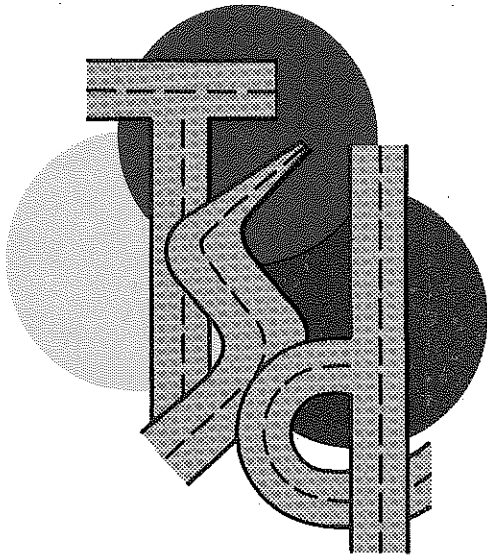


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PROJECT BEAR
ONE YEAR
EVALUATION

Prepared By
Frank M. Spica



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**MICHIGAN DEPARTMENT OF STATE HIGHWAYS
AND TRANSPORTATION**

PROJECT BEAR
ONE YEAR
EVALUATION

Prepared By
Frank M. Spica

Michigan Department of
Transportation
Director

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Michigan Department of
State Police
Director

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DEC 1980

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PROJECT DESCRIPTION

Project BEAR (Broad Emergency Assistance Radio) is a system of ten evenly spaced, remotely controlled CB base stations along the I-96 corridor between Grand Rapids and Detroit. The system relays motorists' requests for assistance on CB Channel 9 (the emergency frequency) to State Police Headquarters in East Lansing. Relay from remote antennas is accomplished by a combination of leased telephone lines and an existing microwave communication system. State police radio operators provide full-time coverage of the system, monitor Channel 9, and dispatch the proper aid to the caller.

PROJECT OBJECTIVES

The basic objectives of this project are threefold. First, to determine the feasibility and measure the effectiveness of an in-vehicle, two-way motorist-aid communications device which provides direct communication with emergency services personnel. Second, to measure the impact that the state police monitoring of Channel 9 will have on services to stranded motorists along a rural highway. And, third, to formulate recommendations for future CB motorist-aid systems.

PROJECT HISTORY

From the beginning of the evolution of the nation's highway system, the need to provide services to the disabled motorist has existed. For the past 15 to 20 years, the traditional means of detecting motorists' needs has been the roadside telephone (callbox) or a road patrol system.

Michigan experimented with a callbox system on I-94 in the 1960s. The system was removed because of high vandalism, high operating costs, and poor equipment reliability. A bill was introduced in the Michigan House of Representatives in 1977 that would require callboxes on all Michigan freeways, so the Department of Transportation began looking for alternatives. A request to the Federal Highway Administration for such information brought their suggestion that we contact some of the states experimenting with CB radio. After consulting these sources, the department decided to proceed with an experimental project.

PROJECT PLANNING

Using federal program manuals as a guide, a preliminary proposal was assembled and an organizational meeting was arranged with the Department of State Police.

This preliminary proposal was presented to Department of Transportation representatives involved with electronic systems, signing, engineering development, and contracts and Department of State Police representatives for communications, operations, and traffic services.

Areas of responsibility were informally agreed to and preparation of a formal agreement between the two departments began. A copy of this agreement can be found in the appendix (Item 1, page 13).

After the meeting, a committee called the Project BEAR Advisory Council was established. The Council consisted of representatives from the Department of State Police communications, operations, and traffic services sections, and post commanders within the project influence area. The Department of Transportation representatives were from the Traffic and Safety Division. The Federal Highway Administration and Federal Communications Commission each had a representative on the Council. Also on the Council were representatives of each known volunteer monitor group within the project's influence area. They were the Brighton Community Watch, Tri-County Community Radio Watch, Red Cedar React, Lansing React, and County Line React. These groups provided a considerable amount of experience as to what could be expected when monitoring Channel 9.

AREAS OF RESPONSIBILITY

The Federal Highway Administration designated the project a Category II Experimental project which allowed 90 percent federal funding of the operation for an 18-month evaluation period.

The Michigan Department of Transportation responsibilities included:

- .. acquire all the equipment for the project through competitive bidding.
- .. prepare, let, and administer a contract for providing and installing seven new towers.
- .. provide and install advisory signing.
- .. provide right-of-way for the field installations (generally these were in rest areas or weigh stations).
- .. arrange for the installation of leased telephone lines and power where necessary.
- .. assume responsibility for project supervision.
- .. prepare the final evaluation report.

The Michigan State Police had the following responsibilities:

- .. prepare specifications for all the radio equipment to be purchased.
- .. install all the equipment with exception of the seven new towers.
- .. provide radio operators to operate the system.
- .. provide all maintenance for the system.
- .. record all calls received on the system.
- .. provide and execute the response plan for calls received (Response Plan Appendix Item 1 Exhibit A page 22).
- .. obtain all FCC waivers and approvals.

Areas of joint responsibility were:

- .. provide construction engineering and inspection.
- .. provide the matching funds for the activities eligible for federal funding.
- .. develop information on the project for the motoring public.

DURATION OF THE PROJECT

Federal funds were provided for an evaluation period of one year. The FHWA also funded a 6-month operator break-in and equipment test period to ensure that the system was operating effectively and efficiently during the subsequent evaluation period.

PROJECT IMPLEMENTATION

Two separate contracts were prepared for competitive bidding. One contract provided for the radio equipment and was awarded to Communications Control Centers of Hampstead, Maryland.

F & D Company of Grand Rapids, Michigan was awarded a contract for providing and installing seven new towers. This contract also allowed for the installation of equipment cabinets and antennas purchased by the Department of Transportation. This equipment required about 32 manhours per site for installation.

The radio equipment was installed by State Police radio technicians. This required 32 manhours for the central control console and 40 manhours for the field installations. Installation went smoothly with minor level settings being the only adjustments necessary.

When necessary, leased telephone lines and power feeds were installed by the telephone company and power company, respectively. State Police radio dispatchers began official monitoring operations on October 5, 1978.

WAIVERS AND APPROVALS

All FCC rules under Section 95 were adhered to. However, two waivers were obtained to make the system operable. The first provided for remote control of the radios over telephone lines and an existing microwave communication system. The second waiver allowed modification of the tower height to 80 feet, which put the antennas at 100 feet.

The Federal Highway Program Manual Volume 6, Chapter 8, Section 3, Subsection 3 was used as a general guideline. However, since this was written when callbox systems were the general means of providing motorist aid, some portions could not be rigidly adhered to and deviations were approved by the FHWA.

PUBLIC INFORMATION AND EDUCATION

News releases were used to inform the public of the system.

A brochure was prepared and distributed in restaurants, gas stations, motels, and rest areas along the I-96 corridor. A copy of the brochure can be found in the appendix (Item 3, page 26).

In accordance with the Federal Program Manual, signing was erected on I-96. The signing plan is shown in the appendix (Item 2, page 24). Once into the project, some of the signs were modified. The modification changed the panel that read "Mile 33-163" to "Give Location First Call." This was done because operators complained that they didn't always know which tower to use when answering a call because it was difficult to determine which tower was closest to the caller. The modification proved successful as afterward more callers gave their location on the initial call.

DATA COLLECTION AND ANALYSIS

Before the project was approved, a survey was conducted along I-96. Vehicles were counted and divided into four categories: cars with CB antenna, cars without, trucks with CB antenna, trucks without. There were 3144 cars observed with 43 percent having a CB antenna. A total of 662 trucks were counted with 78 percent having a CB antenna. The survey revealed that 49 percent of the vehicles counted had a CB antenna. The hours of this study were 9:30 a.m. to 11:30 a.m., 3:30 p.m. to 4:30 p.m., and 11 p.m. to 1 a.m. The nighttime study was taken at a lighted interchange near a metropolitan area. Although some of the vehicles with small antennas could have been missed, the data indicated a sufficient percentage of CB-equipped vehicles to warrant proceeding with the project.

A copy of the BEAR Log developed for data collection is included in the appendix (Item 4, page 27). It was kept brief to ensure its being filled out completely. A log entry was made for each call received. All logs were tabulated and placed on a computer file to permit interrogation and analysis to group the logs by different types.

The State Police troopers patrolling I-96 began using BEAR Logs six months prior to beginning operation of the system. This was done for two reasons: first, to get some indication of the number of calls that could be expected on the system; and second to use this "before" data to see if the number of reported incidents increased significantly after the system was installed.

ANALYSIS

The following data compares incidents reported on I-96 during the 6-month period prior to operation with the same 6-month period afterward. The average daily traffic volumes on this section of roadway for both periods were not significantly different.

<u>Type of Call</u>	<u>Before (April-Sept. '78)</u>	<u>After (April-Sept. '79)</u>	<u>% Increase</u>
Abandoned Vehicle	18	19	5.6
Motorist Assistance	195	745	282
Accident	39	278	613
Fire	9	81	800
Medical Emergency	3	19	533
Highway Hazard	16	165	931
Traffic Violation	42	264	529
Other	35	204	483
Total	357	1775	397

In the first operational year, BEAR operators handled 4115 calls for an average of 11.3 per day. Of these, 73 percent were from motorists traveling I-96 and 27 percent came from others. Therefore, 1092 motorists received assistance not expected in the original service concept. Volunteer groups handled 1290 calls that fell within the influence area served by the 10 relay towers.

The following chart shows the type of the calls received:

Action/Service	BEAR		Volunteer		Total	
	Calls	%	Calls	%	Calls	%
Abandon Vehicle	60	1.5	16	1.3	76	1.4
Motorist Assist	1927	46.8	748	58.0	2675	49.5
Accident	701	17.0	160	12.4	861	15.9
Fire	124	3.0	35	2.7	159	2.9
Medical Emergency	32	.8	10	.8	42	.8
Highway Hazard	387	9.4	118	9.2	505	9.4
Traffic Violation	512	12.5	157	12.2	669	12.4
Other	372	9.0	46	3.4	418	7.7
Total	4115	100	1290	100	5405	100

The following is an explanation of calls in each of the action/service categories:

Abandoned Vehicle - Most concerned vehicles that had a mechanical problem and the driver left to get help. One of the vehicles checked turned out to be stolen.

Motorist Assistance - These calls related to flat tires, need gas, dead battery, vehicle in a ditch, and mechanical problems. A small percentage of these calls were for directions or information. It is significant that 70 percent of the motorist assistance calls received were made for other motorists.

Accident - 51 percent of these calls were on I-96 and 49 percent off I-96. There were 188 property damage accidents and 107 injury accidents, two of which were fatal. There were 38 entries where no contact was made by the investigating officer. A total of 387 calls were made by motorists not involved in the accidents. An interesting statistic is that there were 94 accidents involving deer and 11 involving other animals.

Fire - 47 percent were for vehicle fires and 25 percent for structure or grass fires, with 34 percent of the calls originating off I-96. Most of the calls, 66 percent, were called in by another motorist. There were 10 calls that resulted in no contact or contact but no fire. No contact means either no agency had a vehicle to send or a vehicle was sent but could not find the caller. Contact but no fire means the caller was found but was mistaken or the fire had been extinguished.

Medical Emergency - The BEAR operators handled 32 calls for medical assistance. There were seven for heart attack victims, five for illness, one for a seizure, three for women in labor, and one for a Red Cross blood escort run. The police also responded to two attempted suicides. Motorists called for assistance for some other person in 50 percent of the cases. No contact was made in eight cases while one heart attack call turned out to be another problem.

Highway Hazard - This category is not common to most motorist-aid systems. The calls received included objects being thrown at or dropped on vehicles, animals, or objects in the road, vehicles traveling at night without lights, and trucks losing their loads. Calls from off I-96 included 22 reports of malfunctioning traffic signals, damaged traffic signs, broken water main and damaged power lines.

Traffic Violation - Drunk driving accounted for 57 percent of these calls, speeding accounted for 18 percent, reckless driving 14 percent, and vehicles traveling on the wrong side of the road 5 percent. These calls resulted in 10 arrests for drunk driving and one arrest for driving a vehicle with stolen license plates.

Other - Only 61 percent of the calls in this category were on I-96. The largest category - 27 percent - concerned hitchhikers, pedestrians, or bicyclists on the expressway. The calls from off I-96 dealt with domestic problems, burglaries, breaking and entering, auto theft, or suspicious people or situations.

Recognition Study

After the system had been in operation for about one year, a study was made at a rest area to determine how many people had heard of or used Project BEAR. This study was conducted by one of the CB volunteer groups. A total of 513 persons were interviewed, of whom 401 indicated that they were aware of Project BEAR. There were 48 people who had attempted to use Project BEAR, 36 of whom found the system satisfactory. This study was conducted in September 1979 during the Labor Day weekend when many vehicles from other areas were on I-96; yet 80 percent of the people interviewed had heard of the system.

SYSTEM PROBLEMS AND MODIFICATIONS

Replacement Antenna Experiment

Early in the project there was concern that another manufacturer's antenna might hold up better under ice conditions and possibly give better coverage. An experiment was conducted by making a coverage study with the old antenna and then replacing it with the new antenna and conducting a second coverage study, all within three hours. The results of this experiment indicated no significant difference in coverage between the two antennas.

Atmospheric and "Skip" Noise Problem

Due to atmospheric conditions (sun spot activity peaked during the evaluation period), a severe operational problem developed with the system. All receivers produced a steady squelch and skip noise level above the squelch setting. This resulted in unbearable noise levels (S7 to S9) for the operators and reduced the range from the base locations. To return the system to an operational condition, technicians adjusted the receiver squelch controls to cover the S9 noise level. Calls from motorists were monitored for the next three weeks to determine the effect upon calls received. The results indicated a slight reduction in number of calls received and revealed an increase in calls between 8 a.m. and 5 p.m. The system operators attribute this phenomenon to not having the high noise level from the speakers drowned out calls. Present records indicate a radius of four to four and one-half miles from the tower sites at this squelch level.

Additional Antenna Height

During the test period, a question was raised regarding additional antenna height to correct identified dead spots in the system due to the squelch adjustment. To test the advantage of raising the antenna heights, a Special Temporary Authority was obtained from the FCC to operate a Channel 9 station antenna at 200 feet for 30 days. This experiment was accomplished by installing a 20-foot antenna at the 180 level of a 200-foot tower. This tower is located ½ mile from an existing BEAR tower. Results indicated an increase in transmission distance; however, the reception distance was not significantly increased. It appeared that the high atmospheric noise and skip condition negated the advantage of height while receiving. As a result of this experiment, six of the BEAR Transmitter site towers were doubled in height to 80 feet. These antenna modifications eliminated most of the dead spots in the system but also increased the reception of "skip" interference. Small dead spots still remained.

Adjustable Squelch Modification

After the antenna height modification a modification was made to the CB Base Station receivers to allow the operator at the remote control console to select one of two levels of squelch. If atmospheric noise or skip levels are high, the operator may select the higher level to squelch the noise. Should the operator need more sensitivity to hear a mobile unit that is noisy or "breaking up", he may select the lower levels.

Channel 19 Capability

Although false calls were not a problem, The Council envisioned a need to switch the base stations to CB Channel 19 to confirm calls for aid when there was doubt as to the validity of a call. This modification was made at the time of the adjustable squelch modification. The operator may now select Channel 19 for transmission or reception at any base station; however, should the operator forget to switch back to Channel 9, the base station will automatically switch back in approximately 40 seconds. This capability also allows checking the system transmission and reception on Channel 19 which has more radio traffic than Channel 9.

Console

The original tone remote switch presented a problem by drifting off frequency, thus requiring readjustment every few weeks. The manufacturer traced the problem to several components on the printed circuit board. The board was re-engineered to remedy the problem.

The addition of audio active filters is also being considered to reduce the radio noise at the speakers.

Other System Deficiencies

Because a malfunction at one of the remote stations is not easily detected from the console, these should be checked frequently or the operator may lack confidence in the system. At present, this problem is addressed by having technicians check the stations every two or three weeks; this procedure is not completely satisfactory and alternative solutions are being sought. The

original system design included an alarm system that would signal the remote operator if the primary power failed or the cabinet door was opened at the tower site. This item was deleted because of budget constraints. We are aware of one instance in which benefits could have been derived from an alarm system. Operators reported no calls from Station #4. Upon checking, technicians found the 120 VAC breaker had tripped and the battery had run down. There is no way of knowing how long the power was off or the cause of the failure.

PROJECT COSTS

Capital Outlay

Agency - Funds

Radio Equipment	\$81,800	FHWA (90%) -	141,143.40
Tower - Original	9,996	MDOT (10%) -	16,682.60
Modifications	9,000		<u>156,826.00</u>
Antennas & Cables	2,200		
Equipment Cabinets	4,180		
Microwaver Multiplex Equip.	5,640		
Install Leased Tel. Lines	500		
Install Power Feeds	2,350		
Multi Channel Playback Recorder	6,460		
Original Signs	28,400		
Sign Modifications	<u>6,300</u>		
Total	\$156,826		

Annual Operating Cost

Agency

		MDOT	MSP
Operators (Salaries & Fringes)	\$91,000*		91,000
Telephone Line Leases	4,000	4,000	
Power	1,000	1,000	
Maintenance	<u>1,800</u>		<u>1,800</u>
Total	97,800	\$5,000	\$92,800

*For the first 18 months of operation, salaries were considered part of the evaluation costs and thus funded 90 percent by the FHWA.

Cost Per Call

Capital Cost	\$156,826
Maintenance	1,800/year
Leased Telephone Lines	4,000/year
Dispatchers	91,000/year

Based on an expected 10-year system life the cost per call would be \$27.37 $(15,826 + 1,800 + 4,000 + 91,000) \div 4,115$. If the 1920 calls handled by the volunteer groups along I-96 were added in the cost per call would drop to \$20.84. The cost per call could be further reduced if all calls were counted, however, multiple calls for the same incident are not always recorded. The State Police have said that they could handle two more systems of equal size with the existing dispatchers, which would drop the cost per call considerably.

CONCLUSIONS AND RECOMMENDATIONS

Objectives

The three objectives stated on page 1 were accomplished. First, the number of calls taken proved CB radio to be a feasible and effective method of providing direct communication between the State Police and motorists. This is borne out by the data which is summarized later in this report.

Second, the data which compares the number of incidents reported before-and-after shows an increase of 397 percent.

The third objective was accomplished by the following recommendations.

Equipment

Using tone equipment to control, remote CB radios proved successful. Use of a battery and a float charger to power the equipment was helpful in reducing failures due to power surge and momentary interruptions. An alarm system to alert the station operator of power failure and illegal entry to the station cabinet would be helpful for future installations.

A great deal of experimentation was generated by the problems of antenna height and station spacing. The results indicated that signal improvements resulting from greater antenna height were cancelled by the increase in skip interference and noise. At a legal antenna height of 50 feet, noise levels regularly required tightening of squelch sensitivity to alleviate operator fatigue, even though this reduced reception range. Our recommendation for new systems is to use an antenna height of no more than 50 feet and design for a radius of coverage of no more than four miles. This short range criteria is required because there is no control over the strength and quality of the mobile signal. The CB units in many motorist vehicles have poor transmitters.

Total equipment failures were minimal. Only five component failures were recorded. We recommend checking the operation of each station at least once a week by making signal checks from a good mobile unit. This would improve operator confidence in the equipment and give early alert of failure. Without such a procedure, a station may fail and be out of service several days before operators notice they are not receiving any calls from that station.

Data Summary

The data shows that a CB motorist-aid system receives a greater variety of calls. There are four action/service categories common to all motorist-aid systems: accidents, fire, motorist-assist, and medical emergencies. These accounted for only 68 percent of the calls received by BEAR. The other 32 percent fell into categories not listed on a coded callbox system or that would not normally be reported if the motorist had to stop and use a telephone to make the call.

Two concerns proved to be unwarranted. The first was providing aid to those without CB radios. The data showed 60 percent of all calls were made by motorists reporting an incident that they themselves were not involved in. The second concern was that this type of system would produce many false

calls. There were only five proven false calls during the evaluation period. One person responsible for four of these calls was later arrested and prosecuted.

The data also revealed the wide coverage possible with a system of this type and showed that the aid required off the freeway generally is of a more serious and immediate nature, often involving reported felonies.

Operation

Prior to beginning operation, it was determined that the volunteer groups would be allowed to respond to a call first. They notified the State Police dispatchers when they would be monitoring so the radio operator knew at what times to expect help in taking calls and about what area the help would be in.

There was some confusion with this operation at first but, after working together for several months, the volunteer groups and State Police radio operators became a cohesive team.

The average number of calls per day was about 12. This means that the same operator could handle about three times as many miles of roadway, assuming the volumes of vehicles were approximately the same as this section of I-96 (25,000 vehicles per day).

System Expansion

It is recommended that if motorist aid is to be provided, this system be used along rural sections of roadway. Expansion of the present system should be confined to I-94 between Ann Arbor and Battle Creek, I-69 from Battle Creek to Flint, US-127 from Jackson to Lansing, and US-27 from Lansing to Alma. All of these could not be added, but they are the freeways closest to Lansing that could use motorist aid. The recommendation to stay near Lansing is made only to keep the retransmission of the CB signal at a shorter range.

Expansion into other areas of the state would require that additional central monitoring points be set up, probably in district headquarters of the State Police.

Expansion to these areas would require field equipment and some type of voter system added to the console. The voter system is necessary because of the difficulty the operator would have listening to additional speakers. A voter is a device that allows up to ten towers to be fed into one speaker at the console.

Summary

Summarizing the recommendations made previously:

1. The system should be expanded and include a basic alarm system.
2. Antenna height should be limited to 50 feet with a planned 4-mile radius of coverage.
3. A procedure should be developed for checking the operation of each station at least once a week.

APPENDIX

THIS CONTRACT is made and entered into this ____ day of _____, A.D., 19____, by and between the MICHIGAN STATE HIGHWAY COMMISSION, hereinafter referred to as the "COMMISSION"; and the MICHIGAN DEPARTMENT OF STATE POLICE, hereinafter referred to as the "STATE POLICE"; for the purpose of fixing the rights and obligations of the parties in agreeing to the installation, operation, and maintenance of an experimental motorist-aid communication system along that part of Highway I-96 between Grand Rapids and Eight Mile Road in Wayne County, Michigan, which will monitor citizens band (CB) radio requests for emergency assistance.

WITNESSETH:

WHEREAS, in an effort to develop an effective means of communications between the motorist in need of emergency assistance and the proper authority, the COMMISSION and the STATE POLICE, with the cooperation of the United States Department of Transportation, Federal Highway Administration, hereinafter referred to as the "FHWA", have proposed as an experimental project the establishment and operation of a communication system which will consist of a network of remote citizens band (CB) radio transceivers and relay antennas along portions of Highway I-96 and a monitoring console to be located in the East Lansing Operations Office of the STATE POLICE; and

WHEREAS, the proposed communication system, hereinafter referred to as the "PROJECT" will encompass that portion of Highway I-96 extending from the east limits of the City of Grand Rapids easterly to Eight Mile Road in Wayne County, Michigan, and will consist of the following:

The installation of remote transceivers consisting of citizens band (CB) radio and antenna with standby battery capability and other necessary equipment at approximately ten (10) selected locations.

The installation of a control console, tone recorder, and other necessary equipment at the East Lansing Operations Office of the STATE POLICE.

The erection of towers necessary for placing of seven (7) of the antenna installations described.

The installation of leased telephone lines from the transceivers to the control console.

The installation of appropriate advisory signing to facilitate use of the system.

Together with necessary related work, including maintaining and evaluation of the PROJECT.

WHEREAS, the PROJECT has been given the title of BEAR, the acronym for Broad Emergency Assistance Radio; and

WHEREAS, the PROJECT is being programmed with the FHWA for financing in part with the use of Federal Interstate funds as a Category II experimental project; and

WHEREAS, the parties hereto have reached an understanding with each other regarding the installation, monitoring, and evaluation, of the PROJECT, and desire to set forth this understanding in the form of a written agreement.

NOW, THEREFORE, in consideration of the premises and of the mutual undertakings of the parties and in conformity with applicable law, it is agreed:

1. The parties shall undertake and complete the PROJECT in accordance with this contract.

2. The term "PROJECT COST", as herein used, is hereby defined as all costs necessary of the physical construction of the PROJECT, including the costs of construction engineering, inspection, and evaluation of the system. The evaluation

costs shall consist of the costs of monitoring the system by the STATE POLICE during the evaluation period, and the analysis and such report preparation by the STATE POLICE and the COMMISSION as will form the basis for the evaluation of the PROJECT.

3. The engineering, construction, operation and maintenance of the communication system being installed as the PROJECT will be undertaken in accordance with the provisions of this section.

A. COORDINATION

In order to facilitate the design, construction, operation, and maintenance of the PROJECT, an Advisory Committee will be established with representatives from the COMMISSION and the STATE POLICE to coordinate the implementation of the PROJECT.

B. DESIGN

The COMMISSION and the STATE POLICE will each provide such design services as may be required for the PROJECT and will jointly select the location for the field installation of antennas and towers.

The STATE POLICE shall secure from the Federal Communications Commission the necessary FCC licenses, and waivers of the FCC rules and regulations for the installation and operation of the system being installed as the PROJECT.

Each party will assume the costs of the services which it performs.

C. RIGHT OF WAY

The COMMISSION at no cost to the STATE POLICE will provide or secure such right-of-way as may be necessary for the erection of the towers, antennas, and field equipment at those locations not under the jurisdiction of the STATE POLICE.

The STATE POLICE, at no cost to the COMMISSION, will provide necessary space and facilities for the base station control console and will permit the utilization of those antenna sites under its jurisdiction which may be appropriate.

D. CONSTRUCTION

The construction of the PROJECT will be performed in accordance with the following:

(1) The COMMISSON as a part of the PROJECT will:

- (a) Acquire radio equipment necessary for the PROJECT.
- (b) Erect the seven towers necessary for antenna installation.
- (c) Install the appropriate advisory signing.
- (d) Make the necessary arrangements for the installation of leased telephone communication lines and such power lines and connections as may be required.

All eligible items of construction work undertaken by the COMMISSION will be participated in with Federal funds. The balance of the costs will be assumed by the COMMISSION.

(2) The STATE POLICE will:

- (a) Install all necessary radio equipment and antennas other than the towers to be erected by the COMMISSION.

No Federal participation will be requested and the STATE POLICE will assume all costs therefor.

In the event that the parties hereto, with the concurrence of the FHWA, determine that additional transceivers, antenna, or other related equipment are necessary for the effective evaluation of the system, such equipment may be installed in compliance with the procedures and obligations set forth in this contract.

E. PROJECT SUPERVISION

The COMMISSION is authorized by this contract to administer all phases of the PROJECT and will, at PROJECT expense, appoint a project engineer who shall be in responsible charge of the PROJECT.

The COMMISSION and the STATE POLICE will each, on a force account basis at PROJECT expense, provide such construction engineering and inspection services under the direction of the COMMISSION'S project engineer as may be necessary for the construction of the PROJECT.

F. OPERATION

The system being installed as the PROJECT will be operated in accordance with the following:

(1) STAGE I

The initial start up date for the system will be on or about July 4, 1978. STAGE I will consist of the initial break in phase of the operation and will extend for a period of three to six months or until such prior time as the system is considered to be fully operational. The determination as to the operational level of the system will be made by the Advisory Committee with the concurrence of the FHWA. The need for any additional equipment or modification will be made within this period on the recommendation of the Advisory Committee and with the concurrence of the FHWA.

(2) STAGE II

The commencement of STAGE II, the fully operational phase of the PROJECT, will be determined by the Advisory Committee with the concurrence of the FHWA. STAGE II will extend for a one year evaluation period from the date the installation is completed and accepted as operational.

- (3) All eligible costs incurred by the parties in STAGE I and STAGE II and during the evaluation period will be programmed for Federal participation. The duration of the evaluation period may be increased or decreased if it is determined by the parties, with the concurrence of the FHWA, that such is warranted.
- (4) The lease costs for any telephone communication lines required from the transceivers to the dispatch console, and the cost of any electrical power other than that furnished by the STATE POLICE will be assumed by the COMMISSION.
- (5) Upon assessment of the system the parties hereto will mutually determine whether the public interest warrants its continued operation.

G. EVALUATION

The COMMISSION, in accordance with paragraph 8, of FHPM Volume 6, Chapter 8, Section 3, Subsection 3, will evaluate the system being installed as the PROJECT.

The work necessary to properly evaluate the effectiveness of the system will be performed in accordance with the following and will consist of monitoring, recording, and such report preparation as may be required for the evaluation phase. An interim evaluation report will be prepared on completion of STAGE I.

- (1) Calls from motorists requesting assistance through use of the system will be received at the East Lansing Operations Office of the STATE POLICE. Requests for assistance will be processed in accordance with the procedures set forth in the BEAR RESPONSE PLAN which is attached and made a part hereof as "EXHIBIT A".
- (2) The STATE POLICE will monitor the system through STAGE I and STAGE II on a continuous 24 hour per day basis at a level of service mutually satisfactory to the parties and the FHWA. Included within the evaluation phase will be those costs incurred by the COMMISSION and the STATE POLICE relative to monitoring, recording of information, analysis, and report preparation which will form the basis for the evaluation report.
- (3) The STATE POLICE will maintain and provide to the COMMISSION such records of incoming calls, responses, and other information as mutually agreed upon by the parties to evaluate the mechanical effectiveness, response plan effectiveness, maintenance and other costs, and system usage.

- (4) In order to assure the optimum evaluation of the system, modifications to the BEAR RESPONSE PLAN will be made as necessary by the parties with the concurrence of the FHWA.

All eligible items of evaluation costs will be participated in with Federal funds.

Any costs not reimbursed with Federal funds will be assumed by that party performing the work.

H. MAINTENANCE

The system being constructed as the PROJECT will be maintained by the STATE POLICE. Any costs not reimbursed with Federal funds will be assumed by the STATE POLICE.

I. TERMINATION OF THE PROJECT

Upon termination of the PROJECT for whatever reason, the equipment purchased and installed as a part of the PROJECT will be disposed of as determined by the parties with the concurrence of FHWA acting within the guidelines of Cir. A-102 of the Federal Office of Management and Budget.

4. The PROJECT COST, estimated to be \$264,000.00, is detailed on "EXHIBIT B" attached hereto and made a part hereof and shall be met in part by contributions by the Federal Government. The balance of the PROJECT COST shall be assumed by the parties as provided in Section 3 hereof. The manner of payment of the PROJECT COST shall be as hereinafter set forth.

5. Each of the parties shall be responsible for the accurate and detailed accounting of the costs and expenses incurred in the performance of any part of the PROJECT work it agrees to undertake as provided within this contract. Said accounts shall be made available for review and audit as required, by the FHWA and shall be retained on file for a period of not less than three years from the date of the final payment for work conducted under this contract.

All billings submitted to the COMMISSION for reimbursement for items of work performed by the STATE POLICE under the terms of this contract, shall be prepared in accordance with the provisions of the pertinent FHPM Directives and the procedures

of the COMMISSION. Progress billings may be submitted monthly during the time work is being performed provided, however, that no bill of a lesser amount than \$1,000.00 shall be submitted unless it is a final or end of fiscal year billing. All billings shall be labeled either "Progress Bill Number _____" or "Final Billing". Final billing under this contract shall be submitted in a timely manner but not later than twelve months after completion of the work. Billings for work submitted later than twelve months after completion of the work will not be paid.

Upon receipt of billings for reimbursement for work undertaken by the STATE POLICE the COMMISSION will act as billing agent for the STATE POLICE consolidating said billings with those for its own work and presenting these consolidated billings to the FHWA for payment. Upon receipt of reimbursement from the FHWA, the COMMISSION will promptly forward to the STATE POLICE its share of said reimbursement.

Upon completion of all work under this contract and final audit, the STATE POLICE promises to promptly repay the COMMISSION for any disallowed items of cost previously disbursed by the COMMISSION.

6. Each of the parties shall maintain accurate records and accounts relative to that portion of the PROJECT COST which it performs and, upon completion of that part of the PROJECT, payment of all items of PROJECT COST, receipt of all Federal Aid, if any, and completion of final audit shall make a final accounting to the other party.

7. Each of the parties hereto agrees with respect to its specific jurisdiction and work responsibilities to comply with the following provisions.

A. COMPLIANCE WITH THE FEDERAL REGULATIONS

All PROJECT work for which reimbursement with Federal funds is requested shall be performed in accordance with the requirements and guidelines set forth in the following Directives of the Federal-Aid Highway Program Manual (FHPM) of the FHWA, as applicable, and all supplements and amendments thereto.

- (1) FHPM Volume 1, Chapter 4, Section 5: Reimbursement for Employment of Public Employees on Federal-Aid Projects
- (2) FHPM Volume 6, Chapter 4, Section 1, Subsection 6: Contract Procedures
- (3) FHPM Volume 6, Chapter 4, Section 1, Subsection 14: Contract and Force Account (Justification required for Force Account work)
- (4) FHPM Volume 6, Chapter 8, Section 3, Subsection 3: Motorist-Aid Systems

All the requirements, guidelines, conditions and restrictions noted in all other pertinent Directives and Instructional Memoranda of the FHWA will apply to this contract and will be adhered to, as applicable, by the parties hereto.

B. PROJECT ADMINISTRATION

- (1) All work in connection with the entire PROJECT shall be performed in conformance with the standard specifications of the Michigan Department of State Highways and Transportation and the supplemental specifications and plans pertaining to the PROJECT or with plans and specifications approved by the COMMISSION and the STATE POLICE, and all materials furnished and used in the construction of the PROJECT shall conform to the aforesaid specifications. No extra work shall be performed nor changes in plans and specifications made until said work or changes are approved and authorized by the FHWA.
- (2) No PROJECT work for which Federal reimbursement will be requested by the STATE POLICE is to be performed until authorization in writing has been given to the STATE POLICE by the COMMISSION which specifies that such work may commence.

8. In connection with the performance of PROJECT work under this contract the parties hereto (hereinafter in Appendix "A" referred to as the "contractor") agree to comply with the provisions of the State of Michigan "Non-Discrimination Clause for All State Contracts", as set forth in Appendix "A", attached hereto and made a part hereof. The parties further covenant that they will comply with the Civil Rights Act of 1964 (78 Stat. 252) and the Regulations of the Department

of Transportation (49 C.F.R. Part 21) issued pursuant to said Act, including Appendix "B" attached hereto and made a part hereof, and will require a similar covenant on the part of any contractor or subcontractor employed in the performance of this contract.

9. This contract shall become binding on the parties hereto and of full force and effect upon the signing thereof by the duly authorized officials for the parties hereto, and with approval by the State Administrative Board.

IN WITNESS WHEREOF, the parties hereto have caused this contract to be executed the day and year first above written.

MICHIGAN DEPARTMENT OF STATE POLICE

MICHIGAN STATE HIGHWAY COMMISSION

By _____
Title:

By _____
Title:

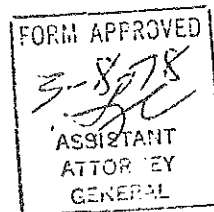


EXHIBIT "A":
BEAR RESPONSE PLAN

The BEAR Response Plan shall consist of the following:

1. All calls for aid will be received and handled by the STATE POLICE with vehicle dispatching done by the STATE POLICE.
 - A. Crime - STATE POLICE will expeditiously dispatch vehicles to scene.
 - B. Car Trouble
 1. If a car is on the shoulder involving minor vehicular problems and a police car is not dispatched, a service station will be notified by the STATE POLICE to handle the problem.
 2. If a car is stalled in a traffic lane, the STATE POLICE will make arrangements to remove the stalled car from the freeway lane.
 - C. Accident - STATE POLICE car will be dispatched and if necessary towing unit notified to assist. If Emergency Medical Service assistance is needed, the STATE POLICE will make arrangements to dispatch EMS unit(s).
 - D. Overtaken tanker truck or other truck- STATE POLICE will dispatch police car and will request fire department assistance and heavy duty towing assistance as necessary.
 - E. Debris removal - STATE POLICE will make such arrangements as may be necessary for assistance of the appropriate roadway authority.
 - F. Fire - STATE POLICE will notify the appropriate Fire Department and will dispatch STATE POLICE vehicle(s) for assistance.
 - G. Miscellaneous - For road closures occasioned by major accident, fire, flooding, STATE POLICE will dispatch necessary vehicles.
 - H. Information Dissemination - Will be taken care of by STATE POLICE as priorities permit.

EXHIBIT B

ESTIMATED PROJECT COSTS
WHICH ARE ELIGIBLE FOR
FEDERAL PARTICIPATION

INSTALLATION - JOB NUMBER 13673

By COMMISSION

Erection of Towers (Contracted)	\$ 21,000
Installation of Freeway Signing (Force Account)	\$ 35,000
Purchase of Radio Equipment	\$ 67,000
Installation of Telephone Lease Line and Electrical Power Connection	\$ 2,000
Construction Engineering and Inspection	\$ 7,000

TOTAL \$132,000

EVALUATION, MONITORING, ETC - JOB NUMBER 13781

By COMMISSION \$ 5,000

By STATE POLICE \$127,000

TOTAL \$132,000

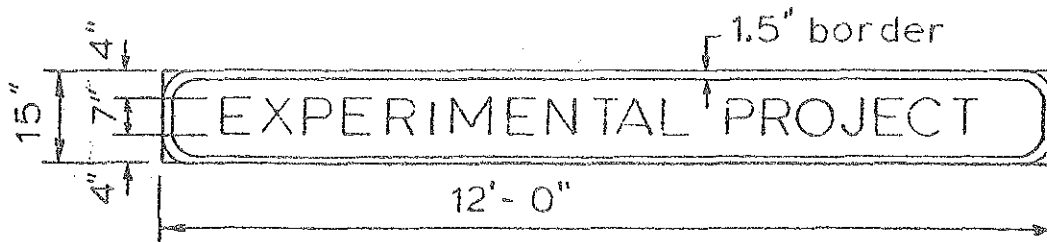
GRAND TOTAL \$264,000

COST PARTICIPATION

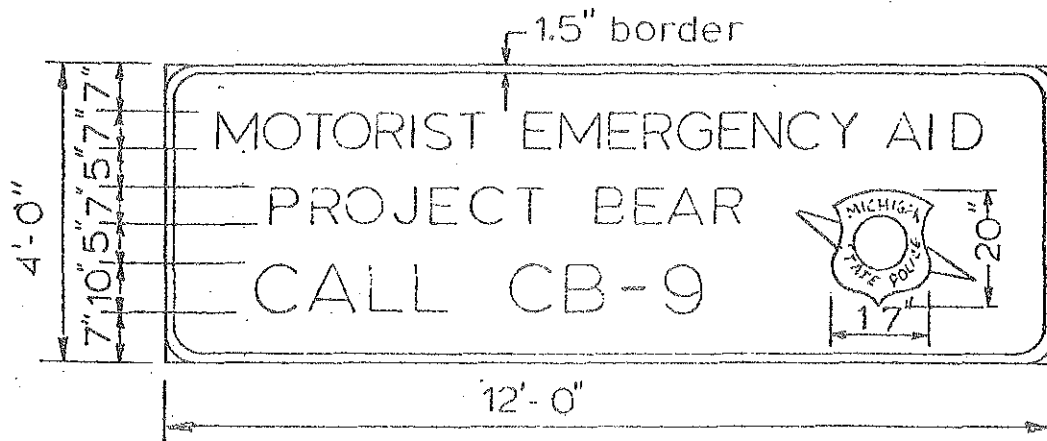
	TOTAL EST COST	FED FUNDS	BALANCE	COMM SHARE	STATE POLICE SHARE
INSTALLATION	\$132,000	\$118,800	\$13,200	\$13,200	-0-
EVALUATION	\$132,000	\$118,800	\$13,200	\$ 500	\$12,700
TOTAL	\$264,000	\$237,600	\$26,400	\$13,700	\$12,700

The participation by the parties in the balance of the PROJECT COST after Federal-aid is set forth in Section 3.

ITEM 2



(I)

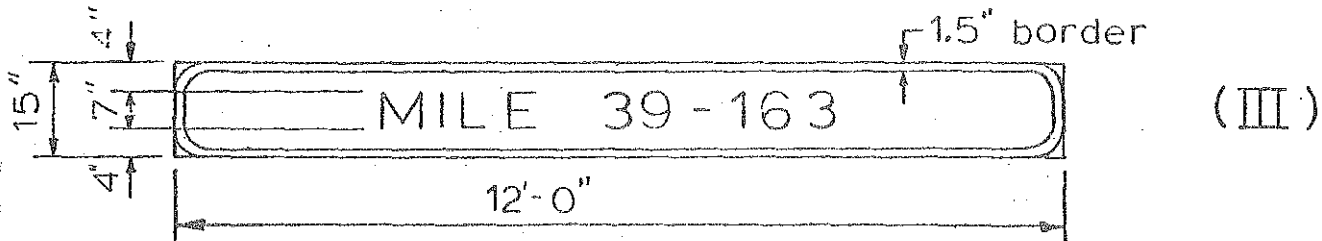


(II)

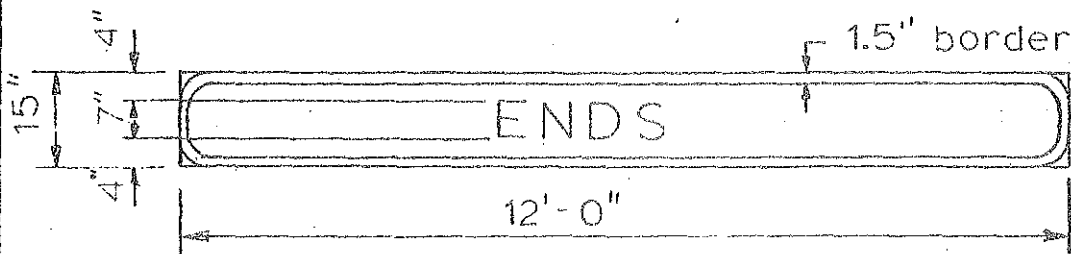
SPECIFICATIONS:

- 1) Sign Panel: Type II, $\frac{5}{8}$ " plywood or approved equal.
- 2) Sign Face: Type A,
 - a.) Legend: Series "D" letters of the height indicated.
 - b.) Color: Silver legend and border on a blue background, gold and blue M.S.P. shield as per standard I7-3.
 - c.) Reflectorization: Silver, blue and gold sheeting.

STATE OF MICHIGAN DEPARTMENT OF STATE HIGHWAYS TRAFFIC DIVISION	AUTH. NO.	DRAWN P.T.C.	MOTORIST EMERGENCY AID CB-9 "OPERATION BEAR"
	CONT. SEC.	DATE 12-77	
	REP.	SCALE none	
	SHEET 1 OF 2	PLAN A-6-11	



(III)



(IV)

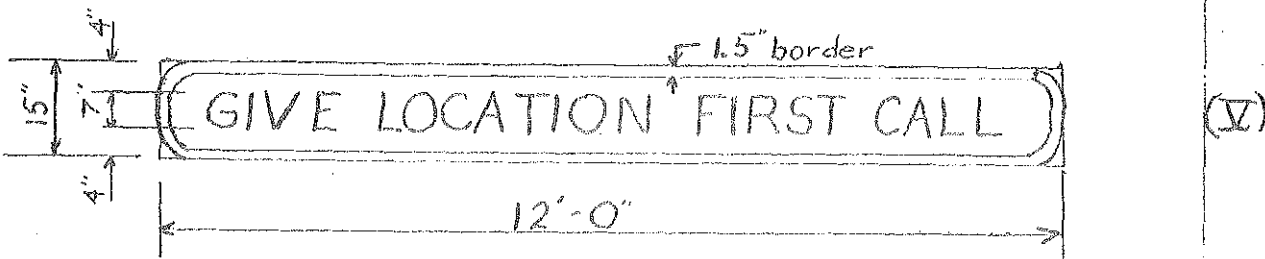
NOTE:

Panels I, II, & III to be utilized at the locations numbered ① on drawing B-698.

Panel II to be utilized by itself at locations numbered ②.

Panels I II & IV to be utilized at locations numbered ③.

Panel V replaced panel III

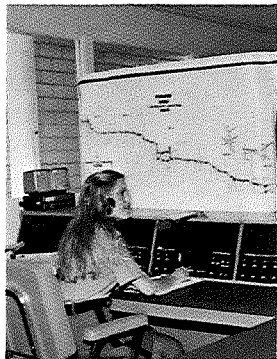
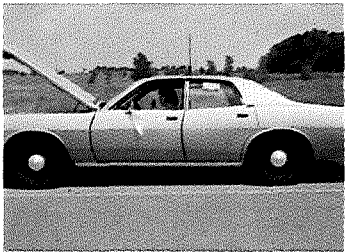


(V)

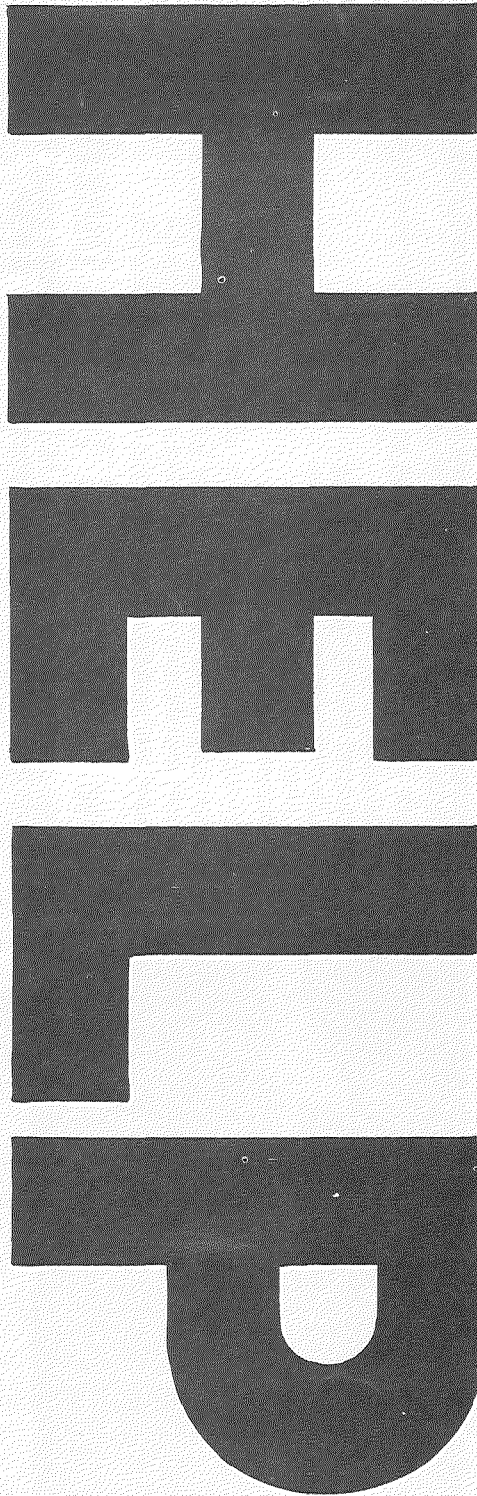
STATE OF MICHIGAN DEPARTMENT OF STATE HIGHWAYS TRAFFIC DIVISION	AUTH. NO.	DRAWN P.T.C.
	CONT. SEC.	DATE 12-77
	REF.	SCALE none
	SHEET 2 OF 2	PLAN A 641

THE BEAR FACTS

- Project BEAR is an experimental project being conducted jointly by the Michigan Department of State Highways and Transportation and the Michigan Department of State Police.
- It is the first CB system in the nation to qualify for Federal Highway Administration funding.
- The system will provide full coverage of I-96 between Grand Rapids and Detroit.
- A state police dispatcher will be able to answer calls on Channel 9 along I-96.
- Where local volunteer CB groups monitor Channel 9, they may also answer calls.
- The success of project BEAR will depend on CB'ers helping those without CB's.
- The system will be expanded if this experiment proves successful.



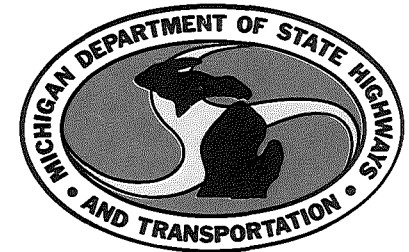
IN CASE OF EMERGENCY - Place This Sign Where Others Can See It.



96 PROJECT **96**

BEAR

BROAD EMERGENCY ASSISTANCE RADIO



C.B. Channel 9
KMI-0911

ITEM 3



KMI-0911



IF YOU HAVE A C.B. BEAR NEEDS YOUR EYES AND EARS

How To Get Help From BEAR

- If you need help, put the "Help" sign in your window where it can be seen and attach a handkerchief to the door handle or outside mirror.
- If you have a CB radio, ask for help on Channel 9. Give your location.
 - Milepost
 - Nearest interchange or crossroad
 - Direction of travel
 - Other landmarks
 - Nature of emergency
- Stay securely in your car with doors locked and windows up until help arrives.
- When help arrives, stay in your car with the doors locked and windows up until proper identification is made of police or service personnel.
- Always stay with your car unless help is obviously close by.

How To Use BEAR To Help Others

- If you see a stranded motorist, DO NOT STOP! Signal the person by flashing your lights or blowing your horn then report the situation to BEAR.
- Do not assume that the incident has been reported by someone else. It is better to report an incident two or three times than to let it go unreported.
- When giving help, be sure to give the exact location and other necessary details.

What To Report

- Traffic Accidents
- Sick or Injured Persons
- Any Criminal Activity
- Dangerous Drivers
- Stranded Motorists
- Hazardous Road Conditions
- Any other situation which presents an immediate threat to the safety of any person or protection of property.

CB radio is a valuable means of communication between the citizens and law enforcement officers. Channel 9 is the emergency frequency and may only be used for emergency communications.



BEAR NEEDS YOUR HELP!

ITEM 4

MDOT 1528
(N12/78)

BEAR LOG

BROAD EMERGENCY ASSISTANCE RADIO

KMI 0911 CH. 9

LOCATION: HWY _____ MM _____ N S E W

EMERGENCY COMMUNICATION BY

- 1 CB Mobile _____
- 2 CB Base _____
- 3 Telephone _____
- 4 Police Radio _____
- 5 Self Contact _____
- 6 Other: _____

ACTION/SERVICE

- 1 Abandoned Vehicle _____
- 2 Motorist Assist _____
- 3 Accident _____
- 4 Fire _____
- 5 Medical Emergency _____
- 6 Highway Hazard _____
- 7 Traffic Violation _____
- 8 Arrest: _____
- 9 Other: _____
- 0 No Contact _____

TIME AM/PM

- 1 Incident Occurrence _____
- 2 Incident Reported _____
- 3 Dispatch Time _____
- 4 Contact/Verification/
Service _____

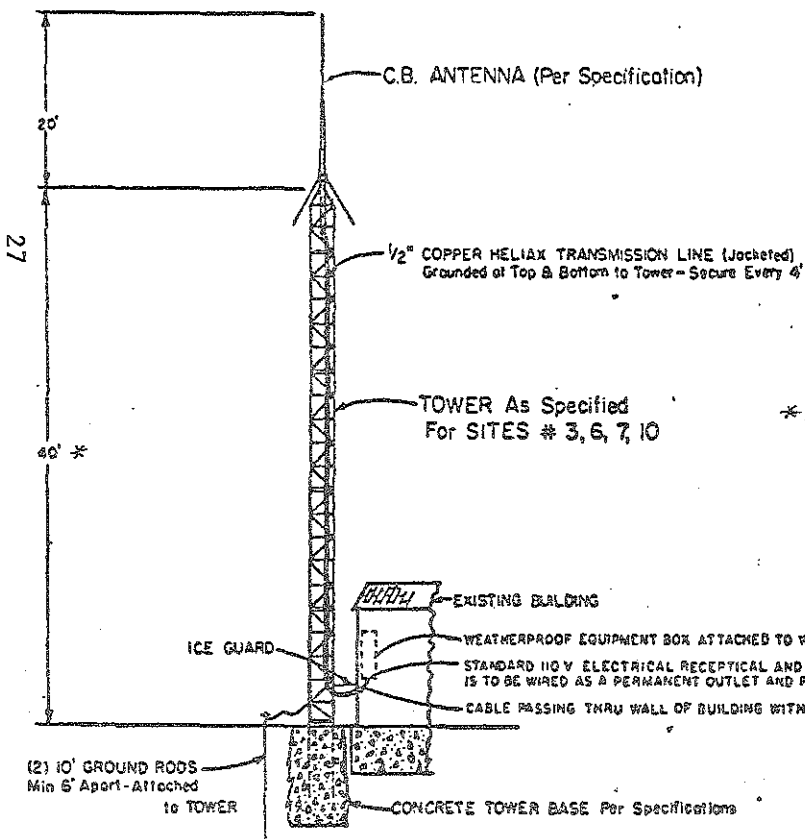
Subject vehicle CB EQUIPPED _____ yes _____ no

NAME _____ AGENCY _____ DATE _____

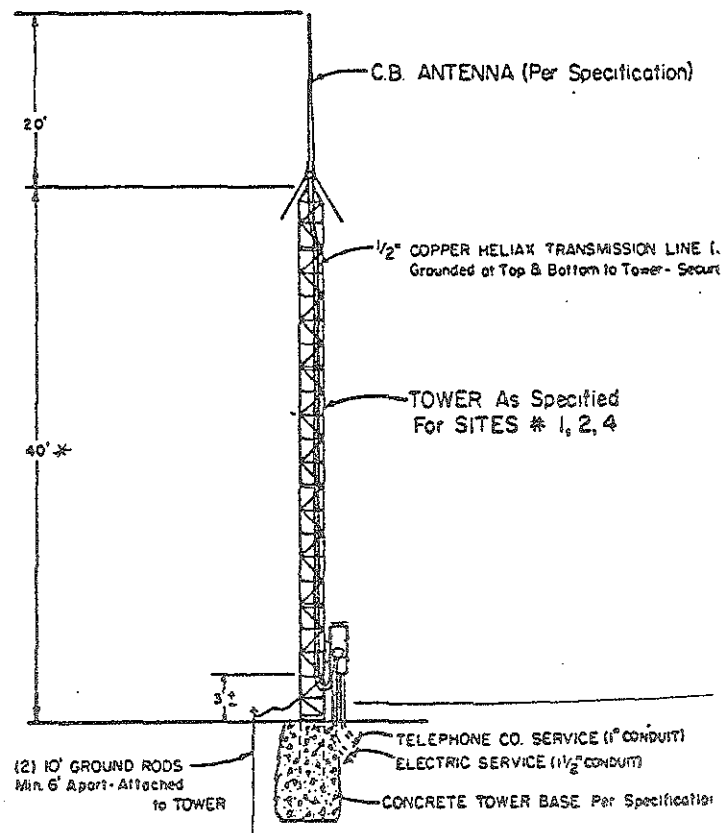
THE CITIZENS WE SERVE EXPECT US TO BE THERE !

ITEM 5

TYPICAL INSTALLATIONS

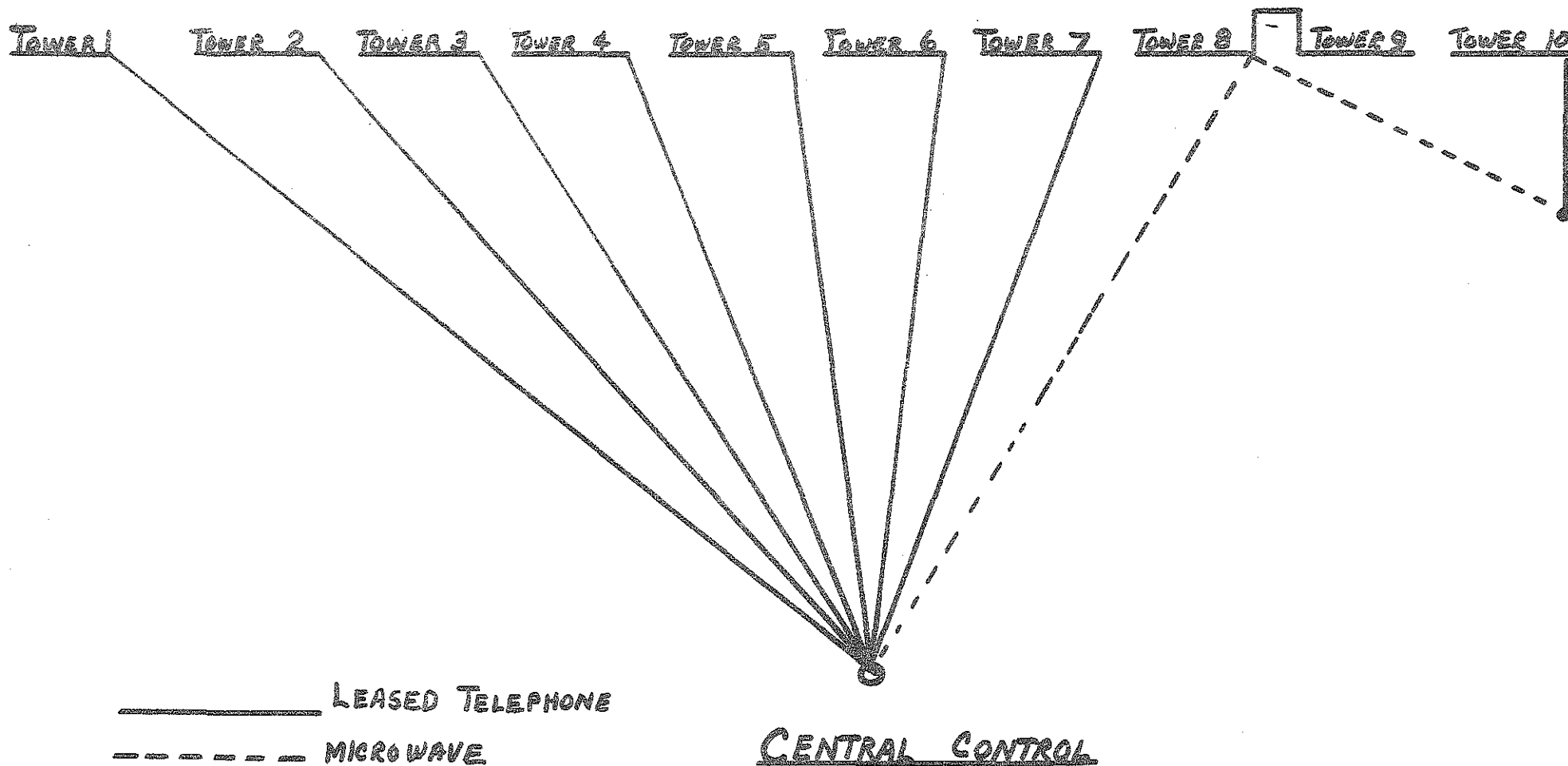


*** NOTE**
LATER TOWER HEIGHT WAS
INCREASED TO 80' AT SIX
LOCATIONS 1, 2, 3, 4, 7, & 8



WEATHERPROOF EQUIPMENT BOX ATTACHED TO TOWER. (BOX TO BE PROVIDED BY M.D.S.N.T.)
STANDARD 110V ELECTRICAL RECEPTICAL AND IS A DISCONNECT SWITCH INSIDE EQUIPMENT BOX RECEPTICAL IS TO BE FED FROM ELECTRIC SERVICE PROVIDED BY POWER CO.
METER BASE INSTALLED ON SIDE OF CABINET BY CONTRACTOR. ®

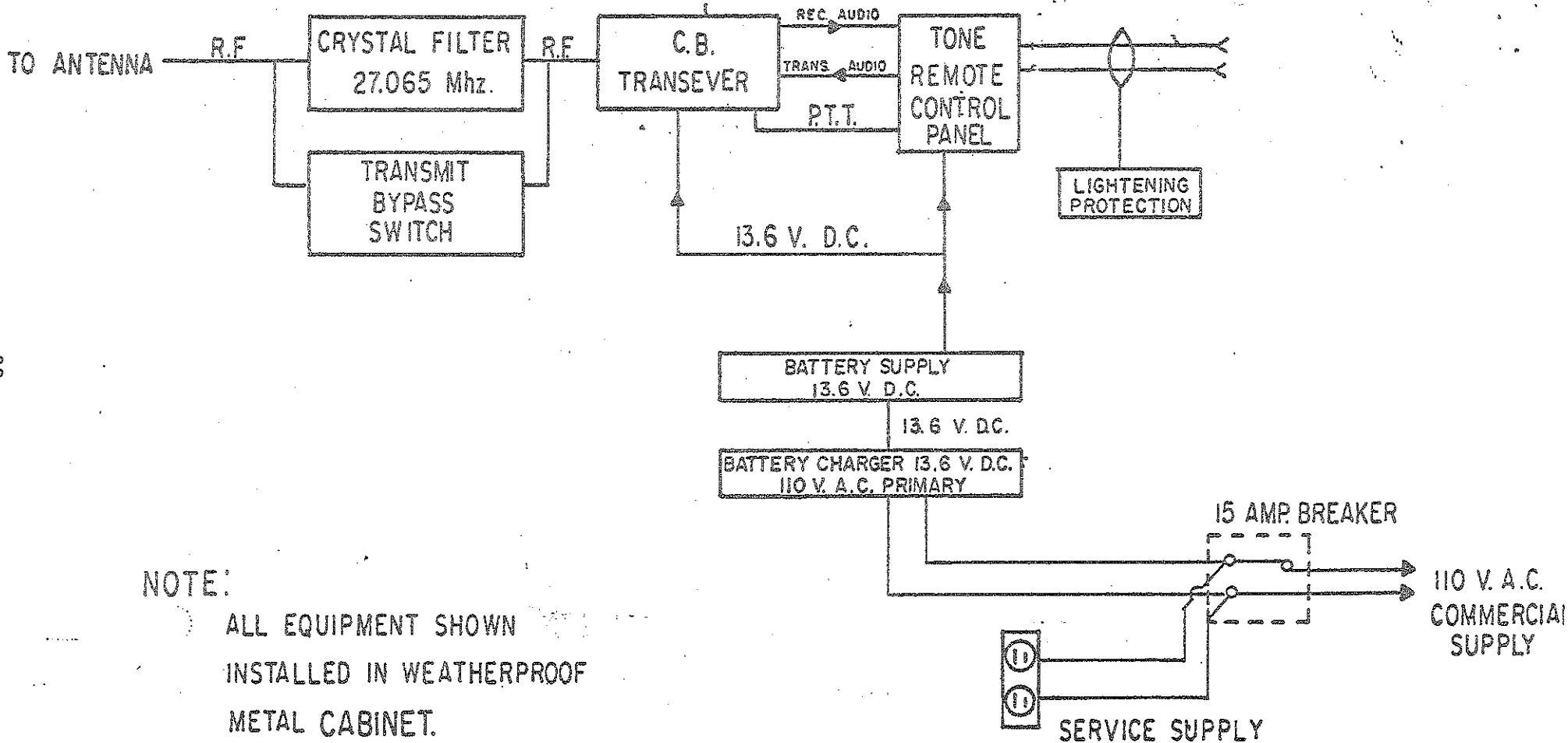
COMMUNICATION SYSTEM



ITEM 7

PROJECT B.E.A.R.

REMOTE C.B. BASE STATION - BLOCK DIAGRAM



NOTE:

ALL EQUIPMENT SHOWN
INSTALLED IN WEATHERPROOF
METAL CABINET.