INITIAL ASSESSMENT

Dallas Floodway Extension
Reevaluation of the Cadillac Heights
Floodplain Evacuation Measure

Purpose

Section 219(a) of the Water Resources Development Act of 1999 (WRDA 1999) directs that the U.S. Army Corps of Engineers (Corps) calculate benefits for nonstructural flood damage reduction using methods similar to those used in calculating the benefits for structural projects, including similar treatment in calculating the benefits from losses avoided. Further, Section 219(b) provides for the reevaluation of a previously authorized flood control project to consider nonstructural alternatives in light of the economic evaluation changes, if requested by the non-Federal sponsor.

By letter dated April 19, 2001 (Exhibit 1), the City of Dallas requested that the Corps recalculate the benefits and costs for the Cadillac Heights buyout alternatives which are documented in the Final General Reevaluation and Environmental Impact Statement (GRR/EIS), dated February 1999, for the Dallas Floodway Extension (DFE) Project. In response to the City's letter, this Initial Assessment was performed to determine if further, more detailed investigations would be warranted.

Background

The DFE project was authorized by Section 301, River and Harbor Act of 1965, and modified by Section 351 of WRDA 1996, as well as Section 356 of WRDA 1999. The authorized project consists of three major elements: 1) a Chain of Wetlands (1.5 miles upper; 2.2 miles lower), 2) a levee providing Standard Project Flood (SPF) level protection along Lamar Street which is 2.9 miles in length, and 3) a 2.3 mile long SPF levee protecting the Cadillac Heights neighborhood. In addition, the project includes 123 acres of wetlands for ecosystem restoration, and 31 miles of linear trails. The estimated total cost of the project is currently estimated to be $140.8 million, at Year 2001 price levels.

The recommended multipurpose project configuration cited above was the result of an extensive reevaluation study conducted by the Corps from 1991 thru 1999. A final General Reevaluation Report and Environmental Impact Statement was published in February 1999. The subsequent Record of Decision was signed on December 1, 1999, and the final Chief's report to the Assistant Secretary of the Army (Civil Works) was completed on December 7, 1999.

The project is currently undergoing the development of the Plans and Specifications for the initial segment to be constructed, which is referred to as "Cell D". "Cell D" is one portion of the Chain of Wetlands element, and is located immediately downstream and adjacent to the Interstate Highway 45 crossing of the Trinity River.

The ongoing design efforts performed are independent of the Cadillac Heights element of the project. Regardless of the flood damage reduction measures ultimately implemented for the Cadillac Heights area, the "Cell D" design efforts would not be affected, and thus, this work is continuing.

Plans Investigated

GENERAL

The area of consideration for purposes of this preliminary investigation was limited to those structures that would be protected or removed by construction of the Cadillac Heights element of the DFE Project, including a small number of residences along Rockefeller Street. Generally, this area is located on the right bank of the Trinity River, immediately upstream of the Central Wastewater Treatment Plant in southeast Dallas. Access to the area is primarily by means of Martin Luther King, Jr. Boulevard, a major thoroughfare in southeast Dallas. Figure 1 depicts the area relative to the other elements of the proposed DFE Project.

It is assumed that all other elements of the Dallas Floodway Extension would be constructed as designed, with the proposed evacuation measure being a last added element in lieu of the authorized Cadillac Height levee. Baseline conditions for this evaluation, therefore, assume the Chain of Wetlands and the Lamar Street levee to be fully constructed and functional.

For evaluation purposes, the floodplain evacuation measure, or buyout as it is commonly labeled, was evaluated in four increments. These were based on the varied flood zones in which each structure is located. Since damages under the baseline conditions first start within the 10 to 25-year flood zone, the first increment evaluated the feasibility of performing a buyout of all structures that would be located within the 25-year flood zone. The second increment consisted of all structures within the 50-year flood zone, which means an evaluation of all the structures within the original increment, in addition to all structures between the 25-year and 50-year levels. Similarly, the last two increments consist of all structures in the 100-year and Standard Project Flood (SPF) zones, respectively.

The study area is comprised primarily of single-family residential structures, comprising 78 percent of the total number of structures. Figure 2 identifies the structures within the study area. Also, the findings of the evaluation are presented for two scenarios: 1) residential properties only, and 2) all properties, commercial as well as residential. The “residential only” scenario is shown mainly for comparison purposes, because the Corps would only participate in complete solutions that would not leave scattered commercial properties that would continue to be threatened by flooding. In both scenarios, estimates of the demolition costs were developed using actual costs associated with the Corps’ Johnson Creek, Arlington project which is currently under development. These costs account for 65 to 70 percent of the total buyout expenditures.

The analysis for the evacuation plans utilized data contained in the General Reevaluation Report. As in the GRR, this analysis is based on April 1998 prices and level of development. A 50-year project life was assumed using the FY 1998 Federal Interest of 7.125 percent in order to provide a direct comparison to the alternatives provided in the GRR. No attempt was made to adjust the existing data to current price levels.

Under the implementation guidance provided, flood damage reduction benefits are equal to the total flood damages reduced. These include damage to the structure, vehicles and incidental damages (emergency, infrastructure, clean-up). The Dallas County Central Appraisal District (DCCAD) certified values were used as a proxy for the market values. Preliminary comparisons indicate that these values are within 10 percent of market values. Based on a preliminary evaluation of comparable structure values in the immediate vicinity surrounding the study area, no substantial difference in residential values was found when comparing floodplain versus non-floodplain properties. The DCCAD database, however, was found to contain a small percentage of inordinately low values for some structures within the floodplain. It was ascertained that structures carrying these lower values would require extensive repairs to bring them up to decent, safe, and sanitary (DSS) standards, as cited in the Section 219 implementation guidance. Based on the judgment of real estate acquisition professionals, approximately 40 percent of the maximum relocation assistance allowance can be attributable to meeting the required DSS standards in economically depressed areas. Therefore, the total economic cost of the buyout reflects an average $9,000 adjustment for the lower valued residential structures. It would also be necessary to purchase

scattered vacant parcels between improved parcels to assure proper floodplain management. Relocation costs for the commercial properties were estimated to average $66,000 for each commercial structure, with an added cost of $2,000,000 for relocating the meat packing plant. This estimate for relocation of the meat packing plant was based on an investigation previously conducted by the City of Dallas in 1996. As detailed in Table 1, the total economic cost of evacuation includes the purchase price of the damageable structures and associated lands, vacant lands between properties (community cohesion), structure demolition costs, moving costs for personal property, and the cost to remove the existing infrastructure.

Due to the preliminary nature of this analysis, determination of the demolition costs associated with each increment of the buyout plan required making a variety of assumptions. The assumptions relied heavily on previous completed Corps of Engineers' projects where actual detailed information was available. A list of assumptions utilized to estimate the demolition costs is contained in Exhibit 2. Upon implementation, detailed assessments would be required to develop a precise estimate of the demolition costs.

In addition to the costs shown in the following analyses, there would be additional financial costs incurred that are not used to compute the benefit-to-cost ratio, but these costs would have to be added to the total project implementation costs. Relocation assistance in an amount up to $22,500 would be available to each residential property owner in accordance with PL91-646 to aid them in relocating to property outside the flood plain. .

RESIDENTIAL ONLY SCENARIO

Table 1 provides a summary of the analysis of the evacuation of residential structures by varying flood levels. For the buyout of the entire SPF flood zone, 229 structures would be purchased and removed for approximately $8.1 million. Additionally, there would be approximately $5.2 million in financial costs associated with this buyout, resulting in a total project cost of $13.2 million to implement the SPF residential buyout plan. The project first cost of the 100-year and 50-year levels would be about $4.4 million and $3.4 million, respectively, with additional financial costs of $2.9 million and $2.3 million. Table 2 shows these costs on an annualized basis, and compares them to the flood damage reduction benefits achieved from the buyout to determine a benefit-to-cost ratio for each increment. As shown, the benefit-to-cost ratio for the evacuation of each of these flood zones is below unity and, therefore, fails to meet the economic feasibility criteria (BCR > 1) to qualify for Federal interest.

Table 1

Cadillac Heights Floodplain Evacuation Initial Assessment
Determination of Total Cumulative Costs and Benefits
Residential Only Structures

Costs

Flood Zone	Num	Structures	Land	Vacant	Subtotal
0-25	12	$238,400	$18,000	$18,000	$274,400
0-50	102	$1,604,000	$153,000	$153,000	$1,910,000
0-100	131	$2,078,200	$196,500	$196,500	$2,471,200
0-SPF	229	$4,052,400	$343,500	$343,500	$4,739,400

Flood Zone	Num	DSS	Demolition	Moving	Subtotal	Economic	Additional Financial	Total Project
0-25	12	($108,000)	$271,200	$12,000	$175,200	$449,600	$270,000	$719,600
0-50	102	($918,000)	$2,305,200	$102,000	$1,489,200	$3,399,200	$2,295,000	$5,694,200
0-100	131	($1,179,000)	$2,960,600	$131,000	$1,912,600	$4,383,800	$2,947,500	$7,331,300
0-SPF	229	($2,061,000)	$5,175,400	$229,000	$3,343,400	$8,082,800	$5,152,500	$13,235,300

Annual Benefits

Flood Zone	Num	Expected Annual Damages			
		Structures	Incidental	Vehicle	Total
0-25	12	$5,100	$1,000	$400	$6,500
0-50	102	$29,800	$5,600	$3,300	$38,600
0-100	131	$34,200	$6,400	$4,200	$44,800
0-SPF	229	$41,000	$7,600	$7,300	$56,000

Note: All damages have been counted as benefits in accordance with Section 219 of WRDA 1999. Incidental damages take into consideration infrastructure damages, flood insurance costs, emergency management costs, and flood fighting costs.

Table 2

Cadillac Heights Floodplain Evacuation Initial Assessment
Benefit- to-Cost Computation
Residential Only Structures

Description	*25-year Zone*	*50-year Zone*	*100-year Zone*	*SPF Zone*
INVESTMENT				
Estimated First Cost	$449,600	$3,399,200	$4,383,800	$8,082,800
Annual Percentage Rate	0.07125	0.07125	0.07125	0.07125
Project Life (years)	50	50	50	50
Construction Period (mo)	18	18	18	24
Capital Recovery Factor	0.0736071	0.0736071	0.0736071	0.0736071
Interest During Const.	$24,000	$181,700	$234,300	$582,700
Investment Cost	$473,600	$3,580,900	$4,618,100	$8,665,500
ANNUAL CHARGES				
Interest	$33,700	$255,100	$329,000	$617,400
Amortization	$1,200	$8,500	$10,900	$20,400
O&M	$3,000	$22,500	$32,750	$57,250
Total Annual Charges	$37,900	$286,100	$372,650	$695,050
ANNUAL BENEFITS	$6,500	$38,700	$44,800	$56,000
Net Annual Benefits	($31,400)	($247,400)	($327,850)	($639,050)
Benefit-Cost Ratio	0.17	0.14	0.12	0.08
Cumulative Structures Removed	12	90	131	229

TOTAL EVACUATION SCENARIO

Table 3 provides a summary of the analysis of the evacuation of all structures, commercial and residential, by varying flood levels. For the buyout of the entire SPF flood zone, 294 structures would be purchased and removed for approximately $39.0 million. Additionally, there would be approximately $5.1 million in financial costs associated with this buyout, resulting in a total financial cost of $44.1 million for implementation of the complete SPF buyout. The project first cost of the 100-year and 50-year levels would be about $21.9 million and $15.8 million, respectively, with additional financial costs of $2.9 million and $2.3 million. Although residential structures account for over 75 percent of the flood plain properties, they contribute less than 10 percent to the total expected annual damages. Table 4 shows these costs on an annualized basis, and compares them to the flood damage reduction benefits achieved from the buyout to determine a benefit-to-cost ratio for each increment. As shown, the benefit-to-cost ratio for evacuation of each of these flood zones is below unity and, therefore, does not meet the economic feasibility criteria (BCR>1) to qualify for Federal interest.

Table 3

Cadillac Heights Floodplain Evacuation Initial Assessment
Determination of Total Costs and Benefits
All Structures

Costs

Flood Zone	Num	Structures	Land	Vacant	Subtotal
0-25	24	$1,923,300	$579,600	$298,800	$2,801,700
0-50	126	$4,914,000	$1,256,300	$704,700	$6,875,000
0-100	160	$8,007,600	$2,173,000	$1,184,700	$11,365,300
0-SPF	294	$13,335,500	$3,437,800	$1,890,700	$18,664,000

Flood Zone	Num	DSS	Demolition	Moving	Subtotal	Economic	Additional Financial	Total Project
0-25	24	($108,000)	$2,251,200	$2,738,000	$4,881,200	$7,682,900	$270,000	$7,952,900
0-50	126	($918,000)	$6,265,200	$3,620,000	$8,967,200	$15,842,200	$2,295,000	$18,137,200
0-100	160	($1,179,000)	$7,745,600	$3,979,000	$10,545,600	$21,910,900	$2,947,500	$24,858,400
0-SPF	294	($2,061,000)	$15,900,400	$6,453,000	$20,292,400	$38,956,400	$5,152,500	$44,108,900

Annual Benefits

Flood Zone	Num	Expected Annual Damages: Structures	Incidental	Vehicle	Total
0-25	24	$398,500	$74,100	$400	$473,000
0-50	126	$450,000	$83,700	$3,300	$537,000
0-100	160	$462,000	$85,900	$4,200	$552,100
0-SPF	294	$482,300	$89,700	$7,300	$579,300

Note: All damages have been counted as benefits in accordance with Section 219 of WRDA 1999. Incidental damages take into consideration infrastructure damages, flood insurance costs, emergency management costs, and flood fighting costs.

Table 4

Cadillac Heights Floodplain Evacuation Initial Assessment
Benefit- to-Cost Computation
All Structures

Description	*25-year Zone*	*50-year Zone*	*100-year Zone*	*SPF Zone*
INVESTMENT				
Estimated First Cost	$7,682,900	$15,842,200	$21,910,900	$38,956,400
Annual Percentage Rate	0.07125	0.07125	0.07125	0.07125
Project Life (years)	50	50	50	50
Construction Period (mo)	18	18	18	24
Capital Recovery Factor	0.0736071	0.0736071	0.0736071	0.0736071
Interest During Const.	$410,600	$846,600	$1,170,900	$2,808,500
Investment Cost	$8,093,500	$16,688,800	$23,081,800	$41,764,900
ANNUAL CHARGES				
Interest	$576,700	$1,189,100	$1,644,600	$2,975,700
Amortization	$19,000	$30,500	$54,400	$98,500
O&M	$6,000	$31,500	$40,000	$73,500
Total Annual Charges	$601,700	$1,251,100	$1,739,000	$3,147,700
ANNUAL BENEFITS	$473,000	$537,000	$552,100	$579,300
Net Annual Benefits	($128,700)	($714,100)	($1,186,900)	($2,568,400)
Benefit-Cost Ratio	0.79	0.43	0.32	0.18
Cumulative Structures Removed	24	126	160	294

Comparison of SPF Evacuation to Proposed SPF Levee

The evacuation plans investigated were formulated to allow a direct comparison between the SPF evacuation plan and the recommended SPF levee for Cadillac Heights, when added to the Chain of Wetlands and Lamar Street Levee features of the DFE Project (the baseline). Comparative analysis of the Cadillac Heights levee versus the buyout was performed at the SPF level to meet the planning objective of providing equal protection to all areas; and to offer a level of protection previously authorized by Congress.

Table 5 provides a summary of flood control only costs and benefits for this baseline, which were extracted from the DFE GRR. Also extracted from the DFE GRR are the flood control only costs of the 1) DFE project with the Cadillac Heights SPF levee, and 2) the incremental costs associated with the Cadillac Heights SPF levee.

Table 5

Cadillac Heights Floodplain Evacuation Initial Assessment
Comparison of SPF Evacuation
to the Proposed SPF Levee

7.125% interest rate, April 1998 price level

Description	*Baseline*	*Baseline + SPF Levee*	*Levee Increment*	*Baseline + SPF Buyout*	*SPF Buyout Increment*
INVESTMENT					
Estimated First Cost	74,046,700	83,159,400	9,112,700	113,003,100	$38,956,400
Interest During Const.	3,601,500	4,499,800	898,300	6,410,000	2,808,500
Cost of Non-Fed Levees	23,120,000	23,120,000	0	23,120,000	0
Investment Cost	100,768,200	110,779,200	10,011,000	142,533,100	41,764,900
ANNUAL CHARGES					
Interest	7,179,700	7,893,000	713,300	10,155,400	2,975,700
Amortization	237,600	261,100	23,500	336,100	98,500
O&M	386,000	527,000	141,000	459,500	73,500
Total Annual Charges	7,803,300	8,681,100	877,800	10,951,000	3,147,700
ANNUAL BENEFITS					
Inundation Reduction	4,876,700	5,286,800	410,100	5,440,500	563,800
Insurance Subsidy	78,700	94,200	15,500	94,200	15,500
Existing Dallas Fldwy	8,790,800	6,626,400	(2,164,400)	8,790,800	0
IH-45 Proposal	1,043,500	1,043,500	0	1,043,500	0
Total Annual Benefits	14,789,700	13,050,900	(1,738,800)	15,369,000	579,300
Net Annual Benefits	6,986,400	4,369,800	(2,616,600)	4,418,000	(2,568,400)
Benefit-Cost Ratio	1.9	1.5	-1.98	1.4	0.18

CONCLUSIONS

Various conclusions can be drawn by comparison of the benefits and costs of the two different combinations of flood damage reduction segments. The SPF levee option has an absolute cost advantage over the SPF buyout option, and also has a higher benefit-cost ratio. Adoption of the SPF buyout would result in a project first cost of approximately $29.8 million more than if the SPF levee is constructed. When both economic and financial costs are considered, this amount increases to $35.0 million. While the resultant net annual benefits are higher for the SPF buyout combination, the difference is only 1.1 percent. Current Federal policies state that when two different plans provide similar outputs, then the lowest cost plan will be selected.

Although neither of the Cadillac Heights SPF plans is close to being economically justified, the Cadillac Heights SPF levee was previously recommended and approved for construction by Congress. A levee providing a lower level of protection was found to be economically justified, but it did not meet Federal Emergency Management Agency (FEMA) standards for protecting the area from a 100-year flood. Based on the rationale that Congress had previously authorized a similar project at the SPF level of protection, the need to comply with applicable FEMA standards, and for purposes of environmental justice, the Assistant Secretary of the Army for Civil Works endorsed the upgrade for the Cadillac Heights levee to the SPF level.

The City's vision for future land uses in the Cadillac Heights area may have a bearing on ultimate plan selection. The SPF levee alternative could facilitate potential future commercial or residential development, while the SPF buyout option would not allow new commercial or residential development on the vacated lands. The project lands vacated in an SPF buyout, however, potentially could be used for flood compatible purposes, including compatible recreational development and limited ecosystem restoration. Potential ecosystem restoration benefits are expected to be small due to the need to keep the area maintained in order to minimize backwater effects upstream on the existing Dallas Floodway.

Assuming the City wanted to seek construction of the non-structural plan for the Cadillac Heights area, a rigorous, cost shared reevaluation study would be required to more precisely estimate the costs and benefits with a higher level of confidence. The resulting report would then be submitted through Corps' higher authority to the Assistant Secretary of the Army for Civil Works, and serve as a basis for a request of an exception to current policies (required due to the lack of economic justification). Also, given the changes in the project scope, the potential exists that a Post Authorization Change Report would be required to obtain Congressional authorization. It is estimated that a minimum of one year, and possibly more, would be required to prepare these documents and obtain approval to submit the report to Congress. Congress typically authorizes project in Water Resource Development Acts (WRDA) on a biannual basis. Thus, the earliest WRDA bill for authorizing legislation would be in fiscal year 2004.

Finally, a comparison can be made regarding the non-Federal cost sharing of the two SPF options. The GRR states that the City's share of the total project costs as currently authorized would be approximately $20.9 million. If, however, the Cadillac Heights levee element would be replaced by an SPF buyout of the Cadillac Heights area, the City's share of the total project costs would increase significantly. Based on the assumption that the SPF buyout of Cadillac Heights is not in the Federal interest due to lack of economic justification, the cost of the SPF buyout would be entirely borne by the City. Total non-Federal projects costs would, therefore, increase to approximately $58.4 million.

EXHIBIT 1

CITY OF DALLAS

April 19, 2001

Mr. Gene T. Rice, Jr., P.E.
Project Manager
U.S. Army Corps of Engineers, Fort Worth District
ATTN: CESWF-PM-C
P.O. Box 17300
Fort Worth, Texas 76102-0300

RE: Dallas Floodway Extension Project: Cadillac Heights Buyout Analysis

Dear Mr. Rice:

Section 219 of the Water Resources Development Act (WRDA) of 1999 produced a change in the procedural approach for benefit-cost analysis on nonstructural alternatives as conducted by the U.S. Army Corps of Engineers. I understand that the Corps has recently established its internal implementation guidance for addressing Section 219 of WRDA 1999.

Given the high level of public interest in the Cadillac Heights neighborhood and the City's desire to make sure that our decision-making process is solid with respect to the best available criteria and information, I am requesting that the benefit-cost analysis for the Cadillac Heights buyout alternatives as produced in the Final Environmental Impact Statement for the Dallas Floodway Extension Project be revisited with respect to the new procedures. The Cadillac Heights buyout analysis should be based on having the Chain of Wetlands and the Lamar Levee components of the Dallas Floodway Extension Project in place.

We appreciate your diligence in this matter and continue to support this important project. If you should have any questions regarding this request, please contact Mr. Greg Ajemian at 214-948-4663.

Sincerely,

Jill A. Jordan, P.E.
Assistant City Manager

C: Teodoro J. Benavides, City Manager
Rebecca Dugger, P.E., Director, Trinity River Corridor Project
David C. Dybala, P.E. Director, Public Works and Transportation
Larry Scalf, Assistant City Attorney
Lee DeNooyer, Assistant City Attorney

OFFICE OF THE CITY MANAGER CITY HALL DALLAS, TEXAS 75201 TELEPHONE 214/670-3302

Exhibit 2

Demolition Assumptions For Cadillac Heights Buyout

1. 1 S.F. of asbestos pipe insulation per 840 S.F. of residential housing.
2. .19 S.F. of asbestos flooring per S.F. of residential housing.
3. 0.083 S.F. of asbestos ceiling tile per S.F. of residential housing.
4. 0.71 S.F. of asbestos wall material per S.F. of residential housing.
5. 0.23 S.F. of asbestos sheetrock per S.F. of residential housing.
6. 0.043 S.F. of asbestos siding per S.F. of residential housing.
7. 1 S.F. of asbestos roofing per 210 S.F. of residential housing.
8. 1 S.F. of asbestos transit flu per 336 S.F.
9. 1 S.F. of asbestos HVAC duct insulation per 33.6 S.F.
10. Approximately 8 fluorescent bulbs per residence.
11. Approximately 1 PCB ballast per residence.
12. Approximately 1 thermostat per residence.
13. Approximately 3 doors with lead based paint per residence.
14. Approximately 6 widow frames with lead based paint per residence.
15. 5 gallons of solvents per residential building.
16. Approximately 3 gallons of used oil per residential building.
17. 1 S.F. of asbestos pipe insulation per 420 S.F. of business structure.
18. .25 S.F. of asbestos flooring per S.F. of business structure residential housing.
19. 0.1 S.F. of asbestos ceiling tile per S.F. of business structure residential housing.
20. 1 S.F. of asbestos wall material per S.F. of business structure residential housing.
21. 0.25 S.F. of asbestos sheetrock per S.F. of business structure.
22. 0.043 S.F. of asbestos siding per S.F. of business structure.
23. 1 S.F. of asbestos roofing per 210 S.F. of business structure.
24. 1 S.F. of asbestos transit flu per 336 S.F. of business structure.
25. 1 S.F. of asbestos HVAC duct insulation per 33.6 S.F. business structure
26. Approximately 15 fluorescent bulbs per business structure.
27. Approximately 5 PCB ballast per business.
28. Approximately 2 thermostat per business.
29. Approximately 10 doors with lead based paint per business.
30. Approximately 20 widow frames with lead based paint per business.
31. 15 gallons of solvents per business structure.
32. Approximately 10 gallons of used oil per business.
33. Above assumptions based largely on ratios of materials found at Johnson Creek buyout project.
34. Unit prices from Johnson Cr. Buyout were used for the Cadillac cost estimate.
35. It was assumed that the length of time for the City of Dallas to proceed with the buy-out would be so great that any existing lead soil issues faced by the various companies in the area south of Sargent Road and Morrell Avenue will have been resolved with the Texas Natural Resource Conservation Commission and remedial actions completed. Because of the that assumption, no line items were include in the cost estimate for lead contaminated soil excavation at purchase business properties or purchasing of Resource Conservation Recovery Act closed landfills.