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**RED MOUNTAIN FREEWAY
LOCATION STUDY**

**ANALYSIS OF
ALTERNATIVE B - MODIFIED**

Prepared for

THE CITY OF MESA
and
ARIZONA DEPARTMENT OF TRANSPORTATION



Prepared and Submitted by

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

December 1986

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David K. French, PE
Principal

December 5, 1986

Mr. Arnold Harring
Transportation Director
CITY OF MESA
Transportation Department
P.O. Box 1466
Mesa, Arizona 85201

RE: Red Mountain Freeway Location Study

Dear Arnold:

Enclosed is the analysis of Alternative B-Modified. This analysis summarized results of meetings held with affected governmental agencies, estimates of construction and right-of-way costs and evaluation of probable impacts on the community.

Based on the findings of this analysis it is concluded that Alternative B-Modified is superior to Alternative B. It is also concluded that Alternative B-Modified provides solutions to two key concerns which have cast some doubt on the previous recommendation of Alternative B over Alternatives A and AA, namely:

1. Flood protection for the freeway.
2. Noise and visual impacts on the surrounding community.

It is therefore concluded that Alternative B-Modified offers the most favorable location for the Red Mountain Freeway from Bush Highway to University Drive.

Your review and comments will be appreciated.

Very truly yours,

PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

Howard L. Pilkington
Howard L. Pilkington, P.E.
Project Manager

HLP/alm

cc: John Louis, ADOT
Kebba Buckley, FCDMC
Dave French
Mike Davis

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**RED MOUNTAIN FREEWAY
LOCATION STUDY
SPOOK HILL DAM RELOCATION**

Analysis of Alternative B-Modified

A. INTRODUCTION

The Red Mountain Freeway Location Study included evaluation of five alternative alignments from a location about one half mile north of McDowell Road and Bush Highway to a location at University Drive near Ellsworth Road. The results of the evaluation were presented to the public at a location public hearing held in Mesa on September 17, 1986. One of the location alternatives presented, labeled "Alternative B", is located immediately upstream of the current floodplain area of the Spook Hill Flood Retarding Structure (FRS). The route location generally parallels the FRS for a distance of 4.0 miles. This freeway location would require that all floodwaters be passed under the freeway to reach the floodplain in order for the FRS to function as designed.

A suggestion, resulting from the public hearing, was to move Alternative B to the vicinity of the existing Spook Hill Dam and relocate the present Spook Hill Dam to the upstream side of the Red Mountain Freeway, thereby eliminating extensive drainage problems inherent with the presented Alternative B alignment.

Parsons Brinckerhoff was directed to consider the feasibility of this Alternative B modification and dam relocation using community and environmental impacts and costs as the primary criterion. A further modification was then developed to retain the existing dam, build the freeway on the upstream side of the existing dam and build a new dam immediately upstream from the freeway.

The following constraints regarding the Spook Hill Dam and flood storage area were established:

1. The principal spillway was not to be relocated or revised.
2. The emergency spillway was not to be relocated or revised.

3. Existing design criteria established by the Soil Conservation Service (SCS) would be maintained. This criteria includes 1,866 acre-feet of storage to the crest of the emergency spillway and 4,000 arce-feet of total storage capacity.
4. The inlet channel and splash pool from the other flood control dams upstream would remain as they presently exist.

The present Spook Hill Dam is on the east side of the existing CAP Canal. Material for construction of the current dam was obtained from the proposed CAP Canal and from the storage area for the dam. A low flow channel parallels the existing dam from the splash pool at the southerly terminus of the dam to the principal spillway located approximately 2,000 feet north of McDowell Road. The emergency spillway is immediately south of the principal spillway.

The construction of a new dam upstream from the freeway would require constructing replacement storage capacity because the present dam uses the existing topography for storage capacity. Since the elevation of the emergency spillway and the top of the new dam will remain the same as the present dam, constructed (excavated) storage will be needed with the new dam to obtain the same storage capacity. We propose to leave the present dam in place and locate the proposed new dam from 255 feet to 330 feet east of the existing dam. The Red Mountain Freeway (Alternative B-Modified) would be constructed between the two FRS structures. (See Figures 1 and 2.)

B. RIGHT-OF-WAY REQUIREMENTS

The proposed new Spook Hill FRS will require additional right-of-way to restore the existing drainage detention capacity. The area required would be a strip of land adjacent, approximately 72 acres, to the existing FCDMC right-of-way owned by the Flood Control District of Maricopa County (FCDMC).

The existing FCDMC right-of-way totals 480 acres. Freeway Alternative B-Modified will require approximately 185 acres of existing FCDMC right-of-way between the existing and proposed new dams. In discussions with the Flood Control District staff, it was indicated that ADOT would be requested to purchase the 72 acres and transfer in fee title the 72 acres to the Flood Control District in exchange for fee title to the 185.0 acres needed for the freeway. The resultant FCDMC right-of-way would be 367 acres, a reduction of 123 acres. However, excavation within the resultant 367 acres would restore flood storage capacity to the existing amount.

C. COST ESTIMATE

Table I lists the cost estimate for Alternative B and Alternative B-Modified. The replacement storage capacity for the new dam and reservoir will require the excavation of approximately 4.5 million cubic yards of material. The new dam will require approximately 1.4 million cubic yards for construction. Some of the excess material could be used to fill between the two dams for the base of the new freeway.

**TABLE I
COST ESTIMATES**

	Alt. B	Alt. B-Modified
Freeway Construction	\$36,200,000	\$31,600,000
Right-of-Way		
For Freeway	21,700,000	
For Enlarged Flood Storage Area		11,700,000
Flood Control		
Drainage Under Freeway	5,000,000	
New Dam and Storage Area Excavation		13,200,000
	\$62,900,000	\$56,500,000

D. AGENCY MEETINGS:

A meeting to establish procedural and technical criteria was held with representatives of ADOT, City of Mesa Transportation Department, the Flood Control District of Maricopa County (FCDMC) and Parsons Brinckerhoff on October 29, 1986. The Alternative B-Modified concept was discussed. The general consensus was that the modification is feasible and a meeting should be arranged to obtain input from the Soil Conservation Service. The possibility of delay by 4(f) requirements during the Environmental Assessment process was discussed. Parsons Brinckerhoff agreed to investigate this possibility. It was later determined that 4(f) would not be a factor (see memorandum enclosed).

The meeting was then held with the SCS, FCDMC, City of Mesa, ADOT and Parsons Brinckerhoff on November 3, 1986. There was no objection expressed from SCS to the proposed new dam and reservoir. SCS indicated that the new dam should meet current SCS standards. The SCS would need to review the plans should the new dam be designed. It was also brought up by the SCS that the new dam would have to be approved by the State Department of Water Resources.

Another meeting was arranged with the City of Mesa Transportation Department, Parsons Brinckerhoff, ADOT and the City of Mesa Parks Department on November 17, 1986 and with the Spook Hill Park Citizens Advisory Committee on November 26, 1986. The purpose of the meetings was to inform the Parks Department of the Alternative B-Modified concept and to receive input. It was learned that the City of Mesa has a lease agreement with the FCDMC to establish a linear park on the existing floodway.

There was no major objection expressed to the proposed new dam. The main concern was the timing of the two projects and possible loss of total land available for park use. Mesa proposes to start construction of certain elements of the park within a few years but the freeway is not scheduled for construction until 1990 to 1995. The idea of having the bottom of the storage reservoir undulate with variable elevations rather than being flat was discussed. This would leave certain higher locations which would not be flooded during 10 and 20 year floods. It appears that such a configuration may be possible, however, careful considerations will be needed during the design of the FRS to make sure that flows are not impeded and that adequate storage is provided.

In summary, there have been no serious objections to the Alternative B-Modified from government agencies with an interest in the Spook Hill Dam.

E. EVALUATION:

1. Advantages of Alternative B-Modified

- a. The freeway would be located between two earth dams. The earth dams would act as noise barriers and visual barriers, shielding the surrounding neighborhoods from noise and visual impacts.
- b. The estimated cost of construction of Alternative B-Modified is less than Alternative B.

- c. The proposed Mesa City Park east of the CAP would have better access to local streets than it would have with Alternative B.
- d. The freeway would be protected from cross drainage flows for up to the 100-year frequency storm by the new dam; pavement drainage will have to be provided as part of the freeway design.

2. City of Mesa Park

The proposed City of Mesa Park consists of land west of the CAP, land east of the CAP in the floodway and land east of the floodway. Table I shows the effect on the total areas of the park by Alternatives B and B-Modified.

TABLE II

	ALTERNATIVES	
	<u>B</u>	<u>B-Modified</u>
Total Available Park Land (Acres)*		
Existing	962.0	962.0
Highway Right-of-Way	-54.1	-185.0
New Floodway Right-of-Way	0.0	+71.9
Net Available Park Land (Acres)*	<u>907.9</u>	<u>848.9</u>
Available Park Land East of the C.A.P. (Acres)*		
Existing	541.7	541.7
Highway Right-of-Way	-54.1	-185.0
New Floodway Right-of-Way	0.0	+ 71.9
Net Available Park Land (Acres)*	<u>487.6</u>	<u>428.6</u>
Available Park Land Severed (Acres)*	<u>-54.6</u>	<u>0.0</u>
Net Available Contiguous Park Land (Acres)*	433.0	428.6

* Includes land owned by the Flood Control District of Maricopa County and available for use as a park.

3. Other Considerations

- a. Timing - The Red Mountain Freeway is scheduled for construction in 1990 to 1995. However, the City of Mesa is moving forward on plans for the development of the park. To facilitate the park development, if Alternative B-Modified is adopted, design of the freeway from Bush Highway to University Drive could be completed early with construction of the new dam, freeway earthwork, drainage and the bridge crossing of McDowell Road, McKellips Road, and Brown Road completed to meet the schedule of the Mesa Parks Department.
- b. Soil Conditions and Topography - Prior to conceptual design of the freeway, dam and flood storage area, additional topographic mapping should be obtained. The existing topography maps were completed before the existing dam was completed and the estimate of construction of the new dam is based on the old topographic maps.

The soil borings taken for the Spook Hill Dam do not give enough information in the area of the proposed dam. Additional borings should be taken to insure that suitable material is available for the dam and to determine the type of substructure needed for the dam.

F. CONCLUSIONS

It has been concluded that, based on this preliminary analysis, Alternative B-Modified offers significant advantages over Alternative B, including:

- Improved freeway flood protection.
- Decreased freeway noise impact on the surrounding community.
- Visual shielding of the freeway from the surrounding community.
- Less adverse impact on access to the proposed City of Mesa park.
- Lower construction and right-of-way costs.

Disadvantages include:

- Decrease in available park land.
- Scheduling differences for park and freeway construction.

Parsons Brinckerhoff

Parsons Brinckerhoff Quade & Douglas, Inc.
Engineers • Architects • Planners

Memorandum

To: Project Participants/File
From: Mike Davis, Environmental Analyst
Subject: Red Mountain Freeway Potential 4(f) Action

Date: October 30, 1986

Job:

Mike

I called Ken Davis, Federal Highway Administration (FHWA) District Engineer, for the Mesa area to determine if there was any possibility that 4(f) could become an issue during the Environmental Assessment (EA) process for the Red Mountain Freeway project.

Section 4(f) of 1966 U.S. Department of Transportation Act outlines procedures to be followed for the protection and preservation of parks and recreational lands potentially affected by highway projects using Federal funding or FHWA approvals.

I explained to Ken that the Red Mountain Freeway project would involve the U.S. Soil Conservation Service (SCS) by impacting the Spook Hill Dam. One of the suggested alternatives would require the dam to be relocated into an area that has been designated as a park by the City of Mesa.

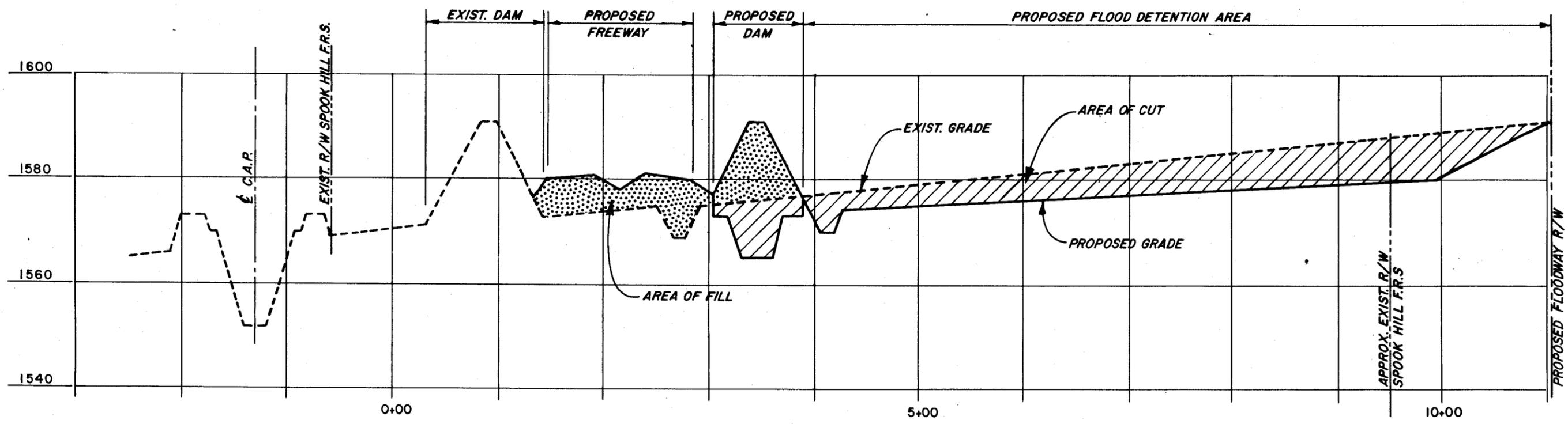
Ken replied that he was positive that 4(f) would not be an issue. He based this determination on the fact that 4(f) actions are only administered by the FHWA and they would not be involved in funding the project or giving any approvals on the Red Mountain Freeway project.

Ken did say, however, that FHWA has a policy on "piecemealing" projects where 4(f) could be involved. This would potentially occur when Federal funding is used on one portion of a contiguous project and not on an intervening segment where 4(f) properties exist and then used again on the remaining segments of the project. Should this occur, FHWA would require that a 4(f) statement be prepared for the intervening segment.

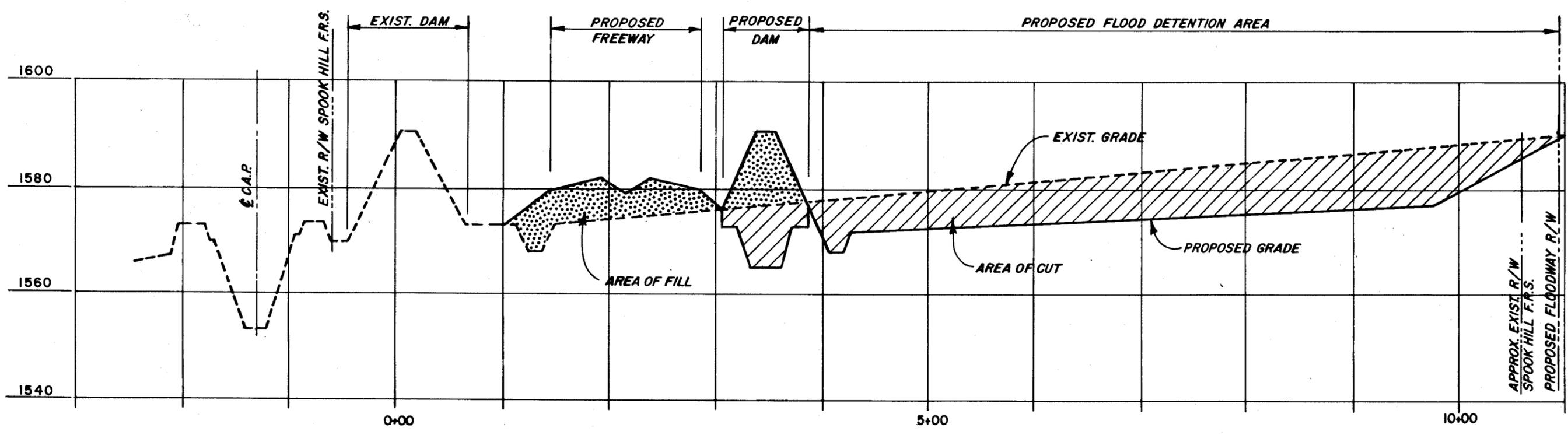
In addition, Ken said that since the SCS is potentially a responsible agency that the proposed EA would probably need to comply with National Environmental Policy Act (NEPA) regulations. SCS policy, in this regard, should be reviewed to determine their criteria and requirements.

Since Arizona Department of Transportation (ADOT) environmental guidelines closely resemble those outlined in NEPA, it is anticipated that there will be no special considerations out of the ordinary now that 4(f) is no longer a significant issue.

JMD/ksl

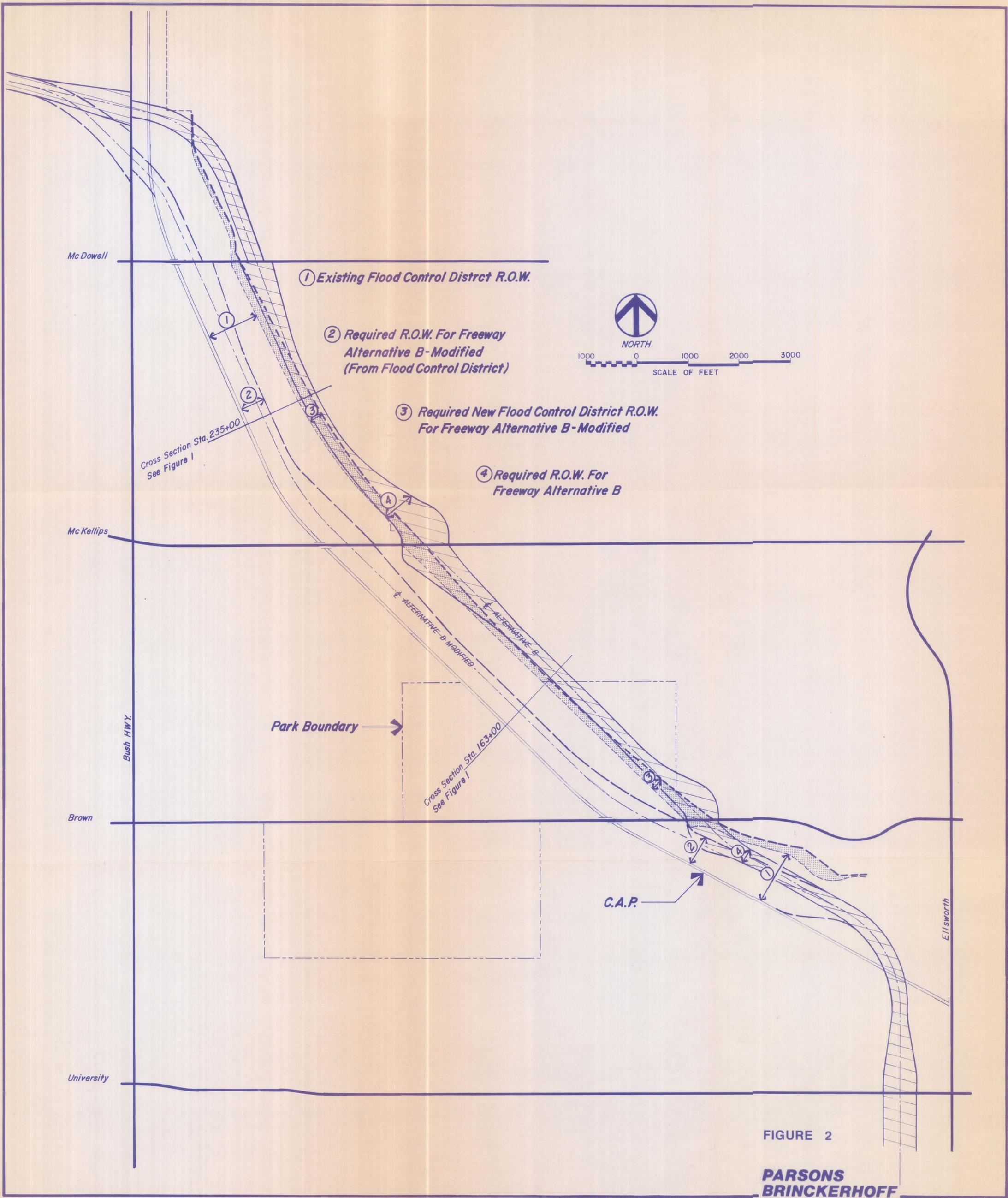


CROSS SECTION AT SPOOK HILL F.R.S. STATION 163+00



CROSS SECTION AT SPOOK HILL F.R.S. STATION 235+00

FIGURE 1



① Existing Flood Control District R.O.W.

② Required R.O.W. For Freeway Alternative B-Modified (From Flood Control District)

③ Required New Flood Control District R.O.W. For Freeway Alternative B-Modified

④ Required R.O.W. For Freeway Alternative B

Cross Section Sta. 235+00
See Figure 1

Cross Section Sta. 163+00
See Figure 1

Park Boundary

C.A.P.

FIGURE 2

PARSONS
BRINCKERHOFF