OF PREPARATION:	03/19/2024
SCALE:	N/A
SHEET 1 OF 3	

RIVER CANYON FILING NO. 2, 4TH AMENDMENT

A REPLAT OF LOT 1, RIVER CANYON FILING NO. 2 AND LOT 2A-2, RIVER CANYON FILING NO. 2, 3RD AMENDMENT
SITUATED IN THE NORTH HALF OF SECTION 34, TOWNSHIP 6 SOUTH, RANGE 69 WEST OF THE SIXTH PRINCIPAL MERIDIAN,
COUNTY OF DOUGLAS, STATE OF COLORADO.
6.019 ACRES - 8 RESIDENTIAL LOTS - 1 TRACT - SB2024-019

CURVE TABLE			
CURVE	DELTA	RADIUS	LENGTH
C1	8°28'11"	184.85'	27.33'
C2	122°02'16"	20.00'	42.60'
C3	10°01'18"	134.15'	23.46'
C4	110°08'24"	30.92'	59.43'
C5	36°11'04"	23.92'	15.10'
C6	35°44'31"	24.08'	15.02'
C7	32°15'27"	60.92'	34.30'
C8	37°39'59"	4.08'	2.68'
C9	23°37'11"	68.92'	28.41'
C10	37°40'01"	4.00'	2.63'
C11	36°26'12"	61.01'	38.80'
C12	10°24'52"	184.85'	33.60'

LINE TABLE		
LINE	BEARING	LENGTH
L1	N21°58'26"W	12.68'
L2	N04°12'52"W	4.57'
L3	S04°12'55"E	4.82'
L4	S09°37'27"E	10.34'
L5	N72°50'42"W	10.47'



LEGEND

- FOUND ALIQUOT CORNER AS SHOWN HEREON
- SET NO. 5 X 18" REBAR WITH 1-1/4" PINK PLASTIC CAP STAMPED "AZTEC LS 38636"
- 1 FOUND NO. 5 REBAR WITH 1-1/4" ORANGE PLASTIC CAP STAMPED "PLS 28286"
- 2 FOUND NO. 5 REBAR WITH NO CAP
- 3 FOUND NO. 5 REBAR WITH 1-1/4" YELLOW PLASTIC CAP STAMPED "RMC LS 9329"
- D.E. DRAINAGE EASEMENT DEDICATED BY THIS PLAT
- U.E. UTILITY EASEMENT DEDICATED BY THIS PLAT
- S.D.E. SIGHT DISTANCE EASEMENT DEDICATED BY THIS PLAT
- A.E. ACCESS EASEMENT DEDICATED BY THIS PLAT

N
SCALE: 1" = 40'

FOR REVIEW

FOR AND ON BEHALF OF AZTEC CONSULTANTS, INC

AZTEC CONSULTANTS, INC.
300 East Mineral Ave., Suite 1
Littleton, Colorado 80122
Phone: (303) 713-1898
Fax: (303) 713-1897
www.aztecconsultants.com

AzTec Proj. No.: 125823-02 Drawn By: TP

DEVELOPER
THE CLUB AT RAVENNA
11118 CARETAKER ROAD
LITTLETON, CO 80125
(720)927-9909

DATE OF PREPARATION:	03/19/2024
SCALE:	1" = 40'
SHEET 2 OF 3	

RIVER CANYON FILING NO. 2, 4TH AMENDMENT

A REPLAT OF LOT 1, RIVER CANYON FILING NO. 2 AND LOT 2A-2, RIVER CANYON FILING NO. 2, 3RD AMENDMENT
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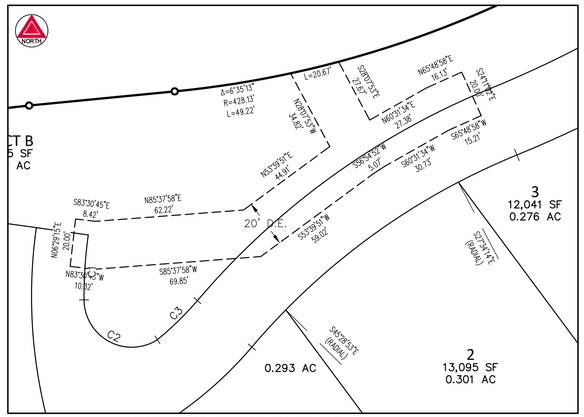

DRAINAGE EASEMENT DETAIL
SCALE 1" = 30'

LEGEND

✦	FOUND ALIQUOT CORNER AS SHOWN HEREON
○	SET NO. 5 X 18" REBAR WITH 1-1/4" PINK PLASTIC CAP STAMPED "AZTEC LS 38636"
1 ●	FOUND NO. 5 REBAR WITH 1-1/4" ORANGE PLASTIC CAP STAMPED "PLS 28286"
2 ●	FOUND NO. 5 REBAR WITH NO CAP
3 ●	FOUND NO. 5 REBAR WITH 1-1/4" YELLOW PLASTIC CAP STAMPED "RMC LS 9329"
D.E.	DRAINAGE EASEMENT DEDICATED BY THIS PLAT
U.E.	UTILITY EASEMENT DEDICATED BY THIS PLAT
S.D.E.	SIGHT DISTANCE EASEMENT DEDICATED BY THIS PLAT
A.E.	ACCESS EASEMENT DEDICATED BY THIS PLAT

N
0' 15' 30' 60'
SCALE: 1" = 30'

FOR REVIEW

FOR AND ON BEHALF OF
AZTEC CONSULTANTS, INC

AZTEC CONSULTANTS, INC.
300 East Mineral Ave., Suite 1
Littleton, Colorado 80122
Phone: (303) 713-1898
Fax: (303) 713-1897
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DATE OF PREPARATION:	03/19/2024
SCALE:	1" = 30'
SHEET 3 OF 3	