2006 CHANNEL STUDY UPDATE

THOMPSON CREEK

72ND STREET TO LA VISTA FALLS GOLF COURSE

CITY OF LA VISTA

TEXT & APPENDICES "A" & "C"

June 13, 2007

INTRODUCTION

This study update has been prepared based upon authorization of the Public Works Director of the City of La Vista. The purpose of conducting the update is to provide an evaluation of alternatives for the treatment of Thompson Creek downstream of the storm water detention structure located on the La Vista Falls Golf Course. The primary focus will be on the section from the storm water detention structure to 72nd Street where erosion control and channel maintenance are ongoing problems due to existing development immediately adjacent to the creek. The section from 72nd Street to 69th Street was stabilized under a previous project constructed in 1999. The section from 69th Street to 66th Street lies in an area not yet developed and would best be addressed when development plans occur on that property; therefore, this section is not addressed by this update. The final section from 66th Street to the confluence with the Big Papillion Creek has been straightened and has levees. This section is relatively stable and is not addressed by this update. The goals of the update are to present alternatives and provide sufficient information to allow the City of La Vista to select a desired alternative. The process of reviewing and selecting a desired alternative is quite often a pre-requisite to applying for funding from various agencies and is required for obtaining permits from the Corps of Engineers. This update should be able to serve as a major component of an alternatives analysis that will be required by the Corps of Engineers for obtaining an individual permit for whatever physical improvements are undertaken in future channel improvement projects on Thompson Creek.

BACKGROUND

Existing Conditions

Thompson Creek is a small tributary of the Big Papillion Creek. It flows easterly discharging into the Big Papillion Creek approximately one-half mile downstream of Harrison Street. The study area includes Thompson Creek from its confluence with the Big Papillion Creek upstream to the outlet of the principal spillway from the Thompson Creek Flood Detention Structure consisting of a channel length of nearly 11,000 feet. The entire drainage basin for Thompson Creek contains 1300 acres and is shown on Figure 1. The drainage area to 72nd Street contains 926 acres and the portion lying above the flood detention structure is 341 acres. This structure contains 71.5 acre-feet of storage, has a maximum discharge from the principal spillway of 240 cubic feet per second, and was placed into operation in 1986.

The existing channel has an overall average gradient of 0.0087 ft. /ft. and as a result the channel is degrading. The lower 3100 feet of the channel has been straightened and includes levees that run from 66th Street to the levees along the Big Papillion Creek. The next 3000 feet of the channel between 66th Street and 72nd Street follows its natural alignment except for isolated instances where severe meanders have been altered or cut off by manmade activities. The westerly 1500 feet of this section was treated with grade control structures and slope protection at the base of a tall bluff on the south side of this reach. The lower part of this section is abutted by undeveloped property used primarily for agricultural purposes, which is likely to be redeveloped for residential purposes at a future date. The next 3000 feet from 72nd Street to Edgewood Blvd. was straightened when the adjacent lots and subdivision were developed and platted in 1961. The lots were platted to the middle of the channel and a 45 feet wide drainage easement was noted on the plat. The lower 1000 feet of this section drops 19 feet from the west side of 73rd Avenue to the east side of 72nd Street in a distance of about 1000 feet. Throughout this section the channel banks are eroding and are the primary source of damages and complaints from the abutting property owners. Except in those areas where the City has acquired lots for park space there is no vehicular access to the creek channel to provide for maintenance activities. This section also includes the roadway crossing structures at 72nd Street, 73rd Avenue, and Edgewood Boulevard. The structures at 73rd Avenue and Edgewood Boulevard are overtopped periodically which results in erosion problems on the downstream side of these structures. Efforts to stabilize the downstream side of these crossings have been undertaken in recent years including grouted rip-rap and stone-filled gabions. The final segment of the channel in this study lies between Edgewood Blvd. and the principal spillway from the flood detention structure consisting of 1800 feet with an average gradient of 0.0056 ft. /ft. This portion lies in Central Park and is abutted on the north side of the channel by residential lots. This portion of the channel receives primarily the controlled discharge from the flood detention structure and does not have steep, eroding channel banks. Two problem areas in this section consist of erosion at the abutment walls for a pedestrian bridge across the channel and erosion adjacent to a retaining wall around a green on the No. 3 hole on the La Vista Falls Golf Course. This section of the channel has a grade drop of 12 feet in a distance of 1500 feet for a gradient of 0.8 percent. This is allowing from some moderate degradation of the channel in the upper end of this section in the vicinity of the pedestrian bridge and the retaining wall.

Flood Plain Regulations

Thompson Creek was initially made a part of the National Flood Insurance Program as a result of a Flood Insurance Study that was initiated in November of 1977 and was published with an effective date of July 1979. This study addressed all creeks within the City of La Vista zoning jurisdiction at that time and addressed Thompson Creek as well. Originally, the study was to have examined Thompson Creek with detailed methods; however, it was changed to an approximate method of analysis because the U.S. Army Corps of Engineers determined that the average width of the 100-year flood boundaries were less than 200 feet. As a result, the area along Thompson Creek was analyzed with approximate methods and was classified as a Zone A on the Flood Insurance Rate Map. This means that no elevations or depths of flooding were determined. The Flood Insurance Study for Sarpy County was recently updated with an issuance date of December 2, 2005. The areas along Thompson Creek are shown as Zone A with no Base Flood Elevations determined. This makes the abutting properties subject to the need for Flood Insurance. It should be noted that the Flood Insurance Rate Map does not take into consideration the existence of the detention structure and was not prepared with detailed topographic information.

Previous Studies

The first formal study of Thompson Creek was undertaken in 1978 by the Papio Natural Resources District who engaged the services of Backlund Engineering Company. They prepared a report that examined Thompson Creek from 84th Street to 72nd Street. The initial version of this study evaluated up to ten schemes for channel improvement including various combinations of vegetated channels, rock rip-rap lining, concrete grid lining, concrete lining, grade control structures, partially enclosed pipe system, and identified the possibility of a flood detention structure near 84th Street. The interim final report produced in this study, dated August 10th, 1978, identified five channel improvement plans ranging from only rock rip-rap lining to partially enclosed system with a combination of rock rip-rap and gabion linings and a flood detention structure. This report will not discuss in detail these previously considered options but reference may be made to this previous report for those that may be interested. After having held public hearings, a final report was issued on August 30, 1978. The final recommendation was for an enclosed system from 72nd Street to 73rd Avenue, a rectangular gabion lined channel from 73rd Avenue to Edgewood Blvd., a trapezoidal gabion lined channel from Edgewood Blvd. to a flood detention structure near 84th Street. In 1978 dollars the construction cost was estimated at $845,000. The report also identified the Nebraska Natural Resources Development Fund as a possible funding source.

Subsequently, the City of La Vista appeared before the Nebraska Natural Resources Development Fund Advisory Board on February 17, 1981 to propose that the recommended project be considered by the Board. The Board recommended that the City of La Vista proceed with an Application and Feasibility Report. This became the next formal study of Thompson Creek and it focused only on the flood detention structure due to the NRDF guidelines concerning what type of projects they would participate in. In 1982 the application and feasibility study was submitted to the Advisory Board for formal consideration. In January of 1985 after various delays the final approval of the necessary funds representing 75% of the project costs was obtained from the Nebraska Natural Resources Development Fund Advisory Board. Construction of the flood detention structure began in 1985 and was completed in 1986. The application and feasibility report for this project is not addressed by this report but is available for review by interested parties.

The most recent study was undertaken in 1995 to identify options to address Thompson Creek erosion problems downstream of the flood retention structure. At that time the most pressing issue was channel and bank stabilization in the section between 72nd Street and 69th Street where erosion was threatening the integrity of existing sewer lines and where very tall creek banks were in danger of becoming unstable. In 1999 a construction project was undertaken on this priority area. Extensive engineering analysis was done for the preparation of that report including hydrologic and hydraulic analyses, which continue to be the foundation for this study update. The condition of the drainage basin has not changed significantly and the prior analyses remain applicable to the current conditions.

In regards to the channel improvements below the flood detention structure downstream to 72nd Street, which are the focus of this study, the reduction in peak design flows resulting from the construction of the flood detention structure is illustrated in the following table:

Storm Event	Peak Discharge By Location, C.F.S.		
	Edgewood	73rd Avenue	72nd Street
Before Structure			
50-year	1860	1980	2380
100-year	1960	2225	2610
After Structure			
50-year	1182	1809	2162
100-year	1347	2111	2541

The existing topography in the study area is illustrated on Figures 2A through 2D. The approximate location of property lines are also shown on these drawings as well as the estimated limits of the water surface during a 100-year storm event under existing conditions. These water surface limits are based on the detention structure being in place and the culverts under Edgewood Blvd., 73rd Avenue, and 72nd Street being free of obstructions during the storm event

Park & Recreation Master Plan

Since the last study on Thompson Creek, the City has adopted a Park and Recreation Master Plan. This was done in 2002. In Section 6 of this Plan there are Greenways and Neighborhood Green Streets identified in this study area of Thompson Creek. The Greenway sections are anticipated to be passive greenways with the purpose of protecting natural areas. Along Park View Blvd. a Neighborhood Green Street is proposed. The concept of a green street calls for a sidewalk widened to at least 8 feet to allow for use as a multi-use walk/trail along with planting of trees. Where possible, it would be preferable to widen the trail to the standard width of 10 feet and to locate it in public property to avoid driveway conflicts and resolve maintenance and liability issues associated with placement in front of privately owned property.

ANALYSIS

Engineering Methods

Standard hydrologic and hydraulic study methods were used to determine the flood hazard data in the 1995 study. For existing conditions, flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, and 100-year period (recurrence interval) were examined. These events, commonly termed the 10-year, 50-year, and 100-year floods, have a 10, 2, and 1 percent chance, respectively of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The analyses were conducted using the U. S. Army Corps of Engineers HEC-1 computer program, PC version, March 1987 revision with the SCS dimensionless unit hydrograph for determination of peak discharges. The HEC-2 computer program, version 4.6 was used to route the peak flows through the channel and determine the water surface elevations. Culvert capacity calculations for the current study were performed using HY-8, Version 6.1 as authored by the Federal Highway Administration for Culvert Analysis.

Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships. The drainage basin limits were established based upon USGS 7.5 minute quadrangle maps. The land lying west of 72nd Street in the drainage basin is already completely developed as a combination of residential and commercial uses. Peak discharges were computed for six sub-basins within the drainage area. The rainfall data used was obtained from U.S. Weather Bureau Technical Paper No. 40 verified by rainfall data from Omaha gages. The storage effect of the flood detention structure was considered and the outflows from this structure were determined by the HEC-1 computer program.

Hydrologic Analyses

Analyses of the hydraulic characteristics of Thompson Creek were carried out in 1995 to provide estimates of the elevations of the floods of the various frequencies for existing conditions. Cross section data was obtained from the topographic survey conducted in December, 1994. The most current topography taken from Sarpy County's GIS data is shown on Figure 2. In addition detailed information about each creek crossing structure at 66th Street, 72nd Street, 73rd Avenue, and Edgewood Boulevard was obtained which was used to rate the capacity of the existing drainage structures at these locations.

The roughness coefficients used in the analyses were selected as follows:

Concrete	Manning's n value = 0.016
Natural Channel	Manning's n value = 0.03 to 0.12

The starting water surface elevation at the confluence of the Big Papillion Creek and Thompson Creek was determined by comparing two possible combinations of events. These were a 10-year flood on the Big Papillion Creek in conjunction with a 100-year flood on Thompson Creek versus a 100-year flood on the Big Papillion Creek in conjunction with a 10-year flood on Thompson Creek. The condition resulting in the highest water surface elevations upstream on Thompson Creek was utilized. This was determined to be the 10-year flood on the Big Papillion Creek with a 100-year flood on Thompson Creek. Due to the disparity in the size of the drainage basins for Thompson Creek and the Big Papillion Creek it was assumed that a 100-year event occurring on both streams at the same time was too unlikely to base the analyses upon. The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on Figure 2 are therefore considered valid only if the hydraulic structures, such as culverts, remain unobstructed, operate properly, and do not fail.

Regulatory Considerations

Corps of Engineers: This project will require a Section 404 Permit from the Corps of Engineers since construction activities are expected to affect both wetlands and jurisdictional waterways. The City Engineer and the Public Works Director met with Matt Wray from the local office of the Corps of Engineers to discuss this study area in general terms. Mr. Wray advised that the Corps desires to see an overall plan for improvements to Thompson Creek rather than piecemeal construction permit applications. The scope of potential project will require an individual permit process as opposed to a nationwide permit process. This requires public hearings and notices to adjacent property owners. The application for an individual permit also requires an alternatives analysis showing what alternative measures the applicant has considered. This analysis is to include identification of the least damaging alternative to the environment. This study will provide a good foundation for preparation of such an alternatives analysis.

Nebraska Dept. of Natural Resources: The Nebraska Department of Natural Resources has authority to review the plans and request changes since the project will affect more than 100 feet of a natural waterway.

Nebraska Dept. of Environmental Quality: The Nebraska Department of Environmental Quality has authority to issue the erosion control permit for compliance with NPDES regulations for this project since the disturbed area will exceed 1 acre.

Papio-Missouri River Natural Resources District: The amount of authority exercised by this agency will depend in part on whether they are participating in funding on an improvement to the channel. They may make recommendations or they make require plan approval in order to qualify for funding.

Other agencies: Various federal agencies such as EPA, Fish & Wildlife, and others will have an opportunity to review the plans for any selected improvement project through the Corps of Engineers individual permit process.

ALTERNATIVE SOLUTIONS

The identification of possible solutions is based upon taking into consideration the possible physical solutions, the environmental impacts, the social impacts, conformance with City master plans, costs, aesthetics and durability of the solutions. Based on our experience with prior projects on Thompson Creek and our general familiarity with the community we have identified the following alternatives for consideration.

Scheme 1

This scheme would not involve any significant construction projects and would not involve any acquisition of properties. Essentially this approach would strive to maintain the existing conditions. The replacement of a retaining wall around Green No. 3 on the golf course and replacement of the pedestrian bridge in Central Park would be part of the project as these structures are suffering from erosion damage at this time. Repair of erosion at storm sewer outlets, around utility structures, and other locations in public property would be performed on an ongoing basis as needed. Channel banks on private property would remain the responsibility of the property owners. The City will have to monitor and stop individual property owners from building retaining walls or other encroachments into the channel. We also recommend that in this scheme a policy be adopted setting forth a restriction on construction of any new structures within a channel setback area. The channel setback area would be defined as the limits of a three horizontal to one vertical slope plus 20 feet from the edge of the normal water surface. Further, if existing structures within such a setback area are lost due to erosion or fire or some other reason, then we recommend that these structures not be allowed to be replaced in the setback area. The establishment of a channel setback area would serve to reduce potential economic losses by the property owners due to erosion along Thompson Creek.

While this scheme does not involve major capital expenditures it does have cost impacts. These would include the following:

Annual costs to the Public Works Department to repair erosion
Annual costs to property owners to repair erosion.
Annual costs to utility companies to repair their facilities due to erosion
Perceived or real decline in property values due to erosion
Perceived or real decline in property values due to building setbacks

It is obviously difficult to assign a reliable cost to these factors. The cost to the Public Works Department just for erosion repairs has been approximated at $20,000 per year in 2006 dollars.

This scheme does not promote the Park and Recreation Master Plan as it does not enhance the ability to establish a greenway along Thompson Creek. Instead it would be necessary to purse the green street concept along Park View Blvd with numerous driveways crossing the contemplated 8 feet wide walk/trail and would impact the adjoining landowners with such a trail in their front yard.

On Exhibits 2A through 2D aerial photos of the area are presented that show the approximate property lines, the location of the 100-year water surface and the extent of existing drainage easements.

Scheme 2

This scheme would consist of acquiring all the homes along Thompson Creek between 72nd Street and Edgewood Boulevard. There would be no major construction project undertaken for Thompson Creek other than to repair erosion at various storm sewer outlets. Rather than trying to control erosion the solution is to leave the creek alone. There would be 24 homes acquired between 72nd Street and 73rd Avenue. There would be 41 homes acquired between 73rd Avenue and Edgewood Blvd. Between Edgewood Blvd and the flood detention structure on the golf course, the channel is shallow and generally does not have significant bank erosion potential. Further, in this last section the City has access to the channel throughout from Central Park, which allow for maintenance access. The existing pedestrian bridge into Central Park from Park View Blvd. near Lillian Street is suffering from erosion around the abutments and there is a retaining wall around Green No. 3 that is beginning to fail. These two structures need to be replaced and are included as part of this project.

The acquisition of the properties would result in an increase of 13.5 acres of land to maintain. This additional property would obviously allow for the establishment of a greenway along Thompson Creek and would be consistent with the Park and Recreation Master Plan goals. Space would be available to allow for development of a hiking/biking trail from Central Park easterly to 72nd Street, which could ultimately be connected to the Keystone Trail along the Big Papillion Creek.

This scheme has the least environmental impact but the greatest social impact. Economic impacts would include the following:

Cost to acquire homes and relocate residents
Cost to demolish and remove structures
Lost property tax revenue from the acquired properties
Increased quantity of public property to maintain
Replacement of pedestrian bridge and retaining wall
Reduced cost to utility companies for erosion damage to facilities
Real or perceived increase in property values to lots along Park View
and Valley Drive abutting the new greenway

On Exhibits 3A through 3D are aerial photos on which are shown the approximate property lines and designation of the homes that would be acquired. The addresses are also shown. In Appendix A is presented the tax base valuation of the existing homes based on information available on the Sarpy County web site in November of 2006.

Scheme 3

This scheme would include acquiring 22 existing homes. This would consist of 18 homes along the north side of Thompson Creek between 72nd Street and Edgewood Boulevard and 4 homes on the south side of Thompson Creek just east of Edgewood Boulevard. Where homes are not acquired we recommend obtaining a channel easement and/or building setback line based upon the limits of a three horizontal to one vertical slope plus 20 feet from the edge of the normal water surface. Further, if existing structures within such a setback area are lost due to erosion or fire or some other reason, then we recommend that these structures not be allowed to be replaced in the setback area. The acquisition of the homes on the north side of the creek would allow for relocation of the channel in some locations where there are problems with bank erosion on the south side of the creek. These locations are shown on Figures 4A and 4B in this report. The total length of channel relocation is 1,430 linear feet, which is about 50% of the length of the channel between 72nd Street and Edgewood Boulevard. The acquisition of the homes also provides maintenance access to the channel, which does not presently exist. The construction work involved would consist of demolishing homes, clearing and grubbing trees at channel relocation areas, grading the channel to the new location, regrading slopes on the south side of the channel at problem areas, installing articulated concrete block channel lining only at inlets and outlets from existing culverts, installing a gabion wall on the north bank just east of Edgewood Boulevard for about 450 feet and re-vegetation including tree mitigation planting. Mitigation of wetlands would also be included and may consist of replacement wetlands being constructed in the vicinity of the Soccer Complex or contribution to a wetlands bank as would be determined as conditions in a Corps Permit for this project. As in Scheme 2, the replacement of the pedestrian bridge into Central Park from Park View Blvd. near Lillian Street and the retaining wall around Green No. 3 would be included.

The acquisition of the properties would result in an increase of 4.7 acres of land to maintain. As in Scheme 2 additional property would allow for the establishment of a greenway along Thompson Creek and would be consistent with the Park and Recreation Master Plan goals. Space would be available to allow for development of a hiking/biking trail from Central Park easterly to 72nd Street, which could ultimately be connected to the Keystone Trail along the Big Papillion Creek. A bridge to cross Thompson Creek would be needed in the southwest corner of Champion Park.

This scheme increases the environmental impact and reduces the social impact as compared to Scheme 2. Economic impacts would include the following:

Cost to acquire homes and relocate residents
Cost to demolish and remove structures
Cost to perform clearing, grubbing and grading of the relocated channel areas
Lost property tax revenue from the acquired properties
Increased quantity of public property to maintain
Replacement of pedestrian bridge and retaining wall
Reduced cost to utility companies for erosion damage to facilities
Real or perceived increase in property values to lots along
Valley Drive and Park View Blvd. abutting the new greenway

On Figures 4A through 4D are aerial photos on which are shown the approximate property lines, designation of homes that would be required, the proposed extent of channel relocation and existing drainage easements. The tax base valuation of the existing homes can be found in Appendix A.

Scheme 4

This scheme would be the most construction intensive solution. The plan would involve constructing an articulated concrete block channel lining system from 72nd Street to the cart path bridge near Green No. 3 on the golf course. This lining system would be the same as previously used on Thompson Creek on the golf course just east of 84th Street and between 85th and 87th in Kelly Field. The acquisition of homes would be made only where necessary to facilitate construction access and physical installation of the lining system. The section between 72nd Street and 73rd Avenue is the most difficult section to access as there is no existing public property along the creek. In this section we anticipate that it would be necessary to acquire 4 homes in order to provide construction and long term maintenance access. The goal would be to find willing sellers at appropriately spaced locations. The section between 73rd Avenue and Edgewood Boulevard already has some sections of public property abutting the creek. There are still some locations where additional construction and maintenance access will be needed. We estimate that 2 to 4 homes will need to be acquired in this section. Again, the goal would be to find willing sellers at appropriate locations to meet this need.

The construction work will involve nearly total removal of existing trees in and along Thompson Creek throughout the reach from 72nd Street to the cart path bridge near Green No. 3. The creek would be reshaped to allow a uniform configuration and to create a smooth bed upon which to place the channel lining system. There is a 450 feet long section on the north side of the channel just east of Edgewood Boulevard where gabions would be installed in lieu of the channel lining system. This would be done to match the gabions that exist on the south side. On the golf course, the channel would be relocated away from the existing retaining wall at Green No. 3 in order to eliminate removal and replacement of this wall. Due to the large environmental impact, there will be substantial mitigation involved with this scheme. It is likely that some wetlands creation will be required by the Corps of Engineers. The terms of the permit from the Corps to perform such work can also be expected to include tree mitigation similar to the permit that was obtained for the work between 72nd Street and 69th Street. From past experience, the density of tree planting that will be required will use all open space that is owned by the City along this section of Thompson Creek and may well involve additional property to meet the planting requirements. The channel lining would also be planted with native grasses and wetlands plants. As in Schemes 2 and 3, the replacement of the pedestrian bridge into Central Park from Park View Blvd. near Lillian Street and the retaining wall around Green No.3 would be included. In order to construct this project it will be necessary to obtain additional permanent grading and drainage easements as well as temporary construction easements on most privately owned lots abutting the channel.

This scheme is the most costly in terms of construction and would likely be the most difficult on which to obtain permits due to the environmental impact. In addition, this scheme does not create the opportunity to create the greenway along Thompson Creek. However, the reasons for considering this scheme are that it requires the least amount of property acquisition is expected to have the least long-term maintenance costs in terms of repairing erosion. The economic impacts would include the following:

Limited acquisition of homes from willing sellers
Cost to demolish and remove structures
Cost to perform clearing, grubbing and grading of the entire channel area
Lost property tax revenue from the acquired properties
Cost to construction channel lining system
Replacement of pedestrian bridge and retaining wall

Reduced cost to utility companies for erosion damage to facilities
Reduced long term costs to City for erosion maintenance
Real or perceived increase in property values to lots along Valley Drive and Park View Blvd. abutting the stabilized creek banks
Real or perceived decrease in property values due to loss of mature trees at rear of properties abutting Thompson Creek

On Figures 5A through 5D are aerial photos on which are shown the approximate property lines and the estimated limits of the channel lining system. In Appendix B there are cross sections illustrating the extent of the grading required for the channel lining.

COSTS

A true cost comparison of the various alternatives is not possible to prepare. This is due to the solutions being different in nature. For example, Scheme 1 does not include construction but the costs of this scheme are essentially annual maintenance and repair costs that are not predictable or constant. In addition, to convert an annual stream of costs to a present value one needs to assign an annual inflation factor and establish a time period over which to consider the costs. The other schemes involve varying social and economic impacts and benefits. It is impossible to assign reliable values to such factors. In the following, cost figures are presented for the elements that are identifiable and for which definite expenditures would be made by the City in order to implement the solutions. The elements for each scheme that are not able to estimated and/or which would not be direct expenditures by the City will be noted so that they can be weighed subjectively as part of the alternative selection process. Examples of such items would be the increased valuation of homes left in place but abutting a stabilized channel or the decreased valuation to a home if a building restriction is imposed that would prohibit replacement of a structure that is too close to the channel.

Scheme 1

This scheme does not involve any major construction but does include replacement of the retaining wall at Green No. 3 on the golf course and replacement of the pedestrian bridge into Central Park project. The cost expenditures to the City consist of the costs expended annually on creek channel maintenance and the wall and bridge replacement. The structure replacements would cost $180,000. Based on discussions with the Public Works Department the annual creek channel maintenance may be approximated as $20,000 per year in 2006 dollars. Then for comparison with a construction alternative a time horizon of 50 years can be used. By assuming the average investment interest on City funds over this period to be 4%, then the annual stream of maintenance costs is converted to approximately $430,000 in 2006 dollars.

The other costs of this scheme that are real but would not be direct expenditures of City funds include:

Annual costs of erosion repairs by property owners
Annual costs of erosion repairs to utility companies

Other value considerations include impacts to property values due to ongoing erosion versus impacts due to adopting increased setback requirements and reducing the buildable space on the lots. In general these impacts could be considered a trade-off with little net effect.

Scheme 2

This scheme involves minimal construction of improvements. The cost expenditures to the City would be the cost of acquiring homes, relocating residents, and demolishing structures. A line item summary of the initial cost expenditures by the City can be found in Appendix C. These costs are summarized as follows:

Total Construction Expenditures	$1,156,176
Total Property Expenditures	$9,252,600
Total Project Expenditures	$10,408,776

In addition to the direct expenditures there are also direct losses of income to the City as a result of the acquisition of the homes in the form of lost property taxes. Based on the 2006 tax information shown on the Sarpy County website the lost revenue to the City would be $25,750.73 per year. This is an annual revenue stream, therefore, if we assume a time horizon of 50 years and an average interest rate of 4% during this period then the present value of the revenue stream is $533,000.

This scheme is intended to relieve the City of the annual costs of repairing erosion, however, the increase in publicly owned property would also cause an increase in the expense of maintenance such as mowing. Therefore, for purposes of this comparison it will be assumed that these two expenses are equal with no net impact.

The other costs of this scheme that are real but would not directly impact City funds include:

Annual savings to utility companies for elimination of erosion damages
Annual costs to homeowners for erosion damage are eliminated

Other value considerations include increases to property values for homes remaining along Park View Boulevard and Valley Road, recreational benefits to citizens as a result of the creation of the greenway, and environmental benefits of leaving the mature vegetation in place along the channel.

Scheme 3

This scheme includes a combination of construction and property acquisition as outlined in the foregoing. A line item summary of the initial cost expenditures by the City can be found in Appendix C. These costs are summarized as follows:

Total Construction Expenditures	$1,344,854
Total Property Expenditures	$2,971,261
Total Project Expenditures	$4,316,116

In addition to the direct expenditures there are also direct losses of income to the City as a result of the acquisition of the homes in the form of lost property taxes. Based on the 2006 tax information shown on the Sarpy County website the lost revenue to the City would be $8,560.57. This is an annual revenue stream, therefore, if we assume a time horizon of 50 years and an average interest rate of 4% during this period then the present value of the revenue stream is $183,898.

As with Scheme 2 this scheme is intended to relieve the City of the annual costs of repairing erosion, however, the increase in publicly owned property would also cause an increase in the expense of maintenance such as mowing. Therefore, for purposes of this comparison it will be assumed that these two expenses are equal with no net impact.

The other costs of this scheme, which are real but would not be direct expenditures of City funds include:

Annual savings to utility companies for elimination of erosion damages
Annual costs to some homeowners for erosion damage are eliminated

Other value considerations include increases to property values for homes remaining along the north side of Park View Boulevard and along Valley Road immediately abutting the stabilized channel, recreational benefits to citizens as a result of the creation of the greenway, and environmental benefits of leaving at least some of the mature vegetation in place along the channel.

Scheme 4

This scheme is a construction intensive solution aimed at solving the erosion problems while leaving the existing homes in place. A line item summary of the initial cost expenditures can be found in Appendix C. These costs are summarized as follows:

Total Construction Expenditures	$4,395,552
Total Property Expenditures	$1,169,520
Total Project Expenditures	$5,565,072

In addition to the direct expenditures there are also direct losses of income to the City as a result of the acquisition of eight homes in the form of lost property taxes. Based on the an average value of $83,000 for these homes based on information shown on the Sarpy County website the lost revenue to the City would be $3,199. This is an annual revenue stream, therefore, if we assume a time horizon of 50 years and an average interest rate of 4% during this period then the present value of the revenue stream is $68,724.

This scheme would result in a reduction of certain cost expenditures to the City consisting of the costs expended annually on creek channel maintenance. Based on discussions with the Public Works Department this amount may be approximated as $20,000 per year in 2006 dollars. Then for comparison with a construction alternative a time horizon of 50 years can be used. By assuming the average investment interest on City funds over this period to be 4%, then the annual stream of maintenance costs is converted to a savings of approximately $430,000 measured in present dollars, which could be treated as an offset towards the construction costs.

The other costs of this scheme that are real but would not be direct expenditures of City funds include:

- Annual savings to utility companies for elimination of erosion damages
- Annual costs to homeowners for erosion damage are eliminated

Other value considerations include decreases to property values for homes along the channel due to the loss of mature vegetation and the resultant impact on aesthetics. This loss in value would be partially offset by those properties that no longer are threatened by erosion damage. There would be a loss to the community at large in comparison to Schemes 2 and 3 since there would be less recreational benefits to citizens as a result of not creating greenway, and the environmental impacts of removing all mature vegetation along the channel.

General

It is worth noting that none of these schemes include the removal and replacement of the major drainage culverts under Edgewood Boulevard, 73rd Avenue or 72nd Street. While these structures do not pass the 100-year storm events, the depth of overtopping was considered shallow enough and infrequent enough to not warrant the expenditures. While the replacement of the culverts to convey 100-year storm events would allow the water surface elevation to be lowered by approximately 2 feet, the present water surface does not inundate homes. The present water surface as shown in Figures 2A through 2D only inundates street and yard areas. The cost to replace these culverts is estimated to be $1,125,000. There is not enough benefit to justify this expense and replacing the culverts does not address the erosion problems.

RECOMMENDATIONS

City staff has discussed the schemes outlined in this report. Selection of an alternative took into consideration many factors. Foremost in the considerations were:

- Project Costs
- Social Impacts
- Environmental Impacts
- Permitting Approvals
- Conformance to Master Plans
- Maximizing Protection of Property (Safety)
- Indirect Costs & Benefits
- Funding Eligibility

The recommendation is to accept Scheme 3 as the best solution. It is the least costly of the alternatives, other than Scheme 1, which is essentially the "Do Nothing" alternative. It represents a compromise between social impact to those that would be relocated versus addressing the needs of those that would not be relocated and the community as a whole. This solution also considers environmental impact by leaving mature vegetation in place where possible and confining construction operations as much as possible.

Details of this scheme remain to be worked out and would likely be revised during the permitting process and further public hearings.

Prepared by,

THOMPSON, DREESSEN & DORNER, INC.

John M. Kottmann, P.E.
City Engineer

JMK/jlf

APPENDIX A
2006 STUDY UPDATE
THOMPSON CREEK

Address	2006 Valuation	Property Taxes	La Vista Taxes	Ownership On Site	Off Site
7201 Park View Blvd	$67,987.00	$1,450.90	$338.93		X
7205 Park View Blvd	$75,207.00	$1,605.00	$374.93		X
7209 Park View Blvd	$83,665.00	$1,785.50	$417.09		X
7213 Park View Blvd.	$103,294.00	$2,204.40	$514.95	X	
7217 Park View Blvd.	$71,893.00	$1,536.18	$358.85		X
7221 Park View Blvd.	$76,343.00	$1,629.24	$380.59	X	
7225 Park View Blvd.	$72,369.00	$1,544.42	$360.78		X
7229 Park View Blvd.	$73,285.00	$1,563.98	$365.35	X	
7233 Park View Blvd.	$90,206.00	$1,925.08	$449.70		X
7301 Park View Blvd.	$72,517.00	$1,547.58	$361.51		X
7305 Park View Blvd.	$74,122.00	$1,581.84	$369.52	X	
7309 Park View Blvd.	$72,517.00	$1,547.58	$361.51		X
7601 So. 73rd. Ave.	$72,565.00	$1,548.60	$361.75	X	
7602 So. 73rd Ave.	$77,188.00	$1,647.26	$384.80		X
7405 Park View Blvd.	$79,794.00	$1,702.88	$397.79	X	
7409 Park View Blvd.	$73,154.00	$1,561.18	$364.69		X
7413 Park View Blvd.	$85,535.00	$1,825.40	$426.41	X	
7417 Park View Blvd.	$82,888.00	$1,768.92	$413.22	X	
7603 Park View Blvd.	$107,947.00	$2,303.70	$538.14		X
7605 Park View Blvd.	$117,698.00	$2,511.80	$586.76	X	
7607 Park View Blvd.	$105,873.00	$2,259.44	$527.81	X	
7609 Park View Blvd.	$105,572.00	$2,253.02	$526.31		X
7611 Park View Blvd.	$89,847.00	$0.00	$0.00	X	
7613 Park View Blvd.	$118,275.00	$2,524.10	$589.63	X	
7615 Park View Blvd.	$119,832.00	$2,557.34	$597.39	X	
7617 Park View Blvd.	$111,638.00	$2,382.46	$556.54	X	
7619 Park View Blvd.	$111,067.00	$2,370.28	$553.70		X
7621 Park View Blvd.	$90,763.00	$1,936.98	$452.48		X
7623 Park View Blvd.	$104,594.00	$2,232.14	$521.43	X	
7601 Edgewood Blvd.	$92,913.00	$1,982.86	$463.20	X	
7608 Valley Rd.	$80,092.00	$1,709.24	$399.28		X
7604 Valley Rd.	$84,918.00	$1,812.24	$423.34	X	
7602 Valley Rd.	$74,887.00	$1,598.16	$373.33	X	
7548 Valley Rd.	$72,662.00	$1,550.68	$362.24		X
7544 Valley Rd.	$72,345.00	$1,543.92	$360.66	X	
7540 Valley Rd.	$73,752.00	$1,573.94	$367.67	X	
7536 Valley Rd.	$87,267.00	$1,862.36	$435.05	X	
7532 Valley Rd.	$78,810.00	$1,681.88	$392.89	X	
7528 Valley Rd.	$115,683.00	$2,468.78	$576.71	X	
7524 Valley Rd.	$79,777.00	$1,702.52	$397.71	X	
7520 Valley Rd.	$75,343.00	$1,607.90	$375.61	X	
7516 Valley Rd.	$79,490.00	$1,017.84	$237.77	X	
7512 Valley Rd.	$70,853.00	$1,512.08	$353.22		X
7508 Valley Rd.	$76,247.00	$1,627.18	$380.11		X
7504 Valley Rd.	$106,103.00	$2,264.34	$528.95		X

7502 Valley Rd.	$70,668.00	$0.00	$0.00	X	
7414 Valley Rd.	$81,730.00	$1,744.20	$407.45	X	
7410 Valley Rd.	$70,943.00	$1,514.00	$353.67		X
7406 Valley Rd.	$71,338.00	$1,522.42	$355.64		X
7402 Valley Rd.	$80,510.00	$1,718.16	$401.36	X	
7314 Valley Rd.	$74,582.00	$1,591.66	$371.81	X	
7310 Valley Rd.	$74,527.00	$1,590.48	$371.54	X	
7306 Valley Rd.	$88,209.00	$1,882.46	$439.74	X	
7606 So. 73rd Ave.	$75,446.00	$0.00	$0.00	X	
7605 So. 73rd Ave.	$77,393.00	$1,651.64	$385.82		X
7238 Valley Rd.	$71,573.00	$1,527.44	$356.81		X
7234 Valley Rd.	$80,731.00	$1,722.88	$402.46	X	
7230 Valley Rd.	$76,443.00	$1,631.36	$381.09		X
7226 Valley Rd.	$79,223.00	$1,690.70	$394.95	X	
7222 Valley Rd.	$73,573.00	$1,570.12	$366.78	X	
7218 Valley Rd.	$72,372.00	$1,544.50	$360.80	X	
7214 Valley Rd.	$71,997.00	$1,536.48	$358.92	X	
7210 Valley Rd.	$72,365.00	$1,544.34	$360.76		X
7206 Valley Rd.	$83,817.00	$1,788.74	$417.85	X	
7202 Valley Rd.	$76,828.00	$1,639.58	$383.01		X
Totals	$5,433,045.00	$110,234.28	$25,750.73		

Inf. From Sarpy County Records the week of Nov. 27, 2006

APPENDIX C
THOMPSON CREEK 2006 STUDY UPDATE
COST ESTIMATE INFORMATION

SUMMARY OF DIRECT EXPENDITURES

SCHEME	CONST. COST	PROPERTY COSTS	TOTAL
1	$ 178,560	$ 0	$ 178,560
2	$ 1,156,176	$ 9,252,600	$ 10,408,776
3	$ 1,344,854	$ 2,971,261	$ 4,316,115
4	$ 4,395,552	$ 1,169,520	$ 5,565,072

SEE FOLLOWING PAGES FOR ITEMIZATION OF EACH SCHEME

THOMPSON CREEK 2006 STUDY UPDATE
PRELIMINARY ESTIMATE FOR SCHEME 1
ESTIMATE BASED ON CONCEPTUAL PLANS
TDD 171-318

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COSTS					
1.	Remove & Replace Ped. Bridge	1	LS	$100,000.00	$100,000.00
2.	Replace Retaining Wall at Green No.	500	SF	$30.00	$15,000.00
3.	Restore Green	1	LS	$5,000.00	$5,000.00
4.	Reserved				
5.	Reserved				
6.	Reserved				
7.	Reserved				
8.	Reserved				
9.	Reserved				
10.	Reserved				
11.	Reserved				
	Construction Costs Subtotal				$120,000.00
	Contingency, 20%				$24,000.00
	Construction Costs Total				$144,000.00
	Preliminary Engineering, 10%				$14,400.00
	Final Design & Const. Engineering,14%				$20,160.00
	Engineering Costs, Total				$34,560.00
	Total Project Costs				$178,560.00
PROPERTY COSTS					
	Assume no acquisitions				
	Temporary Easement	0	AC	$8,000.00	$0.00
	Right of Way	0	AC	$30,000.00	$0.00
	Home & Lot	0	EA		
	Total for Right of Way				$0.00

NOTES

THOMPSON CREEK 2006 STUDY UPDATE
PRELIMINARY ESTIMATE FOR SCHEME 2
ESTIMATE BASED ON CONCEPTUAL PLANS
TDD 171-318

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COSTS					
1.	Remove & Replace Ped. Bridge	1	LS	$100,000.00	$100,000.00
2.	Replace Retaining Wall at Green No.	500	SF	$30.00	$15,000.00
3.	Restore Green	1	LS	$5,000.00	$5,000.00
4.	Demolish homes	65	EA	$10,000.00	$650,000.00
5.	Stabilize storm sewer outlets	7	EA	$1,000.00	$7,000.00
6.	Reserved				
7.	Reserved				
8.	Reserved				
9.	Reserved				
10.	Reserved				
11.	Reserved				
	Construction Costs Subtotal				$777,000.00
	Contingency, 20%				$155,400.00
	Construction Costs Total				$932,400.00
	Preliminary Engineering, 10%				$93,240.00
	Final Design & Const. Engineering,14%				$130,536.00
	Engineering Costs, Total				$223,776.00
	Total Construction Expenditures				$1,156,176.00
PROPERTY COSTS					
	Assume no acquisitions				
	Temporary Easement	0	AC	$8,000.00	$0.00
	Right of Way	0	AC	$30,000.00	$0.00
	Acquire Homes & Lots	65	EA		$6,248,000.00 *
	Relocation Assistance	65	EA		$1,462,500.00 **
	Total for Right of Way				$7,710,500.00
	Legal & Appraisals,20%				$1,542,100.00
	Total Property Expenditures				$9,252,600.00
	Total Project Expenditures				$10,408,776.00

NOTES

* Based on Sarpy website tax value week of Nov. 27, 2006 plus 15% for estimate of fair market value

** Based on allowing $22,500 per residence

THOMPSON CREEK 2006 STUDY UPDATE
PRELIMINARY ESTIMATE FOR SCHEME 3
ESTIMATE BASED ON CONCEPTUAL PLANS
TDD 171-318

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CONSTRUCTION COSTS					
1.	Remove & Replace Ped. Bridge	1	LS	$100,000.00	$100,000.00
2.	Replace Retaining Wall at Green No.	500	SF	$30.00	$15,000.00
3.	Restore Green	1	LS	$5,000.00	$5,000.00
4.	Demolish homes	22	EA	$10,000.00	$220,000.00
5.	Stabilize storm sewer outlets	7	EA	$1,000.00	$7,000.00
6.	Clearing & Grubbing	1	LS	$60,000.00	$60,000.00
7.	Excavation for relocated channel areas	22,000	CY	$3.00	$66,000.00
8.	Channel Lining	12,600	SF	$10.00	$126,000.00
9.	Gabion Wall	700	CY	$200.00	$140,000.00
10.	Tree Mitigation	328	EA	$300.00	$98,400.00
11.	Erosion Control	1	LS	$23,000.00	$23,000.00
12.	Seeding	4.2	AC	$2,000.00	$8,400.00
13.	Relocate Play Structure	1	EA	$10,000.00	$10,000.00
14.	Wetlands Mitigation	0.5	AC	$50,000.00	$25,000.00
	Construction Costs Subtotal				$903,800.00
	Contingency, 20%				$180,760.00
	Construction Costs Total				$1,084,560.00
	Preliminary Engineering, 10%				$108,456.00
	Final Design & Const. Engineering,14%				$151,838.40
	Engineering Costs, Total				$260,294.40
	Total Construction Expenditures				$1,344,854.40
PROPERTY COSTS					
	Assume no acquisitions				
	Temporary Easement	0.8	AC	$8,000.00	$6,400.00
	Permanent Easement	0	AC	$30,000.00	$0.00
	Acquire Homes & Lots	22	EA		$1,974,651.00 *
	Relocation Assistance	22	EA		$495,000.00 **
	Total for Right of Way				$2,476,051.00
	Legal & Appraisals,20%				$495,210.20
	Total Property Expenditures				$2,971,261.20
	Total Project Expenditures				$4,316,115.60

NOTES

* Based on Sarpy website tax value week of Nov. 27, 2006 plus 15% for estimate of fair market value

** Based on allowing $22,500 per residence

THOMPSON CREEK 2006 STUDY UPDATE
PRELIMINARY ESTIMATE FOR SCHEME 4
ESTIMATE BASED ON CONCEPTUAL PLANS
TDD 171-318

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL	
CONSTRUCTION COSTS						
1.	Remove & Replace Ped. Bridge	1	LS	$100,000.00	$100,000.00	
2.	Replace Retaining Wall at Green No.	500	SF	$30.00	$15,000.00	
3.	Restore Green	1	LS	$5,000.00	$5,000.00	
4.	Demolish homes	8	EA	$10,000.00	$80,000.00	
5.	Stabilize storm sewer outlets	7	EA	$1,000.00	$7,000.00	
6.	Clearing & Grubbing	1	LS	$300,000.00	$300,000.00	
7.	Excavation for relocated channel areas	12,000	CY	$5.00	$60,000.00	
8.	Channel Lining	185,000	SF	$10.00	$1,850,000.00	
9.	Gabion Wall	700	CY	$200.00	$140,000.00	
9.	Tree Mitigation	850	EA	$300.00	$255,000.00	
10.	Erosion Control	1	LS	$60,000.00	$60,000.00	
11.	Seeding	11	AC	$2,000.00	$22,000.00	
12.	Relocate Play Structure	1	EA	$10,000.00	$10,000.00	
13.	Wetlands Mitigation	1	AC	$50,000.00	$50,000.00	
	Construction Costs Subtotal				$2,954,000.00	
	Contingency, 20%				$590,800.00	
	Construction Costs Total				$3,544,800.00	
	Preliminary Engineering, 10%				$354,480.00	
	Final Design & Const. Engineering,14%				$496,272.00	
	Engineering Costs, Total				$850,752.00	
	Total Construction Expenditures				$4,395,552.00	
PROPERTY COSTS						
	Assume no acquisitions					
	Temporary Easement	2	AC	$8,000.00	$16,000.00	
	Permanent Easement	0.5	AC	$30,000.00	$15,000.00	
	Acquire Homes & Lots	8	EA		$763,600.00	*
	Relocation Assistance	8	EA		$180,000.00	**
	Total for Right of Way				$974,600.00	
	Legal & Appraisals,20%				$194,920.00	
	Total Property Expenditures				$1,169,520.00	
	Total Project Expenditures				$5,565,072.00	

NOTES

* Based on average valuations at 83,000 per home plus 15% for estimate of fair market value

** Based on allowing $22,500 per residence