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Colorado Springs
Denver

Engineering
Planning
Surveying

MASTER DEVELOPMENT DRAINAGE PLAN

CENTENNIAL BOULEVARD (ALLEGHENY DRIVE TO WICKES ROAD)

JUNE, 1993

Job No. 8503.99

Prepared For:

R.W. CASE II
102 E Pikes Peak Ave., Suite 601
Colorado Springs, Colorado 80903
(719) 338-2273

RIDGE DEVELOPMENT CO., INC.
4785 Granby Circle
Colorado Springs, Colorado 80919
(719) 594-0227

Prepared By:

JR ENGINEERING, LTD.
6455 N. Union Blvd., Suite 202
Colorado Springs, Colorado 80918
(719) 593-2593

June 23, 1993

City of Colorado Springs
Engineering Division
101 W. Costilla, Suite 122
Colorado Springs, CO 80903

ATTN: Mr. Tim Mitros

RE: Centennial Boulevard between Allegheny Drive and Wickes Road

Dear Tim:

Please find enclosed the Master Development Drainage Plan for the aforementioned area. This report has been prepared at the request of City Engineering to identify potential drainage problems impacting the future widening of Centennial Boulevard in this area. The revisions you requested have been made.

Sincerely,

Joseph W. DesJardin, P.E.
Director of Engineering
For and On Behalf of
JR Engineering, Ltd.

/js

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MASTER DEVELOPMENT DRAINAGE PLAN
CENTENNIAL BOULEVARD

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 directly caused by the negligent acts, errors or omissions on my part in preparing this report.

COLORADO REGISTERED JOSEPH W DESJARDIN 24207 PROFESSIONAL ENGINEER

Joseph W. DesJardin, Colorado P.E. #24207 — 6.24.93 Date

Statement:

The undersigned adjacent property owners have read all the requirements specified in this drainage report, which has been prepared for the proposed construction of the roadway through a cooperative agreement with the City of Colorado Springs.

Ridge Development Co., Ltd
Business Name

By: [signature]

Title: Business Manager

Address: P. O. Box 7711
Colorado Springs, CO 80933

R.W. Case II
Business Name

By: [signature]

Title: Owner

Address: 102 E. Pikes Peak Ave, STE 601
Colorado Springs, CO 80903

City of Colorado Springs:

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

[signature] — June 25, 1993
City Engineer — Date

Conditions:

MASTER DEVELOPMENT DRAINAGE PLAN
CENTENNIAL BOULEVARD

PURPOSE

This document is the Master Development Drainage Plan (MDDP) for improvements made to Centennial Boulevard between Allegheny Drive and Wickes Road. This Master Development Drainage Plan has been prepared to identify and calculate the runoff of the contributing basins which impact the proposed Centennial Boulevard improvements.

GENERAL DESCRIPTION

The proposed Centennial Boulevard Improvements are located in Sections 11 and 14, Township 13 South, Range 67 West of the 6th P.M. The sub-basins which drain across these improvements include the following subdivisions: Mountain Shadows Filings No.'s 8 through 12A, 15 through 19, 21, 23, 26, and 29, Reed Ranch Subdivision, and Wilson UMC Subdivision. The bulk of these subdivisions (excepting Reed Ranch) are located on the west side of Centennial Boulevard and extend into the foothills at the westerly City limits.

The current Drainage Basin Planning Study for this area is the "Douglas Creek Drainage Basin" prepared by Leigh Whitehead & Associates from March of 1981. Individual drainage reports for platted subdivisions in this area were prepared both before and after the adoption of the 1987 City/County Drainage Criteria Manual. An extensive study of the area immediately north of these improvements has recently been completed under the title of "Oak Valley Master Development Drainage Plan", prepared by JR Engineering, Ltd., dated December 1992.

EXISTING DRAINAGE CONDITIONS

The area contributing to the Centennial Boulevard site extends from the road itself westerly up the front range foothills to the existing Mountain Shadows water tank site. Soils conditions are described by the Soil Conservation Service as being of both hydrologic soils groups "A" and "B" in their "Soil Survey of El Paso County". This area is not yet completely developed; most roadways have been constructed in the area easterly of Rossmere Street and roughly 80% of the housing constructed. West of Rossmere Street (Basin I), the streets have been rough graded only.

PROPOSED DRAINAGE CHARACTERISTICS

It is not the intent of this study to recommend improvements within the Mountain Shadows and Reed Ranch areas which do not directly affect the proposed Centennial improvements. However, Centennial Boulevard itself is to be constructed to current drainage standards, and any undersized upstream facilities will naturally impact the new construction. The most economical solution is to provide facilities to intercept the flows just prior to their reaching Centennial Boulevard. These facilities are summarized on the enclosed drainage plan. Please note the size of said facilities; when additional improvements in Tyrone Drive are constructed by the City they may tie into the new 48" RCP without having to disturb Centennial Boulevard itself.

As previously mentioned, the area immediately north of these improvements was recently studied as a part of the Oak Valley MDDP. Flows from that drainage study have been shown directly on the enclosed MDDP. Since some of the drainage reports for this area predate the 1987 City/County Criteria Manual, the storm sewer systems in portions of Mountain Shadows are deficient according to current standards. This is especially evident at the intersections of Tyrone Drive and Flying W Ranch Road. City Engineering has acknowledged this particular deficiency in the drainage report for Mountain Shadows Filing No. 23, and has agreed to design and construct a remedial drainage system. However, to our knowledge no plans for such a system have been completed. This study indicates runoff leaving this intersection to be Q_{10}=96 cfs/Q_{100}=296 cfs. Following this flow to the east, it has been assumed that roughly half of this flow will reach the intersection of Tyrone Drive and Centennial Boulevard. Visual observation of the intersections of Tyrone Drive at Savannah Way and Tyrone Drive at Manning Way indicates the other half of the flow will be directed into other systems, as shown in the appendix. A new storm sewer system should be constructed in the vicinity of Tyrone and Wickes; please refer to the enclosed sketch entitled "Storm Sewer System #102" in the appendix. The routed flow in the proposed 48" RCP exiting this system will be Q_{10}=45 cfs/Q_{100}=100 cfs, with 38 cfs flowby in Centennial Boulevard.

Approximately three-fourths of the flow from the south half of the intersection of Tyrone Drive and Flying W Ranch Road, as well as flow from adjacent basins, will ultimately reach the intersection of Wickes Road and Centennial Boulevard. This runoff reaches Wickes via Savannah Way. A new system will be required between Centennial Boulevard and Savannah Way one block to the west. Please refer to the enclosed "Storm Sewer System # 100" in the appendix for details. This system will discharge Q_{10}=76 cfs/Q_{100}=222 cfs across Centennial Boulevard into Douglas Creek in a 60" RCP.

Both storm sewer systems #100 and #102 at the intersection of Wickes Road and Tyrone Drive with Centennial Boulevard, will require major street reconstruction to achieve sump conditions. Future inlets located at sump conditions are the most efficient method of intercepting 10 year runoff and minimizing 100 year flowby onto Centennial Boulevard. At Tyrone Drive, the proposed 30' sump inlet will intercept approximately 100 cfs, leaving 38 cfs flowby in Centennial Boulevard during a 100 year storm. The street capacity is 50 cfs with a flow depth of 8 inches. At Wickes Road, the Centennial Boulevard flowby will combine with basin flows. The proposed pair of 30' sump inlets will intercept approximately 222 cfs, leaving 28 cfs flowby along the west side of Centennial Boulevard in a 100 year storm. Street capacity is 28 cfs for a flow depth of 8 inches.

The remainder of the flow from the south half of the intersection of Tyrone Drive and Flying W Ranch Road will be routed with runoff from Basins S and T and collect in a sump in Manning Way northeasterly of Savannah Way per the routing schematic shown in the appendix. An existing system with a capacity of approximately 32 cfs conducts water from the sump in Manning Way into Douglas Creek to the east. Water collecting in this sump is Q_{10}=26 cfs/Q_{100}=62 cfs, and the excess runoff has no designated outlet.

The MDDP for Oak Valley has previously addressed the flows north of the intersection of Centennial Boulevard and Douglas Creek Channel just north of Tyrone Drive. Additional study of the area was performed for the drainage report for Mountain Shadows Filing No. 31, and this study reflects those changes. Please refer to the attached exhibits for specific details. In general, runoff from the Oak Valley area is conducted southward in a 42"/48" RCP storm sewer on the east side of Centennial Boulevard, as well as by surface flow in Centennial Boulevard itself. With regard to flow on the east side of Centennial, runoff continues until it reaches the existing box culvert for Douglas Creek. Here, it is proposed that a 100' curb opening with ten foot wide by two foot deep concrete chase section be constructed to direct all flow directly into the creek. Please refer to "Storm Sewer System #101" in the Appendix. Additional flow picked up on the east side of Centennial Boulevard to the south will be carried in the street to an existing catch basin just north of Rendezvous Trail, and the minimal flowby will enter the subdivision to the east.

Regarding flow on the west side of Centennial Boulevard, some flowby from Oak Valley will combine with runoff generated directly adjacent to the street and will travel southerly. A driveway intersection will eventually be constructed which will intersect Centennial midway between Vindicator Drive and Douglas Creek, and a ten foot sump inlet can be constructed at this intersection to intercept all runoff on the west side of the street. Discharge will be Q_{10}=3 cfs/Q_{100}=17 cfs, which will be directed via 18" RCP into the 42" RCP on the west side of Centennial Boulevard. This 42" RCP will ultimately discharge Q_{10}=54 cfs/Q_{100}=119 cfs into Douglas Creek. Pipe capacity is roughly 123 cfs. This system is described in the Appendix as "Storm

Sewer System #103".

HYDROLOGIC CALCULATIONS

The Rational Method was used to estimate the peak flows impacting this construction. Each of these individual basins is smaller in extent than 100 acres, the maximum limit for usage of the Rational Method. The total studied acreage exceeds 300 acres, thus making the resulting flows on the conservative side. Please refer to the appendix for the specific calculations.

CONSTRUCTION COST STATEMENT

Public Drainage Facilities

Item	Quantity	Unit Cost	Cost
30' D-10R Inlet	3	$7,500.00/EA	$22,500.00
10' D-10R Inlet	1	3,000.00/EA	3,000.00
60" RCP - Class II	550 LF	90.00/LF	49,500.00
48" RCP - Class II	206 LF	60.00/LF	12,360.00
36" RCP - Class II	40 LF	48.00/EA	1,920.00
18" RCP - Class II	42 LF	24.00/LF	1,008.00
60" RCP-45° Bend Class II	4	1,200.00/LF	4,800.00
Removal of existing asphalt & base	1,800 SY	2.50/SY	4,500.00
Replace Asphalt			
Asphalt 2"	1,800 SY	4.00/LF	7,200.00
Base 6"	1,800 SY	3.00/SY	5,400.00
Curb & Gutter removal & replacement	986/LF	16.00/LF	15,776.00
Sidewalk Removal & Replacement	986/LF	13.00/LF	12,818.00
Landscaping	LS		2,500.00
Utility Lowering	LS		10,000.00
Outfall Structures	2	2,000.00/EA	4,000.00
10'x2' Concrete chase	1,750/SF	3.00/SF	5,250.00
Regrading-Street	1,000/CY	2.00/CY	2,000.00
	SUBTOTAL		164,532.00
	10% Engineering		$16,453.20
	10% Contingency		$16,453.20
	TOTAL		$197,438.40

JR Engineering, Ltd. cannot and does not guarantee that the construction cost will not vary from these opinions of probable construction costs. These opinions represent our best judgement as design professionals familiar with the construction industry and this development.

SUMMARY

As in the case of Oak Valley to the north, existing facilities and flow patterns do NOT meet current drainage criteria. These deficiencies continue down to the presently proposed facilities, requiring the construction of four separate drainage systems as detailed on the enclosed drainage plan. Naturally, equivalent systems are permissible if they carry the flows indicated herein.

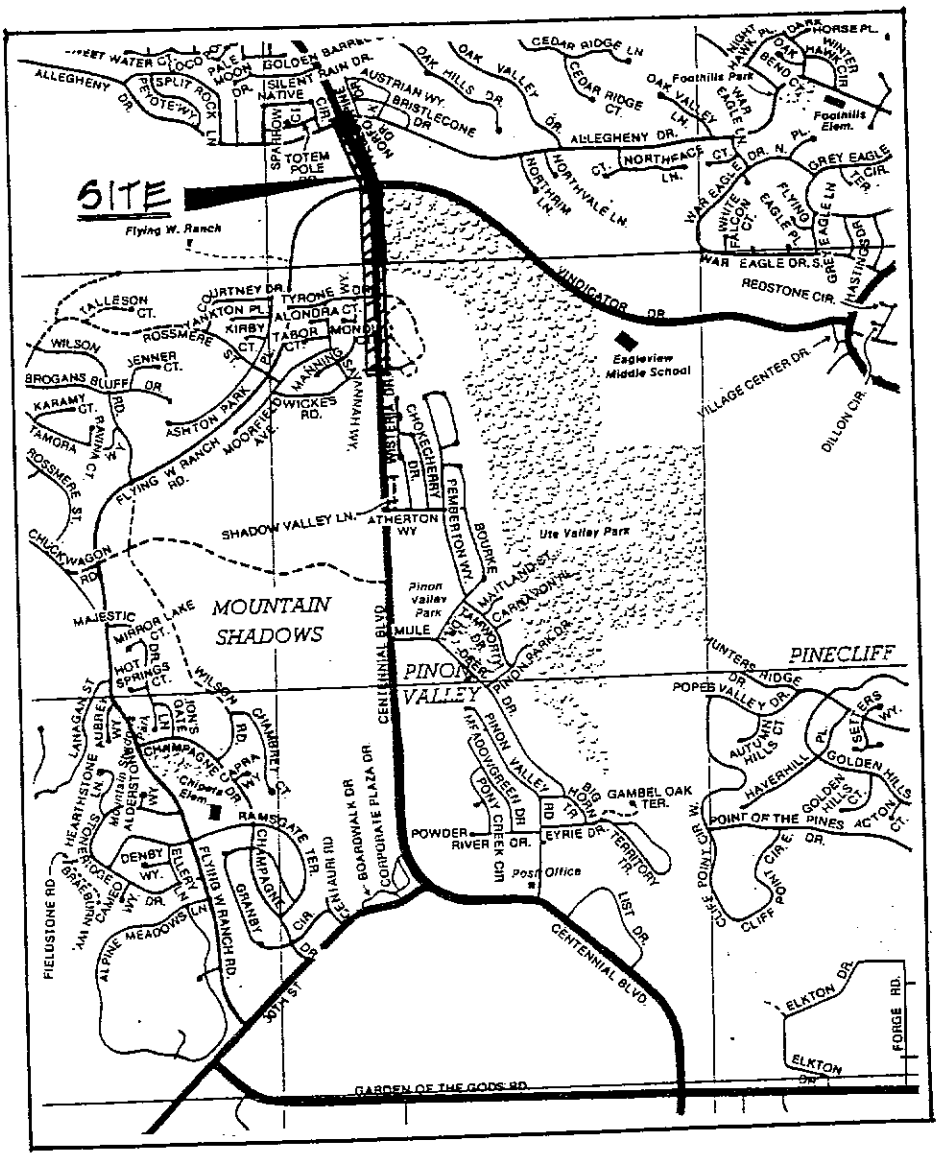
Respectfully Submitted,

Joseph W. DesJardin, Colorado P.E. #24207
For and on behalf of JR Engineering, Ltd.

6.23.93
Date

APPENDIX

VICINITY MAP



VICINITY MAP

N.T.S.

BASIN CALCULATIONS

BASIN	AREA IN ACRES	BASIN		Tc (min)	I(10)	I(100)	SOIL GROUP	LAND USE	C(10)	C(100)	FLOW	
		LENGTH	HEIGHT								Q(10)	Q(100)
A	1.338	180 700	10 50	7.8	5.1	7.7	A,B	STREET/ LAWN	0.64	0.71	4	7
B	5.039	300 600	30 82	9.9	4.7	7.0	A,B	½ ACRE LOTS	0.35	0.45	8	16
C	2.890	300 330	34 16	9.4	4.8	7.2	A,B	½ ACRE LOTS	0.35	0.45	5	9
D	1.865	200 610	16 50	9.0	4.8	7.3	A,B	¼ ACRES LOTS	0.50	0.60	4	8
E	14.404	300 1,750	50 324	9.6	4.7	7.1	A,B	½ ACRE LOTS	0.35	0.45	24	46
F	40.821	300 3,300	34 310	18.2	3.6	5.5	A,B	½ ACRE LOTS	0.35	0.45	51	101
G	12.981	300 1,670	24 150	12.4	4.3	6.5	A,B	⅓ ACRE LOTS	0.40	0.55	22	46
H	3.886	200 1,000	12 19	12.2	4.3	6.5	A,B	¼ ACRE LOTS	0.50	0.60	8	15
I	32.130	300 3,300	3 200	25.8	3.0	4.6	A.B	MIXED	0.33	0.43	32	64
J	1.110	100 400	4 30	6.1	5.5	8.3	A,B	STREET/ LAWN	0.64	0.71	4	7
K	37.263	300 3,000	50 292	13.8	4.1	6.2	A,B	MIXED	0.38	0.57	58	132
L	10.276	300 1,500	70 116	12.3	4.3	6.5	A,B	RANCH	0.25	0.35	11	23
M	34.940	150 4,050	3 340	17.6	3.7	5.6	A,B	¼ ACRE LOTS	0.50	0.60	65	117
N	1.879	40 1,000	1 26	7.0	5.3	7.9	A,B	STREET/ LAWN	0.64	0.71	6	11
O	10.333	150 1,940	3 164	14.1	4.1	6.1	A,B	½ ACRE LOTS	0.35	0.45	15	28
P	22.069	300 2,020	30 118	13.1	4.2	6.3	A,B	¼ ACRE LOTS	0.50	0.60	46	83

BASIN	AREA IN ACRES	BASIN		Tc (min)	I(10)	I(100)	SOIL GROUP	LAND USE	C(10)	C(100)	FLOW	
		LENGTH	HEIGHT								Q(10)	Q(100)
Q	6.731	90 700	2 26	9.9	4.7	7.0	A,B	¼ ACRE LOTS	0.50	0.60	16	28
R	3.516	120 950	2 26	13.1	4.2	6.3	A,B	¼ ACRE LOTS	0.50	0.60	7	13
S	8.383	150 700	3 20	12.9	4.2	6.4	A,B	¼ ACRE LOTS	0.50	0.60	18	32
T	3.416	100 700	2 20	10.9	4.5	6.8	A,B	¼ ACRE LOTS	0.50	0.60	8	14
U	32.108	200 2,400	4 190	23.0	3.2	4.9	A,B	½ ACRE LOTS	0.35	0.45	36	71
V	2.377	60 1,530	2 211	6.4	5.4	8.2	A.B	STREET/ LAWN	0.64	0.71	8	14
W	1.94	100 150	2 4	9.4	4.8	7.2	A,B	¼ ACRE LOTS	0.50	0.60	5	8
X	2.471	70 1,200	2 30	10.3	4.6	6.9	A,B	¼ ACRE LOTS	0.50	0.60	6	10
Y	4.24	100 1,800	6 120	6.2	5.5	8.2	A,B	¼ ACRE LOTS	0.50	0.60	12	21
AA	0.38	9 400	0.2 6	5(min)	6.0	9.0	A,B	STREET ROW	0.84	0.89	2	3
BB	1.15	9 1,220	0.2 32	7.4	5.2	7.8	A,B	STREET ROW	0.84	0.89	5	8
CC	15.17	REFER TO OAK VALLEY MDDP		26	3.0	4.6	A,B	MIXED	0.62	0.71	28	49
DD	7.6	300 1,700	20 130	19	3.6	5.4	A,B	R-2	0.35	0.45	10	18
EE	0.96	50 550	1 3	12	4.3	6.6	A,B	STREET ROW	0.58	0.65	2	4
FF	3.6	300 60	60 1	10.5	4.6	6.9	A,B	MIXED	0.45	0.58	7	14
GG	1.62	250 450	38 14	11.5	4.4	6.7	A,B	MIXED	0.43	0.52	3	6

EXISTING STRUCTURES SUMMARY

EXISTING STRUCTURES SUMMARY

STRUCTURE NUMBER	SIZE
1	5' CATCH BASIN
2	5' CATCH BASIN
2a	8' CATCH BASIN
3	6' CATCH BASIN
4	6' CATCH BASIN
5	8' CATCH BASIN
6	8' CATCH BASIN
7	6' CATCH BASIN
8	6' CATCH BASIN
9	4' CATCH BASIN
10	8' CATCH BASIN
11	6' CATCH BASIN
12	25' CATCH BASIN
13	5' CATCH BASIN
14	6' CATCH BASIN
15	6' CATCH BASIN
16	6' CATCH BASIN
17	12' CATCH BASIN
18	14' CATCH BASIN
19	8' CATCH BASIN
20	4' CATCH BASIN
21	6' CATCH BASIN
22	15' CATCH BASIN
23	10' CATCH BASIN
24	10' CATCH BASIN
25	6' CATCH BASIN
26	6' CATCH BASIN
27	6' CATCH BASIN
27A	6' COVERED CATCH BASIN
28	10' CATCH BASIN
29	14' CATCH BASIN
30	20' CATCH BASIN
31	16' CATCH BASIN
32	14' CATCH BASIN
32A	8' CATCH BASIN
33	GRATED INLET
34	10' CATCH BASIN

SURFACE ROUTING

CENTENNIAL DRAINAGE ROUTING
JOB NO. 8503.99
MAY 12, 1993

SURFACE ROUTING

BASIN	Tc	I(10)	I(100)	CA(10)	CA(100)	Q(10)	Q(100)
M	18	3.7	5.6	17.47	20.96	65	117
12', 14' CB (#17 & 18)				-17.03	-11.25	-63	-63
				0.44	9.71	2	54
K	14	4.1	6.2	14.16	21.24	58	132
ROUTE	19	3.6	5.4	14.60	30.95	53	167
(2) 6' CB'S (#14 & 15)				-7.78	-5.19	-28	-28
				6.82	25.76	25	139
L	12	4.3	6.5	2.57	3.6	11	23
ROUTE	20	3.5	5.2	9.39	29.36	33	153
6' CB (#16)				-0.86	-2.12	-3	-11
				8.53	27.24	30	142
U	23	3.2	4.9	11.24	14.45	36	71
14' CB (#32)				-3.75	-3.47	-12	-17
				7.49	10.98	24	54
GG	11	4.4	6.7	0.70	0.84	3	6
				8.19	11.82	26	58
G	12	4.3	6.5	6.49	7.79	28	51
	24	3.2	4.8	14.68	19.61	47	94
6' CB (#8)				-2.19	-2.08	-7	-10
				12.49	17.53	65	127
E	10	4.7	7.1	5.04	6.48	24	46
8' CB (#5)				-1.06	-0.99	-5	-7
				3.98	5.49	19	39
F	18	3.7	5.5	14.29	18.37	53	101
				18.27	23.86	68	131
8', 6' CB (#6 & 7)				-2.97	-0.18	-11	-1
				15.30	23.68	57	130
U,G, GG	24	3.2	4.8	12.49	17.53	65	127
ROUTE				27.79	41.21	89	198
H	12	4.3	6.5	1.94	2.33	8	15
ROUTE	28	2.9	4.4	29.73	43.54	86	192
M,K,L				8.53	27.24	30	142
ROUTE				38.26	70.78	111	311
8' CB (#19)				-5.17	-3.41	-15	-15
				33.09	67.37	96	296

ASSUME FLOW SPLITS EVENLY EITHER SIDE OF TYRONE

SURFACE ROUTING (CON'T)

BASIN	Tc	I(10)	I(100)	CA(10)	CA(100)	Q(10)	Q(100)
CC	26	3.0	4.6	9.43	10.76	28	49
14' CB (#29)				-5.67	-5.00	-17	-23
FLOWBY				3.76	5.76	11	26
20' CB (#30)				-2.00	-3.04	-6	-14
FLOWBY				1.76	2.72	5	12
32	16	3.9	5.8	10.80	11.52	41	66
FUTURE (2) 10' CB'S				-10.80	-11.52	-41	-66
				0.00	0.00	0	0
OAK VALLEY MDDP- D.P.F	38	2.4	3.6	0.00	8.33	0	30
33	12	4.3	6.6	0.93	1.04	4	7
ROUTE	38	2.4	3.6	2.69	12.09	6	44
16' CB (#31)				-2.69	-8.89	-6	-32
				0.00	3.20	0	12
35 (OAK VALLEY MDDP)	12	4.3	6.6	0.81	0.88	3	6
ROUTE	38	2.4	3.6	0.81	4.08	2	15
EE	12	4.3	6.6	0.56	0.62	2	4
ROUTE				1.37	4.70	3	17
FUTURE SUMP 10' CB (#103)				-1.37	-4.70	-3	-17
				0.00	0.00	0	0
29 FLOWBY (OAK VALLEY)	14	4.1	6.2	2.71	6.02	11	36
34 (OAK VALLEY)	12	4.3	6.6	2.09	2.55	9	17
ROUTE	17	3.8	5.7	4.80	3.57	18	49
38	12	4.3	6.6	0.87	10.98	4	6
ROUTE	20	3.5	5.2	5.67	9.55	20	50
FUTURE CHASE SECTION						-20	-50
						0	0

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SURFACE ROUTING (CON'T)

BASIN	Tc	I(10)	I(100)	CA(10)	CA(100)	Q(10)	Q(100)
N. SIDE TYRONE	28	2.9	4.4	16.55	33.69	48	148
V	6	5.4	8.2	1.52	1.69	8	14
ROUTE	31	2.7	4.1	18.07	35.38	49	145
W	9	4.8	7.2	0.97	1.16	5	8
ROUTE	31	2.7	4.1	19.04	36.54	51	150
PICKUP BY NEW SYSTEM #102 & CB #21				-19.04	-27.32	-51	-112
FLOWBY	31	2.7	4.1	0.00	9.22	0	38
N	7	5.3	7.9	1.20	1.33	6	11
4' CB (#20)				-0.19	-0.25	-1	-2
				1.01	1.08	5	9
S. SIDE TYRONE	28	2.9	4.4	16.55	33.69	48	148
ROUTE				17.56	34.77	51	153
O	14	4.1	6.1	3.62	4.65	15	28
4' CB (#9)				-0.49	-0.49	-2	-3
				3.13	4.16	13	25
P	13	4.2	6.3	10.57	12.68	46	83
ROUTE	14	4.1	6.1	13.70	16.84	56	103
3/4 FLOW FROM S. SIDE TYR	28	2.9	4.4	12.41	25.26	36	111
ROUTE	33	2.6	4	26.11	42.10	68	168
(#10 & 11)				-5.77	-6.25	-15	-25
				20.34	35.85	53	143
S	13	4.2	6.4	4.19	5.03	18	32
T	11	4.5	6.8	1.71	2.05	8	14
ROUTE				5.90	7.08	26	62
1/4 FLOW FROM S. SIDE TYR	33	2.6	4	4.14	8.42	11	34
ROUTE				10.04	15.50	26	62
6' CB'S (#25 & 26)				-10.04	-8.00	-26	-32
				0.00	7.50	0	30

::

SURFACE ROUTING (CON'T)

BASIN	Tc	I(10)	I(100)	CA(10)	CA(100)	Q(10)	Q(100)
X	10	4.6	6.9	1.24	1.48	6	10
6' CB (#27)				-0.43	-0.42	-2	-3
				0.81	1.05	4	7
S,T	33	2.6	4.0	0.00	7.50	0	30
				0.81	8.55	2	34
FLOWBY FROM SYSTEM 102	31	2.7	4.1	0	9.22	0	38
ROUTE	33	2.6	4	0.81	17.77	2	71
O,P	33	2.6	4.0	26.11	42.10	68	168
Y	6	5.5	8.2	2.12	2.54	12	21
ROUTE				28.23	44.64	73	179
FLOW FROM CENTENNIAL	33	2.6	4.0	0.81	17.77	2	71
				29.04	62.41	76	250
PICKUP BY NEW SYSTEM #100							
				-29.04	-55.50	-76	-222
FLOW DOWN WEST SIDE CENTENNIAL				0.00	6.91	0	28
AA	5	6.0	9.0	0.32	0.34	2	3
BB	7	5.2	7.8	0.97	1.02	5	8
ROUTE	7	5.2	7.8	1.29	1.36	7	11
10' CB (#28)				-0.77	-0.64	-4	-5
				0.52	0.72	3	6

FLOWBY CONTINUES SOUTH INTO REED RANCH

SURFACE ROUTING (CON'T)

BASIN	Tc	I(10)	I(100)	CA(10)	CA(100)	Q(10)	Q(100)
X	10	4.6	6.9	1.24	1.48	6	10
6' CB (#27)				-0.43	-0.42	-2	-3
				0.81	1.05	4	7
S,T	33	2.6	4.0	0.00	7.50	0	30
				0.81	8.55	2	34
FLOWBY FROM SYSTEM 102	31	2.7	4.1	0	9.22	0	38
ROUTE	33	2.6	4	0.81	17.77	2	71
O,P	33	2.6	4.0	26.11	42.10	68	168
Y	6	5.5	8.2	2.12	2.54	12	21
ROUTE				28.23	44.64	73	179
FLOW FROM CENTENNIAL	33	2.6	4.0	0.81	17.77	2	71
				29.04	62.41	76	250
PICKUP BY NEW SYSTEM #100							
				-29.04	-55.50	-76	-222
FLOW DOWN WEST SIDE CENTENNIAL				0.00	0.00	0	28
AA	5	6.0	9.0	0.32	0.34	2	3
BB	7	5.2	7.8	0.97	1.02	5	8
ROUTE	7	5.2	7.8	1.29	1.36	7	11
10' CB (#28)				-0.77	-0.64	-4	-5
				0.52	0.72	3	6

FLOWBY CONTINUES SOUTH INTO REED RANCH

PIPE ROUTING

PIPE ROUTING

STRUCTURE	Tc	I(10)	I(100)	CA(10)	CA(100)	Q(10)	Q(100)	PIPE SIZE
12	26	3.0	4.6	10.60	13.82	32	64	24" RCP
13	6	5.5	8.3	0.71	0.79	4	7	18" RCP
ROUTE	26	3.0	4.6	11.31	14.61	34	67	24" RCP
14.15	19	3.6	5.4	7.78	5.19	28	28	24" RCP
ROUTE	26	3.0	4.6	19.09	19.80	57	91	36" RCP
16	20	3.5	5.2	0.86	2.12	3	11	
ROUTE	26	3.0	4.6	19.95	21.92	60	101	36" RCP
DIVERSION - 18" RCP				-8.33	-5.43	-25	-25	18" RCP
				11.62	16.49	35	76	36" RCP
22	6	5.4	8.2	1.52	1.69	8	14	
ROUTE	26	3.0	4.6	13.14	18.18	39	84	42" RCP
23,24	10	4.7	7.0	3.37	4.04	16	28	
ROUTE	26	3.0	4.6	16.51	22.22	50	102	42" RCP
DISCHARGES INTO DOUGLAS CREEK								
17,18	18	3.7	5.6	17.03	11.25	63	63	24" RCP
19	28	2.9	4.4	5.17	3.41	15	15	
ROUTE	28	2.9	4.4	22.20	14.66	64	65	30" RCP
DIVERSION - 18" RCP	26	3.0	4.6	8.33	5.43	25	25	18" RCP
ROUTE	28	2.9	4.4	30.53	20.09	89	88	30" RCP
20	7	5.3	7.9	0.19	0.25	1	2	
ROUTE	28	2.9	4.4	30.72	20.34	89	90	30" RCP
21	31	2.7	4.1	2.22	2.93	6	12	
ROUTE	31	2.7	4.1	32.94	23.27	89	95	36" RCP
DISCHARGES INTO DOUGLAS CREEK								
SYSTEM #102	31	2.7	4.1	16.67	24.39	45	100	48" RCP
DISCHARGES INTO DOUGLAS CREEK								

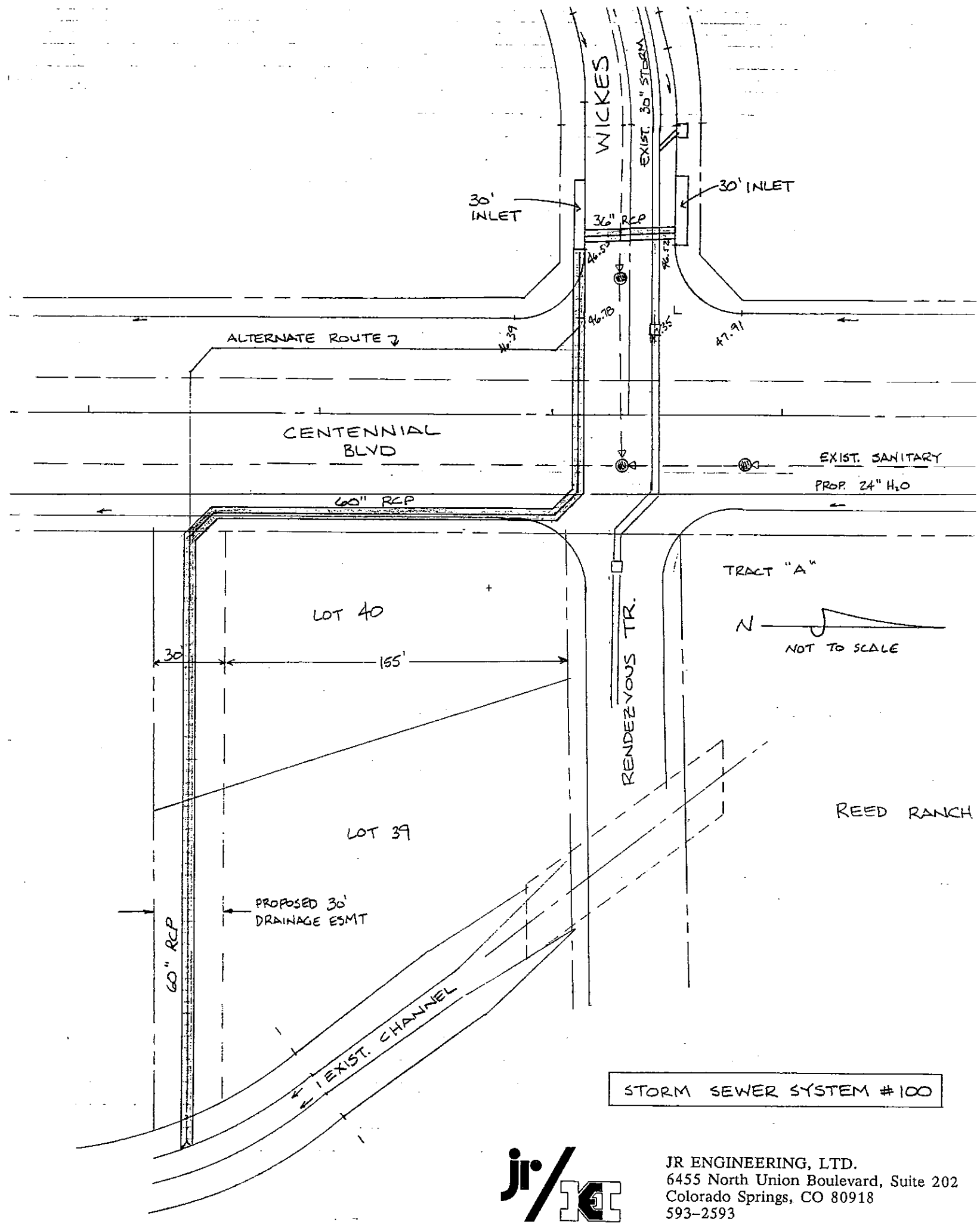
PIPE ROUTING (CON'T)

STRUCTURE	Tc	I(10)	I(100)	CA(10)	CA(100)	Q(10)	Q(100)	SIZE
1	8	5.1	7.7	0.86	0.95	4	7	18" RCP
2	10	4.7	7.0	1.76	2.27	8	16	
ROUTE	10	4.7	7.0	2.62	3.22	12	23	18" RCP
34	11	4.6	6.9	1.62	2.09	7	14	24" RCP
33	19	3.6	5.4	2.66	3.42	10	18	24" RCP
ROUTE				4.28	5.51	15	30	24" RCP
32	23	3.2	4.9	7.49	10.98	24	54	
ROUTE				11.77	16.49	38	81	
1,2				2.62	3.22	12	23	
				14.39	19.71	46	97	24" RCP
8	24	3.2	4.8	2.19	2.08	7	10	
				16.58	21.79	53	105	
3	9	4.8	7.2	1.01	1.30	5	9	18" CMP
4	9	4.8	7.3	0.93	1.12	4	8	18" CMP
ROUTE				1.94	2.42	9	17	18" CMP
5	10	4.7	7.1	1.06	0.99	5	7	
				3.00	3.41	14	24	18" RCP
6,7	18	3.7	5.5	2.97	0.18	11	1	
ROUTE				5.97	3.59	22	20	30" RCP
1,2,34,33,32,8	24	3.2	4.8	16.58	21.79	53	105	24" RCP
				22.55	25.38	72	122	30" RCP
9	14	4.1	6.1	0.49	0.49	2	3	
ROUTE				23.04	25.87	74	124	
	DISCHARGES INTO DOUGLAS CREEK							
10,11	33	2.6	4.0	5.77	6.25	15	25	
ROUTE				28.81	32.12	75	128	36" RCP
28	7	5.2	7.8	0.77	0.64	4	5	
ROUTE	33	2.6	4.0	29.58	32.76	77	131	36" RCP
	DISCHARGES INTO DOUGLAS CREEK							
SYSTEM #100	33	2.6	4	29.04	55.5	76	222	60" RCP

PIPE ROUTING (CON'T)

STRUCTURE	Tc	I(10)	I(100)	CA(10)	CA(100)	Q(10)	Q(100)	SIZE
29	26	3.0	4.6	5.67	5.00	17	23	24" DIP
30				2.00	3.04	6	14	30" RCP
				7.67	8.04	23	37	
FUTURE (2) 10' CB'S	16	3.9	5.8	10.80	11.52	41	66	
				18.47	19.56	55	90	
31	38	2.4	3.6	2.69	8.89	6	32	
				21.16	28.45	51	102	
FUTURE 10' CB (#103)				1.37	4.70	3	17	42" RCP
				22.53	33.15	54	119	42" RCP
25,26	33	2.6	4.0	10.04	8.00	26	32	
27	10	4.6	6.9	0.43	0.42	2	3	
				10.47	8.42	27	34	

NEW STRUCTURES



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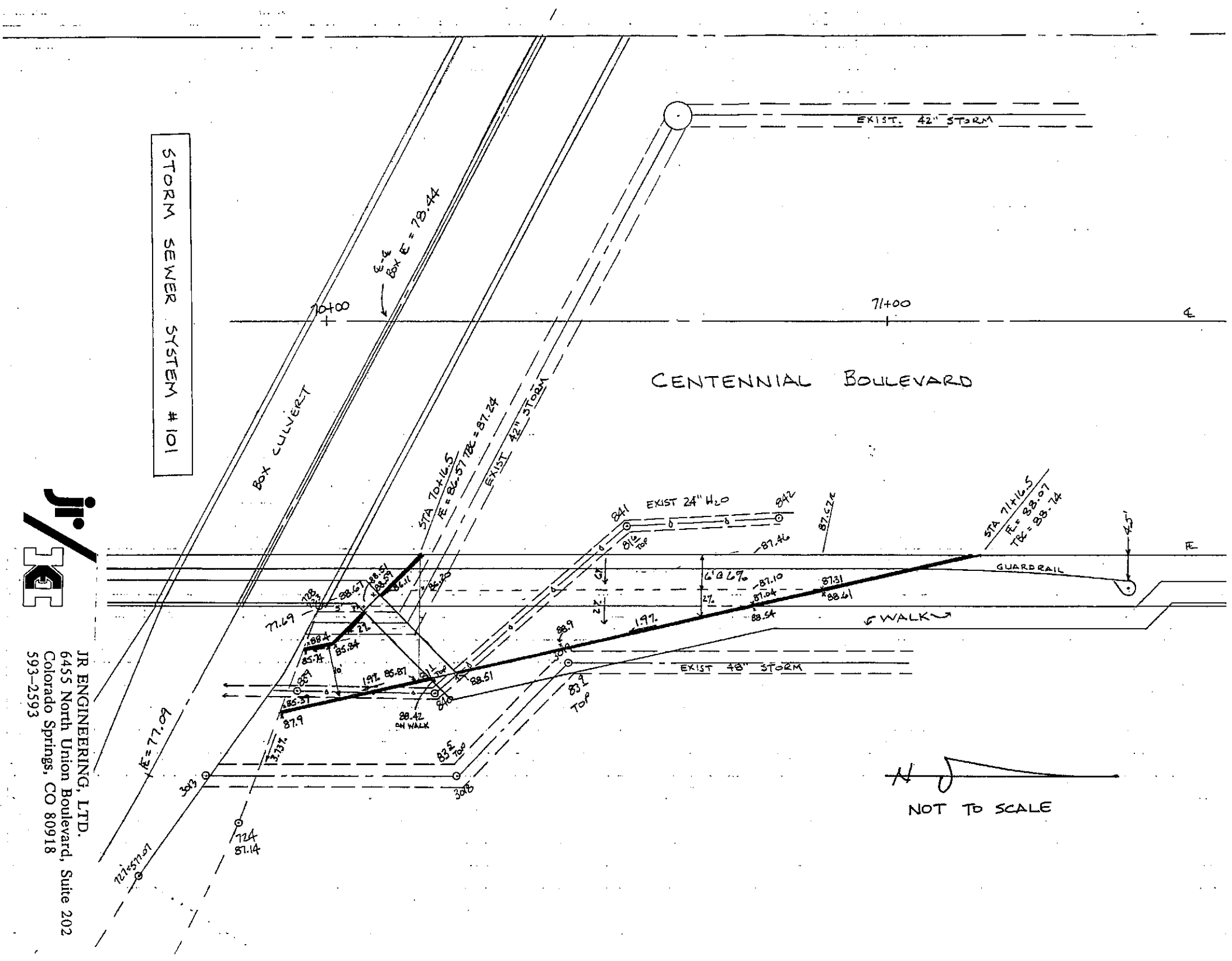

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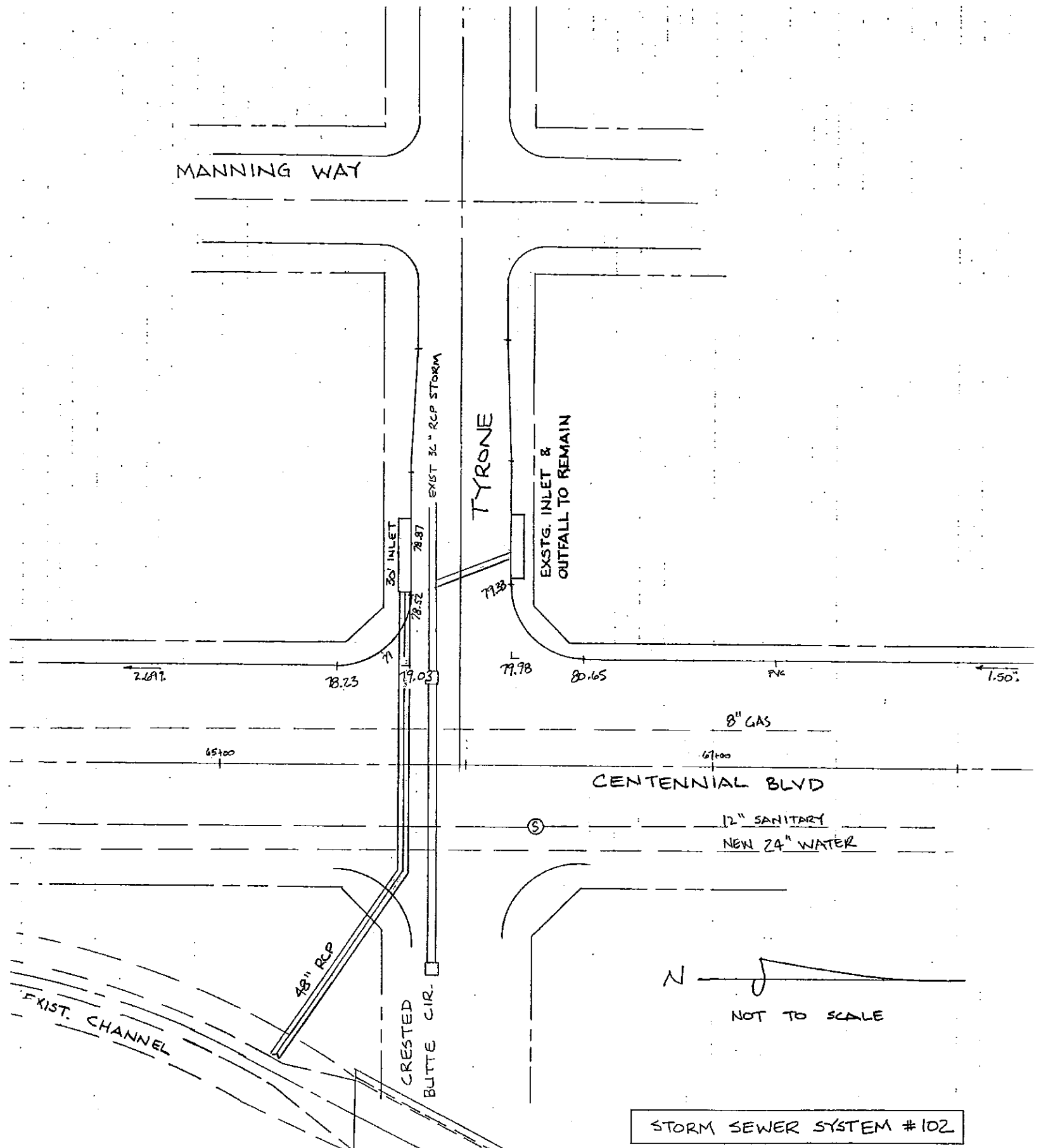

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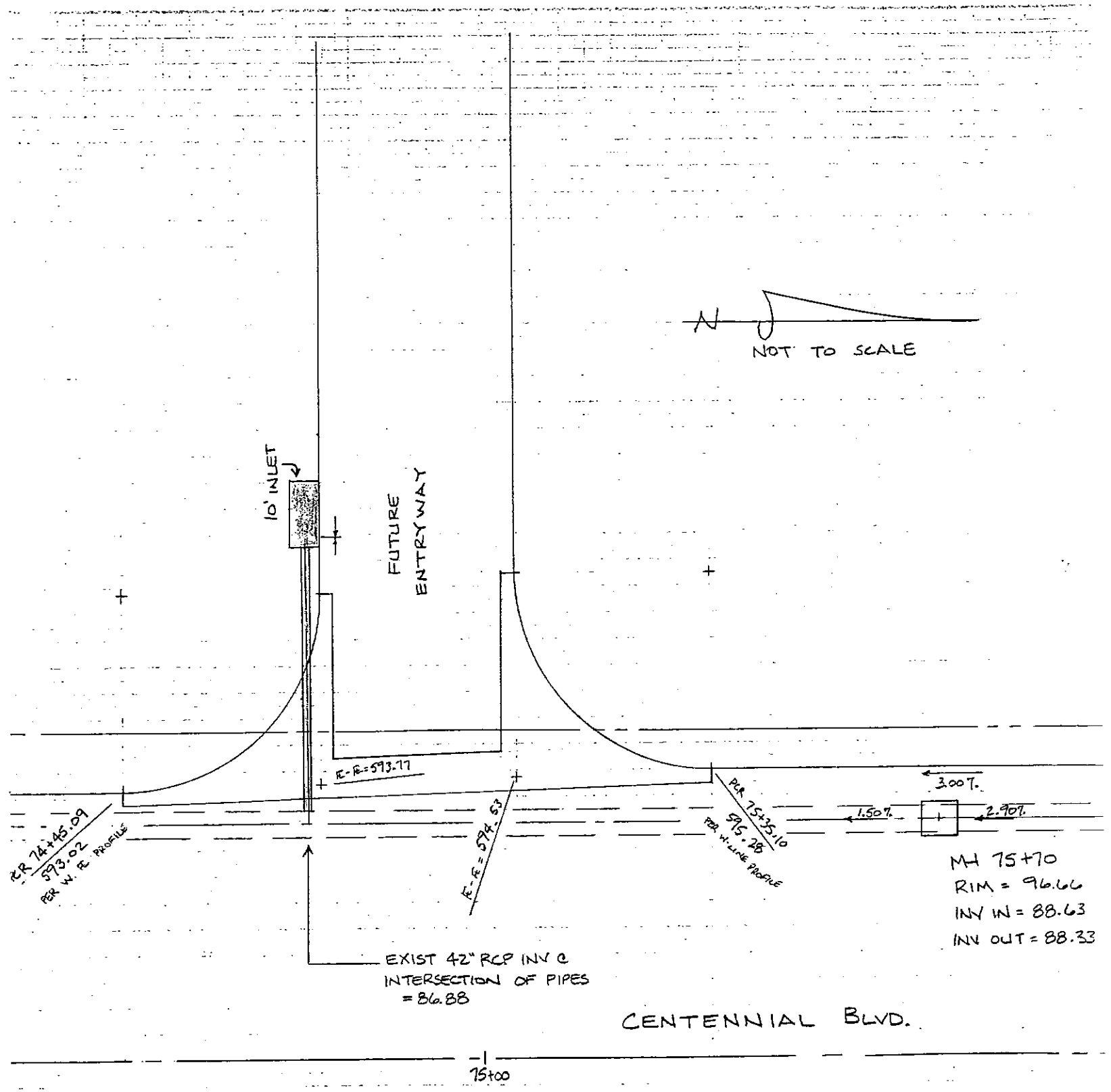

STORM SEWER SYSTEM #103

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RELEVANT DRAINAGE REPORTS

RELEVANT DRAINAGE REPORTS

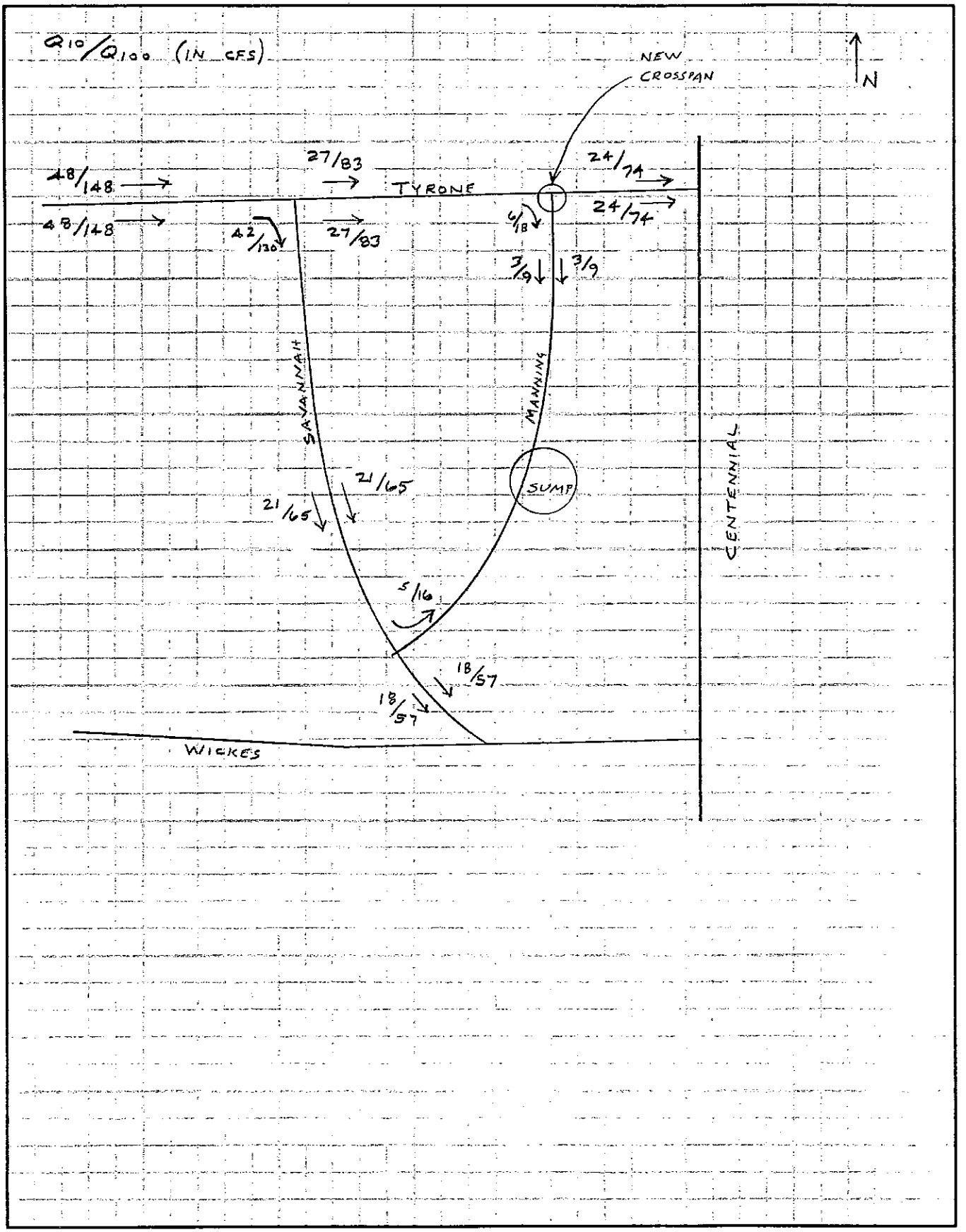
DOUGLAS CREEK DRAINAGE BASIN	MARCH 1981
OAK VALLEY MASTER DEVELOPMENT DRAINAGE PLAN	DECEMBER 1992
THE MEADOWS FILING NO. 1	SEPTEMBER 1984
WESTLINK SUBDIVISION	AUGUST 1984
PINON VALLEY MASTER PLAN & FIL. 1	MARCH 1979
PINON VALLEY FILINGS 2,3, & 4	JANUARY 1983
PARKSIDE AT MOUNTAIN SHADOWS FILING NO. 2	DECEMBER 1984
MOUNTAIN SHADOWS FILING NO. 5	APRIL 1984
MOUNTAIN SHADOWS FILINGS 8 & 9	MAY 1985
MOUNTAIN SHADOWS FILING NO. 10	FEBRUARY 1986
MOUNTAIN SHADOWS FILING NO. 11	AUGUST 1986
MOUNTAIN SHADOWS FILING NO. 12	AUGUST 1987
MOUNTAIN SHADOWS FILING NO. 12A	FEBRUARY 1992
MOUNTAIN SHADOWS FILING NO. 16	JULY 1987
MOUNTAIN SHADOWS FILING NO. 17	APRIL 1988
MOUNTAIN SHADOWS FILING NO. 18, 22 & 23	JULY 1991
MOUNTAIN SHADOWS FILING NO. 19	MARCH 1989
MOUNTAIN SHADOWS FILING NO. 21	FEBRUARY 1992
MOUNTAIN SHADOWS FILING NO. 23	FEBRUARY 1992
MOUNTAIN SHADOWS FILING NO. 26	FEBRUARY 1991
MOUNTAIN SHADOWS FILING NO. 31	JANUARY 1993
REED RANCH FILINGS NO'S 2 & 4	NOVEMBER 1992

JR Engineering, Ltd.

CLIENT RIDGE JOB NO. 8503.99

PROJECT CENTENNIAL BLVD BY RIH CHK. BY DATE 6-23-93

SUBJECT FLOW SPLIT SCHEMATIC - TYRONE / WICKES SHEET NO. 1 OF 1



F.I.M.S. DRAINAGE MAP

SCHEMATIC FLOW DIAGRAM