1. PROJECT PURPOSE

A. Problem

Like many urban areas, existing economic challenges place the City of Dallas at a competitive disadvantage for real estate investment with other jurisdictions in the metropolitan area. Among the barriers to development are transportation congestion, incompatible land uses, an aging infrastructure, land assembly issues, and neighborhood disinvestment. In addition, there is the perception that Dallas projects face more community obstacles, and take longer for city approval than similar projects in the suburbs.

To spur reinvestment and revitalization in its core area, the City of Dallas collaborated with state and federal agencies to construct the Trinity River Corridor Project, a $1.2 billion project involving flood control and transportation improvements, downtown lakes, park facilities, and the environmental restoration and preservation of an urban forest. The Trinity River Corridor, the 44,000-acre impact area of the project, includes the central business district, industrial and residential areas, and vacant, undeveloped and underdeveloped areas. To maximize the value of the infrastructure, the *Trinity River Corridor Comprehensive Land Use Plan* is underway to demonstrate alternative development and redevelopment scenarios at 22 primary planning sites. Although the efforts are projected to positively impact real estate investment and land use, an economic analysis of the Trinity Project indicated that the improvements by themselves will not be sufficient to spur dramatic investment. A range of other tools will be necessary to assist City leaders in identifying strategic projects that will allow Dallas to capture a larger share of the regional marketplace.

The City needs to create tools that will be readily available for developers and other stakeholders for accessing the wealth of data on the corridor and potential development opportunities, which has become available due to Trinity planning activities. This information will help mitigate investment risk due to incomplete or untimely information, which is the current situation.

The goal of this initiative is utilize technology in an innovative and efficient manner to further economic development and make better decisions in the planning efforts for the Trinity River Corridor.

B. Propose a credible solution that employs network technologies

An Internet-based data management solution will be deployed that provides one central source of information for both the City and the general public. The solution will be accessible to any end user with a personal computer (PC), an Internet connection and a web browser. Existing data related to the Corridor will be integrated with the solution. Additional data sets that could benefit from the initiative will be evaluated, collected and/or developed, and integrated with the solution.

To ensure accessibility, the solution will allow non-technical users to easily interact with significant quantities of sophisticated GIS-based data. Besides end users not being

burdened with technical applications, the solution will incorporate a simple tool interface that will enable users to view only the information they find valuable for each visualization activity they perform. The resulting information will be displayed in an intuitive and real-time 3D visualization view port. This functionality will allow for instant analysis, planning, construction scrutiny, and presentation opportunities in less time and cost of traditional approaches.

Initial data layers that will be incorporated into the solution include the following:

3D 1ft accurate contours – 3D vector data
Ortho. aerial photography. – full-color raster data
Above ground facilities – LIDAR elev. data
Code Compliance – 1 layer
Dallas Area Rapid Transit – 3 layers
City of Dallas enterprise GIS – 26 layers
Fire – 1 layer
Parks – 2 layers
Planning – 5 layers
Police – 10 layers
Public Works – 12 layers
Sanitation – 4 layers
Social Economics – 9 layers
Storm Water – 7 layers
Streets – 3 layers

Key resources, such as loaner laptops for the City staff and kiosks for the general public, will be implemented in order to provide access to the solution for end users that otherwise lack the necessary hardware, Internet connection and web browser.

C. Identify realistic, measurable outcomes that are expected as a result of the project

Efficiencies in communicating information amongst City staff, and between the City and external entities involved in the development process will be realized through the solution. Proposed outcomes of the project are as follows:

- City staff and associated partner organizations and consultants will be able to more readily access data sets that are critical to the City's planning efforts via one centralized solution. This solution will ensure that all planning participants will utilize one master data set.
- Access to the City's planning data sets will be easily and securely provided to external City staff and associated partner organizations and consultants. This will enable the City to expand participation in the development process.
- One centralized data solution will enable the City's planning staff to overlay previously disparate data sets in a common base. This overlaying of data sets will allow for effective targeting of City and private resources and better planning due to more informed inputs.

Several examples of potential future uses for the solution include:

- The solution will likely evolve into a medium with which the City can readily share data and invite developer participation via real-time, two-way communication. Private interests would be given the ability to seamlessly place their own site plans directly onto the City's current/existing data and immediately evaluate the planned development's true contextual impact. This hypothetical planning exercise could be conveyed to City staff and stakeholders.

- The solution could evolve into a marketing tool for presenting City properties, planned developments and other resources to potential developers, employers and other private and municipal interests.
- The solution could be utilized as a "live/real-world" interactive tool during City executive functions such as Council and Plan Commission meetings.

2. INNOVATION

The innovative aspects of the program relate to the use of one common, easy-to-use tool for hosting, sharing, querying and reporting of the City's planning data. Stakeholders interested in corridor development will have access to a master set of base data and related tools to analyze, query and report on the data through one common solution. The data display medium utilized by the proposed solution simulates an actual real-world, 3D-type interaction with the City's data in lieu of a traditional "2D" perspective. The solution will require no actual GIS experience or familiarity with GIS data in order to utilize the tools. Any end user that is comfortable surfing the web or utilizing common mapping solutions, such as MapQuest, will readily adapt to the proposed solution. The proposed solution will serve as a model for other municipalities that have many internal departments and external agencies involved in development projects and that need to access critical information for the decision making process.

3. COMMUNITY INVOLVEMENT

A. Partnerships

- HNTB Corporation – technical support; stakeholder involvement
- University of Texas at Arlington – School of Urban and Public Affairs (UTA-SUPA) – technical support; stakeholder involvement; program evaluation
- Trinity Commons Foundation - Economic Development Committee – stakeholder involvement

B. Support for End Users

Because the solution runs on top of an environment already in place (end user's PC), the provision of adequate support for end users will be simple. The tools for end users will be developed with ease-of-use in mind. A tool that any end user familiar with common web and mapping technology can readily utilize will be provided. Training and support will be conducted for City staff responsible for maintaining the base data and the hosting environment. End user training will be conducted for City staff end users. A user guide will be made available via file download from the web site. Dedicated loaner laptops for City staff will ensure that public presentations and meetings are conducted without experiencing technical issues. Community stakeholders will have access to the loaner laptops and provided end user training at community presentations. Ongoing technical support will be provided through the City's existing GIS and IT resources, the Trinity River Corridor Project Office, and the primary software vendors.

C. Stakeholder Involvement

The public participation plan for the Trinity land use plan will be revised to incorporate outreach activities to discuss the solution. The public participation plan was initially prepared at the onset of the land use planning process to encourage the widest degree of

public involvement possible. Besides stakeholder meetings at the 22 primary planning sites, public participation provisions include community workshops, project newsletter, and presentations to interest groups. Community stakeholders who have been involved in the Trinity planning process will serve on the program's evaluation steering committee.

D. Demonstrating Sustained Commitment

After the federal grant period, the City of Dallas, in partnership with UTA-SUPA and HNTB, will continue the program.

4. EVALUATION

A. Evaluation Strategy

The evaluation approach will monitor, track and report on the proposed outcomes noted in Section 1 - Project Purpose. This will enable the City, project team and evaluation steering committee to assess the overall success of the program in meeting the stated objectives.

1st Outcome: City staff and partner organizations can more readily access data sets that are critical to the City's planning efforts via one centralized solution. This solution will ensure that all planning participants utilize one master data set.

Performance Measure: The City and evaluation committee will establish a baseline for typical data requests prior to full implementation of the GIS web site, track data requests during the project implementation, and then compare the volume and type of data requests prior to implementation with post implementation requests. A simple method of tracking use of the GIS web site would be to implement "counter functionality" to capture who accesses the site, what content they visit, and what content they download.

2nd Outcome: Access to the City's planning data sets will be easily and securely provided to the public and other community stakeholders, partner organizations and consultants. This will enable the City to expand participation in the development process.

Performance Measure: The City and evaluation steering committee will establish a baseline for typical data access with external organizations, primarily focusing on the medium with which this data access occurs (i.e. transfer of hard copy plans, FTP of CAD files, etc.) The evaluation team will then track data access during the project implementation and then compare and contrast the primary methods in which data is shared post-implementation of the solution.

3rd Outcome: One centralized data solution will enable City staff to overlay previously disparate data sets in a common base. This overlaying of data sets will allow for more effective targeting of City and private resources and better planning due to more informed inputs.

Performance Measure:
Measures will include the length of time it takes for development packages to be approved; amount of resources used to assist developers in collecting information; and the number of proposals rejected because of incomplete information.

D. Evaluation Questions

Evaluation review questions will help assess the usefulness and cost benefit of the solution. The evaluation questions will target two primary audiences – the end users of the tools and the stakeholders that rely on the data and reporting the solution creates.

The primary goal of evaluation questions for basic end users is to identify ways to ensure that the tools are readily adopted. Example evaluation review questions include:

- Did the end user find the web site easy to navigate and operate?
- Were the web site map navigation tools intuitive and easy to learn?
- How easy was it to select a parcel and identify the associated land use?
- How easy was it to generate a report detailing building inventories for the parcel?
- How effective was the water usage scenario constructor tool in determining water needs for the parcel?

The primary goals of evaluation questions for stakeholder questions are to capture, quantify and qualify cost benefit areas of concern. Some example evaluation questions are:

- Has use of the web site enabled the City to make more intelligent, informed decisions concerning economic development issues within the Corridor?
- Identify a specific situation where use of the web site made the decision making process more efficient. Describe the scenario. How would the City have gathered information to make the decision prior to implementation of the web site?
- Have any efficiency gains been realized by the City staff through use of the web site? Have these gains enabled the City to reallocate or decrease staffing requirements?

E. Data Collection and Analysis Plans

The server solution has the ability to log, track and report on utilization. In addition to these common 'use metrics,' the solution can record the amount of each data download, the approximate time users spend during each session or spend in a particular section of the site. Because the solution will utilize common technology, virtually any aspect of the use of the solution could be tracked. Prior to implementation, attention will be paid to the City's existing information technology security and privacy regulations to ensure that the solution is in compliance.

D. Funds for Evaluation

Funds will be allocated for quality control throughout the development and implementation phases. Evaluation funds will be allocated to evaluate the degree the project has met the project objectives and proposed outcomes. Approximately 10% of the proposed budget will be allocated for quality control and evaluation purposes.

E. Evaluators

Project implementation will be evaluated by a steering committee comprised of the following:

- Casey Gardner – City of Dallas Director of GIS Infrastructure Management (steering committee chairperson)
- Dr. Ard Anjomani, UTA-SUPA (professor of urban planning and GIS)
- Marcus Wood, Marcus Wood & Associates (commercial realtor)
- Charles Johnson, South Central Community Development Corporation (neighborhood/community developer)

- John Clark, Trinity Commons Foundation - Economic Development Committee (chairperson of group comprised of development community and chambers of commerce)
- Cyndy Lutz, Habitat for Humanity - Director of Real Estate Development (housing developer)

F. Final Evaluation Report

The final evaluation report will be prepared by the UTA-SUPA. Besides assessing program outcomes, the report will include a cost/benefit analysis of the program, and long range recommendations for future applications to improve planning and development-related decision-making.

5. PROJECT FEASIBILITY

A. Technical Approach

A detailed technical approach is listed in Appendix 1 – Detailed Technical Approach. The solution will consist primarily of a host environment that includes a web / application server and a database server and the client environment which will obviously vary according to the end user. However, some specifications regarding the City's current client environment and the proposed loaner laptops have been included for clarity.

Alternative approaches were considered concerning the primary off-the-shelf components of the proposed solution. These approaches included ViewTec, Terra Explorer, GeoSim Cities, ArchiVideo, Environmental Simulation Center, and Urban Viewer. The basic system architecture is the same for each approach -- the only changing variable is that of the host location and related responsibility.

The product that meets the majority of requirements for the solution is Keyhole Corporation's EarthStream Enterprise Server Solution. None of the alternative technologies include a compatible enterprise workflow solution capable of realizing a seamless extension to the current software being utilized by the City to rectify and manage GIS data assets. Achieving a seamless integration with the City's ESRI AcrIMS Server, ArcView, and ArcInfo managed datasets will be crucial in creating an inexpensive, easy-to-maintain conversion work flow when preparing the master datasets for internet based distribution.

Keyhole's patent pending Pyramid Compression delivery method for imagery will be applied to available aerial imagery allowing the City to place sub-meter photography on the stream-server while avoiding bandwidth requirements greater than 128 kbps. Being able to efficiently deliver high-quality data with low bandwidth requirements will allow the solution to effectively serve a much broader group of potential end-users. No other competing solution maintains both an OpenGL and a Direct-X thin client 3D real-time viewer. The dual support of the APIs is important to supporting a broad base of end-users. The advanced development of Keyhole's product is apparent in the average frame rates that are maintained during data delivery. Frame rates are a crucial aspect to creating compelling believable simulation experiences when real world information is being delivered.

The solution can accommodate growth beyond the scale defined for the grant period. The solution will utilize a common operating system and communication platform that can be readily scaled up (or down) to accommodate new supporting criteria. Examples of potential growth issues include:

- An infrastructure growth issue that might surface after implementation of the solution -- Inadequate bandwidth and hosting infrastructure to accommodate more concurrent sessions (i.e. more end users attempting to access the web site at the same time than was originally planned for). This issue can be mitigated by improving the host server or Internet connection to the site (i.e. upgrading the web server).
- An organizational issue that could arise -- If the City's GIS Infrastructure Management Department upgraded their desktop software used to maintain the City's base data sets with resulting in data layers that are not compatible with the initial solution. This issue could be resolved by ensuring that interface control documents (ICDs) are developed during the implementation. This requires the GIS Infrastructure Management Department include the web site in their upgrade schedule.

B. Applicant Qualifications

<u>City of Dallas – Project Management Team</u>

Jo Ann Wilkerson (City of Dallas Trinity River Corridor Project Office)
15 years planning and economic development experience; experience managing large federal government funded demonstration projects; master degrees in business administration - finance and city and regional planning.

Brian Kilburn (City of Dallas Trinity River Corridor Project Office)
GIS Analyst III; master degree in GIS; currently modeling the Great Trinity Forest; experience managing natural resources with aid of GIS.

<u>Technical and Solution Development Team</u>

Michael Hulme (HNTB) - Urban Simulation
Primary technical expert and solution development lead; extensive experience in the field of 3D graphics, animations and real-time simulations; led development of a profitable startup and merged with an engineering firm; directed over 50 full-production computer animation projects.

Stephen Haag, MCSE (HNTB) – Information Technology
Primary information technology resource; extensive information technology and GIS background; managed large technology initiatives within the engineering and municipal industries; project experience specifically related to municipal GIS and corridor planning.

Mark Bowers, ASLA, AICP (HNTB) – Urban Planning
Registered landscape architect and planner with 14 years of urban design and landscape architectural experience; extensive experience in the project management/design of transportation enhancement projects, and comprehensive master plans.

Robert Prejean, AICP (HNTB) - Urban Planning
10 years planning and economic development experience; extensive experience in real estate market analysis.

Ard Anjomani, Ph.D. (UTA-SUPA)
Over 30 years academic and professional experience in urban and regional planning; areas of expertise include GIS for spatial analyses; transportation and demand modeling; land use/environmental planning; Coordinator for the UTA-SUPA GIS Certificate Program.

Full resumes are listed in Appendix 2.

C. Proposed Implementation and Completion

Timeframe:	Milestone Description:
Months 1 – 3	Requirement Gathering / System Architecture
Months 4 – 6	Hardware Installation
Months 7 – 9	GIS Data Gathering & Conversion
Months 10 – 12	Hardware Testing / Streaming
Months 13 – 15	Application Customization / Training & Support
Months 16 – 18	White Paper Posting / Full Site Availability

D. Privacy and Security

The proposed solution will utilize common enterprise server and Internet security methods such as encryption algorithms for data transfer, as well as standard x509 certificates and LDAP directory services for user authentication and access control. Common NTFS file and share permissions will be utilized for internal City tasks such as data uploading and maintenance. Other means of addressing privacy and security concerns will include the creation of custom information data sets for individual end users and logging of data access. Log user specific information can be accomplished if necessary.

E. Sustainability

The funds required in this application are viewed as seed money for a program that will require additional funding if effectiveness is demonstrated. If the program is successful, future funding support for the technology and equipment will be assumed by the City of Dallas' Trinity River Corridor Project Office. Costs for database development and maintenance will be shared with other City of Dallas departments that share the data. In addition, opportunities for supplemental funding from private foundations will be sought by the Trinity River Corridor Project Office.

F. Dissemination

Dissemination of information concerning the solution will be accomplished by educating potential end users. Tactics include links on the City's web site and the inclusion of the URL in both soft and hard copy materials that concern the corridor. End users will be recruited through presentations to various City departments and staff work groups, and use of promotional materials such as emails and regular updates when additional tools

have been deployed. External stakeholders will have access to the technology through contractual agreements with the City.

Briefings on program progress will be made to the City of Dallas' City Council. Briefings will also be made to the Trinity River Corridor Interagency Committee, which includes officials from the North Texas Council of Governments; Texas Department of Transportation; North Texas Tollway Authority; Army Corps of Engineers; Environmental Protection Agency; and Dallas County. A goal of the briefings will be to: 1) describe the impacts of the program on planning and economic development initiatives; and 2) discuss the implications of the technology on decision-making and outreach if used by other Interagency Committee members for other components of the Trinity River Corridor Project.

The solution will be discussed in course work on planning/GIS at the UTA-SUPA. Program results will be published in professional planning journals and presented at conferences, such as those sponsored by the American Planning Association.