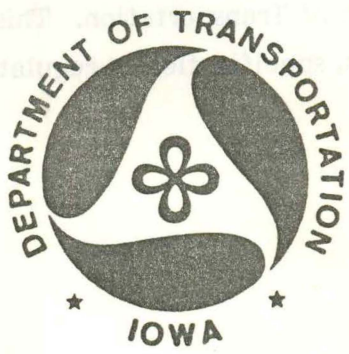


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Traffic Control Inventory Manual



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OCTOBER, 1982

TRAFFIC CONTROL INVENTORY MANUAL

Prepared for the
Iowa Department of Transportation
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Ames, Iowa 50010

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October, 1982

PART A

TRAFFIC SIGNAL INVENTORY SYSTEM

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PART A — TRAFFIC SIGNAL INVENTORY SYSTEM

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EXHIBITS

Physical Data Form
Operational Data Form (Fixed-Time)
Operational Data Form (Actuated)
Coordination Data Form
Signal Maintenance Log

This portion of the manual has been prepared to provide cities with a methodology for developing a traffic control signal inventory and record keeping system. The system has been developed to be applicable to city traffic signal systems of from one to 200 or more installations.

Standard 613 (Traffic Engineering Services) of the Highway Safety Program requires local political jurisdictions to have a "traffic control plan" which includes an inventory of all traffic control devices; periodic review of existing traffic control devices, including a system for upgrading of substandard devices to conform to standards issued or endorsed by the Federal Highway Administration; and a maintenance schedule adequate to insure proper operation and timely repair of control devices.

The traffic control signal inventory and record system will provide cities with a method for maintaining up-to-date information on traffic control signal installations; aid in providing a base for development of upgrading and replacement programs for traffic signal controls; assist in periodic inspection and maintenance programs for traffic control signals; and aid in satisfying legal requirements for the maintenance and monitoring of traffic control signals.

The methodology for the development of a sound traffic signal inventory and record keeping process as outlined herein utilizes a series of forms which provide an integrated inventory and record keeping system. These forms are described and discussed in detail in the following sections of this portion of the manual.

The purpose of this chapter is to describe in detail the use of the traffic signal inventory forms and procedures to be used for the collection of basic information regarding physical and operational characteristics at traffic control signal installations. This chapter will also aid in assuring the completeness of data collected at each signal installation and that the data collected is properly recorded on the form.

SIGNAL IDENTIFICATION SYSTEM

A number of identification methods are available for use by cities to identify traffic signal locations or intersections which are signalized. Within a community, several agencies may be involved in the operation and/or maintenance requirements of a signalized location, each possibly utilizing a different means of identifying a particular signal installation. For example, the utility providing energy for the installation may use a billing number or address to identify the signal location while the community may simply use the literal intersection location for identification. As the number of signalized locations increase within a community, the need for interfacing the various identification methods becomes important in communications and dealings between agencies regarding traffic signal installations. The following identification methods are typical and could be used by communities as identification techniques.

1. Intersection Location - Literal intersection location (i.e. 1st Street and Main Street).
2. Power - An address, billing account number or other method used for identification by the local Power Company.
3. City Intersection Number - A number or other identification method (such as D.I.M.E. system number, a planning or transportation planning node number, etc.) which has been assigned.
4. ALAS Number - A six digit node number assigned to an intersection as part of the Iowa Department of Transportation's Accident Location and Surveillance System.

5. Telephone Circuit Number - An identification number assigned by the local Telephone Company, to telephone circuits used for traffic signal interconnection.

The various identification systems for a particular signal location may be cross-referenced by a typed listing or by a computerized listing. A computerized Signal Identification System (SISY) is being utilized in the City of Des Moines. The SISY listing assigns a signal number for each signal location; a sector number conforming to the City's presently assigned signal maintenance areas; a system number (for interconnected locations); and a signal type number indicating controller type as well as the various identification systems. A sample coding form and instructions for the SISY system is included in the Appendix.

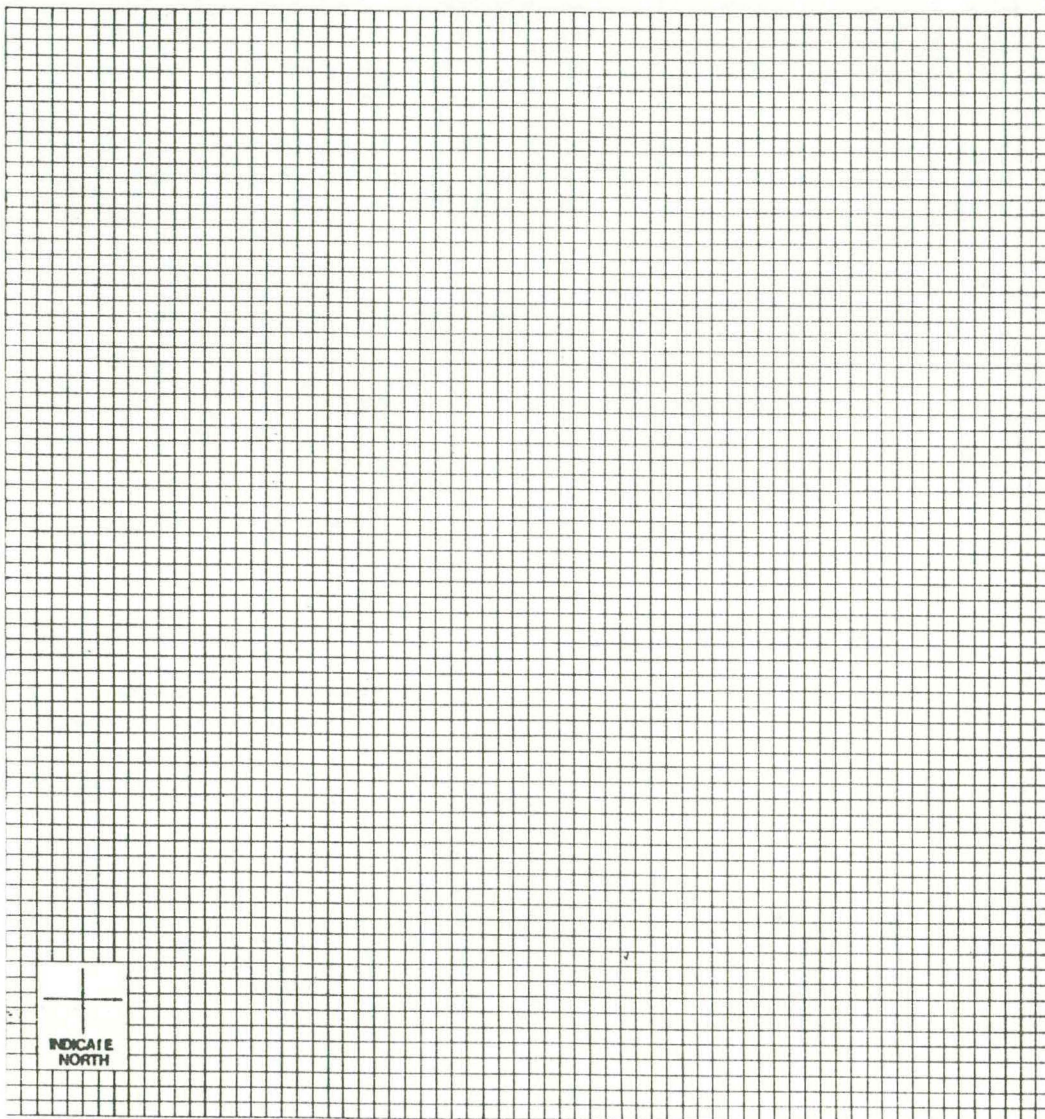
SIGNAL INVENTORY FORMS

A total of four (4) field inventory forms have been developed for completing a traffic signal inventory, they include a physical data form for signal equipment and physical aspects of the signal installations; an operational data form for fixed-time signal installations; an operational data form for actuated signal locations; and a coordination data form for signal coordination timing provided by external coordination units.

PHYSICAL DATA FORM . . . The Physical Data Form is a two-part form (8½" x 11" front and back or 11" x 17" one side) which is designed for use in recording physical information concerning the traffic signal equipment in operation of the signalized installation.

Front or Right Side:

1. Heading - Information recorded in the heading portion of the form includes:
 - a. Intersection - Literal location of the signal installation.
 - b. Sector - Sector number within which the installation is located (if any).
 - c. Power - Power Company identification assigned to the signal installation.
 - d. System - System name if signal location is included in a coordinated system. Left blank if installation is an isolated location.
 - e. ALAS - ALAS node number of signalized intersection. If midblock, the node numbers of intersections either side of the installation are recorded.
 - f. Tele. - Telephone company circuit number for telephone interconnect, if provided.



PHYSICAL DATA

INTERSECTION: _____ SECTOR: _____
 POWER: _____ SYSTEM: Tele
 ALAS: _____
 METERED _____ UNMETERED _____

CONTROLLER: _____ DETECTORS: _____
 TYPE _____ LOOP _____
 MODEL _____
 _____ MAGNETIC _____
 _____ PUSHBUTTONS _____

POLE DATA

| POLE NO. | POLE TYPE | POLE MATL. | TYPE OF ARM | TYPE OF BASE | ARM LENGTH PEDSTL. HEIGHT | BOLT CIRCLE (IN) | REMARKS |
|----------|-----------|------------|-------------|--------------|---------------------------|------------------|---------|
| | | | | | | | |
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- | | | | |
|--------------------|-------------------|--------------------|----------------------|
| POLE TYPE | POLE MATL. | TYPE OF ARM | TYPE OF BASE |
| 1. SINGLE MAST ARM | 1. ALUMINUM | 1. BOLT ON | 1. PLATE |
| 2. TWIN MAST ARM | 2. STEEL | 2. CLAMP ON | 2. STEEL TRANSFORMER |
| 3. COMBINATION | 3. WOOD | 3. SECTIONAL | 3. ALUM. TRANSFORMER |
| 4. STRAIN | 4. OTHER | 4. CLASSIC | |
| 5. PEDESTAL | | | |
| 6. UTILITY | | | |
| 7. OTHER | | | |

AUXILIARY EQUIPMENT

FLASHER _____ TIME CLOCK _____

RESPONDER _____ CONFLICT MONITOR _____

- LEGEND**
- POLE AND NUMBER
 - SIGNAL INDICATION
 - PEDESTRIAN SIGNAL INDICATION
 - PB PUSHBUTTON
 - 00 MAGNETIC DETECTOR - DISTANCE FROM STOP LINE
 - 00:00:00 LOOP DETECTOR
 - DISTANCE FROM - AREA OF - PRESENCE PR
 - STOP LINE DETECTION PULSE P
 - CONTROLLER DELAY D
 - NO DELAY NO
 - METER EXTENSION E

SIGNAL FACES

| A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---------|---------|--------|---------|---------|---------|---------|---------|----------|---------|---------|---|---|---|
| 12 R | 12 R | 8 R | 12 R | 12 R | 12 R | 12 R | 8 DW | 12 DW | 12 R | 12 R | | | |
| 12 Y | 12 Y | 8 Y | 8 Y | 12 Y | 12 Y | 12 Y | 8 W | 12 W | 12 Y | 12 Y | | | |
| 12 G | 12 G | 8 G | 8 G | 12 G | 12 G | 12 G | | | 12 G | 12 G | | | |
| | | | | * | * | 12 G | | | 12 G | 12 G | | | |
| | | | | | | 12 G | | | 12 G | 12 G | | | |
| | | | | | | 12 G | | | 12 G | 12 G | | | |

* OPTICALLY PROGRAMMABLE

DATE: _____

- g. Metered or Unmetered - Check the appropriate blank to indicate if the signal installation is metered or unmetered.
2. Controller - Information to be recorded should include controller type, manufacturer, and model number.
 3. Detectors - Information to be recorded includes the number and type of detector amplifier units or pedestrian pushbuttons used for detection.
 4. Pole Data - Information to be recorded in the pole data section of the form includes:
 - a. Pole Number - A number assigned to each pole at the signalized location in the signal installation sketch on the back or left side of the form.
 - b. Pole Type - A code number assigned to various pole types as shown on the form.
 - c. Pole Material - A code number for material type as shown on the form.
 - d. Type of Arm - A code number for arm type as shown on the form.
 - e. Type of Base - A code number for base type as shown on the form.
 - f. Arm Length/Pedestal Height - Information provides mast arm length or pedestal height for the pole.
 - g. Bolt Circle (inches) - Information provides the bolt circle, in inches, for the pole's anchor bolt pattern.
 - h. Remarks - Pertinent information about pole not included elsewhere.
 5. Auxiliary Equipment - Information to be recorded in this section includes the number, type and/or model number for auxiliary equipment such as flashers, time clocks, responders and conflict monitor.
 6. Date - The date of the field inventory is shown in the space provided.

Back or Left:

The back or left side of the Physical Data form provides a grid area for a not-to-scale sketch of the traffic signal installation. Data typically provided on the sketch includes: intersection geometrics; pavement markings; meter location; and traffic signal appurtenances utilizing the legend provided on the form. Conduit runs, pull boxes, etc. may also be shown on the sketch.

OPERATIONAL DATA FORM (Fixed-Time Signal) . . . The Operational Data Form for fixed-time signal installations is utilized to record traffic signal timing, phasing, and

signal sequence at pretimed traffic signal installations. The form should be completed as follows:

1. **Heading** - Information to be recorded in the heading portion of the form includes the intersection location; sector number; Power Company Identification; system name (if any); ALAS node number(s); and Telephone Company circuit number (if any). A detailed explanation of the signal identification system data included in the heading has been discussed previously.
2. **Signal Timing** - The signal timing portion of the form is used to record the signal timing and sequence (by interval) in operation at the signal installation.
 - a. **Dial Number** - Record the dial or cycle number for each controller dial or cycle provided on this line.
 - b. **Time of operation** - List the time period each dial or cycle is in operation.
 - c. **Interval number (INT)** - Indicate the interval number for each signal timing interval in this column.
 - d. **Interval** - Show street names and directions in the spaces provided. Under each column show the signal indications during each signal timing interval as follows:
 - R = Red
 - Y = Yellow
 - G = Green
 - ⬅️ = Green left turn arrow
 - ⬅️⚡ = Yellow left turn arrow
 - ➡️ = Green right turn arrow
 - ⬆️ = Green straight through arrow
 - W = Walk
 - DW = Don't Walk
 - FDW = Flashing Don't Walk
 - e. **Seconds (SEC)** - In this column record the number of seconds allotted to each signal timing interval.
 - f. **Per Cent (%)** = Show the dial setting for the beginning of each signal timing interval in this column.
 - g. **Cycle Length** - Record the total cycle length assigned to each signal dial or cycle.

- h. Offset 1, 2, 3 - These lines should be completed if the signal location is included in a signal progression system. The offset to the system master should be shown in seconds and the signal dial setting (%) entered in the columns for each signal dial/cycle.
 - i. Date - Record the inventory date or the date that the signal timing and sequence was placed into operation.
- 3. Signal Phasing - Sketch the signal phasing in operation at the signal location in the boxes provided. Use a solid arrow indication for vehicle movements and a dashed arrow indication for pedestrian movements. Orient the sketches with north to the top of the form.
- 4. Flashing Operation - Information regarding signal flashing operation is recorded in this section of the form.
 - a. Indicate the hours during which the signalized location is in remote (or time clock) flashing operation. Leave blank if there is no flashing operation or if it is manual flash.
 - b. Yellow - Enter the street or approach directions controlled by the yellow flashing indications during flashing operation.
 - c. Red - Enter the street or approach directions controlled by the red flashing indications during flashing operation. If flashing operations are red indications in all directions, record All Red.
- 5. Interconnection - This section of the form is to be completed for signal locations which are included in a signal progression system.
 - a. Type - Record the type of interconnection provided. Example: hardwire; telephone pairs; time based coordination; etc.
 - b. Location Master Controller - Note the location of the master controller which directs the signal progression system.
- 6. Preemption - Record in the space provided the type of preemption provided at the signal location. Leave blank if no signal preemption is provided.

OPERATIONAL DATA FORM (Actuated Signal) . . . The Operational Data Form for actuated signal installations is utilized to record traffic signal timing and phasing at traffic actuated signal installations. The form should be completed as follows:

- 1. Heading - The information to be recorded in the heading portion of the form includes the intersection location; sector number; system name (if any); Power Company identification; Telephone Company circuit number (if any); and ALAS

OPERATIONAL DATA

ACTUATED SIGNAL

INTERSECTION: _____ SECTOR: _____ SYSTEM: _____
 POWER: _____ TELE: _____ ALAS: _____

| | | | | | | | | | | | | | | | | |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| PHASE | | | | | | | | | | | | | | | | |
| STREET | | | | | | | | | | | | | | | | |
| MOVEMENT | | | | | | | | | | | | | | | | |
| FUNCTION | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC |
| MIN. GREEN/INITIAL | | | | | | | | | | | | | | | | |
| PASSAGE | | | | | | | | | | | | | | | | |
| YELLOW | | | | | | | | | | | | | | | | |
| RED CLEAR. | | | | | | | | | | | | | | | | |
| MAX 1 | | | | | | | | | | | | | | | | |
| MAX 2 | | | | | | | | | | | | | | | | |
| WALK | | | | | | | | | | | | | | | | |
| PED. CLEAR. | | | | | | | | | | | | | | | | |
| SEC. PER ACT. | | | | | | | | | | | | | | | | |
| TIME TO REDUCE | | | | | | | | | | | | | | | | |
| TIME BFR. RDCN. | | | | | | | | | | | | | | | | |
| MIN. GAP | | | | | | | | | | | | | | | | |
| MIN.GR.(NON-ACT) | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| MEMORY | | | | | | | | | | | | | | | | |
| RECALL | | | | | | | | | | | | | | | | |
| ACT.-NONACT. | | | | | | | | | | | | | | | | |
| DATE | | | | | | | | | | | | | | | | |

INTERCONNECTION _____

PREEMPTION _____

SIGNAL PHASING

FLASHING OPERATION
 PERIOD _____
 YELLOW _____
 RED _____

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| | | | | | | | |
|--|--|--|--|--|--|--|--|

node number(s). A detailed explanation of the signal identification system data included in the heading has been previously discussed.

2. Phase - Assign a number designation to each phase of the signal operation. If no numbering system has been developed, simply assign phase numbers from left to right for each active phase module as viewed in the cabinet.
3. Street - Record the street name associated with each phase on this line.
4. Movement - Enter the direction and any other appropriate description for each phase (i.e. E-W; S.B. Thru; W.B. LT, etc.).
5. Function - This portion of the form is used to record the signal timing (in seconds) for the appropriate controller functions of each signal phase.
 - a. Minimum Green/Initial - Record the minimum green/initial timing (in seconds) allotted to each signal phase.
 - b. Passage - Indicate the passage (or unit extension) time in seconds for each actuated signal phase.
 - c. Yellow - Record the yellow clearance interval (in seconds) assigned to each signal phase.
 - d. Red Clearance - Indicate the red clearance time allotted to each signal phase.
 - e. MAX 1 - Record the maximum 1 green timing (seconds) assigned to each actuated signal phase. If the controller has the capability for only one (1) maximum green time per phase enter that value on this line.
 - f. MAX 2 - Record the maximum 2 green timing in seconds for each actuated signal phase.
 - g. Walk - Indicate the Walk time (in seconds) for each phase with actuated pedestrian intervals.
 - h. Pedestrian Clearance - Record the length of the pedestrian clearance interval (in seconds) for phases with actuated pedestrian intervals.
 - i. Seconds Per Actuation - Enter the number of seconds per actuation (or added initial) to be added to the initial interval during the non-green time for each actuated phase.
 - j. Time to Reduce - Record the time in which allowed gap is reduced for actuated phases with volume density timing.
 - k. Time Before Reduction - Enter the preset time before the allowable gap begins to reduce for actuated phases with volume density timing.
 - l. Minimum Gap - Record the minimum value to which the allowed gap between actuations on the phase with the green can be reduced for actuated phases with volume density timing.

- m. Minimum Green (Non-actuated) - Enter the minimum number of seconds allotted for green time for each nonactuated phase.
 - n. Use the blank lines provided on the form for other controller functions not listed.
-
- 6. Memory - Enter the position the memory switch for each phase.
 - 7. Recall - Enter the position the recall switch(es) for each phase.
 - 8. Actuated/Nonactuated - Record the type of operation (actuated or nonactuated) of each signal phase.
 - 9. Date - Record the inventory date or the date that the signal timing was placed into operation.
 - 10. Interconnection - Record in the space provided the type of interconnection provided at the signal location. Leave blank if interconnection is not provided.
 - 11. Preemption - Record in the space provided the type of preemption provided at the signal location. Leave blank if no signal preemption is provided.
 - 12. Signal Phasing - Sketch the signal phasing in the boxes provided (orient with north to the top of the form). Label each phase in accordance with the phase numbers assigned in the timing portion of the form.
 - 13. Flashing Operation - Information regarding signal flashing operation is recorded in this section of the form.
 - a. Indicate the hours during which the signalized location is in remote (or time clock) flashing operation. Leave blank if there is no flashing operation or if it is manual flash.
 - b. Yellow - Enter the street or approach directions controlled by the yellow flashing indications during flashing operation.
 - c. Red - Enter the street or approach directions controlled by the red flashing indications during flashing operation. If flashing operations are red indications in all directions, record All Red.

COORDINATION DATA FORM . . . The Coordination Data Form is utilized to record information regarding coordination programs and timing for intersection coordination units which are external to the controller. The form should be completed as follows:

- 1. Heading - The information recorded in the heading portion of the form includes the intersection location; sector number; system name (if any); Power Company identification; Telephone Company circuit number (if any); and ALAS node

- number(s). A detailed explanation of the signal identification system data included in the heading has been previously discussed.
2. Coordination Program - This portion of the form is utilized to record data concerning the coordination programs in operation.
 - a. Time of Operation - Indicate the day(s) of the week each program is in effect on the top line of the form. The hours of operation for the various coordination programs should be entered in the appropriate column corresponding to the day(s) of operation and the appropriate line reflecting the cycle and offset in operation.
 - b. Cycle - Record the cycle (or dial) number in operation during each program time period.
 - c. Offset - Enter the offset number in operation during each programmed time interval.
 - d. Flash - Record the time of operation for periods of remote flashing operation.
 3. Coordination Timing - This part of the form is used to record coordination timing information in operation.
 - a. Cycle Number - Enter the cycle number of each cycle in operation in the columns provided.
 - b. Cycle Length - Record the cycle length (in seconds) for each cycle in operation.
 - c. Offset 1, 2, and 3 - Indicate the signal offset (in seconds and percent of dial, as appropriate) for each signal offset used in the coordination program.
 - d. End Permissive 1, 2, and 3 - Record the end of permissive period (in seconds and percent of dial, as appropriate) for each permissive period used in the coordination program.
 - e. Start Permissive 2 and 3 - Indicate the start of permissive period (in seconds and percent of dial, as appropriate) for each permissive period used in the coordination program.
 - f. Force-off 1, 2, and 3 - Record the force-off point (in seconds and percent of dial, as appropriate) for each force-off point used in the coordination program.
 - g. Remarks - A column is provided for remarks as appropriate for the coordination timings utilized.
 - h. Additional lines are provided for other coordination timings as may be provided by the coordination program.

4. Interconnection - Information concerning the type of interconnection provided is recorded in this area of the form.
 - a. Type - Record the type of interconnection provided (such as hardwire, time based, etc.).
 - b. Location of Master Controller - Indicate the location of the master controller in the space provided.
5. Date - Record the date of the inventory or the date that the coordination program and/or timing was placed into operation.

SAMPLE INVENTORY FORMS . . . Sample copies of each signal inventory form have been completed utilizing the instructions discussed above. These completed forms are included in the Appendix.

In conjunction with the traffic signal inventory system, a record keeping system is necessary to allow cities to maintain the traffic signal inventory data up-to-date. The signal record keeping system utilizes the forms developed for the basic inventory to the fullest extent possible. The format of the inventory forms will allow update information changes to be entered on the same form as the original inventory thus creating a historic record of changes and the date changes were made.

RECORD KEEPING SYSTEM FORMS

The record keeping system utilizes the Physical Data form; Operational Data; Fixed-Time Signal and Actuated Signal forms; and the Coordination Data form as developed for the inventory process.

PHYSICAL DATA FORM . . . The Physical Data form used in the inventory and record keeping process was developed as either a two-sided form (8½" x 11") or as a one-sided form (11" x 17") displaying the intersection sketch and signal equipment data side-by-side. The master form (to be filed in the office) could also be provided on mylar material to allow ease in making corrections and updating the physical signal data. The form is to be completed as outlined in the instructions for the physical data inventory form previously discussed, and dated in the space provided.

OPERATIONAL DATA FORMS . . . The Operational Data forms for fixed-time and actuated signals utilize the same form for the record system as used in the inventory process. Each form provides several columns for use in recording the original signal timings inventoried and for recording changes in timing and/or phasing.

The forms should be completed in the same manner as the original inventory information with the date of the signal operations change recorded in the space provided.

COORDINATION DATA FORM . . . The record keeping system for signal coordination data utilizes the same form as the original inventory. Whenever a change occurs in the coordination data for intersection coordination units, which are external to the

controller, a new signal coordination form should be completed and the data noted in the space provided.

SIGNAL MAINTENANCE LOG . . . The Signal Maintenance Log form was developed to record information concerning maintenance activities performed at a signal location. The form should be completed as follows:

1. Heading - Information recorded in the heading portion of the form includes the intersection location; sector number; system name (if any); Power Company identification; Telephone Company circuit number (if any); and ALAS node number(s). A detailed explanation of the signal identification system data included in the heading has been discussed in Chapter 2.
2. Date Reported - Record the date the signal problem was reported or the date the maintenance activity was requested.
3. Reported Problem/Maintenance Activity - Indicate the nature of the reported problem or maintenance activity in the space provided. Use as many lines as necessary to record the information.
4. Corrective/Maintenance Action - Record the corrective or maintenance action taken to correct the problem or complete the maintenance activity.
5. Date Corrected - Indicate the date the reported problem was corrected or maintenance action was completed.
6. Maintenance Action By - Record the name or initials of the individual providing the maintenance action.

TRAFFIC SIGNAL ELECTRICAL COST . . . In many jurisdictions the power company supplying energy for the signal installations provides a separate billing for energy costs at each signalized location. This practice can create a very time consuming manual process to consolidate monthly bills into one payment and to determine annual energy costs at individual signal installations.

One possible method for simplifying this task is the use of a computer filing system. Such a system, (TRASEC) was developed for the City of Des Moines to aid in processing and filing information on traffic signal electrical costs. The computer filing system will allow the bills to be processed in a more efficient manner than the current manual methods used. The computerized file will also provide the ability to create a historical file of energy costs by location, signal type, and sector. A copy of the coding form and instructions is included in the Appendix.

RECORD KEEPING SYSTEM FILES . . . The Signal Record Keeping System has been designed as three separate files: office records; shop records; and field records. The files include the following records for each signal location:

1. Office Records - Maintained in the Traffic Engineering Department Office.
 - a. Physical Data Form
 - b. Operational Data Form (Fixed-Time or Actuated Signal, as applicable)
 - c. Coordination Data Form (as applicable)
 - d. Signal Maintenance Log
 - e. Traffic Signal Electrical Cost file

Additionally, a copy of the Signal Identification System (SISY) Listing and a copy of a Signal Location Map should be included as part of the Office Records.

2. Shop Records - Maintained in the Signal Shop.
 - a. Physical Data Form
 - b. Operational Data Form (Fixed-Time or Actuated Signal, as applicable)
 - c. Coordination Data Form (as applicable)
 - d. Signal Maintenance Log

In addition, the Shop Records include a copy of the SISY listing and a copy of the Signal Location Map.

3. Field Records - Maintained in each signal controller cabinet.
 - a. Physical Data Form
 - b. Operational Data Form (Fixed-Time or Actuated Signal, as applicable)
 - c. Coordination Data Form (as applicable)
 - d. Signal Maintenance Log

APPENDIX - PART A

| <u>SUBJECT</u> | <u>PAGE</u> |
|--|-------------|
| FIXED - TIME SIGNAL | |
| Physical Data Form (Front Side) | A-1 |
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| | |
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PHYSICAL DATA

INTERSECTION: 42nd & Grand SECTOR: 1
 POWER: 4142 Grand SYSTEM: Monotrol
 ALAS: 128101 TELE: ITCNA 5061 N.W.
 METERED: UNMETERED:

CONTROLLER:
 TYPE Eagle
 MODEL EF73E51900
S#55960-32-3

DETECTORS:
 LOOP _____
 MAGNETIC _____
 PUSHBUTTONS _____

POLE DATA

| POLE NO. | POLE TYPE | POLE MATL. | TYPE OF ARM | TYPE OF BASE | ARM LENGTH | BOLT CIRCLE (IN) | REMARKS |
|--------------|-----------|------------|-------------|--------------|----------------|------------------|---------|
| | | | | | PEDSTL. HEIGHT | | |
| <u>1,4,6</u> | <u>5</u> | <u>1</u> | | | <u>10</u> | | |
| <u>3</u> | <u>5</u> | <u>2</u> | | | <u>10</u> | | |
| <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>1</u> | <u>25</u> | <u>14</u> | |
| <u>5</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>1</u> | <u>20</u> | <u>14</u> | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

- POLE TYPE**
- SINGLE MAST ARM
 - TWIN MAST ARM
 - COMBINATION
 - STRAIN
 - PEDESTAL
 - UTILITY
 - OTHER

- POLE MATL.**
- ALUMINUM
 - STEEL
 - WOOD
 - OTHER

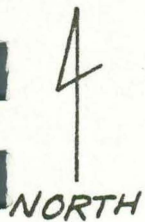
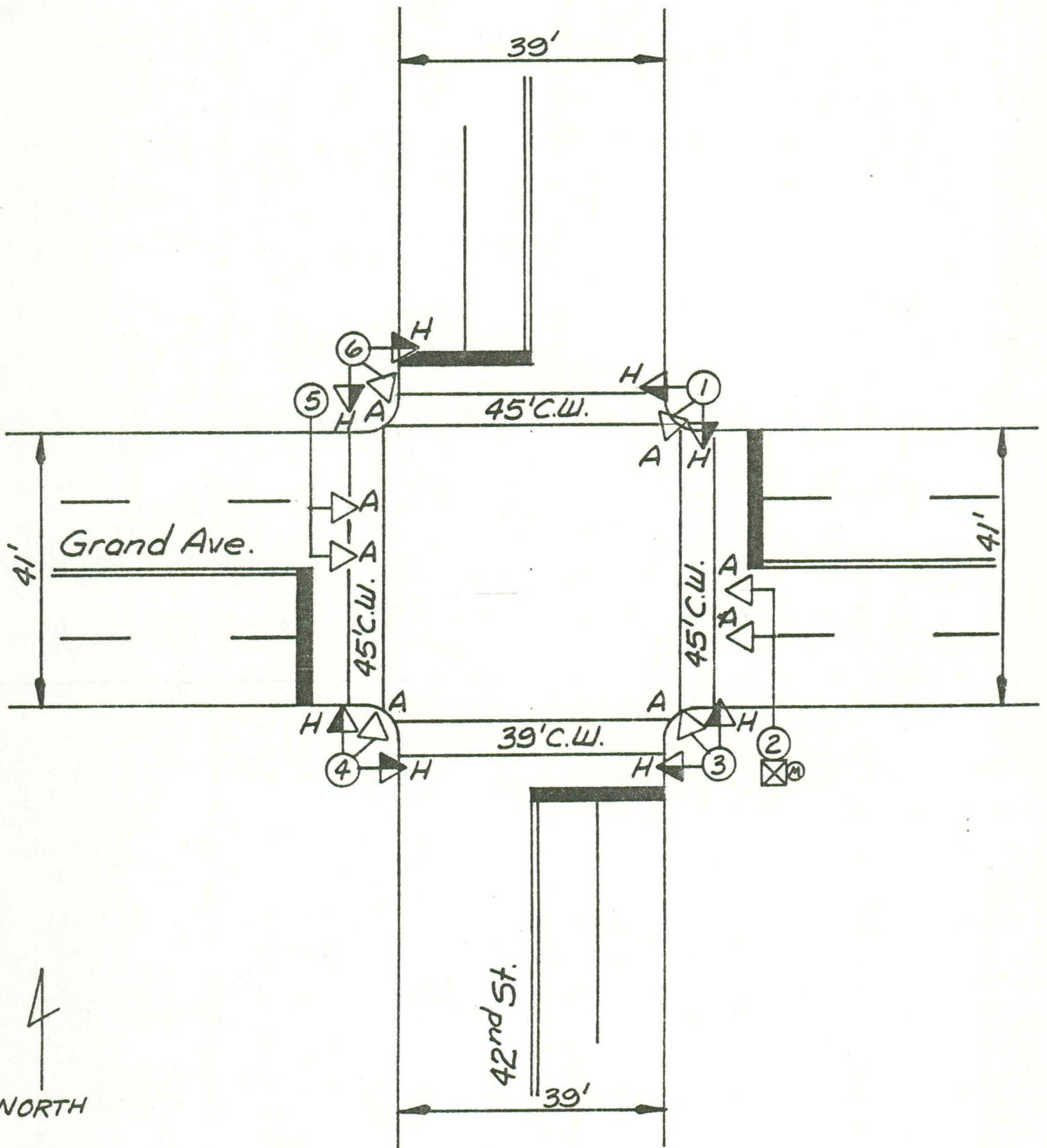
- TYPE OF ARM**
- BOLT ON
 - CLAMP ON
 - SECTIONAL
 - CLASSIC

- TYPE OF BASE**
- PLATE
 - STEEL TRANSFORMER
 - ALUM. TRANSFORMER

AUXILIARY EQUIPMENT

FLASHER Eagle HT-130Zckt TIME CLOCK _____
Solid State
 RESPONDER EYS-3 CONFLICT MONITOR _____
Night Flash Relay

DATE: 9-8-81



- LEGEND**
- ⊙ POLE AND NUMBER
 - SIGNAL INDICATION
 - ↔ PEDESTRIAN SIGNAL INDICATION
 - PB PUSHBUTTON
 - ⊙00 MAGNETIC DETECTOR - DISTANCE FROM STOP LINE
 - 00-00-PD LOOP DETECTOR
 - STOP LINE
 - AREA OF - PRESENCE
 - DISTANCE PULSE
 - EXTENSION DELAY
 - NO DELAY ND
 - CONTROLLER METER
 - E

SIGNAL FACES

| A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|------|------|-----|------|------|------|------|------|-------|------|------|---|---|---|
| 12 R | 12 R | 8 R | 12 R | 12 R | 12 R | 12 R | 9 DW | 12 DW | 12 R | 12 R | | | |
| 12 Y | 12 Y | 8 Y | 8 Y | 12 Y | 12 Y | 12 Y | 9 W | 12 W | 12 Y | 12 Y | | | |
| 12 G | 12 G | 8 G | 8 G | 12 G | 12 G | 12 G | | | 12 G | 12 G | | | |
| | | | | | | 12 G | | | 12 Y | 12 G | | | |
| | | | | | | 12 G | | | 12 G | 12 G | | | |
| | | | | | | | | | 12 G | 12 G | | | |
| | | | | | | | | | 12 G | 12 G | | | |

• OPTICALLY PROGRAMMABLE

OPERATIONAL DATA

INTERSECTION: 42nd and Grand

POWER: 4/42 Grand

ALAS: 128101

FIXED-TIME SIGNAL

SECTOR: 1

SYSTEM: Monotrol

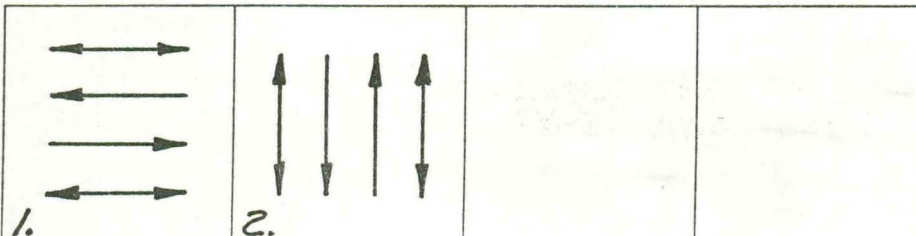
TELE: ITCNA 5061 N.W.

SIGNAL TIMING

| DIAL NUMBER | | 1 | 2 | 3 | | | | | | | | |
|---------------------|--------------|--------------|------------------|------------------|--------|----|--------|----|-----|---|-----|---|
| TIME OF OPERATION | | | 7:15- 8:15 AM | 3:55- 5:30 PM | | | | | | | | |
| <u>1</u> / <u>2</u> | <u>Grand</u> | <u>42nd</u> | SEC | % | SEC | % | SEC | % | SEC | % | SEC | % |
| | <u>E - W</u> | <u>N - S</u> | | | | | | | | | | |
| 1 | <u>G:W</u> | <u>R:DW</u> | 24 | 40 | 32.8 | 41 | 51 | 60 | | | | |
| 2 | <u>G:FDW</u> | <u>R:DW</u> | 10.8 | 18 | 5.6 | 7 | 6.8 | 8 | | | | |
| 3 | <u>Y:FDW</u> | <u>R:DW</u> | 3 | 5 | 3.2 | 4 | 3.4 | 4 | | | | |
| 4 | <u>R:DW</u> | <u>G:W</u> | 12 | 20 | 29.6 | 37 | 13.6 | 16 | | | | |
| 5 | <u>R:DW</u> | <u>G:FDW</u> | 7.2 | 12 | 5.6 | 7 | 6.8 | 8 | | | | |
| 6 | <u>R:DW</u> | <u>Y:FDW</u> | 3 | 5 | 3.2 | 4 | 3.4 | 4 | | | | |
| CYCLE LENGTH | | | 60 | | 80 | | 85 | | | | | |
| OFFSET 1 | | | 588 | 98 | 24 | 30 | 44.2 | 52 | | | | |
| OFFSET 2 | | | | | | | | | | | | |
| OFFSET 3 | | | | | | | | | | | | |
| DATE | | | 9-8-81 | | 9-8-81 | | 9-8-81 | | | | | |

PREEMPTION _____

SIGNAL PHASING



FLASHING OPERATION

PERIOD Mid - 5:30 A.M.

YELLOW Grand

RED 42nd

INTERCONNECTION

TYPE Phone

LOCATION MASTER

CONTROLLER 7th & Grand

PHYSICAL DATA

INTERSECTION: 62nd & Douglas SECTOR: 1
 POWER: Urbandale SYSTEM: Douglas
 ALAS: 213393 TELE: -
 METERED: _____ UNMETERED: ✓

CONTROLLER:
 TYPE Automatic
 MODEL MF-10
3ø 3-(PC-80)
BT# 18751

DETECTORS:
 LOOP 3
 MAGNETIC 2
 PUSHBUTTONS 2

POLE DATA

| POLE NO. | POLE TYPE | POLE MATL. | TYPE OF ARM | TYPE OF BASE | ARM LENGTH | | BOLT CIRCLE (IN) | REMARKS |
|----------|-----------|------------|-------------|--------------|----------------|--|------------------|---------|
| | | | | | PEDSTL. HEIGHT | | | |
| <u>1</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>35'</u> | | <u>18</u> | |
| <u>2</u> | <u>5</u> | <u>1</u> | | | <u>10'</u> | | | |
| <u>3</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>3TBZ</u> | <u>25'</u> | | <u>15</u> | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

- POLE TYPE**
 1. SINGLE MAST ARM
 2. TWIN MAST ARM
 3. COMBINATION
 4. STRAIN
 5. PEDESTAL
 6. UTILITY
 7. OTHER

- POLE MATL.**
 1. ALUMINUM
 2. STEEL
 3. WOOD
 4. OTHER

- TYPE OF ARM**
 1. BOLT ON
 2. CLAMP ON
 3. SECTIONAL
 4. CLASSIC

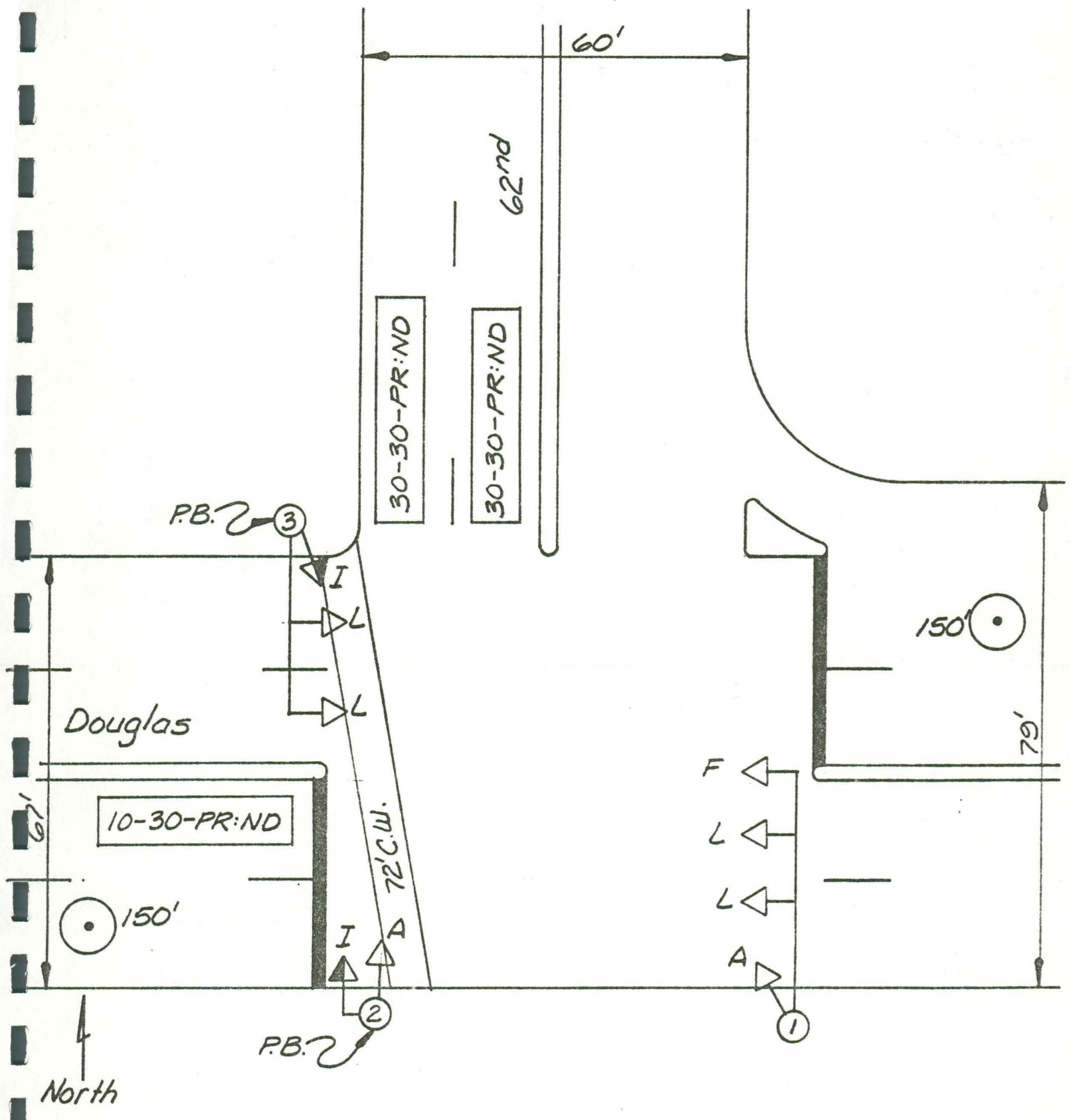
- TYPE OF BASE**
 1. PLATE
 2. STEEL TRANSFORMER
 3. ALUM. TRANSFORMER

AUXILIARY EQUIPMENT

FLASHER Mech. 2 Circuit F-2 TIME CLOCK _____

RESPONDER 5-SCR-4 CONFLICT MONITOR S4-12
Overlap Relay ET-251 Eagle Coordinator
Part# A-131872

DATE: 7-29-81



- LEGEND**
- ⊙ POLE AND NUMBER
 - ↔ SIGNAL INDICATION
 - ↔ PEDESTRIAN SIGNAL INDICATION
 - PB PUSHBUTTON
 - ⊙∞ MAGNETIC DETECTOR - DISTANCE FROM STOP LINE
 - 100-00-PD LOOP DETECTOR
 - DISTANCE FROM - AREA OF - PRESENCE
 - STOP LINE DISTANCE
 - ⊗ CONTROLLER
 - ⊙ METER
 - P PULSE
 - D DELAY
 - ND NO DELAY
 - E EXTENSION

SIGNAL FACES

| A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---------|---------|--------|---------|---------|----------|----------|---------|----------|----------|----------|---|---|---|
| 12 R | 12 R | 8 R | 12 R | 12 R | 12 R | 12 R | 9 DW | 12 DW | 12 R | 12 R | | | |
| 12 Y | 12 Y | 8 Y | 8 Y | 12 Y | 12 Y | 12 Y | 9 W | 12 W | 12 Y | 12 Y | | | |
| 12 G | 12 G | 8 G | 8 G | 12 G | 12 G | 12 G | | | 12 G | 12 G | | | |
| | | | | | 12 ◀G | 12 G | | | 12 ◀Y | 12 ◀G | | | |
| | | | | | | 12 ◀G | | | 12 ◀G | | | | |

* OPTICALLY PROGRAMMABLE

BIMODAL ARROW

OPERATIONAL DATA

ACTUATED SIGNAL

INTERSECTION: 62nd & Douglas

SECTOR: 1

SYSTEM: Douglas

POWER: Urbandale

TELE: _____

ALAS: 213393

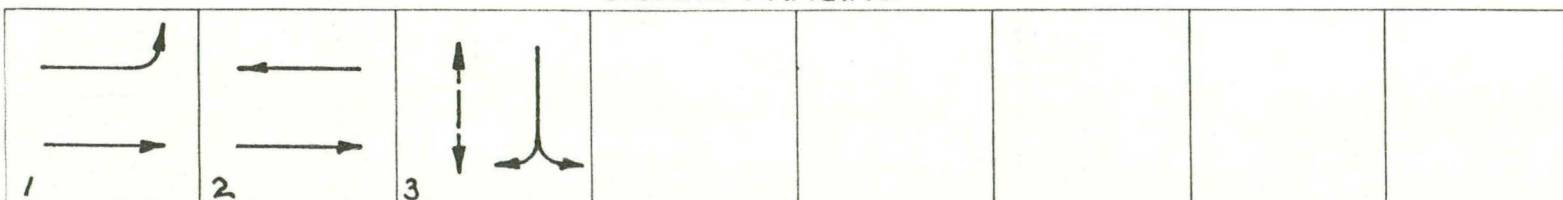
| PHASE | 1 | 2 | 3 | | | | | | | | | | | | |
|--------------------------------|-------------------------|----------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| STREET | <u>Douglas</u> | <u>Douglas</u> | <u>62nd</u> | | | | | | | | | | | | |
| MOVEMENT | <u>E.B. E.B.Lt.</u> | <u>E-W</u> | <u>S.B.</u> | | | | | | | | | | | | |
| FUNCTION | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC | SEC |
| MIN. GREEN/INITIAL | <u>5</u> | <u>6</u> | <u>4</u> | | | | | | | | | | | | |
| PASSAGE | <u>5</u> | <u>4</u> | <u>4</u> | | | | | | | | | | | | |
| YELLOW | <u>3.2</u> | <u>3.2</u> | <u>3</u> | | | | | | | | | | | | |
| RED CLEAR. | <u>0</u> | <u>0</u> | <u>0</u> | | | | | | | | | | | | |
| MAX 1 | <u>30</u> | <u>40</u> | <u>40</u> | | | | | | | | | | | | |
| MAX 2 | <u>0</u> | <u>0</u> | <u>0</u> | | | | | | | | | | | | |
| WALK | <u>0</u> | <u>0</u> | <u>10</u> | | | | | | | | | | | | |
| PED. CLEAR. | <u>0</u> | <u>0</u> | <u>10</u> | | | | | | | | | | | | |
| SEC. PER ACT. | | | | | | | | | | | | | | | |
| TIME TO REDUCE | <u>23</u> | <u>40</u> | <u>30</u> | | | | | | | | | | | | |
| TIME BFR. RDCN. | | | | | | | | | | | | | | | |
| MIN. GAP | <u>2</u> | <u>2</u> | <u>2</u> | | | | | | | | | | | | |
| MIN.GR.(NON-ACT) | | | | | | | | | | | | | | | |
| No. of Act. to give Var. Init. | <u>∞</u> | <u>12</u> | <u>∞</u> | | | | | | | | | | | | |
| Variable Initial | | | | | | | | | | | | | | | |
| MEMORY | <u>Lock</u> | <u>Lock</u> | | | | | | | | | | | | | |
| RECALL | <u>Off</u> | <u>Off</u> | | | | | | | | | | | | | |
| ACT.-NONACT. | | | | | | | | | | | | | | | |
| DATE | <u>7-29-81</u> | <u>7-29-81</u> | <u>7-29-81</u> | | | | | | | | | | | | |

INTERCONNECTION _____

PREEMPTION _____

SIGNAL PHASING

FLASHING OPERATION PERIOD
 YELLOW Douglas
 RED 62nd



COORDINATION DATA

INTERSECTION: 62nd and Douglas

SECTOR: 1

POWER: Urbandale

SYSTEM: Douglas

ALAS: 213393

TELE: _____

COORDINATION PROGRAM

| CYCLE | OFFSET | TIME OF OPERATION | | | |
|-------|--------|-----------------------------|---|-----------------------------|----------------------------|
| | | Mon.-Thurs. | Fri. | Sat. | Sun. |
| 1 | 1 | 6:00A-8:30A 10:00P-Mid. | 6:00A-8:30A 10:00P-Mid. | 7:00A-9:00A | 8:00A-11:00A 7:00P-Mid. |
| 2 | 1 | 9:15A-3:15P 7:00P-10:00P | 9:15A-11:00A 1:00P-3:00P 7:00P-10:00P | 9:00A-10:00A 3:00P-8:00P | 11:00A-7:00P |
| 2 | 2 | 4:00P-7:00P | | | |
| 3 | 1 | | 11:00A-1:00P | 10:00A-3:00P | |
| 3 | 2 | 8:30A-9:15A 3:15P-4:00P | 8:30A-9:15A 3:00P-7:00P | | |
| FLASH | | | | | |

COORDINATION TIMING

| CYCLE NUMBER | 1 | | 2 | | 3 | | | | REMARKS |
|---------------|------|----|------|----|------|----|-----|---|----------------------|
| | SEC | % | SEC | % | SEC | % | SEC | % | |
| CYCLE LENGTH | 50 | | 70 | | 90 | | | | |
| OFFSET 1 | 25.5 | 51 | 46.2 | 66 | 70.2 | 78 | | | Offset dial readings |
| OFFSET 2 | 10 | 20 | 32.2 | 46 | 33.3 | 37 | | | Offset dial readings |
| OFFSET 3 | 9 | 18 | 25.9 | 37 | 27.9 | 31 | | | Offset dial readings |
| END PERM 1 | | | | | | | | | |
| START PERM 2 | | | | | | | | | |
| END PERM 2 | | | | | | | | | |
| START PERM 3 | | | | | | | | | |
| END PERM 3 | | | | | | | | | |
| FORCE - OFF 1 | 39 | 78 | 54.6 | 78 | 63.9 | 71 | | | E.B. Lt. |
| FORCE - OFF 2 | 47 | 94 | 66.5 | 95 | 84.6 | 94 | | | S.B. |
| FORCE - OFF 3 | | | | | | | | | |
| | 31 | 62 | 35 | 50 | 46.8 | 52 | | | E-W Yield Point |

INTERCONNECTION

TYPE Hardwire

LOCATION MASTER

CONTROLLER 59th & Douglas

DATE: 7-29-81

SIGNAL IDENTIFICATION SYSTEM (SISY)

The Signal Identification System (SISY) provides a matrix of various identifying codes and systems which have been assigned to each traffic signal installation by various utility and governmental jurisdictions. The identification system has been developed in a format which lends itself to data processing utilizing a standard 80 column format and common codes for each column. The suggested codes, format, and instructions are provided in the following coding instructions.

The following codes are suggested for recording information in the columns used.

COLUMN 1-3--SIGNAL NUMBER

Record the 3-digit Signal Number assigned to the signal location in the columns provided.

| | <u>Code</u> |
|---------------------------------|-------------|
| Example: 1st St. and Court Ave. | - 001 |
| Polk Blvd. and University Ave. | - 281 |

COLUMN 4,5--SECTOR

Record the Sector number within which the signal installation is located in the columns provided.

| | <u>Code</u> |
|--------------------|-------------|
| Northwest Area | 01 |
| North Central Area | 02 |
| Northeast Area | 03 |
| Downtown Area | 04 |
| Southside Area | 05 |

COLUMN 6,7--SYSTEM

Record the System number that the signal location is a part of in the columns provided.

| | <u>Code</u> |
|--------------------------|-------------|
| Isolated Signal Location | Blank |
| Downtown System | 01 |
| MONOTROL System | 02 |
| East Side System | 03 |
| Fleur Drive System | 04 |
| Indianola Road System | 05 |
| Douglas Avenue System | 06 |

COLUMN 8,9--TYPE

Record the Type of signal installation in the columns provided.

| | <u>Code</u> |
|--|-------------|
| Pre-timed, metered | 01 |
| Semi-traffic actuated, metered | 02 |
| Fully traffic actuated (2-4 phases), metered | 03 |
| Fully traffic actuated (5-8 phases), metered | 04 |
| School signal, metered | 05 |
| Flasher, metered | 06 |
| Pre-timed, unmetered | 07 |
| Semi-traffic actuated, unmetered | 08 |
| Fully traffic actuated (2-4 phases), unmetered | 09 |
| Fully traffic actuated (5-8 phases), unmetered | 10 |
| School signal, unmetered | 11 |
| Flasher, unmetered | 12 |

COLUMN 10-27--SIGNAL LOCATION

Record the literal location of the signal installation in the columns provided.

| | <u>Code</u> |
|--------------------------------------|--------------------|
| Example: 1st Street and Court Avenue | 1st St./Court Ave. |
| Polk Boulevard and University Avenue | Polk/University |

COLUMN 28-44--CONTROLLER ADDRESS

Record the Controller Address assigned to the signal location in the columns provided.

| | <u>Code</u> |
|---|---------------|
| Example: 1st St. and Court Ave. - 100 Court | 100 Court |
| 2nd Ave. and New York - 2802 2nd Ave. | 2802 2nd Ave. |

COLUMN 45-52--PREMISES NUMBER

Record the last 8 digits of the utility company premises number, or other identifying number, assigned to the signal location in the columns provided.

| | <u>Code</u> |
|--|-------------|
| Example: 1st St./Court Ave. 101-29942005 | 29942005 |
| 2nd Ave./New York 101-03102865 | 03102865 |

COLUMN 53-64--STREET INVENTORY NUMBER

Record the 6-digit Street Inventory Number assigned to the signal location. When the signal is at a mid-block location record the Street Inventory Number assigned to the intersections at either end of the mid-block location.

| | <u>Code</u> |
|-----------------------------|--------------|
| Example: 1st St./Court Ave. | 075800 |
| SW9th St./Bell Ave. | 081100263100 |

COLUMN 65-76--ALAS NUMBER

Record the 6-digit Alas Number assigned to the signal location. When signal is at a mid-block location record the Alas Number assigned to the intersections at either end of the mid-block location.

| | <u>Code</u> |
|-----------------------------|--------------|
| Example: 1st St./Court Ave. | 128347 |
| SW9th St./Bell Ave. | 125541125542 |

COLUMN 77-80--TELEPHONE CIRCUIT NUMBER

Record 4-digits of the Telephone Circuit Number assigned to the signal location by the Telephone Company in the columns provided.

| | <u>Code</u> |
|---------------------------------------|-------------|
| Example: 2nd Ave./College-ITCNA5062NW | 5062 |
| 6th Ave./Boston -ITCNA5064NW | 5064 |

Traffic Signal Electrical Cost (TRASEC)

SHEET ___ OF ___

TRAFFIC SIGNAL CARD FORM (One card per signal location)

DATE: _____ CODED BY: _____

| SIGNAL NUMBER | SECTOR | GROUP | TYPE | CONTROLLER ADDRESS | PREMISES NUMBER | ENDING BILLING DATE | ENDING METER READING | ENERGY USED (KWH) | BILLING AMOUNT | REMARKS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|--------|-------|------|--------------------|-----------------|---------------------|----------------------|-------------------|----------------|---------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |

TRAFFIC SIGNAL ELECTRICAL COST (TRASEC)

The electrical cost for each traffic signal installation is billed monthly by the local utility. In order to facilitate payment of these individual power bills and to create a historic record of electrical billings, by location, a filing system suitable for computerization has been developed.

The filing system developed provides card formats which would allow data processing utilizing standard 80 column cards and common codes for each column in each card type. Two card types would be utilized (a monthly billing header card and a traffic signal card). The suggested codes, format, and instructions for each card are provided in the following coding instructions.

MONTHLY BILLING HEADER CARD INSTRUCTIONS...The following instructions are provided for use in coding header information for the printout of monthly electrical billing data.

The following codes are suggested for recording information in the card columns used. Additional codes or other data may be added if desired.

COLUMN 1-20--CITY

Record the name of the City in the columns provided.

COLUMN 21-42--DEPARTMENT

Record the name of the City Department responsible for traffic signal electrical costs in the columns provided.

COLUMN 43-47--DEPARTMENT FUND CODE

Record the Departmental Fund Code in the columns provided.

COLUMN 48-53--EXPENDITURE ACCOUNT

Record the Expenditure Account number for traffic signal electrical costs in the columns provided.

COLUMN 54-59--DATE

Record the ending billing date of the utility's electrical billings in the columns provided.

COLUMN 60-80--REMARKS

Record any remarks or comments in the columns provided.

Columns 1-53 include data which will not change month-to-month and once coded would not need to be repeated unless the funding code or expenditure account number would be changed.

TRAFFIC SIGNAL CARD INSTRUCTIONS...The following instructions are provided for use in coding information concerning the individual power bills for each traffic signal installation.

The following codes are suggested for recording information in the columns utilized. Additional codes or other data may be added if desired.

COLUMN 1-3--SIGNAL NUMBER

Record the 3-digit Signal Number assigned to the signal location by the Signal Identification System (SISY) in the columns provided.

Example: 1st St. and Court Ave. - Code 001
Polk Blvd. and University Ave. - 281

COLUMN 4,5--SECTOR

Record the Sector number within which the signal installation is located in the columns provided.

| | <u>Code</u> |
|--------------------|-------------|
| Northwest Area | 01 |
| North Central Area | 02 |
| Northeast Area | 03 |
| Downtown Area | 04 |
| Southside Area | 05 |

COLUMN 6,7--GROUP

Record the Group number assigned to the signal location in the columns provided.

COLUMN 8,9--TYPE

Record the Type of signal installation in the columns provided.

| | <u>Code</u> |
|--|-------------|
| Pre-timed, metered | 01 |
| Semi-traffic actuated, metered | 02 |
| Fully traffic actuated (2-4 phases), metered | 03 |
| Fully traffic actuated (5-8 phases), metered | 04 |
| School signal, metered | 05 |
| Flasher, metered | 06 |
| Pre-timed, unmetered | 07 |
| Semi-traffic actuated, unmetered | 08 |
| Fully traffic actuated (2-4 phases), unmetered | 09 |
| Fully traffic actuated (5-8 phases), unmetered | 10 |
| School signal, unmetered | 11 |
| Flasher, unmetered | 12 |

COLUMN 10-26--CONTROLLER ADDRESS

Record the controller address assigned to the signal location in the columns provided.

Example: 1st St. and Court Ave. - 100 Court
2nd Ave. and New York - 2802 2nd Ave.

COLUMN 27-38--PREMISES NUMBER

Record the utility company premises number, or other identifying number, assigned to the signal location in the columns provided.

Example: 1st St. and Court Ave. Code 101-29942005
2nd Ave. and New York 101-03102865

COLUMN 39-44--ENDING BILLING DATE

Record the ending billing date as shown on the utility company bill for the signal location.

| | <u>Code</u> |
|----------------------------|-------------|
| Example: December 18, 1981 | 12/18/81 |
| June 16, 1980 | 06/16-80 |

COLUMN 45-49--ENDING METER READING

Record the ending meter reading as shown on the utility company monthly billing for the signal location.

| | <u>Code</u> |
|----------------|-------------|
| Example: 44752 | 44752 |
| 4175 | 04175 |

COLUMN 50-53--ENERGY USED

Record the energy used (KWH) as shown on the utility company billing for the signal location.

| | <u>Code</u> |
|------------------|-------------|
| Example: 582 KWH | 0582 |
| 1234 KWH | 1234 |

COLUMN 54-59--BILLING AMOUNT

Record the total cost for the energy used during the billing period from the utility company billing for the signal location.

| | <u>Code</u> |
|-------------------|-------------|
| Example: \$ 56.34 | 56.34 |
| \$109.17 | 109.17 |

COLUMN 60-80--REMARKS

Enter any remarks or comments in the columns provided.

| | <u>Code</u> |
|-----------------------------------|-------------------|
| Example: Signal billed as part of | SEE SIGNAL 072 |
| signal at 805 Keo. | |
| Signal electrical cost paid | PAID BY URBANDALE |
| by City of Urbandale. | |

PART B

TRAFFIC SIGN INVENTORY SYSTEM

TABLE OF CONTENTS
PART B — TRAFFIC SIGN INVENTORY SYSTEM

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| 3 SIGN INVENTORY CODING FORM | 10 |
| 4 MANUAL FILE SYSTEM | 18 |
| 5 WORK ORDER FORM | 21 |
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| APPENDIX | 28 |

EXHIBITS

| | |
|----------------------------|----|
| Sign Inventory Form | 3 |
| Sign Inventory Coding Form | 11 |
| Manual File System Card | 19 |
| Work Order Form | 22 |

The purpose of this portion of the manual is to provide cities with a method for developing a traffic control sign inventory and filing system. The filing system may be computerized or manual in nature depending on the desires and capabilities of each jurisdiction.

This inventory and filing system will provide cities with the means for maintaining information on traffic control signs, aid in providing a base for improvement programs for signing controls, assist in periodic inspection and maintenance programs, and satisfy legal requirements for the maintenance and monitoring of traffic signing.

Through these means a properly maintained inventory and filing system can be developed that should aid in reducing the potential for traffic accidents and mitigate the risk of agency or personal tort liability.

The procedure for developing this system falls into three general steps: collecting existing traffic control sign inventory data; coding of this inventory data to automatic data processing (ADP) card format for computerized filing or coding of the data onto manual file system (MFS) cards for manual filing; and utilizing work order forms to record sign changes for field repair crews and to update the data file.

To accomplish these steps a series of forms have been developed which form an integrated inventory and filing system. These forms have been described and discussed in greater detail in the following chapters of this section. The Appendix at the end of this section has listed in it completed examples of each form discussed in the following chapters as well as additional pieces of information to help illustrate the overall concept of this report.

The purpose of this chapter is to describe in detail the manual collection method utilized in completing the field Sign Inventory form. This chapter shall also help to insure completeness of the data collected at each sign installation and that the information is recorded on the form in a uniform manner.

A method of pinpointing sign locations with reasonable accuracy is very important to the overall effectiveness of the sign inventory program. As a base for the sign location process, a City should utilize existing street names and numbers as its route numbering system.

However, other successful methods have been developed for identifying routes for inventory purposes. One method, developed by the Iowa Department of Transportation, is a link-node identification system which is utilized in the Accident Location and Analysis System (ALAS) for the filing and analysis of traffic accident data. This system assigns a six digit node number to reference points (intersections, railroad crossings, bridges, etc.) which are identifiable on a city map. These reference points could also be used to locate traffic signs in the inventory procedure.

The route identification system used in a particular city's inventory could be either of the above systems, or some other system developed by the local staff. The most important aspect of whatever system is used, is that the system be understood and applied by all personnel who are involved in the sign inventory, sign record keeping, and sign maintenance activities of that city.

In larger communities it may be necessary to divide the city into a system of sectors which would be based on physical, natural, or other boundaries. Such a system would provide more manageable and workable sized areas with which to deal with. In many cases these sectors could be made to coincide with maintenance areas that are already developed in some of the larger cities.

The following instructions are provided to aid field personnel in completing the Sign Inventory form.

SIGN INVENTORY FORM

Sheet _____ of _____

Route: _____

Date: _____

Begin at: _____

Sector: _____

End at: _____

Inventory Direction: _____

| Sign Location | Dir. Facing | Lateral Position | | | Sign Legend | MUTCD Number | Sign | | | | | | | | Post | | Remarks/Recommendations |
|---------------|-------------|------------------|-----------------|--------------------|-------------|--------------|-------|-------|--------|-------|-----------|----------|------------|--------|------|-----------|-------------------------|
| | | Distance | Side of Roadway | Number in Assembly | | | Shape | Color | Size | | Condition | Reflect. | Visibility | Height | Type | Condition | |
| | | | | | | | | | Horiz. | Vert. | | | | | | | |
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 Direction Facing
 sign faces north
 sign faces south
 sign faces east
 sign faces west

 Side of Roadway
 Right Side
 Left Side
 Overhead
 Median

 Sign Shape
 1. Diamond
 2. Rectangular
 3. Square
 4. Octagonal
 5. Triangular
 6. Round
 7. Crossbuck
 8. Pentagonal
 9. Trapezoidal
 0. Other

 Sign Color
 1. Black on white
 2. Black and red on white
 3. White on black
 4. White on red
 5. Red on white
 6. Green on white
 7. White on green
 8. Black on yellow
 9. White on blue
 0. Other

 Sign Condition
 1. Satisfactory
 2. Bent
 3. Defaced
 4. Faded
 5. Map Cracked
 6. Rusty
 7. Peeling
 8. Not Legible
 9. Badly Damaged
 0. Other

 Reflectivity
 1. Reflective
 2. Non-reflective

 Sign Visibility
 1. Easily seen
 2. Hidden by official sign
 3. Hidden by advertising sign
 4. Hidden by brush
 5. Hidden by tree limbs
 6. Hidden by parked vehicles
 7. Hidden because of curve
 8. Hidden because of hill
 9. Other

 Post Type
 1. Steel channel or U
 2. Steel pipe
 3. Street name sign post
 4. Wood 4" x 4"
 5. Wood 6" x 6"
 6. Overhead
 7. Signal post
 8. Wood utility pole
 9. Steel utility pole
 0. Other

 Post Condition
 1. Satisfactory
 2. Leaning
 3. Bent (metal)
 4. Warped (wood)
 5. Damaged
 6. Other

A separate inventory sheet or series of sheets should be completed for each continuous route segment. Continuous route segments would typically extend from city limit to city limit or sector boundary to sector boundary depending on whether or not the City is to be divided into sectors. However, due to dead ends, T-intersections, physical boundaries, etc., route segments may not extend for a full city or sector width or length.

The heading of the Sign Inventory form should be completed using the following instructions:

ROUTE — Record the name or number of the route being inventoried.

BEGIN AT — Enter the starting point (intersecting route or other definitive point) of the route segment being inventoried.

END AT — Enter the ending point (intersecting route or definitive point) defining the other limit of the route segment being inventoried. The ending point when combined with the beginning point will define the route segment inventoried for a given inventory sheet or series of sheets.

Note: Several route segments could be encountered for a specific route within a City or even within a sector due to deadends or T-intersections occurring along the route. For each such discontinuous route segment encountered an inventory sheet or series of sheets should be completed.

SHEET ____ OF ____ — Record the number of each sheet and the total number of sheets for the inventory forms completed for each route segment inventoried.

DATE - Enter the date the route was inventoried.

SECTOR — Record the sector number applicable to the route that is being inventoried. Leave this blank if the City is not divided into sectors.

INVENTORY DIRECTION — The direction of travel of the inventory team along the inventory route should be shown (north, east, south, or west).

The balance of the sign inventory form is to be used for recording of the inventory data for individual signs and sign assemblies. Where more than one sign is included in the sign assembly (one or more signs mounted on a post) several lines may be required to record the sign inventory data.

SIGN LOCATION — Record the location of the sign being inventoried by distance (in feet) from the most recent crossroad intersection. The inventory team should also record the centerline distances for intersecting streets, railroad crossings, bridges, and other topographic features as they are encountered. Each centerline distance should be recorded on a separate line of the inventory form.

DIRECTION FACING — Record the cardinal direction the sign faces using the codes shown on the form and as follows:

Code

- N - Sign faces North
- S - Sign faces South
- E - Sign faces East
- W - Sign faces West

LATERAL POSITION — The lateral position of the sign will be measured in feet from a reference point as shown in the codes listed on the form and as shown herein. Generally, the distance would be measured from the nearest edge of pavement or face of curb to the nearest edge of the sign. Indications of left or right in the coding information refer to left or right as the inventory survey team views it and not necessarily as the motorist viewing the sign would see it.

Code

- R - Right side of route
- L - Left side of route
- O - Overhead
- M - Median

NUMBER IN ASSEMBLY — The number in assembly pertains to sign assemblies which are made up of two or more signs on a common post or mounting assembly. Signs in an assembly should be recorded 1, 2, 3, etc. (from highest mounted to lowest mounted sign) in the box provided. Each sign in an assembly will have its inventory data recorded on a separate line of the form; however, items pertaining to sign assembly location and sign post information should only be completed for sign number 1.

SIGN LEGEND — Record the legend of the sign in its entirety in the blank provided. If more space is required use the Remarks column or additional lines of the form. The MUTCD Number box should not be completed in the field. This information will be recorded in the office.

SIGN SHAPE — Record the shape of the sign using the codes shown on the form and as follows:

| <u>Code</u> | |
|-------------|---------------|
| 1 | - Diamond |
| 2 | - Rectangular |
| 3 | - Square |
| 4 | - Octagonal |
| 5 | - Triangular |
| 6 | - Round |
| 7 | - Crossbucks |
| 8 | - Pentagonal |
| 9 | - Trapezoidal |
| 0 | - Other |

SIGN COLOR — Record the color of the sign legend and the color of the sign background using the codes shown on the form and as follows:

| <u>Code</u> | |
|-------------|--------------------------|
| 1 | - Black on white |
| 2 | - Black and red on white |
| 3 | - White on black |
| 4 | - White on red |
| 5 | - Red on white |
| 6 | - Green on white |
| 7 | - White on green |
| 8 | - Black on yellow |
| 9 | - White on blue |
| 0 | - Other |

SIGN SIZE — Enter the sign size to the nearest inch in the spaces provided for the horizontal and vertical dimensions of the sign. The following criteria should be used for the measurements:

- a) Square and rectangular signs - measure along horizontal and vertical edges.

- b) Diamond shaped signs - measure along sign edge from bottom corner to side corner. Use this dimension for both horizontal and vertical measurements.
- c) Triangular signs - measure along the top of the sign and along the side. Pennant signs should also be measured along the top (long dimension) for horizontal and along the side (short dimension) for vertical dimension.
- d) Shields and octagon shaped signs - measure in a horizontal and vertical direction; enter the largest dimension in each direction.
- e) Round signs - measure diameter, record horizontal distance only.
- f) Pentagonal signs - measure along the horizontal edge and vertically from the bottom edge to the peak of the sign.

All dimensions recorded for signs should be the size of the sign as if the corners were not rounded.

SIGN CONDITION - The condition of the sign should be recorded in the box provided using the codes shown on the form and as follows:

Code

- 1 - Satisfactory
- 2 - Bent
- 3 - Defaced
- 4 - Faded
- 5 - Map Cracked
- 6 - Rusty
- 7 - Peeling
- 8 - Not Legible
- 9 - Badly Damaged
- 0 - Other

Note: If more than one of the sign condition codes are applicable, record the highest numerical code (largest number) in the box provided.

SIGN REFLECTIVITY — Record whether sign is reflective or non-reflective using the codes shown on the form and as follows:

Code

- 1 - Reflective
- 2 - Non-reflective

SIGN VISIBILITY — The sign visibility should be recorded in the box provided by the code on the form, or shown herein:

Code

- 1 - Easily seen
- 2 - Hidden by official sign
- 3 - Hidden by advertising sign
- 4 - Hidden by brush
- 5 - Hidden by tree limbs
- 6 - Hidden by parked vehicles
- 7 - Hidden because of curve
- 8 - Hidden because of hill
- 9 - Other

SIGN HEIGHT — Record the height (measured in feet, to the nearest one-half foot) from the bottom of the sign to the level of the pavement or roadway edge or sidewalk - whichever applies.

POST DATA — Data pertaining to sign post or mounting details should be recorded in the boxes provided for the post type and post condition. Use the codes shown on the form and as follows to record this data.

POST TYPE:

Code

- 1 - Steel channel or U
- 2 - Steel pipe
- 3 - Street name sign post
- 4 - Wood 4" x 4"
- 5 - Wood 6" x 6"
- 6 - Overhead
- 7 - Signal Post
- 8 - Wood utility pole
- 9 - Steel utility pole
- 0 - Other

POST CONDITION:

Code

- 1 - Satisfactory
- 2 - Leaning
- 3 - Bent (metal)
- 4 - Warped (wood)
- 5 - Damaged
- 6 - Other

Note: At locations where two or more signs are included in the sign assembly, the post data needs only to be completed for the line designated for sign number 1 in the Number in Assembly box.

REMARKS/RECOMMENDATIONS — This column should be used to write brief remarks concerning anything unique about a sign, its mounting, or location which are not adequately covered by the coded data. The Remarks column can also be used for overflow of the sign legend and other items previously mentioned.

A methodology has been developed in this chapter by which the sign inventory process can be maintained on an up-to-date basis using automatic data processing (ADP) techniques. With the data that is coded onto ADP cards, combinations of information can be extracted through computer programs that are almost endless and in fact are limited only by the computer size and capabilities of the City staff involved. Computer programs can be and several were developed in this study that provide readily accessible information on current sign inventory data, historical information based on sign replacements, cost information for sign replacements by sign location or type, data on inventory stockpiles for sign replacements and new installations, etc.

The automatic data processing (A.D.P.) card format utilizes standard 80 column cards and an alpha-numeric coding system for each card (sign card, work order card, street name sign card or new installation card). The suggested codes and instructions for the sign inventory data file are included in the following coding instructions.

CODING INSTRUCTIONS . . . The following instructions are provided for coding the inventory information collected on each sign installation to automatic data processing (A.D.P.) card format. The following codes are suggested for recording information in the card columns used. Additional codes may be added if desired. Also included in parentheses is whether or not the information coded be right justified or left justified.

Column 1 **CARD NUMBER** — Record the card type using the code numbers assigned to the card for identification purposes.

Code

- 1 - Sign Card (Original Inventory)
- 2 - Work Order Card
- 3 - Street Name Sign Card
- 4 - New Installation Card

Column 2-3 **SECTOR** — Record the sector number of the route inventoried (right justified).

Column 4 **INVENTORY DIRECTION** — Record the direction of travel of the inventory team along the inventory route using the following codes.

Code

- N - North
- S - South
- E - East
- W - West

Column 5-9

SIGN NUMBER — A sign number will be assigned to each individual sign on a sector basis. Code this number from 10 to 99990 in a consecutive manner as each sign is coded onto a coding form (right justified).

Example: 10
20
30 etc.

The last digit is left a zero so that additional signs can be added at a later date and still retain a numerical order.

Example: 10
20
25 (new sign)
30 etc.

No two signs in a sector will have the same number, whereas, these numbers will be repeated from sector to sector.

Care should be exercised in coding the inventory data that sign numbers (by sector) are not duplicated and that they are numbered consecutively from the beginning to the end of each specific route segment.

Column 10-15

INVENTORY ROUTE — A master list of City street codes should be developed and utilized so that the correct street code names can be exactly coded. In these columns the code name for the inventory route being coded should be recorded (left justified).

Column 16-19

DISTANCE — Record the distance (in feet) from the most recent crossroad intersection to the location of the sign assembly. If a cumulative record of distances was kept, then a subtraction calculation will have to be made to obtain the distance required to code this information (right justified).

Column 20-25 REFERENCE CROSS STREET — Using the master list of City street codes, record the name of the most recent cross street. This will be the street from which the distance in columns 16-19 was measured (left justified).

Column 26 DIRECTION FACING — Record the cardinal direction the sign faces using the following codes:

Code

- N - Sign faces North
- S - Sign faces South
- E - Sign faces East
- W - Sign faces West
- U - Sign faces North & South
- A - Sign faces East & West

Column 27-29 LATERAL POSITION — Code the lateral distance (right justified) in feet (in columns 27 and 28) from the sign to the reference point (coded in column 29) as indicated by the following codes:

Code

- R - Right edge pavement or face of curb
- L - Left edge pavement or face of curb
- O - Overhead (This does not require a coding of Columns 27 & 28)
- M - Median

Column 30 NUMBER IN ASSEMBLY — Code number in assembly recorded by the sign inventory team for sign assemblies with two or more signs. If assembly contains a single sign this column need not be coded.

Column 31-43 MUTCD NUMBER — The MUTCD number of the sign should be coded starting with Column 31 (left justified) and using as many columns as necessary to record its assigned MUTCD number. Column 31 should be coded as a letter designation. Hyphens, parentheses, and asterisks included as a part of the MUTCD number should also be coded in the columns provided. If not all of the columns are required, leave the excess columns uncoded.

Column 44

SIGN SHAPE — Code sign shape using the following codes:

Code

- 1 - Diamond
- 2 - Rectangular
- 3 - Square
- 4 - Octagonal
- 5 - Triangular
- 6 - Round
- 7 - Crossbuck
- 8 - Pentagonal
- 9 - Trapezoidal
- 0 - Other

Column 45

SIGN COLOR — Code sign color using the following codes:

Code

- 1 - Black on white
- 2 - Black and red on white
- 3 - White on black
- 4 - White on red
- 5 - Red on white
- 6 - Green on white
- 7 - White on green
- 8 - Black on yellow
- 9 - White on blue
- 0 - Other

Column 46-49

SIGN SIZE — Code horizontal sign dimension to nearest inch in Columns 46 and 47. Code vertical sign dimension to nearest inch in Columns 48 and 49. In the case of a round, or other type sign having only one dimension, record the horizontal dimension in Columns 46 and 47 and code "00" in Columns 48 and 49 (right justified).

Column 50

SIGN CONDITION — The condition of the sign should be recorded using the following codes:

Code

- 1 - Satisfactory
- 2 - Bent
- 3 - Defaced
- 4 - Faded
- 5 - Map cracked
- 6 - Rusty
- 7 - Peeling
- 8 - Not Legible
- 9 - Badly Damaged
- 0 - Other

Column 51

SIGN REFLECTIVITY — Code whether sign is reflective or non-reflective using the following codes:

Code

- 1 - Reflective
- 2 - Non-reflective

Column 52

SIGN VISIBILITY — Record sign visibility using the following codes:

Code

- 1 - Easily seen
- 2 - Hidden by official sign
- 3 - Hidden by advertising sign
- 4 - Hidden by brush
- 5 - Hidden by tree limbs
- 6 - Hidden by parked vehicles
- 7 - Hidden because of curve
- 8 - Hidden because of hill
- 9 - Other

Column 53-54

SIGN HEIGHT — Code sign mounting height (to bottom of sign) in feet, to nearest one-half foot.

Examples: 50 (5.0 feet)

65 (6.5 feet)

Signs with a mounting height in excess of 9.5 feet should be coded as 99 with the actual sign height recorded in the Remarks area (Column 58-72).

Column 55 POST TYPE — Code data regarding the type of post using the following codes:

Code

- 1 - Steel channel or U
- 2 - Steel pipe
- 3 - Street name sign post
- 4 - Wood 4" x 4"
- 5 - Wood 6" x 6"
- 6 - Overhead
- 7 - Signal Post
- 8 - Wood utility pole
- 9 - Steel utility pole
- 0 - Other

Column 56 POST CONDITION — Record the information concerning the condition of the post using the codes below:

Code

- 1 - Satisfactory
- 2 - Leaning
- 3 - Bent (metal)
- 4 - Warped (wood)
- 5 - Damaged
- 6 - Other

Column 57-72 REMARKS/SPECIAL SIGN MESSAGE — These columns can be used for remarks or special word messages on signs. Abbreviate word messages and/or remarks to fit the limits of 15 characters on the card. Start with column 57 and proceed consecutively to column 72 (left justified).

Column 73 SIGN CHANGE — Although this column will not be required for the original inventory data, it will be required for use by Card Number 2 (Work Order Card). Use the following codes for the appropriate sign change action.

Code

- 1 - Relocate sign
- 2 - Remove sign
- 3 - Remove sign and post
- 4 - Replace sign
- 5 - Replace post
- 6 - Replace sign and post
- 7 - Straighten sign
- 8 - Correct sign height
- 9 - Improve visibility
- 0 - Other

Column 74 REASON FOR CHANGE — Code the reason for sign change using the following codes:

Code

- 1 - No longer needed
- 2 - Vandalism
- 3 - Damaged by accident
- 4 - Rusty, bent, defaced, etc.
- 5 - Faded
- 6 - Loss of reflectivity
- 7 - Not legible
- 8 - Nonconforming to standards
- 9 - Other

NOTE: Columns 73 and 74 are for use by Card Number 2 (Work Order Card) and should not be used for Card Numbers 1, 3 or 4.

Column 75-80 DATE — Code date of original sign inventory, date of sign change, or date new sign was installed by month (col. 75, 76), day (col. 77, 78) and last two digits of year (col. 79, 80). All should be right justified.

This chapter will provide cities with a workable means of maintaining sign inventory data on an up-to-date basis. This file card method is simple and straightforward in nature and is applicable to communities without computer based capabilities (either equipment or staff). It is especially applicable to small cities whose staff, budget, and sign inventory is limited.

The manual file system (MFS) utilizes 5" x 8" file cards which should be completed using the following instructions. A separate file card should be completed for each sign assembly (could include one or more signs) identified during the sign inventory or for each new sign location.

FILE CARD — FRONT SIDE . . . The heading of the file card includes the basic data which determines the location of the sign assembly and the date the inventory data was obtained, or in the case of a new sign installation, the date it was first installed. Two items in the heading - "Sector" and "Sign #'s" should be left blank if the City has determined not to divide the City into sectors or assign sign numbers. If sign numbers are used, then list the numbers from left to right in the same order of mounting - top to bottom (for multi-sign assemblies).

The balance of the form is utilized for more definitive information regarding the sign assembly and should be transferred from the Sign Inventory form completed in the field. In the case of a new sign installation after the current inventory process is completed or a sign change due to a work order (Chapter 5) on an existing sign by a field crew, the data on the sign assembly should be completed using the codes and instructions outlined in the inventory instructions portion of this section. If the sign assembly contains one sign only, a single line need be completed. Several lines in the "Inventory Data" section of the form may be required where several signs are included in the sign assembly.

FILE CARD — BACK SIDE (Maintenance Record) . . . The reverse side of the sign file card should be used to record the chronological maintenance record of the particular sign assembly included on the file card. The following instructions are provided to complete the Maintenance Record items:

DATE REPORTED — Enter the date need for maintenance action was reported (same date recorded on the Work Order form in Chapter 5).

CONDITION — Record the condition of the sign assembly requiring maintenance action.

RECOMMENDED IMPROVEMENTS — Enter the recommended maintenance action to correct the deficient condition of the sign assembly.

DATE IMPROVEMENTS IMPLEMENTED — Enter the date the recommended maintenance action was accomplished.

REMARKS — This column can be used for any brief remarks regarding condition or recommended improvement actions.

The purpose of the Work Order form is twofold: it provides information to field crews to allow them to accurately locate the specific sign location and to perform the work required to make the sign change; and it provides a record of the new sign information that can be transferred to coding forms for updating of either the computerized filing system or the manual filing system.

It should be noted that during the interim period between the beginning of the sign inventory and keypunching of the inventory data onto ADP cards (or transferring of the data onto MFS cards), the Work Order forms should be used to maintain an up-to-date record of sign changes. When the coding process for the original inventory data is completed, the coding process for the Work Order forms can begin.

A Work Order form should be completed for each sign installation on which work is completed - either maintenance of an existing sign or the installation of a new sign. The information recorded will be of the same nature that is recorded on the Sign Inventory forms and coded on the Sign Inventory Coding forms.

When a work assignment is initiated by the engineering office, their personnel will complete the top portion of the form (non-shaded areas) and the field crew will complete the bottom portion of the form (shaded areas).

The field crew will complete both portions of the form (if the information is known) on those occasions when maintenance inspections reveal a problem that the field crew can remedy immediately without having to wait for a work order from the engineering office.

The Work Order form should be completed utilizing the following instructions. It should be noted that the numbers in parentheses refer to the eighty blocks at the bottom of the form which are to be completed by office personnel in accordance with the instructions in Chapter 3 for the Sign Inventory Coding form.

DATE - The date that the Work Order was initiated should be recorded in this space.

ORDERED BY - Record the name of the person ordering the work to be completed.

ASSIGNED TO - The crew leader who has been assigned this job should have his name recorded in this space.

APPROVED BY - Record the name of the person who approves this work order.

INVENTORY DIRECTION - Record the direction of travel (north, east, south, or west) of the original inventory team or field crew, whichever is applicable.

SIGN # - The sign number that has been designated for the sign in question should be recorded here. As the City's sign upgrading program progresses, these sign numbers may be stenciled to each sign.

LOCATION - In the next four spaces provided record the following information: the name of the street on which the sign is located; the distance (in feet) that the sign is located from the most recent cross street; the direction (north, east, south, or west) that the sign is located from the cross street; and the name of the cross street.

It should be noted that a field crew may record this information in an inventory direction different from that originally recorded and different from that which is coded into the computer. Therefore, the office personnel transferring this data into the eighty ADP blocks at the bottom of the sheet, should verify the original inventory direction and revise all location related information to correspond to the original location data.

SIGN IS FACING - In these two spaces indicate the direction that the sign is facing and the distance between the edge of the sign and edge of the pavement or face of the curb (whichever is applicable).

SIDE OF ROADWAY - Record left or right in this space indicating the side of the road that the sign is located as the inventory team or field crew (whichever is applicable) views it while traveling in the "INVENTORY DIRECTION" recorded previously.

NUMBER IN ASSEMBLY - Information in this space should be provided only for sign assemblies of two or more signs on a common post or mounting assembly. Signs in the assembly are numbered 1, 2, 3, etc. (from highest mounted to lowest mounted sign). Leave the space blank if the sign installation is single signed and not multi-signed.

SIGN LEGEND - In this space record the legend of the sign in its entirety.

WORK NEEDED & REMARKS - Use these spaces to indicate what work needs to be accomplished to complete the work order. Write brief remarks concerning anything unique about the sign, its location, or its mounting which are not adequately covered by the other data on the Work Order.

The following information refers to the replacement sign and/or post and will therefore always be supplied by the field crew.

SHAPE - Record the shape of the sign in this space - diamond, square, pentagonal, etc. If unsure of the wording, sketch the sign's shape.

COLORS - In these spaces indicate the color of the sign's legend and the color of the sign's background. Example: a stop sign is white on red.

SIZE - In these two spaces record the horizontal sign dimension (to the nearest inch) and the vertical sign dimension (to the nearest inch). The following criteria should be used for these measurements:

- a) Square and rectangular signs - measure along horizontal and vertical edges.
- b) Diamond shaped signs - measure along sign edge from bottom corner to side corner. Use this dimension for both horizontal and vertical measurements.
- c) Triangular signs - measure along the top of the sign and along the side. Pennant signs should also be measured along the top (long dimension) for horizontal and along the side (short dimension) for vertical dimension.
- d) Shields and octagon shaped signs - measure in a horizontal and vertical direction; enter the largest dimension in each direction.
- e) Round signs - measure diameter, record horizontal distance only.
- f) Pentagonal signs - measure along the horizontal edge and vertically from the bottom edge to the peak of the sign.

All dimensions recorded for signs should be the size of the sign as if the corners were not rounded.

CONDITION - Record the condition of the sign in this space. Examples: satisfactory, bent, defaced, faded, map cracked, rusty, peeling, not legible, badly damaged, etc.

REFLECTIVITY - In this space indicate whether or not the sign is reflective by recording yes or no.

VISIBILITY - Indicate the sign's visibility in the space provided. Examples: easily seen, hidden by advertising sign, hidden by tree limbs, hidden by parked car, etc.

HEIGHT - Record the height (in feet to the nearest one-half foot) from the bottom of the sign to the level of the pavement or roadway edge or sidewalk - whichever condition applies. If the sign is overhead, record its height to the nearest foot.

POST TYPE - In this space indicate the type of post used. Examples: steel channel or U, steel pipe, street name sign post, wood 4" x 4", wood 6" x 6", overhead, signal post, wood utility pole, steel utility pole, etc.

POST CONDITION - Record the condition of the post. Examples: satisfactory, leaning, bent, warped, damaged, etc.

WORK COMPLETED - In this space, the field crew should record the work it completed. Examples: replaced sign, replaced post, installed new sign and post, etc.

REASON FOR WORK - Record the reason for which the work was completed. Examples: vandalism, damaged by accident, rusty, faded, non-reflective, not legible, etc.

DATE OF WORK - In these three spaces record the month, day, and year on which the work was accomplished.

A sketch area can be included on the back of the Work Order form to assist the field crew in identifying the sign location.

This section of the manual has dealt with the development of an inventory and filing system that will provide to cities of all sizes a method or tool by which they can develop, monitor, and evaluate their own traffic sign program.

The system discussed in this section is based on three general steps: collecting the data base which consists of an inventory of existing traffic signs; coding this data onto various forms for either automatic data processing or manual filing; and utilizing work order forms to maintain and update the original sign inventory.

The manual file system is a simple and straightforward method of storing and retrieving data. For small sign systems it can be effective and efficient; however, a large city with an extensive sign system would find the manual filing method a very cumbersome and time consuming method for monitoring and evaluating its signing program.

Utilizing a computer which has been programmed to assist in maintaining a sign inventory makes information retrieval simple and rapid; permits a wide variety of analyses; and reduces the chance for errors that might occur through manual tabulations, loss of information, overlooking records, etc. In general terms a computer program can be designed in a manner that it can address the following functions.

1. Maintain an up-to-date inventory of all the City's signs conveniently available.
2. Provide a permanent record of all completed maintenance and new traffic sign work.
3. Develop and maintain a data base which can be used to identify trends in the type and quantity of sign improvement and maintenance work being accomplished.
4. Provide a means to quickly evaluate existing signing for condition and compare sign conformance to the Manual on Uniform Traffic Control Devices.

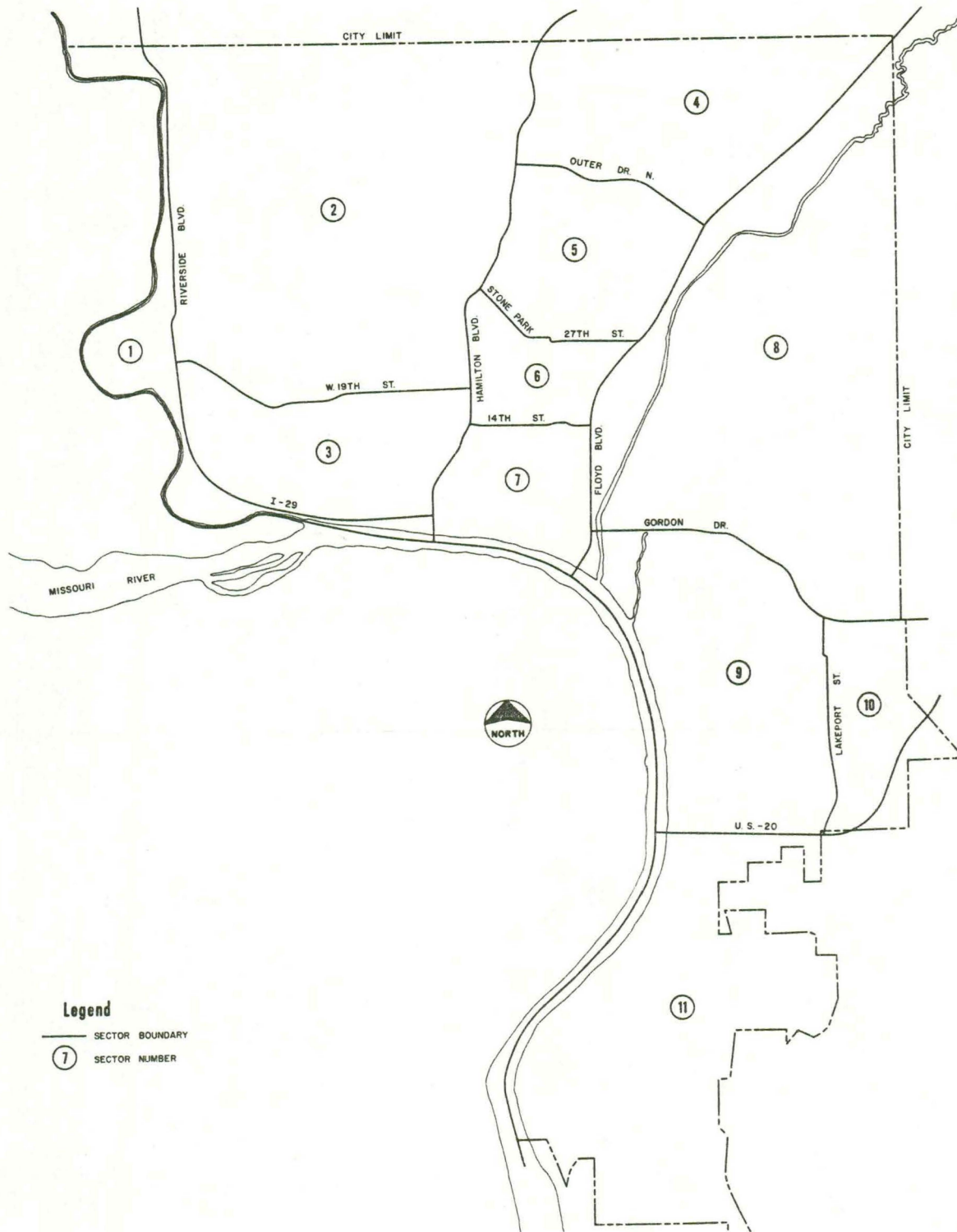
5. Assist in the development of spending priorities and budget requirements and purchasing of materials.
6. Permit more efficient scheduling of field work.

It should be pointed out that the more finite the city wants to be in obtaining detailed information from a computerized filing system, the more extensive its street network file must be. In other words, for the computer to locate and retrieve information, it must have detailed location data to key on before it can find the specific information in the storage file. This type of location data could include but would not be limited to inventory routes, cross streets, dead end streets, sign identification numbers, number of blocks, etc. A form with coding instructions indicating the type of data that typically might be required has been included in the Appendix.

A city is not limited to any of the codings, functions, goals, inventory data, output information, data collection procedures or any of the recommendations stated and described in this manual. A city may develop an inventory and filing system (whether manual or computer) as extensive and sophisticated as it needs to satisfy the parameters of its own particular signing program.

APPENDIX - PART B

| <u>SUBJECT</u> | <u>PAGE</u> |
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| Street Network Coding Form Coding Instructions | B-8 - B-9 |



Legend

- SECTOR BOUNDARY
- ⑦ SECTOR NUMBER

**Sector Map
Sioux City, Iowa**

SIGN INVENTORY FORM

Sheet 1 of 1

Route: Jones Street
 Begin at: 1st Street
 End at: 4th Street

Date: September 14, 1982
 Sector: 3
 Inventory Direction: North

| Sign Location | Dir. Facing | Lateral Position | | Number in Assembly | Sign Legend | MUTCD Number | Sign | | | | | | | | Post | | Remarks/Recommendations |
|----------------|-------------|------------------|-----------------|--------------------|----------------|--------------|-------|-------|--------|-------|-----------|----------|------------|--------|------|-----------|--------------------------|
| | | Distance | Side of Roadway | | | | Shape | Color | Size | | Condition | Reflect. | Visibility | Height | Type | Condition | |
| | | | | | | | | | Horiz. | Vert. | | | | | | | |
| 15' N. of 1st | N | 10 | L | | STOP | R1-1 | 4 | 4 | 30 | 30 | 3 | 2 | 1 | 7 | 1 | 1 | |
| 125' N. of 1st | S | 4 | R | | SPEED LIMIT 25 | R2-1(25) | 2 | 1 | 24 | 30 | 1 | 1 | 1 | 5 | 2 | 1 | |
| 290' N. of 1st | S | 8 | R | 1 | STOP | R1-1 | 4 | 4 | 30 | 30 | 2 | 1 | 1 | 7 1/2 | 1 | 1 | Straighten Out Stop Sign |
| " " | S | 9 | R | 2 | 4-WAY | R1-3 | 2 | 4 | 12 | 6 | 1 | 1 | 1 | 7 | 1 | 1 | |
| 25' N. of 2nd | N | 12 | L | 1 | STOP | R1-1 | 4 | 4 | 30 | 30 | 5 | 2 | 1 | 5 | 3 | 1 | |
| " " | N | 8 | L | 2 | 4-WAY | R1-3 | 2 | 4 | 12 | 6 | 1 | 1 | 1 | 4 1/2 | 3 | 1 | |
| 330' N. of 2nd | S | 6 | R | | STOP | R1-1 | 4 | 4 | 24 | 24 | 1 | 1 | 1 | 8 | 8 | 1 | |
| 15' N. of 3rd | N | 6 | L | | STOP | R1-1 | 4 | 4 | 24 | 24 | 1 | 1 | 1 | 7 | 2 | 1 | |
| 215' N. of 3rd | S | 10 | R | | STOP | R1-1 | 4 | 4 | 30 | 30 | 1 | 1 | 1 | 5 | 7 | 1 | Need to trim tree limbs |

- Direction Facing
 sign faces north
 sign faces south
 sign faces east
 sign faces west

- Sign Shape
 1. Diamond
 2. Rectangular
 3. Square
 4. Octagonal
 5. Triangular
 6. Round
 7. Crossbuck
 8. Pentagonal
 9. Trapezoidal
 0. Other

- Sign Color
 1. Black on white
 2. Black and red on white
 3. White on black
 4. White on red
 5. Red on white
 6. Green on white
 7. White on green
 8. Black on yellow
 9. White on blue
 0. Other

- Sign Condition
 1. Satisfactory
 2. Bent
 3. Defaced
 4. Faded
 5. Map Cracked
 6. Rusty
 7. Peeling
 8. Not Legible
 9. Badly Damaged
 0. Other

- Reflectivity
 1. Reflective
 2. Non-reflective

- Sign Visibility
 1. Easily seen
 2. Hidden by official sign
 3. Hidden by advertising sign
 4. Hidden by brush
 5. Hidden by tree limbs
 6. Hidden by parked vehicles
 7. Hidden because of curve
 8. Hidden because of hill
 9. Other

- Post Type
 1. Steel channel or U
 2. Steel pipe
 3. Street name sign post
 4. Wood 4" x 4"
 5. Wood 6" x 6"
 6. Overhead
 7. Signal post
 8. Wood utility pole
 9. Steel utility pole
 0. Other

- Post Condition
 1. Satisfactory
 2. Leaning
 3. Bent (metal)
 4. Warped (wood)
 5. Damaged
 6. Other

- Side of Roadway
 Right Side
 Left Side
 Overhead
 Median

Route: Jones Street

City: Friendly

Location: 15' N. of 1st

Inventory Direction: N

Sector: 3

Date: 9-14-82

Sign #'s: 680

Inventory Data

| Dir. Facing | Lateral Position | | No. in Assembly | Sign Legend | MUTCD Number | Sign | | | | | | | Post | | Remarks | |
|-------------|------------------|-----------------|-----------------|-------------|--------------|-------|-------|------------|----------|-----------|--------------|------------|--------|------|---------|-----------|
| | Distance | Side of Roadway | | | | Shape | Color | Size | | Condition | Reflectivity | Visibility | Height | Type | | Condition |
| | | | | | | | | Horizontal | Vertical | | | | | | | |
| N | 10 | L | | STOP | R1-1 | 4 | 4 | 30 | 30 | 3 | 2 | 1 | 7 | 1 | 1 | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

FRONT SIDE

Maintenance Record

| Date Reported | Condition | Recommended Improvements | Date Improvements Implemented | Remarks |
|---------------|--------------|--------------------------|-------------------------------|-------------------|
| 9-14-82 | Sign Defaced | Replace Sign | 9-28-82 | Sign Size 30"x30" |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

BACK SIDE

WORK ORDER

DATE: 9-28-82

ORDERED BY: DRC

ASSIGNED TO: VJG

APPROVED BY: GLB

Inventory Direction: (4) N

Sign #: (5-9) 680

Location: On (10-15) Jones Street, (16-19) 15 feet

north (north, east, south, or west) of (20-25) 1st Street

Sign is facing (26) north, (27-28) 10 ft. from edge of roadway/face of curb.

Sign is on the (29) left side of roadway. Sign is # (30) one in the assembly.

Sign Legend: STOP

Work Needed & Remarks: Sign is defaced - replace it at a height of 7'.

Shape: (44) Octagon. Colors (45) White on Red.

Size: (46-47) 30 " x (48-49) 30 ". Condition: (50) Good (New Sign)

Reflectivity: (51) Yes. Visibility: (52) Good (Easily Seen)

Height: (53-53) 7 feet. Post Type: (55) U-channel

Post Condition: (56) Good. Work Completed: (73) Removed old sign & installed new sign at 7' mounting height

Reason for Work: (74) Sign was defaced - hard to read

Date of Work: (75-76) September. (77-78) 28 (79-80) 1982

2 3 N 680 JONES 15 1ST N 10 L R 1-1

44 30 30 1 1 1 70 1 1 44 9 28 82



NORTH

2nd
STREET

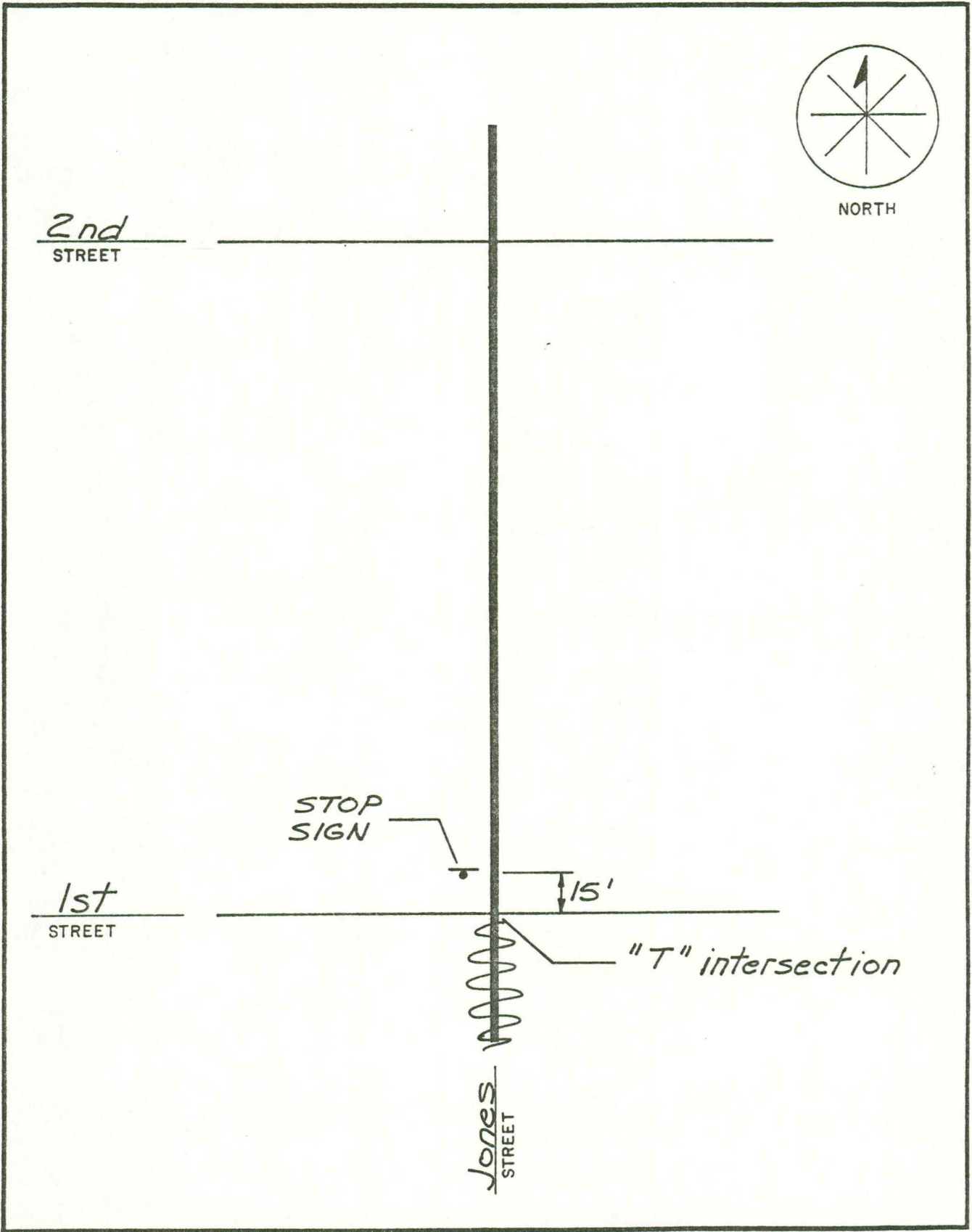
STOP
SIGN

1st
STREET

15'

"T" intersection

Jones
STREET



Coded by: DRC

Checked by: GLB

| | | Inventory Route | | | | | | | | # of Ref. X- Streets | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|---------------|-----------------|---|---|---|---|---|---|---|----------------------|----|----|-----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Sector | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3 JONES | | | | | | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cross Streets | 1st | 1ST | | | | | | | | 2ND | | | 3RD | | | | | | | | 4TH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block Lengths | 310 | | | | | | | | 350 | | | 240 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1st Sign # | 680 | | | | | | | | 720 | | | 750 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Inventory Route | | | | | | | | # of Ref. X- Streets | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sector | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cross Streets | 1st | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Block Lengths | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1st Sign # | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

STREET NETWORK CODING FORM
CODING INSTRUCTIONS

Inventory Route Card

Inventory Route cards must appear in alphabetical order according to the street name code which has been assigned to each route inventoried. The remaining cards follow each Inventory Route card and contain descriptive information about the particular inventory route which they follow.

| <u>Field</u> | <u>Columns</u> | <u>Description</u> |
|--------------|----------------|--|
| 1 | 1-2 | Sector number |
| 2 | 3-8 | Inventory route name, left-justified |
| 3 | 14-15 | Number of reference cross streets for this inventory route |

Reference Cross Street Card

The street name codes of the streets that cross the inventory route appear on this card. There are eight fields on this card and multiple cards may be used as necessary to give a complete description.

| <u>Field</u> | <u>Columns</u> | <u>Description</u> |
|--------------|------------------------|---|
| 1-8 | 1-6, 11-16, ..., 71-76 | Reference cross street name, left-justified |

Field 1 is the southernmost or westernmost reference cross street of the north-south or east-west inventory routes, respectively. Subsequent fields represent the streets in the order they are crossed as the inventory proceeds north or east. Within each inventory route, each cross street must have a unique code. If unusual network configurations exist, this requirement can lead to variances of the codes given to the affected cross street.

Block Length Card

The distance between each reference cross street is entered on the Block Length card. There are 16 fields on each card and the data must appear in the same order as the corresponding street name codes which appear on the Reference Cross Street card. Additional cards must appear in sequence if more than 16 cross streets exist.

| <u>Field</u> | <u>Columns</u> | <u>Description</u> |
|--------------|-----------------------|---|
| 1-16 | 1-5, 6-10, ..., 76-80 | Distance, in feet, between each reference cross street, right-justified integer |

There will always be one less distance coded on the Block Length card than the number of reference cross streets coded. If an inventory route is discontinuous within a sector, then a distance of zero (0) must be coded to represent the distance between the last cross street of the first route segment and the beginning cross street of the second segment.

First Sign Number Card

The sign number assigned to the southernmost (north-south streets) or westernmost (east-west streets) sign inventoried for each route subsegment (block) is coded on this card. This information is ordered exactly like the distances on the Block Length card. If no sign is inventoried for the entire block length or if a zero (0) is coded for the block length, code a one (1) in the corresponding field.

| <u>Field</u> | <u>Columns</u> | <u>Description</u> |
|--------------|-----------------------|--------------------------------------|
| 1-16 | 1-5, 6-10, ..., 76-80 | Sign number, right-justified integer |