CITY COUNCIL COMMUNICATION:

99-341

AGENDA:

JULY 26, 1999

SUBJECT:

DOWNTOWN TRAFFIC SIGNAL SYSTEM PROJECT

TYPE:

RESOLUTION
ORDINANCE
RECEIVE/FILE

SUBMITTED BY:

FLOYD BENTZ. P.E.
CITY ENGINEER

ITEM ____

OFFICE OF THE CITY MANAGER
CITY OF DES MOINES, IOWA

SYNOPSIS -

The City's Downtown Traffic Signal System consultants have completed the Phase One Design Concept Report. This report documents the analysis of alternatives and preliminary design work on this project, and summarizes a series of technical memos. These technical memos and the preliminary design elements have been coordinated with and reviewed by a Technical Advisory Committee. The Design Concept Report presents the recommended features for a complete traffic control system, including the necessary communications system. The report also includes an automated parking sign system, which has been reviewed and endorsed by the Downtown Parking Committee.

It is recommended that the Design Concept Report be approved, and the consultants proceed with design of final plans and specifications for the traffic control system and issuance of a Request for Proposals (RFP) for procurement of the "high-tech" system software and related computer hardware items. It is also recommended that the City Manager negotiate a professional services agreement with the consultants to prepare the final plans and specifications for the parking sign system to be installed in conjunction with the traffic control system.

FISCAL IMPACT -

The Downtown Traffic Signal System is included in the1999-2000/2004-05 Capital Improvements Program (CIP), page 331, Account No. 389346. Funding for this project includes $2.4 million of federal funds; $360,000 of state safety funds; and $642,000 of local funds, primarily Tax Increment Financing (TIF) funds. The CIP includes a separate project for the "Parking Facility Exterior Signing," page 189, Account No. 352369. This project includes a total of $617,000 of parking system funds.

RECOMMENDATION -

The following actions are recommended: (1) approval of the Phase One Design Concept Report as prepared by the City's consultants, Snyder & Associates, Inc., in Ankeny, Iowa, and Kimley-Horn and Associates, Inc., in Dallas, Texas; (2) authorization to proceed with the RFP for the procurement of the "high-tech" system software and related computer hardware items identified in the Design Concept Report; (3) authorization to proceed with the preparation of final plans and specifications for the furnishing and installation of the traffic signal system, communications network, and related items as identified in the Design Concept Report; and (4) authorize the City Manager to negotiate an Agreement for Engineering Services with Snyder & Associates, Inc., and Kimley-Horn and Associates, Inc., to prepare the final plans and specifications for furnishing and installing the automated parking sign system as identified in the Design Concept Report.

BACKGROUND -

On October 23, 1995, by Roll Call No. 95-4079, the City Council approved a project agreement with the Iowa Department of Transportation (IDOT) for an Iowa Clean Air Attainment Program (ICAAP) project for the Des Moines Downtown Signal System. On September 3, 1996, by Roll Call No. 96-3055, the City Council approved an Engineering Agreement with Snyder & Associates, Inc. (Dennis L. Snyder, President - Ankeny, Iowa) to provide three phases of engineering services on this project: Phase One - Alternatives Analysis and Conceptual Design; Phase Two - Preparation of Final Plans and Specifications for signal system construction and preparation of signal timing plans; and Phase Three - certain construction administration and inspection services. Snyder & Associates, Inc., subcontracted with the firm of Kimley-Horn and Associates, Inc. (Wayne Kurfees, Associate) of Dallas, Texas, to provide traffic signal system and communications system expertise in the analysis and design of this project.

<u>Alternatives Analysis and Design Concept Report</u>

The consultants have completed the phase one work and have

prepared a Phase One Design Concept Report. A copy of the Executive Summary of this report will be available Monday. The phase one work included preparation of a series of technical memos, which are summarized in the report:

#1 - Traffic Variability/Predictability
#2 - Traffic Engineering Software
#3 - Traffic Control System/Center Site Visits
#4 - Travel Time Studies
#5 - Turning Movement Traffic Counts
#6 - System Procurement
#7 - System Topology
#8 - Communications Assessment

Technical Advisory Committee

The phase one work and technical memos have been developed and reviewed through a series of meetings with a Technical Advisory Committee. This committee includes representatives from the consultants, City staff (Traffic and Transportation, Engineering Design, and Information Technology), Traffic and Safety Committee, Downtown Partnership, Metropolitan Planning Organization (MPO), Metropolitan Transit Authority (MTA), City of West Des Moines, IDOT, Federal Highway Administration (FHWA), and the Center for Transportation Research and Education (CTRE) at Iowa State University. The committee provided input and review to help develop a consensus understanding of the needs of the new traffic control system, improvement opportunities, maintenance concerns, and options for procurement of the system.

Recommended Control and Communications System

The alternatives analysis has identified a recommended control system that will provide centralized monitoring of signal operations, but distributed control of the local intersections. This type of system is probably the most cost-effective, and allows the local controllers to remain operating in a coordinated manner even if the communication link is disrupted. The system capabilities are sized to run the Downtown Signal System, with 95 signals, and to incorporate the new system being installed on East 14th Street, to convert other existing arterial "closed loop" systems, and to add future arterial systems. Total capacity of the system will be 512 signals.

A key component of the system is development of a

communications network to provide the necessary signal monitoring and control, and to also provide capability for other key "Intelligent Transportation Systems" (ITS) functions. For cost efficiencies, the recommended initial system is a hybrid system that utilizes some of the newer existing twisted-pair copper wire (telephone grade) and adds key segments of fiber optic cable, installed in available utility duct whenever possible. The fiber optic network will originate in the Information Technology Center at the Armory Building and will connect to a control center in the Traffic and Transportation Office and to two communication hubs located in City parking garages at 3rd & Court and 9th & Locust. This fiber optic network is being developed in conjunction with interagency agreements for shared fiber with the City, Des Moines School District, and the Iowa Communications Network (ICN), and also coordinated with fiber being installed for City use by the cable television company TCI.

Traffic Control Center

As identified above, the traffic control system will be operated from a Traffic Control Center that will be located in existing space in the Traffic and Transportation Office in the lower level of the Armory Building. Staff from the consultants and the City visited several centers in Texas and California, ranging from very simple to very elaborate. The recommended center will be relatively small and modest, but will offer a high degree of capability. It will be necessary to construct one wall to enclose an existing work area, and install some control equipment. Existing furniture will be used to create two workstations, and the effective use of technology will provide the high degree of capability. The two workstations will allow the monitoring and control of the signal systems through closed circuit television (CCTV) equipment and video displays.

In addition to operating the traffic control system, the Control Center will provide the following functional ITS applications: Automated Parking Sign System; video monitoring of traffic conditions through CCTV cameras and fixed video detectors; and motorist information through changeable message signs. An extensive automated parking sign system is recommended, while the video monitoring and message signs will be initially limited due to the cost, but can be expanded in the future.

The Traffic Control Center will be designed with an "open architecture" that will allow it to function as a key component

of a total Traffic Management System. This Traffic Management System would collect and process traffic data to operate traffic signal systems; provide video monitoring of traffic conditions; coordinate operation of the radio controlled School Flasher Speed Limit signs; provide real-time parking availability information in a series of directional signs for the parking system; and provide driver information through changeable message signs.

The system would also provide processing and communications capabilities for the following future ITS applications: Freeway Incident Monitoring and Management, either independently or coordinated with an IDOT Traffic Management Center; coordination with the MTA Automated Vehicle Location System, and/or bus priority control at signalized intersections; coordination of traffic signal system operation with other metropolitan area communities; coordination with CTRE for traffic control research and education; and additional motorist information through future message signs and information kiosks.

The Freeway Monitoring and Management capabilities would be especially valuable during the reconstruction of I-235. If IDOT has not implemented a separate traffic management center, then the City's Traffic Control Center could be used to provide this important function if the necessary monitoring and control equipment, either permanent or temporary, is installed in the field.

Annual Performance Measures - Improved Air Quality

The ICAAP funding grant for this project was based on estimated traffic control improvements that would reduce stops, delay, and fuel consumption, which would in turn reduce vehicle emissions and improve air quality in the downtown area. As part of the phase one work, the consultants have refined the estimates of these benefits through on-street travel time and delay studies and computer modeling, compared to computer modeling of future optimized traffic control.

This estimate of the Annual Performance Measures shows the recommended traffic control system will provide the following benefits: 18 percent reduction in traffic signal delay (over 500,000 vehicle-hours per year); 19 percent reduction in vehicles stops (over 6.2 million fewer stops per year); 10 percent reduction in travel time (over 500,000 vehicle-hours

per year, primarily through reduction in signal delay); and 11 percent reduction in fuel consumption (over 700,000 gallons of fuel saved per year). These traffic flow improvements result in an estimated 11 percent reduction in Annual Air Pollutant Emissions, which will remove the following amounts of pollutants from the air downtown: over 50,000 kilograms (kg) (110,000 pounds) of carbon monoxide (CO); nearly 10,000 kg of nitrous oxide (N2O); and nearly 12,000 kg of volatile organic compounds (VOC).

System Procurement

The Design Concept Report recommends dual methods for procuring and installing the Traffic Control System. The majority of the system components and features would be provided through the traditional method of awarding a contract to the lowest compliant bidder based on approved plans and specifications. Phase two of the existing consultant contract provides for them to prepare the necessary plans and specifications for this work. The specific items that would be covered in these plans and specifications are as follows: traffic signal modifications and/or reconstruction; installation of the communications network, including fiber optic cable, equipment, and communications hubs; CCTV cameras, monitors and control equipment; signal system detector loops and video detectors; automated parking sign system; changeable message signs; and minor building modifications to enclose the Traffic Control Center.

However, this traditional low-bid method is not well suited for acquiring the high-tech control system software and computer hardware. The study recommends that these items be acquired through a direct high-tech procurement method that would evaluate proposed system functional capabilities as well as cost, similar to the method used recently to procure the PeopleSoft financial management and human resources software package. Under this method, potential suppliers would submit proposals to furnish the required system software and associated computer hardware, and to also provide technical services to install the software, integrate it with the field communications and traffic control systems installed by the contractor, and successfully operate the entire system through a required test period before final acceptance by the City. In addition, the software supplier would provide training to City personnel on the necessary operation and maintenance of the software and hardware systems.

The consultants have prepared an RFP for the recommended traffic control system software, associated hardware, and systems integrator services. This RFP identifies the minimum functional requirements of the system, optional features, minimum bidder qualifications, and evaluation criteria that will be used to select a supplier. A selection committee, consisting of members of the Technical Advisory Committee, will review and evaluate the proposals. It is expected that the selection committee will select the top proposals for submittal of final proposals, including final cost and proposed equipment, and interviews/demonstrations of their proposed systems. The selection committee will evaluate the proposed system capabilities and cost, and then make a recommendation of the "best bid" to the City Council for award of a system procurement contract.

Proposed Schedule

The design of the plans and specifications is ongoing and should be completed in September or October, with a bid letting scheduled for January 2000. The high-tech system procurement process should be completed in October. This system can then be implemented and tested on the East 14th Street Signal System. Construction of the field communications and traffic control elements will be accomplished in the spring and summer of 2000, with full implementation of the system in the summer and fall of 2000.

A key function of the design phase is the development of signal system timing plans, so the new traffic control system can provide the improved operations that will produce the expected reductions in air pollutants, stops, and delays. These signal timing plans will be developed with the assistance of computer modeling programs, and adjusted using computer animation of the proposed operations. The final timing plans will be implemented in the operating signal system, and final field adjustments made as necessary. The consultants will then make final travel time studies and will document the final, actual improvements in Annual Performance Measures.

Design of Automated Parking Sign System

The scope of services included in the existing Engineering Agreement with the consultant team provides for the development of a functional traffic control system that would

include an ability to coordinate with a real-time automated sign system. The scope does not provide that the consultants will prepare the necessary final plans and specifications for installation and operation of such a sign system.

The 1999-2000/2004-05 CIP includes a separate project for the "Parking Facility Exterior Signing," page 189, Account No. 352369. The consultants have prepared a design concept for the parking sign system that has been reviewed and endorsed by the Downtown Parking Committee. This system is proposed to be installed and operated in conjunction with the traffic control system to maximize efficiency and minimize cost. The sign system will share features with the signal system, including computer processing at the control center, local intersection signal controller processing for sign control, and communications links wherever possible.

This parking sign system will include a series of highly-visible, fixed signs that are color coded to provide advance guidance to the parking system garages. The signs will be installed on the major entrance streets to the downtown, and will also be installed at the garage entrances to better identify the entrance. The sign system will interface with the computerized revenue control system to provide the real-time status of parking availability in each garage. A changeable matrix incorporated in the fixed sign will show the current status of each garage as "OPEN," "FULL," or "CLOSED." These signs will allow motorists, especially visitors, to find the most convenient available parking. This system will greatly enhance customer service to persons seeking parking in the downtown, and will increase the overall efficiency and utilization of the parking system.

It is recommended that the City Council authorize the City Manager to negotiate a separate agreement for professional services with the consultant team of Snyder & Associates, Inc., and Kimley-Horn and Associates, Inc., to provide the necessary preparation of design plans and specifications for the parking sign system. These plans and specifications would be included as a separate division in the overall traffic control system plans. This will provide for both systems to be installed by the same contractor, and will achieve the greatest cost savings and efficiencies.