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File 1982-0068 Project Name: Redlands Parkway – Flood Plain Permit
Date 8/16/02

Present	Scanned	
		A few items are denoted with an asterisk (*), which means they are to be scanned for permanent record on the in some instances, not all entries designated to be scanned by the department are present in the file. There are also documents specific to certain files, not found on the standard list. For this reason, a checklist has been provided. **Remaining items, (not selected for scanning), will be marked present on the checklist. This index can serve as a quick guide for the contents of each file.** **Files denoted with (**) are to be located using the ISYS Query System. Planning Clearance will need to be typed in full, as well as other entries such as Ordinances, Resolutions, Board of Appeals, and etc.**
X	X	***Summary Sheet – Table of Contents**
X	X	**Review Sheet Summary**
		Application form
		Review Sheets
X		Receipts for fees paid for anything
		***Submittal checklist**
		***General project report**
		Reduced copy of final plans or drawings
		Reduction of assessor's map
		Evidence of title, deeds
		***Mailing list to adjacent property owners**
		Public notice cards
		Record of certified mail
		Legal description
		Appraisal of raw land
		Reduction of any maps – final copy
		***Final reports for drainage and soils (geotechnical reports)**
		Other bound or nonbound reports
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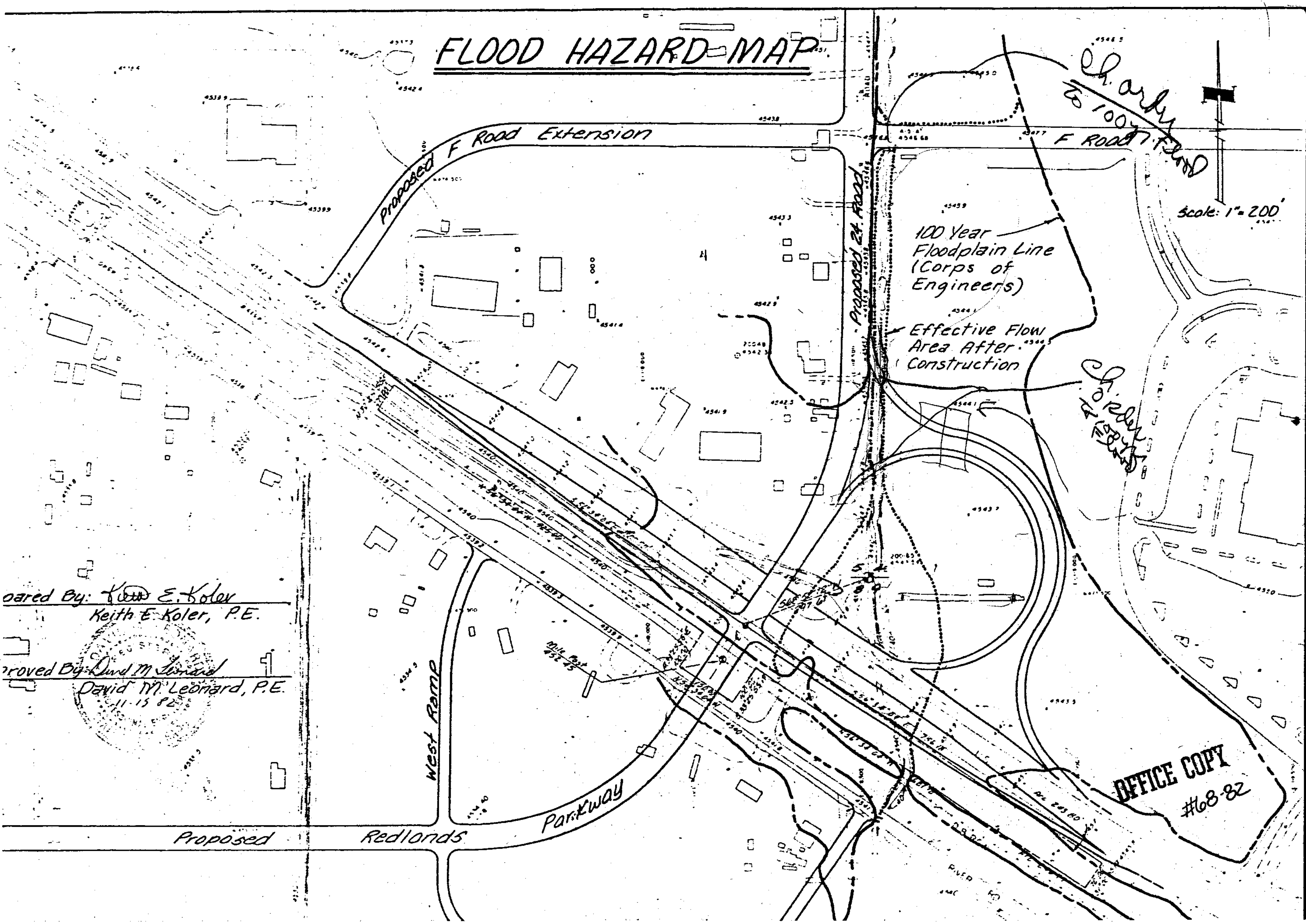
DOCUMENTS SPECIFIC TO THIS DEVELOPMENT FILE:

		Action Sheet	X		Leach Creek – Water Surface Profiles
		Review Sheet Summary	X		In-flow – Outflow Hydrographs ancillary Construction
		Review Sheets	X	X	Flood Hazard Map
X		Flood Plain Permit	X	X	Letter from Keith Koler to Ron Rish re: Impact of 54" extension-12/16/82
X	X	Letter from Bob Goldin to Armstrong Eng. re: response to application-1/4/83	X		Daily Sentinel article "Flood plain regulation stalls overpass work" - no date
X	X	Letter from Bob Goldin to Armstrong Eng. re: follow-up of discussion-12/6/82	X		Letter from Donald Pettygrove to Ron Rish re: bid opening bids-10/13/82
X	X	Flood Plain Development Permit	X	X	Memo from Jim Patterson to Ron Rish re: comments in response to 10/4/82 letter from Pettygrove – 10/22/82
X		Letter from James Bragdon to Randy Sanman re: traffic control plans approved – 1/6/83	X	X	Letter from Bob Goldin to Armstrong & Assoc. re: time frame – 12/29/82
X	X	Letter from James Bragdon to Randy Sanman re: observations of traffic control – 1/4/83			
X	X	Memo from Ron Rish to Bob Goldin re: hydraulic analysis – 12/23/82			



Architects
Engineers
Planners
Surveyors
Soil Testing
Material Testing
US Mineral Surveyors
Geotechnical Engineers

ARMSTRONG & ASSOCIATES, INC.

861 Rood Avenue
Grand Junction, Colorado 81501
(303) 245-3861

725 S. Broadway Suite 16
Denver, Colorado 80209
(303) 777-4601

Redlands Parkway Overpass
Mesa County Colorado

Project No. 823770
Date 09-30-82
Revisions

Drawn
Checked
Approved

Site

Development Department

CITY - COUNTY PLANNING
grand junction-mesa county 559 white ave. rm. 60 grand jct.,colo. 81501
(303) 244-1628

December 6, 1982

Armstrong Engineering
861 Rood
Grand Junction, CO 81501

Attention Dave Leonard

Dear Dave:

This letter is merely a follow-up of our discussion of 12/6/82.

Enclosed is a copy of the City Engineer's response to your floodplain permit application for the Redlands Parkway overpass.

Through discussions with the City Engineer, the Assistant County Administrator, County engineering Supervisor, Keith Corey and yourself, the City is looking for direction regarding upstream storm detention facilities of Leach Creek which could determine how we (the City) review the permit. In addition, we will need the following to complete our analysis:

1. The City would prefer some type of firm written agreement or assurances with an acceptable time frame of when these upstream facilities may occur. The County would be responsible for this.

2. The City will need responses to the City Engineer's memo for the hydraulic analysis, time frames of Highway 6 & 50 culvert expansions, and alternatives if Mesa Village never develops.

3. From the administrative aspect, clarification on #7 precedent setting - precedent could be set by allowing less than adequate flow through the area for this project in relation to new or proposed development which may occur.

If you have questions, you can contact myself or Ron Rish. We have not at this time, approved or denied your floodplain permit application. However, by our regulations, we are required to keep

you informed of our progress.

Thank you for your continued cooperation in this matter.

Sincerely,

Bob Goldin
Floodplain Administrator

BG/vw

xc: Mark Eckert
Keith Corey
Ron Rish
File

File

CITY OF GRAND JUNCTION, COLORADO

MEMORANDUM

Reply Requested
Yes ☐ No ☐

Date
December 6, 1982

To: (From:) Bob Goldin From: (To:) Ron Rish RRR

Subject: Revised Floodplain Development Permit Application for Redlands Parkway Overpass at 24 Road and U. S. 6 & 50

As requested, I have reviewed the above as prepared by Armstrong & Associates, Inc., and received by me on November 15, 1982, and I have the following comments.

1. Based on the submitted calculations it appears the 100 year flood flow in Leach Creek can be passed through the proposed channel modifications and proposed culvert crossings without overtopping the roads or flooding adjacent properties.

2. The existing structures under U.S. Highway 6 & 50 will cause ponding during the 100 year flood due to lack of capacity. It seems a shame to propose "future" expansion of these structures especially since this project is so large and also since it is necessary to extend the structures now anyway to accommodate the interchange.

3. The application discusses "short term" increased erosion to be expected north of F Road. Does the County know when Mesa Village will correct this situation? What if development plans are postponed?

4. In my October 22, 1982, memo to Jim Patterson (which was transmitted to Armstrong & Associates on October 26, 1982) I asked for a submittal of a hydraulic impact analysis of the proposed 54 inch Ranchmen's Ditch extension and irrigation structures on the 54 inch drain under Mesa Mall. To date, I have not received anything on this and the Floodplain Permit Application does not address it.

I discussed the above with Dave Leonard by telephone this morning.

cc - Mark Eckert
Keith Kory
Jim Patterson
File

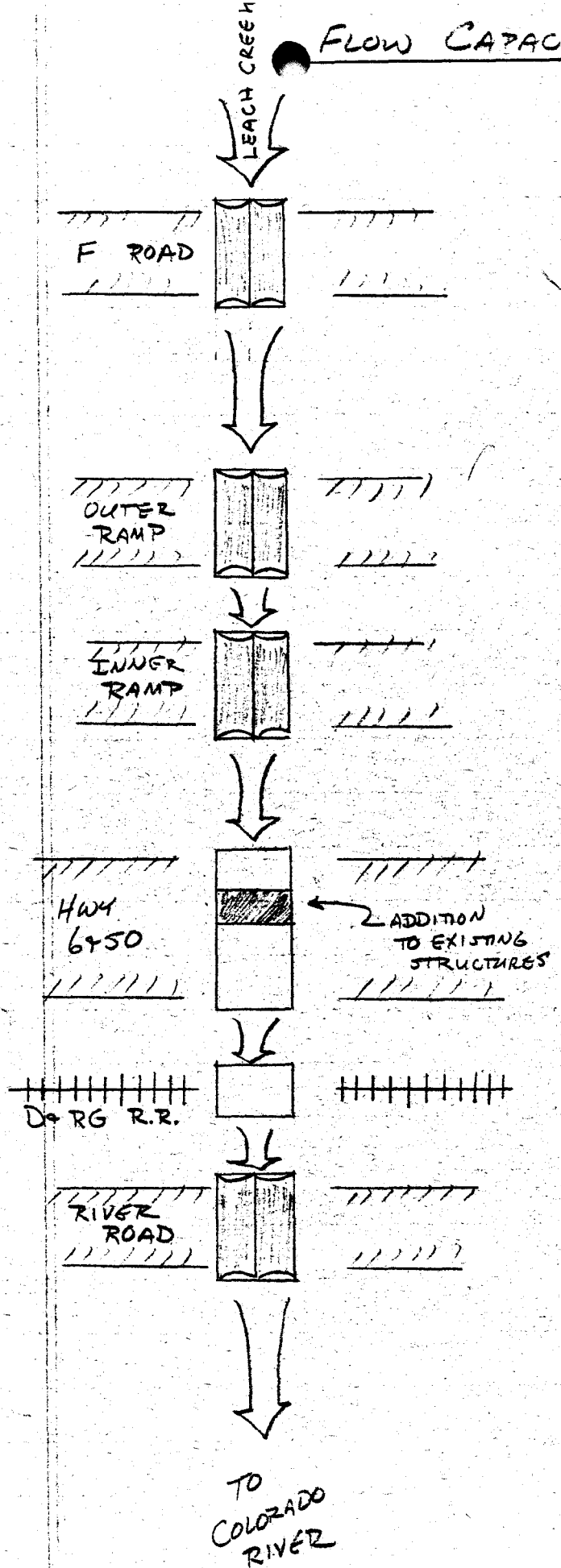
RECEIVED MESA COUNTY DEVELOPMENT DEPARTMENT
DEC 06 1982

- Discussed memo w/ Armstrong

FLOW CAPACITY SUMMARY

KEK
11/9/0?

1/6



STRUCTURE SYMBOL	FLOW (Q) CAPACITY
A	1808 cfs
B	1,808 cfs
C	1,808 cfs
D	1,363 cfs
E	2,718 cfs
F	1,808 cfs

LEACH CREEK
100yr storm Q = 1800 cfs

FROM CORPS of ENGINEER'S
FLOOD HAZARD REPORT

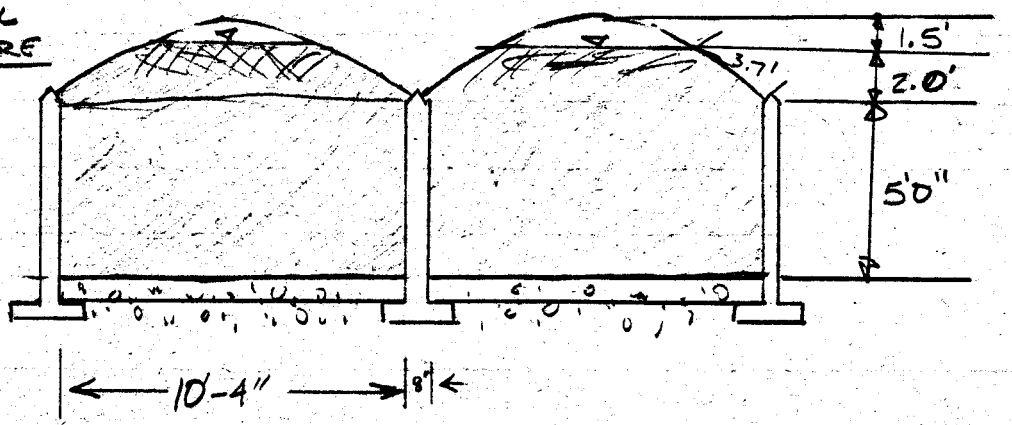
11/9/82
KEK

GIVEN: TWIN STRUCTURES A, B, C, F

2/6

TYPICAL STRUCTURE
N.T.S

S = 0.6 %



REQ'D: DETERMINE Q_{MAX} FOR STRUCTURES A, B, C, F

SOLUTION: Assume n = 0.017 Unfinished Concrete Wal
n = 0.024 CMP

$$n_{AVE} = \frac{[2(5.00)(.017) + (5.0)(.024) + (10.33)(.017)}{(10.0 + 5.0 + 10.33)}$$

$$= .466 / 25.33$$

$$= .0183$$

$$R_h = A/P$$

$$= [(5.0)(10.33) + 20] / 25.33$$

$$= (51.65 + 20) / 25.33$$

$$= 2.83$$

11/9/05
KEK
3/6

USE MANNING'S EQ

$$V_1 = \left(\frac{1.49}{n}\right)(R_h)^{2/3}(S)^{1/2}$$

$$= (1.49/.0183)(2.83)^{2/3}(.006)^{1/2}$$

$$= (81.42)(2.00)(.0775)$$

$$= 12.62 \text{ ft/sec}$$

$$Q_1 = A\,V_1$$

$$= (71.65)(12.62)$$

$$= 904 \text{ cfs}$$

$$Q_{MAX} = Q_1 + Q_2 = 2Q_1$$

$$= \underline{1808 \text{ cfs}} \longleftarrow$$

9/21/82
PB

LOW CAPACITY

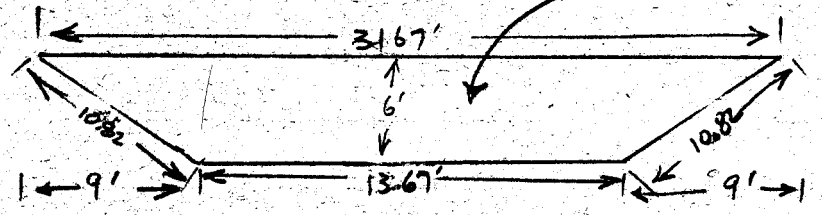
LEACH CREEK STRUCTURES

4/6

(EXISTING)

(1) **Bridge - Hwy 6 & 50** (Hwy Dept Data)

Waterway Area = 136 SF (Hwy Dept)



Assume $n = 0.030$ (Ted - Bureau Rec.)

$$R_h = A/P$$
$$= (136\ SF)/[(13.67) + 2(10.82)]$$
$$= 3.85\ FT$$

$$S = (36.19 - 35.92)/88'$$
$$= 0.0031$$

USE MANNINGS EQ

$$V = \frac{1.49}{n} R_h^{2/3} S^{1/2}$$
$$= (1.49/.030)(3.85)^{2/3}(0.0031)^{1/2}$$
$$= (49.67)(2.46)(.0557)$$
$$= 6.87\ ft/sec$$

$$Q = VA$$
$$= (6.87)(136)$$
$$= \underline{926\ cfs} \longleftarrow$$

823891
KEK
11-9-82

FLOW OVER HIGHWAY 6&50 5/6

ASSUMING FLOW APPROXIMATES A BROAD CRESTED WEIR

$Q = C L H^{3/2}$

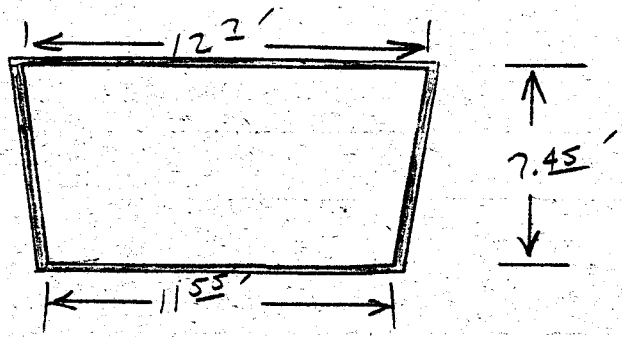
Q= Discharge
C= Variable Coefficient of Discharge
L= effective length of crest
H= Head on the Crest

C= 3.087
L= 400'
H= 0.5'

$Q = 3.087 (400)(0.5)^{3/2} = 437$ cfs

TOTAL Q PAST 6&50 = 926 + 437 = 1363 cfs

(2) Bridge - RR



$$\text{Area} = [(12.7' + 11.55')/2](7.45')$$
$$= 90.33 \text{ SF}$$

Assume $n = 0.017$ (Unfinished Concrete Channel)

$$R_h = A/P$$
$$= (90.33)/[(11.55) + 2(7.45)]$$
$$= 3.42 \text{ FT}$$

$$S = (34.12 - 33.80)/14$$
$$= 0.0228$$

$$V = \frac{1.49}{n} R_h^{2/3} S^{1/2}$$
$$= (1.49/.017)(3.42)^{2/3}(.0228)^{1/2}$$
$$= (87.65)(2.27)(.1512)$$
$$= 30.1 \text{ ft/sec}$$

$$Q = VA$$
$$= (30.1)(90.33)$$
$$= 2,718 \text{ cfs} \leftarrow \text{THEORETICAL}$$

ACTUAL VELOCITY PROBABLY LOWER DUE TO EFFECTS FROM RIVER FLO

ARMSTRONG & ASSOCIATES, INC.
861 Rood Avenue — Grand Junction, Colorado 81501 — (303) 245-3861

December 16, 1982

City of Grand Junction
250 North 5th Street
Grand Junction, CO 81501

Attn: Ron Rish, P.E.

Re: Impact of 54" RCP extension on Independent Ranchman's Ditch (823890)

Dear Mr. Rish,

In accordance with your request of October 22, 1982, I have enclosed calculations concerning the above noted subject. Also enclosed are the drawings I have been able to find on the system.

If you have further questions, please let me know.

Respectfully Submitted,

ARMSTRONG & ASSOCIATES, INC.

Keith E. Koler

Keith Koler, P.E.

KK/lb

encl.

cc: Keith Corey

NCK
12/82

AT EXISTING INLET, STA 53+68.34, 40' RT. of PATTERSON Rd.
INV. ELEV. = 4549.68 ✓, LOW POINT ABOVE PIPE ELEV. = 4555.1
PIPE IS 81"x59" CSP, S = 0.35%,

HW_{MAX} = 55 - 49.68 = 5.32', HW/D = 1.10
FROM CHART, Q_{MAX} = 170 cfs ← SEE ATTACHMENT #1
$Q = VA$, $V = Q/A = 170^{cfs}/26\ ft^2 = 6.5$ fps ← ie max. capacity for entrance control only @ 24½ & F Rd.

MITERED END ∴ Ke = 0.7
ENTRANCE LOSS = $He = Ke \frac{V^2}{2g} = (.7)\frac{6.5^2}{64.4} = \underline{\underline{0.46'}}$

CALC. PIPE LOSS (FT PER FT)

$$S = \frac{(nV)^2}{2.21 R^{4/3}} = \frac{(.032 \times 6.5)^2}{2.21 \times 1.39^{4/3}} = .013 \text{ ft/ft.}$$

PIPE LENGTH to Connection w/ 54"ϕ RCP = 200 L.F.

$$H_f = 200 \times .013 = \underline{\underline{2.6'}}$$

Velocity thru 54"ϕ RCP = $Q/A = 170/15.9 = 10.7$ fps.
HORIZONTAL BEND LOSS
$K_b = .25\sqrt{\frac{\theta}{90}}$ $\theta = 71°$ $K_b = .22'$ $H_b = .22\left(\frac{10.7^2}{64.4}\right) = \underline{\underline{.39'}}$

PIPE LOSS TO STA 5+00

$$S = \frac{(nV)^2}{2.21 R^{4/3}} = \frac{(.013 \times 10.7)^2}{2.21 \times 1.125^{4/3}} = .007 \text{ ft/ft.}$$

$H_f = 300 \times .007 = \underline{2.1'}$

HORIZONTAL BEND LOSS (PARTIAL)
STA 3+00 to 3+75 ($\pm 16.5°$)

$K_b = .25\sqrt{\frac{16.5}{90}} = .111$

$H_b = .11\left(\frac{10.7^2}{64.4}\right) = \underline{.20'}$

PIPE LOSS STA 3+00 to 3+75

$H_f = 75 \times .007 = \underline{.53'}$

JUNCTION LOSS from 12" ϕ LATERAL @ 3+75 — SEE ATTACHMENT #2

$H_J = K_J \frac{V^2}{2g}$

$(H_J + D_1 - D_2)\left(\frac{A_1 + A_2}{2}\right) = \frac{Q_2^2}{A_2 g} - \frac{Q_1^2}{A_1 g} - \frac{Q_3^2}{A_3 g}\cos\theta$

$Q_1 = 170$ cfs	$Q_2 = 180$ cfs	$Q_3 = 10$ cfs
$A_1 = 15.9$ ft^2	$A_2 = 15.9$ ft^2	$A_3 = .79$ ft^2
$d_1 = 54"$	$d_1 = 54"$	$d_3 = 12"$
$D_1 = 4.5'$	$D_2 = 4.5'$	$D_3 = 1.0'$
		$\theta = 90°$

$H_J + 4.5 - 4.5\left(\frac{15.9+15.9}{2}\right) = \frac{180^2}{15.9(32.2)} - \frac{170^2}{15.9(32.2)} - \frac{10^2}{.79(32.2)}(\cos 90°)$

$15.9\, H_J = 6.84$

$\underline{H_J = .43'}$

KEK
12/82

$Q = 180 = V(15.9)$ NEW $V = 11.3$ fps

BEND LOSS 3+75 to $4+28.5$ (12.5°)

$K_b = .25\sqrt{\frac{12.5}{90}} = .09$

$H_b = .09 \frac{11.3^2}{64.4} =$ $= \underline{.18'}$

NEW $S_f = \frac{(.013 \times 11.3)^2}{2.21 \times 1.125^{4/3}} = .008$ ft/ft

PIPE LOSS STA 3+75 to STA $4+28.5$

$H_f = 53.5 \times .008$ $= \underline{.43'}$

PIPE LOSS STA $4+28.5$ to STA 6+31

$H_f = 202.5 \times .008$ $= \underline{1.62'}$

PIPE LOSS STA 6+31 to STA 825.17

$H_f = 194.17 \times .008$ $= \underline{1.55'}$

BEND LOSS STA 6+31 to STA 8+25.17

$K_B = .25\sqrt{\frac{44.5}{90}} = .18$

$H_B = .18 \frac{11.3^2}{64.4} =$ $= \underline{.36'}$

PIPE LOSS 8+27.17 to 12+75

$H_f = 447.83 \times .008$ $= \underline{3.58'}$

KEK
12-82

JUNCTION LOSS FROM 12" CATERAL @ 12+75

$Q_1 = 180$ cfs $Q_2 = 190$ cfs $Q_3 = 10$ cfs

$A_1 = 15.9\ ft^2$ $A_2 = 15.9\ ft^2$ $A_3 = .79\ ft^2$

$d_1 = 54"$ $d_2 = 54"$ $d_3 = 12"$

$D_1 = 4.5'$ $D_2 = 4.5'$ $D_3 = 1.0'$

$\theta = 48°$

$$\left(H_J + \cancel{4.5 - 4.5}\right)\left(\frac{15.9+15.9}{2}\right) = \frac{190^2}{\cancel{18.9}(32.2)}\ \cancel{70.5} - \frac{180^2}{\cancel{15.9}(32.2)}\ \cancel{63.3} - \frac{10^2}{\cancel{.79}(32.2)}\ \cancel{2.63}\left(\cos 48°\right)$$

$$15.9\, H_J = 4.6$$

$H_J =$ .29'

NEW VELOCITY $Q: 19.0 = V(15.9)$ $V = 11.9$ fps

$$S_f = \frac{(.013 \times 11.9)^2}{2.21 \times 1.125^{4/3}} = .009'/'$$

PIPE LOSS STA 12+75 to STA 12+82.67

$H_f = 7.67 \times .009 =$ .07'

PIPE LOSS STA 12+82.67 to STA. 13+80.84

$H_f = 98.17 \times .009 =$ .88'

BEND LOSS STA 12+82.67 to STA 13+80.84

$K_B = .25\sqrt{\frac{12.5}{90}} = .125$

$H_B = .125 \times \frac{11.9^2}{64.4} =$ .27'

KEK
12-82

PIPE LOSS STA 13+80.84 to STA 25+56.58

H_f 1175.66 X .009 = 10.6'

PIPE LOSS STA 25+56.58 to STA 26+65.58

H_f = 109.08 X .009 = .98'

Bend loss STA 25+56.58 to 26+65.58 (END EXISTING)

$K_b = .25\sqrt{\frac{25}{90}} = .13$

$H_b = .13 \times \frac{11.9^2}{64.4}$ = .29'

TOTAL HEAD LOSSES to this POINT = 27.81'

TOTAL HEAD AVAILABLE = 10.0', WATER LEVEL of LEACH CREEK = 4545, WATER LEVEL AT PIPE INLET BEFORE OVERFLOW = 4555. PIPE CARRYING CAPACITY WILL BE REDUCED.

ie 27.81 ft. of head required to get 170 cfs thru the system under Mesa Mall but only 10.0 ft. of head is physically available.

TRY 60 cfs, I.E. CAPACITY of SIPHON UNDER HIGHWAY 6

$Q = VA \qquad V = 60/26 = 2.31$ fps.

ENTRANCE LOSS = $H_e = .7\left(\frac{2.3^2}{64.4}\right) = .06'$

PIPE LOSS

$$S_f = \frac{(.032 \times 2.3)^2}{2.21 \times 1.39^{4/3}} = .002'/'$$

$H_f = 200 \times .002 = .40'$

$V_{54"} = 60/15.9 = 3.8$ fps

$$S_f = \frac{(.013 \times 3.8)^2}{2.21 \times 1.125^{4/3}} = .001'/'$$

BEND LOSS

$K_b = .22, \quad H_b = .22 * \frac{3.8^2}{64.4} = .05'$

PIPE LOSS 0+00 to 3+00

$H_f = 300 \times .001 = 0.30'$

BEND LOSS (PARTIAL)

$K_b = .11 \quad H_b = .11\left(\frac{3.8^2}{64.4}\right) = .02'$

PIPE LOSS 3+00 to 3+75

$H_f = 75 \times .001 = .08'$

KEK
12/82

Junction Loss @ 3+75

Q_1 = 60 cfs Q_2 = 70 cfs Q_3 = 10 cfs

H_J = .16'

V_{70} = 70/15.9 = 4.4 fps.

Bend Loss 3+75 to 4+28.5

K_B = .09, H_b = .09 $\frac{4.4^2}{64.4}$ = .03'

S_{f70} = $\frac{(.013 \times 4.4)^2}{2.21 \times 1.125^{4/3}}$ = .001'/'

Pipe Loss 3+75 to 4+28.5

H_f = 53.5 x .001 = .05'

Pipe Loss 4+28.5 to 6+31

H_f = 202.5 x .001 = .20'

Pipe Loss 6+31 to 8+25.17 =

H_f = 194.17 x .001 = .19'

Bend Loss 6+31 to 8+25.17

K_b = .18, H_b = .18 $\frac{4.4^2}{64.4}$ = .05'

Pipe Loss 8+27.17 to 12+75

H_f = 447.83 x .001 = .45'

KEK
12/82

JUNCTION LOSS @ 12+75

Q_1 = 70 cfs Q_2 = 80 cfs Q_3 = 10 cfs

H_J = .02'

V_{80} = 5.0' fps

S_{f80} = .002'/.

PIPE LOSS 12+75 to 12+82.67

H_f = 7.67 x .002 = .02'

PIPE LOSS 12+82.67 to 13+80.84

H_f = 98.17 x .002 = .20'

BEND LOSS STA 12+82.67 to 13+80.84

K_b = .125 $H_b = .125 \frac{5^2}{64.4}$ = .05'

PIPE LOSS STA 13+80.84 to 25+56.5

H_f = 1175.66 x .002 = 2.35'

PIPE LOSS STA 25+56.5 to 26+65.58

H_f = 109.08 x .002 = .22'

BEND LOSS 25+56.5 to 26+65.58

K_b = .13, $H_b = .13 \frac{5^2}{32.2(2)}$ = .05'

TOTAL HEAD LOSS = 4.95' OK < 10.0', TRY 90 cfs.

KEK
12/82

TRY 90 cfs

$Q = VA \quad V = 90/26 = 3.5$ fps

ENTRANCE Loss = $H_c = .7\left(\frac{3.5^2}{64.4}\right) = .13'$

Pipe Loss

$S_f = .004$ ft/ft

$H_f = 200 \times .004 = .80'$

$V_{54"} = 90/15.9 = 5.7$ fps

$S_f = .002$ ft/ft

Bend Loss	= .11'
Pipe Loss 0+00 to 3+00	= .60'
Bend Loss	= .06'
Pipe Loss 3+00 to 3+75	= .15'
Junction Loss @ 3+75	= .23'

$V_{100} = 6.3$ fps

$S_{f100} = .003$ ft/ft

Bend Loss 3+75 to $4+28^{.5}$	= .06'
Pipe Loss " " "	= .16'
" " $4+28^{.5}$ to 6+31	= .61'
" " 6+31 to $8+25^{.17}$	= .58'
Bend loss " "	= .11'
Pipe loss $8+25^{.17}$ to 12+75	= 1.34'

KEK
12/82

Junction Loss @ 12+75

Q_1 = 100 cfs Q_2 = 110 cfs Q_3 = 10 cfs

H_5 = .09'

V_{110} = 6.9 fps

S_{f110} = .003'/.

Pipe Loss	12+75 to $12+82^{67}$	= .02'
"	" $12+82^{67}$ to $13+80^{84}$	= .29'
Bend Loss	" "	= .09'
Pipe Loss	$13+80^{84}$ to $25+56^{5}$	= 3.53'
"	" $25+56^{5}$ to $26+65^{58}$	= .33'
Bend Loss	" "	= .10'

TOTAL HEAD LOSS = 9.5' ≈ 10.0'

The capacity of the existing system during the 100 year flood event is approximately 90 cfs

KEK
12/82

$S_{f110} = 0.003^{1/1}$

$H_f = 280 \times .003 = \underline{0.84'}$

this represents the increased head loss from the 280 LF. of 54" RCP Peoposed to be constructed during the overpass construction.

total Head loss including this is 10.34'. total carrying capacity of the system will still be ± 90 cfs.

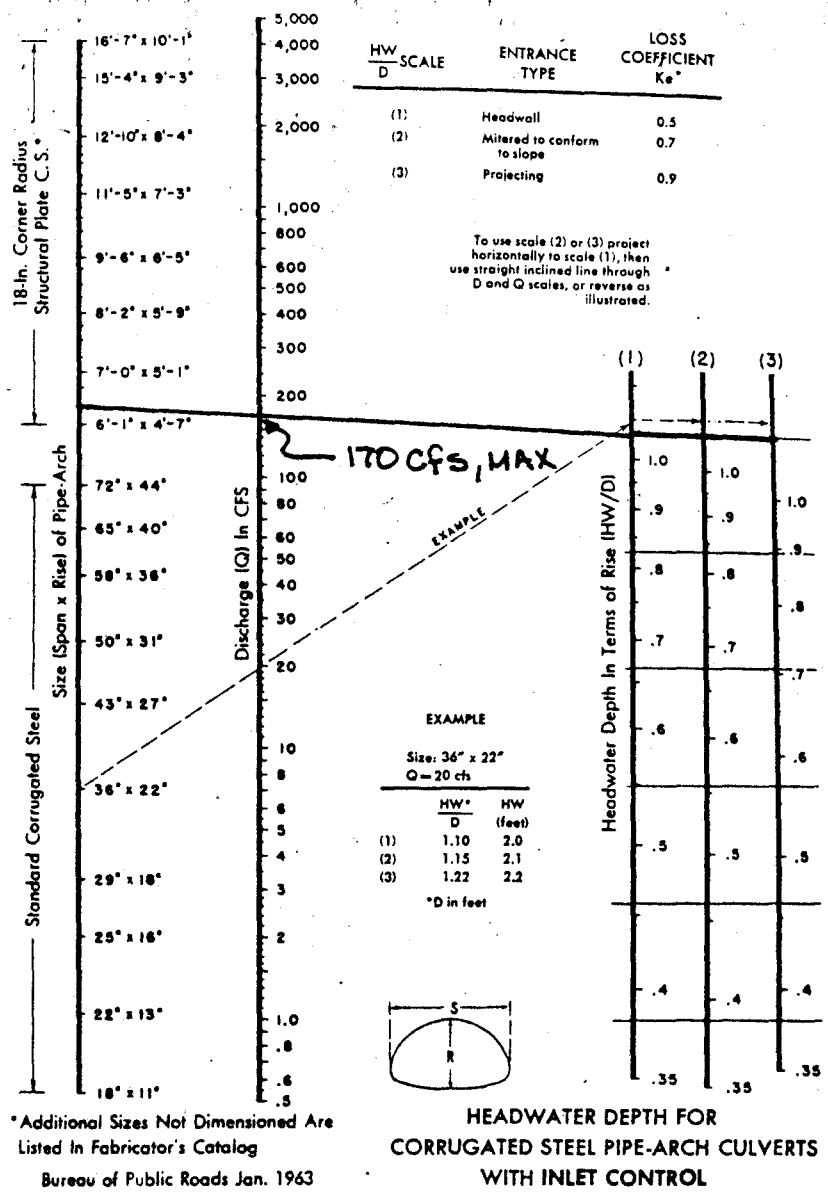


Fig. 4-20. *Inlet control* and headwater depths for corrugated steel *pipe-arch* culverts. Headwater depth should be kept low because pipe-arches are generally used where headroom is limited.

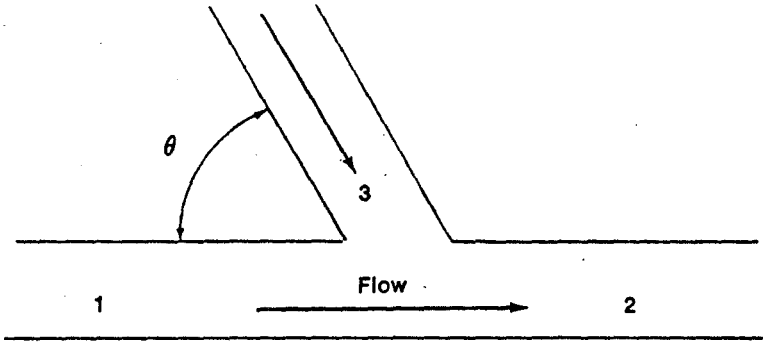
Manhole Junction Losses

Losses at junctions where one or more incoming laterals occur may be estimated by combining the laws of pressure plus momentum where H_j is equal to the junction losses.

$$H_j = K_j \frac{V^2}{2g}$$

using the laws of pressure plus momentum

$$(H_j + D_1 - D_2) \frac{(A_1 + A_2)}{2} = \frac{Q_2^2}{A_2 g} - \frac{Q_1^2}{A_1 g} - \frac{Q_3^2}{A_3 g} \cos\theta$$



If more detailed hydraulic calculations of junction losses are desired then reference should be made to available literature on the subject. A number of charts to aid the designer in estimating junction losses are provided in these references (16, 22, 23).

Bend Losses

Bend losses may be estimated from the equation:

$$H_b = K_b \frac{V^2}{2g}$$

For curved sewer segments where the angle is less than 40° the bend loss coefficient may be estimated as:

$$K_b = .25 \sqrt{\frac{\phi}{90}}$$

where: ϕ = central angle of bend in degrees

For greater angles of deflection and bends in manholes the bend loss coefficient may be determined from Figure 3-31.

CITY OF GRAND JUNCTION, COLORADO

MEMORANDUM

Reply Requested
Yes ☐ No ☐

Date
December 23, 1982

To: (From:) Bob Goldin

From: (To:) Ron Rish RPR

Subject: Floodplain Permit Application for Redlands Parkway Overpass at 24 Road and U. S. 6 & 50

Enclosed is a December 16, 1982, submittal from Armstrong & Associates of the hydraulic analysis requested in comment No. 4 of my December 6, 1982, memo.

The submittal demonstrates that the proposed interchange improvements will increase the flood elevation at 24½ and F Road 0.34 ft. However, the 54 inch pipe through Mesa Mall does not have 100 year flood capacity at present.

The following summary discussion of their findings is offered to help you "through the numbers".

On page 1 they estimate the "entrance" capacity at 24½ Road and F Road is 170 cfs. However, on pages 1 through 5 by calculating the various pressure losses required to overcome bends, structures, pipe roughness, etc., they show that 27.81 ft. of pressure head would be required to "push" 170 cfs through the 54 inch pipe system while only 10.0 ft. of elevation difference is physically present.

Therefore, on pages 6 through 8 they "try" a lesser flow of 60 cfs to predict how much pressure head would be required. 4.95 ft. (vs. the 10.0 ft. available) is predicted. Therefore they "try" a flow of 90 cfs and find that it would require 9.5 ft. vs the 10.0 ft. available. From this it is deducted that although the entrance at 24½ and F Rds. would pass 170 cfs, the various system constraints in the 3000 L.F. existing piping through Mesa Mall will only allow 90 cfs through with the elevation difference available from entrance to outlet.

It is also implied on page 11 that the 0.34 ft. of increased system pressure required by the 280 ft. pipe extension proposed is not significant when compared to the serious system capacity deficiencies which exist. I agree.

Also enclosed is a copy of my review comments of September 15, 1978, submitted as requested by the Development Department when Mesa Mall was being planned. I have never received any feed back from anyone concerning those comments which included concern about the sizing of the proposed Ranchmen's Ditch piping through the Mall.

Enclosure

cc w/encl: Keith Corey - Mesa County
John Kenney
Jim Patterson
Jim Taylor
File

REVIEW SHEET

O: City Engr

Date Item Submitted to Planning Office: 8/25/78

TEM: Bulk Development - Mesa Mall

Date Sent to Review Dept. 8/25/78

tem #: C 48-77

ocation: Northeast of 24 Road and U.S. Highway 50 (Approxm F Road)

eveloper or Petitioner: Wayne Fisher, General Growth Properties

ddress: c/o P.O. Box 40

hone: 242-4903

The attached plat has been sent to your office for your review and comments. Failure to object or comment within 21 days after receipt of same, shall constitute approval by your office.

Comments: (1) Roadway plans for Relocated F Road show 24' mat with gravel shoulders (Note Leach Creak Bridge plan shows 22' mat). On August 22, 1978, Mesa County Commissioners by resolution adopted Alt. 3 of the Horizon/Patterson EIS which designates F Road as a 4-lane major arterial to its terminii at Hwy 6&50. The choice of 24 Rd. or 24½ Rd. as the major-arterial connection should be the subject of Preliminary Design Phase by Mesa County. In either case the other road (24 or 24½) also needs at least collector treatment. Intersection treatments at Hwy 6&50 should be as approved by Colo. Div. of Hwys. On Sept. 11, 1978, MCC directed Ted Ford to engage a consulting engineer to do prel. design of a Colo. River bridge to connect Goat Draw to Hwy 6&50 near 24 Rd. This also emphasizes the significance of the arterial connections of F Road to Hwy 6&50.

(See other side also →

end to: Planning Department, P.O. Box 897, Att: Larry Rasinski

eviewing Office City Engr-Pub. Works By Ron Rish Date Sept. 15, 1978

Use additional sheets if necessary.

CC: Patterson 9-15-78

Draft 1 of the Mesa County Road Standards submitted to me with Conni McDonough's memo of Aug 31, 1978, shows a divided, curbed parkway with 6' bike/ped paths on 120' R.O.W. for an urban principal arterial standard. I feel this category is appropriate for Mesa Mall at its proposed location of F Road and 24 Rd. (F and 24 or 24½ Rds around)

Western Engineer plans submitted show relocating the Ranchman's Ditch through the shopping center in a 54" RCP @ 0.0032 ft/ft. This checks out to have a "full flow" capacity of 130 cfs ±.

Corps of Engrs. "Flood Hazard Information Report", Nov. 1976, shows Q_{100} = 600 cfs @ Ind. Ranchmen's Ditch @ 26½ Rd. (2 mile drainage area) which is 2 miles upstream from Mesa Mall.

NHPQ "Master Drainage Plan", April, 1975, shows 3600 cfs existing capacity and 2280 cfs = Q_{100} in the ditch @ 25½ Rd which is 1 mile upstream from Mesa Mall.

How will a 100 yr. flood be routed through (or around) Mesa Mall in light of all the above.

CITY - COUNTY PLANNING
grand junction-mesa county 559 white ave. rm. 60 grand jct.,colo. 815
(303) 244-1628

December 29, 1982

Armstrong & Associates
ATTN: Keith Koler
861 Rood Avenue
Grand Junction, CO 81501

Dear Keith:

As a result of your analysis of Ranchman's Ditch, the floodplain review by the City Engineer (enclosed), and conversations with Bob Carman representing the County, the following timeframe is anticipated:

1. First part of the week of January 3rd, preliminary meeting with the City and the County to discuss the floodplain permits and issues.

2. Monday afternoon, January 3rd, County meeting with Bob Carman and representatives to discuss structural features.

3. Mid to late week of January 3rd, discussion regarding the actual issuance of the City and County floodplain permits. At this time, any modifications or stipulations will be presented and required in regard to the permits.

Please note: Until such time that the floodplain permit is issued, no modification, construction or alterations within the designated 100 year floodplain can occur (Sec. 5-8, Grand Junction Zoning and Development Code).

Thank you for your continued cooperation in this matter.

Sincerely,

Bob Goldin
Floodplain Administrator

BG/mm

xc: Ron Rish
Bob Carman
Keith Cory
Mark Eckert

~~DAISC~~ file FP for Redlands

CITY OF GRAND JUNCTION, COLORADO

MEMORANDUM

Reply Requested
Yes ☐ No ☐

Date
Oct. 22, 1982

To: (Rxxxx) Jim Patterson From: (Xx:) Ron Rish RPR

SUBJECT: Redlands Parkway Overpass - 24 Road and Highway 6 & 50.

The following comments are offered in response to an October 4, 1982, letter from Donald Pettygrove of Armstrong & Associates in which he requested written comments prior to October 26, 1982. (Copy attached.) Would you please incorporate these comments with yours, Ralph Sterry's and Jim Bragdon's in a City response to his request.

1. Jim Bragdon should review the proposed intersection geometry, traffic signal system and signal phasing for 24 Road and F Road intersection.

2. Leach Creek 100 year floodplain analysis should be submitted to Bob Goldin for review.

3. Leach Creek flood capacity should be maintained at all times during construction.

4. The hydraulic impact analysis of the proposed 54 inch Ranchmen's Ditch extension and irrigation structures on the 54 inch drain under Mesa Mall should be submitted to the City Engineer for review.

5. The Contractor should be required to contact Ralph Sterry prior to <u>any</u> work affecting River Road Interceptor Sewer.

I am enclosing the two sets of plans (#15) and the Detailed Specifications for your use.

Enclosure

cc: Bradgon
Goldin ✓
Sterry

Redlands F Parkway FP File

City of Grand Junction, Colorado 81501
250 North Fifth St.

January 4, 1983

Mr. Randy Sanman
Peter Kiewit Sons' Co.
916 - 18 Road
Fruita, CO 81521

Dear Mr. Sanman:

I received today a copy of your traffic control plan for the F Road closure and I would like to offer the following observations:

1. F Road is a City street and is not under the jurisdiction of the Colorado Department of Highways. Until such time as a detailed and geometrically correct traffic control plan is submitted to me (on a basis other than "FYI") and approved in writing, F Road between 24 Road and 24½ Road is NOT to be closed.

2. In developing your traffic control plan, F Road motorists should be warned in advance of 24½ Road that the road is closed at 24 Road. There should also be a signed detour set up using G Road for those motorists going to I-70.

3. I do not see any indication of a time frame for the closure. I would like to have a schedule for the closing and re-opening and paving of the 24 Road and F Road intersection.

Ron Rish, City Engineer, indicated to your representative at the pre-construction meeting on December 8, 1982, that I was to be contacted in order to work out details for handling traffic on F Road during the construction work. To date the only contact I have had was the "FYI" sketch. I have been and will be available to discuss this matter at any time. However, please remember that F Road is NOT to be closed until everything is worked out.

Very truly yours,

James A. Bragdon Jr.

James A Bragdon, Jr. P.E.
Transportation Engineer

JAB/hm

FP permit file
Redlands Parkway

Development Department

CITY - COUNTY PLANNING
grand junction-mesa county 559 white ave. rm. 60 grand jct.,colo. 81501
(303) 244-1628

January 4, 1983

Armstrong Engineers
ATTN: Dave Leonard
861 Rood Avenue
Grand Junction, CO 81501

Dear Dave:

This letter is in response to your application for a floodplain permit for the Redlands Parkway Overpass, that portion within the City Limits of Grand Junction.

As previously discussed regarding your most current application of November 12, 1982, the City Engineer found those structures as shown in the application to be acceptable in meeting the requirements of the 100 year floodplain requirements as referenced in Sec. 5-8, Grand Junction Zoning and Development Code.

The application and accompanying documents of the November 12, 1982, Floodplain Permit submittal will replace those documents (the plans for the bid package) of October 27, 1982, submitted and reviewed with the original application.

Given those materials as submitted, the City of Grand Junction therefore approves the floodplain permit.

It is recommended, however, that the following items be considered prior to construction of Redlands Parkway Overpass:

1. A mutual commitment of the City, County and State Highway Dept. to resolve the Highway 6 & 50 culvert crossing to pass the 100 year flood flow. It is recognized that the existing situation with the culvert is not desirable, but that it is outside the jurisdiction of this department to control.

2. Upstream retention facilities regarding Leach Creek and other potential flood hazard areas be analyzed as possible alternatives for the future.

3. The commitment from Mesa Village to improve the Patterson (F) Road culvert at 24 Road be examined to incorporate possible improvements there to pass the 100 year flood flow, with possible City/County participation.

4. Continued cooperation of the City and County in regards to construction and development along 24 Road within the designated 100 year floodplain to accommodate the requirements of the City and County floodplain regulations.

We hope you find this acceptable. Enclosed is a copy of the floodplain permit. Original is on file in this department (File 68-82).

Sincerely,

Bob Goldin
Floodplain Administrator

BG/mm

Enc.

xc: Jim Wysocki
Gerald Ashby
Ron Rish
Jim Patterson
Bob Carman
Keith Corey
Mark Eckert
Mesa Mall
LaBelle's
Mesa Village
File
Bob Moston

Redlands Parkway FP File

JAN 12 1983

FLOODPLAIN DEVELOPMENT PERMIT

An application has been made for placement of 4 double arch culverts in Leach Creek along the east side of 24 Road line from the south side of River Road to the north side of F Road.

> Common location of the site is just east of 24 Road from just south of River Road to 100 feet north of F Road as relocated (Leach Creek mile stationing is from 2.0 to 3.65 mile.)

A summary of the permit application process follows:

Initial application was made for a Floodplain Development Permit on October 26, 1982. The body of the material submitted dealt with a hydrology report and a flood hazard report. Later submittals included culvert design hydrographs and profiles. Also, the application included statements of "no affect" of this operation on adjoining people and property.

Materials provided by the applicant and subsequent review have enabled the following evaluations to be made:

1) The culvert design as submitted on November 12, 1982, will adequately handle the water of the 100-year flooding event described in the application.

2) Channel improvements will allow the design 100-year flooding event to remain within the channel area except at the Highway 6 & 50 structure.

3) Restrictions at the Highway 6 & 50 structure will cause floodwater to flow west along Highway 6 & 50.

Therefore, this Floodplain Development Permit for 4 double arch culverts in Leach Creek is granted subject to the following conditions:

1) The applicant shall proceed in conformity with all applicable federal and state statutes as well as all local regulations; including, but not limited to, subdivision regulations, zoning regulations, and building codes.

2) An unrestricted roadside ditch shall be constructed along the north side of Highway 6 & 50 to the F Road extension.

3) The Engineer shall supply a letter to the Floodplain Administrator stating that the earthwork, grading and reclamation of the site was completed as outlined in final Project Plans. This letter shall be submitted as soon as possible after the completion of the reclamation activity.

4) All recommendations of the City Floodplain Administrator on the City Floodplain Permit issued January 4, 1983, shall be considered as recommended.

This permit applies only to the proposal as identified in the application and may not be expanded or transferred.

This permit shall be valid for one year from the date of issuance. If substantial commencement relative to the original purpose of this permit has not begun during that one year, this permit shall become invalid at that time. Extension of a Floodplain Development Permit shall be achieved only through the application, review, and evaluation process as required for the original permit.

Sincerely,

H. Keith Corey

H. Keith Corey
Mesa County Floodplain Administrator

Date: 1-11-82

AMENDMENT TO FLOODPLAIN DEVELOPMENT PERMIT

This permit is for placement of 4 double arch culverts in Leach Creek along the east side of 24 Road from the south side of River Road to the North side of F Road.

This amendment is to amend paragraph number 3 under Conditions, to read:

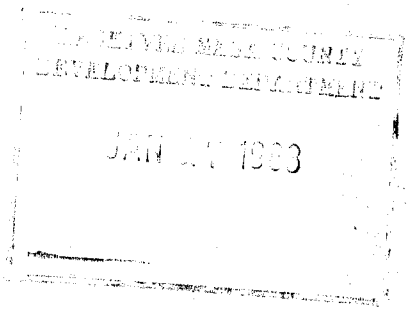
> The Engineer shall supply a letter to the Floodplain Administrator stating that the earthwork, grading and reclamation of the site was completed as outlined in the final Project Plans and Adendums and Change Orders attached thereto. This letter shall be submitted as soon as possible after the completion of the reclamation activity.

Sincerely,

H. Keith Corey

H. Keith Corey
Mesa County Floodplain Administrator

1-14-83



1. Susceptibility of Proposed Facilities to Flood Damage

No proposed facilities will be susceptible to severe flood damage. The disturbed portions of the channel will be graded and seeded to reduce erosion and degradation of the adjoining embankments from flood waters (please see plan details for additional information).

2. Proposed Use

The short term use of the property will be for construction of the roadway and ancillary facilities.

The long term use of the property will be by the general motoring public.

3. Water and Wastewater Systems Contamination

Water and wastewater systems will not be significantly changed from their current design or condition. Possible contamination from wastewater systems or contamination to water systems will not be increased from current probabilities and in most cases, contamination possibilities will be decreased with the roadway and ancillary improvements.

4. Importance of Improvements Service to Community

The road improvements will provide necessary service to the community by providing improved roadways in keeping with current and future roadway needs. In addition, the Redlands Parkway Overpass improvements will provide improved safety features to the current roadway which has less than ideal safety features.

5. Requirement for Location along Leach Creek

Construction of Redlands Parkway Overpass at this location is necessary because of its relative location to other key community transportation corridors, i.e., F Road, U.S. Hwy 6 & 50, Redlands Parkway and the 24 Road interchange at I-70. Current and future land uses providing necessary goods and services such as Mesa Mall and other business and commercial enterprises also warrant the proposed improved roadway.

6. Compatibility with Present & Future Development

The construction of the proposed improvements are expected to improve the compatibility of existing and future land uses by providing roadways in keeping with existing and future needs.

Given that the Leach Creek Channel has a capacity of 960 cfs* and that the U.S. Highway 6 & 50 structure has the capacity to pass approximately 930 cfs, no reason could be found to size the proposed structures to pass the total stream flow anticipated.

With continued enforcement of the Mesa County Drainage Regulations, i.e. limiting outflows from developments to 2 year historic flows, the storm flow along Leach Creek will decrease with time.

Additionally, Mesa County, in cooperation with certain developers, is investigating the cost effectiveness of construction of a series of storm water retention-detention facilities, which would further decrease the design discharge of Leach Creek.

4. Increased Erosion Downstream

No increase in erosion to downstream properties is anticipated to occur as a result of Redlands Parkway Overpass construction. Flood waters will not be accelerated or directed in a way that would increase erosion above the existing potential for erosion.

5. Additional Public Expenditures

No additional public expenditures for dike or bridge maintenance will be necessitated by the construction of Redlands Parkway Overpass. Maintainability should be increased by these improvements.

6. Applicant's Advantage

The applicant will not gain undue advantage compared to later applicants.

7. Materials Swept Away

No floatable or un-anchored materials will be kept or stored as a part of the Redlands Parkway Overpass improvements.

8. Downstream Contamination

Waste disposal systems, toxic chemical and/or bateriological substances will not be used or be a part of the proposed construction.

PRESERVATION WATERCOURSE

The watercourse will not be affected by the proposed roadway improvements. The efficiency and capacity of the

*Drainage in the Grand Valley, Mesa County, Colorado, March, 1981.

7. Precedent Setting and Similar Permits

No precedent will be set by granting this permit. Requests for similar permits are not probable in this location and would only occur in the distant future when the proposed Redlands Parkway Overpass or highway improvements become obsolete.

8. Access

Access to properties within and adjoining Leach Creek flood hazard areas will be improved by the construction of this road.

9. Channel Relocation

No channel relocation is included in the Redlands Parkway Overpass Project.

EFFECTS CONVEYED UPSTREAM AND DOWNSTREAM

1. Velocity and Depth Characteristics

The hydraulic carrying capacity of Leach Creek will not be reduced by Redlands Parkway Overpass.

2. Danger to Life and Property

With the construction of Redlands Parkway Overpass, no increased danger to life and property will occur upstream or downstream at the time of a flooding event.

3. Increase in Depth of Flood Waters

Inflow - outflow hydrographs for the proposed and existing structures that are to remain in service have been included in the attachments. The hydrographs show that a portion of the flow will be detained by the proposed structure at 24 Road and F Road. It should also be noted that the existing capacity of the Leach Creek channel is 960 cfs. All flow in excess of this amount will be over bank flow.

The hydrographs also show that a portion of the flow will be detained by the existing U.S. Highway 6 & 50 structure. This stream flow obstruction is the critical obstruction in this segment of Leach Creek and is expected to remain for many years as the structure has an estimated remaining service life of over 50 years.

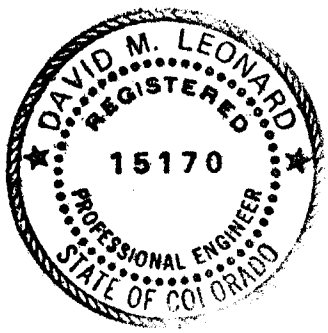
watercourse to transmit and discharge floodwaters, and the capacity of floodplain areas to absorb floodwaters will be preserved.

Please call Armstrong & Associates, Inc., if you have any questions or concerns.

Prepared by Armstrong & Associates, Inc.

David M Leonard

David M. Leonard, PE
Executive Vice President



10-26-82