

Drainage Copy 4-8-85  
See copy returned to planning for comments

FINAL DRAINAGE REPORT  
FOR  
MAPLE STREET APARTMENTS  
CITY OF FORT COLLINS  
STATE OF COLORADO



engineering  
professionals inc.

A CIVIL ENGINEERING AND LAND SURVEYING FIRM

2625 Redwing Road  
Suite 110  
Ft. Collins, CO 80526  
303/226-3852

377 E. Agate Avenue  
P.O. Box 500  
Granby, CO 80446  
303/887-2631

Drainage copy Reviewed 9-7-85,  
comments on report returned  
to planning THG

FINAL DRAINAGE REPORT  
FOR  
MAPLE STREET APARTMENTS  
CITY OF FORT COLLINS  
STATE OF COLORADO

JANUARY, 1985

PROJECT NO.: 332.3

Prepared by:

Engineering Professionals, Inc.  
2625 Redwing Rd., Suite 110  
Fort Collins, CO 80526

(303) 226-3852

## **INTRODUCTION**

This final drainage report is submitted in conjunction with construction drawings for Maple Street Apartments prepared by Engineering Professionals, Inc. The City of Fort Collins "Storm Drainage Design Criteria and Construction Standards" were used as a guideline during the preparation of this report.

## **SITE DESCRIPTION**

The Maple Street Apartments are located at 1216 Maple Street in north-central Fort Collins, and are more particularly described as part of lots 7 and 8 of the Tennyson Heights subdivision. The site contains 22,000 square feet and slopes to the north and west at approximately 1.3%. A portion of the site is currently occupied by a single-family residence, while the remainder of the site is vegetated by trees, shrubs and lawn. A 13-unit apartment building and parking lot are proposed for construction on the site.

## **HISTORIC DRAINAGE**

The site has historically drained to the north and west, storm water leaving the site at the northwest corner of the property, crossing adjacent lands to the west and north, then discharging to Cherry Street. Historic discharges from the site are estimated to be .20 cfs and 0.70 cfs for the 2-year and 100-year events, respectively.

## **DRAINAGE UNDER DEVELOPED CONDITIONS**

The historic site drainage pattern will not be altered by development except for the addition of approximately 3400 cubic feet of parking lot detention to meet City of Fort Collins Storm Drainage Design Criteria detention requirements. Storm water developed on the site will flow through parking lot detention to the northwest corner of the property. A valley pan will be installed from the northwest site corner to Cherry Street across adjacent property to allow the storm water to discharge into Cherry Street as it has done historically. Releases from the parking lot detention area will be limited to the 2-year historic discharge of .20 cfs by a 2.76" orifice in a concrete headwall. We propose to use a 2-1/2" (nominal) schedule 40 PVC pipe as the orifice. This size of pipe has an inside diameter of 2.469

inches, which closely approximates the required diameter of 2.76 inches. Maximum water depth in the detention area is .93 feet; should the orifice plug, the top of the headwall will be set .93 feet above the orifice invert in order to act as an overflow weir to limit significant increases in water depth. Estimated developed discharges are .84 cfs and 3.30 cfs for the 2-year and 100-year events, respectively.

Respectfully submitted,  
ENGINEERING PROFESSIONALS, INC.

Jonathan B. Howard

Michael N. Schmid, P.E.

MNS:psm

1/24/95

MAPLE STREET ADTS

332.3-111

HOWARD

1/4

HISTORIC CONDITIONS:

$$\text{TOTAL IMPERVIOUS AREA} = 1290 \text{ FT}^2$$

$$\text{TOTAL AREA} = 22000 \text{ FT}^2 = .51 \text{ A}$$

$$\text{OVERLAND FLOW DISTANCE} = 290 \text{ FT}$$

$$H = 29.46 - 25.64 = 3.82 \text{ FT}$$

$$S = \frac{3.82}{290} (100) = 1.32 \%$$

$$C = \frac{1290(.95) + 20710(.20)}{22000} = .24$$

$$T_{L2} = \frac{1.87(1.1 - .20)(290)^{1/2}}{1.32^{1/3}} = 26 \text{ MIN} \Rightarrow I_2 = 1.6 \text{ IPI}$$

$$T_{L100} = \frac{1.87[1.1 - 1.25(.20)](290)^{1/2}}{1.32^{1/3}} = 25 \text{ MIN} \Rightarrow I_{100} = 4.6 \text{ IPI}$$

$$Q_2 = (.24)(1.6)(.51) = \underline{.20 \text{ CFS}}$$

$$Q_{100} = (1.25)(.24)(4.6)(.51) = \underline{.70 \text{ CFS}}$$

$$\text{ALLOWABLE RELEASE / ACRE} = .20 / .51 = \underline{.39 \text{ CFS / ACRE}}$$

23 SHEETS 3 SQUARE  
23 SHEETS 100 SQUARE  
23 SHEETS 100 SQUARE



1/24/85

MAPLE STREET APTS

332.3 - 111

HOWARD

2/4

DEVELOPED CONDITIONS:

TOTAL IMPERVIOUS AREA = 14500 FT<sup>2</sup>

TOTAL AREA = 22000 FT<sup>2</sup>

$$C = \frac{14500(.95) + 7500(.20)}{22000} = .69$$

DEVELOPED DISCHARGES:

$T_{c2} = 11 \text{ MIN}, I_2 = 2.4 \text{ IPI}$

$Q_2 = (.69)(2.4)(.51)$

$Q_2 = .84 \text{ CFS}$

$T_{c100} = 7 \text{ MIN}, I_2 = 7.5 \text{ IPI}$

$Q_{100} = (.25)(.69)(7.5)(.51)$

$Q_{100} = 3.30 \text{ CFS}$

DEVELOPED TIMES OF CONCENTRATION:

OVERLAND FLOW SLOPES AND DISTANCES:

LENGTH FT	SLOPE %	T <sub>c2</sub> MIN	T <sub>c100</sub> MIN
135	.4	4	3
78	.92	3	2
87	2.97	2	1
20	.45	2	1
TOTALS		11	7

1/24/85

MAPLE STREET  
APTS  
332.3-111

HOWARD

3/4

ORIFICE SIZE

$$Q = .65 A \sqrt{2gh}$$

$$Q = .20 = (.65) \left( \frac{\pi D^2}{4} \right) \sqrt{60.18 - 32.2D}$$

BY TRIAL,  $D = .23 = 2.76'' \Rightarrow$  USE 2-1/2" (NOMINAL)

PK SCHED. 40 PIPE - I.D. = 2.469

43 385 50 SHEETS SQUARE  
43 386 100 SHEETS SQUARE



PROJECT NAME: MAPLE STREET APARTMENTS  
PROJECT NUMBER: 332.3-111

DEVELOPED RATIONAL COEFFICIENT= .69  
BASIN AREA= .51 ACRES  
ALLOWABLE RELEASE RATE= .38 CFS/ACRE

TIME, MINUTES	INFLOW VOLUME, CU. FT.	OUTFLOW VOLUME, CU. FT.	DETENTION VOLUME, CU. FT.
10	1900.26	116.28	1783.98
20	2744.82	232.56	2512.26
30	3325.45	348.84	2976.61
40	3694.95	465.12	3229.83
50	3958.87	581.4	3377.47
60	4117.23	697.68	3419.55
70	4249.19	813.96	3435.23
80	4328.37	930.24	3398.13
90	4441.85	1046.52	3395.34
100	4486.72	1162.8	3323.92
110	4557.98	1279.08	3278.9
120	4560.62	1395.36	3165.26
130	4563.26	1511.64	3051.62
140	4618.68	1627.92	2990.77
150	4711.06	1744.2	2966.86
160	4771.76	1860.48	2911.28
170	4935.39	1976.76	2958.63
180	5083.19	2093.04	2990.15
190	5014.57	2209.32	2805.25
200	5120.14	2325.6	2794.54
210	5154.45	2441.88	2712.57
220	5225.71	2558.16	2667.55
230	5281.14	2674.44	2606.7
240	5320.73	2790.72	2530.01
250	5344.48	2907	2437.48
260	5421.02	3023.28	2397.74
270	5415.74	3139.56	2276.18
280	5394.62	3255.84	2138.78
290	5434.21	3372.12	2062.09
300	5463.24	3488.4	1974.85
310	5481.72	3604.68	1877.04
320	5489.64	3720.96	1768.68
330	5487	3837.24	1649.76
340	5563.54	3953.52	1610.02
350	5634.79	4069.8	1565
360	5510.75	4186.08	1324.67

REQUIRED DETENTION VOLUME, CU. FT. = 3435.23