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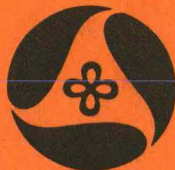
NOVEMBER 1984

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REPORT ON TRAFFIC CONTROL PLAN REVIEWS

OFFICE OF MAINTENANCE
HIGHWAY DIVISION
Telephone 515-239-1197

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Iowa Department
of Transportation

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*Included a Nighttime Review

Introduction

Federal Highway Program Manual 6-4-2-12 issued by the Federal Highway Administration on October 13, 1978 outlined procedures to be followed to assure that adequate safety consideration is given to motorists, pedestrians and construction workers on all Federal-aid highway projects. Included in the FHPM is a requirement that randomly selected projects be reviewed by a team composed of various disciplines to assess the effectiveness of traffic control and safety in work zones.

Review Team Composition

The Iowa Procedural Plan for traffic safety in work zones approved by the Federal Highway Administration on March 30, 1984 specified that Review Teams have the following representation. The State Traffic Engineer, a Design Safety Section Engineer, the Project Resident Construction Engineer or City/County Engineer, an Office of Road Design Section Engineer or Secondary/Urban Engineer, an Office of Construction Engineer and a Federal Highway Administration Engineer. It also specified that the Review Team should include a member at large not associated or familiar with traffic control. The Review Teams were to be headed by the State Traffic Engineer. At least one project was to include a nighttime review to determine the effectiveness of traffic control during hours of darkness.

For this year's Primary System Reviews, each team consisted of representation from the offices outlined in the above paragraph. The only exceptions were a bridge resurfacing project which did not have representation from the Office

of Bridge Design and a safety enhancement project which was done by the Design Safety Section and, therefore, did not involve a Road Design Section Engineer. For both the Urban and Secondary reviews, the Review Team was composed of nine members. The Review Team leader for Primary System projects was State Traffic Engineer Dwight L. Stevens. This responsibility was delegated to Project Development Engineer Mark R. Bortle for the Urban Systems project and to Secondary Roads Engineer Jerry V. Bergren for the Secondary Roads project.

Projects For Review

Projects to be reviewed were to be selected by the Director of Highways by April 15, 1984. A list including 16 Primary projects was received from the Development Bureau on April 18, 1984. As a minimum, reviews were to be conducted on six of these projects. Some latitude was allowed in the selection of projects so the review would coincide with construction scheduling. Projects to be reviewed by Urban Systems and Secondary Roads were to be selected by the Office of Local Systems.

Accomplishments and Reports

Several of the projects on the list were completed before reviews could be scheduled. To supplement the list, several other active projects were selected. A total of nine (9) reviews were made. They were as follows:

Urban Review

Polk County, M-2669(1)--81-77

Intersection Modifications in West Des Moines

Review Date: August 7, 1984

Secondary Review

Polk County, RS-3365(1)--61-77 and RS-4507(1)--61-77

Grading and Paving on Northeast 126th Avenue

Review Date: July 24, 1984

Primary Reviews

1. Jasper-Poweshiek, IR-80-5(105)173--12-79

ACC Inlay on Interstate 80

Review Date: July 31, 1984

2. Grundy County, FN-14-6(17)--21-38

Reconstruction at Iowa 14-Iowa 57

Review Date: August 2, 1984

3. Linn County, FR-30-7(69)--2G-57

ACC Resurfacing on U.S. 30

Review Date: August 15, 1984

4. Polk County, HES-65-4(34)--2H-77

Reconstruction on S.E. 14th Street

Review Date: August 21, 1984

5. Poweshiek County, IR-80-5(106)183--12-79

PCC Overlay on Interstate 80

Review Date: August 23, 1984

6. Story County, FN-30-5(54)--21-85

Bridge Deck Resurfacing on U.S. 30

Review Date: August 28, 1984

7. Woodbury County, IR-29-6(74)145--12-97

Safety Enhancement on Interstate 29

Review Date: August 29, 1984

Because of time constraints and other essential duties, additional reviews could not be accomplished. In accordance with the Procedural Plan, all of the field reviews were completed prior to October 1, 1984 and this Final Report is being submitted by the November 15, 1984 deadline. The reviews accomplished included a representative sample of different types of construction work at several locations across the State.

The remainder of this report consists of individual sections on each of the nine project reviews completed. Deficiencies were noted and corrective action was discussed with the Resident Construction Engineer or his representative on the project during the review. Necessary changes or alterations were made immediately or within the next few days. The R.C.E. was asked to submit a report outlining what action was taken following the review. These reports are included as part of the individual project reports..

Following the individual project reports is a section entitled "General Summary". This section is to provide an overview discussing the strong points and deficiencies found on this representative sample of reviews. It also makes suggestions for improving standards and traffic control plans as well as items which need to be given additional emphasis in training sessions on traffic control procedures.

POLK COUNTY
TRAFFIC CONTROL PLAN REVIEW
AUGUST 7, 1984

INTERSECTION MODIFICATIONS
ON
E.P. TRUE PARKWAY, RAILROAD AVENUE
19TH STREET AND GRAND AVENUE
IN
WEST DES MOINES
M-2669(1)--81-77

PREPARED BY
MARK R. BORTLE, P. E.
PROJECT DEVELOPMENT ENGINEER
OFFICE OF LOCAL SYSTEMS
HIGHWAY DIVISION
IOWA DEPARTMENT OF TRANSPORTATION

Introduction

A traffic control plan field review was conducted on Tuesday, August 7, 1984 for an urban project at the intersections of E.P. True Parkway, Railroad Avenue, 19th Street and Grand Avenue in West Des Moines. The following is a report on the findings of the Review Team and recommendations for traffic safety improvements.

Review Team

The following persons were members of the project Review Team: Bruce Baldwin, Federal Highway Administration; Richard Bolton, Office of Maintenance; Tom McDonald, Office of Construction; Tom Vaughan Office of Road Design, Design Safety Section; Larry Jesse, Office of Local Systems; Ben Klaus, District 1 Office; Lonnie Hawbaker, City of West Des Moines, Bruce Thorson, City of West Des Moines; Mark Bortle, Office of Local Systems. The Review Team leader was Mark Bortle.

Project Description

Project M-2669(1)--81-77 is located in the City of West Des Moines at the intersections of E.P. True Parkway, Railroad Avenue, 19th Street and Grand Avenue. The work consists of intersection modifications to realign the Railroad Avenue/Grand Avenue intersection to match the new E.P. True Parkway/Grand Avenue intersection and to offset the 19th Street/E.P. True Parkway intersection westerly from Grand Avenue. The project was let on May 9, 1984. The prime contractor is Eco-Tech Contractors, Incorporated of West

Des Moines, Iowa.

Project Administration

Bruce Thorson was the Project Engineer and Steven Freese was the inspector for the City of West Des Moines for this intersection modification project.

Traffic Control Plan

The project plans include a traffic control plan which specifies a marked detour route for 19th Street and Railroad Avenue and also specifies that traffic shall be maintained at all times on Grand Avenue. The traffic control plan includes a traffic control plan sheet which identifies the specified signing layout for the project. The traffic control plan also specifies that all traffic control devices shall conform to Iowa DOT Supplemental Specification 920 along with the Iowa Manual on Uniform Traffic Control Devices. The contract includes a lump sum bid item for "Traffic Control".

Review Team Findings

Traffic Operations

On the day of the review, work was in progress on the portion of the project on Railroad Avenue east of Grand Avenue. The contractor was grading this portion of the project. The Review Team noticed no operational problems during the time of the review.

Signs, Barricades and Lighting Devices

All signs observed were found to be in compliance with the traffic control plan and the Iowa Manual on Uniform Traffic Control Devices. The signs were in excellent condition overall. The project diary showed that the signs were checked at different times every working day of the project. They also included a nighttime check of reflectivity and flashing warning lights. These were found to be satisfactory.

Approach signing in place on Railroad Avenue east of the project and on 19th Street north of the project included "Road Closed Ahead" (W20-3) and "Detour Ahead" (20-2) signs. At the junction of the detour route with Railroad Avenue and 19th Street, two Type 3 barricades on which "Road Closed, Local Traffic Only" (R11-3) signs were mounted closed these two routes and directed traffic to the marked detour route with detour arrow (M4-10) signs. The detour route was marked with detour arrow (M4-9 and M4-10) signs and "Detour" (4-8) signs.

At the Grand Avenue crossing of the project, the two cross legs were closed with Type 3 barricades, on which "Road Closed" (R11-2) signs and detour arrow (M4-10) signs were mounted and plastic orange safety fence stretched from right-of-way to right-of-way. Additionally, Type 2 barricades helped to support the orange safety fence and to delineate the closed portion of Grand Avenue.

On 19th Street just north of the project, a "Road Closed Ahead" (W20-3) sign was mounted at the nearest cross street intersection. At the project limits,

19th Street was physically closed with a Type 3 barricade, on which a "Road Closed" (R11-2) sign was mounted and also the orange safety fence stretched from curb side to curb side.

At the project limits on Railroad Avenue the street was physically closed with the same methodology as the 19th Street closure.

All Type 3 barricades had flashing warning lights placed on them. These were found to be in good to excellent condition and all were in compliance with the traffic control plan.

Accidents

Director Public Services, Lonnie Hawbaker, indicated that there had been two accidents since the project commenced. Details of these two accidents were provided to the Review Team and are as follows.

In the first case, a moped was traveling south on the portion of 19th Street open to local traffic only. The driver apparently did not see any of the "Road Closed" signs and drove through the orange safety fence. He upset after hitting some construction rubble and was injured. It was the opinion of the Review Team that this accident was not preventable and that no changes in the traffic control plan were required.

The second case involved two vehicles colliding at the intersection of Railroad Avenue and Fuller Road. Vehicle number one, a sedan, was stopped eastbound at the Type 3 barricade on Railroad Avenue. Vehicle number two, a

pickup, was westbound on Railroad Avenue turning southbound on Fuller Road. Vehicle one pulled out and struck vehicle two. There was some damage to each vehicle (\$2000 each). After the accident the city placed a post mounted "Yield" (R1-2) sign just west of the Type 3 barricades. Additionally, a second "Yield" (R1-2) sign was placed on the reverse side of the Type 3 barricade. The Review Team recommended that no further action be taken, since the two "Yield" signs placed by the city appear to provide adequate warning to eastbound traffic.

Summary and Conclusions

Traffic control devices on this project were found to be in conformance with the traffic control plan.

The Review Team did make the following recommendations:

1. The Type 3 barricades located on Railroad Avenue and 19th Street that have traffic approaching from their reverse side, should have either a full reflectorized rail or at least 2 reflectorized buttons per rail attached on their reverse sides.
2. The stripes on the Type 3 barricades on Railroad Avenue and 19th Street closing these streets to local traffic only should be pointing towards the direction of the detour route.
3. The small yield sign on back of Type 3 barricade on Railroad Avenue could be removed since the city has placed a post mounted Yield sign on the

parking.

4. The detour route signs should also include project identification signs showing that it is the Railroad Avenue/19th Street detour. Presently it seems that Grand Avenue is detoured, when it is actually opened to traffic.
5. The only major recommendation was dealing with the Grand Avenue signs and barricades. The Review team recommends that "Road Construction Ahead" (W20-1) signs be placed on both approaches to the project site for Grand Avenue traffic. Also, during the paving stage of this project, the Review Team recommends that Grand Avenue be narrowed to only two lanes of traffic to provide adequate clear distance to the construction activities. Appropriate signing, marking and channelizing devices must be used.

In conclusion, despite the two accidents, the traffic control procedures in effect for this project provided adequate safety considerations to motorists and construction workers. The condition of the traffic control devices used on the project was of very high quality and the efforts exhibited by the city during the plan development and by the contractor during the implementation of this traffic control plan show that a strong safety consciousness was readily apparent.

Disposition of Recommendations

1. The project engineer contacted the contractor by mail on August 10, 1984 and informed him of the five traffic control recommendations from the

traffic control Review Team. The Project Engineer informed the Office of Local Systems by mail on August 31, 1984 that all of the traffic control Review Team recommendations were completed, except for removal of the Yield sign in recommendation number 3. This will present no problem.

2. Also in the August 31, 1984 letter, the Project Engineer informed the contractor of his responsibility to provide additional traffic control devices as per recommendation number 5, when paving will occur adjacent to Grand Avenue.

POLK COUNTY
TRAFFIC CONTROL PLAN REVIEW
JULY 24, 1984

GRADING AND PAVING
ON NORTHEAST 126TH AVENUE
FROM U.S. 69 TO ELKHART
RS-3365-(1)--61-77 & RS-4507(1)--61-77

PREPARED BY
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SECONDARY ROADS ENGINEER
OFFICE OF LOCAL SYSTEMS
HIGHWAY DIVISION
IOWA DEPARTMENT OF TRANSPORTATION

Introduction

The following is a report on the findings of the Review Team and recommendations for traffic safety improvements on a Polk County Secondary Road project which was field reviewed on Tuesday, July 24, 1984.

Review Team

The following persons were on the project Review Team: James Hogan, Federal Highway Administration; Karl Elliott, Polk County Engineer's Office; Dwight Stevens, Office of Maintenance; Kip Farthing, Office of Road Design; Thomas Vaughan, Office of Road Design; Don Jordison, Office of Construction; Loren Jacobson, District 1 Office; Steve Stille, Office of Local Systems; Jerry V. Bergren, Office of Local Systems. Jerry Bergren was the Review Team leader.

Project Description

Projects RS-3365(1) and RS-4507(1), for grading and paving, are located on Northeast 126th Avenue from its intersection with U.S. 69 easterly approximately 3.8 miles to Northeast 46th Street in the City of Elkhart. The two projects are continuous, broken by the interchange with I-35. The projects were let, tied on April 10, 1984. The 1980 traffic count was 1100 V.P.D.

Traffic Control Plan

The plans include traffic control notes indicating the road will be closed to

through traffic during construction, with local traffic to adjacent properties being maintained. The note indicates the devices, layouts and procedures shall be as provided in Supplemental Specification 920. The plans also include a complete, detailed barricade and warning sign placement sheet as well as the signing layout for the designated detour route.

Review Team Findings

1. Traffic Operations - On the day of the review, the project was closed to through traffic as per plan. Culvert construction and drain tile installation was underway on the rural section; storm sewers were being installed in the urban section.
2. Signs - All signs observed were found to be in compliance with the traffic control plan, Supplemental Specification 920, and in accordance with the sign layout sheets in the plans, with the following exceptions:
 - a. The directional signs on Northeast 1st Street (Ankeny Interchange) under I-35 advise motorists to use I-35 North to Elkhart. Since Northeast 126th Avenue is closed from I-35 to Elkhart, the message is incorrect.
 - b. The following signs are in place on Northeast 46th Street at the east end of the project - "Detour Ahead" and "Road Construction 500 Feet". As Northeast 46th Street is not detoured, the "Detour Ahead" may not be appropriate.
 - c. At the Iowa DOT's request the exits at the I-35/Northeast 126th Avenue

interchange were opened. (The sign plan called for them to be closed.) This will allow I-35 motorists to turn around, and for local access for adjoining landowners on Northeast 126th Avenue.

d. A sign, "Detour-Take Northeast 126th Avenue East", at the intersection of Northeast 126th Avenue and Northeast 46th Street was facing southwesterly. The message was intended for southbound motorists on Northeast 46th Street. This should have been facing northeasterly.

e. Although in accordance with the plans, (detour route sign layout) the "Elkhart" signs, in the clockwise direction from Elkhart, were considered not to be appropriate.

3. Barricades - Type 3 barricades were placed across Northeast 126th Avenue inside, or between, the entrance/exit ramp terminals at the I-35 interchange. These were considered to serve no good purpose.

Type 3 barricades at construction sites within the project were equipped with two battery operated amber flashing units.

All barricades observed were clean and in new or near new condition.

Recommendations and Disposition

The Review Team concurred in recommending:

1. The "Elkhart" directional signs (referred to in 2.(a) above) should be

covered or removed.

The county advised, by letter of July 31, that both signs have been removed.

2. The "Detour Ahead" on Northeast 46th Street, although technically not correct does provide some information to the southbound motorist, was considered to be acceptable to leave in place.
3. The "Elkhart" on the detour confirmation sign assemblies on the east-to-south-to-west-to-northbound legs of the detour route should be removed.

By letter of July 31, the county has removed these signs.

4. An additional detour confirmation sign assembly should be placed on Northeast 126th Avenue just east of the east end of the project, for the benefit of the eastbound motorist.

By letter of July 31, this assembly was erected.

5. The Type 3 barricade and sign assembly at the intersection of Northeast 126th Avenue and Northeast 46th Street should be turned to face southbound traffic on Northeast 46th Street.

By letter of July 31, county as so located this barricade and sign.

6. The Type 3 barricades on Northeast 126th Avenue between the ramp terminals

at the I-35 interchange, should be removed to allow the public free access across the bridge.

By letter of July 31, the county has removed the barricades.

Summary and Conclusions

The county had documented, in a separate field diary for traffic control matters only, daily, weekly and nighttime sign checks. This is a very good practice.

The signs and barricades were in reasonably close conformity with the stated traffic control plan, specifications and sign layout details.

The County Engineer's Office was very cooperative and prompt in arranging for the changes and corrections as recommended by the Review Team.

JASPER - POWESHIEK COUNTIES
TRAFFIC CONTROL PLAN REVIEW
JULY 31, 1984

ASPHALTIC CONCRETE INLAY
ON INTERSTATE 80
FROM JUST EAST OF THE KELLOGG INTERCHANGE
TO 1 MILE EAST OF THE GRINNELL INTERCHANGE
IR-80-5(105)173--12-79

Members of the Review Team

The Review Team for this project consisted of the following individuals: Don Jordison, Office of Construction; Joe Echer, Office of Road Design; Tom Vaughan, Office of Road Design, Design Safety Section; Gerald Lura, Marshalltown R.C.E. Office; Bruce Baldwin, Federal Highway Administration; Bob Andresen, Office of Safety Programs (member at large) and Dwight Stevens, Office of Maintenance, Traffic Engineering Section. The Review Team leader was Dwight Stevens.

Project Description

This traffic control inspection report is for Project IR-80-5(105)173--12-79 on Interstate 80 from just east of the Kellogg interchange to 1 mile east of the Grinnell interchange. The prime contractor for the project is Manatts, Inc. Iowa Plains Signing is a subcontractor furnishing part of the traffic control devices. Dennis Parking Lot Maintenance is a subcontractor responsible for placing pavement markings. Work consists of milling out 2 1/4 inches of the existing driving surface and replacing with a 1 3/4 inch binder course followed by a 1 1/2 inch surface course over the entire width of the roadway.

Plans required that traffic be maintained through the entire project at all times. Work was to be confined to 1/2 of the roadway with traffic carried in a single lane on the other half of the roadway. If work was not completed on both sides of the roadway the same day, traffic was to be confined to a single lane during the night using the traffic control arrangement shown on Detail

Sheet 520-2A.

At the time of this inspection, all of the milling work was completed. Binder course had been placed on both the eastbound and westbound roadways. The surface course at the east end of the westbound roadway had been placed. At the present time, work was under way placing the surface course on the driving lane of the eastbound roadway near the Grinnell interchange.

Traffic control on the project was to be in accordance with Supplemental Specification 920, Detail Sheet 520-2 entitled "Traffic Control Where Work Area Does Not Require Lane Closure", Detail Sheet 520-3 entitled "Traffic Control for Work Areas Less Than 1/4 Mile Long Requiring Lane Closure", Detail Sheet 521-2A entitled "Traffic Control Layout for Lane Closure on Divided Highway for 55 MPH Speed Limit", Detail Sheet 521-4 entitled "Traffic Control Layout for Work Area Not Requiring Lane Closure" and Detail Sheet 521-5 entitled "Traffic Control Layout for Work Area Through Ramp Exit and Entrance Tapers".

Pay items for traffic control on this project included "Traffic Control" bid lump sum and "Pavement Markings" bid in stations.

Review Team Findings

Signing

Approaching the project from the west, the first sign observed had the message "Road Construction Next 20 Miles". This sign was intended to cover the subject project as well as another highway improvement project being done by the same

contractor further to the east.

The next sign was a special sign placed by the contractor and not required or shown in the plan. The message was "For the Safety of Workers, Slow Down, Manatts, Inc.". The purpose of this sign was to persuade motorists to slow down for the protection of employees required to work very close to the open lane of traffic.

The first advance warning signs were "Road Construction Ahead" signs on both the left and right sides of the roadway. The sign on the right was not satisfactory because the top corner was broken off, it was dirty and it had several heavy scar marks across the message. It was agreed that this sign should be replaced.

The second pair of advance warning signs were "Right Lane Closed Ahead" on both the left and right sides of the roadway. The format of the message on these signs differed. The one on the left read "Right Lane" on the top, "Closed" in the center and "Ahead" on the bottom. The right sign had "Right" on the top, "Lane Closed" in the center and "Ahead" on the bottom. The proper message was displayed on the left sign. Because the right sign was in poor condition it was agreed that it should be replaced with one having the correct message layout to match the one on the left.

The final advance warning signs were a pair of symbol transition signs left and right showing that the right lane was closed ahead. Both of these signs were in excellent condition and much better than the previous signs described above.

All of the advance warning signs for this project were mounted on small trailers consisting of a framework of square tubular material. While it did hold the signs in position approximately 1 foot above the pavement surface, they were considered to be a moderate hazard to traffic. One deficiency noted in these units was that the trailer placed in the median resulted in the sign being tilted because the outside wheel was over the foreslope in lower terrain than the other side of the sign on the edge of the shoulder. Because these units could be a hazard to traffic, it was agreed with the contractor that they would only be used in the daytime. If signs were required at night, other means of mounting would be necessary.

Forty-five MPH advisory speed plates were shown as optional devices on Detail Sheet 521-2A. At the time of this inspection, advisory speeds were not displayed on any of the advance warning signs.

One other advance warning sign used on this project was a "Road Work Ahead" sign placed on the shoulder of the eastbound on ramp at the Grinnell interchange. This was for advance warning for traffic entering the main line where construction work was currently in progress.

Barricades, Vertical Panels and Warning Lights

Vertical panels with steady burn warning lights were used for the taper to transition from two-lanes to a single lane of traffic. Each panel was weighted with a sandbag on the base and the alignment of these units was fairly good.

A Type 3 barricade was used in the closed lane at the end of the taper as specified by the plans.

Vertical panels with steady burn warning lights were placed at approximately 300 foot intervals between the construction work zone and the lane open to traffic. All of these units appeared to be in satisfactory condition and each was ballasted with a sandbag.

Vertical panels with steady burn warning lights were placed on the new mat at approximately 300 foot intervals. According to Detail Sheet 521-2A, Type 2 barricades should have been used at 1500 foot intervals to keep traffic out of the construction work zone.

At the end of the project, a 50 foot closing taper consisting of three vertical panels was used. This was recommended by the R.C.E. Office and was a good change to show where the construction work zone ended and normal traffic resumed.

Markings

On a portion of the eastbound roadway, temporary markings used on the binder course were not as bright as they should have been. This was especially true of the yellow edgeline along the median. It was apparent that earlier applications were not satisfactory because part of the markings had been repainted. Apparently the problem was that the rate of application was too light and the fresh asphaltic concrete material tended to bleed through

partially obliterating the line. The same problem was observed on temporary markings placed on the westbound roadway. As we progressed east, there was a section where the lines were satisfactory and apparently a heavier application of paint had been used.

Permanent markings were being placed on the surface course immediately behind the construction work taking place on the eastbound roadway. These markings were relatively bright and the alignment was fairly good.

Permanent markings placed on the westbound roadway were good, but the alignment would be considered fair. Efforts should be made by both the Contractor and the Resident Construction Office to have permanent markings placed as straight and accurate as possible.

Sequential Arrow Panel

A sequential arrow panel was used on the right shoulder at the beginning of the taper as specified by the plan. It was in excellent condition and was operating in the chevron mode.

Flagging

A flagger was stationed at the laydown machine between the construction work zone and the traffic lane. This was to slow traffic down and move it over where it was necessary for the construction operation to encroach into the traffic lane. Later during the review, it was noted that paving work had stopped for unknown reasons. The flag person was sitting on the paving

stopped for unknown reasons. The flag person was sitting on the paving machine with his flag not being displayed. For the benefit of traffic, the flagger should have been on duty in place at all times directing traffic around the end of the paving machine.

Operations

In the area where construction work was under way, vertical panels were placed in the traffic lane to allow room for construction activity. This resulted in traffic being crowded off onto the median shoulder. While not desirable, this was a temporary measure necessary to accomplish the construction work.

At the eastbound Grinnell off ramp, traffic was required to cross the surface course which was placed earlier in the day. The elevation of the surface course was 1 1/2 inches higher than the lane being used by traffic. To minimize the problem, the edge of the surface mat had been rolled down somewhat to provide a tapered edge where traffic crossed. This area was driven comfortably at 40 MPH, therefore it was not considered to be a problem.

It was noted that contractor or employee vehicles were parked in the construction work zone just east of the Grinnell eastbound on ramp. This is the area which could be used as a safety refuge for motorists who have difficulty entering the single lane of traffic eastbound. Also, contractor or employee vehicles were parked in the median opposite the area where construction work was in progress. Since parking in these areas was specifically prohibited in the traffic control plan, the R.C.E. Office will talk to the contractor and ask him to refrain from parking in these areas.

Accidents

Gerald Lura said that there had been three accidents on the project since work started. They were as follows:

The first accident involved a vehicle which entered the construction lane, came back across the open lane of traffic into the median and hit a truck in the opposing lanes. This was a property damage only accident with no injuries involved.

The second accident involved a westbound truck which went out of control and hit a guardrail in the median between the railroad overpass and the Grinnell interchange. At the time, traffic was confined to the median lane while work was in progress in the driving lane. This was a single vehicle accident and it was believed that the driver may have fallen asleep.

The third accident involved a trailer which came off the hitch of the towing vehicle, went off the right shoulder and overturned. It was a property damage only accident and in no way was related to the construction project.

Summary and Conclusions

As a result of this traffic control plan review, several deficiencies or areas where improvements could be made were noted. They included (1) "Road Construction Ahead" sign in poor condition, (2) incorrect message format on "Right Lane Closed Ahead" sign, (3) trailer mounted signs which were a moderate hazard to traffic, (4) application rate of temporary markings too

light, (5) alignment of markings considered to be fair, (6) inattentive flagger and (7) contractor and employee vehicles parked in unauthorized location.

Positive items noted on the review included (1) most traffic control devices in satisfactory to good condition, (2) sequential arrow in excellent condition and (3) addition of a closing taper at the end of the project.

Following the review, Gerald Lura went over the items which had been noted for corrective action. They included replacement of a "Road Construction Ahead" sign, replacement of a "Right Lane Closed Ahead" sign, removal of construction and employee vehicles from areas where they are not allowed and placement of Type 2 barricades in the construction lane which will be closed over night.

Subsequently, a memo report has been received from Resident Construction Engineer John E. Peters outlining action which was taken on the deficiencies found by the review. All of the items were resolved within the next few days. It was noted in the report that a nighttime review of all traffic control devices was performed and it was found that additional signs needed to be replaced because of poor reflectivity.

In conclusion, this review was helpful in identifying areas where traffic control needed to be improved and in focusing attention on the need for monitoring traffic control matters.

IOWA DEPARTMENT OF TRANSPORTATION

To Office	Central Maintenance	Date	August 23, 1984
Attention	Dwight Stevens	Ref. No.	IR-80-5(105)173--12-50 Contract No. 22515 Manatt's, Inc. & Subsidiary
From	John E. Peters, Jr.		
Office	Marshalltown Construction		
Subject	Traffic Control Plan Review		

This is a follow-up of the findings of the subject review held on July 31, 1984 on the above referenced asphalt cement overlay project.

1. "ROAD CONSTRUCTION AHEAD" sign at beginning of warning for closure. Sign was dirty, scratched, top point broken off.
Sign was replaced by 4:00 P.M. on July 31, 1984.
2. "RIGHT LANE CLOSED AHEAD" signs. Two different types of messages.
Sign on outside shoulder was replaced by 4:00 P.M. on July 31, 1984 to conform. Both signs now read "RIGHT LANE" on same line.
3. Type II Barricades spaced at 1500-ft. intervals within closure.
Manatt's sign foreman was informed at 4:00 P.M. on July 31, 1984. He will locate barricades, but would not guarantee they would be up that night. They were not but, he was informed again at 3:00 P.M. on August 1, 1984 and he said he had found them and they would be up that night. Type II's are being used, as of August 3, 1984.
4. Parking vehicles in median and leaving them unattended.
The Contractor's people and all State Inspectors were cautioned regarding this problem and shown the note on the plans.
5. Trailer signs not to be used during non-working periods.
The sign foreman was consulted at 3:00 P.M. on August 1, 1984. He informed us he will have them by the time they continue west in westbound lane, either the afternoon of August 2 or morning of August 3, 1984.
The foreman was told resurfacing in that position would not be permitted until the proper signs were on the project, to assure the trailer signs would be replaced that night. Trailer signs were replaced by evening of August 2, 1983.

Following are results of night sign check on July 31, 1984 by Gerald Lura.

The "Road Construction Ahead" and "Change Lane" symbol signs were good.

Both "Right Lane Closed Ahead" signs were bad and need to be replaced. Reflecting was very dim in Lura's vehicle headlights and other vehicles headlamps. Note: These were replaced August 2, 1984.

Continued on Page 2-----

Dwight Stevens
Traffic Control Plan Review

August 23, 1984
IR-80-5(105)173--12-50

Some vertical panel lights were out, some of the lights were not turned on and, on others, the batteries were dead. The night sign man arrived on the project shortly after Lura and both situations were corrected.

The night sign man said he would try to locate some Type II barricades that night and put them up if he did find them. As stated in Item #3., he was unable to locate them that night.

Sequential arrow brightness was very excessive. Night man and Lura tried to turn them down but were unable to do so. The sign foreman was notified of this at 3:00 P.M. on August 1 and said he would get them corrected.

It was noted this can be a dangerous situation as excessive brightness of the arrows have a tendency to blind a person driving on the roadway.

Iowa Plains Signing Co., doing that type of signing for Manatt's, was out on the project August 2, 1984 and reviewed the sequential arrows to see they would dim down at night. Dennis Halsne of Iowa Plains Signing assured the arrows were corrected and dimming down at night as required.

JEP/GGL:skd
pc: Roy W. Kuhn

GRUNDY COUNTY
TRAFFIC CONTROL PLAN REVIEW
AUGUST 2, 1984

INTERSECTION RECONSTRUCTION
JUNCTION OF IOWA 14 AND IOWA 57
FN-14-6(17)--21-38

AND

BRIDGE REPLACEMENT
ON IOWA 57 JUST EAST OF IOWA 14
BRF-57-1(5)--38-38

Members of the Review Team

The Review Team for this project consisted of the following individuals: Tom McDonald, Office of Construction; Russ Popp, Office of Road Design; Tom Vaughan, Office of Road Design, Design Safety Section; Tom Cackler, Ames R.C.E. Office; Jim Hogan, Federal Highway Administration; Steve Stille, Office of Local Systems (member at large) and Dwight Stevens, Office of Maintenance, Traffic Engineering Section. The Review Team leader was Dwight Stevens.

Project Description

This traffic control inspection report is for projects FN-14-6(17)--21-38 and BRF-57-1(5)--38-38 at or near the Junction of Iowa 14 and Iowa 57, 7 miles north of Grundy Center. These are two unrelated projects in close proximity to each other. As a result, traffic control overlapped and they are being treated as one project for purposes of construction and this review. The former project is for complete reconstruction of the Junction of Iowa 14 and Iowa 57 from a "Y" type intersection to a "T" intersection. The contractor is Aspro, Inc. The latter is a culvert replacement project on Iowa 57 approximately 1/4 mile east of the Junction. The contractor on this project is Peterson Contractors.

Work was to be done in stages as follows. Stage 1, build the detour runarounds and shift traffic. Stage 2, reconstruct Iowa 57 and the east side of Iowa 14 and build the culvert. Stage 3, shift traffic to the permanent alignment, remove the detours and complete construction on both projects.

Plans required that traffic be maintained on Iowa 14 at all times. The southeast roadway of the intersection and a detour runaround were to be used to carry Iowa 57 traffic east of the Junction. A signalized one lane runaround was to be used to carry traffic around the culvert reconstruction project.

At the time of this inspection, both detour runarounds were being used and work was under way on the east side of Iowa 14, on Iowa 57 and at the culvert site.

Traffic control on the intersection project was to be in accordance with Special Provision 920, Detail Sheet 520-2 entitled "Traffic Control Where Work Area Does Not Require Lane Closure", Detail Sheet 520-3 entitled "Traffic Control For Work Areas Less Than 1/4 Mile Long Requiring Lane Closure", Detail Sheet 520-4 entitled "Traffic Control For Work Areas Greater Than 1/4 Mile Long Requiring Lane Closure" and a special traffic control layout which shows how to handle traffic on the runaround connecting to the southeast roadway. Floodlighting was to be in accordance with Detail Sheet 570-2.

Traffic control on the culvert reconstruction project was to be in accordance with Detail Sheet 520-2 entitled "Traffic Control Where Work Area Does Not Require Lane Closure", Detail Sheet 520-3 entitled "Traffic Control For Work Areas Less Than 1/4 Mile Long Requiring Lane Closure", Detail Sheet 520-5B (modified) entitled "Traffic Control Layout For One-Way Traffic on Bridges" and Detail Sheet 520-10 (modified) entitled "Traffic Control Layout For Paved Runaround with One-Lane Traffic".

Pay items for traffic control on the intersection reconstruction project included "Traffic Control" bid lump sum, "Pavement Markings" bid in stations, "Raised Pavement Markers" bid by the number and "Floodlighting" bid lump sum.

Pay items for the culvert reconstruction project included "Traffic Control" bid lump sum, "Barricades" bid by the number, "Pavement Markings" bid in stations, "Floodlighting" bid lump sum and "Furnish & Install Traffic Control Signals" bid lump sum.

Review Team Findings

Signing

Approaching the east end of the culvert replacement project, the following signs were found in place. (1) "Road Construction Ahead" on the right, (2) "No Passing Zone" pennant on left with "Do Not Pass" sign on the right, (3) "Signal Ahead" signs both left and right, (4) "One Lane Road Ahead" signs both left and right, and (5) a reverse curve sign with a 35 MPH advisory speed plate. All of these signs were mounted on two steel posts at or near the edge of the shoulder approximately 5 feet above the pavement surface. In most cases the signs were found to be in good to excellent condition. Spacing was at approximately 500 feet as specified on the plan. At the beginning of the detour runaround, a "Stop Here On Red" sign was used at the stop line. On the runaround itself, a reverse curve sign with a 35 MPH advisory speed plate was used to direct traffic back to the original roadway.

Approaching the east end of the detour for the intersection reconstruction

project, the following signs were in place. (1) "Detour Ahead" on the right, (2) reverse curve sign with 35 MPH advisory speed plate and (3) a "No Passing Zone" pennant on the left or south side of the roadway. The condition of these signs and mounting details were similar to those mentioned in the above paragraph. The "No Passing Zone" pennant was an original black on yellow sign used at the beginning of a No Passing Zone for the intersection. At the time of the review, the area between the two construction projects was marked with a double yellow centerline, therefore, the "No Passing Zone" pennant was no longer needed. It was recommended that the R.M.E. for this area have it removed. At the point where traffic from the detour runaround at the culvert returned to the original alignment, the Review Team believed that a "No Passing Zone" pennant would be desirable to reinforce the passing prohibition ahead. R.C.E. Cackler was asked to have the contractor install a 36" black on orange "No Passing Zone" pennant on or near the traffic signal at the west end of the culvert replacement project.

Approaching the culvert replacement project from the west, the following signs were in place. (1) a reverse curve sign with a 35 MPH advisory speed plate on the right, (2) "Signal Ahead" signs both left and right, (3) "One Lane Road Ahead" signs both left and right and (4) a reverse curve sign with a 35 MPH advisory speed plate. The mounting details and condition of these signs was similar to those mentioned earlier in this report except for the last reverse curve sign. It was noted that the sheeting was badly cracked and R.C.E. Cackler was asked to have this sign checked closer both day and night and replace it if it was found to be unsatisfactory. A "Stop Here on Red" sign was placed at the stop line for the eastbound traffic signals.. Also, a reverse curve with a 35 MPH advisory speed plate was used on the culvert

replacement runaround directing traffic back to the original alignment beyond the east end of the project.

Approaching the intersection reconstruction project on Iowa 14 from the south, the following signs were in place. (1) "Road Construction Ahead" on the right and (2) a "Soft Shoulder" sign. A 35 MPH advisory speed plate was added to the "Road Construction Ahead" sign because superelevation for traffic turning east onto Iowa 57 had been removed. It was believed that the slower advisory speed was necessary so that traffic did not enter the detour at too high of a speed. The "Soft Shoulder" sign was skid mounted approximately 100 feet south of where construction work began. The sign itself was in good condition, however, it had collapsed and was laying in the grass at the edge of the roadway. It needed to be reset and the suggestion was made that it be mounted permanently on steel or wood posts since the dropoff condition which required it to be in place would continue for some time.

Approaching the intersection reconstruction project from the north on Iowa 14, the only sign in place was a "Road Construction Ahead" sign.

Barricades, Cones and Warning Lights

At the east end of the culvert reconstruction project, five Type 2 barricades with steady burn warning lights were used to guide traffic onto the detour runaround. These units were in satisfactory condition and were held in place with sandbags. A Type 3 barricade with a "Road Closed" sign and a detour arrow below was installed on the center of the roadway at the east end of the construction zone.

At the west end of the culvert replacement project, Type 2 and Type 3 barricades similar to those described above were in place.

At the east end of the intersection replacement project, six Type 2 barricades with steady burn warning lights on the left side were placed to guide traffic from the original pavement onto the detour. All of these units were in fair condition. A Type 3 barricade with a "Road Closed" sign and a detour arrow below was installed in the center of the roadway. It also was equipped with two flashing warning lights, one on each end of the barricade.

On Iowa 14, Type 2 barricades were used on the east side of the roadway to separate traffic from the construction work zone where a drop-off existed. It was recommended that R.C.E. Cackler have these units checked and replace those that are considered to be unsatisfactory. At the north end of the construction work zone on Iowa 14, standard cones were being used along the edge of the traveled way because there was no room for Type 2 barricades where grading operations were under way. It was stated that the Type 2 barricades are used again after construction work ends for the day.

A Type 3 barricade with a "Road Closed" sign was placed for traffic approaching from the west on a local county road. This sign was not shown on the plans and was added by the R.C.E. to prevent side road traffic from accidentally entering the construction work area.

Markings and Raised Pavement Markers

At the culvert replacement project, edgelines on the original pavement were placed using tape for ease of removal after the project was complete. Edge lines on the detour runaround were done with normal traffic paint. Also, raised pavement markers at 40 foot intervals as specified on the plan were used on the detour runaround. R.C.E. Cackler said that these were difficult to maintain because of traffic driving over them.

Between the culvert replacement project and the intersection reconstruction project, a double No Passing Zone was used. A problem noted in this area was that the original dashed yellow centerline between the two No Passing Lines had not been removed. While it was considered to be satisfactory for the remaining time on this project, the Review Team believes that future plans should specifically direct that nonstandard markings such as this be removed.

At the east end of the intersection reconstruction project, the edgeline directing traffic from the original alignment to the detour runaround started abruptly at a rather sharp angle. It should have been placed on a gradual curve approximately parallel to the centerline. No change was recommended on this project, but this type of problem should be avoided on future projects.

Where the detour runaround in this area left the original alignment and rejoined the southeast curve, old markings were not adequately removed. Attempts were made to cover them over with tack coat but this material had worn off exposing the original marking. R.C.E. Cackler was asked to have the contractor remove these conflicting markings in a more thorough manner to

avoid any problems with traffic following the detour alignment. Raised pavement markers were used on the detour at 40 foot spacing as specified on the plan. They were found to be in satisfactory condition.

Temporary markings were placed on the binder course on Iowa 14. These markings were in good condition. One problem was noted with a No Passing Zone for southbound traffic. Because of the construction work area, it was not possible to place the normally required "No Passing Zone" pennant on the left side of the roadway. To solve the problem, it was recommended that R.C.E. Cackler have a "Do Not Pass" sign placed on the right marking the beginning of the southbound No Passing Zone.

Raised pavement markers used on the edgelines of the detour runarounds were thought to be a very helpful and desirable traffic control device. It was suggested that they also be considered for use on the centerline to further improve delineation of the detour alignment.

Traffic Signals

Traffic signals used at the culvert reconstruction project were installed on wood poles approximately 3 to 6 feet from the edge of the pavement. The signal heads were in satisfactory condition. The cycle length was timed to be 80 seconds as specified in the table on the plans for a detour runaround of this length (700 feet). Also, the yellow clearance interval of 4 seconds was as specified in the table. No delays or operational problems were noted with the signal system.

Floodlighting

Floodlights had been installed at four locations on these two projects. They were in place on the south side of the roadway at both ends of the detour runaround for the culvert replacement project. Also, they were used at the east end of the detour runaround for the intersection reconstruction project and at the stop sign connection where the Iowa 57 detour joined Iowa 14. All of these floodlights were in excellent condition and directed light to areas where traffic was transitioning from one roadway to another.

Accidents

R.C.E. Cackler said that to the best of his knowledge, there had been no accidents on either of these projects since construction work began.

Miscellaneous

It was noted that the contractor for the culvert replacement project had parked a pickup in front of a Type 3 barricade used at the east end of the construction work zone. It blocked approximately 1/2 of the unit. R.C.E. Cackler was asked to remind the contractor that parking vehicles in areas such as this is not allowed and disrupts the function of traffic control devices.

In the design of the project, it was stated that perhaps it would have been better not to use the old southeast return connection to Iowa 14 to avoid the superelevation problem mentioned earlier. Perhaps it would have been better to require all traffic to turn at the connecting roadway where the stop sign

was installed.

Summary and Conclusions

As a result of this traffic control plan review, several deficiencies or areas where improvements could be made were noted. They included (1) signs mounted rather close to the edge of the roadway, (2) contractor vehicles parked in front of signs, (3) an original "No Passing Zone" pennant which was no longer needed, (4) lack of a "No Passing Zone" pennant to reinforce a No Passing Zone, (5) use of a nonconforming dashed centerline between two no passing lines, (6) red flags missing from a "Do Not Pass" sign, (7) poor alignment of an edgeline in a transition zone, (8) unsatisfactory removal of old pavement markings, (9) a skid mounted sign which had fallen down, (10) Type 2 barricades which were in marginal condition, (11) need for a "Do Not Pass" sign at the beginning of a No Passing Zone and (12) a curve sign which was in questionable condition and in need of replacement.

Additions and changes which were made to improve traffic control on this project included (1) the addition of a Type 3 barricade for eastbound traffic on the county road approaching the project, (2) posting of a 35 MPH advisory speed plate on the northbound "Road Construction Ahead" sign to warn traffic turning where there was no superelevation and (3) removal of conflicting and overlapping signs between two closely spaced construction projects.

R.C.E. Cackler was asked to submit a report on action taken on the deficiencies within two weeks after the review. Such a report was not received within the prescribed time period. Subsequently, R.C.E. Cackler has

submitted a report on the disposition of these items. A copy of that report is attached.

In conclusion, several deficiencies were found on these projects. The review served to direct attention to the need for improved traffic control and to eliminate some minor problems which existed on these two projects.

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: Maintenance

DATE: October 18, 1984

ATTENTION: Dwight Stevens

REF. NO.: Grundy County
FN-14-6(17)-21-38

FROM: E. Tom Cackler

OFFICE: Ames Construction Residency

SUBJECT: Traffic Control Plan Review

The deficiencies noted on the traffic control plan review of August 2, 1984, were corrected within a few days following the review. The contractor is presently working on the second phase of the project. No accidents have been reported to date.

I am sorry for the oversight in not responding to you earlier.

ETC:ld

LINN COUNTY
TRAFFIC CONTROL PLAN REVIEW
AUGUST 15, 1984

ACC RESURFACING
ON U.S. 30
FROM THE IOWA 13 INTERCHANGE
TO THE CEDAR COUNTY LINE
FR-30-7(69)--2G-57

Members of the Review Team

The Review Team for this project consisted of the following individuals. Don Jordison, Office of Construction; Mark Kerper, Office of Road Design; Fred Walker, Office of Road Design, Design Safety Section (was unable to attend review); John Smythe, Cedar Rapids R.C.E. Office; Bruce Baldwin and Roger Jorstad, Federal Highway Administration; Mark Bortle, Office of Local Systems (member at large) and Dwight Stevens, Office of Maintenance, Traffic Engineering Section. The Review Team leader was Dwight Stevens.

Project Description

This traffic control inspection report is for Project FR-30-7(69)--2G-57 on U.S. 30 from the Iowa 13 interchange east to the Cedar County line. The contractor on the project is River City Construction Company. Work consists of heater scarification and recycled AC resurfacing on the entire section.

Plans required that traffic be maintained through the project at all times. Construction was to be done in a single lane with traffic being carried in the other lane using a pilot car operation in accordance with Detail Sheet 520-4. On the west mile of the project, which is a four-lane section, work could be accomplished by closing one lane at a time in accordance with Detail Sheet 521-2A. All markings were to be replaced by the contractor.

At the time of this inspection, work was progressing eastbound in the north lane just east of the four-lane divided section. Traffic was being carried in the south lane with a pilot car. The length of the closed lane at the time of

the review was approximately 2 miles.

Traffic control on the project was to be in accordance with Supplemental Specification 920, Detail Sheet 520-2 entitled "Traffic Control Where Work Area Does Not Require Lane Closure", Detail Sheet 520-3 entitled "Traffic Control for Work Areas Less Than 1/4 Mile Long Requiring Lane Closure", Detail Sheet 520-4 entitled "Traffic Control for Work Areas Greater than 1/4 Mile Long Requiring Lane Closure", Detail Sheet 521-2A entitled "Traffic Control Layout for Four-Lane Closure on Divided Highway for 55 MPH Speed Limit", Detail Sheet 521-4 entitled "Traffic Control Layout for Work Area Not Requiring Lane Closure" and Detail Sheet 521-5 entitled "Traffic Control Layout for Work Area Through Ramp Exit and Entrance Tapers". No special traffic control layouts were provided with the plan.

Pay items for traffic control on this project included "Traffic Control" bid lump sum, "Pavement Markings" bid in stations and "Symbols" bid by the number.

Review Team Findings

Signing

Advance warning signs for westbound traffic approaching the work area consisted of the following. (1) "Road Construction Ahead", (2) "One Lane Road Ahead" and (3) a symbol "Flagger Ahead" sign. All of these signs were mounted on the right shoulder on metal skids which were held in place with sandbag ballast. The signs were mounted approximately 1 foot above the pavement surface and all were in good to excellent condition.

Advance signing for eastbound traffic consisted of the following. (1) "Road Construction Ahead", (2) "One Lane Road Ahead" and (3) a symbol "Flagger Ahead" sign. Since these signs were in the four-lane divided area, signs were placed on both the left and right shoulders. They were also skid mounted approximately 1 foot above the pavement surface. All signs were in excellent condition.

The eastbound on ramp from Iowa 13 to U.S. 30 east joined the mainline in the area just west of the construction work area. To provide advance warning for this movement, the same series of signs as mentioned above for eastbound and westbound traffic on U.S. 30 were in place.

At the far west end of the project, there was an "End Construction" sign for westbound traffic and a "Road Construction Next 26 Miles" sign for eastbound traffic.

Barricades and Cones

At the west end of the construction work area, Type 2 barricades were used to close off the median lane just beyond the flagger station. There were 14 units in place spaced approximately 6 feet apart. Although more units were needed than necessary, there was no objection to this setup. At the end of the taper where traffic was confined to a single lane, a Type 3 barricade was placed in the lane which lined up with the construction work ahead.

Cones approximately 18 inches high were placed at 300 foot intervals between

was held in place with a sandbag.

At the east end of the construction work area, six-18 inch cones were used to form a taper just beyond the flagger station.

Markings

As resurfacing work progressed, temporary markings were being place where the construction work obliterated the previous markings. These temporary markings were normally placed on the lower lift because subsequent resurfacing work which involved the burner on the heater scarification unit would damage any markings placed on the upper driving surface. When all of the resurfacing work had been completed, permanent markings were to be placed on the final driving surface as part of the contract. This results in some markings being placed twice, but this is unavoidable because of the nature of the resurfacing operation.

Flagging

Flaggers were used at both ends of the reconstruction area where the pilot car turned around. They were equipped with a stop/slow paddle to control traffic entering the one lane section along the construction work zone. The flagging paddles had one minor deficiency. The blank on the paddle was round. The octagonal shaped stop message and the diamond shaped slow message were displayed on the circular paddle. The result was that the silhouette of the stop message was not provided.

The pilot car was equipped with signs on both the front and the back with the message "Pilot Car Follow Me". These signs were mounted approximately 12-18 inches above the top of the vehicle.

The construction work zone in progress the day of the review intersected two county roads to the north. Flaggers were stationed at both of these county roads to control traffic and prevent them from entering the construction work zone.

Operations

A check was made of the waiting time or turnaround time on the single lane pilot car operation. The approximate waiting time for westbound traffic at 11 a.m. was 12 minutes. Upon proceeding into the single lane section, the travel speed was approximately 35 MPH. The length of the queue which built up in line for this cycle was approximately 60 vehicles. This was typical of movements in both directions the day of the review.

For eastbound traffic, it was observed that many motorists slowed down considerably where they are required to move out on the shoulder to get around the construction equipment. Another reason the traffic slowed may have been curiosity about the heater scarification unit which was being used on this project. After passing the construction work area, speeds of traffic in the single lane again increased to 30-45 MPH and the distance between vehicles was often 200-500 feet.

At the west end of the project, no provisions were made for reducing the two lanes of traffic down to a single lane approaching the flagger station. Essentially, this was self regulating since most vehicles tended to form a single line of traffic in the right lane. There were no problems observed and no adjustment in signing on this approach was recommended. Also, traffic on the eastbound on ramp from Iowa 13 needed to merge into the single line of traffic entering the construction work zone. This merging maneuver took place with no real problems observed.

After reviewing operations for both eastbound and westbound traffic in the single lane section, the waiting times and queue lengths were considered to be satisfactory. The Review Team did not believe there was any need for modification of the length of the construction work zone based on what was observed. If waiting times and queue lengths increase substantially during peak hours, it may be necessary to shorten the construction work zone to reduce the turnaround time or to provide two sets of signs so that the length of the construction work zone can be adjusted as work progresses.

During the review, a minor problem was observed. A westbound construction truck pulled over from the operating lane of traffic into the construction work zone. A car in the line followed the truck into the construction work zone. Within a short time, the motorist discovered his mistake and again moved over into the operating lane of traffic.

Accidents

R.C.E. Smythe stated that he was not aware of any accidents which had taken

place on this project since work began.

Miscellaneous

No special plans were provided for handling traffic in the area where the roadway transitions from a four-lane divided to a two-lane section. The Review Team believed that some thought should have been given to handling traffic in this area and a special traffic control plan should have been provided to show how traffic is to be handled. Of particular concern was what to do with eastbound traffic while resurfacing the eastbound throat area from the four-lane section to the two-lane section. R.C.E. Smythe indicated that he had a contingent plan developed which would carry this traffic across the median and into a two-way section on the westbound lanes.

It would be the Review Team's recommendation that these types of areas be considered at the time of field exam or early in the plan development stage and that some consideration be given to developing and including a traffic control plan for these types of areas with the project.

Summary and Conclusions

Traffic control on this project was being handled in accordance with the standards contained in the plan and there were no real deficiencies observed. Consequently, no follow up report was required of R.C.E. Smythe.

POLK COUNTY
TRAFFIC CONTROL PLAN REVIEW
AUGUST 21, 1984

STREET RECONSTRUCTION
ON U.S. 65/69 (SOUTHEAST 14TH STREET)
FROM ARMY POST ROAD
TO PLEASANTVIEW DRIVE
HES-65-4(34)--2H-77

Members of the Review Team

The Review Team for this project consisted of the following individuals: Tom McDonald, Office of Construction; Dave Berryhill, Office of Road Design; Tom Vaughan, Office of Road Design, Design Safety Section; Paul McGuffin, Des Moines R.C.E. Office; Jack Latterell, Federal Highway Administration; Lester Paff, Office of General Counsel (member at large) and Dwight Stevens, Office of Maintenance, Traffic Engineering Section. The Review Team leader was Dwight Stevens.

Project Description

This traffic control inspection report is for Project HES-65-4(34)--2H-77 on U.S. 65/69 (Southeast 14th Street) in Des Moines. The prime contractor for the project is Cedar Valley Corporation. Subcontractors include Iowa Plains Signing for vertical panels, Dennis Parking Lot Maintenance for markings and Ron Johnson Construction Company for temporary traffic signals. Work consists of complete reconstruction including grading, PCC paving and other miscellaneous work on the 2 mile section from Army Post Road north to Pleasantview Drive. When completed, the street will consist of a four-lane divided section with a 16' median and auxiliary left turn and right turn lanes at major intersections.

Plans required that traffic be maintained through the project at all times. Construction was to be done in five separate stages. Stage 1 provided for removing portions of the raised median in the center of the roadway. Stage 2 provided for preparation of the northbound lanes to carry two-way traffic.

Stage 3 was reconstruction of the southbound lanes. All traffic would be moved over and carried in the old existing northbound lanes. Stage 4 was reconstruction of the northbound lanes. During this stage, traffic would be moved over to the new southbound lanes. Stage 5 provided for completion of the median in the center of the roadway and other miscellaneous work not included in the other stages.

At the time of this inspection, Stage 4 was in operation. Two-way traffic was being carried on the new southbound lanes and work was under way on the south portion of the northbound lanes.

Traffic control on the project was to be in accordance with Supplemental Specification 920, Detail Sheet 521-3B entitled "Traffic Control Layout for Closure on Four-Lane Undivided Highway For 45 MPH Speed Limit", Detail Sheet 521-3C entitled "Traffic Control Layout for Lane Closure for Four-Lane Highway for 35 MPH Speed Limit" and Detail Sheet 521-4 entitled "Traffic Control Layout for Work Area Not Requiring Lane Closure". Special traffic control layouts were provided showing the requirements for handling traffic during Stages 3, 4 and 5. Also a special sheet was provided showing the method of handling staged traffic on side street approaches. Details were provided for temporary concrete barrier rails. Also installation and phasing details for temporary traffic signals were provided.

Pay items for traffic control on this project included "Traffic Control" bid lump sum, "Pavement Markings" bid in stations, "Raised Pavement Markers" bid by the number, "Symbols" bid by the number, "Barricades" bid by the number, "Temporary Concrete Barrier Rail" bid in lineal feet and "Temporary Traffic

Signals" bid lump sum.

Review Team Findings

Signing

At the south end of the project, the following construction advance warning signs were in place. (1) "Road Construction Ahead", (2) "Right Lane Closed Ahead" and (3) a symbol transition sign indicating that the right lane was closed. Since the approach area south of Army Post Road is a four-lane divided section, the above described signs were placed on both sides of the roadway. All signs were post mounted except for the last two on the left. This was a concrete median area, therefore, they were installed on skids approximately 1 foot above the pavement surface. It appeared that the post mounted signs on the right were somewhat lower than the minimum prescribed mounting height of 5 feet. All of the signs in this area were in good to excellent condition.

At the north end of the project, the following construction advance warning signs were in place. (1) "Road Construction Ahead", (2) "Left Lane Closed Ahead" and (3) a symbol transition sign indicating that the left lane was closed. All of these signs were post mounted between the sidewalk and curb approximately 5 feet above the pavement surface. All were considered to be in excellent condition. One problem noted with this series of signs was that they were partially blocked from view by a row of power poles just behind the curb. Suggestions made to improve this situation were to relocate the signs to points where visibility was the best and/or supplement them with identical

signs placed on the left side of the roadway.

No advance warning sign was provided east and west on Army Post Road at the south end of the project. The only traffic control devices used in this area were Type 2 barricades to close off the left lane of the dual left turn bay from eastbound Army Post Road to northbound Southeast 14th Street. The reason for this closure was that accidents were occurring due to traffic having to merge into a single lane north of the intersection upon entering the project. This arrangement was not specified on the traffic control plan, but was placed by the Resident Construction Office in response to a problem.

On the east leg at McKinley Avenue, a skid mounted stop sign with a "Please Alternate" panel below was in place. It was the opinion of the Review Team that this sign was unnecessary. There was sufficient room for two-way traffic on this approach and the intersection itself was controlled with a temporary traffic signal. The Review Team recommended that this sign be removed unless traffic was restricted to a single lane.

At Watrous Avenue, skid mounted "Road Construction Ahead" signs were in place on both approaches. They were placed at the edge of the roadway approximately 1 foot above the pavement surface. Both were in fair condition. The sign for traffic approaching from the west had fallen down at the time of the review. R.C.E. McGuffin was asked to have the contractor reset this sign.

At Indianola Road, a "Road Construction Ahead" sign was installed on a metal skid on the right approximately 1 foot above the pavement surface. The sign was in excellent condition.

At Park Avenue, a "Road Construction Ahead" sign was in place on the east approach. It was mounted on steel supports between the sidewalk and the curb. The sign panel was in fair condition. A problem noted with this assembly was that it was partially hidden behind some tree branches. It was recommended to R.C.E. McGuffin that these branches be trimmed if possible to improve visibility or the sign be relocated.

At Virginia Avenue northbound, an "End Construction" sign was in place on the right for northbound traffic.

Barricades, Vertical Panels and Warning Lights

At the south end of the project, vertical panels were used for the taper to transition traffic to a single lane and move it over to the west side of the roadway. Each panel was equipped with a steady burn warning light and was held in place with a sandbag on the base.

In the two-lane two-way section on the west side of the roadway, vertical panels were used behind the right edgeline between the construction work zone and the traffic lane. They were placed at approximately 50 foot intervals as specified on the plan. They were in fair condition and most were equipped with steady burn warning lights. Occasionally, it was observed that the warning light was missing or had been turned at 90° to traffic. It was also observed that some of the panels were rather dirty and in a few instances the stipes were sloping in the wrong direction.

On the east leg at McKinley Avenue, Type 3 barricades and a fence were needed to close off the construction work zone north of the intersection. R.C.E. McGuffin was asked to have the contractor add these traffic control devices. South of the intersection, a fence was provided, but was laying on the finished concrete slab. Also the Type 3 barricade used on this side of the roadway was turned in the wrong direction. R.C.E. McGuffin was asked to have the contractor make appropriate adjustments in these traffic control devices. On the west side of the roadway at McKinley, the road was closed because of culvert construction a short distance to the west. Two Type 3 barricades were in place. One was equipped with a "Road Closed" sign and both had flashing warning lights on each end.

On the east leg of Indianola Road, vertical panels and barricades were installed in accordance with the special traffic control plan. Between Indianola Road and Park Avenue, access was allowed to commercial establishments on the east side of Southeast 14th Street. Additional barricades were needed in this area to keep traffic out of the construction work area. On the south side of Park Avenue only two green barrels were used to close off the construction work zone. R.C.E. McGuffin was asked to have the contractor provide additional protection in this area.

At Park Avenue, the construction work area was very close to the traffic lane in the northeast quadrant. Additional vertical panels were needed in this area to keep traffic from entering an excavation at the edge of the roadway.

At Pleasantview Drive near the north end of the project, additional barricades were needed to keep traffic from turning south into the construction work

area.

Markings

At the south end of the project, a white edgeline was used on the right and a yellow edgeline was used on the left in the transition area from two lanes of traffic to a single lane on the west side of the roadway. These markings were in good condition.

For the two-lane two-way section, raised pavement markers were used for all of the markings. Those on the right were white and the double yellow centerline was yellow. All units were placed at 5 foot centers and appeared to be in excellent condition. Alignment on these raised pavement markings was excellent.

At Watrous Avenue, the taped double yellow centerline on the west approach extended out into the intersection too far. It should have ended at the stop line, but instead continued out to the center of the intersection. R.C.E. McGuffin was asked to have the contractor shorten this double yellow centerline back to the stop line. A similar condition existed at Park Avenue and needed to be corrected.

Near the culvert reconstruction area just north of McKinley Avenue, tape was used to form the double yellow centerline and the edgelines. Apparently this was changed by the Resident Construction Office since the plans called for raised pavement markings in this area. The reason for the change was that considerable turning movements take place in this area and the raised pavement

markers may not be durable enough for these conditions.

At Indianola Road, the markings were placed in accordance with the plan, however, one problem was noted. The edgeline on the south side of the roadway was partially covered with debris and dirt. R.C.E. McGuffin was asked to have the contractor remove this material so the edgeline was visible.

At the north end of the project, a white edgeline was used on the right and a yellow edgeline was used on the left in the transition zone from the two-lane two-way section to the normal roadway. Both of these markings were made with tape and were in good condition.

Sequential Arrow Panels

Two sequential arrow panels were used on this project. One was located just north of Army Post Road facing northbound traffic. It was used to indicate that the right lane was closed in the transition area entering the project from the south. It was operating in the chevron mode and light intensity of the unit appeared to be correct for daytime use. The overall condition of this arrow panel was excellent. The other sequential arrow panel was located north of Pleasantview Drive facing southbound traffic. It was placed in the median and indicated that the left lane was closed approaching the project from the north. It was operating in the chevron mode and appeared to be in good condition. There was a slight visibility problem with this sequential arrow panel due to the vertical geometry of the roadway. At certain points approaching the project, the bottom portion of the arrow panel was not visible. This was not considered to be a problem since a portion of the

display was visible at all times.

Traffic Signals

Temporary traffic signals were provided at four intersections on the project. They were McKinley Avenue, Watrous Avenue, Indianola Road and Park Avenue. These signal units were installed and maintained by the contractor.

All of these units were operated in the fixed time mode. At Indianola Road, phases were provided for northbound traffic, southbound traffic and east-west traffic on Indianola Road. At the other three intersections, the arrangement was a simple two phase set up for north-south traffic and east-west traffic. No particular problems were noted in the operation of these traffic signals.

At Indianola Road, visibility of the traffic signals from the east was a slight problem because all traffic was being carried on the far south side of the roadway. As a result, the motorist was required to look to the right for the signal display which applied to his movement. There was no apparent solution to this problem. This condition will have to be tolerated until the next phase when traffic is moved over to the north side of the roadway.

Temporary Concrete Barrier Rail

Temporary concrete barrier rail was used at the culvert reconstruction project just north of McKinley Avenue. Eighteen 10 foot sections were used to separate the construction work zone from the northbound lane of traffic. A tapered end section was used on the south end of the temporary barrier rail as

a safety measure.

Operations

One operational problem that could have been improved was on the southeast leg of Indianola Road. It appeared that the stop line was too close to the intersection. At the stop line, it was difficult to see the signal indications which were to the extreme right as mentioned earlier in the report. The condition would have been improved if the stop line were placed 50-75 feet further east. This would also provide more room for traffic making a right turn from the south leg of Southeast 14th Street to continue east on Indianola Road.

Overall, R.C.E. McGuffin said that traffic operation on the project was reasonably good. He had received very few complaints about delays or difficulty traffic was having within the construction limits of the project.

Accidents

Since work began on April 1, 1984, reports had been received on 11 accidents to date. There have been other accidents, but reports have not yet been received on the details. The types of accidents included rear end collisions, improper passing and left of center. There were a few personal injury accidents, but most were property damage only. It was R.C.E. McGuffin's opinion that most of the accidents were not directly related to the construction activity. They were the result of restricting traffic to two lanes which causes congestion and increases the potential for rear end type

collisions. The number of accidents which have taken place would not be considered alarming taking into consideration the length of the project and the heavy traffic volumes.

Summary and Conclusions

As a result of this traffic control plan review, deficiencies or areas where improvement could be made were noted. They included (1) removal of an unnecessary stop sign at McKinley Avenue, (2) addition of Type 3 barricades and barricade fence at McKinley Avenue north, (3) reinstallation of barrier fence and repositioning of Type 3 barricade at McKinley Avenue south, (4) "Road Construction Ahead" sign on the west leg of Watrous was down, (5) double yellow centerline from the west on Watrous was too long, (6) dirt and debris accumulation on the south edgeline on the east leg of Indianola Road, (7) "Road Construction Ahead" sign on the east leg of Park Avenue located behind tree branches, (8) need to move vertical panels to protect construction excavation at northeast corner of Park Avenue, (9) post mounted signs at south end of project too low and (10) the need for additional barricades to protect access points between Indianola Road and Park Avenue.

Positive items noted on the review included (1) excellent sequential arrow panels, (2) good installation and maintenance of raised pavement markers for delineating centerlines and edgelines, (3) temporary traffic signals which were properly installed and maintained to carry relatively heavy volumes of traffic and (4) vertical panels effectively placed to separate the construction work zone from the traffic lane.

In conclusion, most of the problems associated with traffic control on this project related to devices used to close off the construction work zone and the attention given to traffic control measures provided on side street approaches.

R.C.E. McGuffin was asked to make the corrections outlined above and to provide a report on the disposition of these items within two weeks. On September 4, 1984 a memorandum was received outlining corrective action taken. A copy of that memorandum is included as part of this report. Most of the items were taken care of within the next few days after the review. In conclusion, this traffic control plan review was helpful to point out areas where traffic control could be improved and to direct attention to this part of a rather complex urban project.

IOWA DEPARTMENT OF TRANSPORTATION

To Office Central Maintenance Date 9-4-84
Attention D. L. Stevens Ref. No. F-65-4(4)34--20-77
From Paul J. McGuffin Sign Review
Office Resident Engineer, Des Moines
Subject Sign Review F-65-4(4)34--20-77

We reviewed the deficiencies noted on the sign review and corrective action was taken 8-22 through 8-24-84.

At the south end the Road Construction Ahead was checked.

At McKinley the stop sign and barricades were corrected and a proper barricade was constructed.

The tape at Watrous intersection was removed and the Road Construction sign was set up.

The various access points to the east, from Watrous north were properly barricaded and a barricade was placed at Park to properly close the southbound lanes.

The obstruction covering the Road Closed sign at Park Avenue east was removed.

The median hole at Park Avenue was filled and marked with a vertical panel.

The white edge line was cleaned at Indianola Road.

All deficiencies were corrected 8-24-84 and checked again 8-29-84.

PJMCG/ah

cc: District #1 Office
Ames, Iowa
Jim Rash
Record Center
File

POWESHIEK COUNTY
TRAFFIC CONTROL PLAN REVIEW
AUGUST 23, 1984

PCC OVERLAY
ON INTERSTATE 80
FROM ONE MILE EAST OF THE GRINNELL INTERCHANGE
TO ONE MILE EAST OF THE MALCOM INTERCHANGE
IR-80-5(106)183--12-79

Members of the Review Team

The Review Team for this project consisted of the following individuals: Tom McDonald, Office of Construction; Dennis Larson, Office of Road Design; Fred Walker and Tom Vaughan, Office of Road Design, Design Safety Section; Lowell Davis, Marshalltown R.C.E. Office; Frank Howell, Federal Highway Administration; Jerry Bergren, Office of Local Systems (member at large) and Dwight Stevens, Office of Maintenance, Traffic Engineering Section. The Review Team leader was Dwight Stevens.

Project Description

This traffic control inspection report is for Project IR-80-5(106)183--12-79 on Interstate 80 from one mile east of the Grinnell Interchange to one mile east of the Malcom Interchange. The contractor on this project was Manatts, Inc. Work consisted of placing a 4 inch PCC overlay over the entire 24 foot width of the westbound roadway. Also, the shoulders were to be raised to the level of the new PCC surface using asphalt treated base. Work was also under way filling the median approximately 1 foot to adjust for the raised surface of the PCC overlay.

Plans required that traffic be maintained through the project at all times. Two-lane two-way operation was to be provided on the eastbound roadway by placing crossovers at various locations along the project. Traffic on the two-lane two-way section was to be separated by a double yellow centerline supplemented with vertical tubes placed at 150 foot intervals. "Do Not Pass" and two-way traffic signs were to be placed at 1/2 mile intervals to remind

motorists of opposing traffic. A weave section developed by using barricades was to be provided at the east end of the project where traffic was required to cross the median to reach to the two-lane two-way section. A standard taper merging the median lane to a single lane was to be used on the west approach.

At the time of this inspection, traffic had been shifted from normal operation to two-lane two-way operation on the eastbound roadway from the beginning of the project 1 mile east of the Grinnell interchange to the second crossover approximately 4 miles to the east. Work was under way placing the PCC overlay on the westbound roadway in this section.

Traffic control on this project was to be in accordance with Supplemental Specification 920, Detail Sheet 521-2A entitled "Traffic Control Layout for Lane Closure on Divided Highway for 55 MPH Speed Limit", Detail Sheet 521-4 entitled "Traffic Control Layout for Work Areas Not Requiring Lane Closure" and Detail Sheet 521-5 entitled "Traffic Control Layout for Work Areas Through Ramp Exit and Entrance Tapers". A special traffic control layout was provided showing the signing, marking and barricade requirements at both ends of the construction area. Also, a traffic control layout was provided showing details for the ramp crossovers at the Malcom interchange when construction work progressed to that point at a later date. Details were provided for temporary concrete barrier rail and for a G-R-E-A-T impact attenuator system. Floodlighting was to be in accordance with Detail Sheet 570-2. Markings were to comply with Supplemental Specification 925.

Pay items for traffic control on this project included "Traffic Control" bid

lump sum, "Floodlighting" bid lump sum, "Temporary Concrete Barrier Rail" bid in lineal feet, "Impact Attenuator" bid by the number and "Pavement Markings" bid in stations.

Review Team Findings

Signing

Approaching the project from the west, the following advance construction signs were found in place. (1) "Road Construction Ahead", (2) "Left Lane Closed Ahead", (3) "Left Lane Closed 2000 Feet" and (4) symbol transition signs indicating that the left lane was closed. In all cases, signs were mounted on both the left and right sides of the roadway. They were installed on wood posts approximately 5 feet above the edge of the roadway and all were in good to excellent condition. One problem noted with these signs was that they tended to be rather close to the edge of the shoulder. In some instances, the signs appeared to overhang the edge of the shoulder. One other discrepancy noted with these signs was the lack of 45 MPH advisory speed plates on the symbol transition signs. Inspection personnel will check with the contractor and arrange to have these signs added in conformance with the plan.

Continuing on east into the project, the next sign is a two-way traffic symbol sign on the right. It was supplemented with a word message plate saying "Two-Way Traffic". On the back of the two-way traffic sign is a "Do Not Enter" sign for westbound traffic. The Review Team thought that this panel looked smaller than the 30"x30" panel required by the plan. Inspection personnel

will check the size of this sign and have it replaced if it is smaller than specified.

Continuing into the two-lane two-way section, "Do Not Pass" signs were placed on both the left and right sides of the roadway.

A short distance further east, a "Two-Way Traffic Next 4 Miles" sign was installed on the right. This sign was not specified by the plans, but was added by the R.C.E. Office to provide the motorist with additional information on the length of the two-lane two-way section.

At 1/2 mile intervals along the entire length of the two-lane two-way section, "Do Not Pass" and "Two-Way Traffic" signs were installed alternately on the left and the right sides of the roadway. They were post mounted approximately 5 feet up. It was noted that some of the two-way traffic signs did not have the supplemental panel with the "Two-Way Traffic" word message. Inspection personnel will talk to the contractor and arrange to have these panels installed on all of the symbol two-way traffic signs. Otherwise, these signs were found to be in good condition.

Approaching the project from the east, the same series of signs as outlined above was found in place. These signs were again post mounted approximately 5 feet above the pavement surface and were in good to excellent condition. One discrepancy found was that the second and third signs in the plan showed that the right lane was closed ahead. This was incorrect since the special traffic control layout clearly showed that the left lane was actually closed. A change was made in the field and the signs used showed that the left lane was

closed ahead.

A short distance into the two-way section, symbol two-way traffic signs were in place on both the left and right sides of the roadway. They were supplemented with word message "Two-Way Traffic" plates. A short distance further west, a sign with the message "Two-Way Traffic Next 4 Miles" was in place on the left side of the roadway. Again this sign was added by the Resident Construction Office to provide the motorist with information on the length of the two-way section.

As was the case for eastbound traffic, "Do Not Pass" and "Two-Way Traffic" signs were installed alternately on the left and right sides of the roadway at 1/2 mile intervals. These were post mounted back to back with those for westbound traffic at approximately 5 feet above the pavement surface.

A reverse curve sign was in place on both the left and right sides of the roadway approaching the west crossover. These signs were supplemented with 45 MPH advisory speed plates.

Finally, a "Keep Right" sign facing westbound traffic was in place on the Type 3 barricade behind the temporary concrete barrier rail. One problem noted with this sign was that it had a horizontal which pointed slightly downward toward the pavement. The plan showed that the arrow should be horizontal without any slope upward or downward.

Barricades, Vertical Panels, Tubular Markers and Warning Lights

For eastbound traffic, vertical panels were used to form the taper transitioning from two-lanes of traffic to a single lane. Each unit was equipped with a steady burn warning light on the top and had a sandbag on the base to hold it in place.

A Type 3 barricade was placed in the closed lane at the far end of the transition taper.

Tubular markers 24 inches in height were installed at 150 foot centers between the double yellow no passing lines on the two-lane two-way section. Each of these units had two white stripes with the remainder of the unit being made up of fluorescent orange plastic material. Lowell Davis said that 13 markers were lost the first night traffic was placed on the two-lane two-way section. He also said that some of the tubular markers need to be replaced daily. At the time of the review, some of the tubular markers were leaning and appeared to be damaged after being struck by a vehicle.

For westbound traffic approaching the project, vertical panels were used to form the taper transitioning traffic from two-lanes to a single lane of traffic. Vertical panels were also used within the weave section and along the left edge of the single lane approaching the crossover. All of these units were equipped with steady burn warning lights and were in good condition.

Type 3 barricades were used in the weave pattern as specified on the plan.

All devices within the weave section were in good to excellent condition and their placement was as shown on the special traffic control layout. These units were effective in reducing the speed of traffic approaching the median crossover.

At the median crossover, vertical panels with steady burn warning lights were provided on both sides of the roadway. Also in that vicinity, a Type 3 barricade was placed in the closed roadway just east of where construction began. This Type 3 barricade was equipped with a detour arrow above and a "Road Closed" sign below. Plans specified that these two signs be placed in opposite positions. Inspection personnel will ask the contractor to have this change made. The Type 3 barricade was equipped with a flashing warning light on the right side. It should have also had one on the left side. Inspection personnel will ask the contractor to install an additional flashing warning light.

At the far west end of the two-lane two-way section, the Type 3 barricade in place behind the temporary concrete barrier rail was equipped with one flashing warning light on the right. Again, this barricade should have had two flashing warning lights. Inspection personnel will have the contractor add a second warning light to this barricade.

Markings

At the west end of the project, a yellow edgeline was in place in front of the vertical panels forming the taper from two lanes to a single lane. In the two-lane two-way section, a double centerline was in place. The lines were

approximately 10-12 inches apart. They were placed using removable tape. The white lane line which would have been between the double yellow centerlines had been removed by sandblasting. The reason was that this white line, which denotes traffic traveling in the same direction, would have been in conflict with the two-lane two-way operation. The yellow median edgeline had been painted over with white. In no case was any of the old yellow marking visible. This was a very well placed edgeline.

At the east end of the project, a yellow edgeline was in place in front of the vertical panels forming the taper for westbound traffic. A yellow edgeline was also used through the weave section and along the left edge of the single lane approaching the crossover. On the crossover itself, a yellow edgeline was used on the left and a white edgeline on the right. Both of these were formed with removable tape.

For westbound traffic at the west end of the project, a yellow edgeline was placed in front of the temporary concrete barrier rail at the crossover. Also, a white edgeline was used on the right side of traffic at the crossover. Placement of asphaltic material on the crossover had partially obliterated the white edgeline. Inspection personnel will talk to the contractor about having this edgeline fully restored.

Sequential Arrow Panels

Sequential arrow panels were used at the beginning of the taper at both ends of the project. These units were installed on the left shoulder where the taper began. Each unit was operating in the chevron mode and all lamps

appeared to be lit. The intensity was about correct for daytime operation. Both of the units were placed approximately 7 feet above the pavement surface.

Lowell Davis indicated that he had made a night inspection the day before the traffic control plan field review and found that both of the sequential arrows being used were too bright. Apparently they had not been dimmed for night operation. Lowell said he would talk with the contractor and arrange to have the units modified so they would be less intense or dimmed for nighttime operation.

Temporary Concrete Barrier Rail

Temporary concrete barrier rail sections were placed in accordance with the plans at the crossover near the west end of the project. An impact attenuator was placed on the leading end of the barrier rail. Each barrier rail section was equipped with a yellow reflector facing westbound traffic. This resulted in reflector spacings of approximately 10 feet. Upon inspection, it was found that seven of the temporary concrete barrier rail sections were not properly pinned together so that they would operate as a unit. Inspection personnel will talk to the contractor about having the units properly pinned together as required by the plans.

Floodlighting

At the east end of the project, a luminaire was installed on the south side of the roadway to light up the crossover and the beginning of the two-lane two-way section. Also, a luminaire was placed on the north side of the roadway to

light up the beginning of the crossover. Both of these units were 30 feet or more from the edge of the pavement. The locations were approximately as specified on the plan.

At the west end of the project, a luminaire was installed on the south side of the roadway to light up the end of the impact attenuator and the temporary concrete barrier rail. Also, a luminaire was installed on the north side of the roadway to light up the end of the crossover where traffic rejoins with the original westbound roadway. These units were installed 30 feet or more from the edge of the pavement and were in positions approximately as shown on the plans.

Operations

At the time of the inspection, traffic on the two-lane two-way section was traveling at approximately 55 MPH. This was the average pace with some vehicles traveling slightly faster and others somewhat slower. According to inspection personnel, speed has not been a problem on this project. From a personal observation subsequent to the review, I found that there was a tendency for traffic to exceed the 55 MPH speed limit up into the range of approximately 60 MPH. This did not appear to cause any operational problem that could be observed.

During the inspection, a contractor owned vehicle was observed going east on the two-lane two-way section and making a "U" turn in the crossover area at the east end of the project. This is an extremely hazardous maneuver and it was recommended that the contractor be told that his vehicles must follow the

same procedures required of the public. For the safety of all, his vehicles must refrain from making the types of movements observed.

Contractor and/or employee vehicles were parked in the median 10-20 feet off the edge of the pavement. The traffic control plans specifically prohibits parking of vehicles this close to a traffic lane. Inspection personnel will talk to the contractor about removing these vehicles and not parking in these locations in the future.

Accidents

Lowell Davis said that there had been one serious accident on this project since construction work began. It was while patching operations were under way on the westbound roadway. A semi trailer went out of control and struck a flagger controlling traffic near the construction zone.

Other than this one case, no other accidents have taken place on the two-lane two-way section since traffic was shifted from normal operation.

Miscellaneous

It was observed that route markers and auxiliary panels had been placed and covered at various locations approaching the project. It was determined that these were placed to rapidly implement an emergency detour if a major accident required that the two-lane two-way section be closed. These were not provided for on the traffic control plan, but were done by the R.M.E./R.C.E. Office as a contingent plan. The Review Team commends Resident personnel for making

advance plans for an emergency detour and suggests that this be considered as a standard arrangement for future projects of this type.

At the east end of the project, a power pole 8-9 inches in diameter was in place in the median. It was used to carry a 120 volt electrical connection to the sequential arrow being used in that area. It was placed approximately in the center of a 50 foot median and would not be outside of the 30 foot clear zone nor was it protected by guardrail. It was considered to be a hazard to traffic and it was the consensus of the Review Team that it should be removed. At the time of the review, it appeared that the gasoline engine on the sequential arrow was being used, therefore, the power pole was not necessary. Inspection personnel will talk to the contractor about early removal of this unnecessary hazard.

On future projects consideration should be given to moving the keep right arrow used at the end of the project back to a point near the beginning of the temporary concrete barrier rail. Also the sign should be somewhat larger and should be marked with a nine button object marker below. It is suggested that this change be considered for future projects as a standard arrangement.

Summary and Conclusions

Traffic control on this project was substantially in compliance with the requirements on the standards and plans. Several minor deficiencies were found on the project. They included (1) sequential arrows too bright for nighttime use, (2) symbol transition signs without 45 MPH advisories, (3) some symbol two-way traffic signs without supplemental word messages, (4) an

unnecessary power pole in the median which created a safety hazard, (5) "Detour" and "Road Closed" signs reversed on Type 3 barricade, (6) flashing warning lights missing on Type 3 barricades, (7) contractor vehicles making hazardous "U" turns at median crossover, (8) contractor and/or employee vehicles parked in unauthorized area close to traffic, (9) white edgeline at west crossover partially obliterated with AC material, (10) temporary concrete barrier rails not properly pinned together and (11) "Keep Right" arrow sloping downward instead of horizontal.

Positive items noted on the review included the use of excellent sign panels, markings which were well placed and maintained, sequential arrow panels in correct position and well maintained and reasonably smooth flow of traffic on two-lane two-way section.

Additions or changes which were made to enhance traffic control on the project included installation of additional information signs indicating that the two-lane two-way section was 4 miles long and placement of route markers for the purpose of implementing an emergency detour should the project experience a serious accident.

At the conclusion of the review, Lowell Davis was asked to submit a report on the disposition of the deficiencies which were noted on the review. A copy of an August 31, 1984 memorandum from R.C.E. John E. Peters is included as part of this report. It outlines the corrective action taken on each of the items which were discussed on the review.

In summary, several minor changes were noted which will improve traffic control on this project. The review was beneficial in bringing added emphasis to the need for constant review of traffic control on an important project carrying traffic volumes such as those on Interstate 80.

IOWA DEPARTMENT OF TRANSPORTATION

to Office Central Maintenance

Date August 31, 1984

Attention ~~Dwight Stevens~~

Ref. No. IR-80-5(106)183--12-79

from John E. Peters, Jr.

Contract No. 22710
P.C.C. Overlay - Manatt's, Inc.

office Marshalltown Construction

subject Traffic Control Plan Review

Listed below are the discrepancies and violations to traffic control plan layouts and signing standards as noted by the review team.

1. 45 M.P.H. on W4-2 signs were missing on west end of project.
2. Supplemental plates (two way traffic on W6-3), some were missing.
3. Sequential arrows were left on bright at night.
4. Light power pole placed in median East of middle crossover Sta.401+00.
5. Road Closed sign R11-2 and Detour arrow sign M4-10L placement on Type III barricade reversed at crossover Sta.401+00.
6. Contractor's personnel making U-turns on middle crossover Sta.401+00. Also, construction personnel's personal vehicles in median. Vehicles headed against traffic in median and parked too close to edge of shoulder in median by paving train.
7. Short one Type "A" low-intensity flashing light on Type III Barricade at Sta.401+00.
8. Retape edge line by barrier rail crossover Sta.159+50 (inside lane) white.
9. Crossover Sta.159+50, first vertical panel, reversed hash marks.
10. Crossover Sta.159+50, seven (7) barrier rails not properly pinned.
11. Crossover Sta.159+50, keep right arrow R4-7E pointing down instead of being straight.

The above listed discrepancies were corrected by 08/29/84, with the exception of Item No. 4. The pole in the median for auxiliary power will be removed when West 4-miles is completed.

JEP/LLD:skd
pc: Roy W. Kuhn

STORY COUNTY
TRAFFIC CONTROL PLAN REVIEW
AUGUST 28, 1984

BRIDGE DECK RESURFACING
ON U.S. 30
AT THE SOUTHWEST EDGE OF NEVADA
FN-30-5(54)--21-85

Members of the Review Team

The Review Team for this project consisted of the following individuals: Harold Dowden, Office of Construction; John Nervig, Office of Road Design, Design Safety Section; Tom Cackler, Ames R.C.E. Office; Dennis Cook, Federal Highway Administration; Wayne Wilson, Office of Human Resources (member at large) and Dwight Stevens, Office of Maintenance, Traffic Engineering Section. The Office of Road Design was not represented on this review because the plans were prepared by the Office of Bridge Design. The Review Team leader was Dwight Stevens.

Project Description

This traffic control inspection report is for Project FN-30-5(54)--21-85 on U.S. 30 at the southwest edge of Nevada. Both daytime and nighttime inspections were made. The contractor on the project was Fox Construction Company. Work consisted of bridge deck resurfacing on the two structures in the divided section over the C & N W Railroad. Also modification work was done on the guardrails on each end of the bridges.

Plans required that traffic be maintained through the project at all times. Work was to be restricted to one-half of the bridges at a time with traffic carried on the other half. Temporary concrete barrier rails were to be used between the construction work zone and the moving lane of traffic to protect the construction work area.

At the time of this inspection, work was in progress on the outside lanes of

both bridges. Traffic was being carried in the median lanes both eastbound and westbound.

Traffic control on the project was to be in accordance with Supplemental Specification 920, Detail Sheet 521-2A entitled "Traffic Control Layout for Lane Closure on Divided Highway for 55 MPH Speed Limit", and Detail Sheet 521-4 entitled "Traffic Control Layout for Work Area Not Requiring Lane Closure". Also, special traffic control layouts were provided for both the eastbound approach on the south structure and the westbound approach on the north structure. Floodlighting was to be in accordance with Detail Sheet 570-2. Markings were to comply with Supplemental Specification 925.

Pay items for traffic control on this project included "Traffic Control" bid lump sum, "Pavement Markings" bid in stations, "Floodlighting" bid lump sum and "Temporary Concrete Barrier Rail" bid in lineal feet.

Review Team Findings

Eastbound Approach

Signing

The only advance construction sign for this approach was a "Road Construction Ahead" sign with a 45 MPH advisory speed plate located on the right side of the roadway. It was mounted on two steel posts approximately 5 feet above the edge of the pavement. The "Road Construction Ahead" panel was in fair to good condition, but the advisory speed plate was poor. It had an accumulation of

dirt on the surface and the panel itself was moderately scarred. Another problem noted with this installation was that the posts were noticeably out of plumb. It was suggested that on future sign installations, the contractor be asked to pay closer attention to mounting signs so they were installed approximately vertical.

There was some discussion on the use of two steel posts for mounting signs on construction projects. In this case, the posts were overlapped to obtain the necessary height for mounting the sign. It was indicated that the specifications are now being changed so that two steel posts will not be permitted or considered breakaway for construction work to take place next year.

Barricades, Vertical Panels and Warning Lights

Vertical panels equipped with steady burn warning lights were used to form the taper transitioning from two lanes of traffic to a single lane. All of the units had sandbags on the bases to hold them in place and were in good condition.

Markings

The original markings placed on the approach to the median nose restricted traffic to the right lane causing an abrupt movement where the taper began. Because this condition would only exist for a few more days, no change in these markings was recommended. In retrospect, the traffic control plan should have provided for removal of a portion of the gore markings so that the

left edge of the approach lined up with the inside edge of the median. This would have made a more gradual transition into the single lane section.

The existing laneline in the taper area had been removed. Since it was an epoxy marking, it was necessary to use a grinder to remove the material. This grinding exposed a new concrete surface which appeared white and resembled a normal marking from a distance in the daytime. Upon close observation, there was no epoxy material left and what was being observed was a fresh surface on the concrete pavement.

A white edgeline was used in front of the vertical panels to form the transition taper. It was composed of tape and was in good to excellent condition. There were some shortcomings on the alignment of this marking. In the first 75 feet of the taper, the edgeline curved toward traffic making it more difficult to transition from two lanes to a single lane. The edgeline should have been straighter and placed on a uniform transition.

Just west of the south bridge, additional widening had been placed on the median shoulder to accommodate traffic crossing the bridge. The yellow edgeline along the median had been moved out onto the widened area on the shoulder. The workmanship on the alignment of this marking was not satisfactory. Close attention needs to be paid to placement of markings on future stages so they are reasonably straight.

White reflectors were installed at 10 foot spacing on the temporary concrete barrier rail on the south side of traffic across the bridge. Also, yellow reflectors at 10 foot spacing were in place on the north bridge curb.

Temporary Concrete Barrier Rail

The temporary concrete barrier rail for the south bridge was installed as shown on the plans. The lead end of this barrier rail was at the south edge of the pavement. The only criticism of this barrier rail was that in one instance, two of the sections were approximately 1 1/2-2 inches out of alignment. This created the potential for a snag if the barrier rail was hit. While it was not serious enough to require the contractor to make adjustments on this installation, more attention should be paid to this type of detail on future installations. Also, two or three of the temporary barrier rail sections on the taper did not have white reflectors as required by the plan.

Floodlighting

A luminaire was in place in the median just west of the bridge to light up the face of the temporary concrete barrier rail and the throat to the single lane of traffic across the bridge.

Westbound Approach

Signing

Approaching the project from the east, the following construction advance warning signs were found in place. (1) "Road Construction 1 Mile", (2) "Right Lane Closed Ahead", (3) "Right Lane Closed 2000 Feet" and (4) a symbol

transition sign indicating the right lane was closed ahead. This sign was also equipped with a 45 MPH advisory speed plate.

The four signs in the advance series for this approach were mounted on both the left and right sides of the roadway using steel posts. The mounting height of signs on the right was approximately 5 feet, however those on the left appeared to be slightly lower. R.C.E. Cackler said the mounting heights on these signs were checked and they apparently met the minimum requirement of 5 feet. For daytime appearance, these signs were in satisfactory condition.

One problem was observed with the "Right Lane Closed 2000 Feet" sign on the right. It was placed approximately 100 feet west of another permanent sign approaching the Iowa 133 junction. At first it was thought that this close proximity of spacing would be a problem in viewing the construction warning sign. Upon further observation, it was decided that the construction advance warning sign could be seen early enough that it was possible to read and comprehend the message before passing the sign. Consequently, no change was needed or recommended on the location of this sign.

Barricades, Vertical Panels and Warning Lights

Vertical panels equipped with steady burn warning lights were used to form the taper from the two lane section to a single lane. All of these units were in satisfactory condition. One panel was observed to have the stripes sloping in the wrong direction. Upon further inspection later in the review, it was observed that this panel had been removed and replaced with one having the stripes sloping in the correct direction.

Markings

A white edgeline was used in front of the vertical panels forming the taper from a two lane section to a single lane. The marking was composed of tape and was in good condition. Also, the alignment on this marking was very good.

The laneline in the taper area had been removed by grinding similar to what was done for the eastbound approach. There did not appear to be any of the old epoxy marking remaining.

At county road S-14, the stop line for southbound traffic had been moved out onto the right lane for better visibility of traffic approaching from the east. The median edgeline for the westbound approach had been removed and placed on a widening unit on the shoulder to allow traffic to move over to the south side of the bridge. It appears that part of the original marking material was still in place. Further observations will be made on the nighttime review to see if it caused any operational problems.

Sequential Arrow Panel

A sequential arrow panel was in place on the right shoulder at the beginning of the taper. It was operating in the chevron mode. The arrow was in good condition and was found to be at approximately the correct mounting height.

Temporary Concrete Barrier Rail

Temporary concrete barrier rail was in place on the westbound approach and across the north bridge. The alignment of the taper section was very poor. R.C.E. Cackler was asked to have the contractor reposition these sections so they formed a reasonably straight taper as required by the plans.

Floodlighting

A luminaire was installed in the median to provide light on the south side of the temporary concrete barrier rail and the throat to the single lane across the bridge.

Operations

The traffic control plan for westbound traffic did not take into account or provide for the intersection of County Road S-14 approximately 500 feet east of the bridge project. To improve traffic operations, R.C.E. Cackler and other personnel from the District Office made the following modifications. The entire traffic control plan arrangement was moved eastward so that traffic was restricted to a single lane before reaching the intersection of County Road S-14. Traffic was then carried through the intersection and to the beginning of the construction project in a single lane on the median side of the roadway. Also, the right lane west of the county road intersection was closed off to prevent traffic from entering the construction work zone. The stop sign for southbound traffic was retained in its original position, but the stop line was moved forward onto the through pavement to a position 4-10

feet from the edge of the traveled lane. Finally, "Road Construction Ahead" signs were placed on S-14 both north and south of U.S. 30. These changes appeared to be necessary and resulted in a smoother and safer operation for traffic on U.S. 30 and County Road S-14. A copy of a file memo describing these changes is included with this report.

Accidents

R.C.E. Cackler indicated that there had been no accidents on the project since work started. The only indication of a safety problem was that several barricades and vertical panels had been hit by traffic.

Miscellaneous

At the east end of the south bridge, it was observed that contractor or employee vehicles were parked beyond the area which was protected by the temporary concrete barrier rail. R.C.E. Cackler was asked to remind the contractor that vehicles are restricted from this area and must be parked in protected areas or areas removed from traffic.

There was some discussion about the need for a sequential arrow on the eastbound approach to the south bridge. The traffic control plan did not provide for one. After discussing the pros and cons of the question, it was decided that the traffic control plan was correct because a sequential arrow panel may have directed traffic on the wrong side of the median nose and it may have been too bright for nighttime operations making it difficult for traffic to see the transition area ahead.

A cross road warning sign was in place facing eastbound traffic just west of the south bridge. It was at first thought that vertical panels and other traffic control devices used on this approach may adversely affect visibility of this warning sign, especially during nighttime hours. Upon further inspection later in the review, it was found that this sign was readily visible at all times and that the devices used for the construction project did not obstruct visibility to this sign.

Nighttime Review

Eastbound Approach

The first sign observed was a "Road Construction Ahead" sign with a 45 MPH advisory speed plate. The main sign was in satisfactory condition, but the advisory speed plate appeared dull.

The vertical panels and warning lights for the eastbound taper were readily visible on the approach. Reflectivity of the panels was fair to good. It was observed that some of the warning lights were not operating.

As was discussed earlier in the report, it was concluded that part of the original markings on the approach to the median nose should have been removed to allow traffic to more gradually transition over into the median lane.

The original markings on the median nose appeared to be rather dull. It was the consensus of the Review Team that they should have been renewed prior to

the project beginning to improve visibility for traffic on the eastbound approach.

At the bridge site, reflectors were found on the right on the temporary concrete barrier rail and on the left on the bridge curb. All were in place, but those on the bridge curb were partially obliterated by water and dirt from an earlier stage of the construction project. At the time of this review, they needed to be cleaned in order to restore the reflective qualities.

Some time within the past few hours, 4-6 of the vertical panels in the eastbound approach taper had been hit and damaged by a wide load. Inspection personnel were in the process of obtaining additional panels to replace those which were damaged.

Westbound Approach

The "Road Construction Ahead" signs were found to have marginal reflectivity. The "Right Lane Closed Ahead" signs would only be considered in fair to marginal condition. This was also true of the "Right Lane Closed 2000 Feet" signs. The symbol signs indicating that the right lane was closed ahead had satisfactory reflectivity. R.C.E. Cackler indicated that all of these signs had been checked with a retroreflectometer prior to construction beginning and they were found to have at least 50% or better of new reflective values.

The sequential arrow panel for westbound traffic appeared to be rather bright. R.C.E. Cackler was asked to check with the contractor to see if it

was in the dimmed mode. Subsequently it was found that the arrow was operating in the nighttime dimmed mode and no further action was needed.

The vertical panels and steady burn warning lights on the taper were found to be in good condition. Only one unit had a light which was not operating.

The white edgeline in front of the vertical panels on the taper was in good condition.

Delineators on the temporary concrete barrier rail and the bridge curb were in excellent condition.

Earlier in the report, mention was made of removal of the median edgeline and the possibility that some of the epoxy material was still in place on the pavement. Nighttime observations revealed that removal was complete and none of this material was visible.

Summary and Conclusions

As a result of this traffic control plan review, several deficiencies or areas where improvements could be made were noted. They included (1) sign at the west end of the project not installed vertically, (2) steel posts which may not be considered breakaway, (3) workmanship on edgelines not satisfactory, (4) contractor or employee vehicles parked in unprotected area, (5) some signs on westbound approach which appear to be lower than specifications allowed, (6) vertical panels with stripes in the wrong direction, (7) alignment of temporary concrete barrier rail for westbound approach not satisfactory, (8)

reflectivity of signs marginal in several cases and (9) sequential arrow which may be too bright for nighttime operation.

A positive item noted on the traffic control plan review was a modification made by the R.C.E. Office to improve operations. This involved moving the traffic control devices on the westbound approach easterly to allow for the intersection of County Road S-14.

Upon completion of the review, R.C.E. Cackler was asked to submit a report on the disposition of the items noted. At this writing, the report has not been received. R.C.E. Cackler was reminded that a report is required.

Subsequently, a memo was received and is included as a part of this final report. As indicated, all of the items noted were satisfactorily resolved.

In conclusion, several minor to moderate deficiencies were noted on this project. None were considered to have serious safety effects on traffic operations, but were in need of correction to improve traffic control.

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: Maintenance

DATE: October 18, 1984

ATTENTION: Dwight Stevens

REF. NO.: Story County
FN-30-5(54)-21-85

FROM: E. Tom Cackler

OFFICE: Ames Construction Residency

SUBJECT: Traffic Control Plan Review

The deficiencies noted on the traffic control plan review of August 28, 1984, were corrected soon after the review was conducted. The project has been completed and there were no reported accidents on the project.

I am sorry for the oversight in not responding to you earlier.

ETC:ld

IOWA DEPARTMENT OF TRANSPORTATION

To Office

Date July 31, 1984

Attention Project File

Ref. No.

From E. Tom Cackler 

Office Ames Construction Residency

Subject Traffic Control Plan Modification

The traffic control plan on sheet 20 of the project plans does not identify or consider the county sideroad S-14 just east of the bridges. This situation was reviewed with Roy Kuhn, Harold Dowden, and Don Houston on July 27th and 30th. The following modifications were decided upon:

Eastbound US 30

1. The eastbound bridge will operate as per plan.

Westbound US 30

1. The tangent portion of the lane closure for the westbound bridge will be extended to the east beyond the sideroad. This will result in the traffic being in a single lane before they get to the sideroad. All the advance signing and taper will be moved to the east by the distance the tangent portion is extended.
2. When the left lane is closed, the county sideroad to the north shall operate as it currently exists.
3. When the right lane is closed the county sideroad to the north will have access by an increased gap in the tangent portion of the vertical panels to allow for exit and through traffic movements on the sideroad. The westbound on lane from the sideroad will be blocked off. There should be enough room for vehicles to make a right turn from the through, stop condition with the right lane closed on US 30. The stop sign will remain as is but the stop bar will be moved so it is within 4' to 10' from the traveled lane.

S-14

1. 'Road Construction ahead' signs should be mounted both north and south of the intersection.
2. No other modifications needed on S-14 south of US 30.
3. Modifications as described above for S-14 north of US 30.

ETC:ld

cc: Ron Otto

WOODBURY COUNTY
TRAFFIC CONTROL PLAN REVIEW
AUGUST 29, 1984

SAFETY ENHANCEMENT WORK
ON INTERSTATE 29
FROM THE I-129 INTERCHANGE
TO THE SOUTH DAKOTA BORDER
IR-29-6(74)145--12-97

Members of the Review Team

The Review Team for this project consisted of the following individuals: Harold Dowden, Office of Construction; Fred Walker and Tom Vaughan, Office of Road Design, Design Safety Section; Richard Bolton, Sioux City R.C.E. Office; Jim Hogan, Federal Highway Administration; Jerry Solbeck, Office of Road Design (member at large) and Dwight Stevens, Office of Maintenance, Traffic Engineering Section. The Review Team leader was Dwight Stevens.

Project Description

This traffic control inspection report is for Project IR-29-6(74)145--12-97 on Interstate 29 from the I-129 interchange to the South Dakota border. This review included both daytime and nighttime inspections. The contractor on the project was Jensen Construction Company. The subcontractor providing traffic control was Roberts Warning Lights. Work consisted of safety enhancement improvements including the following. Removal of the box beam barrier rail in the median and replacement with a jersey section median barrier, reconstruction of median drainage, replacement of median curbs on bridges, modernization of steel beam guardrail, removal of cable guardrail and some minor lighting and signing modifications.

Plans required that traffic be maintained through the project at all times. The project was divided into five separate work zones, A through E. According to the plans, work was not to be conducted in two adjacent zones at the same time except that work could be under way in zones A and E simultaneously.

At the time of this inspection, separate lane closure arrangements were in place at four different locations northbound and three different locations southbound. In one instance northbound, a traffic control arrangement was being removed since work was completed in that area. Also, another traffic control arrangement was just being installed in anticipation of work beginning in that area. Active work was currently under way at seven different locations between the Floyd River bridge and the Riverside interchange. Approximately one-half of these were on the northbound lanes and one-half were on the southbound lanes.

Traffic control on this project was to be in accordance with Supplemental Specification 920, Detail Sheet 521-2A entitled "Traffic Control Layout for Lane Closure on Divided Highway for 55 MPH Speed Limit" and Detail Sheet 521-4 entitled "Traffic Control Layout for Work Area Not Requiring Lane Closure". Details were provided in the bridge reconstruction plans for temporary concrete barrier rail to be used between the construction work zone and the open lane of traffic.

Pay items for traffic control on this project included "Traffic Control" bid lump sum and "Temporary Concrete Barrier Rail" bid in lineal feet. All traffic control work was to be included in these two items or considered incidental to other bid items on the project.

Review Team Findings

Since this project included several separate traffic control setups the following sections of the report will cover each of these setups separately.

It will include comments on all traffic control devices used within one area rather than the usual breakdown of comments on each category of traffic control device.

Traffic Control on the Northbound Lanes

Location 1

Advance warning signs for this location included "Road Construction Ahead" signs, "Left Lane Closed Ahead" signs and symbol transition signs indicating that the left lane was closed ahead. In each case, signs were installed on the left and right sides of the roadway on skids with the bottom of the sign approximately 1 foot above the shoulder surface. Signs were in variable condition from fair to good and in some cases excellent. One problem noted with the "Left Lane Closed Ahead" sign in the median was that the corners on each side and on the bottom of the sign had been removed to allow horizontal clearance and clearance to place the sign over the box beam barrier rail in the median. It was the consensus of the Review Team that this type of sign modification was not satisfactory and that the sign should be replaced with one having smaller dimensions that will fit within the space available.

A sequential arrow panel was in place on the left shoulder at the beginning of the taper. It was operating in the chevron mode and was in satisfactory condition.

Type 2 barricades were used to form the taper transitioning traffic from two lanes to a single lane of traffic. Each barricade was held in place with a

sandbag on the base. It was observed that only four of the barricades were equipped with warning lights. The traffic control contractor was working in this area and it was concluded that missing warning lights would be placed by nightfall.

There was no Type 3 barricade in the closed lane at the end of the taper. Also, there were no Type 2 barricades at 1500 foot intervals in the closed lane. Again, it was concluded that the traffic control contractor would have these devices placed within a short time.

In the single lane area, vertical panels were in place on the centerline at approximately 300 foot intervals. Each panel was equipped with a steady burn warning light and these units were considered to be in fair to good condition.

The apparent reason why some devices were missing from this traffic control setup was that it was being installed at the time of the review.

Location 2

Advance warning signs for this location included "Road Construction Ahead" signs, "Right Lane Closed Ahead" signs and transition symbol signs indicating that the right lane was closed ahead. All of these units were in place on both the left and right shoulders and were mounted on skids with the bottom of the sign approximately 1 foot above the pavement surface. Signs were considered to be in good to excellent condition.

The symbol transition signs were also supplemented with 45 MPH advisory speed

plates on separate supports. These were located 30-40 feet beyond the signs which they applied to. This type of arrangement should not have been permitted. The advisory speed plates should be mounted on or immediately adjacent to the sign which they apply to.

A sequential arrow was in place on the right shoulder at the beginning of the taper. It was operating in the chevron mode and was in satisfactory condition.

Type 2 barricades were used on the taper transitioning from two lanes of traffic to a single lane. Each unit was equipped with a steady burn warning light. A problem noted with the placement of these devices was that two Type 2 barricades were located in front of the sequential arrow on the right shoulder. This was incorrect according to the plans. All Type 2 barricades should have been placed beyond the sequential arrow panel, i.e., the sequential arrow panel should have been in advance of all barricades used on the taper.

A Type 3 barricade was in place in the closed lane at the end of the taper.

Temporary concrete barrier rails were in place across the bridge over the Floyd River.

At the time of the review, the traffic control devices which make up Location 2 were in the process of being removed.

Location 3

Advance warning signs for this location included "Left Lane Closed Ahead" signs and symbol transition signs indicating that the left lane was closed ahead. The latter were also supplemented with 45 MPH advisory speed plates on separate supports. Again, these signs were incorrectly installed at a point 30-40 feet beyond the signs which they applied to. The mounting and condition of all the signs in this series were similar to those described at the previous two locations.

A sequential arrow panel was in place on the left shoulder at the beginning of the taper. It was operating in the chevron mode. The arrow panel was mounted at the proper height and appeared to be in good condition.

Type 2 barricades were used for the taper transitioning from two lanes of traffic to a single lane. These were supplemented with steady burn warning lights and were held in place with sandbags. As was the case for Location 2, two of the Type 2 barricades were placed in front of the sequential arrow panel. They should have been moved downstream to a point beyond the location of the arrow panel to fill an apparent gap in the taper.

A Type 3 barricade was in place at the end of the taper in the closed lane.

Temporary concrete barrier rail was used to separate the open lane of traffic from the construction work area on the left side of the bridge over Wall Street. A short distance further downstream, temporary concrete barrier rail was also used to close off the left lane at the Pierce/Nebraska Street

interchange. The leading end of the temporary concrete barrier rail was located approximately in the center of the inside or closed lane. This was an undesirable condition because traffic could collide with the end of the barrier causing a rather serious accident. Plans called for the end of the temporary concrete barrier rail to be placed at the inside edge of the inside lane closest to the median. R.C.E. Bolton said that the reason the temporary concrete barrier rail was opened up was to provide space for the contractor to transport material into the construction work area. He said it has been a problem to police the contractor and keep the temporary concrete barrier rail positioned safely as required by the plan.

Since Location 2 was being removed, the traffic control setup for Location 3 could be considered redundant and not necessary. The arrangement at Location 1 moving traffic into the right lane could have been carried forward to Location 3 without repeating a left lane closure.

Another problem noted at Location 3 was the placement of the sequential arrow panel. It was installed a short distance in advance of the exit for the Wall Street interchange. It was believed by members of the Review Team that it could be misinterpreted as requiring an exit from the mainline at this location.

Location 4

Advance warning signs for this location included "Road Construction Ahead" signs, "Left Lane Closed Ahead" signs and symbol transition signs indicating that the left lane was closed ahead. These traffic control devices were

installed on both the left and the right shoulders on skids approximately 1 foot above the pavement surface. As was the case at previous locations, the left, right and bottom corners had been removed from the "Left Lane Closed Ahead" sign and the symbol transition sign in the median. These signs should be replaced with 30" signs which will more readily fit in the limited space available. A 45 MPH advisory speed plate was used with the left symbol transition sign. It was placed on the median approximately 30 feet beyond the transition sign. As in previous cases, this advisory speed plate should be installed immediately adjacent to the sign it applies to. The right symbol transition sign was also equipped with a supplemental 45 MPH advisory speed plate. It was improperly secured and at the time of the review was laying on the ground on its side in front of the transition sign.

A sequential arrow panel was in place on the left shoulder and was operating in the chevron mode.

Type 2 barricades were used for the taper transitioning from two lanes of traffic to a single lane. One of these Type 2 barricades was placed in front of the sequential arrow panel. At the time of the review, five Type 2 barricades had collapsed and were laying on the pavement surface. While the Review Team was watching, another Type 2 barricade fell over as a truck passed. R.C.E. Bolton will have the contractor reinstall these barricades in a more secure manner so they remain in place.

Within this traffic control series, a "Road Construction Ahead" sign was in place. There was no apparent need for this sign and it probably should be removed as an unnecessary device.

Yellow delineators were used on the temporary concrete barrier rail on the right and white delineators were used on the bridge curb on the left for the bridge over Hamilton Boulevard.

Vertical panels were used at 300 foot intervals between the lane which was open to traffic and the construction work zone. Also Type 2 barricades were used at 1000 foot intervals in the closed lane. All of these devices were considered to be in fair condition. They continued for some distance up to the Riverside interchange where work in the median ended.

Traffic Control in the Southbound Lanes

Location 5

Advance warning signs for this location included "Road Construction Ahead" signs, "Left Lane Closed Ahead" signs and symbol transition signs indicating that the left lane was closed. These traffic control devices were in place on both the left and the right shoulders and were skid mounted approximately 1 foot above the pavement surface. They were considered to be in fair to good condition. The symbol transition signs were supplemented with 45 MPH advisory speed plates at a location 40-50 feet beyond the main sign. As previously noted, these separate installations are improper. The right symbol transition sign was placed just off the edge of the shoulder on the foreslope. As a result, it was tilted considerably. Members of the Review Team moved this sign up on the shoulder and also moved the 45 MPH advisory speed plate back to a point adjacent to the transition sign. This made a much better arrangement

which should be used by the contractor at all other locations where advisory speed plates are separated from the signs which they apply to.

For southbound traffic on the on ramp at the Riverside interchange, advance warning signs included a "Road Construction Ahead" sign and a "Left Lane Closed Ahead" sign. The Review Team thought that use of the "Left Lane Closed Ahead" sign was improper because there was no left or right lane on the ramp. Traffic on the approach from this ramp operated in a normal manner and entered the mainline in the right lane of traffic. It was suggested that the "Left Lane Closed Ahead" sign be removed from the ramp.

A sequential arrow panel was in place on the left shoulder and was operating in the chevron mode.

Type 2 barricades were used for the taper transitioning from two lanes of traffic to a single lane. They were properly installed and in good condition. The only exception was that two Type 2 barricades were installed in advance of the sequential arrow panel.

A Type 3 barricade was in place in the closed lane at the end of the taper.

Vertical panels were installed on centerline between the construction work zone and the open lane of traffic. Type 2 barricades were used in the closed lane at 1000-1500 foot intervals.

Location 6

Advance warning signs for this location included "Road Work Ahead" signs, "Left Lane Closed Ahead" signs and symbol transition signs indicating that the left lane was closed ahead. The latter were supplemented with 45 MPH advisory speed plates. The only difference observed with this series of signs was that the first one used the words "Road Work" rather than "Road Construction".

A sequential arrow panel was in place in the lane which had already been closed by traffic control at Location 5.

A series of Type 2 barricades was in place beyond the sequential arrow between the lane which was open to traffic and the construction work area.

Further ahead, vertical panels were installed at 300 foot intervals on centerline. Also, Type 2 barricades were placed at intervals in the closed lane.

All of the above described traffic control devices at Location 6 could be considered unnecessary and redundant since traffic control devices at Location 5 restricting traffic to the right lane could have been continued through Location 6.

Temporary concrete barrier rail was in place on the bridge at the Pierce/Nebraska interchange. The leading end of this barrier rail was located slightly out in the lane adjacent to the median.

Temporary concrete barrier rail was in place on the bridge at the Wall Street interchange. The exposed end of the barrier rail was approximately in the center of the closed lane. A car was parked immediately in front of the barrier. As was the case for a location in the opposite lanes for northbound traffic, the end of this temporary concrete barrier rail should have been located at the median edge of the through roadway. It was suggested that the contractor be required to adjust the rail as required by the plan for safer operation.

Location 7

Advance warning signs for this location included "Right Lane Closed Ahead" signs and symbol transition signs indicating that the right lane was closed ahead. Again, 45 MPH advisory speed plates were located at a point 50 feet beyond the symbol transition signs. These advisories should be adjusted back to a point adjacent to the symbol transition signs.

No "Road Construction Ahead" sign was used at this location. Because of other work and traffic control devices a relatively short distance north of this point, "Road Construction Ahead" signs were probably not needed.

A sequential arrow panel was used on the right shoulder in advance of the taper. It was operating in the chevron mode and was in good condition.

Type 2 barricades were used on the taper transitioning from two lanes to a single lane of traffic. As in previous cases, two barricades were placed in front of the sequential arrow. They should have been moved to a location

beyond the sequential arrow.

Temporary concrete barrier rail was used to close off the right lane at the Floyd River bridge.

Nighttime Review

Observations in Northbound Direction

Advance warning signs at Location 1 were in satisfactory condition, but were not considered exceptional.

The sequential arrow panel at this location was considered to be on the bright side.

All steady burn warning lights required on traffic control devices at Location 1 were in place. This is the area where the traffic control contractor was working in the afternoon. One deviation was that two Type 2 barricades were used at the beginning of the closed lane instead of a Type 3 barricade.

Vertical panels and Type 2 barricades in this area had good to excellent reflectivity. All were equipped with operating steady burn warning lights.

All of the traffic control devices observed at Location 2 during the daytime review had been removed.

Reflectors on the Floyd River bridge were in excellent condition.

No flashing warning light was used at the end of the temporary concrete barrier rail at the Wall Street interchange in Location 3.

At Location 4, some of the advance warning signs were in satisfactory condition and others were marginal.

The sequential arrow at Location 4 was on the bright side.

Several steady burn warning lights on Type 2 barricades near the Hamilton Boulevard interchange were not operating. It was estimated that as many as one-half of them were not functioning.

The end of the temporary concrete barrier rail at the Hamilton Boulevard bridge did not have a flashing warning light in place.

Reflectivity on barricades and signs beyond the Hamilton Boulevard interchange was satisfactory. Most of the warning lights in this area were operating properly except there may have been a few which were out.

Observations in Southbound Direction

Advance warning signs at Location 5 were in acceptable condition.

The sequential arrow panel at this location had about the right intensity for nighttime operation.

Type 2 barricades on the taper had good reflectivity. All had steady burn

warning lights. Only a few of these lights were out or were dim.

The condition of traffic control devices in Location 6 was approximately the same as those for the previous section. All devices were considered to be satisfactory with no criticism to be made.

At the Pierce/Nebraska interchange, temporary concrete barrier rail was in place. A steady burn warning light was used on the leading end of this barrier rail rather than a flashing warning light which would apply to a spot location.

Temporary concrete barrier rail was in place across the Wall Street bridge. Reflective devices were installed on the leading end of the barrier rail, but were missing from the far end.

The sequential arrow panel at Location 7 was considered to be on the bright side. It should have been dimmed somewhat.

At the Floyd River bridge, reflectors were to be installed on the bridge curb at the median edge of the bridge. They were in place on the leading end, but were missing from the far end of the bridge.

Accidents

R.C.E. Bolton said that there had been no vehicular accidents on this project since work started. The only incidents that he is aware of are minor property damage cases caused by aggregate or material dropped or thrown on passing

vehicles. These are not considered to be reportable accidents, but only claims for repair of minor damage.

Speed Limit

At the time of the review, 45 MPH advisory speed plates were used at several locations on the project. It was stated that on August 14, a Commission Order was approved establishing a 45 MPH regulatory speed limit over the entire length of the project. This information was sent out on August 15. R.C.E. Bolton said that he was not aware of this action and that since the 45 MPH regulatory had been approved, it would be posted in the next few days. This would then eliminate the need for 45 MPH advisory speed plates and all of them would be removed.

Summary and Conclusions

As a result of this traffic control plan review, several deficiencies or areas where improvements could be made were noted. They included (1) signs with corners and bottom clipped off, (2) end of temporary concrete barrier rail located out in the center of the closed lane, (3) Type 2 barricades near the Hamilton Boulevard interchange collapsed on the pavement, (4) 45 MPH advisory speed plates located beyond the sign which they applied to, (5) Type 2 barricades in front of sequential arrow panels, (6) redundant signs and traffic control setups in area where lane was closed upstream, (7) improper use of "Left Lane Closed Ahead" sign on ramp, (8) up to 1/2 of steady burn warning lights not operating at Location 4 northbound and (9) sequential arrows which were too bright for nighttime operation.

On August 31, 1984, R.C.E. Bolton submitted a report on his observations and actions which were to be taken on items discussed at the traffic control plan review. A copy of his memorandum is included with this report. Insofar as possible, corrective action was to be taken on those items which were observed and brought up on the review. This traffic control plan was beneficial in focusing attention on many items of traffic control and identifying areas where improvements could be made.

IOWA DEPARTMENT OF TRANSPORTATION

Office	Maintenance	Date	August 31, 1984
Attention	Dwight Stevens	Ref. No.	Woodbury Co. Barrier Rail IR-29-6(74)145
Person	Richard B. Bolton B		Jensen Const. Co.
Address	Sioux City Construction Residency		
Subject	Status of corrections requested by review team.		

At the time the team visited the project the contractor was in the process of changing from working in one set of zones to another. On Tuesday, 28 Aug, the active zones were as seen on attached Tab A. By Wednesday, 05 September, the zones of activity are as shown on Tab B. In that week of time the contractor repositioned more than six hundred ten foot barrier rail sections, two dozen forty-eight inch signs, one hundred class two barricades, and a thousand vertical panels. The review team saw the project in the middle of all that changing.

For this reason, I won't be able to apply some of the teams recommendations to the signing posted and viewed in the review. I will remember these as concepts and apply to future postings. Here is an example. In posting signing for the zone closures shown in Tab B, only four W20-1, Detail 521-2A, Road Construction Ahead signs will be posted. These will be at entry to zone "A" north bound and "E" south bound. At the other sites we need only to follow the concept of "telling the traffic what to do next", and need not remind traffic they are in a construction zone. Also, the change over in zones will automatically eliminate the situation where, in north bound roadway, before Wall Street, the sequential arrow appeared to direct an off exit at Wall Street. We will have to be vigilant in preventing a repeat of this arrangement. The redundant signing will also automatically disappear. Although, I still think that the redundant signing posted south bound between Hamilton and Pierce, though perhaps an overkill, was wise in concept. That curve between the reinforced earth walls and below the bridges was a dim area. The automatic brightness control on the sequential arrow, south bound, advance to Wall Street was checked.

The W13-1, detail 521-2A, advisory speed plates will be eliminated next week. Maintenance will post the regulatory 45 mph signing. We have asked the contractor to attempt to obtain some detail 541 tapered ends to be placed in advance of blunt ends of the completed median barrier segments where adjacent to traffic.

The practice of using "clipped" signs, which crept into this project, will probably survive it. These signs are posted in narrow median locations where there isn't room to accommodate the sixty-eight inch width of a standard sign. I agree with the team (and Harold thought I never agreed with anything) that the use of "clipped" signs must stop. I agree that eliminating left, median side, signing in narrow medians is not an acceptable alternative. And so I also agree that use of a thirty inch sign is the best alternate. Ideally forecasting the need for down sized median signs should occur on the field exam, and be included in the plans.

It was unfortunate, in a way, that the approach tapers of the concrete barrier rail layouts were different from what was shown on the plans. Many of us connected with the project had reminded contractor personnel about this difference previously. But, in a way, I think it is beneficial that the team had an opportunity to view the situation. I think this is another of those situations where we have prepared a detail which satisfies our need at apparent minimum cost, but places the contractor at a disadvantage. In this instance, we have satisfied our goal of providing the most up to date system of positive guidance to get cars to the other side of the bridge. But, we didn't consider the contractor's special need for through access at these bridges. Slipforming bridge barrier rails is state of the art. In this instance the compressed working period mandates this less time consuming technique. An essential element of this slipform technique is continuous supply of low slump portland concrete. He cannot maintain this continuous supply by trying to jockey trucks in from just one end. And so for this and other reasons equally valid to him, he periodically adjusts the approach taper. As, I said, he is at a disadvantage, and this instance is no exception; when the contractor is at a disadvantage, the Residency has a policing problem.

Now, there are a couple of ways of eliminating this disadvantage. The preferred would be to detail a means of positive vehicle guidance that also afforded free access to the work side. If, indeed, no reasonable alternate exists, and the Residency is to be stuck with a policing problem; then provide policing tools. There are a number of situations, especially in signing, where policing is the only alternative. At present our only policing tools are the "paper tiger" tools of requests or the strategic thermo nuclear tools of withholding payment or shut down. Tab C attached is a copy of a conventional forces level of policing. It is a draft of amendment to the 108 detail, traffic control plan.

Dwight, as I told you on the phone, I really appreciate the approach of the team. I had something of a closed feeling going into the view, like the feeling I usually get on field exams. But, after a very few moments I developed an open feeling, and have a positive expectation toward your next visit.

RBB:mab

ATT.

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General Summary

The composition of Review Teams for the nine projects inspected was in conformance with or exceeded that specified in the Procedural Plan. The Urban and Secondary projects had nine members each. For State projects, one had eight members, five had seven members and one had six members. In all cases, a member at large was included. These came from other Engineering Offices, Safety Offices and the Office of General Counsel.

Before discussing deficiencies found, items which were considered exceptionally good or improved traffic control on the project were as follows. In several instances, special note was made of signs which were in new or excellent condition. Also, most sequential arrow panels were properly placed and in good to excellent condition. Temporary signals used on the Southeast 14th Street project functioned very well as did the one lane operation on the Grundy County project. Raised pavement markers used on the Southeast 14th Street project were installed with good alignment and were well maintained. Individual items which improved operations included adding a closing taper at the end of a single lane section, adding barricades where traffic could inadvertently enter a construction work zone, placement of supplemental advisory speed plates where traffic needed to be slowed down, removal of overlapping or conflicting signs, adding special signs telling the motorist the project length and modification of the traffic control arrangement to provide for a side road which was not considered in developing the traffic control plan.

The most frequent problem found with signing was the need to remove unnecessary or improper signs. This condition existed at eight separate

locations. The second most prevalent problem with signing was the need to add or place signs not specified on the traffic control plan. This condition was noted at six different locations. Lack of attention in mounting signs was also a problem. In two cases, signs were improperly oriented. In two other cases, signs were placed where they were obstructed by trees or power poles. On two projects, signs had fallen over because they were not securely mounted. In two cases, signs were mounted too low. Improvement has been noted in offsetting of signs and placement of signs in a vertical or plumb position. Only one each of these conditions was found on the projects inspected. Attention still needs to be paid to offsetting signs further. Most traffic control plans recommended a minimum two foot offset from the edge of the shoulder. On future traffic control plans, it is suggested that this distance be increased to at least six feet. In two instances, the condition of signs was not considered satisfactory for daytime use and in one case, signs had poor nighttime reflectivity. Incorrect messages were used on signs at two locations. Other minor problems included a sign which was not equipped with required red flags and signs which had been modified by cutting corners off so they would fit in the mounting space available.

The most frequent problem noted with barricades, panels and warning lights was the need to add additional units or to reposition units which were already on the project. This was noted in at least three cases. On two projects, barricades were found which were considered to be in marginal to poor condition. On the Woodbury County project, several barricades were found laying on the pavement, In very few instances, barricades were used with the stripes sloping in the wrong direction. Since this is a subtle requirement, it was not considered to be a problem.

On one project, an improper yellow centerline was found between two No Passing Zone lines. Where paint was used for a temporary marking, the application rate sometimes was not sufficient to produce a satisfactory line. In only one instance, debris or dirt was found on the markings. In previous years, this was a problem which was frequently observed. Other minor problems included markings which extended too far into an intersection and edgeline markings which had been partially obliterated by asphalt placed adjacent to the roadway.

On four of the nine projects, contractor and/or employee vehicles were parked improperly at locations too close to the traveled way. The traffic control plans for these projects specifically stated that vehicles be parked off the project or 30-50 feet from the traveled way. This is a chronic problem which has been noted in previous years and continues to be observed. Those in charge of traffic control on projects need to pay closer attention to this problem. Other operational problems included a contractor vehicle making an unsafe maneuver at a crossover on a heavily traveled Interstate route and inattentive flaggers working adjacent to the construction zone.

On each project, there was discussion on accidents which had occurred since construction activity commenced. On four of the nine projects, there had been no accidents. Two adjacent projects on Interstate 80 had a total of four accidents. The urban project in West Des Moines had two accidents. The most accidents were recorded on the Southeast 14th Street project in Des Moines. Available information indicated that there were at least eleven accidents since work commenced. As noted in the report for this project, this may not

be alarming taking into consideration the length of the project, traffic volumes being carried and the fact that the project had several major cross street intersections. In reviewing the accident conditions on these projects it was concluded that construction traffic control was not the cause nor did it contribute to the incident.

Some problem in Ks. City Area

One miscellaneous problem which was frequently noted was sequential arrows which were too bright for nighttime operation. This was observed on three projects. Since it is a factor which is noted each year, construction inspection personnel should pay closer attention to make sure that arrows properly dim for nighttime operation. Another miscellaneous problem regarded improper alignment, position and connecting of temporary concrete barrier rails. These problems were noted on three projects. Other miscellaneous problems included a pole located in a median, sign trailers which were considered to be a hazard to traffic and lack of a traffic control plan to completely cover a situation where standards did not apply.

In all cases, reports were received from the Resident Construction Engineer or other inspection personnel on disposition of the items noted on the traffic control plan review. In most cases, these reports are included with the individual project reports.

In summary, traffic control plan reviews were completed in a timely manner in accordance with the Procedural Plan. Many of the conditions which have been observed in previous years continue to be present on the projects reviewed. The traffic control reviews were beneficial in focusing on the need to pay closer attention to traffic control matters. Project managers should be

encouraged to review the contents of this report to become aware of problems which typically exist. Ample time should be devoted to traffic control so that requirements in the standards and plans are met to maximize safety for the motorist and minimize the potential for tort liability as a result of accidents.

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