

**FINAL DRAINAGE AND EROSION  
CONTROL REPORT**

**FOR**

**LINCOLN AVENUE MIXED USE**

Prepared for:

**Lagunitas Lincoln, Inc.**  
3944 JFK Parkway, Suite B200  
Fort Collins, CO 80525

Prepared by:

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June 17, 2005

Job Number 173-02

June 17, 2005

Basil Hamdan  
City of Fort Collins Stormwater  
700 Wood Street  
Fort Collins, CO 80522-0580

**RE: Final Drainage and Erosion Control Report for Lincoln Avenue Mixed Use**

Dear Basil,

I am pleased to submit for your review and approval, this Final Drainage and Erosion Control Report for the Lincoln Avenue Mixed Use. I certify that this report for the drainage design was prepared in accordance with the criteria in the City of Fort Collins Storm Drainage Manual.

I appreciate your time and consideration in reviewing this submittal. Please call if you have any questions.

Sincerely,



Shane Boyle, EIT  
North Star Design, Inc.



Patricia Kroetch, PE  
North Star Design, Inc.  
President

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## 1. GENERAL LOCATION AND DESCRIPTION

### 1.1. Location

The Lincoln Avenue Mixed Use development is located in the northeast quarter of Section 7, Township 7 North, Range 68 West of the Sixth Principal Meridian, in the City of Fort Collins, County of Larimer, and State of Colorado. See the Vicinity Map located in Appendix A.

The project is bounded on the north and east by undeveloped agricultural land, on the west by existing Lemay Avenue, and on the south by existing Lincoln Avenue. There is also an existing bank building located adjacent to the property on the southwest corner.

### 1.2. Description of Property

The entire project consists of approximately 15.5 acres of land. Existing development on this property includes a house and several small outbuildings. Existing drainage patterns for the site are generally to the southeast with slopes ranging from approximately 0.5% to 1.0%. Runoff from this site flows to the existing roadside ditch along Lincoln Avenue.

Proposed development for the site includes six commercial/office buildings, sixteen multifamily buildings (6, 7, & 8-plexes), a clubhouse, pool, and three detached garage structures, along with associated walks, parking, and drives. Access for the proposed development will be from Lincoln Avenue on the south and Lemay Avenue on the west.

## 2. DRAINAGE BASINS AND SUB-BASINS

### 2.1. Major Basin Description

The proposed development lies within the Dry Creek Drainage Basin as delineated by the City of Fort Collins. Portions of the property lie within both the FEMA Poudre River 100-year floodplain and the City of Fort Collins 100-year Dry Creek floodplain. No portion of this site is within the Poudre River or Dry Creek 100-year floodway boundaries.

A small portion of the site along the western property line lies within the FEMA Poudre River 100-year floodplain and the site is encompassed by the FEMA Poudre River 500-year floodplain. Floodplain information has been provided by the City of Fort Collins,

Floodplain Administrator for the FEMA and City of Fort Collins 100-year floodplain boundaries for the Poudre River. None of the proposed buildings are located within the Poudre River 100-year floodplain. The FEMA 100-year and 500-year Poudre River floodplains are located on the FIRM Panel number 080101 0179E.

The southeastern corner of this site is also within the City of Fort Collins Dry Creek 100-year floodplain and the site is encompassed by the City of Fort Collins 500-year Dry Creek floodplain. All or portions of ten of the proposed buildings lie within the Dry Creek 100-year floodplain. The foundation for all structures is expected to be slab on grade and all buildings have been designed with a minimum opening elevation of at least 1.5' above the 100-year base flood elevation. A floodplain use permit will be required for each building prior to a CO being issued. Floodplain information for the Dry Creek floodplain has been provided by the City of Fort Collins.

## **2.2. Sub-basin Description**

Runoff from this site currently flows southeast to the existing swale along the north side of Lincoln Avenue. The existing drainage patterns will be altered with the development of this site. Runoff will be routed to three ponds. In the interim condition, Ponds 1 and 3 will act as retention ponds and the release will be manually controlled by a valve in the outlet structure. Runoff will be gravity released into the existing storm system along Lincoln Avenue when the storm has passed and water downstream has dissipated. In the ultimate condition, these ponds will be reconfigured and the manual valve will be removed so that the ponds will act as detention ponds, with a release rate equal to the 2-year historic runoff. In both the interim and ultimate conditions, Pond 2 has been designed in series with Pond 3. Pond 3 has been sized to accept the runoff from Pond 2 in both design conditions.

## **3. DRAINAGE DESIGN CRITERIA**

### **3.1. Regulations**

This report was prepared to meet or exceed the "City of Fort Collins Storm Drainage Design Criteria Manual" specifications. Where applicable, the criteria established in the "Urban Storm Drainage Criteria Manual" (UDFCD), 1984, developed by the Denver Regional Council of Governments, has been used. This site is also in compliance with Chapter 10 (Flood Prevention and Protection) of the City of Fort Collins Municipal Code.

### **3.2. Development Criteria Reference and Constraints**

The runoff from this site has been routed to conform to the requirements of the City of Fort Collins Stormwater Department and Larimer County Engineering. In the interim condition, two retention ponds and a detention pond are proposed and will provide 2 times the storage capacity required for the 3-hour 100-year storm event. Manually operated valves will be placed on the outlet structures for Ponds 1 and 3 so that the ponds will act as retention during the storm event. The valves would only be opened after the flow in the existing swale has dissipated. This valve will be operated and maintained by the Home Owner's Association.

### **3.3. Hydrologic Criteria**

Runoff computations were prepared for the 2-year and 10-year minor and 100-year major storm frequencies for the ultimate condition and for the 100-year major storm frequency for the interim condition. All calculations were completed utilizing the rational method for determining peak runoff. All hydrologic calculations associated with the basins are included in Appendix B of this report.

Detention and retention volumes were determined using the FAA Method. Water quality volume was calculated using the method recommended in the "Urban Storm Drainage Criteria Manual" and will only be incorporated in the ultimate pond design, except for Pond 2, which will be used as a detention pond with extended water quality detention in both design conditions.

### **3.4. Hydraulic Criteria**

Hydraulic elements have been designed to adequately convey the 100-year storm runoff from this site to the proposed retention/detention ponds. All hydraulic calculations within this report have been prepared in accordance with the City of Fort Collins Drainage Criteria and are included in Appendix C of this report.

## 4. DRAINAGE FACILITY DESIGN

### 4.1. General Concept

Where possible, runoff from the proposed development will be routed to the proposed retention/detention ponds by surface flow. Where necessary, and at pond outlets, storm sewer has been used to adequately convey storm runoff to the retention/detention ponds.

Three ponds are proposed with this development. In the interim condition, Ponds 1 and 3 will act as retention ponds. These ponds will be allowed to release downstream at the 2-year historic rate once the water in the Lincoln Avenue roadside ditch has dissipated. In the ultimate condition, Ponds 1 and 3 will be reconfigured and will act as detention ponds with a release rate equal to the 2-year historic runoff rate. Pond 2 will act as a detention pond and will release into Pond 3 in both design conditions. These ponds have been modeled in series and Pond 3 has been adequately sized to accommodate the release from Pond 2. Calculations for both the interim and ultimate conditions are included in the Appendices of this report.

### 4.2. Specific Flow Routing

A summary of the drainage patterns within each basin is provided in the following paragraphs.

**Basin 1** is located on the western edge of the site and contains the portion of the site that will drain into Pond 1. Runoff from this basin will be conveyed to the detention pond via surface flow and curb openings. The detained release from Pond 1 will be piped to an existing storm sewer that runs south through the site. From there, the runoff is conveyed to the storm sewer in Lincoln Avenue and ultimately to the northern Lincoln Avenue roadside ditch which will convey the runoff to Dry Creek.

**Basin 2** is located in the northeastern corner of the site and contains the portion of the site that will drain into Pond 2. Runoff from this basin will be conveyed to Pond 2 via a combination of surface and subsurface flow. The detained release from Pond 2 will be conveyed to Pond 3 via a proposed storm sewer. Pond 2 has been designed to act as a detention pond in both the interim and ultimate conditions and has been designed in series With Pond 3. Pond 3 has been designed to accommodate the release from Pond 2 in both the interim and ultimate conditions.

**Basin 3** is located in the southeastern corner of the site and contains the portion of the site that will drain into Pond 3. Runoff from this basin will be conveyed to Pond 3 via a combination of surface and subsurface flow. The detained release from Pond 3 will be piped to the Lincoln Avenue storm sewer, which will convey the runoff to the northern Lincoln Avenue roadside ditch and ultimately to Dry Creek.

#### **4.3. Drainage Summary**

Drainage facilities located outside of the right-of-way (including the ponds, proposed storm drain systems, and the pond outlet structures) will be maintained by the owners of the property. The storm system in the proposed rights-of-way will be owned and maintained by the City of Fort Collins.

### **5. EROSION CONTROL**

#### **5.1. General Concept**

This site lies within the Moderate Rainfall and Wind Erodibility Zone per the City of Fort Collins Zone Maps. The potential exists for silt movement from the site and into the existing swale along the north side of Lincoln Avenue. A potential also exists for tracking of mud onto existing streets which could then wash into existing storm systems. The required performance standard for the site is 74.7%. During construction and after final paving and building construction, this figure has been exceeded with the use of silt fence, straw bales, and by using the retention pond as a sediment trap during construction.

The erosion control escrow amount is \$21,000.

#### **5.2. Specific Details**

To limit the amount of silt leaving the site several erosion control measures shall be implemented during construction. Straw bales will be used where appropriate and silt fence will be installed around the entire property boundary. Vehicle tracking pads shall be installed at the proposed connections to Lemay Avenue and Lincoln Avenue to control the mud being tracked onto existing pavement. During overlot grading, disturbed areas are to be kept in a roughened condition and watered to reduce wind erosion. The retention pond will be used as a sediment trap during construction.



## 6. CONCLUSIONS

### 6.1. Compliance with Standards

All computations within this report are in compliance with the City of Fort Collins Erosion Control Reference Manual for Construction Sites, the Storm Drainage Design Criteria Manual, and Chapter 10 of the City Code (Flood Prevention and Protection). No drainage variances are being requested for this project at this time.

### 6.2. Drainage Concept

The proposed drainage concepts presented in this report and on the construction plans adequately provide for stormwater quality treatment of proposed impervious areas. Conveyance elements have been designed to convey the 100-year storm runoff to the proposed retention/detention ponds and to minimize future maintenance.

If, at the time of construction, groundwater is encountered, a Colorado Department of Health Construction Dewatering Permit will be required.

## 7. REFERENCES

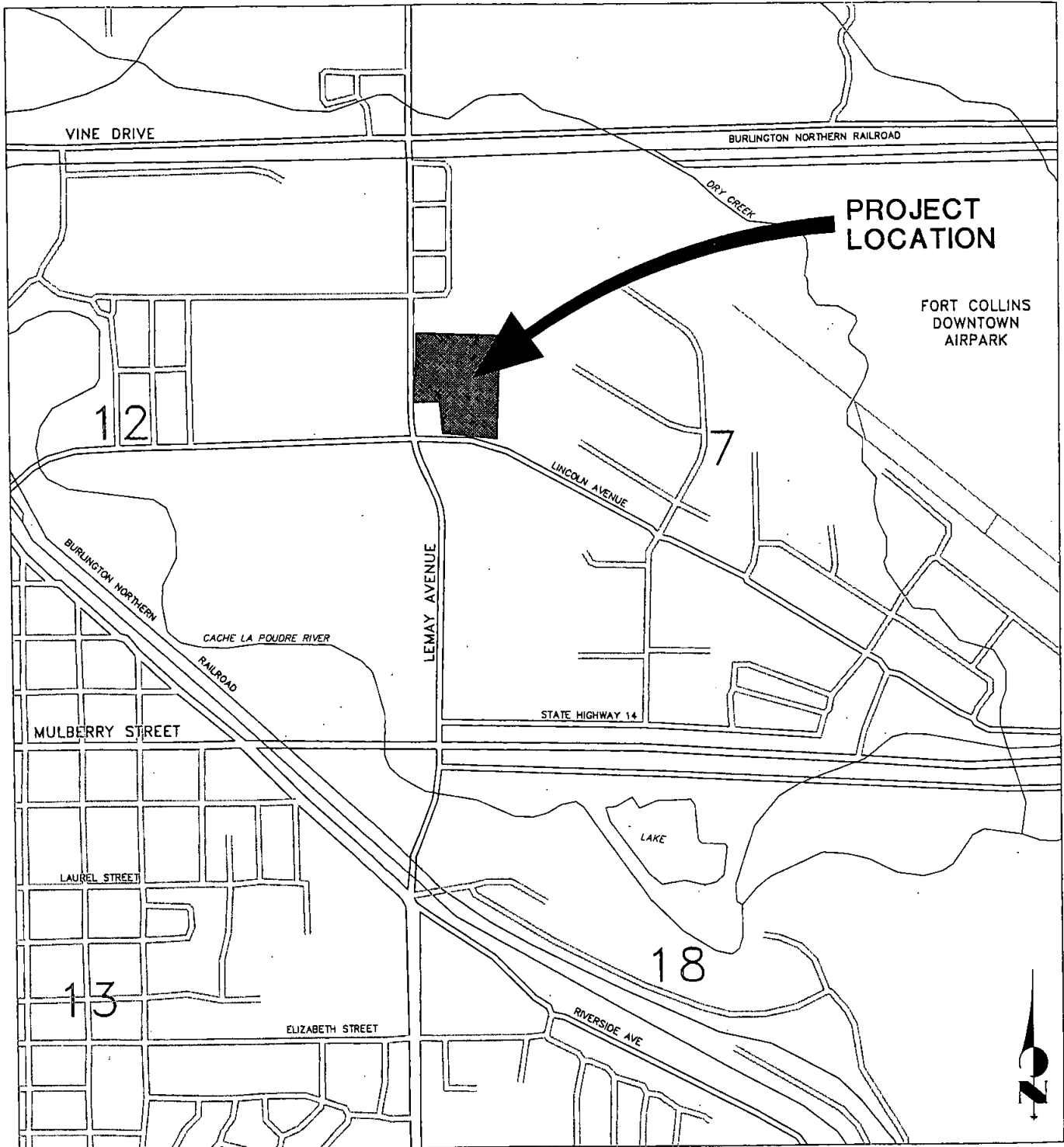
1. City of Fort Collins, "Storm Drainage Criteria Manual", (SDCM), dated March, 1986.
2. Urban Drainage and Flood Control District, "Urban Storm Drainage Criteria Manual", Volumes 1 and 2, dated June 2001, and Volume 3 dated September 1999.
3. City of Fort Collins Code, Chapter 10, City of Fort Collins Web Site under Municipal Code Section [www.fcgov.com/cityclerk/codes.php](http://www.fcgov.com/cityclerk/codes.php). Information obtained on 6/21/04.

**APPENDIX A**

**VICINITY MAP**

A

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SHEET 1 OF 1

DATE: 6/10/05

SCALE: 1" = 1500'

DESIGNED BY: TLN

### AT LINCOLN & LEMAY

VICINITY MAP



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For additional information or an official copy, please contact Current Planning 281 North College Fort Collins, CO 80524 USA