City of Grand Island

Tuesday, October 11, 2005
Council Session

Item G13

#2005-293 - Approving Agreement with CH2M Hill for Consulting Services Relative to the Wastewater Collection and Treatment System Comprehensive Plan Updates

Staff Contact: Steven P. Riehle, Public Works Director

Council Agenda Memo

From: Steven P. Riehle, Public Works Director

Meeting: October 11, 2005

Subject: Approving Agreement with CH2M Hill for Consulting Services Relative to the Wastewater Collection and Treatment System Comprehensive Plan Updates

Item #'s: G-13

Presenter(s): Steven P. Riehle, Public Works Director

Background

Proposals were solicited from Consulting Engineering Companies for performing a Wastewater Collection and Treatment System Comprehensive Plan Updates. One (1) proposal was received.

Discussion

RFPs were received on September 27, 2005. The treatment facilities were last updated in 1993 and the collection system was last updated in 2000. The comprehensive plans will address waste water collection and treatment needs for the next 20 years. Items that will be evaluated include:

Project Execution and Definition
Project Management and Quality Control
Future Flows and Loading Projections
Review of Regulatory Requirements
Review of Existing Treatment Facilities
Treatment and Hydraulic Modeling
Alternatives Analysis and Evaluation
Odor Evaluation
Effluent Polishing Study
Hydraulic Model Update
Existing Collection System Hydraulic Evaluation
Future Collection System Hydraulic Evaluation
Condition Assessment
Hydrogen Sulfide Modeling
Reporting and Capital Improvement Plan Development

Alternatives

It appears that the Council has the following alternatives concerning the issue at hand. The Council may:

1. Move to approve a resolution authorizing the mayor to execute the agreement.
2. Refer the issue to a Committee.
3. Postpone the issue to a future date.
4. Take no action on the issue.

Recommendation

City Administration recommends that the Council approve the agreement.

Sample Motion

Move to approve the agreement with CH2M Hill to perform the Wastewater Collection and Treatment System Comprehensive Plan Updates.

Comprehensive Plan Update

General

This attachment to the AGREEMENT between CH2M HILL, Inc., (the "Engineer") and the City of Grand Island ("City") describes the services to be rendered for a "Project" generally described as engineering services to perform a comprehensive evaluation and develop a plan for improving the wastewater treatment plant (WWTP) and the wastewater collection system.

Project Information

Project Title: Wastewater Collection and Treatment System: Comprehensive Plan Update

Objective: Evaluate the current operation and future use of the wastewater collection and treatment system. Update the existing comprehensive plans for the wastewater treatment plant and collection system.

Work Tasks

The Engineer agrees to furnish City the following specific tasks and services:

General Tasks

Task G1 – Project Execution and Definition

Objective: Define the project and assess specific project goals.

Subtasks:

G1.1 Conduct a half-day workshop with City staff and two members of the Engineer's project team. Facilitate the meeting to discuss project goals, project approach strategies, responsibilities and quality control procedures.

G1.2 Identification of data and their sources will be completed during an initial data request. Additional data may be requested periodically during the project. Includes a discussion of mechanisms for transfer of this data to the Engineer.

Deliverables: Kickoff workshop meeting minutes.

Task Fee: $ 15,000

Task G2 – Project Management and Quality Control

Objective: Provide project management and administrative activities to support the technical work performed. Monitor status and performance, and communicate with team members and other project participants on an ongoing basis. Monthly billing and status reporting for the project.

Subtasks:

G2.1 Prepare project instructions to include a work plan including tasks, staff assignments levels of effort, costs, schedule, and quality assurance / quality control (QA / QC) procedures.

G2.2 Perform routine project management services to include budget and schedule tracking, and coordination activities. Monthly invoices will be prepared except during any month which activities do not take place.

G2.3 Develop, document and implement QA / QC procedures for work products. The QA / QC procedures will be included as an attachment to the project instructions. Consult with reviewers on an as-needed basis during the execution of the project to assess technical project issues. Provide continuity between the work products developed in this project.

G2.4 Provide project archiving and filing for long-term information access.

Deliverables: Invoices, status reports, project instructions.

Task Fee: Included with other tasks.

Treatment Plant Tasks

Task F1 – Future Flow and Loading Projections

Objective: Review historic WWTP operational data to develop a plant-wide liquid and solids balance for the WWTP, to provide the basis for future flow and loading projections, and to use in evaluating the facilities. Develop flow and loading projections for 5-year, 10-year and 20-year intervals.

Subtasks:

F1.1 Gather and review historic WWTP operational data. Components of data to be collected include flow, BOD, TSS, ammonia and TKN. City staff will provide this data to the Engineer in electronic form from 1995 to 2005. Engineer will also review previous reports for flow projections which are available from the City.

F1.2 Update the process flow diagram, and liquid and solids balance of the WWTP showing each of the processes and the respective process flow interactions. This diagram is essentially a setup for the process modeling.

F1.3 Population and sanitary sewer flow and loading projections will be made using growth area, density and land use projection data as described in the 2004 Comprehensive Land Use Plan, as provided by the City. Evaluate in combination with unit rates for each land use classification identified in the City's Sanitary Sewer

Comprehensive Plan Update (CH2M HILL, 2000). Analysis of historic flow and loading will be used to provide input for the projections. Contact will be made with up to two major industrial contributors to the wastewater flow stream to identify future planned increases / decreases in plant production as they relate to future flows and loadings to the WWTP. Projections will be completed for both wet weather and dry weather seasons. As directed by the City, industrial flow and loading reserves will be included in the future projections.

F1.4 Prepare a Technical Memorandum summarizing the liquids and solids balance, and the flow and load projections. Provide tabulated data showing flow and solids loading quantities for present day, 5-year (2011), 10-year (2016) and 20-year (2026) projections. Average-day, peak-month, peak-week and peak-day projections will be provided for wet weather and dry weather projections. Show data projecting with low, expected and high ranges.

Deliverables: Technical memorandum, provide both draft and final versions.

Task Fee: $ 16,500

Task F2 – Review Regulatory Requirements

Objectives: Review existing and expected future regulatory requirements for the wastewater treatment plant.

Subtasks:

F2.1 Review the current regulatory requirements for the wastewater treatment plant. Specifically include the City's current NPDES permit.

F2.2 Describe anticipated future effluent limits. Meet with NDEQ to discuss future regulations that will impact the wastewater treatment plant. Based on this, develop potential future effluent limits for the wastewater treatment plant, and generally describe the impact of these effluent limits on the wastewater treatment plant.

F2.3 Review the City's current sanitary sewer collection system for compliance with the proposed Capacity, Management, Operation and Maintenance (CMOM) regulations.

F2.4 Prepare a technical memorandum to describe the regulatory issues and potential future effluent limits. Include a presentation of the existing regulations, and a discussion of potential future changes to effluent requirements. Provide estimates of the probability and timing of future regulations and limits, and describe impacts on the wastewater treatment plant.

Deliverables: Technical memorandum, both draft and final versions. Meeting summary of discussions with NDEQ.

Task Fee: $ 8,500

Task F3 – Review of Existing Treatment Facilities

Objectives: Examine the facilities at the existing wastewater treatment plant and determine suitability for future use.

Subtasks:

F3.1 Conduct a site visit to examine equipment, structures and treatment processes. Evaluate underground utilities and other non-visible facilities by available means, such as determination of age, operator recollection, and maintenance records. Make recommendations regarding modification or replacement of facilities. Up to three members of the Engineer's team will participate in this half-day assessment, including project manager, electrical engineer, and a project engineer.

F3.2 Review the City's annual budget for operations and maintenance and for capital improvement of the wastewater treatment plant. Evaluate costs for each process.

F3.3 Review of the previous facility plan report recommendations of upcoming projects, with focus on the Phase 2 projects that have not yet been completed. Determine if these projects are still applicable for implementation.

F3.4 Review chemical usage and energy consumption, as available. Evaluate costs for each process.

F3.5 Perform an investigation of the wastewater treatment plant's composting system and the aerobic digesters. Engineer's composting specialist, digestion specialist and project manager will visit the wastewater treatment for a one-day examination of the composting process. This trip will be separate from the investigation described in F3.1. Review current operations of the composting facility and sludge disposal. Develop alternatives for expanding the on-site operation, moving the composting operation off-site, for improving the operations of the composting system including the use of alternative types of amendment, and for other disposal options such as in-vessel composting, landfilling of raw sludge or monofilling. Review the operations of the aerobic digesters, determine appropriate operating levels, and consider the possibility of abandoning these processes. Develop short-term and long-term alternatives for the digestion facility.

F3.6 Review wastewater treatment plant facilities that are not directly connected to the treatment process, but are necessary for the overall operation and maintenance of the plant. This could include the administration building, maintenance shops, storage facilities, sewer cleaning building, sludge lagoon and other facilities. Develop recommendations for continued use, improvement or abandonment of these facilities.

F3.7 Review available data regarding staffing requirements for the primary sanitary sewer collection system and for the wastewater treatment plant. Review current manpower challenges and the City's organizational structure. Develop an organizational chart and describe and recommended improvements. Prepare a technical memorandum to describe the procedures of evaluation and the recommended staff changes and staff needs.

F3.8 Review design criteria and operation for each unit treatment process of the treatment plant. This will include a review of the operations manual and a review of the daily operating data for each process.

F3.9 Develop Revenue Requirements: Review current operating budget, and capital budget. Review revenue and improvement plans with City staff. Engineer will develop projections of operations and maintenance (O&M) expenses over a multi-year forecast period. This analysis will include a review of base operating requirements and an evaluation of potential changes in the level of O&M spending that might occur as a result of new infrastructure or changes in operating procedure. Revenue requirements may also include cost estimates for ongoing Renewal and Rehabilitation of system assets over time

F3.10 Prepare a technical memorandum describing the condition of existing facilities and short-term improvements. Provide background on each unit process, including design parameters and performance attributes. Provide opinion regarding the current condition and functionality of each unit process. Make recommendations, if applicable, for improvements that should be implemented to unit processes.

Deliverables: Technical memorandum, in draft and final versions. Technical memorandum by digestion and composting specialists.

Task Fee: $ 70,500

Task F4 – Treatment and Hydraulic Modeling

Objectives: Develop a process (treatment) model and hydraulic model of the wastewater treatment plant. Use models to estimate current treatment capabilities and capacities, the impact of future regulations and effluent limits, and treatment capacity shortfalls in light of future flows and loadings.

Subtasks:

F4.1 Models to be used are: HYDRO for the hydraulic model, and Pro2D for the process model.

F4.2 Develop and calibrate the models using existing treatment plant data. Work together with City staff to obtain additional data or sampling, if needed, so that the models can be calibrated.

F4.3 Models will be used by the Engineer to estimate capacity and performance capabilities of existing (baseline) unit processes at the wastewater treatment plant.

F4.4 The process model will estimate the concentrations of the following parameters though each unit process: carbonaceous biochemical oxygen demand (CBOD), total suspended solids (TSS), ammonia (NH4-N), nitrate (NO3-N), nitrite (NO2-N), total phosphorus (TP), and total kjeldhal nitrogen (TKN).

F4.5 The hydraulic model will simulate flow through the entire plant and indicate where constrictions exist.

F4.6 Prepare technical memoranda (one for each model) summarizing the development of the hydraulic and process models.

F4.7 Using the calibrated (baseline) hydraulic and process models, assess the impact of future regulations and effluent limits on the capacity of the wastewater treatment

plant. Incorporate flows and loadings previously developed as well as potential regulatory requirements into the models.

F4.8 Conduct a half-day workshop to present and review the findings of the model projections. Attendees include the project manager and two engineers. This workshop will be combined with the alternatives development workshop below.

F4.9 Summarize the results of the model projections in a technical memorandum. Provide a comparison of existing capacity with future flows and loads to identify shortfalls of treatment processes.

Deliverables: Technical memorandum draft and final versions summarizing model development. Technical memorandum, draft and final versions summarizing capacity evaluations from the modeling effort. Workshop meeting minutes.

Task Fee: $ 27,400

Task F5 – Alternatives Analysis and Evaluation

Objectives: Identify, define and evaluate treatment process alternatives, and select alternatives for implementation.

Subtasks:

F5.1 Identify and develop treatment process alternatives to address each unit process for the wastewater treatment plant. Alternatives will be completed for the entire range of flows and loading projections as well as for regulatory and effluent requirements within the 20-year planning period.

F5.2 Conduct a one-day workshop to review the process alternatives and to brainstorm additional alternatives. Attendees may include up to the following: the project manager, a senior treatment professional, a senior compost professional, a senior residuals professional, the program manager and the project engineer. This workshop will be combined with the modeling projection workshop described under Subtask F4.8.

F5.3 Analyze and evaluate the alternatives using the hydraulic and process models as applicable. Estimate capital and operational costs for each alternative. Calculate life cycle costs for the 20-year planning period. Provide an evaluation of non-monetary factors for each alternative. Evaluate physical space for the alternatives using the existing treatment plant site. Identify alternatives that may result in the need to comply with additional regulations such as waste management or air quality.

F5.4 Conduct a one-day workshop to present, discuss and select alternatives recommended for implementation. Attendees include the project manager and the project engineer.

F5.5 Develop a phased implementation plan for recommended alternatives. Address future regulatory impacts, including uncertainties to determine at what point improvements are necessary. Provide an implementation schedule and cost estimates for each improvement.

F5.6 Prepare a technical memorandum to describe the alternatives selection and evaluation process. Include a recommendation for alternatives and the implementation plan.

Deliverables: Workshop meeting minutes for alternative development, workshop meeting minutes for alternatives selection. Technical memorandum for alternatives evaluation and implementation plan.

Task Fee: $ 44,500

Task F6 – Odor Evaluation

Objectives: Perform a special investigation into the odors generated at the wastewater treatment plant processes and at the collection system.

Subtasks:

F6.1 Conduct a one-day site visit. Attendees include the odor control specialist and the project engineer. Review operations of facilities and calculate, based on operating data, the potential for odor generation of selected facilities.

F6.2 Evaluate up to 5 areas in the collection system with known odors. Include an evaluation of onion waste at one select industrial sewer user.

F6.3 Develop and review short-term and long-term alternatives for improvement of odors at the wastewater treatment plant. Provide costs and a description of each alternative. Evaluate the operation of previously installed odor control facilities.

F6.4 Prepare a technical memorandum describing the facilities evaluated and the alternatives and recommendations.

Deliverables: Draft and final versions of the technical memorandum.

Task Fee: $ 17,900

Task F7 – Effluent Polishing Study

Objectives: Provide a conceptual-level layout and sizing for effluent polishing of flow from the wastewater treatment plant.

Subtasks:

F7.1 Conduct an investigation into the possibility of utilizing the existing lake properties for removal of wastewater treatment plant nutrients, such as phosphorus. Include an investigation of wetland treatment system for a portion of the treatment plant flow. Determine the appropriate amount of flow for this facility.

F7.2 Conduct a site visit and brief review of the existing wastewater treatment plant and nearby properties. Attendance of this one-day visit will be by the program manager and a treatment specialist.

F7.3 Review up to 3 alternatives for effluent polishing technologies. Describe alternatives in detail including the possibility of providing a cultural resource for the area. Select

one alternative in conjunction with the City staff for further development and description.

F7.4 Prepare a technical memorandum describing the investigation and the recommended alternative.

Deliverables: Draft and final versions of the technical memorandum.

Task Fee: $ 15,200

Collection System Tasks

Task C1 – Hydraulic Model Update

Objectives: Update the City's existing hydraulic model to reflect recent system improvements.

Subtasks:

C1.1 Modify the existing hydraulic model, "Stormwater Management Model" (SWMM) of the primary sanitary sewer collection system to reflect system improvements constructed since the previous report, "Sanitary Sewer Comprehensive Plan Update.

C1.2 Review and analyze winter quarter water meter records, wastewater treatment plant influent flow records and collection system operational data. Review data from the year 2000 up to the present. Records and data will be provided by the City.

C1.3 Evaluate changes to unit wastewater flow rates for various land classifications as well as diurnal patterns and peaking factors.

Deliverables: Updated hydraulic model.

Task Fee: $ 23,600

Task C2 – Existing Collection System Hydraulic Evaluation

Objectives: Perform an evaluation of existing areas of the hydraulic model to determine areas needing improvement.

Subtasks:

C2.1 Validate the updated hydraulic model (SWMM) of the City's primary collection system by comparing results of model with City personnel historic knowledge and available historic operational data.

C2.2 Conduct a one-day workshop to present and review the hydraulic model results and the validation results. Attendees will include the project manager and an assistant engineer.

C2.3 Once the validation has been confirmed, perform a hydraulic evaluation of the existing primary sanitary sewer collection system. Evaluation shall be completed under existing average day, peak dry day, and peak wet day flow conditions. Identify areas or pipelines needing hydraulic capacity improvement.

C2.4 Evaluate other known problem areas such as lift station wet well deterioration and other problem areas within the primary sanitary sewer collection system. Up to 10 different areas will be evaluated.

C2.5 Review existing primary sanitary sewer collection system and treatment operations and maintenance practices. Include a review of cleaning schedules, repair methods and records management. Prepare a technical memorandum outlining these practices and any recommendations for improvement.

C2.6 Prepare a brief technical memorandum describing the procedures used to update the model, to evaluate the system and the results of the evaluation.

Deliverables: Workshop meeting minutes. Draft and final versions of the technical memorandum.

Task Fee: $ 14,700

Task C3 – Future Collection System Hydraulic Evaluation

Objectives: Perform an evaluation of future areas of the hydraulic model to determine areas needing improvement.

Subtasks:

C3.1 Conduct meetings with local agencies to identify anticipated development areas and population densities. Expected meetings include the Regional Planning Commission of Grand Island / Hall County. Expected areas of development initially include northwest Grand Island, the East Lakes region, areas along the south U.S. Highway 281 corridor, areas along the south Locust Street corridor, areas formerly in the Wood River floodplain, and the Industrial Park located in the area previously occupied by the Cornhusker Army Ammunition Plant.

C3.2 Estimate future peak dry day flows, and peak wet day flows for 5-year and 20-year planning horizons.

C3.3 Using the updated and validated hydraulic model (SWMM), perform hydraulic simulations of the system under peak dry day flow, and peak wet day flow. Simulations will be performed for 5-year and 20-year planning horizons

C3.4 Identify collection system deficiencies based on the simulations and on operational criteria. Criteria shall be as identified in the previous Comprehensive Plan report.

C3.5 Conduct a one-day workshop to develop and review alternative collection system strategies to alleviate system deficiencies. Attendees to include the project manager and a project engineer.

C3.6 Alternatives selected during the workshop would be further refined by hydraulic model simulations.

C3.7 Prepare a technical memorandum describing the procedures used and the alternatives and results.

Deliverables: Workshop meeting minutes, Meeting minutes from local agencies. Draft and final versions of the technical memorandum.

Task Fee: $ 23,100

Task C4 – Condition Assessment

Objectives: Evaluate areas of the collection system that are in need of repair. Develop projects for improvement.

Subtasks:

C4.1 Review CCTV tapes and DVD's for a total of 12.5 miles of concrete pipelines or other areas identified by City staff. Prepare a log of defects that are present for each pipe segment and assign defect codes.

C4.2 Calculate the structural, maintenance and overall pipe score for each segment. Assign pipe condition "grades" on the basis of these scores. Prioritize and recommend capital improvements on the basis of this condition grade.

C4.3 Prepare condition assessment technical memorandum describing repair, replacement or other recommendations for the segments reviewed.

Deliverables: Draft and final version of the technical memorandum.

Task Fee: $ 14,700

Task C5 – Hydrogen Sulfide Modeling

Objectives: Assess odor and corrosion within a portion of the collection system. The portion to be evaluated includes the area near Lift Station 15 and near Lift Station 19.

Subtasks:

C5.1 Sampling. City will collect the samples and supply instruments for sample collection, a sampling plan will be developed by the Engineer and provided for review. City staff will analyze samples for contaminant parameters as needed.

C5.2 Collect existing available data from City staff regarding wastewater quality and flows for the areas being evaluated. Other data to be collected includes physical layout (slope, diameter, etc.) and materials. Utilize information from the hydraulic model (SWMM) as much as possible.

C5.3 Identify likely locations of sulfide generation, hydrogen sulfide release and resultant potential odor and corrosion problems. Use a computer model called INTERCEPTOR for the evaluation. Expected model runs include a baseline (uncontrolled model scenario) and two additional scenarios. Utilize model to predict pipe life based on corrosion rates. Additional scenarios will evaluate the impact of liquid-phase chemical treatment options.

C5.4 Prepare a technical memorandum to document the model results and recommendations of potential solutions to mitigate actual and potential odor and corrosion problems.

Deliverables: Draft and final version of the technical memorandum. Sampling plan.

Task Fee: $ 23,100

Combined Tasks for Treatment and Collection

Task S1 – Reporting and Capital Improvement Plan Development

Objectives: Provide overall documentation and reporting for the collection system portion and the treatment system portion of the Project. Assist the City with development of a capital improvement plan (CIP).

Provide a prioritized list of projects for the next 20 years related to the collection and treatment systems.

Subtasks:

S1.1 Collect a list of projects as outlined from the tasks herein.

S1.2 Develop cost estimates for administrative, design and construction for each of the projects. Costs will be expressed in 2006 dollars.

S1.3 Prioritize projects based on planned City budgeting over the planning horizon (20 years) and need. Schedule each project for implementation in a comprehensive list suitable for inclusion in to the City's CIP.

S1.4 Prepare a report that collects the previously completed technical memoranda related to the collections system and described herein into a single report. A separately prepared report will not be completed; rather an executive summary will be added. Organize report to include an executive summary and table of contents. A portion of the executive summary will describe the CIP.

S1.5 Present findings and recommendations, as requested by City staff to the City Council. Includes a total of one presentation. Attendees include the program manager and the project managers for the treatment and collection portions of the project.

Deliverables: Draft and final versions of the entire report (executive summary, CIP and technical memoranda). CD-ROM of entire report. Presentation materials for City Council presentation.

Task Fee: $ 31,500

Basis of Scope and Fee Development

The following key assumptions were made in the compilation of this scope of work and the estimation of level of effort. These assumptions are in addition to the scope set forth in the foregoing.

1. The City will make its facilities accessible to the Engineer, as required, for performance of the Engineer's services outlined herein and will provide labor and safety equipment as needed by the Engineer for such access.

2. Access to as-built drawings, aerial mapping, plant monitoring data and other data as requested by the Engineer will be available and provided by the City.

3. Engineer (with the City's input) will develop, facilitate and summarize each workshop. This includes developing an agenda, distributing orientation material prior to the workshop, and preparing detailed summary meeting minutes.

4. The proposed list of workshops is as shown in the table below. Some workshops are combined across separate tasks.

LIST OF WORKSHOPS
Comprehensive Plan Update

No.	Description	Attendees	Comment
1.	Kickoff Workshop, 1 day	Simon, Higbee, and Whitlock	G1.1
2.	Modeling Results Workshop, half day & Treatment Alternatives Development Workshop, 1 day (1.5 days total)	Higbee, Whitlock, Daigger, Williams, Sieger, Heinemann	F4.8 & F5.2
3.	Alternatives Evaluation Workshop, 1 day.	Higbee, Whitlock,	F5.4
4.	Hydraulic Model Results Presentation, half day	Simon, Stout	C2.2
5.	Collection Alternatives Development, 1 day.	Simon, Stout	C3.5
6.	Collection Plan Presentation to City Council, 1 day (evening)	Simon, Heinemann, Higbee	S1.5 – Not a workshop presentation only

RESOLUTION 2005-293

WHEREAS, the City of Grand Island invited proposals for Engineering Consulting Services for the Wastewater Collection and Treatment System Comprehensive Plan Update in accordance with a Request for Proposal on file with the City Clerk; and

WHEREAS, proposals were due on September 27 2005; and

WHEREAS, one proposal was received, reviewed and evaluated in accordance with established criteria; and

WHEREAS, CH2M Hill of Englewood, Colorado, submitted a proposal in accordance with the terms of the request for proposals and all statutory requirements contained therein and the City Procurement Code, such proposal being for an amount not to exceed $346,200.

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND COUNCIL OF THE CITY OF GRAND ISLAND, NEBRASKA, that the proposal of CH2M Hill of Englewood, Colorado, for engineering consulting services for the Wastewater Collection and Treatment System Comprehensive Plan Update for an amount not to exceed $346,200 is hereby approved.

BE IT FURTHER RESOLVED, that the Mayor is hereby authorized and directed to execute an agreement for such services on behalf of the City of Grand Island.

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Adopted by the City Council of the City of Grand Island, Nebraska, October 11, 2005.

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RaNae Edwards, City Clerk

Approved as to Form ¤ _____
October 7, 2005 ¤ City Attorney