DRAINAGE REPORT

Planned Centennial Boulevard
Between the North Terminus of
Existing Improved Centennial Boulevard
and Vindicator Drive

City of Colorado Springs
El Paso County, Colorado

June 3, 1983
Revised June 30, 1983
Revised July 27, 1983

Prepared for:

Ridge Development Co., Ltd.
P.O. Box 7711
Colorado Springs, CO 80933

Prepared by:

URS ENGINEERS
3955 E. Exposition Avenue
Denver, Colorado 80209

Phone: (303) 744-1861

DRAINAGE REPORT

Planned Centennial Boulevard
Between the North Terminus of
Existing Improved Centennial Boulevard
and Vindicator Drive

City of Colorado Springs
El Paso County, Colorado
June 3, 1983
Revised June 30, 1983

Engineer's Statement:

"The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by the negligent acts, errors, or omissions on my part in preparing this report."

Stephen C. Behrens
Signature and P.E. # 11447

Seal

Developer's Statement:

"The Developer and/or his representative has read and will comply with all the requirements specified in this drainage report and plan as filed by the City Engineer."

Signature

STEPHEN CHARLES BEHRENS REGISTERED 11447 PROFESSIONAL ENGINEER STATE OF COLORADO

Filed in accordance with Section 15-3-906 of the Code of the City of Colorado Springs, 1980, as amended.

Gary R. Hayes 10-6-83
City Engineer Date

subject to (1) Detailed design plans for street and drainage facilities
(2) Geometrics of street not ~~~~ included
(3) Excludes comment 5 on page 11

TABLE OF CONTENTS

REFERENCES

DRAINAGE REPORT

Planned Centennial Boulevard Between the North Terminus of Existing Improved Centennial Boulevard and Vindicator Drive City of Colorado Springs, El Paso County, Colorado

INTRODUCTION

This Drainage Report (1) summarizes anticipated future fully developed drainage conditions affecting planned Centennial Boulevard as identified and reported by others (References 1 and 2) and in addition (2) presents recommended conceptual design drainage facilities along planned Centennial Boulevard.

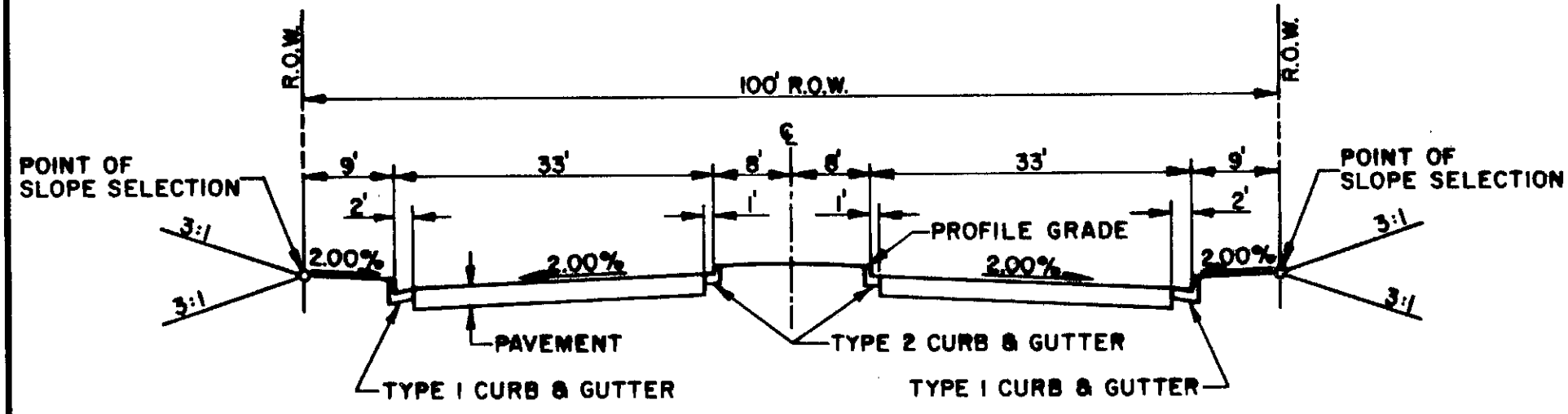
SITE LOCATION AND DESCRIPTION

Centennial Boulevard is a planned four lane north-south major arterial roadway located in the northwest quadrant of the City of Colorado Springs, El Paso County, Colorado. A typical section of planned Centennial Boulevard is shown on Figure 1. The segment of Centennial Boulevard under investigation coincides with Wilson Road, an existing two lane rural (ditched) roadway between the north terminus of existing improved Centennial Boulevard on the south to Vindicator Drive on the north, for a distance of approximately 7,500 lineal feet as shown on Figure 2 and approximately described as follows:

> From a point within the northwest quarter of Section 23, Township 13 south, range 67 west of the 6th Principal Meridian located approximately 1100 feet south and 1400 feet east of the northwest corner of Section 23 to a point within the southwest quarter of Section 11, Township 13 south, range 67 west of the 6th Principal Meridian located approximately 1,100 feet north and 1,350 feet south of the southwest corner of Section 11.

Planned Centennial Boulevard is considered a major arterial street. Minor arterial streets include Vindicator Drive, Flying "W" Ranch Road, and Wilson Road. Gravel Pit Road is a planned local street. Other planned street intersections include north commercial access, north and south Reed Ranch Access Roads, a Research and Development access north of Atherton Way, Atherton Way, Mule Deer Drive, a Research and Development access south of Mule Deer Drive and access to the Office Land Use at the approximate north terminus of existing improved Centennial Boulevard.

Existing and planned developments adjacent to this segment of Centennial Boulevard include Mountain Shadows to the west and Pinon Valley to the east.



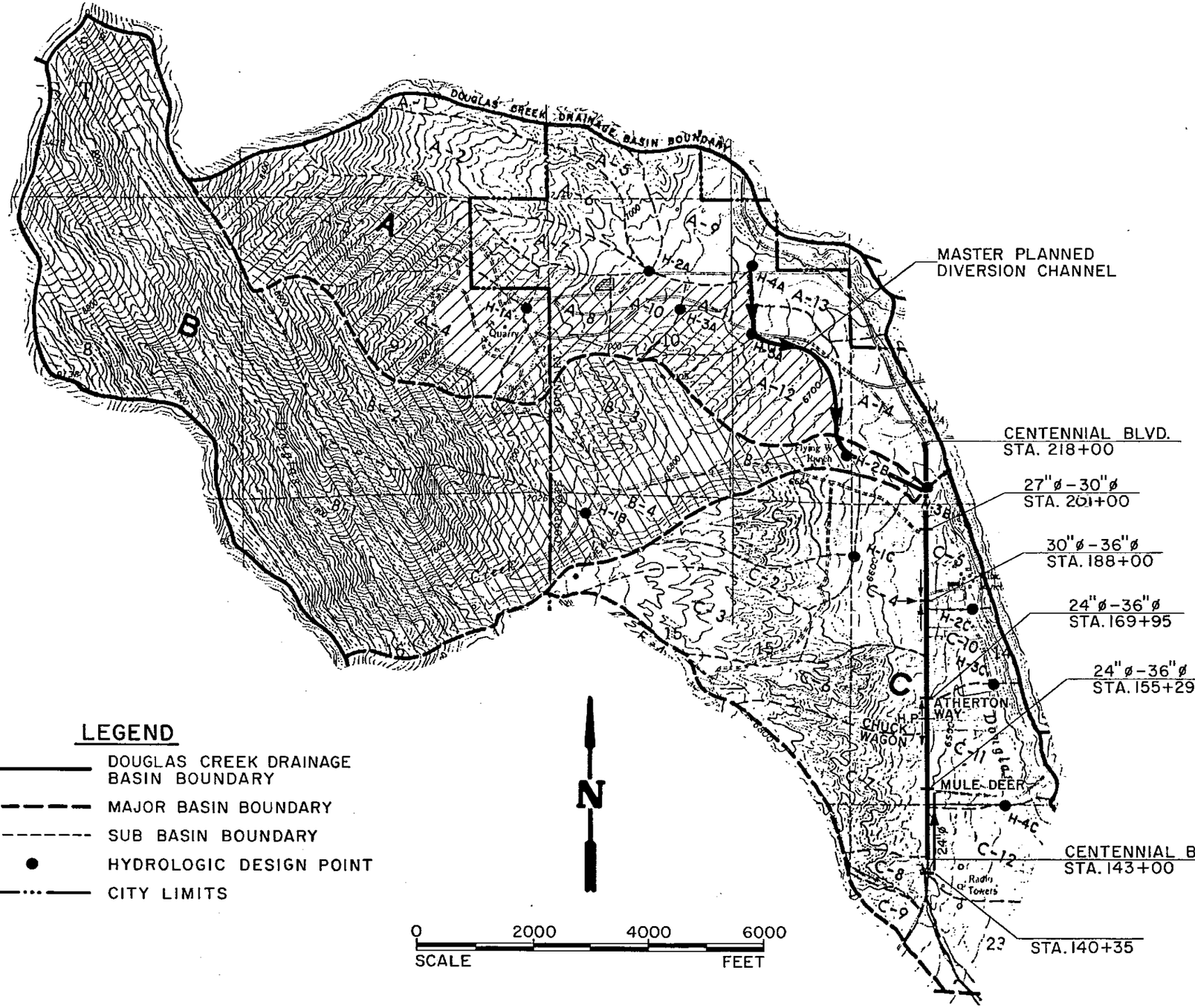
TYPICAL SECTION

PLANNED CENTENNIAL BOULEVARD

NO SCALE

FIGURE 1

2.



DOUGLAS CREEK DRAINAGE BASIN CITY OF COLORADO SPRINGS EL PASO COUNTY, COLORADO

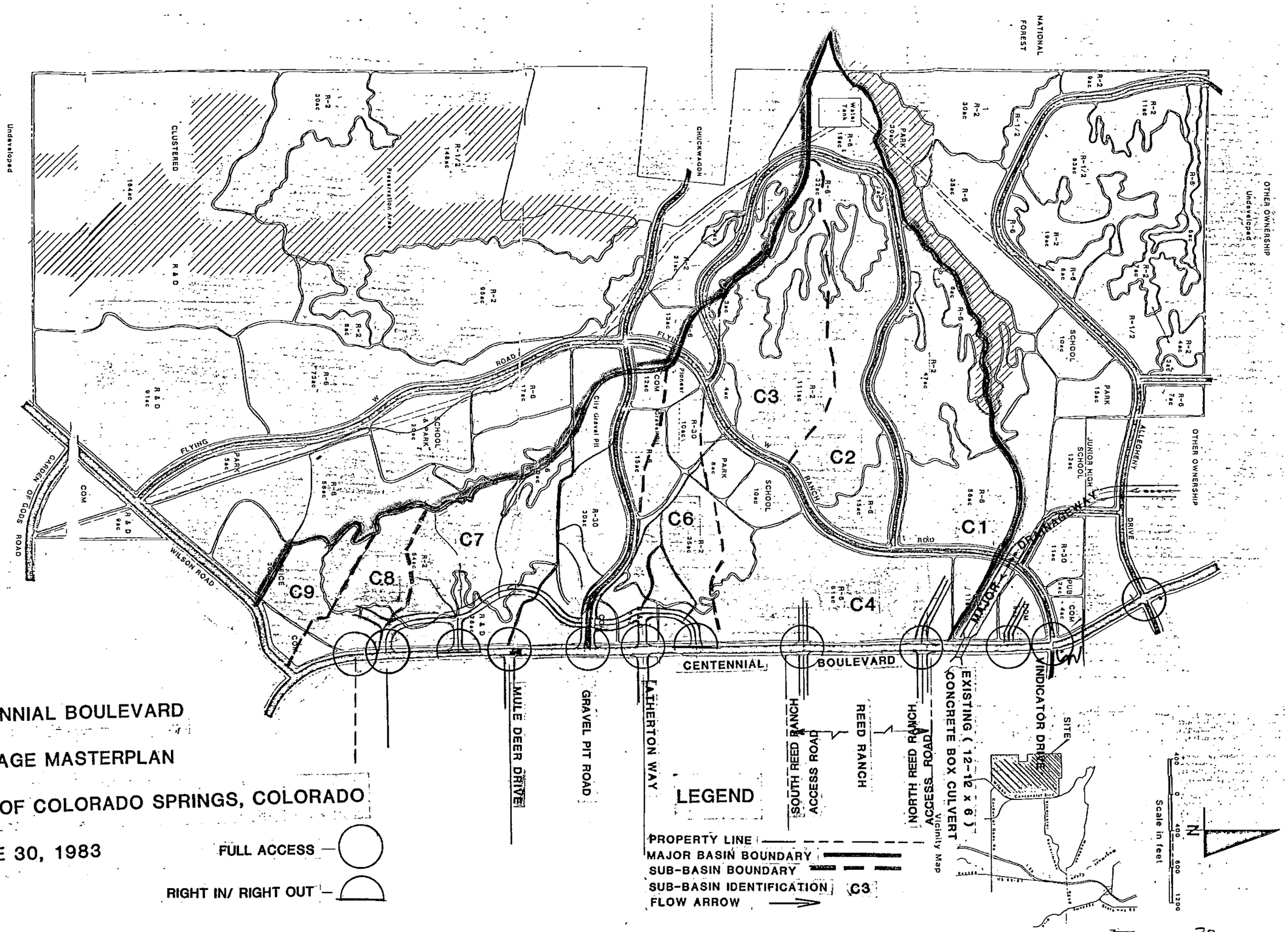
CENTENNIAL BOULEVARD

PRELIMINARY DESIGN

URS/NES PROJECT NO. 3073

JUNE 3, 1983

FIGURE 2



CENTENNIAL BOULEVARD

DRAINAGE MASTERPLAN

CITY OF COLORADO SPRINGS, COLORADO

JUNE 30, 1983

FULL ACCESS

RIGHT IN/ RIGHT OUT

LEGEND

PROPERTY LINE

MAJOR BASIN BOUNDARY

SUB-BASIN BOUNDARY

SUB-BASIN IDENTIFICATION C3

FLOW ARROW

The main stem of the North Fork of Douglas Creek, the major drainageway in the vicinity of this segment of planned Centennial Boulevard, flows from west to east under planned Centennial Boulevard via an existing (12-12)X6 concrete box culvert (CBC) and then flows to the southeast on the east side of Centennial Boulevard.

DRAINAGE MASTER PLAN

Conceptual drainage improvements to accommodate expected peak storm runoff associated with future developed basin conditions have been masterplanned within the Douglas Creek Drainage Basin. (Reference 1).

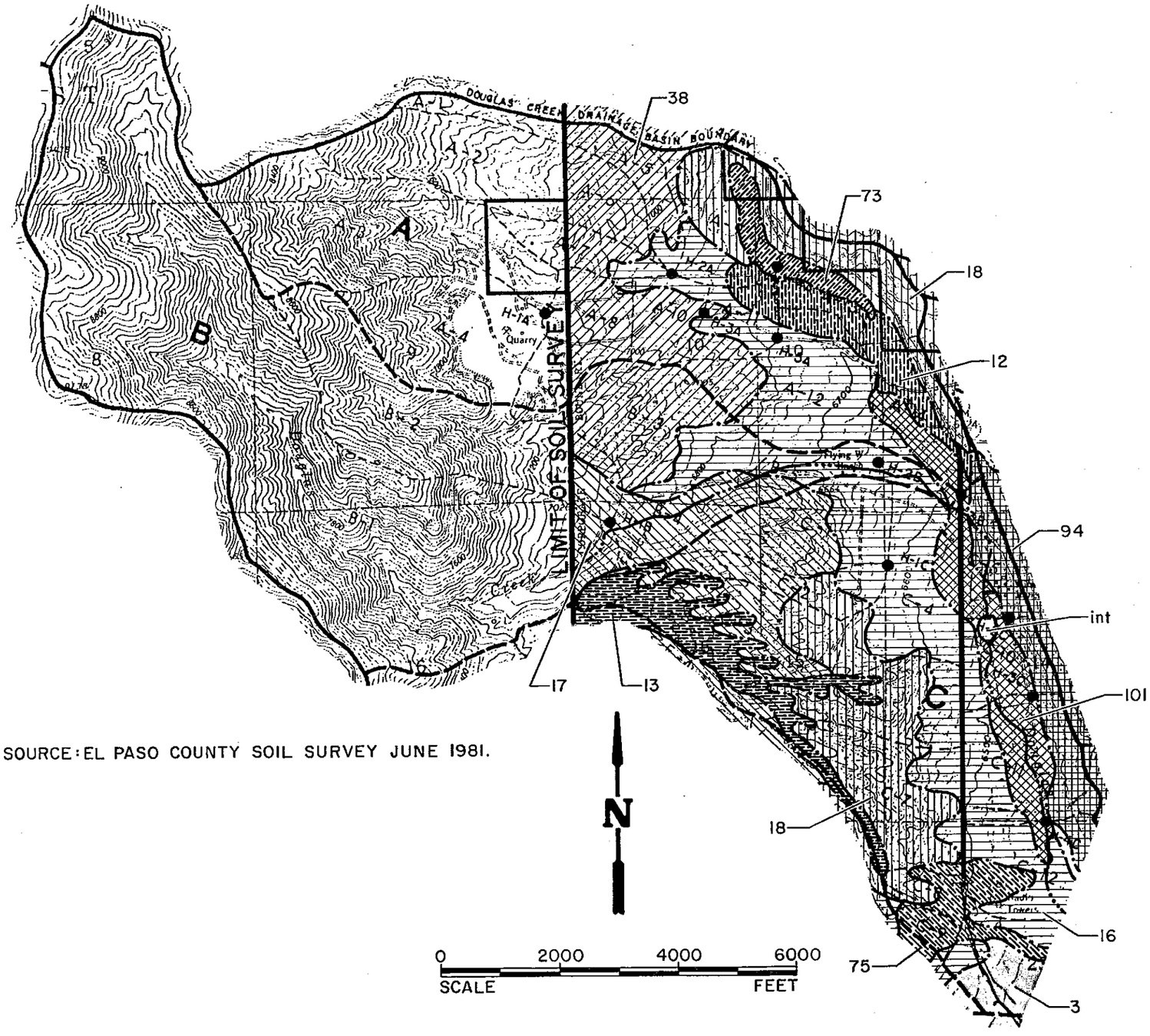
DRAINAGE BASINS

Drainage basin boundaries, sub-basins, and hydrologic design points identified in the Douglas Creek Drainage Basin Master-planning Study of March 1981 (Reference 1) are shown in Figure 2.

SOILS

Soils in the vicinity of Centennial Boulevard consist of loamy ustic torrifluvents (#101), Chaseville Sandy Loam (#16), Chaseville Gravelly Sandy Loam (#17), Chaseville-Midway Complex (#18), all of which are classified as Type A hydrologic soils; Bresser Sandy Loam (#12), Bresser Sandy Loam (#13), both of which are classified as Type B hydrologic soils; and Razor Clay Loams (#73), and Razor Stoney Clay Loams (#74) both of which are classified as Type C hydrologic soils all as obtained from the El Paso County Colorado Soil Survey (Reference 4) and presented in Figure 3.

These soil types and hydrologic soil group classifications differ from preliminary soils information used in the Douglas Creek Drainage Basin Study (Reference 1) which were obtained prior to finalization of the El Paso County Soil Survey. Present soil and hydrologic soil group classifications in the vicinity of planned Centennial Boulevard appear to have somewhat <u>less</u> runoff potential than the preliminary soils classification used in the Douglas Creek Drainage Basin Masterplanning Study. Estimated storm runoff magnitudes presented in the Douglas Creek Drainage Basin Masterplanning Study are, however, believed to be acceptable for preliminary design in view of (1) the number of uncertainties associated with storm drainage including street layout an drainage facilities associated with future developments along planned Centennial Boulevard and (2) acceptance of the present Douglas Creek Drainage Basin Masterplanning Study by the City of Colorado Springs.



SOURCE: EL PASO COUNTY SOIL SURVEY JUNE 1981.

SOIL SURVEY

SOURCE: EL PASO COUNTY SOIL SURVEY - JUNE 1981

SOIL ID #	NAME	HYDROLOGIC SOIL GROUP
12	BRESSER SANDY LOAM, 3-5%	B
13	BRESSER SANDY LOAM, 5-9%	B
16	CHASEVILLE SANDY LOAM, 1-8%	A
17	CHASEVILLE GRAVELLY SANDY LOAM, 8-40%	A
18	CHASEVILLE-MIDWAY COMPLEX	A
73	RAZOR CLAY LOAM	C
74	RAZOR STONEY CLAY LOAM	C
75	RAZOR MIDWAY COMPLEX	C
101	USTIC, TORRIFLUVENTS, LOAMY	A
38	JARRE - TECOLOTE	B
3	ASCALON SANDY LOAM	B
94		

CENTENNIAL BOULEVARD

PRELIMINARY DESIGN

URS/NES PROJECT NO. 3073

JUNE 3, 1983

FIGURE 3 (5)

DRAINAGE ASSUMPTIONS

Conceptual storm drainage improvements presented herein are based on the following assumptions:

1. Assume storm runoff from drainage masterplanning basin C-9 does not affect the segment of planned Centennial Boulevard presently under investigation due to 24 inch diameter storm sewer system in Centennial Boulevard and high point in Centennial Boulevard approximately 880 feet north of Wilson Road; all as shown on Centennial Boulevard plans Sta. 53+64.24 to Sta. 62+62.35 prepared by H. O. Kraettli and Sons and Centennial Boulevard plans Sta. 48+40.85 to Sta. 53+64.24 prepared by United Planning and Engineering.

2. Assume 5-year storm runoff generated from drainage masterplanning basin C-8 to be intercepted by existing 42 inch diameter cmp cross culvert at station 140+35+_and conveyed to planned 36 inch diameter Mule Deer Drive storm sewer system by 24 inch diameter rcp as indicated by Alternative B, Reference 5.

3. Assume that when drainage masterplanning basin C-8 is developed a storm sewer or open channel drainageway will be provided west of the existing cross culvert at station 140+35± to intercept 5-year storm runoff.

4. Assume the planned Mule Deer Drive (Sta. 159+29± east) storm sewer system would be extended to the west with a 24 inch diameter storm sewer stub-out and south to station 151+50 with a 36 inch diameter rcp storm sewer. Storm sewer inlets would be provided at the planned Right-in, Right-out R&D entrance at Station 149+20± west. These inlets would be connected to the planned 36" diameter Mule Deer Drive storm sewer extension at Station 151+50± by a 24 inch diameter rcp connector pipe. In addition, the planned 24 inch diameter rcp storm sewer associated with drainage masterplanning basin C-8 would be connected to the planned 36 inch diameter rcp Mule Deer Drive storm sewer at Sta. 151+50.

5. Assume Atherton Way masterplanned storm sewer will be extended to planned Gravel Pit Road as indicated in the "Douglas Creek Drainage Basin Masterplanning Study of March 1981."

6. The existing (12X12)X6 cbc cross culvert at Centennial Boulevard for the North Fork of Douglas Creek was <u>not</u> designed to accept storm runoff from drainage master-planning basin C-1. Assume a high point would be created

in planned Flying W. Ranch Road south of the planned roadway crossing of the North Fork of Douglas Creek. This high point would prevent storm runoff associated with drainage masterplanning basin C-1 from entering the planned major channel on the west side of Centennial Boulevard.

7. Assume all storm runoff (5-year and 100-year) arriving at design points H-2A and H-4A (basins A-1 thru A-12) to be diverted to the planned major channel as implied in the Douglas Creek Drainage Basin Masterplanning Study dated March 1981.

8. Assume the difference between 100-year storm runoff from basin A-13 and masterplanned storm sewer capacity to carry over into Basin A-14 via Centennial Boulevard.

9. Assume all storm runoff (5-year and 100-year) from basins A-13 and A-14 to enter masterplanned channel at the existing (12-12)X6 concrete box culvert at the outlet of basin A-14 as implied in the Douglas Creek Drainage Basin Masterplanning Study dated March 1981.

DRAINAGE DESIGN CRITERIA

Storm drainage design criteria for planned Centennial Boulevard were obtained from (Reference 3), "Determination of Storm Runoff Criteria, City of Colorado Springs, Colorado, March 1977 as presently amended". A general drainage design criterion for this segment of planned Centennial Boulevard is that planned drainage facilities should accommodate phased buildout of future developments along the roadway.

A. DESIGN STORM(S)

City of Colorado Springs, Colorado drainage design criteria (Reference 3) presently specify the use of a 5-year 6-hour design storm of 2.1 inches for peak storm runoff up to 500 cubic feet per second; and the use of a 100-year, 6-hour design storm of 3.5 inches per hour for peak storm runoff greater than 500 cubic feet per second.

B. STORMWATER DETENTION

Present City of Colorado Springs, Colorado drainage criteria (Reference 3) do not require comparison of existing and anticipated future developed peak storm flows. Present City drainage criteria (Reference 3) generally favor upgrading existing outfall facilities to accept increased peak storm runoff associated with

development and discourage the construction of onsite storm water detention facilities without prior approval by the City Engineer.

The present City of Colorado Springs, Colorado drainage criteria (Reference 3) require a determination of appropriate peak discharges with routing and drainage facility design and in addition, require existing outfall facilities lacking the capacity to accept increased flow to be upgraded to accept such flows in proportion to the increased flow.

C. MAXIMUM PERMISSIBLE STREET FLOW CAPACITY

Maximum permissible street flow capacities obtained from Reference 3 are presented herein as Tables 1 and 2 .

STORM DRAINAGE METHODOLGY

City of Colorado Springs, Colorado storm drainage design criteria (Reference 3) permit the rational method of storm drainage analysis for areas encompassing less than 20 acres, and a U.S. Soil Conservation Service (SCS) graphical procedure modified by the City of Colorado Springs for drainage areas encompassing more than 20 acres.

A. RAINFALL

Rainfall intensity-duration-frequency curves obtained from Reference 3 are presented in Figure 4.

City of Colorado Springs 5-year and 100-year 6-hour rainfall amounts are 2.1 inches and 3.5 inches respectively.

B. RUNOFF COEFFICIENTS

Runoff coefficients, C, recommended for use in the Rational Method obtained from Reference 3 are presented as follows:

Park Areas	0.30
Low Residential (2 1/2 acre single-family lots)	0.40
Medium Residential (3 units per acre)	0.50
High Residential (multi-family areas)	0.70
Business and Commercial Areas	0.70
Light Industrial Areas	0.75
Heavy Industrial Areas	0.85
Road Pavements or Roofs	0.90

C. RUNOFF CURVE NUMBERS

Runoff curve numbers (CN) for use in the SCS method were obtained from the Douglas Creek Drainage Basin Masterplanning Study of March 1981 (Reference 1) and Table 3.

D. RUNOFF

Runoff for use in the SCS method was determined from the following equation:

$$Q = \frac{CN(P+2)^2-400(P+2-100/CN)}{CN\ (P-8)+800}$$

Where Q=runoff in inches
CN=runoff curve number
P=rainfall in inches

E. TIME OF CONCENTRATION

Time of concentration (Tc) was determined as the sum of overland flow time and channel flow time. The overland flow path length was generally limited to 400 feet. Overland flow time in minutes (To) was estimated using the following equation:

$$To = \frac{1.8\ (1.1-C)L^{1/2}}{S^{1/3}}$$

Where To=overland flow time in minutes
C=roughness coefficient assumed equal to rational method runoff coefficient
L=length of overland flow path in feet
S=slope of overland flow path in percent

Channel flow time (T) was estimated by dividing channel flow path length by average flow velocity.

F. PEAK STORM RUNOFF

Peak storm runoff for basins encompassing less than 20 acres was estimated by the rational method. Peak storm runoff for basins encompassing more than 20 acres was estimated by the SCS graphical method using CSM per inch (cfs per square mile per inch of runoff) obtained from Figure 5.

CALCULATIONS

Hydrology calculations for each planned storm sewer system along Centennial Boulevard are presented in the Appendix.

CONCEPTUAL DRAINAGE IMPROVEMENTS

Conceptual drainage improvements to accommodate computed design flows (5-year) along this segment of planned Centennial Boulevard are presented in Table 4 and Figures 6 thru 13. Conceptual pipe sizes presented in Table 3 are based on full pipe flow capacity at the given grade. These pipe sizes may require adjustment during final design based on detailed hydraulic calculations and utility data.

Peak storm runoff calculations indicate that storm sewer inlets are not required along the east side of this segment of planned Centennial Boulevard (except at Vindicator Drive) provided that storm runoff from the east side of planned Centennial Boulevard is intercepted and conveyed to the east by the planned Pinon Valley and Reed Ranch access roadways. That is the east side of planned Centennial Boulevard has adequate flow capacity to convey design (5-year) storm flows if periodically intercepted and conveyed to the east by planned access roadways.

DRAINAGE AND BRIDGE FEES

The segment of planned Centennial Boulevard presently under investigation is within the Douglas Creek Drainage Basin (Basin Code 04) within which the 1983 Drainage Fee is $3,463 per acre and the 1983 Bridge Fee is $86 per acre. These Fees are based on the estimated cost of masterplanned drainage and bridge improvements presented in the Douglas Creek Drainage Basin Masterplanning Study (Reference 1) adjusted to present construction costs and the area of land within the basin subject to development.

The Douglas Creek Drainage Basin Masterplanning Study (Reference 1) indicates that the right-of-way associated with Wilson Road (planned Centennial Boulevard) is not subject to either Drainage or Bridge Fees and furthermore, that the party(s) responsible for constructing planned Centennial Boulevard may be eligible for Drainage and/or Bridge Fee Improvement Credits or Direct Reimbursement for drainage and bridge improvements constructed within public right-of-way. Present city procedures for obtaining Drainage Improvement Credits and Reimbursements are contained in a letter from the City of Colorado Springs Director of Public Works addressed, "To Whom It May Concern", dated July 25, 1979 (attached).

CONCLUSIONS AND RECOMMENDATIONS

1. Whomsoever improves Centennial Boulevard in the vicinity of hydrologic design points H-2A and H-4A, should assure that improvements to divert 100-year storm runoff arriving at masterplanning hydrologic design points H-2A and H-4A to planned major channel are provided.

2. Whomsoever permanently improves Centennial Boulevard immediately north of the existing (12-12)X6 concrete box culvert should provide drainage improvements to divert the difference between 100-year peak storm runoff and the capacity of master planned storm sewer improvements into the major channel for the North Fork of Douglas Creek.

3. Detailed storm sewer hydraulic calculations should be made during final design.

4. Cost Estimate for the drainage facilities included in this preliminary design are shown in table 5. These facilities are included in the Douglas Creek Drainage Basin Master Planning Study and therefore should be eligible for Drainage and/or Bridge Fee Improvement Credit or Direct Reimbursement for improvements constructed within public right-of-way. Note should be taken of the major storm sewer extending from north of Vindicator to the existing concrete channel crossing approximately 940' south of Vindicator which is designated to be constructed by others. The majority of contributory flows to this storm sewer emminate from Oak Valley Ranch with minor Contributions from Mountain Shadows and the City property on the east side of Centennial. Final determination on construction responsibilities of this storm sewer should be made at the time of final design and implementation.

5. Mountain Shadows in association with the Reed Ranch will provide acceptable assurance to the City in the form of a letter of credit, that the facilities identified as the Reed Ranch system will be constructed and installed as indicated on the final design plans dated July 1, 1983.

Excluded

REFERENCES

1. Douglas Creek
   Drainage Basin
   March 1981
   Prepared for: City of Colorado Springs
   Prepared by: Leigh Whitehead and Associates
   5 West Las Vegas
   Colorado Springs, Colorado 80903

2. Drainage Report for
   Pinon Valley, filings No. 2, 3 and 4
   January 4, 1983
   Prepared by: Berge-Brewer and Associates Inc.

3. Determination of Storm Runoff Criteria
   City of Colorado Springs, Colorado
   March 1977
   as amended

4. Soil Survey of El Paso County Area, Colorado
   Soil Conservation Service
   U.S. Department of Agriculture in cooperation with
   Colorado Agricultural Experiment Station
   June 1981

5. Drainage Report for
   Pinon Valley Industrial Park
   Filing No. 9
   Revised February 10, 1983
   Prepared by Berge-Brewer & Assoc., Inc.
   dba H. J. Kraettli & Sons

TABLE 1

- Permissible Drainage Street Capacities with level ramp curbs*

S %	34' Residential FPS	34' Residential CFS	36' Residential FPS	36' Residential CFS	40' Residential FPS	40' Residential CFS
0.5	2.85	11.7	2.77	11.6	2.62	11.2
1.0	4.03	16.6	3.92	16.4	3.70	15.8
1.5	4.93	20.3	4.80	20.1	4.54	19.3
2.0	5.69	23.5	5.54	23.2	5.24	22.3
2.5	6.37	26.2	6.20	25.9	5.86	24.9
3.0	6.97	28.7	6.79	28.4	6.42	27.3
3.5	7.53	31.0	7.33	30.7	6.93	29.5
4.0	8.05	33.2	7.84	32.8	7.41	31.5
4.5	8.54	35.2	8.31	34.8	7.86	33.4
5.0	9.00	37.1	8.76	36.7	8.28	35.2
5.5	9.44	38.9	9.19	38.5	8.69	37.0
6.0	9.86	40.6	9.60	40.2	9.07	38.6

*Intermediate values may be obtained by arithmetic interpolation.

TABLE 2

Permissible Drainage Street Capacities with 8" Vertical Curbs *
8" Curb - Full Storm Water Capacity (with level curbs)

S	34' Residential		36' Residential		40' Residential		34' One-Way Art.		60' & 76' Arterial		S
	FPS	CFS	FPS	CFS	FPS	CFS	FPS	CFS	FPS	CFS	%
0.5	4.08	28.9	4.02	29.5	3.90	30.1		20.0		20.0	0.5
1.0	5.76	40.9	5.70	41.7	5.51	42.6		30.0		30.0	1.0
1.5	7.06	50.1	6.97	51.1	6.75	52.2	6.97	30.0	6.97	30.0	1.5
2.0	8.15	57.8	8.05	59.0	7.79	60.2	8.05	34.0	8.05	34.0	2.0
2.5	9.11	64.7	9.00	65.9	8.71	67.4	9.00	36.0	9.00	36.0	2.5
3.0	9.98	70.9	9.86	72.2	9.54	73.8	9.86	38.0	9.86	38.0	3.0
3.5	10.78	76.5	10.65	78.0	10.31	79.7	10.65	40.0	10.65	40.0	3.5
4.0	11.52	81.8	11.38	83.4	11.02	85.2	11.33	42.0	11.38	42.0	4.0
4.5	12.22	86.8	12.07	88.5	11.69	90.4	12.07	43.0	12.07	43.0	4.5
5.0	12.89	91.5	12.73	93.3	12.32	95.3	12.73	45.0	12.73	45.0	5.0
5.5	13.52	95.9	13.35	97.8	12.92	99.9	13.35	47.0	13.35	47.0	5.5
6.0	14.12	100.0	13.94	102.2	13.49	104.3	13.94	49.0	13.94	49.0	6.0

* ... may be Obtained by Arithmetic Interpolation

DRAINAGE CRITERIA MANUAL 5 year RAINFALL

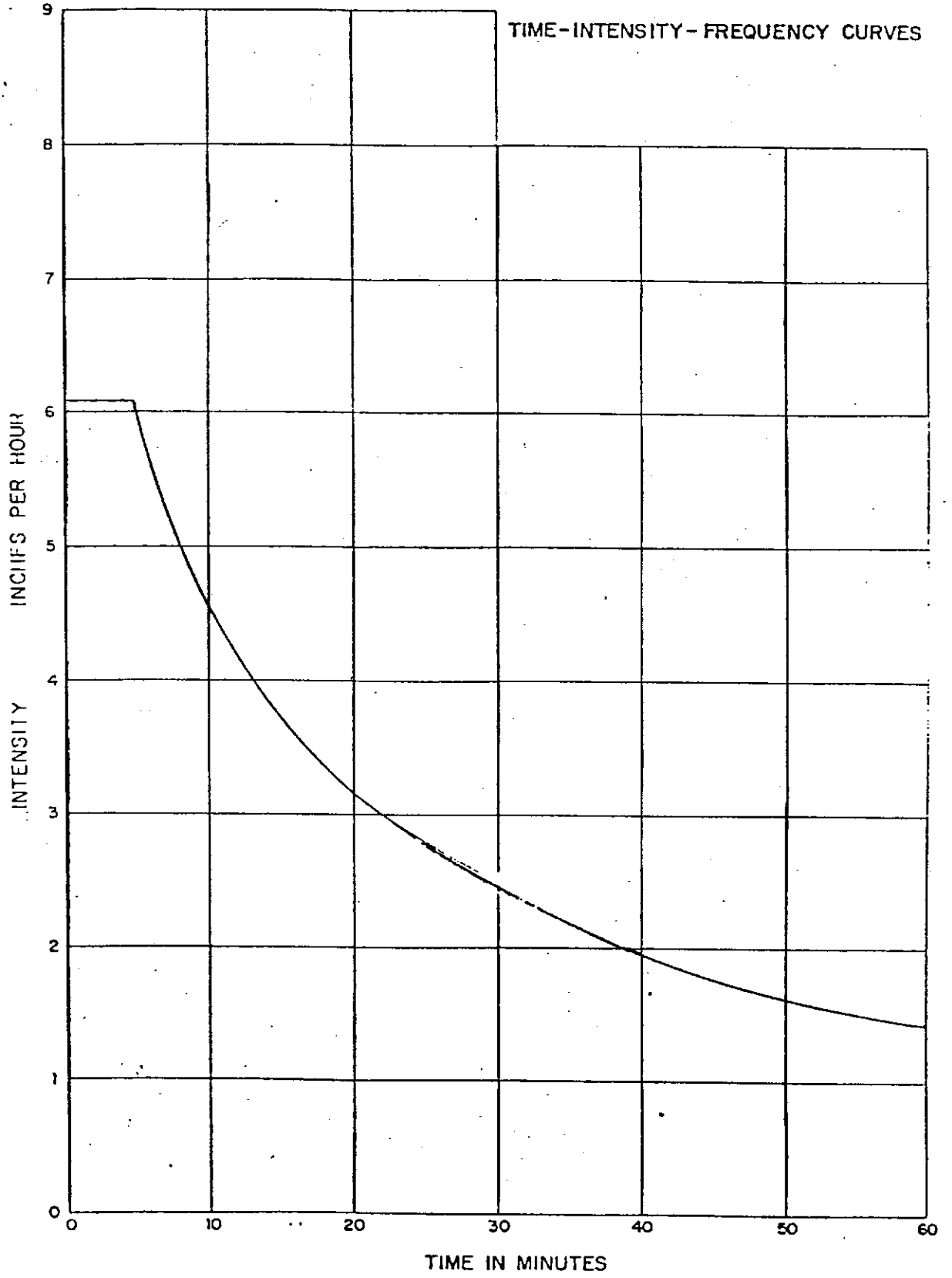


FIGURE 4

TABLE 3 - Runoff curve numbers for selected agricultural, suburban, and urban land use. (Antecedent moisture condition II, and $I_a = 0.2S$)

Land Use Description		Hydrologic Soil Group A	B	C	D
Cultivated land[1] :	without conservation treatment	72	81	88	91
:	with conservation treatment	62	71	78	81
Pasture or range land:	Poor condition	68	79	86	89
:	Good condition	39	61	74	80
Meadow:	Good condition	30	58	71	78
Wood or Forest land:	thin stand, poor cover, no mulch	45	66	77	83
:	good cover[2]	25	55	70	77
Open Spaces, lawns, parks, golf courses, cemeteries, etc.					
good condition:	grass cover on 75% or more of the area	39	61	74	80
fair condition:	grass cover on 50% to 75% of the area	49	69	79	84
Commercial and business areas (85% impervious)		89	92	94	95
Industrial districts (72% impervious).		81	88	91	93
Residential: [3]					
Average lot size	Average % Impervious[4]				
1/8 acre or less	65	77	85	90	92
1/5 acre	47	65	78	85	89
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
Paved parking lots, roofs, driveways, etc.-		98	98	98	98
Streets and roads:					
paved with curbs and storm sewers-		98	98	98	98
gravel		76	85	89	91
dirt		72	82	87	89

1. For a more detailed description of agricultural land use curve numbers refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, August 1972.

2. Good cover is protected from grazing and litter and brush cover soil.

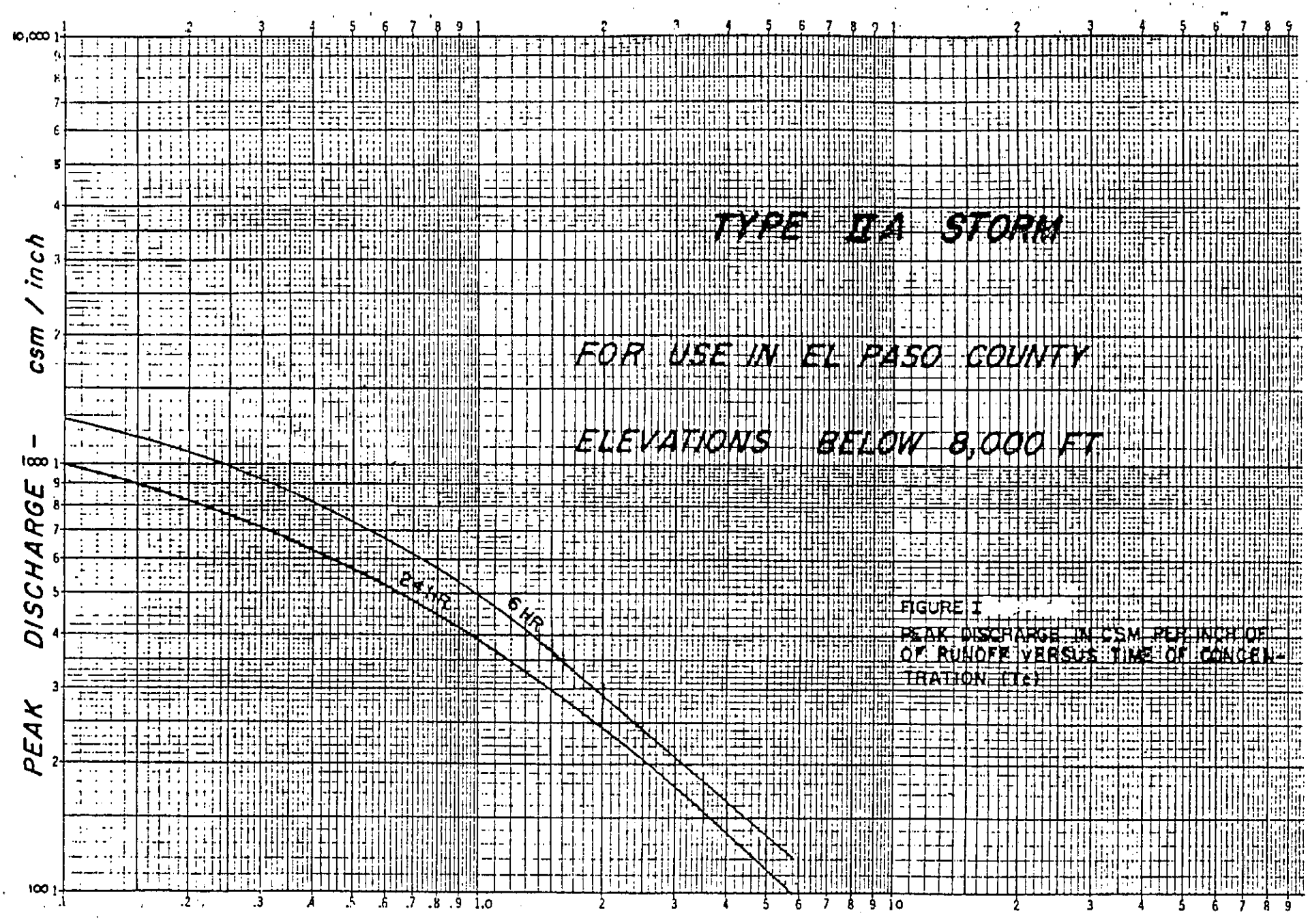


FIGURE I
PEAK DISCHARGE IN CSM PER INCH OF RUNOFF VERSUS TIME OF CONCENTRATION (T_c)

FIGURE 5

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

TABLE 4

CONCEPTUAL STORM DRAINAGE IMPROVEMENTS
CENTENNIAL BOULEVARD STA 143+00 to 213+00

MULE DEER DRIVE STORM SEWER SYSTEM

- STA 140+60 to 151+32 — 24"ø rcp x 1,072 L.F.
  QDES = 15 CFS.
  1- manhole for 42"ø CSP Arch
  1- manholes for 24"ø rcp
- STA 149+20 ±L — 8'-D-10-R, QDES = Q5 = 15 CFS
  24"ø rcp connector line x 75 L.F. Q5 = 15 c
  1 manhole for 24"ø rcp
- STA 149+20 to 151+32 — 24"ø rcp connector x 212 LF
  QDES = Q5 = 31 CFS
  1- manhole for 36"ø rcp
- STA 151+32 — 10', D-10-R, S = 0.5%, QDES = 77 cfs
  36"ø rcp x 90 LF
  1- manhole for 36"ø rcp
- STA 151+32 to 155+29 — 36"ø rcp x 397 L.F.
  QDES = 53.3 CFS
- STA 155+29 — 14' Inlet in Sump QDES = 32.5 CFS
  24"ø rcp stub out to west
  1- manhole for 36"ø rcp
  24"ø x 80 L.F. rcp
  36"ø x ___ L.F. rcp outfall

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

TABLE 4 (CONTINUED)

ATHERTON WAY STORM SEWER SYSTEM (STA 169+95)

STA 169+75 6' D-10-R, QDES = Q5 = 10 CFS

STA 169+95 Manhole for 30" ø rcp
30" ø rcp stub-out to west x L.F.
36" ø rcp outfall QDES = 73 CFS

STA 169+75 to 169+95 18" ø rcp connector

STA 169+75 to 170+15 24" ø rcp connector
QDES = 32 CFS

STA 170+15 to 176+00 24" ø rcp connector
QDES = 16 CFS

STA 173+10 1-manhole for 24" ø rcp

STA 176+00 8', D-10-R in sump QDES = 16 CFS

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE _____ CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BLVD

SUBJECT STORM DRAINAGE

TABLE 4 - (CONTINUED)

SOUTH MOUNTAIN SHADOWS ACCESS ROAD
STORM SEWER SYSTEM (STA 188+00)

STA 188+00 — 2- manhole for 36" ø rcp
30" ø rcp stub out to west x ___ LF
QDES = 75 CFS.
36" ø rcp outfall line x ___ LF.

STA 188+30 — 2- 8' INLET, D-10-R
1 - 24" ø rcp x 30 LF, QDES = 12.7 CFS
24" ø rcp x 30 LF QDES = 6.6 CFS

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

TABLE 4 (CONTINUED)

NORTH SHADOW MOUNTAIN ACCESS ROAD
STORM SEWER SYSTEM (STA 201+00±)

STA 201+00 12' MANHOLE FOR 30" ø rcp
27" ø rcp stub-out
30" ø rcp Storm Sewer outfall QDES=37CFS

STA 201+00 to 201+30
24" ø rcp x 30 L.F QDES = 12 CFS
24" ø rcp x 30 L.F QDES = 7.3 CFS

STA 201+30± 8' inlet QDES = 12 CFS
6' inlet QDES = 7.3 CFS

VINDICATOR DRIVE STORM SEWER
STA. 205+40± to 218+00± 42" ø RCP x 1250 L.F.
3 MANHOLES FOR 42" ø

STA. 215+00 2-8' D-10R INLETS

STA. 216+50 3-8' D-10R INLETS

18" ø RCP CONNECTOR Y L.F.

24" ø RCP CONNECTOR X L.F.

TABLE 5, ESTIMATED COST 7/29/83

1. MULE DEER DRIVE SYSTEM

36" RCP	360'	@ $60/LF	=	21,600
24" RCP	385'	@ $35/LF	=	13,475
18" RCP	80'	@ $25/LF	=	2,000
8' D-10-R	1	@ $1400 EA	=	1,400
10' D-10-R	2	@ $1600 EA	=	3,200
Manholes	4	@ $1700 EA	=	6,800
				48,475

2. ATHERTON WAY SYSTEM

36" RCP	85'	@ $60/LF	=	5,100
30" RCP	35'	@ $45/LF	=	1,575
18" RCP	120'	@ $25/LF	=	3,000
6' D-10-R	2	@ $1,200	=	2,400
10' D-10-R	1	@ $1,600	=	1,600
Manholes	2	@ 1700	=	3,400
				17,075

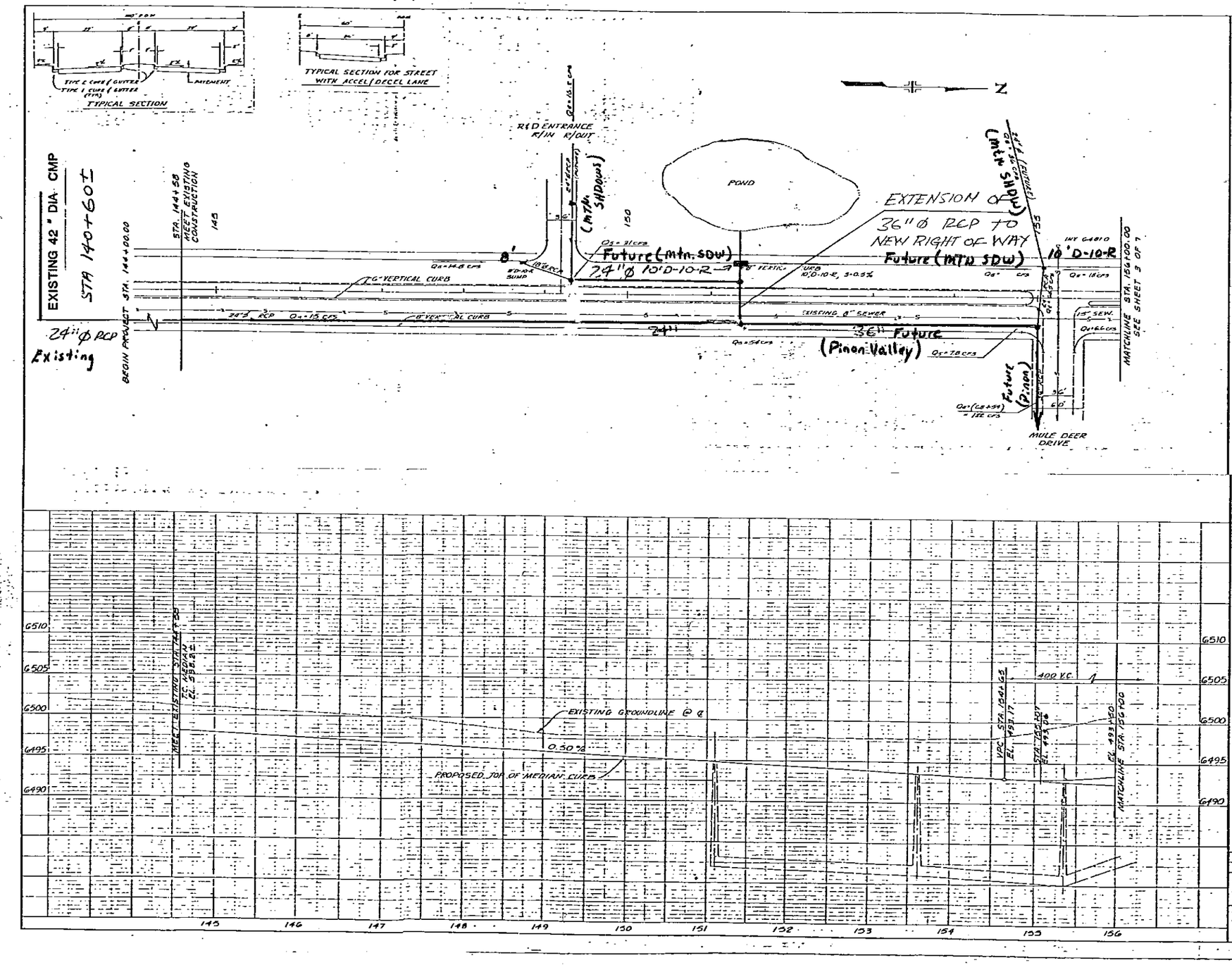
3. REED RANCH SYSTEM

36" RCP	246'	@ $60/LF	=	14,760
30" RCP	202'	@ $45/LF	=	9,090
18" RCP	128'	@ $25/LF	=	3,200
15" RCP	128'	@ $20/LF	=	2,560
10' D-10-R	2	@ $1600 EA	=	3,200
4' D-10-R	2	@ $1200 EA	=	2,400
Manhole (10.5')	1	@ $1900 EA	=	1,900
Manhole (10')	1	@ $1900 EA	=	1,900
Manhole (8.8')	1	@ $1700 EA	=	1,700
Manhole (8')	1	@ $1700 EA	=	1,700
				42,410

4. VINDICATOR / FLYING W RANCH ROAD SYSTEM

42" RCP	940'	@ $80/LF	=	75,200
36" RCP	260'	@ $60/LF	=	15,600
24" RCP	50'	@ $35/LF	=	1,750
18" RCP	300'	@ $25/LF	=	7,500
8' D-10-R	5	@ $1400 EA	=	7,000
Manhole	1	@ $1700 EA	=	1,700
				108,750

Total Const. Cost	216,710
Contingencies (20%)	43,342
	260,052
ENGR, LEGAL, ADMIN (10%)	26,005
	$ 286,057
SAY	$ 286,000 GRAND TOTAL



DES. & DATA
Curb Type
R/W width ____ feet
MAT width ____ feet
(Curb face to curb face)
SIDEWALKS
width ____ feet
location ☐ attached to curb ☐ detached, located 6' from R/L
SUBBASE REQUIRED
a. SELECT ____ inches
b. PIT RUN ____ inches

WHEEL VALUE
TRAFFIC INDEX

STATEMENTS:

A. SEWER- Any changes or differences affecting the grade alignment, elevation, and depth of cover of sewers and appurtenances shown on this drawing shall be the responsibility of the developer.

B. WATER- This approval subject to the final street grade leaving a minimum cover of 5' (five feet) over the water lines. Any changes shall be at the expense of the owner or developer.

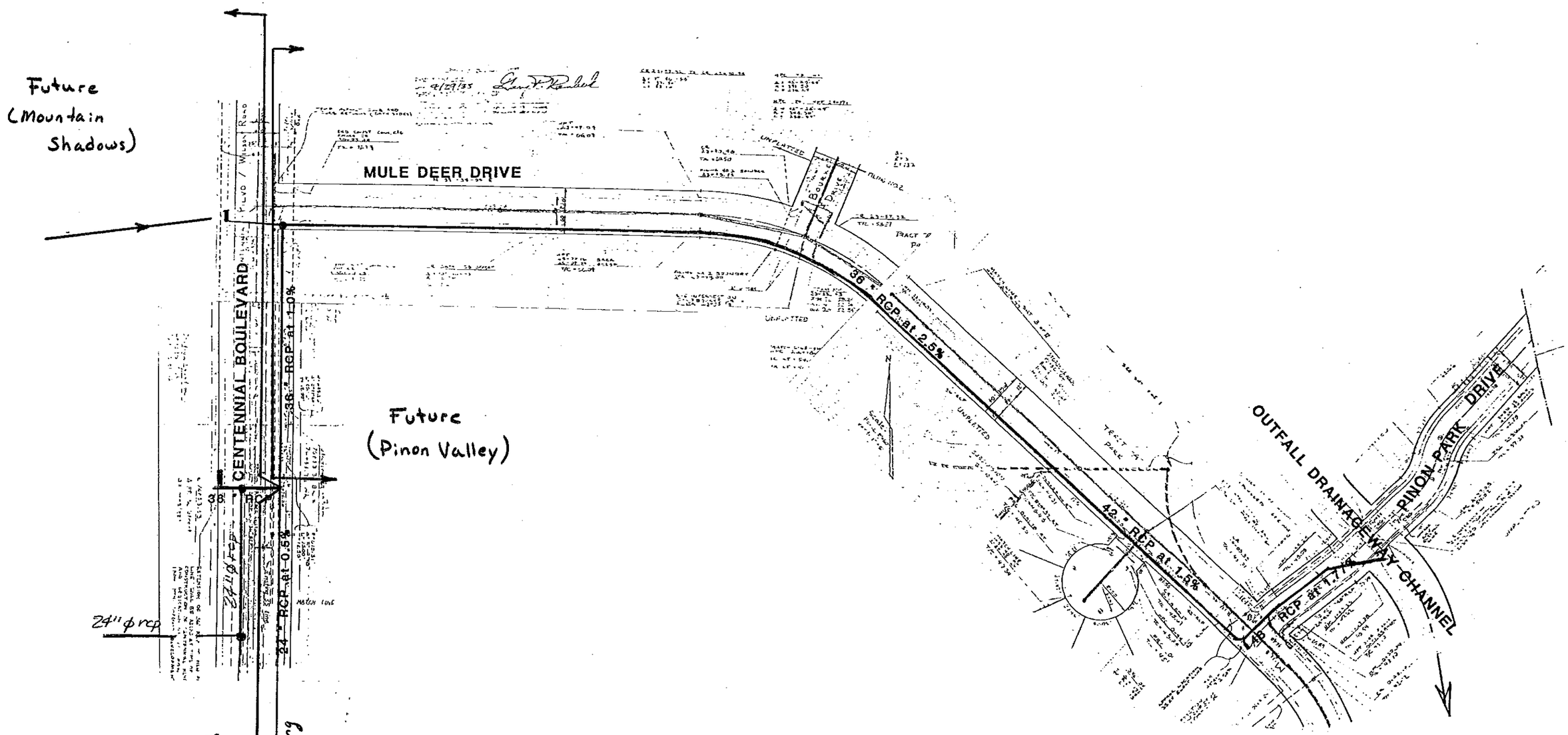
By: _____

APPROVALS
CITY ENGINEER
Rough-Cut Appr.: _____ Date _____
Final Appr. _____ Date _____
WATER DEPT. By _____ Date _____
SEWER DEPT. By _____ Date _____

NOTES:

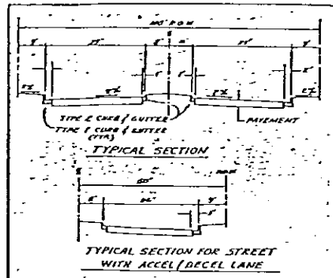
BENCH MARK: _____
REVISIONS: _____
ENGR: URS COMPANY
STREET NAME: CENTENNIAL BLVD.
FROM 144+00 TO 156+00
SUBDIVISION: _____
DESIGN BY: T.L.H. DATE: _____
DRAWN BY: S.J.L. DATE: _____
JOB NO 1078 FILE NO _____
SHEET 2 OF 8

FIGURE 6



PINON VALLEY
CONCEPTUAL STORM SEWER
AT MULE DEER DRIVE

FIGURE 7



TYPICAL SECTION

TYPICAL SECTION FOR STREET WITH ACCEL/DECEL LANE

DESIGN DATA
CURB TYPE*
R/W width ____ feet
MAT width ____ feet
(Curb face to curb face)
SIDEWALKS
width ____ feet
location* attached to curb / detached, located 6' from R/L
SUBBASE REQUIRED
a. SELECT ____ inches
b. PIT RUN ____ inches

HVEEM VALUE
TRAFFIC INDEX

STATEMENTS:

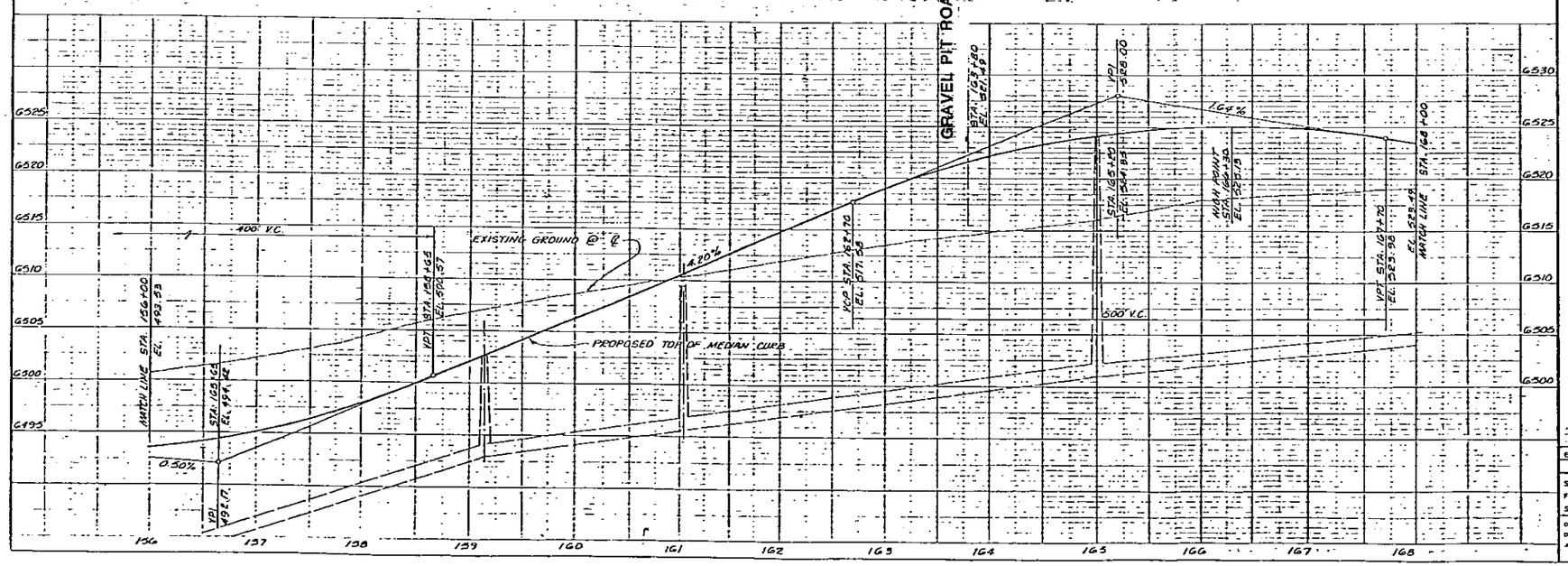
A. SEWER– Any changes or alterations affecting the grade alignment, elevation, and depth of cover of sewers and appurtenances shown on this drawing shall be the responsibility of the developer.

B. WATER– This approval subject to the final street grade having a minimum cover of 5' (two feet) over the water main. Any changes shall be at the expense of the owner or developer.

By: _____

APPROVALS
CITY ENGINEER
Rough-Cut Appr.: _____ Date _____
Final Appr. _____ Date _____
WATER DEPT. By _____ Date _____
SEWER DEPT. By _____ Date _____

NOTES:



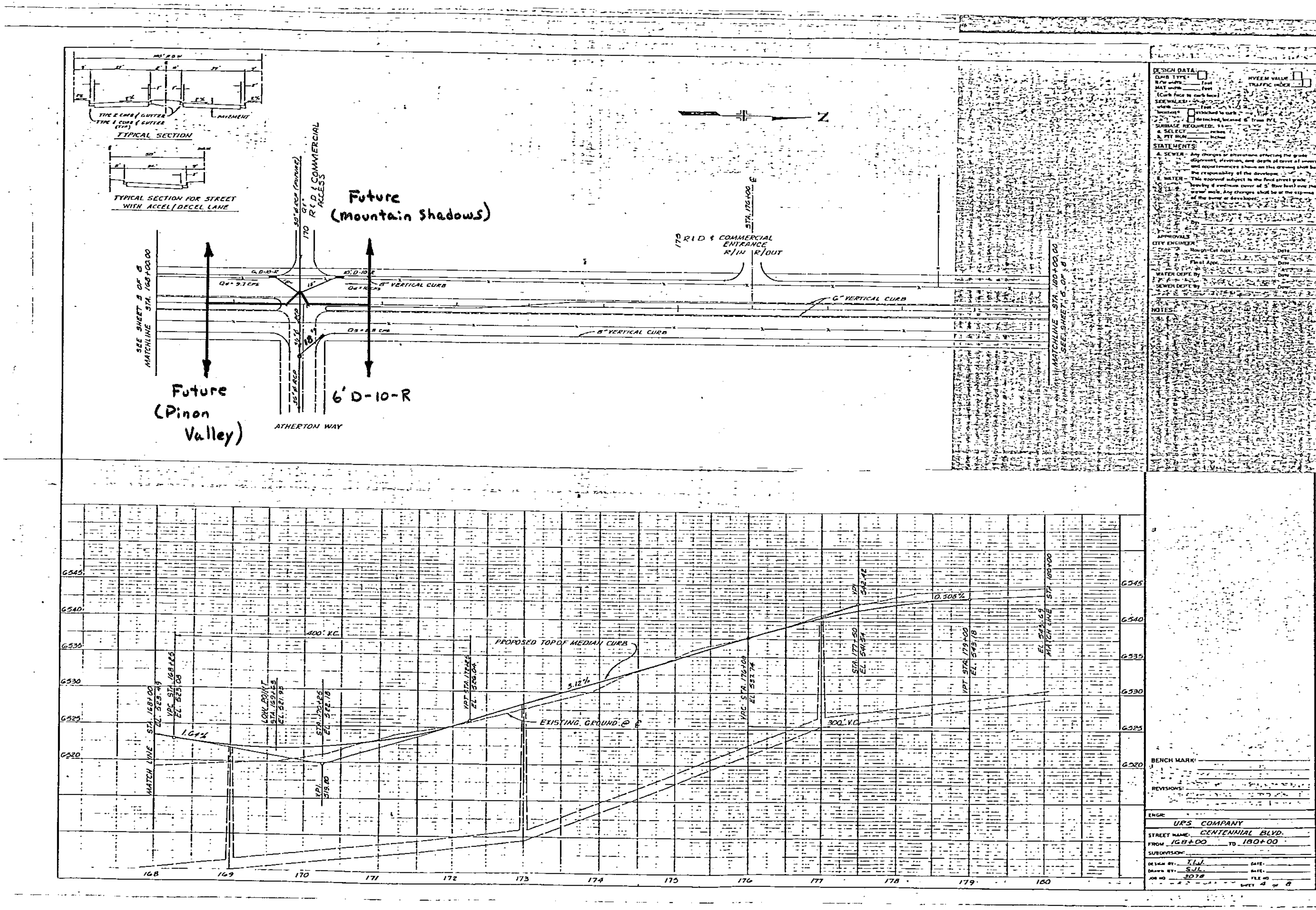
BENCH MARK: _____

REVISIONS: _____

ENGR: URS COMPANY

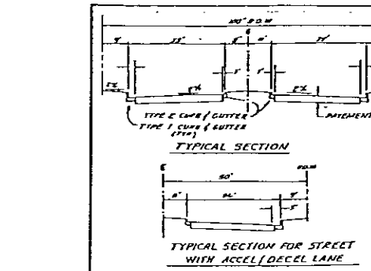
STREET NAME: CENTENNIAL BLVD.
FROM 156+00 TO 168+00
SUBDIVISION: _____
DESIGN BY: T.L.J. DATE: _____
DRAWN BY: S.J.L. DATE: _____
JOB NO. 3078 FILE NO _____
SHEET 3 OF 8

FIGURE 8



TYPICAL SECTION
TYPICAL SECTION FOR STREET WITH ACCEL/DECEL LANE
Future (Mountain Shadows)
Future (Pinon Valley)
6' D-10-R
ATHERTON WAY
R/I D & COMMERCIAL ENTRANCE R/IN R/OUT
6" VERTICAL CURB
PROPOSED TOP OF MEDIAN CURB
EXISTING GROUND @ ℄
1.64%
5.12%
0.508%
400' V.C.
300' V.C.
BENCH MARK:
REVISIONS:
URS COMPANY
STREET NAME: CENTENNIAL BLVD.
FROM 168+00 TO 180+00

FIGURE 9



DESIGN DATA
CURB TYPE* ☐ WHEEL VALUE ☐
R/W width ____ feet TRAFFIC INDEX ____
MAT width ____ feet
(Curb face to curb face)
SIDEWALKS
width ____ feet
location* ☐ attached to curb ☐ detached, located 6' from P/L

SUBBASE REQUIRED
A. SELECT ____ inches
B. PIT RUN ____ inches

STATEMENTS:

A. SEWER – Any changes or alterations affecting the grade, alignment, elevation, and depth of bowl of sewers and appurtenances shown on this drawing shall be the responsibility of the developer.

B. WATER – This approval subject to the final street grade leaving a minimum cover of 5' (five feet) over the water main. Any changes shall be at the expense of the owner or developer.

By: ____

By: ____

APPROVALS
CITY ENGINEER
Rough-Cut Appr.: ____ Date: ____
Final Appr. ____ Date: ____
WATER DEPT. By ____ Date: ____
SEWER DEPT. By ____ Date: ____

NOTES:

BENCH MARK: ____

REVISIONS ____

ENGR: URS COMPANY

STREET NAME CENTENNIAL BLVD
FROM 180+00 TO 189+00
SUBDIVISION ____
DESIGN BY: T.L.J. DATE: ____
DRAWN BY: S.J.L. DATE: ____
JOB NO. 3070 FILE NO. ____
SHEET 5 OF 8

FIGURE 10

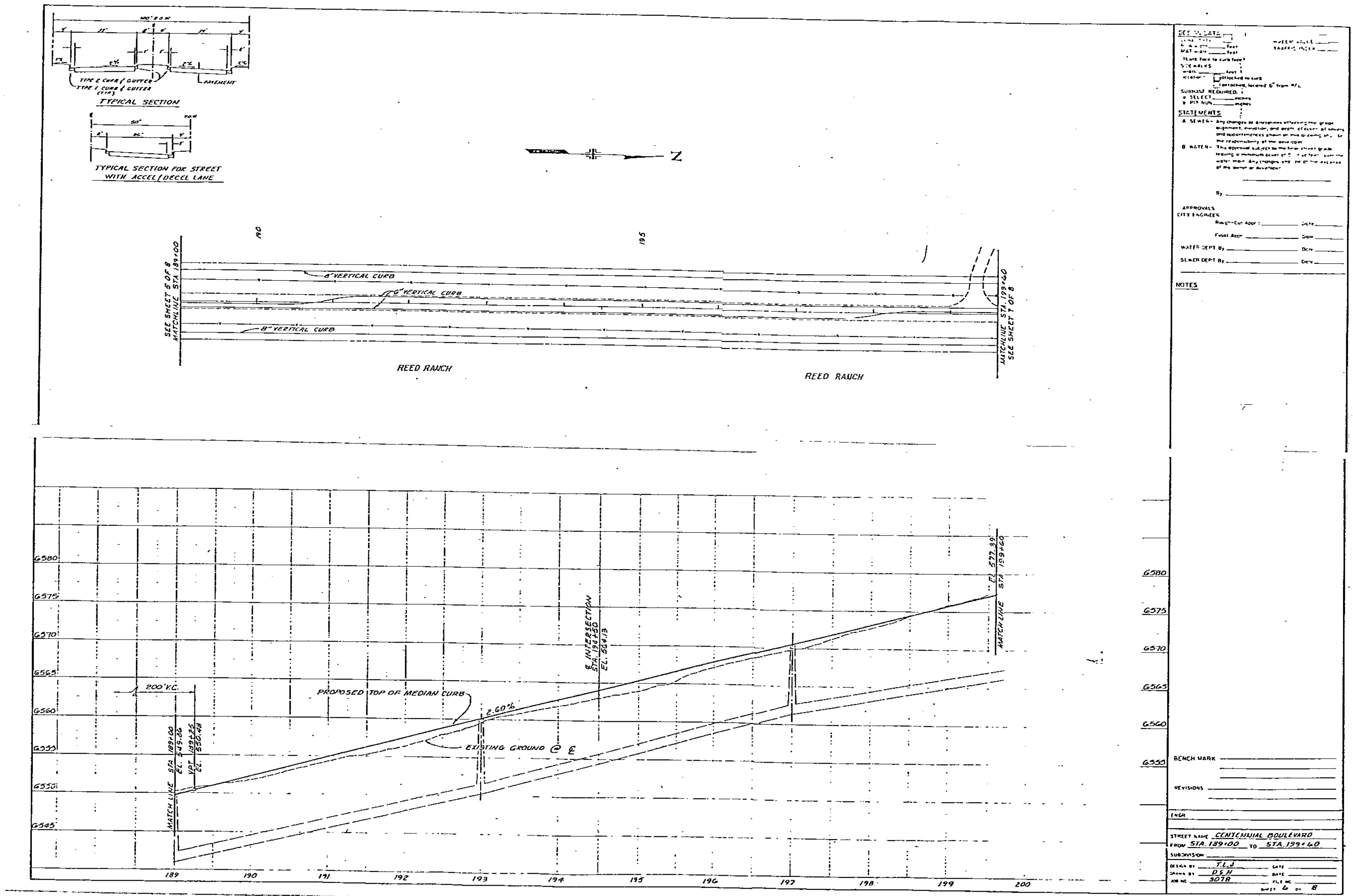

TYPICAL SECTION
TYPICAL SECTION FOR STREET WITH ACCEL/DECEL LANE
8" VERTICAL CURB
6" VERTICAL CURB
REED RANCH
SEE SHEET 5 OF 8 MATCHLINE STA 189+00
MATCHLINE STA 199+60 SEE SHEET 7 OF 8
STATEMENTS
APPROVALS
NOTES
200' V.C.
PROPOSED TOP OF MEDIAN CURB
2.60%
EXISTING GROUND @ ℄
℄ INTERSECTION STA 194+50 EL. 564.13
MATCH LINE STA 199+60 EL. 577.39
BENCH MARK
REVISIONS
STREET NAME CENTENNIAL BOULEVARD
FROM STA. 189+00 TO STA. 199+60
T.L.J
D.S.H
3078
6 OF 8

FIGURE 11

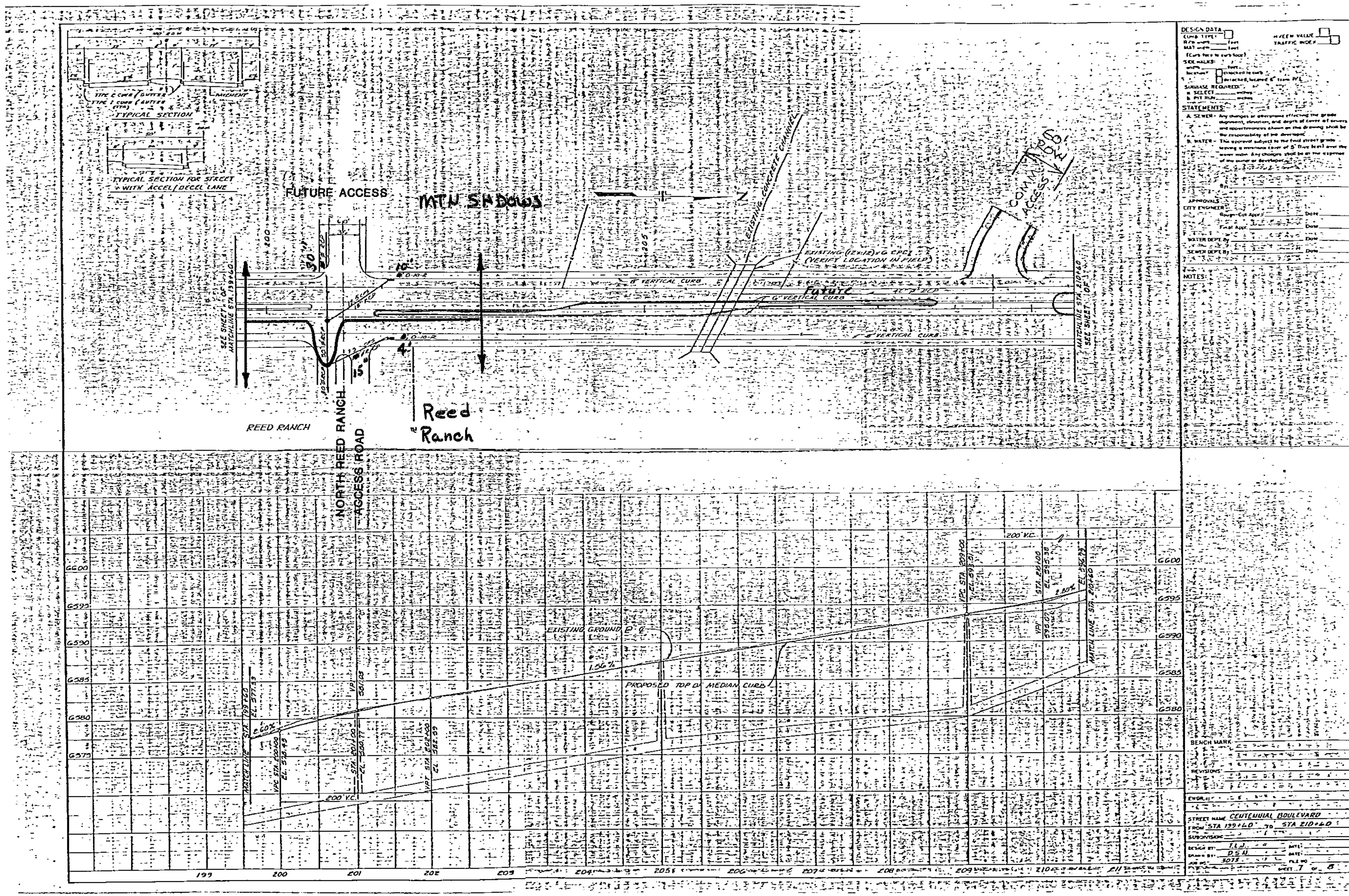
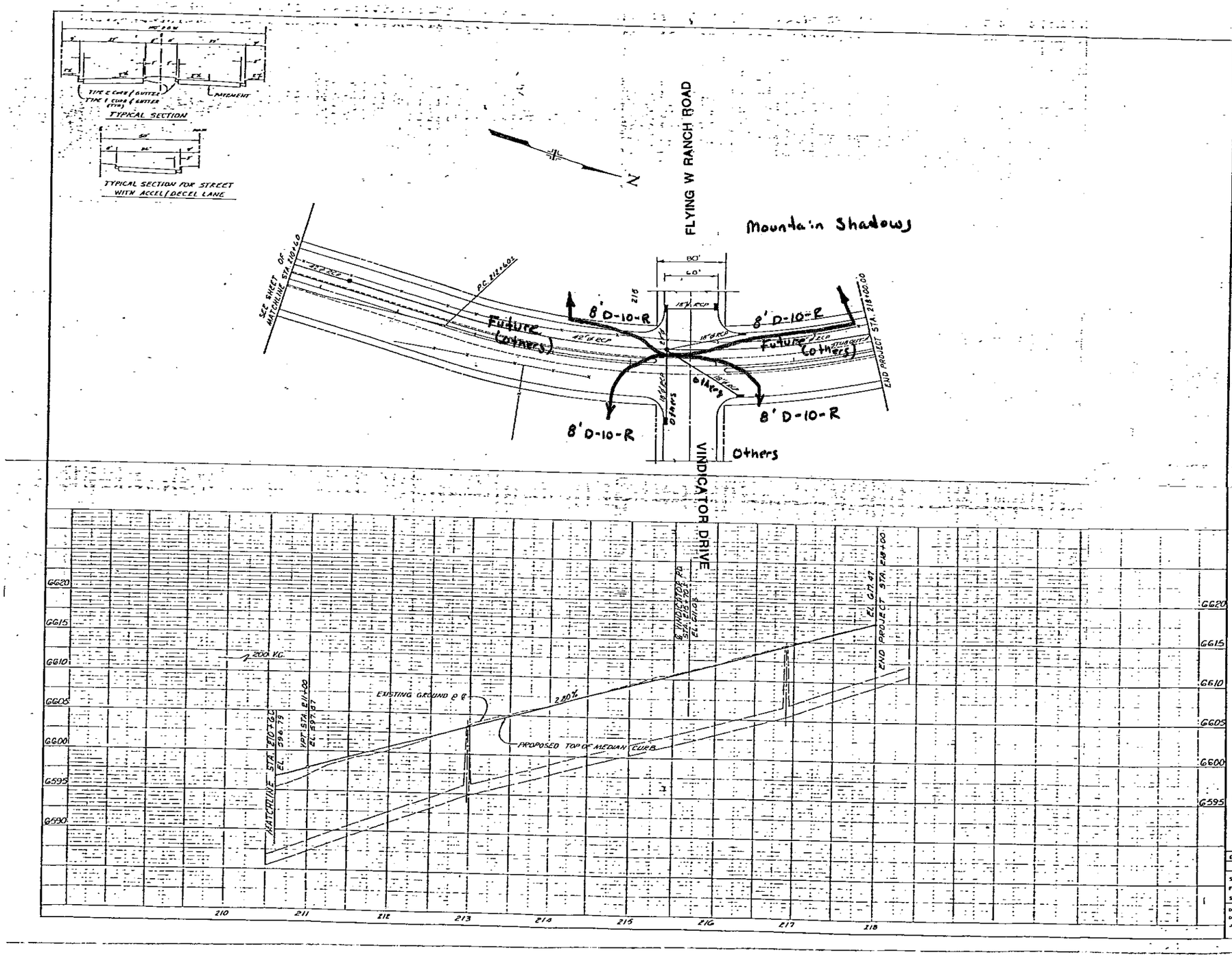

FUTURE ACCESS
MTN SHADOWS
TYPICAL SECTION
TYPICAL SECTION FOR STREET WITH ACCEL/DECEL LANE
EXISTING CONCRETE CHANNEL
COMMERCIAL ACCESS
6" VERTICAL CURB
Future
REED RANCH
NORTH REED RANCH ACCESS ROAD
Reed Ranch
EXISTING GROUND
PROPOSED TOP OF MEDIAN CURB
200' V.C.
DESIGN DATA
STATEMENTS
APPROVALS
CITY ENGINEER
WATER DEPT.
SEWER DEPT.
NOTES
BENCH MARK
REVISIONS
STREET NAME CENTENNIAL BOULEVARD
FROM STA 199+60 TO STA 210+60

FIGURE 12



ENGR. DATA
Curb type ____ HYDRO VALUE ____
Pvmt width ____ feet TRAFFIC INDEX ____
Total width ____ feet
(Curb face to curb face)
SIDEWALKS
width ____ feet
location: attached to curb / detached, located 6' from P/L
SUBBASE REQUIRED
a. SELECT ____ inches
b. PIT RUN ____ inches

STATEMENTS:

A. SEWER - Any changes or alterations affecting the grade alignment, elevations, and storm of cover of sewers and appurtenances shown on this drawing shall be the responsibility of the developer.

B. WATER - This approval subject to the local street grade leaving a minimum cover of 3' over tops over the water mains. Any changes shall be at the expense of the owner or developer.

By: ____

APPROVALS
CITY ENGINEER
Rough-Cut Appr'd ____ Date ____
Final Appr ____ Date ____
WATER DEPT. By ____ Date ____
SEWER DEPT. By ____ Date ____

NOTES:

BENCH MARK ____

REVISIONS: ____

ENGR. ____

STREET NAME CENTENNIAL BOULEVARD
FROM STA. 210+60 TO STA 218+00
SUBDIVISION ____
DESIGN BY: T.L.J. DATE: ____
DRAWN BY: D.S.N DATE: ____
JOB NO. ____ FILE NO. ____
SHEET 8 OF 8

FIGURE 13

CITY OF COLORADO SPRINGS
DEPARTMENT OF PUBLIC WORKS • ADMINISTRATION (303) 471-6660 • ENGINEERING (303) 471-6606
105 WEST COSTILLA • P.O. BOX 1575
COLORADO SPRINGS, COLORADO 80901

July 25, 1979

TO WHOM IT MAY CONCERN:

RE: Procedures for Drainage Improvements Credits and Reimbursements

In order for a developer to obtain reimbursement of drainage costs or credit, certain procedures must be followed. The drainage ordinance, as amended, states that prior to proceeding with construction of major facilities, the developer must comply with the following:

1) Obtain through the subdivision process an approved drainage plan showing the facilities required and the estimated cost of those facilities, and indicate the drainage basin and fee for the acreage shown on the drainage plan. (Copies of the current per-acre fee can be obtained from the Public Works Department.) All drainage basins are identified and fees established each year. Letters of credit are to be posted with the City in accordance with the subdivision ordinance.

2) Obtain three (3) sealed bids for constructing the facilities. If the lowest bid exceeds the Engineer's estimated costs as indicated in the drainage report, the City Engineer must review and give approval (or disapproval) before proceeding.

3) If it is not possible to receive three bids, the developer must obtain the City Engineer's approval before proceeding with construction, and the cost and credits shall be determined at that time.

4) The developer proceeds with construction according to the approved plans and any changes during construction shall be discussed with the City Engineer.

5) Upon completion of the construction of facilities, the developer shall obtain a certification from a Colorado Registered Professional Engineer that the facilities inspected are constructed in accordance with the approved plans.

6) The developer then submits this certification along with records of the cost of construction, i.e., a copy of the bid, as-paid bills, and a request for inspection and reimbursement to the City Engineer.

7) The City Engineer will review the request, inspect the facilities and after verification of the costs, will place the request on the Drainage Board Agenda for formal review. The letter of credit for drainage facilities may be released at this point.

8) The Drainage Board meets on the third Thursday of each month and reviews the requests for reimbursement after hearing from both the City and the developer.

9) If the request is approved, the item is then forwarded to City Council for final approval of reimbursement of monies from the drainage fund account.

10) If the request is not approved, the Drainage Board will set the amount of reimbursement and developer has the right to appeal to City Council.

11) Reimbursements are made twice a year: on the first of June and the first of December. Items to be heard for June disbursement must be approved by the Drainage Board by April 1. Items to be heard for December disbursement must be approved by the Drainage Board no later than October 1.

12) If the Drainage Basin account has insufficient funds for reimbursement, the developer is placed on a priority list and is paid when revenue within the fund is sufficient. Partial reimbursements are made until the developer is fully reimbursed.

13) Any dispute over bidding or fees may be heard by the Drainage Board and City Council.

14) The developer should be aware that all drainage fees are finally computed to the time that bids are taken and not at the time of platting.

15) Fees on all basins are adjusted by City Council each year at their first meeting of the year.

DeWitt Miller
Director of Public Works

RAM.

RAM/pjk

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-93 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

CALCULATIONS

- MULE DEER DRIVE STORM SEWER SYSTEM (STA 155+29±)
- ATHERTON WAY STORM SEWER SYSTEM (STA 169+95±)
- SOUTH MOUNTAIN SHADOWS ACCESS ROAD STORM SEWER SYSTEM (STA 188+00±)
- NORTH MOUNTAIN SHADOWS ACCESS ROAD STORM SEWER SYSTEM (STA 201+00±)
- VINDICATOR DRIVE/MOUNTAIN SHADOWS STORM SEWER SYSTEM (STA 215+70±)

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. B073 BY _____ DATE 6-1-93 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - CONCEPTUAL DESIGN

MULE DEER DRIVE STORM SEWER SYSTEM

- STA 140+60 to 151+32, 24"ø RCP x 1072 LF
  QDES = Q5 = 15 CFS

- STA 149+20 - 8' inlet in sump, QDES = Q5 = 15 CFS
  24"ø rcp connector line x 75 LF Q5 = 15
  1- manhole for 24"ø rcp

- STA 149+20 to 151+32
  24"ø rcp connector x 212 LF
  1 manhole ~~for~~ 36"ø rcp
  QDES = Q5 = 46 CFS

- STA 151+32 · 10-foot inlet on 0.5% QDES = Q5 = 7.7 CF
  36"ø rcp x 90 LF
  1-manhole for 36"ø RCP

- STA 151+32 to 155+29 36"ø rcp x 397 L.F
  QDES = 53.3 CFS

- STA 155+29 14-foot inlet in sump
  QDES = Q5 = 32.5 CFS.
  24"ø RCP stub out to west
  1-manhole for 36"ø rcp
  24"ø x 80 L.F RCP
  36"ø x ____ L.F RCP OUTFALL

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-31-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

North side of planned R-6 R&D Entrance on the West side of planned Centennial Boulevard (STA 140+50±

Assume Storm runoff from drainage masterplanning basin C-9 does not affect this segment of planned Centennial Boulevard.

Assume 5-year storm runoff associated with drainage masterplanning basin C-8 to be intercepted by existing cross culvert (STA 140+35) and conveyed to planned Mule Deer Drive Storm sewer system.

- DRAINAGE AREA

  C-8 21 acres, CN = 73, T_c = 0.10

  west side of planned Centennial Boulevard

  (950×50)/43,560 = 1.1 acres, CN=98, C=0.9

  planned R-6 entrance from the west

  3.2 acres, CN=72, C=0.4

- TIME OF CONCENTRATION

  Assume same time of concentration as masterplanning basin C-8 as obtained from Douglas Creek Drainage Basin Masterplanning Study of March 1981

  T_c = 0.113 hours

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-31-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTINNIAL BLVD

STA 140+50 WEST SIDE OF PLANNED CENTENNIAL BLVD (CONT.)

- CSM per inch (T_c = 0.11 hr) = 1250
- COMPOSITE CN

21 × 73	=	1,533
1.6 × 98	=	108
3.2 × 72	=	230
25.3		1871

$\overline{CN}$ = 1871 / 25.3 = 74

- RUNOFF

Q5 (CN = 74) = 0.40 inches

Q100 (CN = 74) = 1.24 inches

- PEAK RUNOFF

5-year = $\frac{25.3}{640} \times 1250 \times 0.40$ = 19.8 CFS

− 15. (C-8, 24"ø)

4.8 CFS

100-year = $\frac{25.3}{640} \times 1250 \times 1.24$ = 61.3

− 15 (C-8, 24"ø)

46.3 CFS

- EQUIVALENT AREA CARRY OVER

5-year = $\frac{4.8 \times 640}{1250 \times 0.40}$ = 6.1 acres, CN = 73.5

100-year = $\frac{46.3 \times 640}{1250 \times 1.24}$ = 19.1 acres, CN = 73.5

URS COMPANY
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-31-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

SOUTH SIDE OF PLANNED R-6 ENTRANCE STATION 149+20
ON THE WEST SIDE OF PLANNED CENTENNIAL BOULEVARD

- DRAINAGE AREA

West of planned Centennial Boulevard
4.82 acres, CN = 88

West half of planned Centennial Boulevard
(800 x 50)/43560 = 0.92 acres CN=98

- COMPOSITE CN

	5-year		100-year	
	4.8 x 88 =	423	4.8 x 88 =	423
	1 x 98 =	98	1 x 98 =	98
CARRY-OVER FROM STATION 140+50 →	6.1 x 73.5 =	449	19.1 x 73.5 =	1404
	11.9	970	24.9	1925

1970/11.9 = 81.5 1925/24.9 = 77.3

- RUNOFF

Q5 (CN = 81.5) = 0.69
Q100 (CN = 77.3) = 1.45

- TRAVEL TIME BETWEEN 140+50 to 149+20

$$\frac{800}{5 \times 60 \times 60} = 0.044$$

- TIME OF CONCENTRATION

$T_c = 0.113 + 0.044 = 0.157$ hrs

- CSM per inch (T_c = 0.157 hrs) = 1150

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-31-85 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD SOUTH SIDE OF STATION 149+20 WEST SIDE OF CENTENNIAL BLVD

0. PEAK STORM RUNOFF INCLUDING CARRY OVER FROM BASIN C-8

$$5\text{-year} = \frac{11.9}{640} \times 1150 \times 0.69 = 14.8 \text{ CFS.}$$

$$100\text{-year} = \frac{24.9}{640} \times 1150 \times 1.45 = 64.9 \text{ CFS}$$

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-31-85 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

PLANNED STORM SEWER INLET TO PICK UP RUNOFF FROM SOUTHERN PORTION OF DRAINAGE MASTERPLANNING BASIN C-7 WEST OF PLANNED R & D LOOP ROAD DIRECTLY ACROSS FROM PLANNED MULI DEER DRIVE

- DRAINAGE ~~AREA~~

C-7 110 acres
- 11.1
- 4.8
- 16.3
- 5.06
- 6.3
- 8.7

57.75 acres CN=72

- TIME OF CONCENTRATION

6880
6500
380 / 3000 = 12.67 %

$$T_c = \frac{\left(11.9 \times \left(\frac{3000}{5280}\right)^3\right)^{0.385}}{380} = 0.137 \text{ hrs}$$

- CSM per inch = 1180

- RUNOFF

Q5 (CN=72) = 0.34 inches

Q100 (CN=72) = 1.12 inches

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-1-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

PLANNED STORM SEWER INLET TO INTERCEPT STORM RUNOFF FROM THE SOUTHERN PORTION OF DRAINAGE MASTERPLANNING BASIN C-7 WEST OF PLANNED R&P LOOP ROAD DIRECTLY ACCROSS FROM PLANNED MULE DEER DRIVE (CONTINUED)

- PEAK STORM RUNOFF

$$5\text{-year} = \frac{57.75}{640} \times 1180 \times 0.34 = 36.2 \text{ CFS}$$

$$100\text{-year} = \frac{57.75}{640} \times 1180 \times 1.12 = 119.3 \text{ CFS}$$

- ASSUME STORM SEWER INLET INTERCEPTS 5-YEAR PEAK STORM RUNOFF OF 36.2 CFS

- EQUIVILENT AREA ASSOCIATED WITH 100-YEAR CARRY OVER

$$A_{\substack{\text{EQUIV.} \\ \text{100-year}}} = \frac{(119.3 - 36.2) \times 640}{1180 \times 1.12} = 40.24 \text{ Acres}$$

CN = 72

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

PLANNED STORM SEWER INLET TO INTECEPT STORM RUNOFF FROM THE SOUTHERN PORTION OF DRAINAGE MASTER PLANNING BASIN C-7 WEST OF PLANNED R & D LOOP ROAD.

- DRAINAGE AREA

  17.9 acres
  16.3 acres
  24.2 Ac . CN = 72

- RUNOFF

  Q5 (CN=72) = 0.34 inches
  Q100 (CN=72) = 1.12 inches

- TIME OF CONCENTRATION

  6780
  -6520
  260/2100 = 12.4%

$$T_c = \left(\frac{11.9 \left(\frac{2100}{5280} \right)^3}{260} \right)^{0.385} = 0.105 \text{ hrs}$$

- CSM per Inch = 1260
- PEAK STORM RUNOFF

  5-year = $\frac{24.2}{640} \times 1260 \times 0.34 = 16.2$

  100-year = $\frac{24.2}{640} \times 1260 \times 1.12 = 53.4$ CFS

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-20-03 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

STATION 155+72.9 MULE DEER DRIVE

o TOTAL FLOW FROM NORTH AND SOUTH

* EXCLUDING STORM RUNOFF FROM CHUCK WAGON ROAD

	AREA (acres)	CN	CN x A
FROM THE NORTH	70	72	5040
FROM THE SOUTH	61	72.3	4,410
	131		9450

Composite CN = 9450 / 131 = 72.14

RUNOFF

Q5 (CN = 72.14) = 0.34 inches

Q100 (CN = 72.14) = 1.13 inches

TIME OF CONCENTRATION 0.10 hours

CSM per inch = 1260

PEAK STORM RUNOFF

$$5\text{-year} = \frac{131}{640} \times 1260 \times 0.34 = 88 \text{ cfs}$$

$$100\text{-year} = \frac{131}{640} \times 1260 \times 1.13 = 291.4 \text{ cfs}$$

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-28-93 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD.

STATION 155+29 MULE DEER DRIVE FROM THE SOUTH

- SOUTHERN PORTION OF MASTER PLANNING BASIN C-7 AND ALL OF MASTER PLANNING BASIN C-8

BASIN	AREA (acres)	CN	CN x A
C-7 (SOUTH)	40	72	2880
C-8	21	73	1533
	61		4413

- Composite CN = 4413/61 = 72.34
- RUNOFF

  Q5 (CN = 72.3) = 0.34 inches

  Q100 (CN = 72.3) = 1.14 inches

- TIME OF CONCENTRATION

  SOUTHERN PORTION OF C-7

  6780
  6490
  290/2600 = 11.1 %

  Tc (natural) = 0.129

  adjustment factor for 25% length modified = 0.83

  adjustment factor for 25% Impervious = 0.83

  Tc (developed) = 0.83 x 0.83 x 0.129 = 0.089

  ASSUME T_c = 0.1 hours

- CSM per inch = 1260

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-28-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

STATION 155+29 FROM THE SOUTH (CONTINUED)

PEAK STORM RUNOFF

$$5\text{-year} = \frac{61}{640} \times 1260 \times 0.34 = 41 \text{ CFS}$$

$$100\text{-year} = \frac{61}{640} \times 1260 \times 1.14 = 137 \text{ CFS}$$

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

SOUTH SIDE OF MULE DEER DRIVE STATION (155+29)
EXTENDED FROM THE SOUTH ON THE WEST

- DRAINAGE AREA

  5.06 Acres C= 0.7

  (600×50)/43560 = 0.69 acres, C= 0.9

- Assume T_c = 16 minutes

- RAINFALL INTENSITIES

  i5 = 3.5 inches per hour

  i100 = 1.9×3.7 = 6.7 inches per hour

- PEAK STORM RUNOFF

  5-year = 5.75× 0.72 × 3.5 = 14.5 CFS

  100-year = 5.75 × 0.72× 6.7 = 27.7 CFS

* Provide an inlet on the west side of planned Centennial Boulevard between station 149+20 and 155+29, Assume this inlet intercepts half storm runoff or 14.5/2 = 7.3 CFS

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

CHUCKWAGON DRIVE STATION ON THE WEST SIDE OF PLANNED CENTENNIAL BOULEVARD

- DRAINAGE AREA

5.5 Acres
6.3 Acres
1.8 Acres
9.7 Acres
(1,100 x 50)/43,560 = 1.26 Acres

23.6 Acres, CN = 74

- RUNOFF

Q5 (CN=74) = 0.40 inches
Q100 (CN=74) = 1.24 inches

- TIME OF CONCENTRATION

6700
6510
190/2250 = 8.4%

$$Tc = \left(\frac{11.9 \times \left(\frac{2250}{5280}\right)^3}{190} \right)^{0.385} = 0.128 \text{ hours}$$

- CSM per inch = 1220

- PEAK STORM RUNOFF

5-year = $\frac{23.6}{640} \times 1220 \times 0.40 = 18$ CFS

100-year = $\frac{23.6}{640} \times 1220 \times 1.24 = 55.8$ CFS

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-28-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - EAST SIDE OF PLANNED CENTENNIAL BLVD

MULE DEER DRIVE (STA 155+29) ON THE EAST SIDE OF PLANNED CENTENNIAL BOULEVARD FROM THE SOUTH

- AREA

STA 155+29
STA 132+35
2,294 L.F
50
114,700/43,560 = 2.63 acres

- Time of Concentration

assume overland flow for first 400 feet

$$T_o = \frac{1.8\,(1.1-C)\,D^{1/2}}{S^{1/3}}$$

$$= \frac{1.8\,(1.1-0.9)\,400^{2}}{05^{1/3}} = 9.07$$

assume average flow velocity of 4 feet per second

$$T_T = \frac{(2294-400)}{4\times60} = 9.4 \text{ minutes}$$

$$T_c = T_o + T_T = 9.07 + 9.4 = 18.47 \text{ min}$$

- RAIN FALL INTENSITIES

i_5 = 3.3 inches per hour
i_5 = 1.9 x i_5 = 6.27 inches per hour

- PEAK STORM RUNOFF

5-year = 2.63 x 0.9 x 3.3 = 7.8 CFS
100 year = 2.63 x 0.9 x 6.27 = 14.8 CFS.

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-28-03 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - EAST SIDE OF PLANNED CENTENNIAL BLVD

MULE DEER DRIVE (STA 155+29) ON THE EAST SIDE OF PLANNED CENTENNIAL BOULEVARD FROM THE NORTH

- AREA

  1200
  x50
  60,000/43560 = 1.4 acres

- TIME OF CONCENTRATION

  OVERLAND FLOW

  $$T_o = \frac{1.8(1.1-0.9)400^{1/2}}{4^{1/3}} = 4.5 \text{ min}$$

  Channel-flow

  $$T_T = \frac{(1200-400)}{5 \times 60} = 2.7 \text{ min}$$

  $T_c = T_o + T_T = 4.5 + 2.7 = 7.2$ min

- RAINFALL INTENSITY

  I_5 = 5.2 inches per hour

  $I_{100} = 1.9 \times 9.9 =$ inches per hour

- PEAK STORM RUNOFF

  5-year = $1.4 \times 0.9 \times 5.2 = 6.6$ cfs

  100-year = $1.4 \times 0.9 \times 9.9 = 12.5$ cfs.

URS COMPANY
Mailing Address: Denver, Colorado 80200
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE -

ATHERTON WAY STORM SEWER SYSTEM

STA 169+75 16' INLET, QDES = Q5 = 10 CFS

STA 169+95 MANHOLE for 30" ø RCP

30" ø RCP STUB-OUT to WEST X L.F

36" ø RCP OUTFALL QDES = Q5 = 73 CFS.

STA 169+75 to STA 169+95 24" ø RCP Connector

STA 170+15 8' INLET, QDES = Q5 = 10 CFS.

STA 169+75 to 170+15 24" ø RCP Connector

QDES = Q5 = 32 CFS.

STA 170+15 to 176+00 24" ø RCP connector

QDES = Q5 = 16 CFS

STA 173+10 manhole for 24" ø RCP

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-28-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - EAST SIDE OF PLANNED CENTENNIAL BLVD.

DRAINAGE MASTERPLANNING BASIN A-B ON THE WEST SIDE OF PLANNED CENTENNIAL BOULEVARD

- AREA

  (2400 x 50) / 43560 = 2.8 acres C = 0.9

  Note: the area to the west drains to channel away from planned Centennial Boulevard

- TIME OF CONCENTRATION

  OVERLAND FLOW

$$T_o = \frac{1.8\,(1.1-0.9)\,400^{1/2}}{3.3^{1/3}} = 4.8 \text{ minutes}$$

  CHANNEL FLOW TIME

$$T_T = \frac{(2400-400)}{5 \times 60} = 6.7 \text{ minutes}$$

$$T_c = T_o + T_T = 4.8 + 6.7 = 11.5 \text{ minutes}$$

- RAINFALL INTENSITY

  i_5 = 4.25 inches per hour

  i_{100} = 1.9 x 4.25 = 8.1 inches per hour

- PEAK STORM RUNOFF

  5-YEAR = 2.8 x 0.9 x 4.25 = 10.71 CFS

  100-YEAR = 2.8 x 0.9 x 8.1 = 20.41 CFS

- MASTERPLANNED STORM SEWER CAPACITY

  10.1' and 8' inlet

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3673 BY _____ DATE 5-26-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

STATION 169 + 95 ATHERTON WAY

* Including drainage area tributary to Chuck Wagon Road

Masterplanning Basin C-6

- D.A = 82 acres
- CN = 78
- RUNOFF
  - Q5 (CN=78) = 0.54
  - Q100 (CN=78) = 1.50
- T_c = 0.212 hours
- CSM per inch = 1055
- Rock storm Runoff
  - 5-year = 73 cfs
  - 100-year = 203 cfs

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-93 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

SOUTHWEST CORNER OF ~~ATHERTON~~ WAY AND CENTENNIAL BOULEVARD FROM THE SOUTH (STA 169+95)

- DRAINAGE AREA

  3.03 Acres C = 0.7

  (350×50)/43,560 = 0.40 Acres, C = 0.9

  D.A. = 3.43 acres

- Assume T_c = 10 min

- RAINFALL INTENSITIES

  i_5 = 4.5 inches per hour

  i_{100} = 1.9 × 4.5 = 8.55 inches per hour

- PEAK STORM RUNOFF

  5-year = 3.43 × 0.63 × 4.5 = 9.72 CFS.

  100-year = 3.43 × 0.63 × 8.55 = 18.5 CFS.

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE _____ CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

Northwest Corner of Atherton Way and Centennial Boulevard from the north (station 169+95)

- DRAINAGE AREA

  17.8 ACRES, CN = 78

  4.02 Acres, CN = 88

  (1800 x 50)/43,560 = 2.1 ACRES CN = 98

  D.A = 23.9 acres

- COMPOSITE RUNOFF NUMBER = 1950/23.9 = 81.5

- RUNOFF

  Q5 (CN = 81.5) = 0.69 inches

  Q100 (CN = 81.5) = 1.75 inches

- TIME OF CONCENTRATION

  6815

  6510

  305/2650 = 11.5 %

  T_c = 0.129 hours

- CSM per Inch = 1200

- PEAK RUNOFF

  5-YEAR = $\frac{23.9}{640} \times 1200 \times 0.69 = 30.9$ CFS

  100-year = $\frac{23.9}{640} \times 1200 \times 1.75 = 78.4$ CFS

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-93 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

SOUTH WEST CORNER OF PLANNED COMMERCIAL
R-IN, R-OUT ENTRANCE (STATION 176+00)

- DRAINAGE AREA

  17.8 acres, CN = 78

  (1200 x 50)/43560 = 1.39 acres, CN = 98

- RUNOFF

  Q5 (CN = 79.4) = 0.60 inches

  Q100 (CN = 79.4) = 1.59 inches

- TIME OF CONCENTRATION

  6815
  -6550
  265/2050 = 12.9 %

  Tc = 0.101 hours

- CSM per inch = 1260

- PEAK RUNOFF

  5-year = $\frac{17.8}{640}$ x 1260 x 0.6 = 21.0 CFS

  100-year = $\frac{17.8}{640}$ x 1260 x 1.59 = 55.7 CFS

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-28-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - EAST SIDE OF PLANNED CENTENNIAL BOULEVARD

ATHERTON WAY (STATION 169+95) ON THE EAST SIDE OF PLANNED CENTENNIAL BOULEVARD FROM THE NORTH

- AREA

  1800
  50
  90,000/43,560 = 2.1 acres

- Time of Concentration

  overland flow

$$T_o = \frac{1.9\,(1.1-0.9)\,400^{1/2}}{3.3^{1/3}} = 4.9 \text{ minutes}$$

  Channel flow

$$T_T = \frac{1800-400}{5 \times 60} = 4.7 \text{ minutes}$$

$$T_c = T_o + T_T = 4.9 + 4.7 = 9.6 \text{ minutes}$$

- RAINFALL INTENSITIES

$$i_5 = 4.65 \text{ inches per hour}$$
$$i_{100} = 1.9 \times 4.65 = 8.84 \text{ inches per hour}$$

- PEAK STORM RUNOFF

5-year = $2.1 \times 0.9 \times 4.65 = 8.8$ CFS

100-year = $2.1 \times 0.9 \times 8.84 = 16.7$ CFS

URS COMPANY
Mailing Address: Denver, Colorado 80209
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-93 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

SOUTH MOUNTAIN SHADOWS ACCESS ROAD
STORM SEWER IMPROVEMENTS (STATION 188+00)

- STATION 188+00 MANHOLE FOR 36"Ø RCP
  30"Ø RCP STUB-OUT TO WEST X 10 LF.
  QDES = Q5 = 75 CFS
  36"Ø RCP OUTFALL LINE X ___ LF.
- STATION 188+30 S' INLET
  18"Ø RCP X 30 LF
  QDES = Q5 = 12.7 CFS.

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD

NORTHWEST CORNER OF PLANNED ~~ACCESS~~ ROAD TO MOUNTAIN SHADOWS R-6 ~~AREA~~ (STA 188+00) FROM THE NORTH.

---

o DRAINAGE ~~AREA~~

$(1250 \times 50)/43560 = 1.43$ acres, $C = 0.9$

$(1250 \times 100)/43560 = 2.86$ acres, $C = 0.5$

D.A. = 4.29 ac $\bar{C} = 0.63$

o TIME OF CONCENTRATION

$$\begin{array}{r} 6580 \\ -6550 \\ \hline 30 \end{array} / 1250 = 2.4\%$$

$$T_o = \frac{1.8(1.1 - 0.9)\,400^{1/2}}{2.4^{1/3}} = 5.4 \text{ minutes}$$

$$T_T = \frac{(1250 - 400)}{4 \times 60} = 3.5 \text{ minutes}$$

$T_c = 5.4 + 3.5 = 8.9$ minutes

o RAINFALL INTENSITIES

$i_5 = 4.7$ inches per hour

$i_{100} = 1.9 \times 4.7 = 8.93$ inches per hour

o PEAK STORM RUNOFF

5-YEAR = $4.29 \times 0.63 \times 4.7 = 12.7$ CFS

100-YEAR = $4.29 \times 0.63 \times 8.93 = 24.1$ CFS

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-26-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - EAST SIDE OF PLANNED CENTENNIAL BV

SOUTH ACCESS ROAD TO REED RANCH (STA 188+00) ON THE EAST SIDE OF PLANNED CENTENNIAL BOULEVARD FROM THE NORTH

- ~~AREA~~

  1300
  x 50
  65000/43560 = 1.5 Acres

- TIME OF CONCENTRATION

  OVERLAND FLOW

  $$T_o = \frac{1.8(1.1-0.9)\,400^{1/2}}{2.6^{1/3}} = 5.2 \text{ minutes}$$

  Channel Flow

  $$T_c = \frac{(1300-400)}{5 \times 60} = 3 \text{ minutes}$$

  $$T_c = T_o + T_T = 8.2 \text{ minutes}$$

- RAINFALL INTENSITIES

  $i_5 = 4.9$ inches per hour

  $i_{100} = 1.9 \times 4.9 = 9.31$ inches per hour

- PEAK STORM RUNOFF

  5-year = $1.5 \times 0.9 \times 4.9 = 6.6$ CFS

  100-year = $1.5 \times 0.9 \times 9.31 = 12.6$ CFS

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE 5-28-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BOULEVARD

STATION 188+00 planned access road to Mountain Shadows Road on the west and South entrance to Reed Ranch on the east.

- MASTER PLANNING BASINS C-2, C-3 AND SOUTHERN PORTION OF C-4

BASIN	AREA (acres)	CN	CNXA	T_c (HRS)
C-2	75	60	4,500	0.269
C-3	94	60	5,400	0.212
C-4	(93-16.5)	86	6,579	0.208
	245.5		16,479	

- Composite CN = 16,479/245.5 = 67.12

RUNOFF

Q5 (CN = 67.12) = 0.21

Q100 (CN = 67.12) = 0.86

- FLOW TRAVEL TIME BETWEEN OUTLET OF C-2 AND STATION 188+00

Access Road

6633
6552
81/1300 = 6.3%

Average flow velocity = 14 ft/sec

$$\frac{1300}{14 \times 60 \times 60} = 0.026 \text{ hours}$$

- Time of Concentration = 0.269 + 0.026 = 0.295 hours
- CSM per inch = 930

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY S DATE 5-28-03 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BLVD.

STATION 188+00 (CONTINUED)

- PEAK STORM RUNOFF

$$5\text{-year} = \frac{245.5}{640} \times 930 \times 0.21 = 75 \text{ CFS.}$$

$$100\text{-year} = \frac{245.5}{640} \times 930 \times 0.86 = 307 \text{ CFS.}$$

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-1-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

NORTH MOUNTAIN SHADOWS ACCESS ROAD (STA 201+00)
STORM SEWER SYSTEM

- STA 201+00 MANHOLE FOR 36"ø RCP
  27"ø RCP STUB OUT TO WEST x 10 L.F.
  30"ø RCP STORM SEWER OUTFALL
  QDES = Q5 = 37 CFS

- STA 201+00 to STA 201+30
  24"ø RCP x 30 L.F.
  QDES = Q5 = 7.3 CFS.
  24"ø RCP x 30 L.F. QDES = 12 CFS

- STA 201+30 6' Inlet QDES = Q5 = 7.3 CFS
  8' Inlet QDES = Q5 = 12 CFS

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 62-93 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE -

NORTHWEST CORNER, NORTH MOUNTAIN SHADOWS ACCESS ROAD AND PLANNED CENTENNIAL BOULEVARD

- DRAINAGE AREA

  1.09 acres C= 0.7

  (600×50)/43,560 = 0.69 acres, C= 0.90

- TIME OF CONCENTRATION

$$T_c = \frac{1.8\,(1.1-0.9)\,600^{1/2}}{1.56^{1/3}} = 7.60 \text{ minutes}$$

- RAINFALL INTENSITIES

  i_5 = 5.05 inches per hour

  i_{100} = 1.9 × 5.05 = 9.6 inches per hour

- PEAK STORM RUNOFF

  5-YEAR = 1.8 × 1.38 × 5.05 = 12.5 CFS

  100-YEAR = 1.8 × 1.38 × 9.6 = 23.9 CFS.

URS COMPANY
Mailing Address: Denver, Colorado 80209
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 2073 BY _____ DATE 5-26-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - EAST SIDE OF PLANNED CENTENNIAL BLVD.

NORTH REED RANCH ACCESS ROAD (STA 201+00) ON THE EAST SIDE OF PLANNED CENTENNIAL BOULEVARD FROM THE NORTH

- AREA

  1500
  × 50
  75,000 / 43560 = 1.72 acres

- TIME OF CONCENTRATION

  OVERLAND FLOW

  $$T_o = \frac{1.8(1.1-0.9)400^{1/2}}{1.6^{1/3}} = 6.2 \text{ minutes}$$

  CHANNEL FLOW

  $$\frac{(1500-400)}{5 \times 60} = 3.7 \text{ minutes}$$

  $$T_c = T_o + T_T = 6.2 + 3.7 = 9.9 \text{ minutes}$$

- RAINFALL INTENSITIES

  $i_5 = 4.7$ inches per hour

  $i_{100} = 1.9 \times 4.7 = 8.9$ inches per hour

- PEAK STORM RUNOFF

  5-year = $1.72 \times 0.9 \times 4.7 = 7.3$ CFS.

  100-year = $1.72 \times 0.9 \times 8.9 = 13.8$ CFS

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE 5-28-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BOULEVARD

Assume all storm runoff (5-year and 100-year) arriving at masterplanning hydrologic design point H-38 to be intercepted by the North Fork of Douglas Creek as implied in the Douglas Creek Drainage Basin Masterplanning study of March 1981.

STATION 201+00 - planned access road to Mountain Shadows to the west and north access road to Reed Ranch to the east (full intersection)

MASTERPLANNING BASIN C-1

- D.A. = 87 Acres
- CN = 68
- RUNOFF
  - Q5 = 0.23 inches
  - Q100 = 0.90 inches
- T_c = 0.192 hours
- CSM per inch = 1080
- Peak storm runoff

$$5\text{-year} = \frac{87}{640} \times 1080 \times 0.23 = 34 \text{ CFS.}$$

$$100\text{-year} = \frac{87}{640} \times 1080 \times 0.90 = 133 \text{ CFS.}$$

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE 5-26-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE—WEST SIDE OF PLANNED CENTENNIAL BOULEVARD

STATION 201+00 (Continued)

NORTHERN PORTION OF MASTERPLANNING BASIN C-4

- D.A. = $\frac{1200 \times 600}{43,560}$ = 16.52 Acres
- Type A Soil ((16) Chaseville Sandy loam)
- Assume 5 to 6 units per acres
- CN = 68
- COMPOSITE CN = $\frac{87 \times 68 + 16.5 \times 68}{(87+16.5)}$ = 68

FLOW TRAVEL TIME BETWEEN OUTLET OF MASTER PLANNING BASIN C-1 AND STATION 201+00

MOUNTAIN SHADOWS

6634
6621
13/1000 = 1.3 %

ACCESS ROAD

6621
6580
41/1100 = 3.7 %

ASSUME AVERAGE FLOW VELOCITY = 11 ft/sec

$\frac{2100}{11 \times 60 \times 60}$ = 0.053 hours

- T_c = 0.192 + 0.053 = 0.245
- CSM per inch = 1000

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE 5-28-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - WEST SIDE OF PLANNED CENTENNIAL BOULEVARD

STATION 201+00 (CONTINUED)

- PEAK STORM RUNOFF

$$5\text{-year} = \frac{(87+16.5)}{640} \times 1000 \times 0.23 = 37 \text{ CFS}$$

$$100\text{-year} = \frac{(87+16.5)}{640} \times 1000 \times 0.90 = 145 \text{ CFS}$$

-

URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

INTERSECTION OF VINDICATOR DRIVE (STA 215+70±) AND PLANNED CENTENNIAL BOULEVARD STORM SEWER SYSTEM

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 6-2-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE

NORTHEAST CORNER OF VINDICATOR DRIVE AND PLANNED CENTENNIAL BOULEVARD FROM THE NORTH

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE 5-28-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - EAST SIDE OF PLANNED CENTENNIAL BLVD

EAST PORTION OF DRAINAGE MASTERPLANNING BASIN A-13

- DRAINAGE ~~AREA~~

  7.25 Sq In @ 1"=400 = 26.7 acres C = 0.40

  (2400'x50')/43560 = 2.8 acres C = 0.90

  DA = 29.5 acres

- TIME of Concentration

  overland flow

  6910

  6764

  146/750 = 19.5%

  $T_o = \frac{1.8(1.1-0.4)\,750^{1/2}}{19.5^{1/3}} = 12.8$ min

  channel flow along planned Centennial Boulevard

  6764

  6695

  79/2400 = 3.3 %

  $T_T = \frac{2400}{5 \times 60} = 8$ minutes

  $T_c = T_o + T_T = 12.8 + 8 = 20.8$ minutes

- RAINFALL INTENSITIES

  I5 = 3.1 inches per hour

  I100 = 1.9 x 3.1 = 5.9 inches per hour

- PEAK STORM RUNOFF

  5-year = 29.5 x 0.45 x 3.1 = 41.2 cfs

  100-year = 29.5 x 0.45 x 5.9 = 78.3 cfs

- MASTER PLANNED STORM SEWER IMPROVEMENTS

  83' and 10' inlet S = 3.3 %

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

URS NO. 3073 BY _____ DATE 5-26-87 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE – EAST SIDE OF PLANNED CENTENNIAL BLVD

EAST PORTION OF DRAINAGE MASTER PLANNING BASIN A-13 (CONTINUED)

- Estimated Storm carry-over at the outlet of Basin A-13 on the east side of planned Centennial Boulevard

  10' Inlet at 3% Q = 15.4

  8' Inlet at 3% Q = 14.8

  30.2

  5-year 41.2 - 30.2 = 11 cfs Carry over

  100-year 78.3 - 30.2 = 48.1 cfs Carry over

- Estimated street flow capacity (half section)
  60' and 76' arterial at 3% = 38/2 = 19 cfs

- EQUIVILENT CxA ASSOCIATED WITH ESTIMATED STREET FLOW CARRY OVER BEYOND OUTLET OF BASIN A-13

$$CxA_{5\text{-year}} = \frac{11}{3.1} = 8.46$$

$$CxA_{100\text{-year}} = \frac{48.1}{5.9} = 8.15$$

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-26-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - EAST SIDE OF PLANNED CENTENNIAL BLVD

EAST PORTION OF DRAINAGE MASTER PLANNING BASIN A-14
NORTH OF VINDICATOR DRIVE / MOUNTAIN SHADOWS

- AREA

2.45 Sq In at 1"=400 = 9.0 Acres C = 0.4 (low density res)

(2050 x 50) / 43,560 = 2.4 Acres C = 0.9

11.4 Acres $\hat{C}$ = 0.51

- TIME OF CONCENTRATION

overland flow

6735
6685
50 / 220 = 23.0%

$$T_o = \frac{1.8(1.1-0.4)\,220^{1/2}}{220^{1/3}} = 3.1 \text{ minutes}$$

channel flow along east side of planned Centennial Blvd.

6685
6610
75 / 1000 = 7.5%

$$T_T = \frac{1000}{5 \times 60} = 3.3 \text{ minutes}$$

$T_c = T_o + T_T = 3.1 + 3.3 = 6.4$ minutes

- RAINFALL INTENSITIES

i_5 = 5.4 inches per hour

i_{100} = 1.9 x 5.4 = 10.26 inches per hour

- PEAK STORM RUNOFF

5-YEAR = 11.4 x 0.51 x 5.4 = 31.4 CFS

100-YEAR = 11.4 x 0.51 x 10.26 = 59.7 CFS

* EXCLUSIVE OF CARRY OVERS FROM A-13

URS
URS COMPANY
Mailing Address: Denver, Colorado 80206
3955 East Exposition Avenue • Suite 300 • Denver, Colorado 80209 • 303/744-1861

PAGE _____ OF _____

URS NO. 3073 BY _____ DATE 5-28-83 CHECKED BY _____ DATE _____

CLIENT RIDGE DEVELOPMENT PROJECT CENTENNIAL BOULEVARD

SUBJECT STORM DRAINAGE - EAST SIDE OF PLANNED CENTENNIAL BLVD

EAST PORTION OF DRAINAGE MASTER PLANNING BASIN A-14 NORTH OF VINDICATOR DRIVE / MOUNTAIN SHADOWS (CONTINUED)

- MASTERPLANNED STORM SEWER IMPROVEMENTS

  2- 8' Inlets, S= 7.5 %, Q_{CAP} = 13.6 CFS x 2 = 27.2 CFS

- ESTIMATED PARTIAL SUB-BASIN CARRY OVER EXCLUSIVE OF CARRY OVER FROM BASIN A-13

  5-year = 31.4 - 27.2 = 4.2 CFS

  100-year = 59.7 - 27.2 = 32.5 CFS

Item Three
Request for credits for construction of drainage facilities within Cottonwood Creek Basin in Briarwood Village Filing No. 1 for the Briargate Development Group.

Mr. Mike Mallon represented the item for the developer and stated his disagreement with the staff's recommendation. After discussing the differences the Board heard a motion by Rick Simpson to approve the staff's recommendation for credits in the amount of $455.50. The motion was seconded by Mr. Weber. Vote was 4-0 in favor of the motion.

Item Four
Request to establish partial credits within Douglas Creek for facilities built to date in Mountain Shadows for the Ridge Development Co. Mr. Whitehead excused himself from the meeting and Roland Obering represented the item for the developer.

Mr. Obering stated his objections to the staff's recommendation. The City Engineer stated that one of the items listed in the staff's recommendation could be withdrawn and given credit for, in the amount of $975.00; this could be added to the request.

Other items of disagreement were discussed and after considerable discussion on those, Mr. Weber moved to approve the staff's recommendation with the exception that the developer be allowed credit for barricades at $222.50, general overhead and profit for $266.50, pipe patching for $975.00; to allow no more than 10% for engineering costs; and that the 1982 fees for subdivisions currently platted be deducted from the total credit allowed as adjusted. The motion was seconded by Mr. Simpson. Vote was 3-0 in favor of the motion.

The revised total credit as adjusted will be $239,827.48.

Item Ten was heard next as Mr. Whitehead had a conflict and remained excused from the meeting.

Item Ten
Request of Stewart R. Scott, Inc. to appeal City Engineer's position regarding reimbursement for a portion of Monument Creek within the 2400 Wood Avenue Subdivision.

Mr. Obering, representing Stewart R. Scott, presented his position that Monument Creek should be eligible for reimbursement from the Miscellaneous Basin Fund if his client was being asked to construct a portion of Monument Creek.

continued ...

INTER-OFFICE MEMORANDUM
ENGINEERING

To: Bev

From: Gary

Date: 4-1-82

For:

_____ Response

_____ Your project file

_____ Your information

_____ Your signature and return

_____ Urgent

_____ Report back

_____ Route and return

Review and prepare for Drainage Board Agenda of 4/15/82.

Note that the request to encroach for of $45869 exceeds the 10% allowed by City Ordinance.

Signature _____

APRIL 15, 1982 Approved $ 239,827.48

DRAINAGE BOARD ITEM

4

ITEM #3 Request to ESTABLISH CREDITS for partial construction of drainage facilities within DOUGLAS CREEK BASIN in Mountain Shadows Filing No. 1 Ridge Development Company - Developer.

Request as submitted by the developer is as follows:

Storm Sewer System (per low bid)	$ 45,451.05
Box Culvert - Wilson Rd. $32,762.52 (per low	
24" Water Anchors @ Box 1,930.00 bid)	34,692.52
Park Channel, Box Transitions (per low bid)	131,134.08
60" Concrete Pipe	10,322.33
Total	$221,599.98 ✓
Additional Engineering (16.9%) LWH	37,606.89
Additional Engineering (3.7%) JP	8,262.50
TOTAL CREDITS REQUESTED	$267,469.37

Staff Recommendation:

Storm Sewer System	$ 45,451.05
Box Culvert & Anchors	34,692.52 ✓
Barricades (not reimbursable)	- 222.50 ok
General overhead @ 15%	- 266.50 ok
Park Channel, Box Transitions	131,134.08
Temporary Outfall Channel	- 1,400.00
150 cu.yds 18" - 24" Riprap (Below Box Culvert @ Wilson Road)	-2,175.00
50 l.f. reinforced Patch 60" R.C.P	- 975.00 ok
60" Concrete Pipe	10,322.33
	$216,560.98
Additional 10% Engineering	21,656.09
	238,217.07

218024.98
21802.50
239,827.48

Drainage fees will be calculated at time of final completion of drainage facilities.

5087.

216,560.98
1400
215160 98

216560.98
3575
220135.98
220136.00
242149.58

220135.98
222.50
220358 48
-266.50
220624 98
975
220599.98

216,560.98
222.50
266.50
975
218024.98
21802.50
239827 48
21948.90
21

LEIGH WHITEHEAD & ASSOCIATES
CONSULTING ENGINEERS AND SURVEYORS
5 WEST LAS VEGAS • PHONE 636-5179
COLORADO SPRINGS, COLORADO 80903

March 29, 1982

City of Colorado Springs
Department of Public Works
Engineering Division
30 S. Nevada Avenue
Colorado Springs, CO 80903

Re: Mountain Shadows Filing No. 1
Drainage Construction Costs
Douglas Creek Basin

LW Project No. 80089-DRG

ATTN: Bob Martin
Public Works Administrator

Gentlemen:

Ridge Development Company, Ltd., owner/developer of record of Mountain Shadows Filing No. 1 does hereby submit to the City of Colorado Springs the following summary of costs incurred for the construction of certain approved drainage facilities within the Douglas Creek Drainage Basin. Reference the following approved drainage reports and plans which included or affected facilities in this summary:

1. Mountain Shadows Filing No. 1 and Addenda No. 1 and No. 2 (September 12, 1980, October 8, 1980, June 24, 1981).
2. Mountain Shadows Filing No. 2 and Supplement (November 5, 1980, April 3, 1981).
3. Garden of the Gods Road Realignment (July 28, 1981).

The facilities in place and approved have been summarized in a letter to Public Works dated March 19, 1982, a copy of which is attached. Generally, the facilities in place to date will convey storm runoff to the East side of Wilson Road with the exception of the proposed diversion in Filing No. 1. The diversion will be constructed as part of the ROLM development. The purpose of this letter is to document and have on record with the City an amount expended to date on drainage facilities prior to April 1, 1982.

The following is a summary of the Contractor, amounts for various work, and a general description of the work. Copies of all invoices and checks are attached as are the bids received for the work.

CONTRACTOR	DESCRIPTION		AMOUNT
Pate Const. Co. (2 invoices)	Storm Sewer Systems		$ 45,451.05
T.L. Printz Const. (3 invoices)	Box Culvert-Wilson Rd.	$ 32,762.52	
Frazer Const. Co. (1 invoice)	24" Water Anchors @ Box	$ 1,930.00	$ 34,692.52
M & M Cement Contractors, Inc. (2 invoices)	Park Channel, Box Transitions		$131,134.08
Corden Concrete	60" Pipe		10,322.33
	TOTAL DRAINAGE CONSTRUCTION COSTS.....		$221,599.98

RECEIVED
PUBLIC WORKS
COLORADO SPRINGS, COLO.

MAR 30 1982

AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

The engineering fees relative to the preparation of the approved Filing No. 1 drainage report and plans and addenda, and final design of facilities and inspection of the constructed facilities incurred by the developer are $45,869.39 all of which have been paid to date. This figure includes $37,606.89 in fees paid to Leigh Whitehead & Associates and $ 8,262.50 paid to Jerry Novak who was on the developer's staff and lending technical assistance throughout the project. The fees to date represent engineering work on all of the facilities included in the approved report and plan, some of which will be constructed at a later date.

The total cost's incurred to date are $~~267,429.37~~ 267,469.37. All inplace facilities have been installed in accordance with the approved drainage report and plans, final design plans, and the City of Colorado Springs Standards and Specifications. The faciltiies have been inspected and accepted by the Consultant and the City of Colorado Springs subject to the one (1) year warranty period. This correspondence will document bona fide drainage costs to date for Mountain Shadows Filing No. 1.

Copies of paid invoices, project bids, and other pertinent records are attached. Additional information will be made available at the City's request. If there are any questions please contact either of the undersigned.

Very truly yours,

RIDGE DEVELOPMENT CO. LTD.

C. Michael Hausman

C. Michael Hausman
President

LEIGH WHITEHEAD & ASSOCIATES

Roland G. Obering

Roland G. Obering
P.E. & L.S.

RGO/pg
Enclosures

Ridge Development Co., Ltd.
P.O. BOX 7711
COLORADO SPRINGS, CO 80933

(303) 594-0227

MEMO TO: Roland Obering
Leigh Whitehead Engineers

FROM: Mike Hausman
Ridge Development Co., Ltd.

DATE: March 30, 1982

RE: Engineering services of Jerry Novak regarding the storm drainage reports and the subsequent construction of storm drainage improvements for Mountain Shadows Filing No. 1

While Jerry Novak was employed by Ridge Development, he performed many engineering functions, including an extensive amount of research and calculation work for the drainage reports which your firm prepared for the City, and also an extensive amount of supervisory work as well as inspections of the actual construction of these drainage facilities.

We have logged his time for these engineering services, and have billed the hours at $25.00 per hour. The following figures are a summary for these services (we have a detailed breakdown by date, time, and service performed in our files if you need further documentation):

Engineering services relating to the preparation of the Drainage Reports:	$ 3,650.00
Engineering services relating to the construction of Drainage improvements:	$ 4,612.50
TOTAL	$ 8,262.50

MH/pg

Mike Hausman

CITY OF COLORADO SPRINGS
The "America the Beautiful" City
DEPARTMENT OF PUBLIC WORKS **CITY ENGINEERING INSPECTIONS (303) 578-6782**
105 WEST COSTILLA P.O. BOX 1575
COLORADO SPRINGS, COLORADO 80901

March 22, 1982

Ridge Development Company
P. O. Box 7711
Colorado Springs, CO 80933

ATTN: C. MICHAEL HAUSMAN

RE: MOUNTAIN SHADOWS PARK DRAINAGE CHANNEL FILING #1

Dear Mr. Hausman,

PRELIMINARY INSPECTION

A. Box Culvert on Wilson Road - O.K.

B. Two each four foot D.10.R's - O.K.

C. Concrete lined channel - Good

D. Headwall between the concrete channel and the 60 inch R.C.P.-Good

E. 60 inch R.C.P. - Good

F. One each six foot D.10.R. - O.K.

The one year warranty may begin as of March 19, 1982. If you have any questions, please contact Bill Milbrodt at 578-6782.

Sincerely,

William M. Milbrodt
William M. Milbrodt
Engineering Inspector

for Gary R. Haynes
Gerald J. Gromko
City Engineer

WMM:GJG:sp

cc: Bev Dustin-Land Development
John Sentena-Chief of Inspections
Dick Ernster-Asst. Street Supt.

Ridge Development Co., Ltd.
P.O. BOX 7711
COLORADO SPRINGS, CO 80933

(303) 594-0227

JOHN
INSP
FILE

March 12, 1982

Mr. Gerald Gromko,
City Engineer
Public Works Division
105 West Costilla, P.O. Box 1575
Colorado Springs, CO. 80901

Dear Mr. Gromko:

The work on Mountain Shadows Park Drainage Channel in Filing #1 will be completed during the work week of March 15th, 1982. We would like to have the City of Colorado Springs inspect the above mentioned project on Friday March 19, 1982.

Please let us know when on the 19th the inspection will take place as we would like to make our engineers aware of the time for the inspection.

Sincerely,

C. Michael Hausman

C. Michael Hausman

CMH:sn

cc: Leigh Whitehead and Associates
cc: DeWitt Miller
cc: Gil Martnez, M & M Cement

RECEIVED
MAR 15 1982
10:15
PUBLIC WORKS
ENGINEERING

LEIGH WHITEHEAD & ASSOCIATES
CONSULTING ENGINEERS AND SURVEYORS
5 WEST LAS VEGAS • PHONE 636-5179
COLORADO SPRINGS, COLORADO 80903

March 29, 1982

Re: Engineering Fees - Drainage
Mountain Shadows Filing No. 1
LW Project No. 80089-DRG

To Whom It May Concern:

The firm of Leigh Whitehead and Associates, Consultant to the developer of Mountain Shadows Filing No. 1 has accumulated engineering fees relative to preparation of drainage reports and plans, final design plans, construction staking and inspection and contract administration for the subdivision. These fees total $37,606.89. All fees except the March invoice have been paid in full by Ridge Development Company, Ltd. All fees were related directly to the approved drainage facilities. Approximately 45% of the facilities have been constructed at this time.

Very truly yours,
LEIGH WHITEHEAD & ASSOCIATES

Roland G. Obering

Roland G. Obering
P.E. & L.S.

RGO/pg

Cor 1.

LEIGH WHITEHEAD & ASSOCIATES
CONSULTING ENGINEERS AND SURVEYORS
5 WEST LAS VEGAS • PHONE 636-5179

COLORADO SPRINGS, COLORADO 80903

March 19, 1982

City of Colorado Springs
Department of Public Works
Engineering Division-Gary Haynes
P.O. Box 1575
Colorado Springs, CO 80901

Re: Mountain Shadows
Filing No. 1
Drainage Facility Construction
LW Project No. 80089-Drg.

Gentlemen:

The construction of certain portions of the Drainage Facilities required for Mountain Shadows Filing No. 1 has been completed and inspected by the Engineer. The purpose of this letter is to summarize the completed construction and established dates for beginning the required one (1) year guarantee period.

The facilities that are currently in place and included are:

1) Inlets and culverts within the 100 foot Wilson Road right-of-way at its intersection with future Garden of the Gods Road realigned and Mountain Shadows Road. (Pate Construction Co., Inc. - Completed and Accepted September 30, 1981.)

2) Box Culvert and attached Inlets at Mountain Shadows Road and Wilson Road. (T.L. Printz Construction, Co. - Completed and Accepted November 24, 1981.)

3) Park Channel, Box Culvert Transitions, Twin 60" RCP Extensions and Inlet. (M & M Cement Contractors, Inc. - Completed and accepted March 19, 1982.)

The facilities that are in place will convey runoff from Filing No. 1 to the Southeast side of 100 foot Wilson Road right-of-way. This does not include a proposed diversion system which will be required between the Filing No. 1 and Filing No. 2 boundary. The diversion system construction is being planned as part of the development of Filing No. 1 by the ROLM Corporation.

All facilities that are now in place have been constructed in accordance with the approved Drainage Report and Plan and the detailed plans and specifications as prepared by Leigh Whitehead and Associates. It is recommended that the facilities be accepted by the City of Colorado Springs as part of their drainage system subject to the required one (1) year guarantee periods for the various segments of construction included in this summary.

The field inspection records of the Engineer together with quality control test results are all available at the City's request. A summary of all construction costs will be submitted under separate cover establishing exact amounts for

credit against drainage fees within the Douglas Creek Drainage Basin.

If there are any questions concerning acceptance of these facilities, please contact the undersigned.

Very truly yours,
LEIGH WHITEHEAD & ASSOCIATES

Roland G. Obering

Roland G. Obering
P.E. & L.S.

RGO/pg

cc: Ridge Development Co., Ltd.
ATTN: Mike Hausman

BIDDING SCHEDULE FOR MOUNTAIN SHADOWS

PARK DRAINAGE CHANNEL

ITEM #	QUANTITIES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1.	39,556 S.F.	Complete reinforced concrete channel including 6 berms	$3.25	$128,557.00
2.	3 each	50 L.F. Channel transition	$10870.00	$32,610.00
3.	288 L.F.	60" R.C.P. Install only	$21.00	$6,048.00
4.	1 each	17' X 9' X 12" Head Wall	$1,700.00	$1,700.00
5.	1 each	6' Catch Basin	$1,615.00	$1,615.00
6.	12 L.F.	18" R.C.P.	$22.00	$264.00
7.	1 each	Temporary Outfall Channel	$3,800.00	$3,800.00
8.	150 cubic yards	18" - 24" Riprap	$30.00	$4,500.00
9.	50 L.F.	Reinforced Patch - 60" R.C.P.	$22.00	$1,100.00
			Total	$180,194.00

Dated this 30th day of November, 1981.

Mel-Ro Construction, Inc. — Company

Alan E. Brooker — By Alan E. Brooker

President — Title

The accompanying list of instructions and clarifications are acknowledged as a part of the construction specifications and requirements.

Addendum Number 1 acknowledged.

BIDDING SCHEDULE FOR MOUNTAIN SHADOWS

PARK DRAINAGE CHANNEL

ITEM #	QUANTITIES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1.	39,556 S.F.	Complete reinforced concrete channel including 6 berms	$2.91/S.F.	$115,046.00
2.	3 each	50 L.F. Channel transition	$12,400/each	37,200.00
3.	288 L.F.	60" R.C.P. Install only	$23 /L.F.	6,624.00
4.	1 each	17' X 9' X 12" Head Wall		4,200.00
5.	1 each	6' Catch Basin		1,983.00
6.	12 L.F.	18" R.C.P.	$25 /L.F.	300.00
7.	1 each	Temporary Cutfall Channel		2,500.00
8.	150 cubic yards	18" - 24" Riprap	$26.66/C.Y.	4,000.00
9.	50 L.F.	Reinforced Patch - 60" R.C.P.	$26.50/L.F.	1,325.00
			Total	$173,178.00

Dated this 30th day of November, 1981.

J. L. Printz Construction Co. — By — President

Company — Title

The accompanying list of instructions and clarifications are acknowledged as a part of the construction specifications and requirements.

CARDER CONCRETE PRODUCTS CO.

8311 WEST CARDER COURT
LITTLETON, COLORADO 80125
PHONE 794-6303

QUOTATION

Date November 11, 1981

Project

Letting Date

Ridge Development
P. O. Box 7711
Colorado Springs, CO 80933

Attention: Jerry Novak RE: RCP Seconds for Storm Drain

We are pleased to quote the following reinforced concrete #2 R.C.P.

288 LF	60" #2 R.C.P. CL A-25 (3)	34.00 LF
319 FT	1¾" Kent Seal	.66 FT

Weight of 60" R.C.P. 1,473 per ft X 16'=23,568 LB

Price quoted delivered to jobsite as close to the line of ditch as our trucks can travel under their own power.

Pipe in 16' lengths to be unloaded by contractor.

TERMS: NET THIRTY (30) DAYS

CARDER CONCRETE PRODUCTS CO.

Steve Williamson

Steve Williamson
576-9266

Accepted this 17 day of NOV. 1981, subject to and including all of said terms and conditions on the reverse side.

Purchase Order No. _____

RIDGE DEV. CO. LTD. Buyer

By Jerry Novak

CITY OF COLORADO SPRINGS
DEPARTMENT OF PUBLIC WORKS • ADMINISTRATION (303) 471-6660 • ENGINEERING (303) 471-6606
108 WEST COSTILLA • P.O. BOX 1575
COLORADO SPRINGS, COLORADO 80901

November 18, 1981

Ridge Development Company
P.O. Box 7711
Colorado Springs, CO 80933

Attn: Mr. Jerry Novak

Re: RCP Seconds for Mountain Shadows Development

Dear Jerry:

After review of your request to use RCP seconds in the park drainage system adjacent to Mountain Shadows Road, the City Engineering Division has decided to allow the use of same in accordance with the ASTM C-76 requirements. We further stipulate the following items:

1. We require the certification of a registered professional engineer concerning the soundness of the design and certification that the installation was in accordance with City Specifications.

2. The pipe will be used only in the park at the locations shown on your design drawings.

3. The joints will be grouted and imperfections patched in accordance with the specifications presented by your engineer.

We are allowing the use of this pipe material for this installation only, and this permission is not to be used for any other installations within the City of Colorado Springs. We feel that the special circumstances presented on this project were justification for this special consideration.

Please keep us informed of the progress of this installation so that we can have an Inspector present.

By carbon copy of this letter to your Engineer, Roland Obering of Leigh Whitehead & Associates, Inc., I am asking you to investigate the use of epoxy grout for better bonding under paragraph R of your specifications.

Sincerely,

Gerald J. Gromko
City Engineer

60" Concrete pipe
per Carlin's Bill $ 10,322.33

cc: DeWitt Miller, Director of Public Works
Gary Haynes, Assistant City Engineer
Roland Obering, Leigh Whitehead & Associates, Inc.

CARDER CONCRETE PRODUCTS COMPANY

8311 WEST CARDER COURT – (NORTHWEST DOUGLAS COUNTY)
LITTLETON, COLORADO 80125 (303) 794-6303

DATE
1/30/82
CUST. ORDER NO.
0008735

PAGE 1

RIDGE DEVELOPMENT CO.
P.O. BOX 7711
COLORADO SPRINGS, CO 80933

DATE	INVOICE NUMBER	ITEM DESCRIPTION	AMOUNT
01/25/82	010450	INVOICE	10,322.33
FINANCE CHARGE IS COMPUTED BY A PERIODIC RATE OF 1.50 % PER MONTH WHICH IS AN ANNUAL PERCENTAGE RATE OF 18.00 % APPLIED TO THE PREVIOUS BALANCE AFTER DEDUCTING CURRENT MONTHS PAYMENTS AND CREDITS APPEARING ON THIS STATEMENT. MINIMUM FINANCE CHARGE IS 0.50			

CURRENT	30 DAYS PAST DUE	60 DAYS PAST DUE	90 DAYS PAST DUE	TOTAL DUE
10,322.33	0.00	0.00	0.00	10,322.33

50017-1

REVISED BILLING

M & M Cement Contractors, Inc.
1195 Valley Street
COLORADO SPRINGS, COLORADO 80915

Phone 596-7159

DATE: January 22, 1982

NUMBER: Mountain Shadow Channel

Ridge Development Co., LTD
PO Box 7711
Colo. Spgs., Colo. 80933

TERMS:

PLEASE DETACH AND RETURN WITH YOUR REMITTANCE $ _____

DATE	CHARGES AND CREDITS	BALANCE	
	BALANCE FORWARD		
	Rebar	$ 10,705	36
	Concrete placed	929	25
	60' RCP Installed (90%)	5,400	00
	Excavation (channel)	9,000	00
		$ 26,034	61

Thank You

PAY LAST AMOUNT IN THIS COLUMN

M & M CEMENT CONTRACTORS, INC.

M & M Cement Contractors, Inc.
~~1195 Valley Street~~ 5536 E. Pikes Peak
COLORADO SPRINGS, COLORADO ~~80915~~ 80916

Phone 596-7159

DATE: March 23, 1982
NUMBER: Mtn. Shadow Drainage

Ridge Development
PO ~~XXXXX~~ 7711
Colo. Spgs., Colo. 80933

TERMS:

PLEASE DETACH AND RETURN WITH YOUR REMITTANCE $ _____

DATE	CHARGES AND CREDITS	BALANCE
	BALANCE FORWARD	
Item #1.	Final Footage on Channel Reinforced Channel including berms: 39,890.2 SF @ $2.58 SF	$102,916 72
2.	50 LF Trans. 3 each @ $4817.44	14,452 32
3.	60" RCP Installed 288 LF @ $20.83 LF	5,999. 04
4.	Headwall 1 each @ $1400.00 each	1,400 00
5.	6' Catch Basin 1 each @ $1600.00 each	1,600 00
6.	18" RCP 12 LF @ $18.00 LF	216 00
7.	Tem. Outfall Channel 1 each @ $1,400 00	1,400 00
8.	18" -24" Riprap 150 CY @ $14.50 SY	2,175 00
9.	Reinforced Patch-60' RCP 50 LF @ $19.50 LF	975 00
		$131,134 08
	Less previous payment	(26,034 61)
		$105,099 47

M & M CEMENT CONTRACTORS, INC.

Thank You

PAY LAST AMOUNT IN THIS COLUMN

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Materials for drainage channel Mountain Shadows Filing #1
Labor for drainage channel Mountain Shadows Filing #1:
Concrete placed $ 929.25
60' RCP installed 5400.00

$6329.25

No. 1925

REPUBLIC NATIONAL BANK
PUEBLO, COLORADO
42-56
1070

DATE Feb 3 1982

PAY THE SUM 6329 DOLLARS 25 CTS Dollars $ 6329.25

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

TO THE ORDER OF
M & M Cement Contractors, Inc.
1195 Valley St
Colorado Springs Colorado 80915

RIDGE DEVELOPMENT CO., LTD.

BY C. Michael Hansen

⑈107000563⑈ 08 742 2⑈

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Pipe Delivered to Mountain Shadows
Colorado Springs, Colorado

$10,322.33

No. 1922

REPUBLIC NATIONAL BANK
PUEBLO, COLORADO
42-56
1070

DATE Feb 3 1982

PAY THE SUM 10322 DOLLARS 33 CTS Dollars $ 10,322.33

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

TO THE ORDER OF
Carder Concrete Products
8311 West Carder Court
Littleton Colorado 80125

RIDGE DEVELOPMENT CO., LTD.

BY C. Michael Hansen

⑈107000563⑈ 08 742 2⑈

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Work performed and materials for the drainage channel
in Mountain Shadows Filing #1, Colorado Springs Colorado

$10,705.36

No. 1924

REPUBLIC NATIONAL BANK
PUEBLO, COLORADO
42-56
1070

DATE Feb 3 1982

PAY THE SUM 10705 DOLLARS 36 CTS Dollars $ 10,705.35

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

TO THE ORDER OF
M & M Cement Contractors, Inc. and
Transit Mix Concrete Co.
1195 Valley Street
Colorado Springs Colorado 80915

RIDGE DEVELOPMENT CO., LTD.

BY C. Michael Hansen

⑈107000563⑈ 08 742 2⑈

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Work performed and materials for the drainage channel
in Mountain Shadows Filing #1, Colorado Springs, Colo.

$9,000.00

No. 1923

REPUBLIC NATIONAL BANK
PUEBLO COLORADO
42-56
1070

DATE Feb 3 1982

PAY THE SUM 9000 DOLLARS 00 CTS Dollars $ 9,000.00

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

TO THE ORDER OF
M & M Cement Contractors, Inc. and
Murr Ditching Company
1195 Valley Street
Colorado Springs Colorado 80915

RIDGE DEVELOPMENT CO., LTD.

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Materials and Labor for park drainage channel
Mountain Shadows - Filing #1

No. 1971

REPUBLIC NATIONAL BANK
PUEBLO, COLORADO

42-56
1070

DATE Mar. 29, 1982

THE SUM 48531 21 cts

PAY Dollars $ 48,531.21

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

RIDGE DEVELOPMENT CO., LTD.

TO THE ORDER OF
M & M Cement Contractors Inc,
5536 East Pikes Peak
Colorado Springs, CO 80916

BY C. Michael Hansen

⑈107000563⑈ 08 712 2⑈

406

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

M & M Cement Contractors Inc, & Transit Mix Concrete Co,
"Materials & Labor for park drainage Channel"
Mountain Shadows - Filing #1

No. 1972

REPUBLIC NATIONAL BANK
PUEBLO, COLORADO

42-56
1070

DATE Mar. 29 1982

THE SUM 49468 26 cts

PAY Dollars $ 49,468.26

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

RIDGE DEVELOPMENT CO., LTD.

TO THE ORDER OF
M & M Cement Contractors Inc, and
Transit Mix Concrete Co,
5536 East Pikes Peak
Colorado Springs, CO. 80916

BY C. Michael Hansen

⑈107000563⑈ 08 712 2⑈

406

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

"Materials and Labor for park drainage Channel"
Mountain Shadows - Filing #1

No. 1973

REPUBLIC NATIONAL BANK
PUEBLO, COLORADO

42-56
1070

DATE Mar. 29 1982

THE SUM 7100 00 cts

PAY Dollars $ 7,100.00

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

RIDGE DEVELOPMENT CO., LTD.

TO THE ORDER OF
M & M Cement Contractors Inc, and
Murr Ditching Company
5536 East Pikes Peak
Colorado Springs, CO 80916

BY C. Michael Hansen

⑈107000563⑈ 08 712 2⑈

406

MTN SHADOWS FILING No. 1
CITY COPY

1) BIDS
2) INVOICES
3) CHECK STUBS.

M & M CEMENT CONTR.
PARK CHAN, TRANSITIONS, AND 60" RCP.

OK ✓

BIDDING SCHEDULE FOR MOUNTAIN SHADOWS

PARK DRAINAGE CHANNEL

ITEM #	QUANTITIES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1.	39,556 S.F.	Complete reinforced concrete channel including 6 berms	2.58	102,054.48
2.	3 each	50 L.F. Channel transition	4,817.44	14,452.32
3.	288 L.F.	60" R.C.P. Install only	20.83	5,999.04
4.	1 each	17' X 9' X 12" Head Wall	1,400.00	1,400.00
5.	1 each	6' Catch Basin	1,600.00	1,600.00
6.	12 L.F.	18" R.C.P.	18.00	216.00
7.	1 each	Temporary Outfall Channel	1,400.00	1,400.00
8.	150 cubic yards	18" - 24" Riprap	14.50	2,175.00
9.	50 L.F.	Reinforced Patch - 60" R.C.P.	19.50	975.00
			Total	130,271.84

Dated this 30TH day of NOVEMBER, 1981.

M & M CEMENT CONTRACTORS — Company

Gilbert Martinez — By

President — Title

The accompanying list of instructions and clarifications are acknowledged as a part of the construction specifications and requirements.

MTN. SHAD. FILE #1

CITY COPY.

PATE'S WORK

STORM SEWER SYSTEMS.

1) BIDS

2) INVOICES

3) CHECK STUBS.

OK ✓

BIDDING SCHEDULE FOR WILSON ROAD - MOUNTAIN SHADOWS
DRAINAGE IMPROVEMENTS

		Schedule A		
ITEM #	QUANTITES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1	70 L.F.	60" R.C.P.	$ 103.37	$ 7,235.90
2	2 each	60" X 45° R.C.P. bends	178.91	357.82
3	40 L.F.	42" R.C.P.	65.88	2,635.20
4	93 L.F.	36" R.C.P.	40.44	3,760.92
5	88 L.F.	30" R.C.P.	29.92	2,632.96
6	252 L.F.	27" R.C.P.	28.51	7,184.52
7	143 L.F.	21" R.C.P.	22.29	3,187.47
8	130 L.F.	18" R.C.P.	19.76	2,568.80
9	1 each	27" to 18" R.C.P. Reducer	90.50	90.50
10	3 each	8' Catch Basins	1,870.00	5,610.00
11	2 each	6' Catch Basins	1,650.00	3,300.00
12	3 each	4' Catch Basins	1,210.00	3,630.00
~~13~~	~~1 each~~	~~Junction Box~~		5000
			Total	
				$ 42,194.09
		Schedule B		
14	1 each	Double 5' x 6' R.C.B.C.		
14 ALT.	1 each	Single 5' x 12' R.C.B.C.		

Dated this 9TH day of SEPTEMBER, 1981.

PATE CONSTRUCTION CO., INC
Company

By Patel Pat
Title

BIDDING SCHEDULE FOR WILSON ROAD - MOUNTAIN SHADOWS
DRAINAGE IMPROVEMENTS

		Schedule A		
ITEM #	QUANTITES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1	70 L.F.	60" R.C.P.	121.95	8,536.50
2	2 each	60" X 45° R.C.P. bends	637.88	1,275.76
3	40 L.F.	42" R.C.P.	59.50	2,380.00
4	93 L.F.	36" R.C.P.	41.95	3,901.35
5	88 L.F.	30" R.C.P.	31.95	2,811.60
6	252 L.F.	27" R.C.P.	29.50	7,434.00
7	143 L.F.	21" R.C.P.	24.95	3,567.85
8	130 L.F.	18" R.C.P.	21.95	2,853.50
9	1 each	27" to 18" R.C.P. Reducer	292.45	292.45
10	3 each	8' Catch Basins	2,160.00	6,480.00
11	2 each	6' Catch Basins	1,890.00	3,780.00
12	3 each	4' Catch Basins	1,350.00	4,050.00
13	1 each	Junction Box	Sub-Total	$47,363.01
			Total	
		Schedule B		
14	1 each	Double 5' x 6' R.C.B.C.		

Dated this 9th day of September, 1981.

BABCOCK & BABCOCK CONSTRUCTION, INC. [signature] President
Company By Title

BIDDING SCHEDULE FOR WILSON ROAD - MOUNTAIN SHADOWS
DRAINAGE IMPROVEMENTS

		Schedule A		
ITEM #	QUANTITES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1	70 L.F.	60" R.C.P.	131.00	9170.00
2	2 each	60" X 45° R.C.P. bends	750.00	1500.00
3	40 L.F.	42" R.C.P.	76.00	3040.00
4	93 L.F.	36" R.C.P.	53.00	4929.00
5	88 L.F.	30" R.C.P.	47.00	4136.00
6	252 L.F.	27" R.C.P.	39.00	9828.00
7	143 L.F.	21" R.C.P.	34.00	4862.00
8	130 L.F.	18" R.C.P.	26.40	3432.00
9	1 each	27" to 18" R.C.P. Reducer	400.00	400.00
10	3 each	8' Catch Basins	2000.00	6000.00
11	2 each	6' Catch Basins	1740.00	3480.00
12	3 each	4' Catch Basins	1400.00	4200.00
13	1 each	Junction Box	No Bid	—
			Total	54,977
		Schedule B		
14	1 each	Double 5' x 6' R.C.B.C.	No Bid	—

Dated this 9 day of Sept, 1981.

Schmidt-Higo Constr. Co. [signature]
Company By Title [illegible]

BIDDING SCHEDULE FOR WILSON ROAD - MOUNTAIN SHADOWS

DRAINAGE IMPROVEMENTS

ITEM #	QUANTITES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
		Schedule A		
1	70 L.F.	60" R.C.P.	157.–	10,990.–
2	2 each	60" X 45° R.C.P. bends	1110.–	2,220.–
3	40 L.F.	42" R.C.P.	118.–	4720.–
4	93 L.F.	36" R.C.P.	91.–	8463.–
5	88 L.F.	30" R.C.P.	57.–	5016.–
6	252 L.F.	27" R.C.P.	46.–	11592.–
7	143 L.F.	21" R.C.P.	45.–	6435.–
8	130 L.F.	18" R.C.P.	53.–	6890.–
9	1 each	27" to 18" R.C.P. Reducer	610.–	610.–
10	3 each	8' Catch Basins	1900.–	5700.–
11	2 each	6' Catch Basins	1675.–	3350.–
12	3 each	4' Catch Basins	1200.–	3600.–
13	1 each	Junction Box	N/B	N/B
			Total	67,676.–
		Schedule B		
14	1 each	Double 5' x 6' R.C.B.C.	N/B	N/B

Dated this 9th day of [illegible], 1981.

[illegible]

Company

By [illegible] Title

[illegible]

INVOICE

Pate Construction Co., Inc.

1937 Aspen Circle • Pueblo, Colorado 81006 • Telephone 544-8132

SOLD TO

Ridge Development

Box 7711

Colorado Springs, Co. 80933

SHIPPED TO

MOUNTAIN SHADOWS DRAINAGE

IMPROVEMENTS-Colo. Springs

Job 81-13

DATE	P.O. NO.	SHIPPED VIA	F.O.B.	TERMS	INVOICE NO.
30/81					

QUANTITY	DESCRIPTION	PRICE	AMOUNT
LF	60" RCP	103.37/lf	7,752.75
EA	60" X 45 Degree Bends	178.91/ea	357.82
LF	42" RCP	65.88/lf	2,964.60
.5 LF	36" RCP	40.44/lf	3,942.90
LF	30" RCP	29.99/lf	2,692.80
2 LF	27" RCP	28.51/lf	7,184.52
0 LF	21" RCP	22.24/lf	2,891.20
8.5LF	18" RCP	19.76/lf	2,143.96
EA	27" X 18" Reducer	90.50/ea	90.50

TRANSMITTAL

INVOICE

Pate Construction Co., Inc.

1937 Aspen Circle • Pueblo, Colorado 81005 • Telephone 544-8132

SOLD TO

Ridge Development

SHIPPED TO

Mountain Shadows Drainage

Job 81-13

DATE	DATE SHIPPED	SHIPPED VIA	YOUR ORDER NO.	F.O.B.	TERMS	INVOICE NO.
9/30/81						

QUANTITY		DESCRIPTION	PRICE	AMOUNT
3	EA	8' D10R C.B.	1870.00/ea	5,610
2	EA	6' D10R C.B.	1650.00/ea	3,300
1	EA	4' D10R D.B.	1210.00/ea	1,210
1	EA	Junction Box	5000.00/ea	5,000
		TOTAL AMOUNT DUE:		$45,141

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Job 81-13 Mountain Shadows Drainage

No 1822

REPUBLIC NATIONAL BANK
PUEBLO, COLORADO

42-56
1070

DATE Oct. 28, 19 81

AY THE SUM 45 141 05 Dollars $45,141.05**

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

THE
DER

Pate Construction Co., Inc.
1937 Aspen Circle
Pueblo, Colorado 81006

RIDGE DEVELOPMENT CO., LTD.

BY C. Michael Harrison

⑆107000563⑆ 08 712 2⑈

Pate Construction Co., Inc.

1937 Aspen Circle • Pueblo, Colorado 81006 • Telephone 544-8132

SOLD TO

Ridge Development Co., Inc.
1951 Pueblo Blvd.
Pueblo, Co. 81005
Attention: Jerry Novak

SHIPPED TO

DATE	DATE SHIPPED	SHIPPED VIA	YOUR ORDER NO.	TERMS	INVOICE NO.
8/31/81					

QUANTITY	DESCRIPTION	PRICE	AMOUNT
45 LF	21" CMP	7.75/1f	$348.75

Retainer

Reduction to $310.00 OK Bill Pepper

Form NV-R74 © The Drawing Board Inc., Box 505 Dallas, Texas

TRACK 750

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Invoice for 40 LF 21" CMP

No 1792

[illegible] NATIONAL BANK
PUEBLO, COLORADO

DATE Sept. 25, 19 81

AY ... THE SUM OF ... Dollars $ 310.00

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

THE
DER

Pate Construction Co., Inc.
1937 Aspen Circle
Pueblo, Colorado 81006

RIDGE DEVELOPMENT CO., LTD.

NOT NEGOTIABLE

BY

⑆101000563⑆ 08 712 2⑈

MTN. SHAD. FILING NO. 1

CITY COPY

1) BIDS

2) INVOICES

3) CHECK STUBS

T. L. PRINTE
BOX CULVERT-WILSON RD.

OK ✓

BIDDING SCHEDULE FOR WILSON ROAD - MOUNTAIN SHADOWS

DRAINAGE IMPROVEMENTS

		Schedule A		
ITEM #	QUANTITES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1	70 L.F.	60" R.C.P.		
2	2 each	60" X 45° R.C.P. bends		
3	40 L.F.	42" R.C.P.		
4	93 L.F.	36" R.C.P.		
5	88 L.F.	30" R.C.P.		
6	252 L.F.	27" R.C.P.		
7	143 L.F.	21" R.C.P.		
8	130 L.F.	18" R.C.P.		
9	1 each	27" to 18" R.C.P. Reducer		
10	3 each	8' Catch Basins		
11	2 each	6' Catch Basins		
12	3 each	4' Catch Basins		
13	1 each	Junction Box		
			Total	
		Schedule B		
14	1 each	Double 5' x 6' R.C.B.C.	#	$28,850
14 ALT.	1 each	Single 5' x 12' R.C.B.C.		

Dated this 9 day of SEPT., 1981.

T. de Remer Const. Co. [signature] Pres.

Company By Title

BIDDING SCHEDULE FOR WILSON ROAD - MOUNTAIN SHADOWS
DRAINAGE IMPROVEMENTS

		Schedule A		
ITEM #	QUANTITES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1	70 L.F.	60" R.C.P.		
2	2 each	60" X 45° R.C.P. bends		
3	40 L.F.	42" R.C.P.		
4	93 L.F.	36" R.C.P.		
5	88 L.F.	30" R.C.P.		
6	252 L.F.	27" R.C.P.		
7	143 L.F.	21" R.C.P.		
8	130 L.F.	18" R.C.P.		
9	1 each	27" to 18" R.C.P. Reducer		
10	3 each	8' Catch Basins		
11	2 each	6' Catch Basins		
12	3 each	4' Catch Basins		
13	1 each	Junction Box		
			Total	
		Schedule B		
14	1 each	Double 5' x 6' R.C.B.C.	$34,790.00	$34,790.00
14 ALT.	1 each	Single 5' x 12' R.C.B.C.	$35,725.00	$35,725.00

Dated this 9th day of SEPT., 1981.

MEL-RO CONSTRUCTION INC. Allan C. Brooks
Company By PRESIDENT Title

BIDDING SCHEDULE FOR WILSON ROAD - MOUNTAIN SHADOWS
DRAINAGE IMPROVEMENTS

		Schedule A		
ITEM #	QUANTITES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1	70 L.F.	60" R.C.P.		
2	2 each	60" X 45° R.C.P. bends		
3	40 L.F.	42" R.C.P.		
4	93 L.F.	36" R.C.P.		
5	88 L.F.	30" R.C.P.		
6	252 L.F.	27" R.C.P.		
7	143 L.F.	21" R.C.P.		
8	130 L.F.	18" R.C.P.		
9	1 each	27" to 18" R.C.P. Reducer		
10	3 each	8' Catch Basins		
11	2 each	6' Catch Basins		
12	3 each	4' Catch Basins		
13	1 each	Junction Box		
			Total	
		Schedule B		
14	1 each	Double 5' x 6' R.C.B.C.		52,636.00
14 ALT.	1 each	Single 5' x 12' R.C.B.C.		56,795.00

Dated this 9 day of November, 1981.

Byerly & Brew Inc.
Company

By A. L. Byerly
Title
Hugh Byerly. President

M & M

BIDDING SCHEDULE FOR WILSON ROAD - MOUNTAIN SHADOWS
DRAINAGE IMPROVEMENTS

		Schedule A		
ITEM #	QUANTITES & UNIT	DESCRIPTION	UNIT PRICE	BID AMOUNT
1	70 L.F.	60" R.C.P.		
2	2 each	60" X 45° R.C.P. bends		
3	40 L.F.	42" R.C.P.		
4	93 L.F.	36" R.C.P.		
5	88 L.F.	30" R.C.P.		
6	252 L.F.	27" R.C.P.		
7	143 L.F.	21" R.C.P.		
8	130 L.F.	18" R.C.P.		
9	1 each	27" to 18" R.C.P. Reducer		
10	3 each	8' Catch Basins	1,575.00	4,725.00
11	2 each	6' Catch Basins	1,350.00	2,700.00
12	3 each	4' Catch Basins	1,100.00	3,300.00
13	1 each	Junction Box		
			Total	10,725.00
		Schedule B		
14	1 each	Double 5' x 6' R.C.B.C.	326.31	31,000.00
14 ALT.	1 each	Single 5' x 12' R.C.B.C.		

Dated this 9 day of September, 1981.

M&M CEMENT CONTRACTORS, INC.
Company

By Grant Martins President
Title

T.L. PRINTZ CONSTRUCTION CO.

P.O. BOX 1025 1114 ERIE PUEBLO, COLORADO 81002 PHONE 545-8710

November 24, 1981

Ridge Development Co., Ltd.
Attn: Jerry Novak
P. O. Box 7711
Colorado Springs, Colorado 80933

STATEMENT

Contract Amount		$28,419.00
Add: Change Order #1		1,260.00
		$29,679.00
Less: Payment 11/13/81		25,226.00
Project Complete, Balance Due		$ 4,453.00
Add: Extra rebar labor (Per agreement with Jerry Novak)	$478.00	
Increased carpentry labor plus extra labor at construction joints	332.00 ?	810.00
TOTAL DUE (Contract)		$ 5,263.00

*NOTE: Additional excavation and compaction will be billed cost plus 15% as per Jerry Novak.

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Mountain Shadows Filing #1 Storm Sewer $5263.00

No. 1668

REPUBLIC NATIONAL BANK
PUEBLO, COLORADO
42-56
1070

DATE Dec 21 19 81

PAY THE SUM 5263 00 Dollars $ 5263.00

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

T. L. Printz Construction Co.
P O Box 1025
Pueblo, Colorado 8 02

RIDGE DEVELOPMENT CO., LTD.

BY

T.L. PRINTZ CONSTRUCTION CO.

P.O. BOX 1025 1114 ERIE PUEBLO, COLORADO 81002 PHONE 545-6710

December 3, 1981

Ridge Development Co., Ltd.
Attn: Jerry Novak
P. O. Box 7711
Colorado Springs, Colorado 80933

STATEMENT

RE: Box Culvert - Wilson RD.
Extra excavation and compaction for building culvert in two sections after back fill by water department. Per agreement with Jerry Novak.

1.)	Excavation Labor (Dace):		$ 414.00
2.)	Transportation of Machine:		
	Janitel:	$123.75	
	Weickers:	134.70	258.45
3.)	Backfill, 910 Cat & operator:		280.31
4.)	Charge for tamping:		
	Machines rental:	$138.00	
	2 Laborers 16 hrs. each		
	32 hours @ $10.88	348.16	486.16
5.)	Extra compaction tests:	$ 26.00	
	Extra concrete tests:	90.00	116.00
6.)	Form lumber that had to be buried:		~~45.60~~
7.)	Midwest Barricade: (We feel we could have been done 10 days earlier.)		
	B & L 12 for 10 days @ $ .60	$ 72.00	
	Stands 6 for 10 days @ .65	39.00	
	Type III 4 for 10 days @ 1.25	50.00	
	48" Signs 11 for 10 days @ .50	55.00	
	Stand 1 for 10 days @ .65	6.50	222.50
8.)	General Overhead @ 15%		~~273.38~~ 266.55
			~~$2,095.80~~ 2043.97
9.)	Dace for Ridge Development 5 hrs. @ $46		230.00
	TOTAL BALANCE DUE for extra work		~~$2,325.80~~ 2273.52

OK
Room
Storm
Janitel
Weickers

Pay this
J.N.

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Wilson Road $2273.52

Nº 1884

NATIONAL BANK
PUEBLO, COLORADO

DATE Dec 10 19 81

Dollars $

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY

T. L. Printz Construction Co.
P. O. Box 1025
Pueblo, Colorado 81002

NOT NEGOTIABLE

BY

T.L. PRINTZ CONSTRUCTION CO.

P.O. BOX 1025 1114 ERIE PUEBLO, COLORADO 81002 PHONE 545-6710

November 3, 1981

Ridge Development Co., Ltd.
Attn: Jerry Novak
P. O. Box 7711
Colorado Springs, Colorado 80933

STATEMENT

Base Bid - Original Contract			$28,850.00
*Deduct: original excavation in base bid			(1,600.00)
			$27,250.00
Add: Excavation Costs to Date			
Weicker Invoice #S10765		$ 155.75	
Weicker Invoice #P17145		172.15	
Dace Brothers Statement-			
September 30, excavate culvert	- 7 hrs.	322.00	
October 1, excavate culvert	- 7 hrs.	322.00	
Layout, shoot grade	-14 hrs.	140.00	
Contractors overhead		57.10	1,169.00
New Contract Amount			$28,419.00
Add: Change Order #1			1,260.00
			$29,679.00
Less: Retainage to be held until handrails are installed and deck concrete comes up to strength			(4,453.00) - 15%
Total due on or before November 10, 1981			$25,226.00

*Note: All additional excavation and compaction will be billed cost plus 15% as per Jerry Novak.

OK to pay
J.N.

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Statement of Nov. 3, 1981 work in Colorado Springs

No 1838

PUEBLO NATIONAL BANK
PUEBLO, COLORADO

42-38
1570

DATE Nov. 13, 19 81

PAY THE [illegible] Dollars $ 25,226.00
THIS CHECK WILL NOT BE PAID UNLESS PROPERLY DATED AND ENDORSED

RIDGE DEVELOPMENT CO. LTD.

TO THE ORDER OF T. L. Printz Construction Co.
P. O. Box 1025
[illegible] Colorado 81002

STATEMENT

FRAZEE CONSTRUCTION COMPANY

SEWER and WATER MAINS
OFFICE – 392-3443

2855 East Las Vegas
P.O. Box 5308

Colorado Springs
Colorado 80931

Date 10/20/81

Name Ridge Development Co.

Address P.O. Box 7711
Co Springs, Co 80933

DATE	ITEMS	BALANCE
	Wilson Rd - Install	
	Concrete collar encasements	
	on 24" water main	# 1730.00
	260 @ 6.65 ea	
	OK	
	J.C	
		#
	Box Culvert TOTAL	1730.00

FRAZEE CONSTRUCTION COMPANY
SEWER and WATER MAINS
OFFICE — 392-3443

855 East Las Vegas
.O. Box 5308

Colorado Springs
Colorado 80931

Date 10/22/81
Name Ridge Development Co.
Address P.O. Box 7711
Co Springs, Co 80933

DATE	ITEMS	BALANCE
	Wilson Rd - Install	
	concrete collar encasements	
	on 24" water main	$
	2 ea @ 965.00	1930.00
	OK	

DESCRIPTION OF PROPERTY, WORK AND/OR MATERIALS

Concrete Collar on 24 inch water mains

№ 1835

PUEBLO NATIONAL BANK
PUEBLO, COLORADO

DATE 11/9 19

PAY THE SUM 1930 DOLS 00 CTS Dollars $ 1930.00

THIS CHECK WILL NOT BE PAID UNLESS PROPERLY ENDORSED

RIDGE DEVELOPMENT CO., LTD.

TO THE ORDER OF
Frazee Construction Co.
P.O. Box 5308
Colo. Springs, Colo. 80931

NOT NEGOTIABLE

BY

⑆1070005630⑆ 08 712 2⑈

		$	
	TOTAL	1930.00	