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DEPARTMENT OF  
PUBLIC WORKS

CITY OF SACRAMENTO  
CALIFORNIA

1391-35TH AVENUE  
SACRAMENTO, CA  
95822-2911

DIVISION OF  
FLOOD CONTROL AND SEWERS

916-449-5271

September 4, 1990

Budget and Finance Committee  
Sacramento, California

Honorable Members in Session:

**SUBJECT: APPROVING A FLOOD HAZARD WARNING SYSTEM AND APPROPRIATING \$55,000 FROM THE STORM DRAINAGE CONTINGENCY RESERVE TO THE OPERATING BUDGET OF THE FLOOD CONTROL AND SEWERS DIVISION**

**SUMMARY**

This report recommends the installation of a local flood hazard warning (ALERT) system. This system would warn of many potential flooding situations, and would expedite the notification and mobilization of City personnel responsible for emergency planning and response.

**BACKGROUND INFORMATION**

Regional flood forecasting is performed by the State of California, but the State system does not monitor levels of several important local streams (Morrison and Arcade Creek). The National Weather Service has developed an automated system to monitor river levels and warn of flooding hazards; this system is the Automated Local Evaluation in Real Time (ALERT) system. In addition to reporting creek flood levels instantaneously, this system uses real-time rainfall measurements to forecast flood flows and level hours in advance. The Division of Flood Control and Sewers proposes to install two ALERT gaging stations, one on Arcade Creek at the Natomas East Main Drainage Canal and the other on Morrison Creek at the Mack Road bridge, to provide real-time warning of high stream levels. The ALERT system would also provide the division with continuous automatic reports from many other regional river level and rainfall gages, including the American River gage at H Street, the Sacramento River gage at I Street, and Sacramento County and City of Roseville gages on local streams.

Both gage housings, which include radio transmitters, will be installed at City pumping stations. Sensors and sensor cables will be installed within adjacent channels and levees. Permit applications were filed with three agencies for installation of underground sensor cables. The State Department of Fish and Game requires a Streambed Alteration Agreement for the trenching in the two channels. The State Reclamation Board requires a permit for the shallow trenches crossing over the top of the levees. The Union Pacific Railroad Company requires a permit to utilize a portion of their right-of-way at a bridge crossing Arcade Creek. The

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trenching and installation of the gaging stations is to be performed by City forces. Data will be transmitted via radio from the City's gage sites to the National Weather Service receiver. This and additional real-time river and precipitation data will be transmitted via Centrex telephone line to the City's ALERT microcomputer, where it will be continuously evaluated and archived. The system will automatically detect rising and high river levels, severe rainfall intensities, and other flood risk conditions, and it will automatically dial City emergency response personnel.

In addition to gaging equipment, this project will require the purchase of five microcomputers, one 386-type unit and four AT-type units. The 386 microcomputer, located at the Flood Control and Sewers Division office on 35th Avenue, will receive the gaging station data and will automatically maintain, for analysis and archive purposes, a database of rainfall and river and stream levels. The four AT-type microcomputers will be purchased with modems built into them for remote access to the ALERT system. One AT microcomputer at Sump 2 will allow for 24-hour monitoring of the ALERT system during storm periods. A second AT microcomputer will permit ALERT access from the 24th Street Corporation Yard, a staging area for field personnel. The third AT microcomputer will be for use at the State Flood Operations Center, and the fourth will be used at the City Emergency Operations Center and as a back-up for the other three AT microcomputers. Six additional Centrex telephone lines will be needed for the acquisition and distribution of the gage data.

The ALERT system would assist in the operation of the City's Combined System during lesser storms, as well as when threats exist from levee overtopping. The system would warn the appropriate personnel of impending internal flooding threats, would provide managers the ability to monitor the development of such an event and assess risks, and would aid in coordination with other involved agencies. The system could be extended to incorporate plans developed to respond to an emergency and it could be used for the notification of personnel responsible for various duties, aiding in their timely and orderly mobilization. Finally, the rainfall and streamflow data collected would aid in the revision and refinement of local hydrologic design criteria and in calibration of local basin computer models, which are used to define the most cost-effective drainage Capital Improvement Projects.

The City will execute a Memorandum of Understanding (MOU) with the National Weather Service (NWS) to provide, at no cost to the City, extensive technical and software support for operation of a Cooperative Local Flood Warning System. This system will enable the City to use the resources of the NWS to coordinate radio frequencies and obtain the necessary authorizations, to obtain and maintain computer software necessary for the automation of data collection, to obtain supporting hydrometeorological information, to receive advisories to determine expected runoff conditions during critical storm periods, and to receive NWS support in updating and refining calibrations of hydrologic forecast models.

**FINANCIAL DATA**

The estimated cost of this project for equipment and installation is \$55,000. It is recommended

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that the funds be appropriated from the Storm Drainage Fund Contingency Reserve, (425-710-7102-4999), which has a balance of \$855,866 as of July 31, 1990, to the Flood Control and Sewers Division Operations and Maintenance equipment budget (425-310-3166-4630). A list of equipment is attached. This appropriation represents 0.27% impact on rates in order to restore the fund contingency.

**POLICY CONSIDERATIONS**

City policies and procedures require the approval of the City Council for the transfer of funds from contingency reserve.


**MBE/WBE EFFORTS**

MBE/WBE vendors will be encouraged to submit bids for computer-related equipment purchases.

**RECOMMENDATIONS**

To reduce the risk of property damage and loss of life from local flooding, it is recommended that the Budget and Finance Committee forward to the City Council with a recommendation of approval the attached resolution to appropriate \$55,000 from the Storm Drainage Fund Contingency Reserve to purchase ALERT equipment, and to authorize the City Manager and City Clerk to execute a Memorandum of Understanding with the National Weather Service to develop and operate a Cooperative Local Flood Warning System.


Respectfully submitted,

  
Albert E. McCollam, Jr., Division Manager  
Flood Control and Sewers Division

RECOMMENDATION APPROVED:

APPROVED:

  
Jack R. Crist  
Deputy City Manager

  
Melvin H. Johnson  
Director of Public Works

Contact Person:  
Craig Crouch, Senior Engineer  
449-8559

September 4, 1990  
All Districts

# RESOLUTION NO.

ADOPTED BY THE SACRAMENTO CITY COUNCIL

ON DATE OF \_\_\_\_\_

## RESOLUTION TO APPROPRIATE FUNDS FROM THE STORM DRAINAGE FUND CONTINGENCY RESERVE FOR THE INSTALLATION OF A LOCAL FLOOD HAZARD WARNING SYSTEM

BE IT RESOLVED BY THE CITY COUNCIL OF SACRAMENTO:

1. That funds in the amount of \$55,000 are appropriated from the Storm Drainage Fund Contingency Reserve (425-710-7012-4999) to the Flood Control and Sewers Division Operations and Maintenance budget for 1990-91 (425-310-3166-4630) for the purchase and installation of equipment for a local flood hazard warning (ALERT) system as detailed in Attachment 1.
2. That the City Manager and City Clerk are authorized to execute a Memorandum of Understanding (MOU) with the National Weather Service to develop and operate a Cooperative Local Flood Warning System.

\_\_\_\_\_  
MAYOR

ATTEST:

\_\_\_\_\_  
CITY CLERK

\_\_\_\_\_  
FOR CITY CLERK USE ONLY

RESOLUTION NO.: \_\_\_\_\_

DATE ADOPTED: \_\_\_\_\_

REVISED ALERT EQUIPMENT LIST (7/30/90)

EVEREX 386/25Mhz , 4MB RAM , EVEREX 160MB HARD DISK DRIVE , EVEREX 14" VGA DISPLAY MONITOR WITH GRAPHICS CARD . . . . .	\$4,850.00
EVEREX 60T 60MB STREAMER TAPE BACKUP . . . . .	\$700.00
HAYES 2400 BAUD SMARTMODEM ( 5 @ \$375.00 ) . . . . .	\$1,875.00
HEWLETT-PACKARD LASERJET III PRINTER . . . . .	\$2,000.00
SUBTOTAL FOR 386 BASE STATION - - - - -	\$9,425.00
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TOSHIBA T1200 XE 80286 MODEL ( 4 @ \$2575.00 ) . . . . .	\$10,300.00
2400 BAUD INTERNAL MODEM ( 4 @ \$250.00 ) . . . . .	\$1,000.00
SUBTOTAL FOR REMOTE TERMINALS	\$11,300.00
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GAGING STATIONS (ARCADE AND MORRISON) . . . . .	\$12,500.00
SIERRA-MISCO/ALERT SOFTWARE . . . . .	\$5,045.00
QNX OPERATING SYSTEM SOFTWARE ( 5 @ \$450.00) . . . . .	\$2,250.00
LAPTOP SOFTWARE (WORDPERFECT, SPREADSHEET) . . . . .	\$3,000.00
TOTAL EQUIPMENT COST (COMPUTERS, SOFTWARE, AND GAGES) . . .	\$43,520.00
TAX ON EQUIPMENT @ 6.75% . . . . .	\$2,937.60
GRAND TOTAL FOR EQUIPMENT . . . . .	\$46,457.60
ALERT SYSTEM TRAINING SEMINAR . . . . .	\$574.00
FINAL TOTAL (WITHOUT INSTALLATION COSTS) . . . . .	\$47,031.60

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INSTALLATION COSTS:  
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TRENCHING (950 FEET @ \$0.60 PER FOOT) . . . . .	\$570.00
CONDUIT (950 FEET OF 2" PVC @ \$1.10 PER FOOT) . . . . .	\$1,050.00
PULLBOXES FOR SENSOR CABLES (2 @ \$250.00) . . . . .	\$500.00
CONCRETE CAP (4.5 CUBIC YARDS @ \$65.00 PER YARD) . . . . .	\$300.00
CENTREX PHONE LINES (INSTALL SIX @ 71.00 EACH) . . . . .	\$426.00
ELECTRICIAN'S COSTS (50 HOURS @ \$50.00) . . . . .	2,500.00
SYSTEM TESTING (10 HOURS @ \$50.00) . . . . .	\$500.00
TOTAL FOR FIELD INSTALLATION . . . . .	\$5,846.00
TAX ON CONDUIT, PULLBOXES, AND CONCRETE @ 6.75% . . . . .	\$394.60
TOTAL INSTALLATION COSTS . . . . .	\$6,240.60
TOTAL PROJECT COST = \$47,031.60 + \$6,240.60 =	<u>\$53,272.20</u>

RFC/REVISION

MEMORANDUM OF UNDERSTANDING  
For The  
COOPERATIVE LOCAL FLOOD WARNING SYSTEM

This Memorandum of Understanding between the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, hereafter referred to as the NWS, and the City of Sacramento

hereinafter referred to as the Cooperating Agency, is undertaken for the purpose of defining a mutual assistance program for the development and operation of a cooperative local flood warning system.

1. Authority

The NWS undertakes this Memorandum of Understanding pursuant to its authority under 15 U.S.C. 313, 15 U.S.C. 1525, and 7 U.S.C. 450b in order to carry out its functions relating to flood warnings.

2. Nature of Agreement

The NWS and the Cooperating Agency agree to a program for the installation and operation of an automated local flood warning system for Morrison Creek and Arcade Creek

3. Responsibilities of the NWS

The NWS will:

- a. Advise in the selection of equipment appropriate to the cooperative flood warning system.
- b. Provide technical assistance to the Cooperating Agency in the site selections for rain and river gage stations needed for this project during the planning phase, and provide initial training in gage installation.
- c. Coordinate radio frequency usage as well as obtain and hold necessary radio frequency authorizations and licenses for those radio units necessary for incorporation into the cooperative flood warning system.
- d. Provide and maintain computer software necessary for the automation of the data collection and advisory system when using computer equipment compatible to NWS equipment.
- e. As resources and data allow, regularly monitor the data collection by the system and provide supporting hydrometeorological information.

- f. Provide advisories as data allows (e.g., rain, river, QPF, etc.), to determine expected runoff conditions and regular updates during critical storm periods.
- g. Monitor, update, and refine calibration of hydrologic forecast models used by the City of Sacramento.
- h. Incorporate local flood alerts and warnings into related NWS issuances, meeting NWS warning mission released via NWS mass dissemination systems, and assisting in local notification.

4. Responsibilities of the Cooperative Agency

The Cooperating Agency shall:

- a. Designate by unit(s), name(s), or title(s) who is to act for the Cooperating Agency as their local flood warning representative.
- b. Assure development and operation of a Flood Response Plan (FRP).
- c. Provide, install, and maintain field equipment and automated data processing equipment which is compatible with the NWS flood warning system and which provides NWS hydrologic operations direct access to the data base. It will also provide for continuous, real-time access to the system data by the responsible NWS warning office, usually through the data collection subsystem.
- d. Assure utilization of radio frequencies as specifically authorized, and maintain continuous operation of the system in order to ensure completeness and accessibility of the necessary data base.
- e. Monitor the system and, based on NWS guidance and local conditions, provide warnings as appropriate and provided for in the FRP.
- f. Relay flood alert/warnings to the National Weather Service Office at 1416 Ninth Street, Room 1631, Sacramento, CA 95814 (916) 442-1201 as soon as practicable.

5. Amendment and Modifications

Supplementary guidance memoranda and information agreements will be formulated to facilitate efficient attainment of objectives substantially as indicated herein. Any major revisions in the objectives or scope of the program as outlined herein, which either the NWS or Cooperating Agency may consider desirable or necessary in the future, will be made the subject of supplemental agreements.



6. Limitations

Performance under this Agreement is subject to the availability of funds and human resources to the parties hereto, for the purposes described herein, and subject to revised administrative and personnel policies which may have an effect on the terms of the Agreement. Each party shall assume full control and sole responsibility only for its respective equipment, personnel, and activities incident to the performance of this Agreement, consistent with its law(s).

7. Termination

This Memorandum of Understanding becomes effective on the date of the last signature and shall continue in effect unless terminated by either party upon 90 days' written notice to the other party, notice to begin with date of mailing.

Cooperating Agency

Western Region Headquarters  
National Weather Service  
National Oceanic and Atmospheric  
Administration  
U.S. Department of Commerce

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: Regional Director

Date: \_\_\_\_\_

Date: \_\_\_\_\_