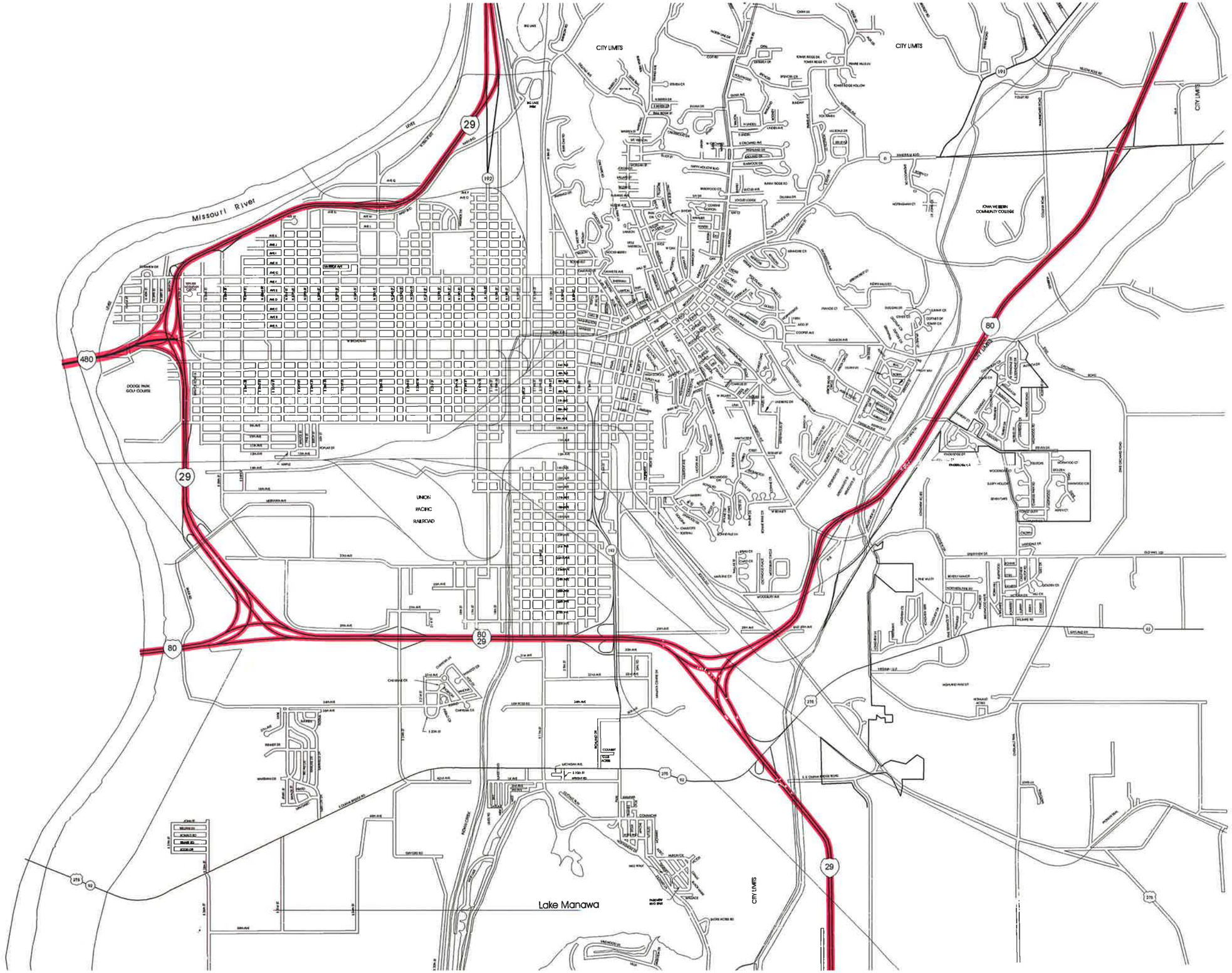

Council Bluffs Interstate System Needs Study

Council Bluffs, Iowa

MAPA
Metropolitan Area Planning Agency

Phase III Report

Detailed Assessment of Preferred Interchange Alternatives

October 1998

HDR

HDR Engineering, Inc.

In Association with:

hgm ASSOCIATES INC.

COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

Phase III Report
Detailed Assessment of Preferred Interchange Alternatives

Prepared For

Metropolitan Area Planning Agency

By

HDR Engineering, Inc

in association with

HGM Associates, Inc.

October 1998

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CHAPTER 1: INTRODUCTION

1.1 STUDY PURPOSE

The purpose of the Council Bluffs Interstate System Needs Study is to identify the needs of the system and recommend improvements to the structural condition, capacity and functionality of the system through a cost effective combination of rehabilitation and reconstruction. Successful attainment of these objectives will result in the preparation of a prioritized plan that the Metropolitan Area Planning Agency (MAPA), the Iowa Department of Transportation (IaDOT) and the City of Council Bluffs can use as a guide in the development of short term and long term improvements for the interstate system.

The study area is shown in Exhibit 1. The general boundaries of the study include:

To the north: I-29, north of Iowa Highway 192 (N. 16th Street)
To the south: I-29, south of US Highway 275/Iowa Highway 92
To the east: I-80, east of US Highway 6 (Kanesville Boulevard)
To the west: Missouri River crossings of I-80 and I-480

The study area includes 17 miles of mainline freeway and 14 interchanges. These interchanges include three system interchanges, seven full interchanges, and four partial interchanges.

1.2 STUDY APPROACH

The project approach being utilized on the Council Bluffs Interstate System Needs Study provides a process to answer the following key questions:

1. What are the current operational and safety problems on the freeway system?
2. What are the long term system needs? How can the freeway system be rehabilitated or reconstructed to address both current problems and long term needs?
3. What are the costs (construction, right of way, environmental, socioeconomic) of a program to rehabilitate/reconstruct the Council Bluffs Interstate System?
4. How can a long range program be implemented in stages to assure overall plan compatibility and reasonable operation during each stage?
5. Will individual improvements fit with each other or the system as a whole?

The study approach includes the following three phases:

- Phase I - Analysis and Evaluation of the Existing System (The focus of Report I)
- Phase II - Development of Improvement Alternatives (The focus of Report II)
- Phase III - Development of a Recommended Plan

Initially, it was intended that the Phase III Report would serve as the final study report. During Phase III, however, it was determined that the development of a recommended plan would benefit from an agency review of the detailed concepts. Therefore, independent reports will be prepared for Phase III and for the overall study.

This report serves as the Phase III report, documenting the detailed assessment of the preferred interchange alternatives that were identified in Phase II. It identifies the alternatives that are recommended for inclusion in the recommended plan based on input from the Technical Advisory Committee (TAC). It should be noted, however, design modifications may be made to these alternatives as part of the development of the recommended plan.

A Final Report for the study will be prepared and will include a brief summary of the study process and findings (i.e., an Executive Summary). The reports for Phase I, II and III will be referenced as companion documents. The Final Report will include 11"X17" plans of the recommended plan and the implementation plan for the corridor.

1.3 SUMMARY OF PHASE III ACTIVITIES

The focus of this report is on the procedures and findings of Phase III. As noted above, the focus of this phase of the study was on the development and assessment of detailed plans for the preferred interchange alternatives that were identified in Phase II. These alternatives were developed at the single-line level of detail in Phase II. For Phase III, new basemapping was obtained to facilitate computer-aided design activities. The detailed plans were developed using the design criteria documented in the Phase II report. Phase III activities also included updates to the costs and impacts of the preferred alternatives. Finally, an environmental review of the preferred alternatives was also performed to identify issues warranting further environmental study during future project development phases.

1.4 REMAINDER OF THE REPORT

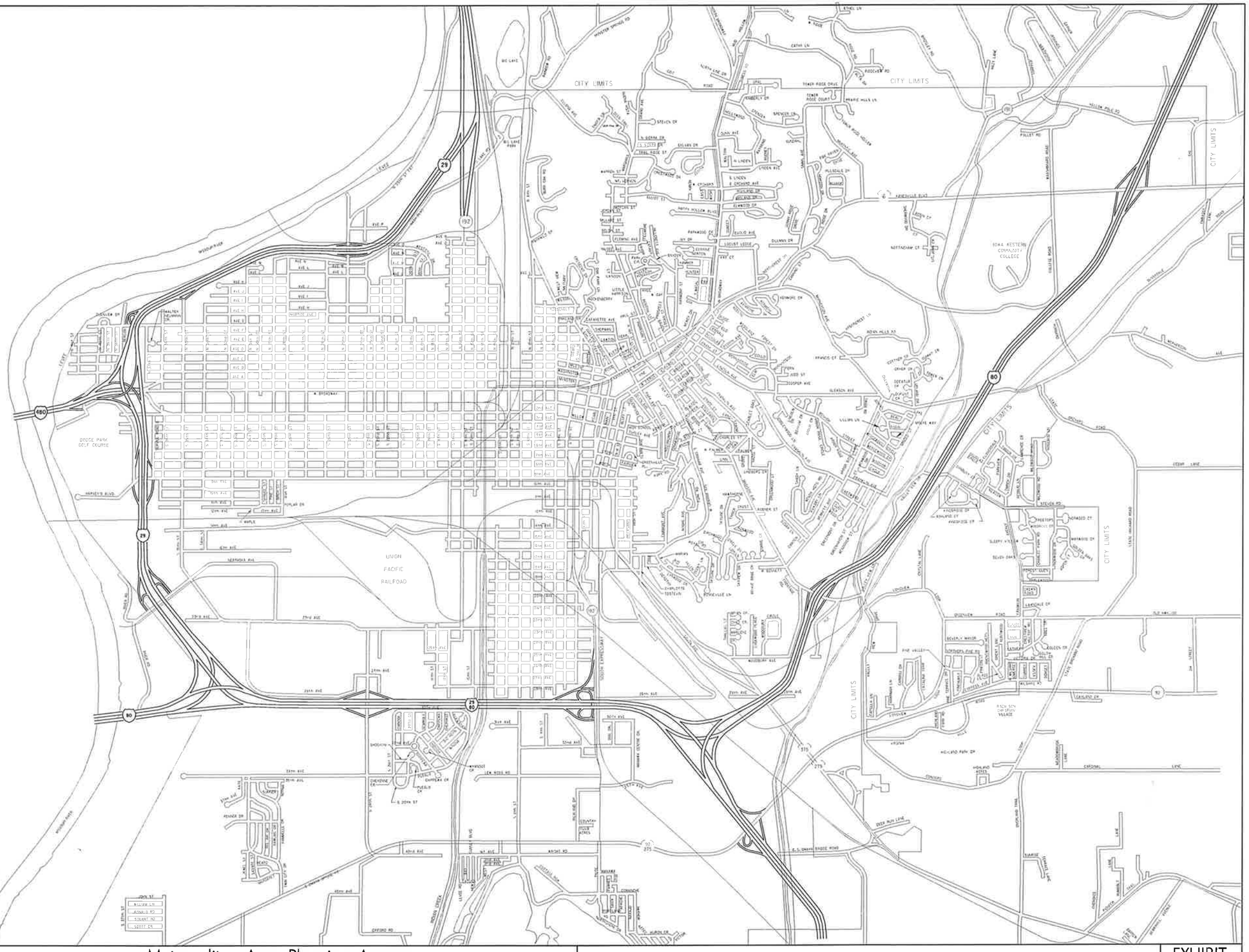
The remainder of this report contains:

- Chapter 2: Phase III Activities
- Chapter 3: Summary of Preferred Alternatives
- Appendix A: 1"=200' Plans of Preferred Interchange Alternatives
- Appendix B: Quantity / Cost Estimates of Preferred Interchange Alternatives

1.6 COMPANION REPORTS

This is the third of three main reports which will document the procedures and findings of the Council Bluffs Interstate System Needs Study. The report for Phase I, entitled " Analysis of Existing Conditions", was published in September of 1997 and described the existing safety, operational and physical conditions of the study area. The report for Phase II, entitled "Development of Improvement Alternatives", was published in August of 1998 and described the future volume conditions in the study area and identified alternative solutions (at a single-line level of detail) to existing and future deficiencies.

NORTH



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Metropolitan Area Planning Agency

COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT

OCTOBER 1998

STUDY AREA

EXHIBIT 1

CHAPTER 2: PHASE III ACTIVITIES

2.1 SUMMARY OF PHASE II RECOMMENDATIONS

Basic Lanes

One additional basic lane (providing a six-lane section) is recommended on I-80 between the Missouri River and the Madison Avenue/I-80 interchange. For the remainder of I-29 and I-80 in the study area, the four basic lanes that are currently provided will provide acceptable traffic operations through the Year 2020. The existing eight lanes of traffic on the I-480 bridge (six basic lanes and two auxiliary lanes) will provide adequate mainline capacity for the Year 2020.

Additional Lanes Across Missouri River

Restriping of the existing bridge will serve as an acceptable short-term improvement until a long-term solution is implemented. The preferred long-term solution is to construct a second bridge to serve traffic in the westbound direction and retain the existing bridge to serve traffic in the eastbound direction. Mainline widening on the Omaha side will likely occur on the north side of the existing mainline to minimize impacts to the Henry Doorly Zoo.

Additional Lanes Between Missouri River and Madison Avenue/I-80 Interchange

Two alternatives for providing six basic freeway lanes were considered. Alternative 1 would be to widen to the inside and provide an urban section (median barrier). Alternative 2 would retain a rural section by retaining the depressed center median. It would add the additional mainline lane to the outside and provide 12-foot inside and outside shoulders. Alternative 1 (Urban Section) is recommended because it will have the fewest right-of-way impacts, will reduce the need for retaining walls, and will provide positive separation between opposing traffic flows (i.e., a median barrier). Alternative 1 will require major interchange ramp reconstruction. However, most ramps will be reconstructed as part of corridor rehabilitation.

Auxiliary Lanes

Auxiliary lanes have been included in a number of the improvement concepts for the system and service interchanges in the study area. In general, all auxiliary lanes have been introduced with one-lane or two-lane on-ramps. The termination of the auxiliary lanes has been accomplished by either a two-lane off-ramp or by tapering the lane just downstream of an off-ramp. Alternatives for providing the recommended auxiliary lane on northbound and southbound I-29 between Nebraska Avenue and 9th Avenue are discussed in the next section.

2.2 ALTERNATIVES FOR UPRR BRIDGE

The existing UPRR bridge over I-29 will be impacted by the recommended auxiliary lane on northbound and southbound I-29 between Nebraska Avenue and 9th Avenue. (See Exhibit 22 for an aerial view of this area.) The existing bridge supports five tracks which are all part of the Council Bluffs Yard. Three of the tracks are mainline tracks and the other two are the longest tracks in the yard. West of the bridge over I-29, the five tracks merge to two tracks which cross the Missouri River. East of the bridge over I-29, the five tracks continue eastward. A bridge over 35th Street supports the same five tracks.

The existing cross section of I-29 under the UPRR bridge and two alternatives are shown in Exhibit 2. The existing cross section provides 12' travel lanes, 14.5' left shoulders and 6' right shoulders. The right shoulder widths are non-standard based on a minimum width of 10'. The existing vertical clearance is 18'.

Alternative 1 would retain the existing UPRR bridge and provide three 12' travel lanes in each direction. To accomplish this, non-standard left (2.5') and right shoulders (6') would be provided. Such non-standard design features would require approval of FHWA. FHWA's review of a request for non-standard features would likely include consideration of cost savings, safety impacts, right-of-way impacts and environmental impacts.

Alternative 2 would provide a new UPRR bridge. This alternative was discussed with representatives of the UPRR. The following points summarize the current position of the UPRR regarding a new bridge:

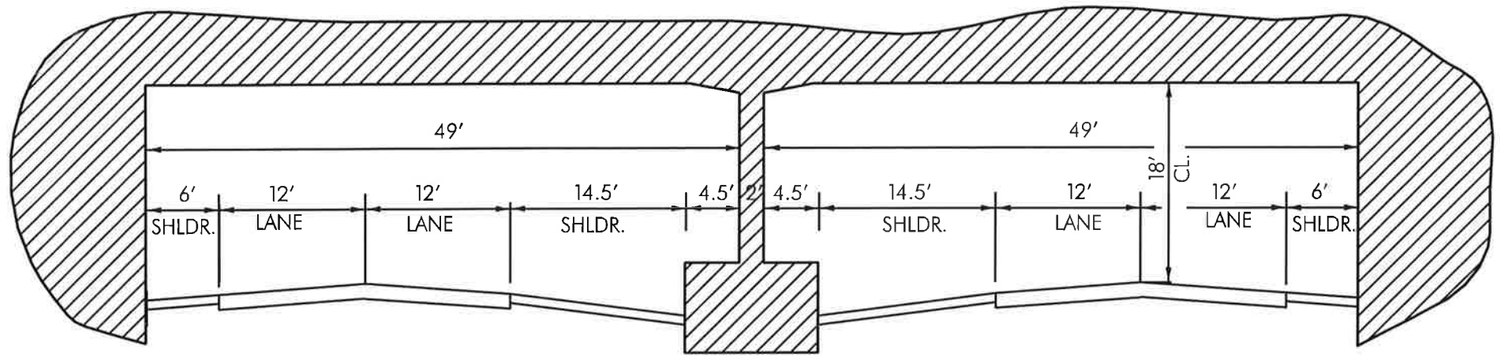
- The UPRR will not consider reducing the number of tracks on a new bridge (i.e., a new bridge would be required to support five tracks).
- It is unlikely that any of the tracks could be temporarily closed during construction of a new bridge.
- From an operating standpoint, it is possible that all five tracks could be shifted to a new (and permanent) alignment. This would enable a new bridge to be constructed adjacent to the existing bridge. However, this would require approval from the UPRR's Engineering Department.

Based on the above points, Alternative 2 includes construction of a new permanent I-29 bridge for five tracks adjacent to the existing bridge. From a preliminary review of potential impacts of such a bridge, it was determined that the best location of a new bridge would be on the south side of the existing bridge. Alternative 2 also includes a new permanent 35th Street bridge for five tracks adjacent to the existing bridge. A new bridge is necessary at this location given its proximity to I-29 (i.e., relocated tracks cannot match back into existing tracks prior to the 35th Street bridge).

Based on the embankment height of the existing tracks, Alternative 2 would require a significant amount of additional right-of-way on the south side of the existing tracks. The order-of-magnitude cost for this alternative is approximately $20 million.

Construction of a temporary shoefly and bridge was also considered. This would allow a new bridge to be constructed on the existing alignment. This option would also require a temporary bridge at 35th Street. The UPRR would require that both bridges accommodate five tracks. The cost for this option would be considerably higher than Alternative 2. Based on the discussions with UPRR representatives, this option was eliminated from consideration.

Alternative 2 was identified by the TAC as the preferred alternative. In general, it was felt that at this preliminary level of assessment, it is unlikely that FHWA would approve of non-standard features.



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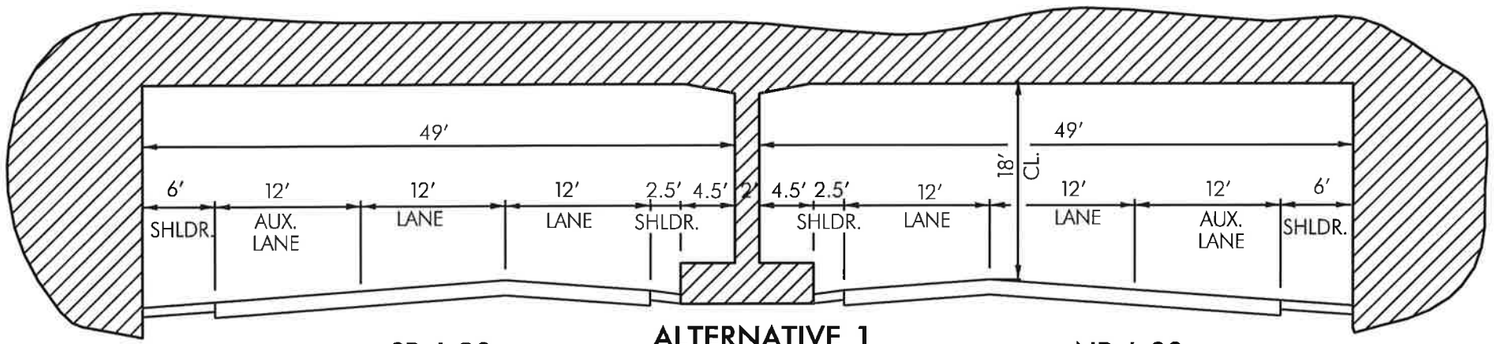

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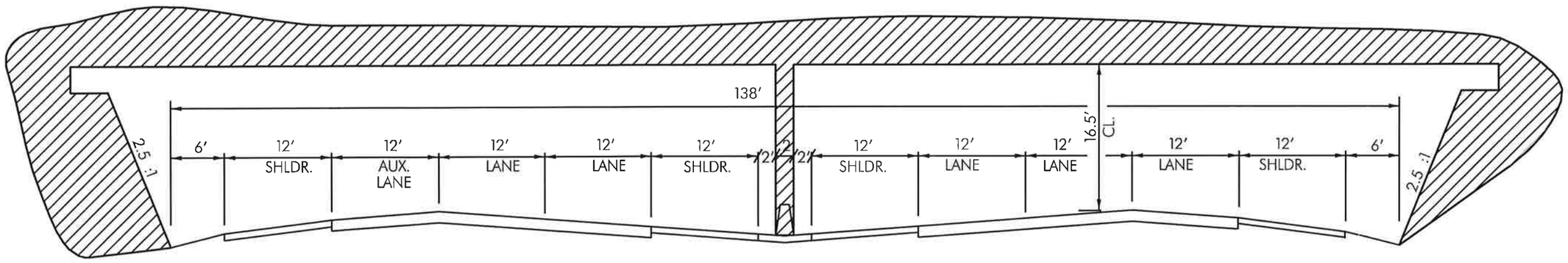
ALTERNATIVE 1

(EXISTING BRIDGE – SUBSTANDARD SHOULDERS)



SB I–29 NB I–29

ALTERNATIVE 2
(NEW BRIDGE)

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PHASE 3 REPORT OCTOBER 1998

U.P.R.R. BRIDGE ALTERNATIVES

EXHIBIT 2

2.3 MCPHERSON AVENUE / I-80 INTERCHANGE

At the direction of the Iowa Department of Transportation, a new interchange I-80 at McPherson Avenue has been dropped from further study. Phase II of this study recommended that a new interchange be constructed at this location. Six alternatives were developed and assessed. From these, three alternatives were identified as preferred alternatives.

A new interchange may be justified for the following reasons:

- A new interchange at McPherson Avenue will provide greater than one-mile spacing between adjacent interchanges at US Highway 6 and Madison Avenue.
- The new interchange will likely attract sufficient traffic to justify the cost of the interchange.
- The new interchange will provide improved access to existing and future housing developments on the east and west side of I-80.
- A new interchange at McPherson will provide operational benefits by off-loading the Madison Avenue interchange.

The City of Council Bluffs has identified this location for a new interchange. However, a new interchange will require justification and documentation per the requirements of the Federal Highway Administration for a change of access to the existing Interstate System. Following completion of such activities (which are beyond the scope of this study), a new interchange at McPherson could be added to the recommended plan. Regardless of whether the recommended plan includes a new interchange at McPherson Avenue or not, this study recognizes that such an interchange may be constructed at some point in the future and that construction of other elements of the plan should consider the impacts to a future interchange at this location.

2.4 ENVIRONMENTAL OVERVIEW

An environmental overview was performed for the preferred interchange alternatives from Phase II. The purpose of the overview was twofold:

1. Identify the potential environmental impacts or fatal flaws of any of the alternatives.
2. Identify the environmental documentation process, approvals, permits, authorizations or actions that may be required for potential environmental impacts.

The preferred alternatives were reviewed with respect to the following potential issues:

- Wetlands/stream crossings
- Unique Habitats (that could be potentially critical for protected species)
- Section 4(f) properties
- Environmental Justice Communities
- Prime Farmlands
- Hazardous Materials Sites
- Historic Properties
- Aesthetics.

Summary of Findings

In general, none of the alternative improvements to the interstate system will have a significant impact to the surrounding environment. It is not apparent that any historical structures exist within the proposed interchange alignments. However, the project area should be evaluated for potential archeological sites. If any cultural, historical or archeological resources were to be impacted, then Section 106 coordination would be required. If any impacts should occur to prime or unique soils designated by the USDA Natural Resources Conservation Service (NRCS), then a Conversion Rating Form (Form AD-1006) must be completed and turned into the District Conservationist to determine impact. The Iowa Department of Natural Resources and the U.S. Fish and Wildlife Service should be contacted to determine if any protected species and/or critical habitats exist within the proposed project area. Research indicates that there is the potential for protected species (federal and state listed) to exist within Pottawattamie County. A more in depth study would need to be done to identify if the appropriate habitats for these species exist within the study area.

It does not appear that any of the preferred alternatives include improvements that are within the 100 year floodplain. Should any impacts to the floodplain and/or floodway occur, it would require coordination and approval by the U.S. Army Corps of Engineers and the governing state agency (Iowa Department of Natural Resources). A U.S. Coast Guard Section 9 permit may be required for a new I-80 bridge over the Missouri River. Construction of piers in the floodway and floodplain would also require coordination and approval by the U.S. Army Corps of Engineers and the governing state agency (Iowa Department of Natural Resources).

The Iowa Department of Natural Resources requires that a Sovereign Lands Construction Permit (Chapter 461A of the Iowa Code) be obtained should any construction activities occur on, above or under state-owned land or water. Other permits may be required by the state depending on the nature of the proposed activities. These may include floodplain construction permits, water quality certification, air, etc.

Environmental Documentation

Since federal funding will be utilized for plan implementation, NEPA documentation will be required A new I-80 bridge over the Missouri River will likely require that an Environmental Impact Statement be prepared. For the improvements included in the alternatives for the remainder of the study area, an Environmental Assessment and a Section 4(f) document may be sufficient.

Agency Coordination

Coordination with various agencies will be required as part of future environmental documentation. A partial list of these agencies is provided below.

- Pottawattamie County NRCS for prime and unique soils
- National Park Service for property boundaries
- Review of FEMA maps to identify floodplain boundaries rivers/streams/creeks in project area
- Iowa Department of Natural Resources

- SHPO
- Threatened and Endangered Species
- Parks and Recreation
- Hazardous Materials
- Permitting (wetlands/stream crossings/floodplains)

- U.S. EPA for potential hazardous waste sites, etc.
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers (wetlands/stream crossings)
- U.S. Coast Guard (Bridge Permit)

Environmental Overview of Individual Interchanges

A summary of the environmental overview of each interchange in the study area is provided below. Notable impacts of the alternatives are repeated as disadvantages in the next chapter.

U.S. Highway 6/ I-80 Interchange

The existing land use within and around the Highway 6/I-80 interchange consists of cleared and agricultural land. Neither of the preferred alternatives (Alternatives 1 and 2) would alter the surrounding environment extensively. Therefore, no significant impacts are expected.

Madison Avenue/I-80 Interchange

The existing land use within and around the Madison Avenue/I-80 interchange consists mainly of commercial land. The remaining land is vacant. Alternatives 1 and 2 would have impacts to wetlands within the exiting interchange. These wetlands are small and are most likely associated with runoff from the interstate and/or drainage ditches. They may, however, be part of the natural drainage system that flow into nearby Mosquito Creek. If wetlands are encountered, a State Section 401 water quality certification and a Section 404 permit/approval may be required by Iowa and the USACOE.

East I-80/I-29 System Interchange

The land use surrounding the existing East I-80/I-29 System Interchange consists of a mix of industrial, commercial, agriculture and vacant land. A lake exists to the north of the interchange. Alternative 1 would impact the southern border of the lake, closest to the existing interchange. It appears that wetlands exist on the southern border of the lake. Alternative 4 would bisect the lake and impact wetlands around the fringes of the lake. If wetlands are encountered, a State Section 401 water quality certification and a Section 404 permit/approval may be required by Iowa and the USACOE.

South Expressway/I-80 Interchange

Land use surrounding the South Expressway (192) is a mix of industrial, commercial and residential. The B.N.S.F. Railroad tracks are a constraint that would preclude any development east of the existing interchange. Neither of the preferred alternatives for the I-80/I-29/192 interchange would alter the surrounding environment extensively. Therefore, no significant impacts are expected.

South 24th Street/I-80 Interchange

Land use surrounding the existing South 24th Street/I-80 interchange includes a mixture of commercial and farmland. North of the interchange is primarily commercial. To the south, it is mostly farmed land. The Historic Trails Center is located south and west of the interchange. Alternative 1 would be within the existing interchange and would have very little impact to the surrounding area. The proposed off-ramp for I-80 east of Alternative 6 may impact land belonging to the National Park Service (NPS), which would require a Section 4(f) evaluation. Property belonging to the NPS may have the potential to support protected species and/or critical habitats. The proposed on-ramp to eastbound I-80 of Alternative 6 would impact an active agriculture field. The proposed on/off-ramps of Alternative 7 would also impact the agricultural field in the southeast quadrant of the interchange. Land south of the interchange area, near the entrance to the Historic Trails Center includes a high quality wetland area on the east and west sides of 24th Street. Impacts to wetlands could occur should the alignment shift further south. If wetlands are encountered, a State Section 401 water quality certification and a Section 404 permit/approval may be required by Iowa and the USACOE.

West I-80/I-29 System Interchange

The existing interchange is surrounded primarily by vacant land, some commercial property and property belonging to the NPS. A levee runs along the south side of I-80. Alternative 1 proposes to relocate the interchange to the west, impacting an agricultural field and potentially the levee. Alternative 3 would impact the levee and the NPS Property. Alternative 3 would probably encounter wetlands on the NPS property. If wetlands are encountered, a State Section 401 water quality certification and a Section 404 permit/approval may be required by Iowa and the USACOE. Property belonging to the NPS may have the potential to support protected species and/or critical habitats. In addition, any impact to NPS property would require a Section 4(f) evaluation. Impacts to the levee would require coordination with the local sponsor and the USACOE to evaluate if the proposed construction would damage the structural integrity of the levee.

Nebraska Avenue/I-29 Interchange

The existing land use surrounding the Nebraska Interchange consists mainly of industrial and vacant land. Railroad tracks run adjacent to Nebraska Avenue. Because the proposed improvements would primarily use existing right of way, no consequential impacts are expected.

9th Avenue/I-29 Interchange

Land use surrounding the 9th Avenue/I-29 interchange consists of commercial, residential and recreational. East of the interchange is primarily commercial and residential. West of the interchange is the Westwood Golf Course. A residential area is located to the east of the proposed interchange Because some of these homes may be impacted, a demographic analysis (population and income statistics) should be conducted for the neighborhood east of I-29 for potential environmental justice impacts.

I-29/I-480/Broadway System Interchange

The existing I-29/I-480/Broadway system interchange is surrounded by a mix of residential and commercial land uses. Playland Park, a public day use recreation facility, is located north of I-480 west of the interchange area. Both of the preferred alternatives, Alternatives 3 and 5, appear to have an impact to the park. These alternatives would result in a potential Section 4(f) issue and may require a separate Section 4(f) evaluation. Alternative 5 would impact a considerable number of residences and commercial properties.

G Avenue – N. 35th Street/I-29 Interchange

Residential and commercial properties surround the existing interchange. The proposed alignment would not alter the surrounding environment extensively. A levee exists north of the proposed alignment. No fill material may be placed on the north side of the existing levee. If construction should occur on or near the levee, coordination would need to take place with the local sponsor and the USACOE to evaluate if the proposed construction would damage the structural integrity of the levee.

N. 25th Street/I-29 Interchange

Residential, commercial and vacant land uses exist at the N. 25th Street/I-29 interchange. The preferred alternative, Alternative 1, would not alter the existing environment extensively and therefore no significant impacts are expected.

N. 16th Street/I-29 Interchange

Land use adjacent to and surrounding the existing interchange consists of vacant and wooded land to the west and the Pottawattamie County Jail to the east. Isolated wetlands abut the proposed I-29 southbound off-ramp to N. 16th Street which would utilize the existing alignment of the southbound I-29 mainline. If wetlands are encountered, a State Section 401 water quality certification and a Section 404 permit/approval may be required by Iowa and the USACOE.

2.5 DETAILED QUANTITIES AND COST ESTIMATES

Preliminary construction cost estimates were prepared for each of the preferred alternatives. The cost for each alternative is summarized in the next chapter. Detailed estimates are included in Appendix B of this report. The major components of the cost estimate are described below:

- The cost of major construction items (e.g., mainline pavement, shoulder pavement, bridges, etc.) was estimated based on estimated quantities and unit costs developed by the Project Team. The unit costs are reflective of recent freeway construction projects in the Omaha-Council Bluffs metropolitan area.
- The cost of other construction items (e.g., earthwork, drainage, signing, construction phasing, etc.) were estimated as percentages of the total construction cost. The percentages vary by location and the complexity of the alternative.
- The cost of right-of-way was estimated based on estimated quantities and unit costs developed by the Project Team based on input from IaDOT and the City of Council Bluffs.
- The cost of contingencies and engineering were estimated as a percentage of the total construction cost.

As in Phase II, the preliminary construction cost estimates of Phase III were prepared to allow comparison between alternatives only. As such, the construction limits utilized in the cost estimates for one interchange do not necessarily match the construction limits for the alternatives of an adjacent interchange. Therefore, the cost estimate for each interchange cannot be summed to estimate the total reconstruction cost of the entire study area. Such cost estimates will be developed following identification of a recommended plan for the entire corridor.

Unlike Phase II, however, the cost estimates for Phase III were developed separately for the system interchanges and adjacent service interchanges. As a result, the system interchange costs discussed in the following chapter and detailed in Appendix B are considerably lower than the system interchange costs documented in the Phase II report. If the cost of the adjacent service interchanges are added to the cost of the system interchange (assuming compatibility), the resulting costs are generally consistent with, although slightly lower than the corresponding cost from Phase II. This comparison as well as the comparison of cost estimates for other service interchanges suggests that the cost estimating procedures utilized in Phase II resulted in estimates that were overly conservative.

CHAPTER 3: SUMMARY OF THE PREFERRED ALTERNATIVES

This chapter summarizes the preferred alternatives for each interchange that were identified in Phase II. A discussion is presented for each interchange. This discussion includes a brief description of the alternative, the advantages and disadvantages of the alternative, and the preliminary construction cost estimate for the alternative.

This discussion is followed by graphical representations of the alternatives on aerial base maps. Service interchange alternatives are shown at a scale of 1"=400'. System interchange alternatives are shown both at a scale of 1"=400' and 1"=800'. The 800 scale exhibits are intended to show the spatial relationship between the system interchanges and the adjacent service interchanges. Additional exhibits of the preferred alternatives are shown in Appendix A. These exhibits, shown at a scale of 1"=200', were developed to illustrate the lane requirements on the cross streets of the interchanges. Detailed cost estimates are included in Appendix B.

Unless specifically noted in this report, all of the other evaluation criteria that were summarized in the screening matrices of the Phase II report remain valid. In particular, criteria such as traffic operations, route/lane continuity, signing, constructability and maintenance of traffic have not been assessed in greater detail than that performed in Phase II.

The recommendations of the TAC regarding the alternatives to be included in the overall recommended plan for the corridor have been noted. Where applicable, the discussion of the recommended alternative also notes whether or not additional revisions to the configuration are anticipated as part of plan development.

US HIGHWAY 6 / I-80 INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of Interchange - Exhibit 3
1"=200' Plan of U.S. Highway 6 - Exhibit A-1 (Appendix A)

Alternative 1 retains the existing diamond interchange configuration. It includes reconstruction of the on-ramp junctions to provide a longer taper. Realignment of all four ramps is also recommended to facilitate future signalization of the ramp terminal intersections. Alternative 1 retains the four-lane divided cross-section on U.S. Highway 6 but provides exclusive turns lanes at intersections, as necessary, to provide acceptable level of service for Year 2020 traffic volumes.

Advantages

- Corrects existing non-standard on-ramp tapers.
- Aligns ramps for future signalization.
- No additional right-of-way required.
- Least cost alternative.
- No significant environmental impacts.

Disadvantages

- Without loop on-ramps, left turns from cross street may reduce the operational efficiency of the interchange, particularly following events at the Westfair Amphitheater.

Cost

The preliminary construction cost estimate for Alternative 1 is $9.6 million.

ALTERNATIVE 2

1"=400' Plan of Interchange - Exhibit 4
1"=200' Plan of U.S. Highway 6 - Exhibit A-2 (Appendix A)

Alternative 2 provides a partial cloverleaf configuration with loop on-ramps. The interchange could initially be reconstructed as a diamond interchange configuration with construction of the loop ramps at some point in the future when traffic volumes dictate. When constructed, these loop ramps would eliminate left turns from the cross street and thus simplify the traffic signal phasing at the ramp terminal intersections. Alternative 2 provides a similar cross section on U.S. Highway 6 as Alternative 1.

Advantages

- Corrects existing non-standard on-ramp tapers .
- Aligns ramps for future signalization.
- Future construction of loop on-ramps will allow left turns from cross street to be served as free-flowing right turns. Simplifies signal phasing at ramp terminal intersections.
- No significant environmental impacts.

Disadvantages

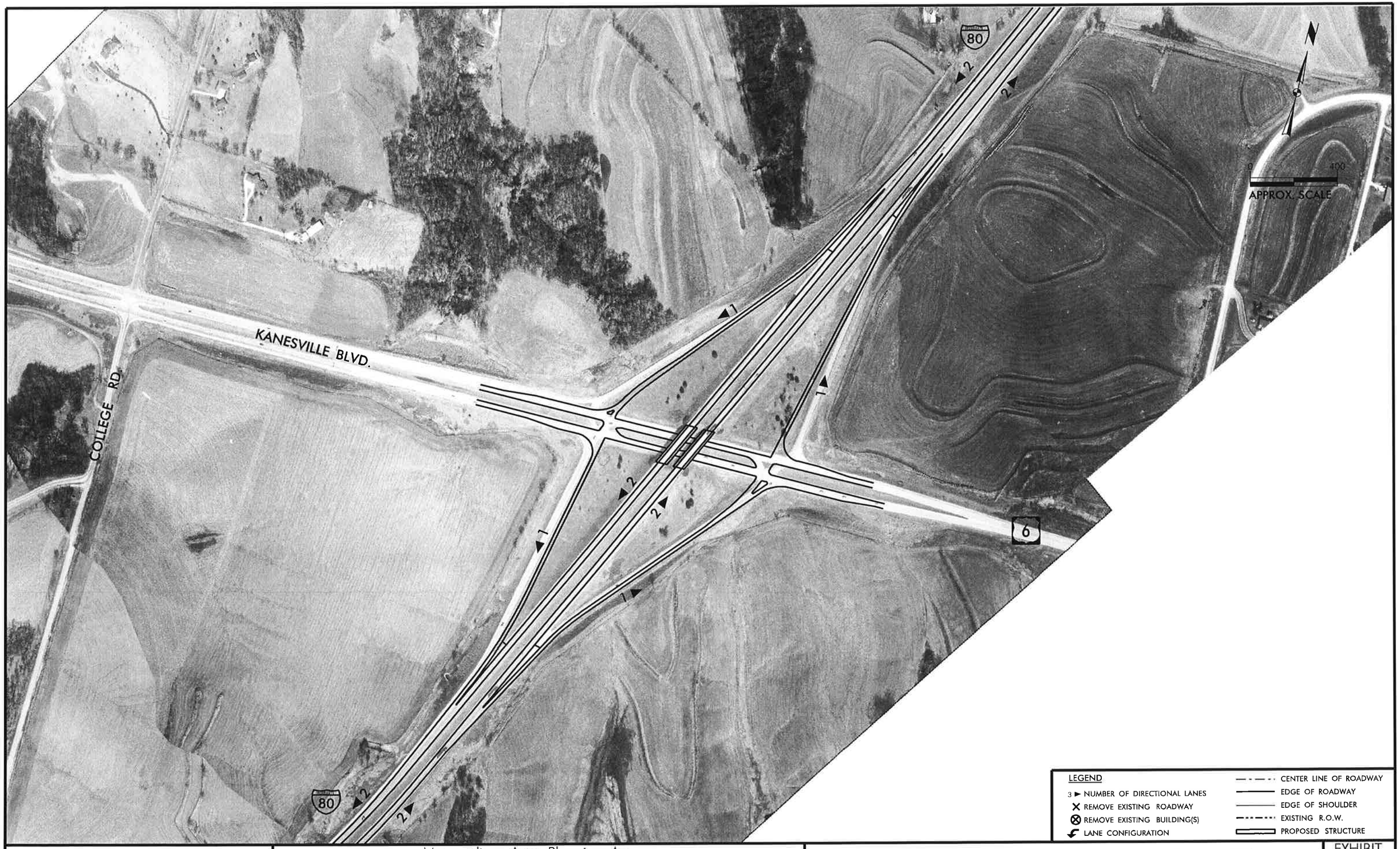
- Approximately 8 acres of additional right-of-way required.
- Highest cost alternative.
- Loop ramps are basic standard to minimize right-of-way impacts.

Cost

The preliminary construction cost estimate for Alternative 2 is $13.6 million. This cost includes the cost for construction of the loop on-ramps and signalization.

Recommended Alternative

Alternative 2 was recommended by the TAC for inclusion in the recommended plan. A key consideration was the flexibility provided by this alternative without significant impacts to developed properties. As part of plan development, the loop ramps of Alternative 2 will be modified to meet full design standards. In addition, the alignment of the other four ramps will be modified (i.e., lined up) to allow the ramp terminal intersections to be signalized prior to construction of the loop ramps.



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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY
PHASE 3 REPORT OCTOBER 1998

U.S. HIGHWAY 6 / I–80 INTERCHANGE ALTERNATIVE 1

EXHIBIT 3

LEGEND

3 ▶ NUMBER OF DIRECTIONAL LANES	CENTER LINE OF ROADWAY
✕ REMOVE EXISTING ROADWAY	EDGE OF ROADWAY
⊗ REMOVE EXISTING BUILDING(S)	EDGE OF SHOULDER
LANE CONFIGURATION	EXISTING R.O.W.
	PROPOSED STRUCTURE

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY
PHASE 3 REPORT OCTOBER 1998

U.S. HIGHWAY 6 / I–80 INTERCHANGE
ALTERNATIVE 2

EXHIBIT
4

MADISON AVENUE / I-80 INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of Interchange - Exhibit 5
1"=200' Plan of Madison Avenue - Exhibit A-3 (Appendix A)

Alternative 1 provides a single-point urban interchange (SPUI). The SPUI essentially combines two separate diamond ramp intersections into one large at-grade intersection which accommodates all interchanging vehicular movements. With a single intersection this alternative would provide improved spacing between the interchange and adjacent intersections at Woodbury Avenue (signalized) and Rue Avenue (unsignalized). Improved spacing would provide an opportunity for improved signal coordination along Madison Avenue. Alternative 1 provides two through lanes in each direction on Madison Avenue and provides exclusive turns lanes at the single intersection, as necessary, to provide acceptable level of service for Year 2020 traffic volumes.

Alternative 1 also reflects the need for three basic lanes in each direction on I-80 to the west of Madison Avenue. The eastbound I-80 off-ramp to Madison includes a two-lane off-ramp to serve the forecasted traffic volume for this movement and to serve as a means of dropping the third basic freeway lane. The westbound on-ramp from Madison Avenue would add the third basic freeway lane in the westbound direction.

Alternative 1 is compatible with both of the preferred alternatives for the East I-80/I-29 System Interchange (Alternative 1 and Alternative 4).

Advantages

- No additional right-of-way required.
- Provides improved spacing between traffic signal at Woodbury Avenue and the single traffic signal for the interchange.

Disadvantages

- Operational performance may be less than Alternative 2 because left turns from ramps are heavily unbalanced and thru traffic on Madison Avenue is highly directional during peak periods.
- Does not accommodate pedestrians as well as Alternative 2.
- Highest cost alternative.
- Potential wetland impacts within interchange.

Cost

The preliminary construction cost estimate for Alternative 1 is $8.5 million.

ALTERNATIVE 2

1"=400' Plan of Interchange - Exhibit 6
1"=200' Plan of Madison Avenue - Exhibit A-4 (Appendix A)

Alternative 2 would provide a diamond interchange configuration similar to the existing configuration. The distance between ramp terminal intersections could be reduced slightly to improve the spacing between the ramp terminal intersections and adjacent intersections at Woodbury Avenue and Rue Avenue. Alternative 2 provides two through lanes in each direction on Madison Avenue and provides exclusive turns lanes at the single intersection, as necessary, to provide acceptable level of service for Year 2020 traffic volumes. Similar to Alternative 1, Alternative 2 was also reflects the need for three basic lanes in each direction on I-80 to the west of Madison Avenue.

Alternative 2 is compatible with both of the preferred alternatives for the East I-80/I-29 System Interchange (Alternative 1 and Alternative 4).

Advantages

- Least cost alternative.
- Accommodates pedestrians better than Alternative 1.
- Operational performance may be better than Alternative 1 because left turns from ramps are heavily unbalanced and thru traffic on Madison Avenue is highly directional during peak periods.

Disadvantages

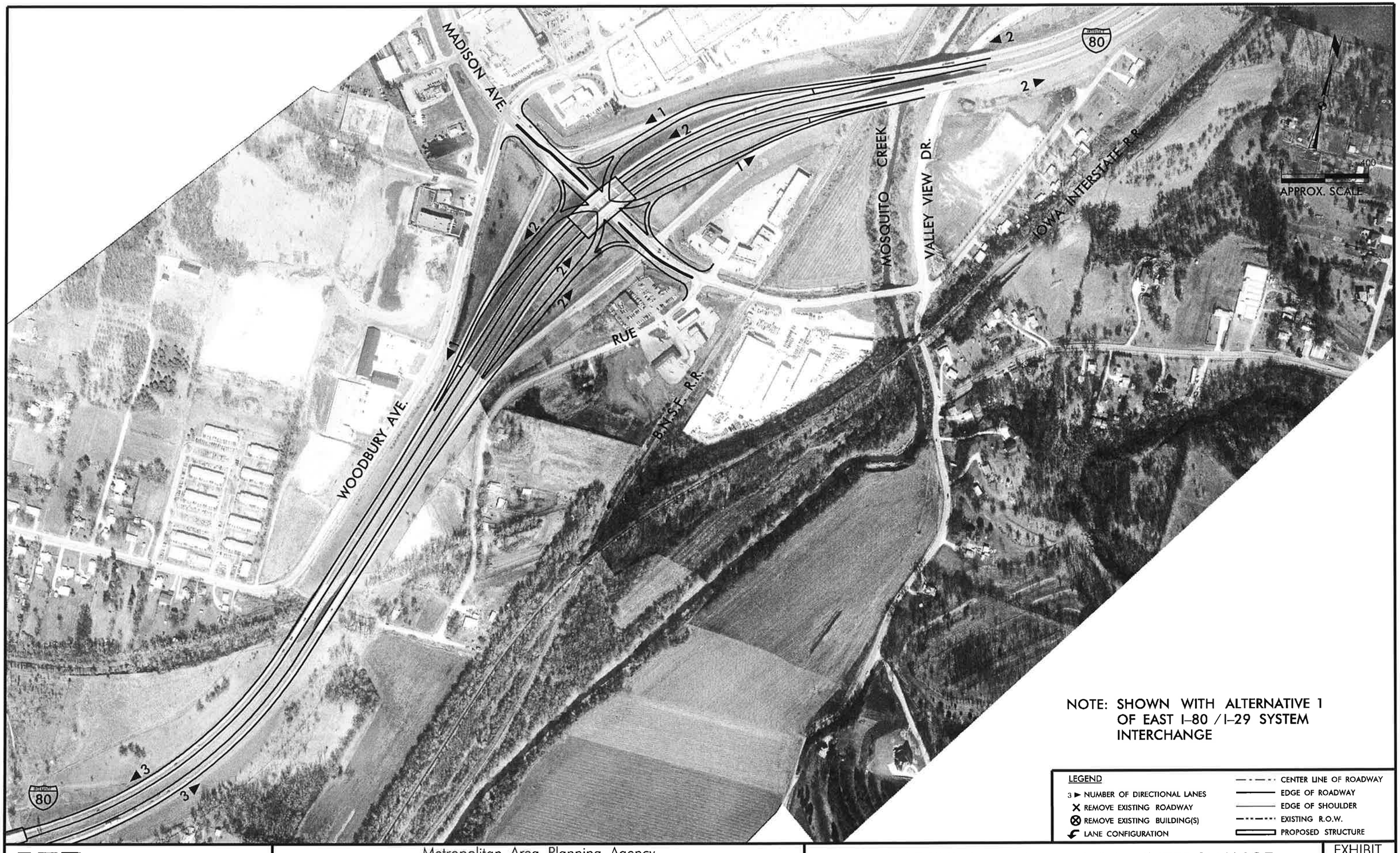
- Tight spacing of signalized intersections; creates potential for internal queue problems.
- Potential wetland impacts within interchange.

Cost

The preliminary construction cost estimate for Alternative 2 is $6.9 million.

Recommended Alternative

Alternative 2 was recommended by the TAC for inclusion in the recommended plan. A key consideration was the concern that the SPUI (Alternative 1) would not operate as well as the diamond interchange based on existing and future traffic volumes and patterns.



NOTE: SHOWN WITH ALTERNATIVE 1 OF EAST I–80 / I–29 SYSTEM INTERCHANGE

LEGEND

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- ✕ REMOVE EXISTING ROADWAY
- ⊗ REMOVE EXISTING BUILDING(S)
- LANE CONFIGURATION
- CENTER LINE OF ROADWAY
- EDGE OF ROADWAY
- EDGE OF SHOULDER
- EXISTING R.O.W.
- PROPOSED STRUCTURE

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT SEPTEMBER 1998

MADISON AVENUE / I–80 INTERCHANGE ALTERNATIVE 1

EXHIBIT 5

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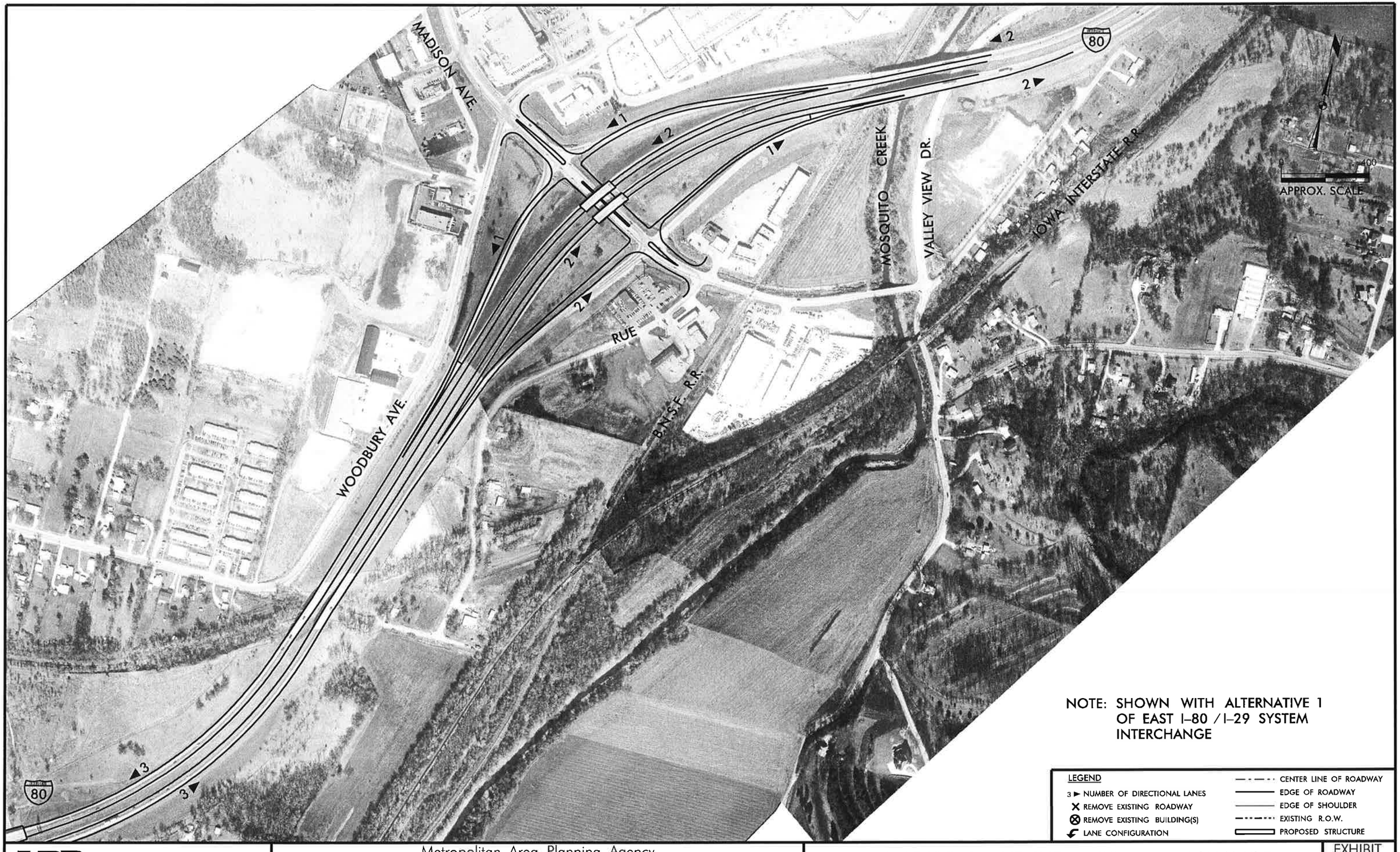
Project number: 134



NOTE: SHOWN WITH ALTERNATIVE 1 OF EAST I–80 / I–29 SYSTEM INTERCHANGE

LEGEND

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- ✕ REMOVE EXISTING ROADWAY
- ⊗ REMOVE EXISTING BUILDING(S)
- LANE CONFIGURATION
- CENTER LINE OF ROADWAY
- EDGE OF ROADWAY
- EDGE OF SHOULDER
- EXISTING R.O.W.
- PROPOSED STRUCTURE

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT — OCTOBER 1998

MADISON AVENUE / I–80 INTERCHANGE ALTERNATIVE 2

EXHIBIT 6

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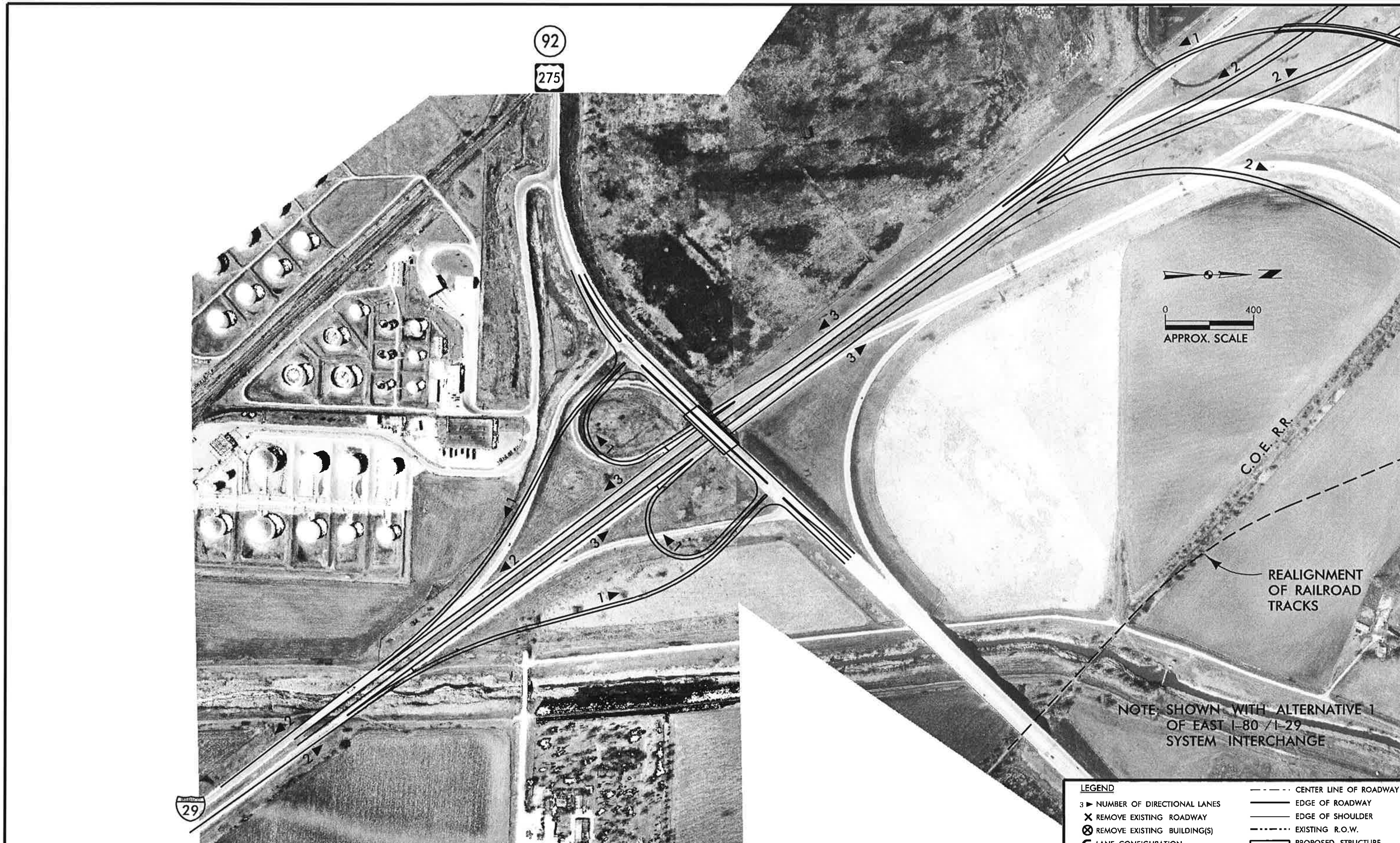

User: DAVID J RAYER
Project number: 134

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PHASE 3 REPORT — OCTOBER 1998

U.S. 275 HIGHWAY / I-29 INTERCHANGE ALTERNATIVE 1

EXHIBIT 7

EAST I-80/I-29 SYSTEM INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of System Interchange - Exhibit 8
1"=800' Plan of System Interchange and Adjacent Service Interchanges - Exhibit 9

Alternative 1utilizes "basic" design criteria at several locations in an attempt to fit a system interchange within the spatial restrictions of the adjacent interchanges while meeting all operational criteria. It also includes the relocation of the C.O.E. railroad tracks as a means to reducing the structure costs of the system interchange.

This alternative retains existing configuration of South Expressway interchange to maximize the weaving distance on I-80/I-29 between the South Expressway and the system interchange. However, the weaving length provided in the westbound direction (approximately 1,700 feet) is considerably less than that provided by the existing system interchange configuration (approximately 2,500 feet) and is not expected to provide acceptable operations. In the eastbound direction, Alternative 1 provides a weaving length (approximately 2,500 feet) that is comparable to that provided by the existing configuration. Since weaving problems occur today, it is unlikely that Alternative 1 will provide acceptable operations.

Alternative 1 also includes a partial cloverleaf configuration at the US Highway 275 interchange (with all ramps on the south side) to maximize the weaving distance on I-29 between US Highway 275 and the system interchange (approximately 1,600 feet in the southbound direction and approximately 2,000 feet in the northbound direction). Alternative 1 is expected to provide acceptable weaving operations in this area.

Advantages

- Eliminates "left-side" ramps.
- 70 mph design speed on "thru" system-to-system ramps. 60 mph design speed on other system-to-system ramps.
- Least cost alternative.
- No homes or businesses impacted.

Disadvantages

- Approximately 18.5 acres of additional right-of-way required.
- Potential wetland impacts within interchange.
- Inadequate weaving length between system interchange and South Expressway.
- More difficult to build under traffic.

Cost

The preliminary construction cost estimate for Alternative 1 is $39.5 million.

ALTERNATIVE 4

1"=400' Plan of System Interchange - Exhibit 10
1"=800' Plan of System Interchange and Adjacent Service Interchanges - Exhibit 11

Alternative 4 is similar to Alternative 1 except that C-D roads are provided to accommodate traffic interchanging between the South Expressway and I-80 to the east and I-29 to the south (i.e., weaving is eliminated from the mainline). Thus, separate off-ramps to the South Expressway are provided from westbound I-80 and northbound I-29. Similarly, separate on-ramps to eastbound I-80 and southbound I-29 are provided from the South Expressway. Relocation of the C.O.E. railroad tracks is <u>not</u> included since it would not result in significant savings in structure costs.

Similar to Alternative 1, Alternative 4 includes a partial cloverleaf configuration at the US Highway 275 interchange (with all ramps on the south side) to maximize the weaving distance on I-29 between US Highway 275 and the system interchange (approximately 1,600 feet in the southbound direction and approximately 2,000 feet in the northbound direction). Alternative 4 is expected to provide acceptable weaving operations in this area.

Advantages

- Eliminates "left-side" ramps.
- 70 mph design speed on "thru" system-to-system ramps. 60 mph design speed on other system-to-system ramps.
- C-D roads remove the weaving section on WB and EB I-80/I-29 between the system interchange and the South Expressway.
- C-D roads, once constructed, provide detour options during construction of mainline.
- Eliminates the mainline curve of I-80 within the system interchange.

Disadvantages

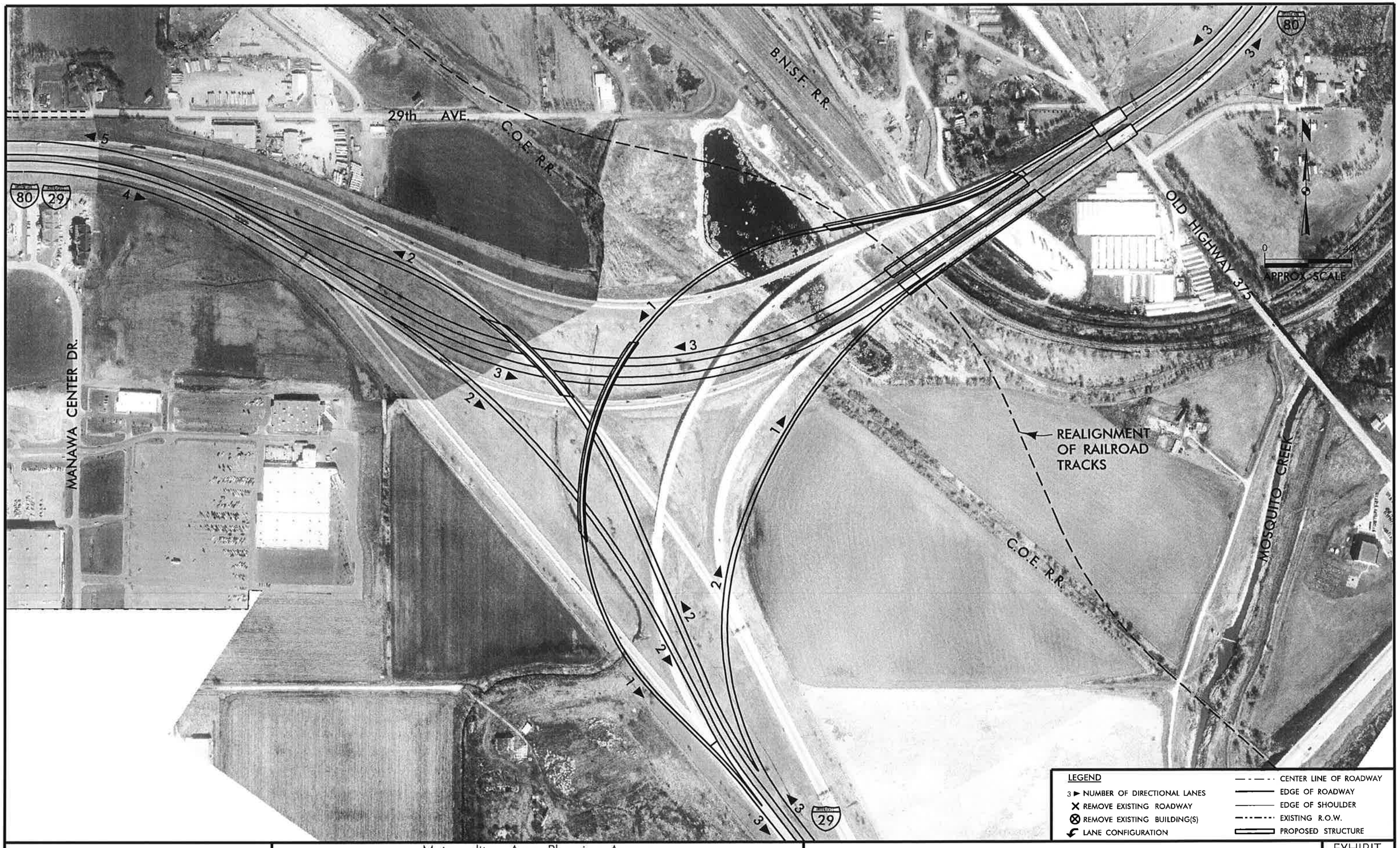
- Highest cost alternative.
- C-D roads require new bridges over South Expressway.
- Approximately 34 acres of additional right-of-way required.
- Significant impacts to businesses located along 29th Avenue.
- Potential wetland impacts within interchange.

Cost

The preliminary construction cost estimate for Alternative 4 is $62.4 million.

Recommended Alternative

Alternative 4 was recommended by the TAC for inclusion in the recommended plan. A key consideration was elimination of the weaving section between the system interchange and the South Expressway.



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EAST I–80 / I–29 SYSTEM INTERCHANGE ALTERNATIVE 1

EXHIBIT 8

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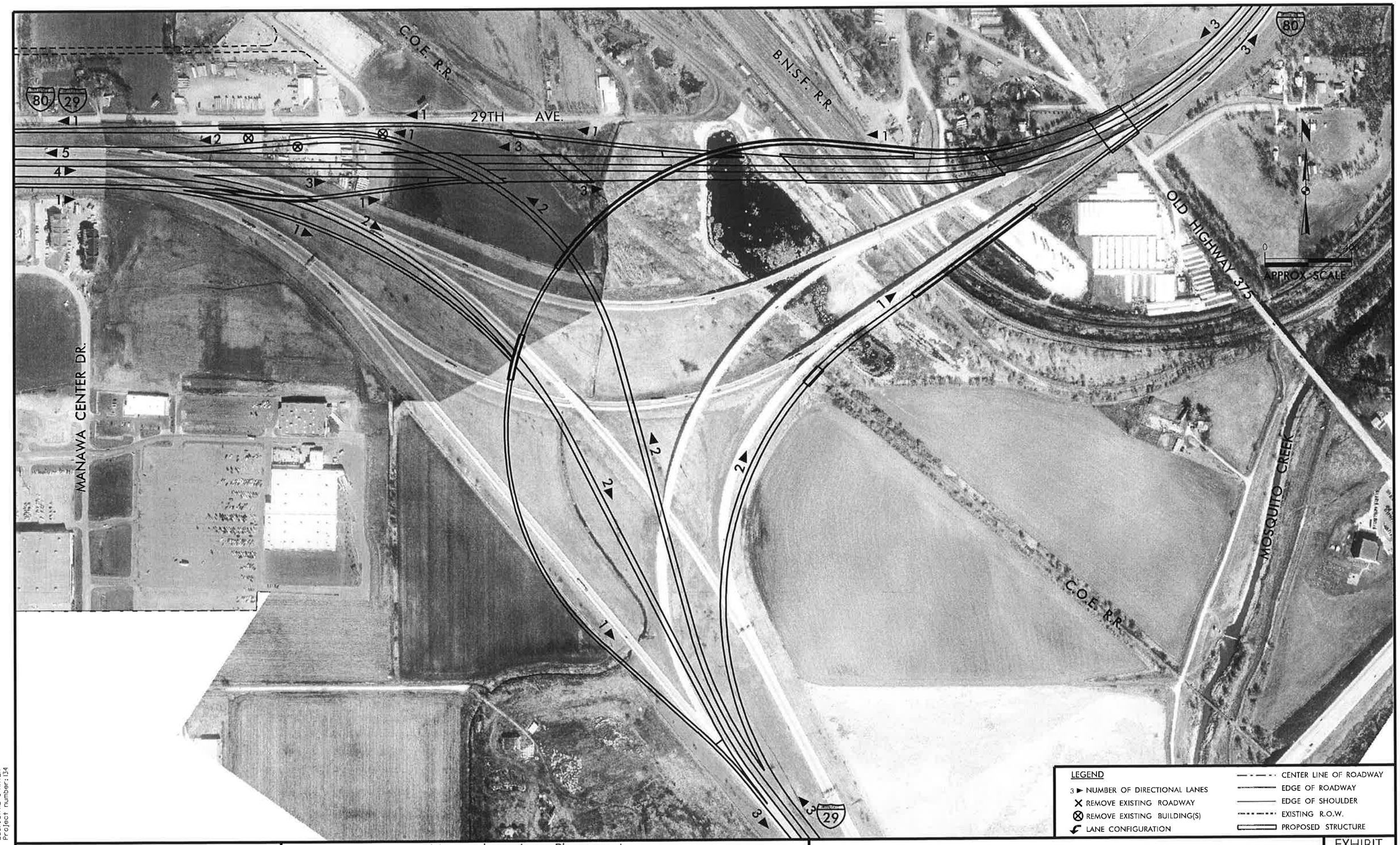
EAST I–80 / I–29 SYSTEM INTERCHANGE ALTERNATIVE 1

EXHIBIT 9



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EAST I-80 / I-29 SYSTEM INTERCHANGE ALTERNATIVE 4

EXHIBIT 10

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EAST I–80 / I–29 SYSTEM INTERCHANGE ALTERNATIVE 4

EXHIBIT 11

SOUTH EXPRESSWAY / I-80 / I-29 INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of Interchange - Exhibit 12
1"=200' Plan of South Expressway - Exhibit A-6 (Appendix A)

Alternative 1 is compatible with Alternative 1 for the East I-80/I-29 System Interchange but not with Alternative 4. It retains the existing configuration of the South Expressway interchange. That is, additional bridges across the South Expressway are not required. (Because of the Burlington Northern Santa Fe Railroad (BNSFRR) tracks on the east side of the South Expressway, a partial cloverleaf configuration, with ramps all on the west side, must be retained for this interchange.) Since additional bridges across the South Expressway are not required, the existing loop ramps can be reconstructed on their current alignment and still meet the "basic" design criteria.

Alternative 1 provides lane geometry on South Expressway based on the recommendations of the South Expressway Corridor Study. A draft report for this study was completed in February 1998. In addition to new lanes on the South Expressway, the study recommended the extension of 30th Street to intersect the South Expressway opposite the ramps to/from eastbound I-80/I-29 and the relocation of 29th Avenue to intersect the South Expressway opposite the ramps to/from westbound I-80/I-29. These improvements are necessary to serve Year 2020 traffic volumes which are expected to be significantly higher than existing volumes as a result of further development of the Power Centre.

Advantages

- Does not require new bridges over the South Expressway.
- No additional right-of-way required.
- Least cost alternative.

Disadvantages

- In combination with Alternative 1 of East I-80/I-29 System Interchange, does not provide adequate weaving length between system interchange and South Expressway.
- Loop ramps are basic standard to minimize right-of-way impacts.

Cost

The preliminary construction cost estimate for Alternative 1 is $15.7 million.

ALTERNATIVE 2

1"=400' Plan of Interchange - Exhibit 13
1"=200' Plan of South Expressway - Exhibit A-7 (Appendix A)

Alternative 2 is compatible with Alternative 4 for the East I-80/I-29 System Interchange but not with Alternative 1. Since Alternative 4 for the East I-80/I-29 System Interchange includes C-D road connections to the South Expressway, additional bridges across the South Expressway will be required. Even with the C-D roads, "basic" design criteria is met for the loop ramps without impacting adjacent businesses by maintaining the existing alignments of the loop ramps.

Alternative 2 also provides lane geometry on South Expressway based on the recommendations of the South Expressway Corridor Study.

Advantages

- In combination with Alternative 4 of East I-80/I-29 System Interchange, C-D roads remove the weaving section on WB and EB I-80/I-29 between the system interchange and the South Expressway.
- C-D roads, once constructed, provide detour options during construction of mainline.

Disadvantages

- Highest cost alternative.
- C-D roads require new bridges over South Expressway.
- Loop ramps are basic standard to minimize right-of-way impacts.
- In combination with Alternative 4 of the East I-80/I-29 System Interchange, additional right-of-way would be required along 29th Avenue.

Cost

The preliminary construction cost estimate for Alternative 2 is $17.6 million.

Recommended Alternative

Alternative 2 was recommended by the TAC for inclusion in the recommended plan. A key consideration was elimination of the weaving section between the South Expressway and the East I-80/I-29 System Interchange.

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SOUTH EXPRESSWAY / I-80 INTERCHANGE ALTERNATIVE 1

EXHIBIT 12

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SOUTH EXPRESSWAY / I-80 INTERCHANGE
ALTERNATIVE 2

EXHIBIT
13

SOUTH 24TH STREET / I-80 / I-29 INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of Interchange - Exhibit 14
1"=200' Plan of South 24th Street - Exhibit A-8 (Appendix A)

Alternative 1 would provide a single-point urban interchange (SPUI). An SPUI may be more appropriate at this location than at the Madison Avenue/I-80 interchange since the left turn traffic volumes from the ramp approaches to Madison Avenue are not as unbalanced. In addition, the thru traffic on S. 24th Street is not as heavy. These traffic characteristics tend to improve the efficiency of a SPUI. Although the geometry of a SPUI generally does not accommodate pedestrians as well as a diamond interchange, pedestrian traffic in this area would be expected to be low or nonexistent. Alternative 1 provides two through lanes in each direction on South 24th Avenue and provides exclusive turns lanes at the single intersection, as necessary, to provide acceptable level of service for Year 2020 traffic volumes.

Alternative 1 is compatible with both of the preferred alternatives for the West I-80/I-29 System Interchange (Alternative 1 and Alternative 3). It is shown with Alternative 1 in Exhibit 14. For Alternative 3 for the West I-80/I-29 System Interchange, the ramps on the west side of the SPUI would be modified slightly to match the C-D roads approaches to South 24th Street.

Advantages

- No additional right-of-way required. In combination with Alternative 3 for the West I-80/I-29 System Interchange, additional right-of-way would be required in the southwest quadrant.
- Operational performance of the SPUI may be better than a diamond configuration (Alternative 2) because thru traffic is relatively low on 24th Street and because traffic is not highly directional during peak periods.
- Provides improved spacing between traffic signal at 29th Avenue and the signal for the interchange.
- Compatible with both preferred alternatives for East I-80/I-29 System Interchange.

Disadvantages

- Does not accommodate pedestrians as well as Alternative 2.
- Highest cost alternative.

Cost

The preliminary construction cost estimate for Alternative 1 is $12.1 million.

Recommended Alternative

Alternative 1 was recommended by the TAC for inclusion in the recommended plan. A key consideration was the determination that the SPUI would operate better than the diamond interchange. As part of plan development, the configuration will be modified to allow this alternative to be compatible with Alternative 3 for the West I-80/I-29 System Interchange. In combination with Alternative 3 for the system interchange, weaving on the mainline is eliminated.

ALTERNATIVE 2

1"=400' Plan of Interchange - Exhibit 15
1"=200' Plan of South 24th Street - Exhibit A-9 (Appendix A)

Alternative 2 would provide a diamond interchange configuration similar to the existing configuration. As shown in Exhibit 28, the distance between ramp terminal intersections is approximately 850 feet. This distance could be reduced considerably to provide a tight diamond configuration but would not provide significant benefits relative to right-of-way or traffic operations. Alternative 2 provides two through lanes in each direction on South 24th Avenue and provides exclusive turns lanes at the ramp terminal intersections, as necessary, to provide acceptable level of service for Year 2020 traffic volumes.

Alternative 2 is compatible with both of the preferred alternatives for the West I-80/I-29 System Interchange (Alternative 1 and Alternative 3). It is shown with Alternative 3 in Exhibit 15. For Alternative 1 for the West I-80/I-29 System Interchange, the ramps on the west side of the diamond interchange would be modified to merge/diverge with the mainline.

Advantages

- Least cost alternative.
- No additional right-of-way required. In combination with Alternative 3 for the West I-80/I-29 System Interchange, additional right-of-way would be required in the southwest quadrant of the interchange.
- Accommodates pedestrians better than Alternative 1.
- Compatible with both preferred alternatives for East I-80/I-29 System Interchange.

Disadvantages

- Two signalized intersections of the interchange may not perform as well as SPUI (Alternative 1).
- Does not improve spacing between traffic signal at 29th Avenue and the traffic signal at the north ramp terminal intersection.

Cost

The preliminary construction cost estimate for Alternative 2 is $9.9 million.

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24TH STREET / I-80 INTERCHANGE ALTERNATIVE 1

EXHIBIT 14

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24TH STREET / I-80 INTERCHANGE ALTERNATIVE 2

EXHIBIT 15

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24TH STREET / I-80 INTERCHANGE ALTERNATIVE 6

EXHIBIT 16

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24TH STREET / I-80 INTERCHANGE ALTERNATIVE 7

EXHIBIT 17

WEST I-80/I-29 SYSTEM INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of System Interchange - Exhibit 18
1"=800' Plan of System Interchange and Adjacent Service Interchanges - Exhibit 19

For traffic operations, the critical design feature of this interchange is the eastbound weaving length between the system interchange and South 24th Avenue. The adequacy of this weaving section depends on the configuration of the South 24th Avenue interchange. With Alternative 1 and 2 at South 24th Avenue - approximately 2,000 feet. With Alternative 6 - approximately 1,300 feet. It is the opinion of the Project Team that these three alternatives at South 24th Avenue may not provide acceptable weaving operations, particularly given the high percentage of heavy vehicles utilizing the South 24th Avenue interchange. Combined with Alternative 7 at South 24th Avenue, Alternative 1 for the system interchange would provide approximately 3,000 feet of weaving length which would be adequate.

The adequacy of the westbound weaving length between South 24th Street and the system interchange also depends on the configuration of the South 24th Avenue interchange. With Alternative 1 and 2 at South 24th Avenue - approximately 1,900 feet. With Alternative 6 - approximately 1,700 feet. Similar to the eastbound direction, these three alternatives at South 24th Avenue may not provide acceptable weaving operations when combined with Alternative 1 for the system interchange. Combined with Alternative 7 at South 24th Avenue, Alternative 1 for the system interchange would provide approximately 3,500 feet of weaving length which would be adequate.

Alternative 1 also retains the partial cloverleaf configuration at the Nebraska Avenue/I-29 interchange (with all ramps on the north side) to maximize the weaving distance on I-29 between Nebraska Avenue and the system interchange (approximately 1,800 feet in the southbound direction and approximately 1,600 feet in the northbound direction). Acceptable weaving operations are expected.

Advantages

- Eliminates "left-side" ramps.
- 70 mph design speed on "thru" system-to-system ramps. 60 mph on other system-to-system ramps.
- Least cost alternative.

Disadvantages

- Approximately 49 acres of additional right-of-way required.
- One business impacted.
- Potential environmental impacts associated with new river bridge and wetlands.
- More difficult to build under traffic.
- Impacts to Western Historic Trails Center

Cost

The preliminary construction cost estimate for Alternative 1 is $47.2 million.

ALTERNATIVE 3

1"=400' Plan of System Interchange - Exhibit 20
1"=800' Plan of System Interchange and Adjacent Service Interchanges - Exhibit 21

Alternative 3 is similar to Alternative 1 except that C-D roads are provided to accommodate traffic interchanging between South 24th Avenue and I-80 to the west and I-29 to the north (i.e., weaving is eliminated from the mainline). Thus, separate off-ramps to South 24th Avenue are provided from eastbound I-80 and southbound I-29. Similarly, separate on-ramps to westbound I-80 and northbound I-29 are provided from South 24th Avenue

Similar to Alternative 1, Alternative 3 retains the partial cloverleaf configuration at the Nebraska Avenue/I-29 interchange (with all ramps on the north side) to maximize the weaving distance on I-29 between Nebraska Avenue and the system interchange (approximately 1,800 feet in the southbound direction and approximately 1,600 feet in the northbound direction). Acceptable weaving operations are expected.

Advantages

- Eliminates "left-side" ramps.
- 70 mph design speed on "thru" system-to-system ramps. 60 mph design speed on other system-to-system ramps.
- C-D roads remove the weaving section on WB and EB I-80/I-29 between the system interchange and South 24th Avenue.
- C-D roads, once constructed, provide detour options during construction of mainline.

Disadvantages

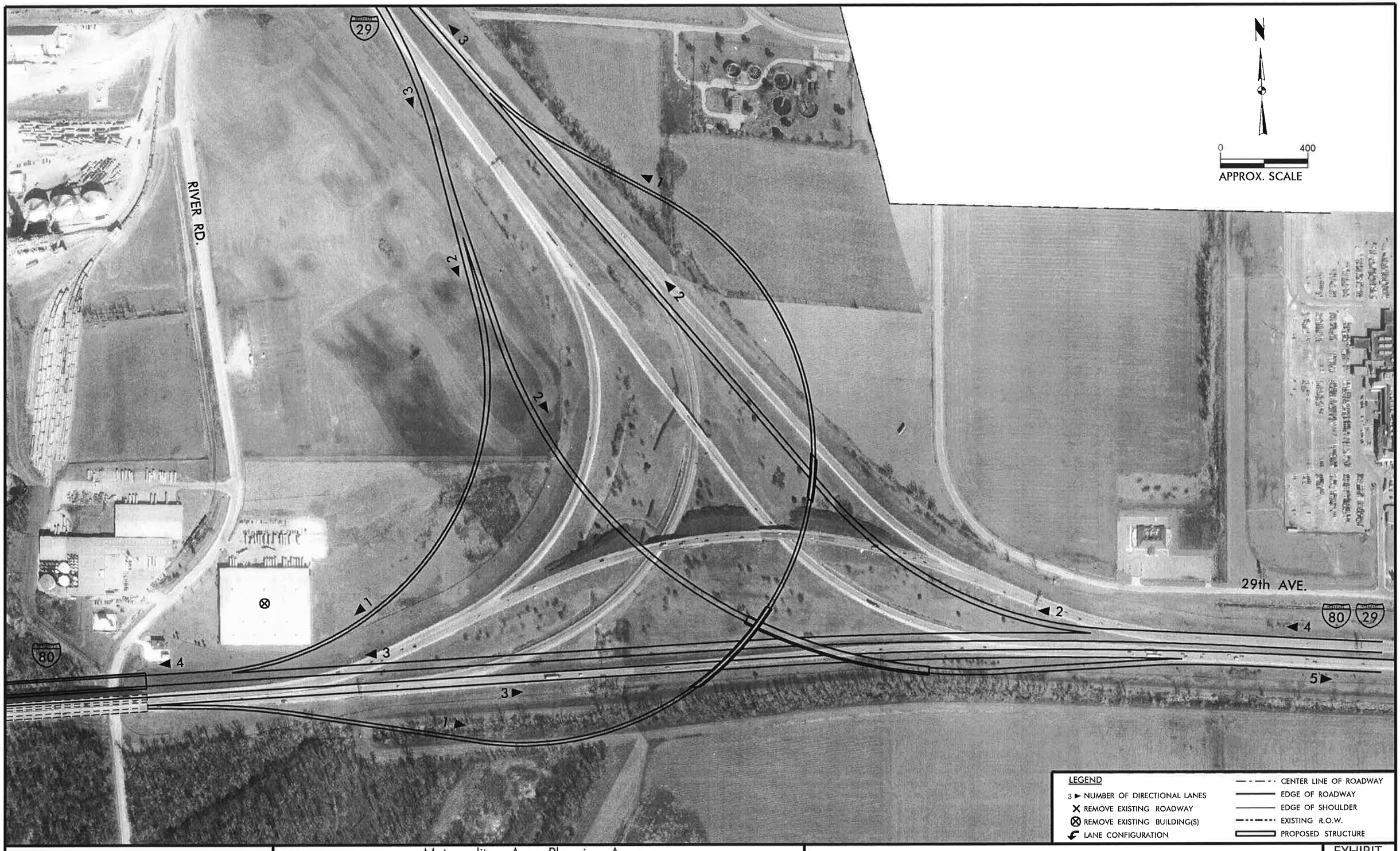
- Highest cost alternative.
- Approximately 92 acres of additional right-of-way required.
- One business impacted.
- Potential environmental impacts associated with new river bridge and wetlands.
- Realignment of 29th Avenue may impact truck business.
- Impacts to Western Historic Trails Center

Cost

The preliminary construction cost estimate for Alternative 3 is $52.9 million.

Recommended Alternative

Alternative 3 was recommended by the TAC for inclusion in the recommended plan. A key consideration was elimination of the weaving section between the system interchange and South 24th Street. As part of plan development, special consideration will be given to the skew angle of the braided ramps.



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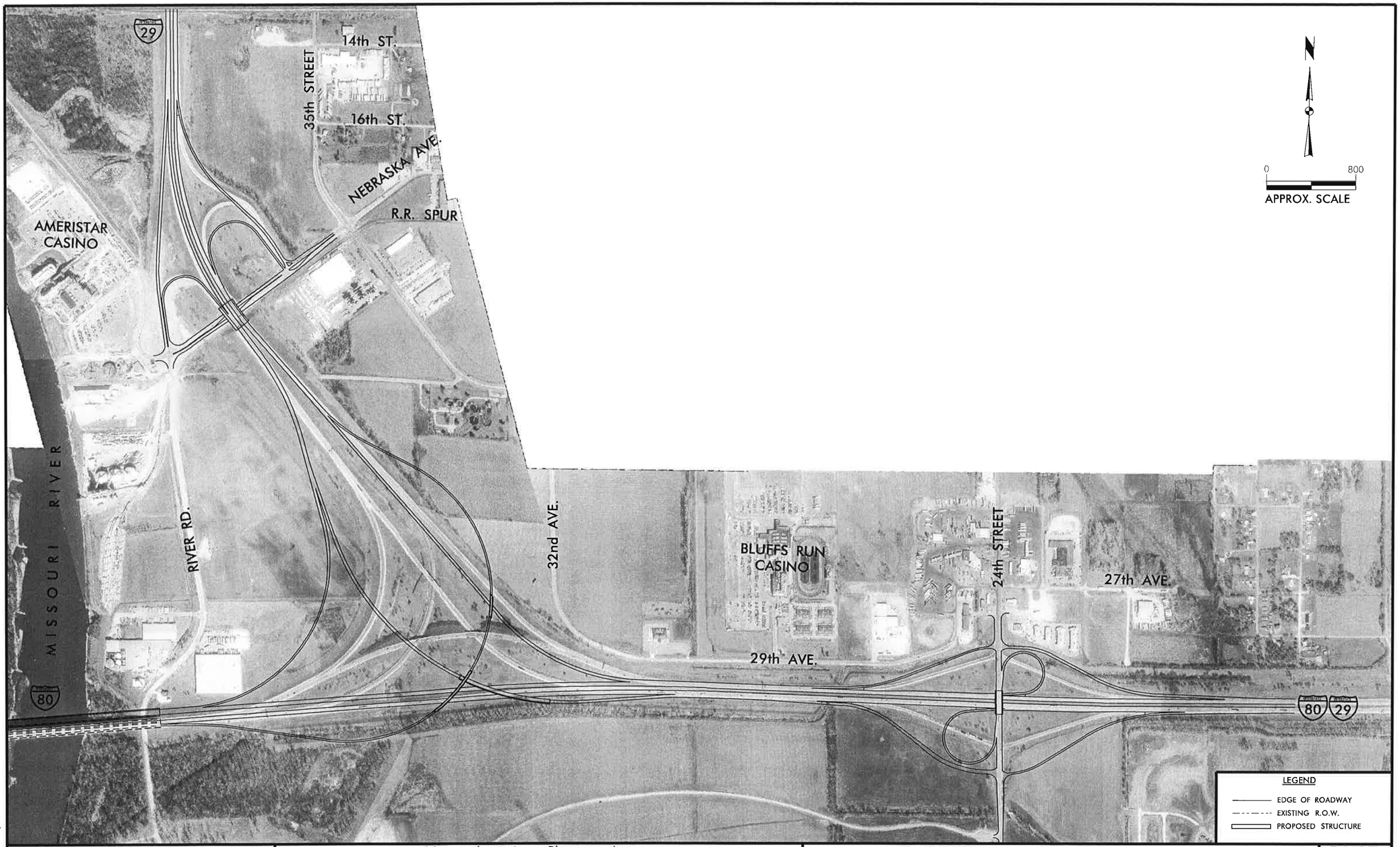
WEST I-80 / I-29 INTERCHANGE
ALTERNATIVE 1

EXHIBIT
18



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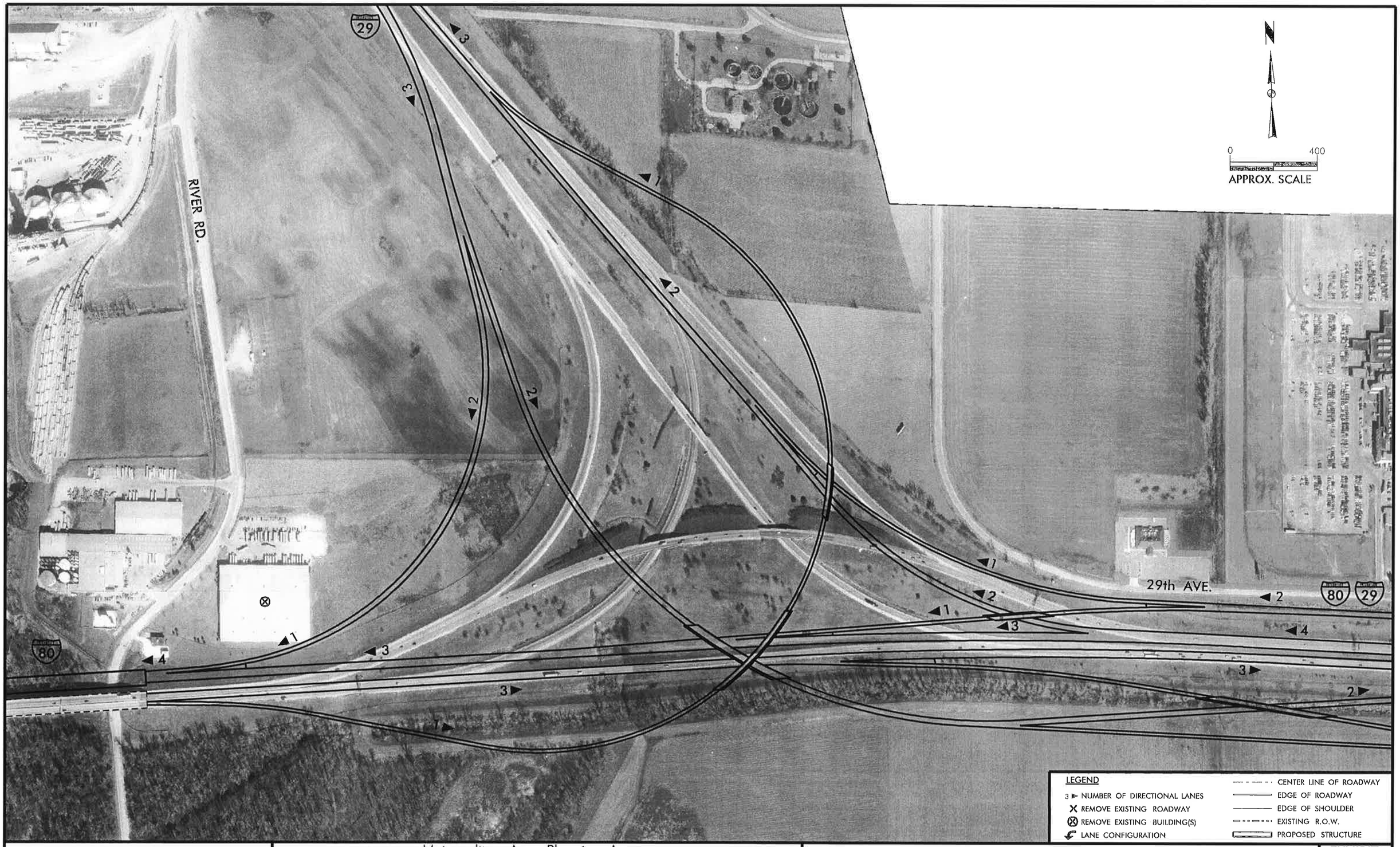
PHASE 3 REPORT OCTOBER 1998

WEST I–80 / I–29 SYSTEM INTERCHANGE ALTERNATIVE 1

EXHIBIT 19



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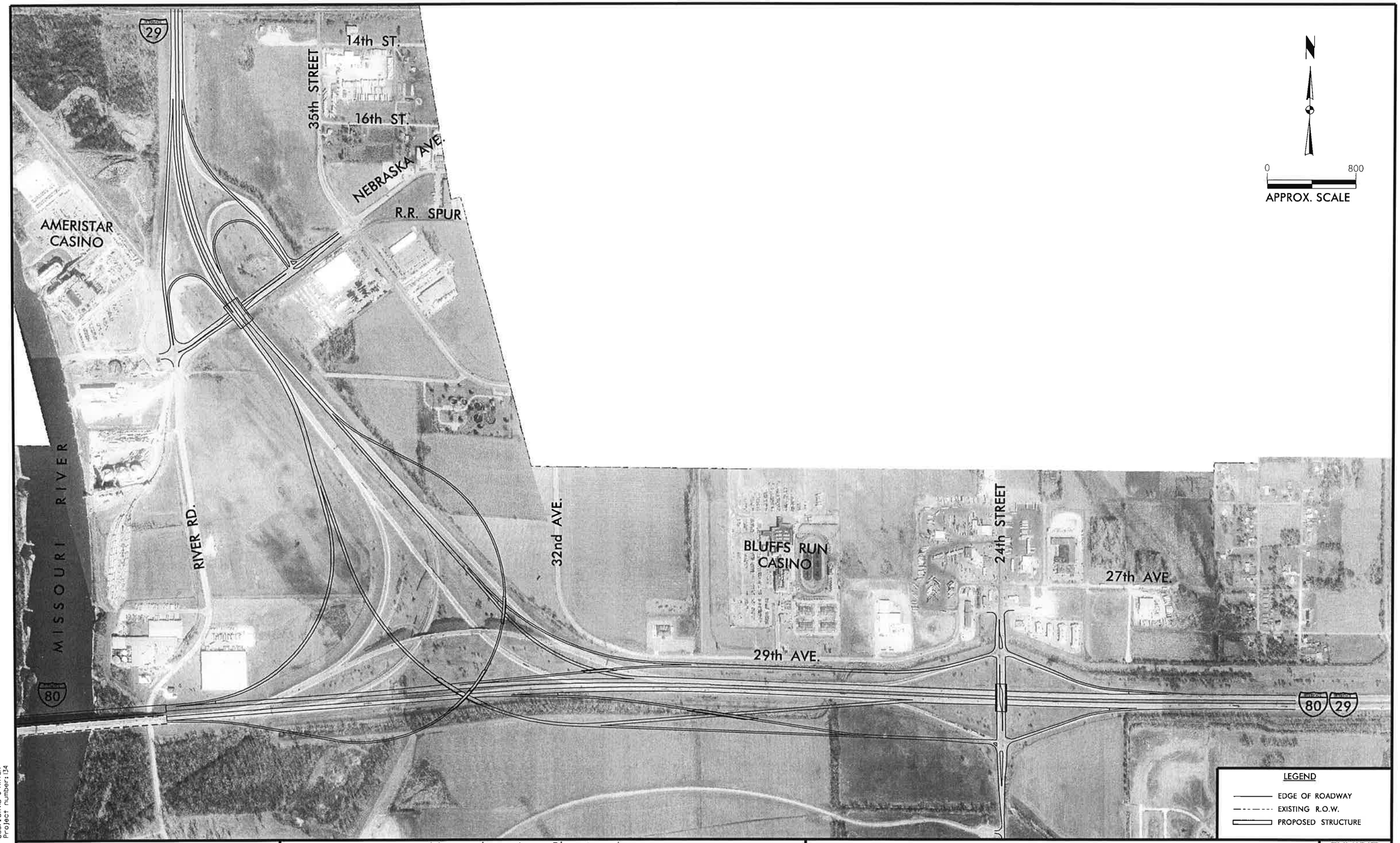
WEST I-80 / I-29 INTERCHANGE
ALTERNATIVE 3

EXHIBIT 20



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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY
PHASE 3 REPORT OCTOBER 1998

WEST I–80 / I–29 SYSTEM INTERCHANGE ALTERNATIVE 3

EXHIBIT 21

NEBRASKA AVENUE / I-29 INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of Interchange - Exhibit 22
1"=200' Plan of Nebraska Avenue - Exhibit A-12 (Appendix A)

Alternative 1 retains the existing configuration of the Nebraska Avenue interchange. (Because of the railroad spur tracks located on the south side of the Nebraska Avenue, the existing partial cloverleaf configuration, with ramps all on the north side, must be retained.) Alternative 1 does not include C-D roads to Nebraska Avenue. Therefore, additional bridges across the Nebraska Avenue are not required. Alternative 1 provides two through lanes in each direction on Nebraska Avenue and provides exclusive turns lanes at ramp terminal intersections, as necessary, to provide acceptable level of service for Year 2020 traffic volumes.

Alternative 1 is compatible with both of the preferred alternatives for the West I-80/I-29 System Interchange (Alternative 1 and Alternative 3) since neither of the preferred alternatives include C-D roads to the north.

Advantages

- No significant environmental impacts.

Disadvantages

- Approximately 1.5 acres of additional right-of-way required.
- Existing configuration restricts the separation between ramps to the north and the ramps to/from 9th Avenue.
- Loop ramp in northwest quadrant meets "basic" standard to minimize right-of-way impacts.

Cost

The preliminary construction cost estimate for Alternative 1 is $11.9 million.

Recommended Alternative

Alternative 1 was recommended by the TAC for inclusion in the recommended plan.

HDR
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hgm
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PHASE 3 REPORT
OCTOBER 1998

NEBRASKA AVENUE / I-29 INTERCHANGE
ALTERNATIVE 1

EXHIBIT
22

Date plotted: 10/21/98 4:43 am
Filename: \lacblnst\fig400l.dgn
User: DAVID J RAYER
Project number: 134

9TH AVENUE / I-29 INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of Interchange - Exhibit 23
1"=200' Plan of 9th Avenue - Exhibit A-13 (Appendix A)

Alternative 1 provides a full access partial cloverleaf interchange with loops in the southeast and southwest quadrants (i.e., a folded diamond configuration). This alternative provides the most weaving length between 9th Avenue and the I-480/I-29 System Interchange to the north. Service Road B has been relocated at 9th Avenue to form a four-way intersection with the revised northbound I-29 ramp terminal. South 37th Street has been eliminated between 5th Avenue and 9th Avenue. Access for the residential area on the west side of I-29 is provided via 5th Avenue which has been extended under I-29.

Alternative 1 provides two through lanes in each direction on 9th Avenue and provides exclusive turns lanes at ramp terminal intersections, as necessary, to provide acceptable level of service for Year 2020 traffic volumes.

Alternative 1 is compatible with Alternative 3 for the I-480/I-29/Broadway System Interchange (as shown in Exhibit 23) but not with Alternative 5 which provides C-D roads. Since the purpose of the C-D roads is to eliminate the mainline weaving between 9th Avenue and the I-480/I-29/Broadway System Interchange, a folded diamond configuration at 9th Avenue would not provide any operational benefits.

Advantages

- Provides necessary weaving lengths between 9th Avenue and I-480 to provide LOS D or better.
- Retains Service Road B.

Disadvantages

- Approximately 4.5 acres of additional right-of-way required.
- Impacts to 5 homes and 5 businesses.
- South 37th Street is eliminated between 5th Avenue and 9th Avenue.
- Loop ramps are basic standard to minimize right-of-way impacts.
- Potential environmental justice impacts.
- Highest cost alternative.

Cost

The preliminary construction cost estimate for Alternative 1 is $14.2 million.

ALTERNATIVE 2

1"=400' Plan of Interchange - Exhibit 24
1"=200' Plan of 9th Avenue - Exhibit A-14 (Appendix A)

Alternative 2 provides a single point urban interchange (SPUI). Alternative 2 is compatible with Alternative 3 for the I-480/I-29/Broadway System Interchange (as shown in Exhibit 24) but would not provide the necessary weaving lengths between 9th Avenue and I-480 to provide LOS D or better. Alternative 2 is also compatible with Alternative 5 for the I-480/I-29/Broadway System Interchange but would require some modifications to accommodate the C-D roads.

Alternative 2 provides two through lanes in each direction on 9th Avenue and provides exclusive turns lanes at ramp terminal intersections, as necessary, to provide acceptable level of service for Year 2020 traffic volumes.

Advantages

- South 37th Street and Service Road B remain operational.
- Minimizes right-of-way impacts.
- 5th Avenue connection under I-29 not necessary.
- SPUI will work with both I-480 alternatives with modifications.
- Least cost alternative.

Disadvantages

- Approximately 1 acre of additional right-of-way required.
- Impacts to 2 homes and 2 businesses.
- Ramp constructability problems requiring closures during removal and reconstruction.
- Combined with Alternative 1 at I-480/I-29/Broadway System Interchange, weaving lengths between 9th Avenue and I-480 do not provide minimum distance for LOS D or better.
- Does not accommodate pedestrians as well as other alternatives.
- Potential environmental justice impacts.

Cost

The preliminary construction cost estimate for Alternative 2 is $8.6 million.

Recommended Alternative

Alternative 2 was recommended by the TAC for inclusion in the recommended plan. A key consideration was the determination that the SPUI would operate better than the diamond interchange and would minimize right-of-way impacts in the interchange area. As part of plan development, the configuration will be modified to allow this alternative to be compatible with Alternative 5 for the I-480/I-29/Broadway System Interchange. In combination with Alternative 5 for the system interchange, weaving on the mainline is eliminated.

ALTERNATIVE 4

1"=400' Plan of Interchange - Exhibit 25
1"=200' Plan of 9th Avenue - Exhibit A-15 (Appendix A)

Alternative 4 retains the tight diamond layout at 9th Avenue and provides C-D roads between 9th Avenue and the I-480 system interchange to the north. The addition of the C-D roads will eliminate the existing deficient mainline weaving lengths between 9th Avenue and I-480. However, the ability of the weaving sections on the C-D roads to provide acceptable operations is questionable.

Service Road B will be eliminated between 9th Avenue and 2nd Avenue and the existing east/west streets tying into Service Road B will need to be cul-de-saced. South 37th Street will be eliminated between 5th Avenue and 9th Avenue and will be rerouted under the interstate. 5th Avenue will be extended under I-29 to connect with South 37th Street.

Alternative 4 provides two through lanes in each direction on 9th Avenue and provides exclusive turns lanes at ramp terminal intersections, as necessary, to provide acceptable level of service for Year 2020 traffic volumes.

Alternative 4 is compatible with Alternative 5 for the I-480/I-29/Broadway System Interchange (as shown in Exhibit 25) but not with Alternative 3.

Advantages

- Eliminates mainline weaving between 9th Avenue and I-480 Interchange.
- Retains tight diamond interchange configuration.
- 9th Avenue ramps meet "full" standard design.

Disadvantages

- South 37th Street and Service Road B are eliminated between 5th Avenue and 9th Avenue.
- Requires significant sound barrier walls for residential neighborhood.
- Requires the acquisition of at least 7 houses between 9th Avenue and 5th Avenue.
- Ramp constructability problems requiring closures during removal and reconstruction.
- Insufficient left turn stacking distance on 9th Avenue between the ramp intersections.
- Additional signing required with C-D road alternative.
- Approximately 1 acres of additional right-of-way required.
- Impacts to 7 homes and 2 businesses.
- Potential environmental justice impacts.

Cost

The preliminary construction cost estimate for Alternative 4 is $10.6 million.

N

0 400

APPROX. SCALE

LEGEND

- 3 ► NUMBER OF DIRECTIONAL LANES
- X REMOVE EXISTING ROADWAY
- ⊗ REMOVE EXISTING BUILDING(S)
- LANE CONFIGURATION
- CENTER LINE OF ROADWAY
- EDGE OF ROADWAY
- EDGE OF SHOULDER
- EXISTING R.O.W.
- PROPOSED STRUCTURE

HDR Engineering, Inc. hgm ASSOCIATES INC.

Metropolitan Area Planning Agency

COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT OCTOBER 1998

9th AVENUE /I-29 INTERCHANGE ALTERNATIVE 1

EXHIBIT 23

Date plotted: 10/16/98 8:06 am
Filename: /workdata/10677/400-1-1.dgn
User: Mark A. Templeman
Project number: 10677-003

NOTE:
SPUI IS COMPATIBLE WITH ALT. 2 FOR THE I–480 SYSTEM INTERCHANGE WITH MODIFICATIONS FOR THE C–D ROADS.

N

0 400

APPROX. SCALE

LEGEND

- 3 ► NUMBER OF DIRECTIONAL LANES
- X REMOVE EXISTING ROADWAY
- ⊗ REMOVE EXISTING BUILDING(S)
- ↶ LANE CONFIGURATION
- CENTER LINE OF ROADWAY
- EDGE OF ROADWAY
- EDGE OF SHOULDER
- EXISTING R.O.W.
- PROPOSED STRUCTURE

HDR Engineering, Inc. hgm ASSOCIATES INC.

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT OCTOBER 1998

9th AVENUE /I–29 INTERCHANGE ALTERNATIVE 2

EXHIBIT 24

Date plotted: 10/6/98 8:06 am
Filename: /workdata/10677/400-i-2.dgn
User: Mark A. Templeman
Project number: 10677-003

N

0 400

APPROX. SCALE

LEGEND

- 3 ► NUMBER OF DIRECTIONAL LANES
- X REMOVE EXISTING ROADWAY
- ⊗ REMOVE EXISTING BUILDING(S)
- LANE CONFIGURATION
- CENTER LINE OF ROADWAY
- EDGE OF ROADWAY
- EDGE OF SHOULDER
- EXISTING R.O.W.
- PROPOSED STRUCTURE

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

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9th AVENUE /I-29 INTERCHANGE ALTERNATIVE 4

EXHIBIT 25

Date plotted: 10/16/98 8:06 am
Filename: /workdata/10677/400-i-3.dgn
User: Mark A. Templeman
Project number: 10677-003

I-29/I-480/BROADWAY SYSTEM INTERCHANGE

ALTERNATIVE 3

1"=400' Plan of System Interchange - Exhibit 26
1"=800' Plan of System Interchange and Adjacent Service Interchanges - Exhibit 27

Alternative 3 retains the existing system interchange configuration while improving some of the existing deficiencies. All ramps merge and diverge on the right side and two lanes are provided between I-480 and I-29 to the south. This alternative includes a 70 mph design for the mainline and 50 mph design for all system to system ramps. The existing 41st Street partial interchange will remain with access provided from eastbound I-480 to 41st Street and from 41st Street to westbound I-480. This alternative includes the extension of Avenue B and 5th Avenue under I-29.

Advantages

- Eliminates "left-side" ramps.
- 70 mph design speed on I-29 "thru" movements.
- Extension of Avenue B and 5th Avenue under I-29 are included with this alternative.
- Least cost alternative.

Disadvantages

- 50 mph design speed on "non-thru" system-to-system ramps.
- Lengthening of 41st Street ramps will require widening Missouri River Bridge.
- The proximity of several new ramps to existing ramps may make maintenance of traffic difficult during reconstruction.
- Approximately 5 acres of additional right-of-way required.
- Impacts to 10 homes.
- Potential environmental impacts to park and Missouri River.
- No access to Broadway from I-29.

Cost

The preliminary construction cost estimate for Alternative 3 is $44.1 million.

ALTERNATIVE 5

1"=400' Plan of System Interchange - Exhibit 28
1"=800' Plan of System Interchange and Adjacent Service Interchanges - Exhibit 29

Alternative 5 provides C-D roads between the I-480 system interchange and the 9th Avenue interchange. This alternative includes a 70 mph design for the mainline and 50 mph design for all system to system ramps. The C-D roads eliminate the mainline weaving between I-480 and 9th Avenue. However, the ability of the weaving sections on the C-D roads to provide acceptable operations is questionable. The existing 41st Street partial interchange will remain with access provided from eastbound I-480 to 41st Street and from 41st Street to westbound I-480. This alternative includes the extension of Avenue B and 5th Avenue under I-29.

Advantages

- Eliminates "left-side" ramps.
- 70 mph design speed on I-29 "thru" movements.
- Extension of Avenue B and 5th Avenue under I-29 are included with this alternative.

Disadvantages

- 50 mph design speed on "non-thru" system-to-system ramps.
- Lengthening of 41st Street ramps will require widening Missouri River Bridge.
- The proximity of several new ramps to existing ramps may make maintenance of traffic difficult during reconstruction.
- Approximately 5 acres of additional right-of-way required.
- Impacts to 10 homes.
- Additional signing required with C-D road alternative.
- Potential environmental impacts to park and Missouri River.
- No access to Broadway.

Cost

The preliminary construction cost estimate for Alternative 5 is $47.6 million.

Recommended Alternative

Alternative 5 was recommended by the TAC for inclusion in the recommended plan. A key consideration was elimination of the weaving section between the system interchange and 9th Avenue. As part of plan development, the configuration may be modified as follows:

- Consider removal of 5th Avenue crossing if necessary to make vertical alignment work.
- Revise northbound C-D road split so that ramp to westbound I-480 departs on the left.
- Design speed for this ramp may be reduced to 45 mph.
- Adjust spacing of successive on-ramps to westbound I-480 so that 41st Street on-ramp does not impact Playland Park and the existing Missouri River Bridge.

Date plotted: 10/16/98 08:06 am
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User: Mark A. Templeman
Project number: 10677-003

HDR Engineering, Inc.

hgm ASSOCIATES INC.

Metropolitan Area Planning Agency

COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

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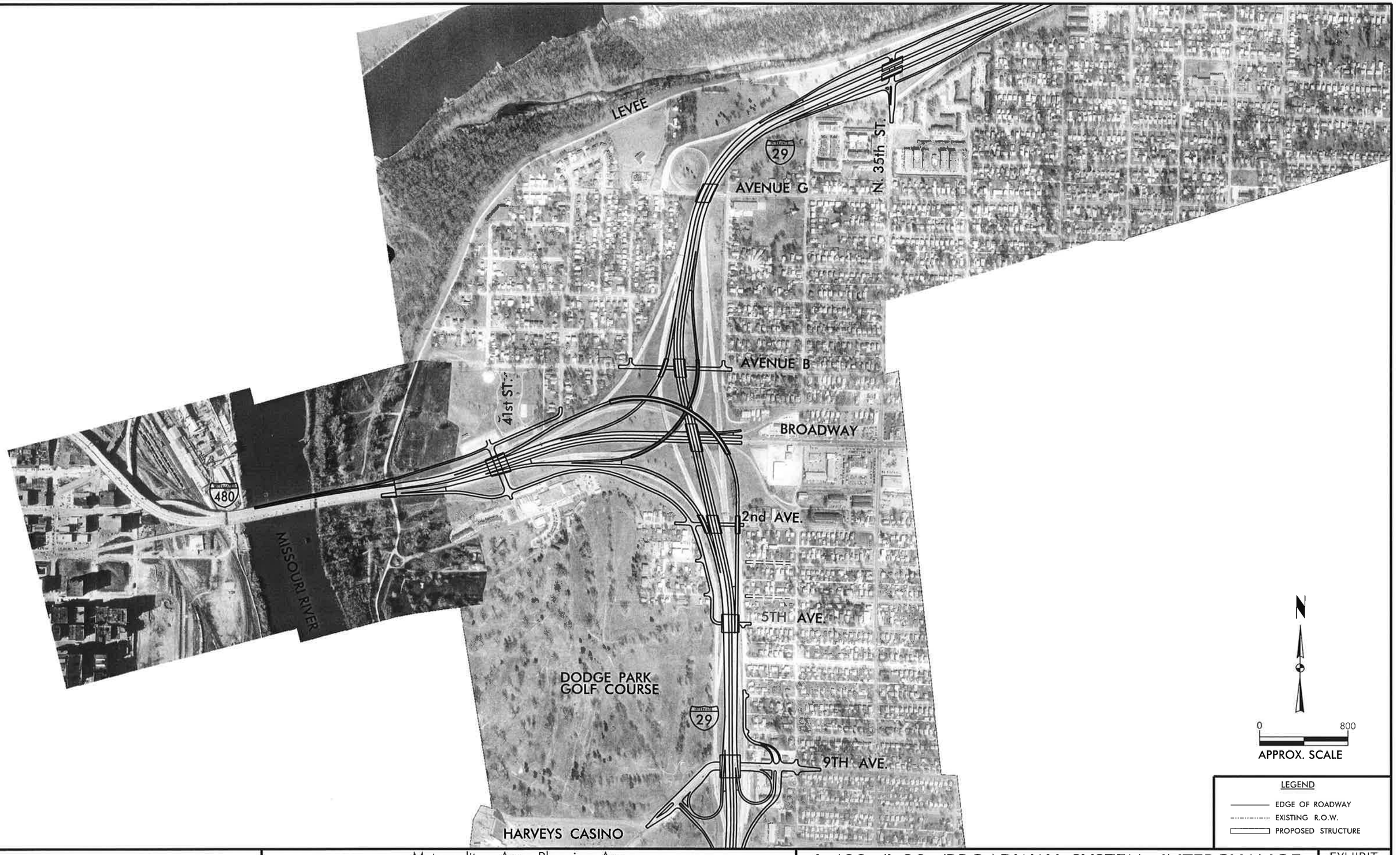
OCTOBER 1998

I–29 /I–480 /BROADWAY SYSTEM INTERCHANGE ALTERNATIVE 3

EXHIBIT 26



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User: Mark A. Templeman
Project number: 10677-003

HDR Engineering, Inc.

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT OCTOBER 1998

I-480 /I-29 /BROADWAY SYSTEM INTERCHANGE ALTERNATIVE 3

EXHIBIT 27

HDR Engineering, Inc. / hgm ASSOCIATES INC.	Metropolitan Area Planning Agency COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY PHASE 3 REPORT — OCTOBER 1998	I–29 /I–480 /BROADWAY SYSTEM INTERCHANGE ALTERNATIVE 5	EXHIBIT 28

Date plotted: 10/16/98 8:06 am
Filename: /workdata/10677/800-i-2.dgn
User: Mark A. Templeman
Project number: 10677-003

HDR Engineering, Inc.

hgm ASSOCIATES INC.

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT

OCTOBER 1998

I–480 /I–29 /BROADWAY SYSTEM INTERCHANGE ALTERNATIVE 5

EXHIBIT 29

AVENUE G/N. 35TH STREET / I-29 INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of Interchange - Exhibit 30
1"=200' Plan of N. 35th Street - Exhibit A-16 (Appendix A)

This alternative provides a tight diamond interchange at N. 35th Street and eliminates the existing partial interchange at Avenue G. Traffic signals are not assumed at the ramp terminal intersections. The I-29 horizontal alignment at Avenue G was improved to meet the 70 mph mainline design criteria. This interchange provides full access and improves the separation between this service interchange and the I-480 system interchange.

Alternative 1 provides exclusive turns lanes at ramp terminal intersections, as necessary, to provide acceptable level of service for Year 2020 traffic volumes.

Alternative 1 is compatible with both of the preferred alternatives for the I-29/I-480/Broadway System Interchange.

Advantages

- Improves mainline curve deficiency.
- Provides full access service interchange.
- Provides acceptable weaving lengths between 35th Street and I-480 to provide LOS D or better.
- Ramps meet "full" standard design.

Disadvantages

- Revised access for users of existing Avenue Ginterchange.
- Northbound 35th Street terminates into I-29 ramps requiring additional signing.
- Constructability problem of northbound ramps requiring closures during removal and reconstruction.
- Potential impacts to existing Missouri River levee.
- Additional right-of-way required.

Cost

The preliminary construction cost estimate for Alternative 1 is $9.4 million.

Recommended Alternative

Alternative 1 was recommended by the TAC for inclusion in the recommended plan. As part of plan development, the configuration will be modified to utilize a 70 mph design speed on mainline even if ramp spacing is sacrificed.

Filename:/workdata/10677/400-3-1.dgn
User:Mark A. Templeman
Project number:10677-003

HDR
HDR Engineering, Inc.

hgm
ASSOCIATES INC.

Metropolitan Area Planning Agency
COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY
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OCTOBER 1998

AVE. G – N. 35th ST./I-29 INTERCHANGE
ALTERNATIVE 1

EXHIBIT
30

NORTH 25TH STREET / I-29 INTERCHANGE

ALTERNATIVE 1

1"=400' Plan of Interchange - Exhibit 31
1"=200' Plan of N. 25th Street - Exhibit A-17 (Appendix A)

Alternative 1 retains the existing tight diamond ramp configuration. Improvements include lengthening all four ramps and increasing the existing ramp taper lengths. Traffic signals are included at both ramp junctions with N. 25th Street. Nash Boulevard was realigned to the south to improve the existing intersection spacing. The preliminary construction cost includes the cost of new mainline bridges over the CPRR tracks.

Advantages

- Retains existing tight diamond configuration.
- Ramps meet "full" standard design.
- No significant environmental impacts.

Disadvantages

- Requires realignment of Nash Boulevard to improve intersection spacing.
- Ramp constructability problems requiring closures during removal and reconstruction.
- Significant cost to reconstruct I-29 bridges over railroad.
- One residential property impacted.

Cost

The preliminary construction cost estimate for Alternative 1 is $14.2 million.

Recommended Alternative

Alternative 1 was recommended by the TAC for inclusion in the recommended plan.

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N. 25th STREET / I-29 INTERCHANGE
ALTERNATIVE 1

EXHIBIT

31

NORTH 16TH STREET / I-29 INTERCHANGE

ALTERNATIVE 3

1"=400' Plan of Interchange - Exhibit 32
1"=200' Plan of N. 16th Street - Exhibit A-18 (Appendix A)

Alternative 3 retains the existing partial interchange at N. 16th Street. Access is currently provided for 16th Street to northbound I-29 and southbound I-29 to 16th Street. This alternative includes realigning the southbound I-29 mainline and providing a right-hand southbound exit to N. 16th Street.

Advantages

- Provides right hand exit from southbound I-29 to N. 16th Street.
- Recently reconstructed northbound I-29 mainline retained.
- Ramps meet "full" standard design.
- No additional right-of-way required.
- No significant environmental impacts.

Disadvantages

- Remains a partial interchange.

Cost

The preliminary construction cost estimate for Alternative 3 is $5.3 million.

Recommended Alternative

Alternative 3 was recommended by the TAC for inclusion in the recommended plan.

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Filename: /workdata/10677/400-5-i.dgn
User: Mark A. Templeman
Project number: 10677-003

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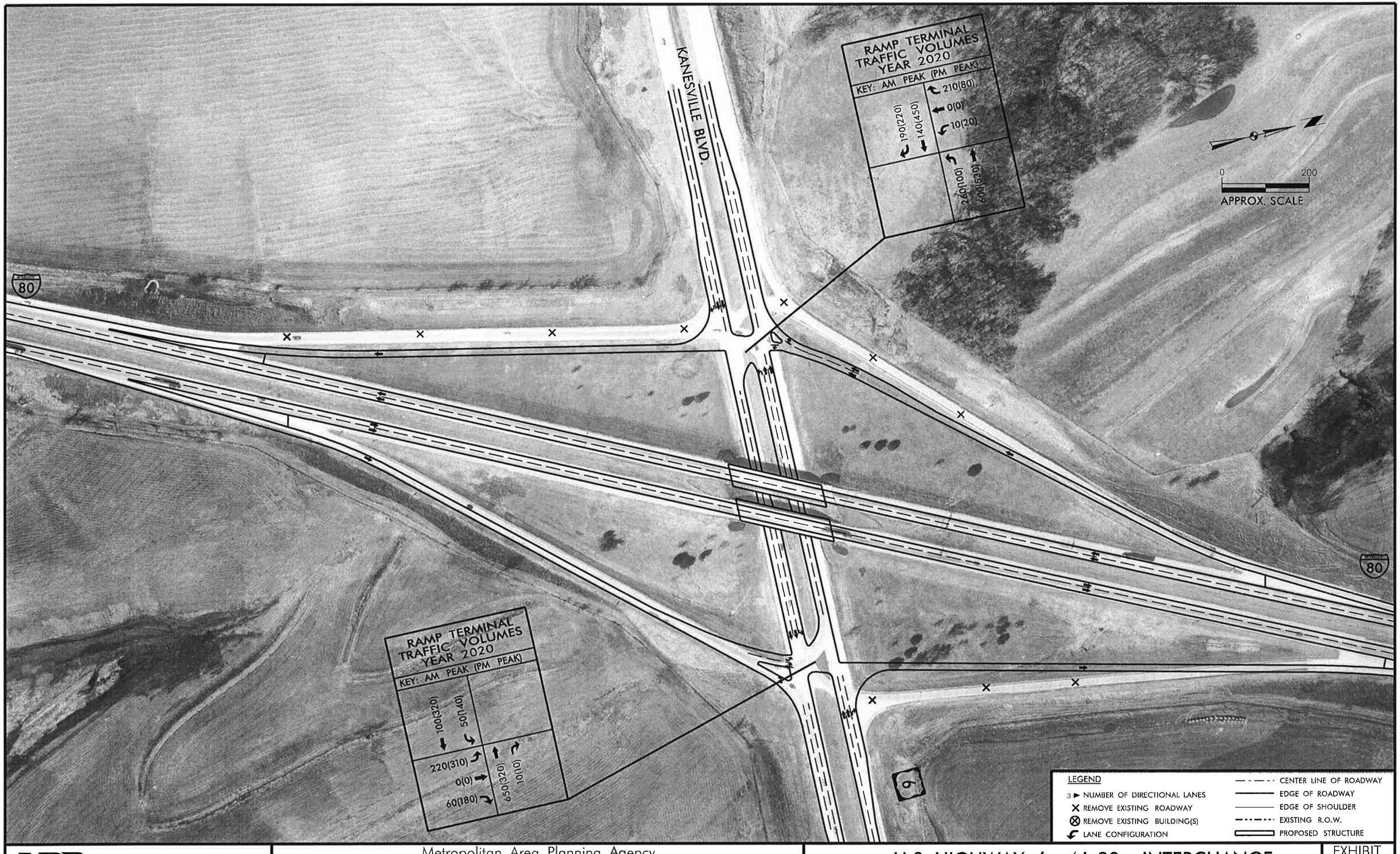
PHASE 3 REPORT OCTOBER 1998

16th STREET /I-29 INTERCHANGE
ALTERNATIVE 3

EXHIBIT 32

APPENDIX A

1"=200' Plan Sheets of Preferred Alternatives



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User: DAVID J RAYER
Project number: 134

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

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U.S. HIGHWAY 6 / I-80 INTERCHANGE ALTERNATIVE 1

EXHIBIT A-1

KANESVILLE BLVD.

RAMP TERMINAL TRAFFIC VOLUMES YEAR 2020	
KEY: AM PEAK (PM PEAK)	
190(220) ↷ 140(450) ↓	↷ 210(80) ↑ 0(0) ↶ 10(20)
	↑ 800(530) ↷ 260(100)

0 200

APPROX. SCALE

RAMP TERMINAL TRAFFIC VOLUMES YEAR 2020	
KEY: AM PEAK (PM PEAK)	
50 (140) ↓ 100(320) ↷	
220(310) ↷ 0(0) → 60(180) ↷	↑ 650(320) ↱ 10(10)

LEGEND

- 3 ▶ NUMBER OF DIRECTIONAL LANES
- ✕ REMOVE EXISTING ROADWAY
- ⊗ REMOVE EXISTING BUILDING(S)
- ↶ LANE CONFIGURATION
- CENTER LINE OF ROADWAY
- EDGE OF ROADWAY
- EDGE OF SHOULDER
- EXISTING R.O.W.
- PROPOSED STRUCTURE

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U.S. HIGHWAY 6 / I-80 INTERCHANGE ALTERNATIVE 2

EXHIBIT A-2

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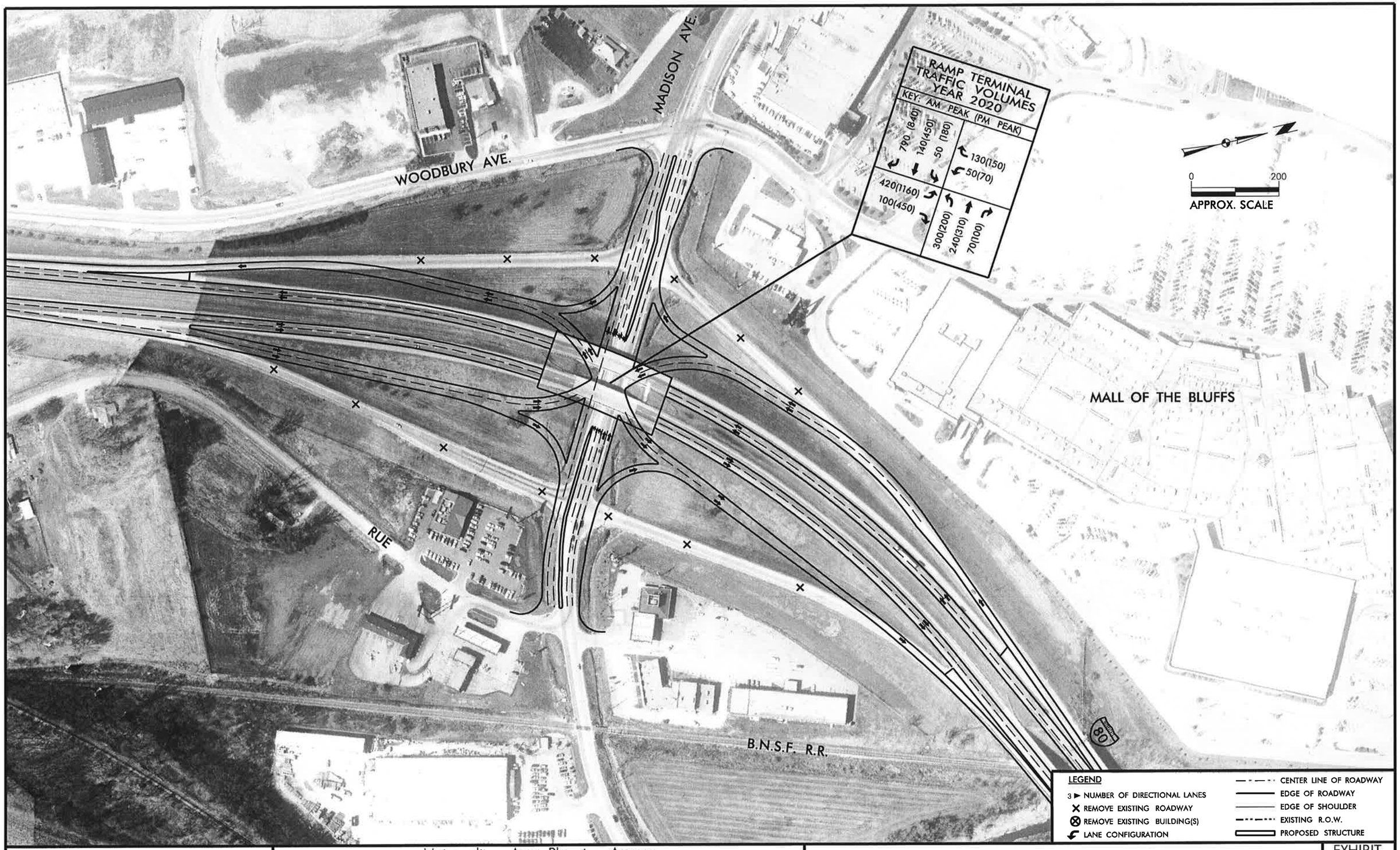
Project number: 134



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User: DAVID J RAYER
Project number: 00137-004-045

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

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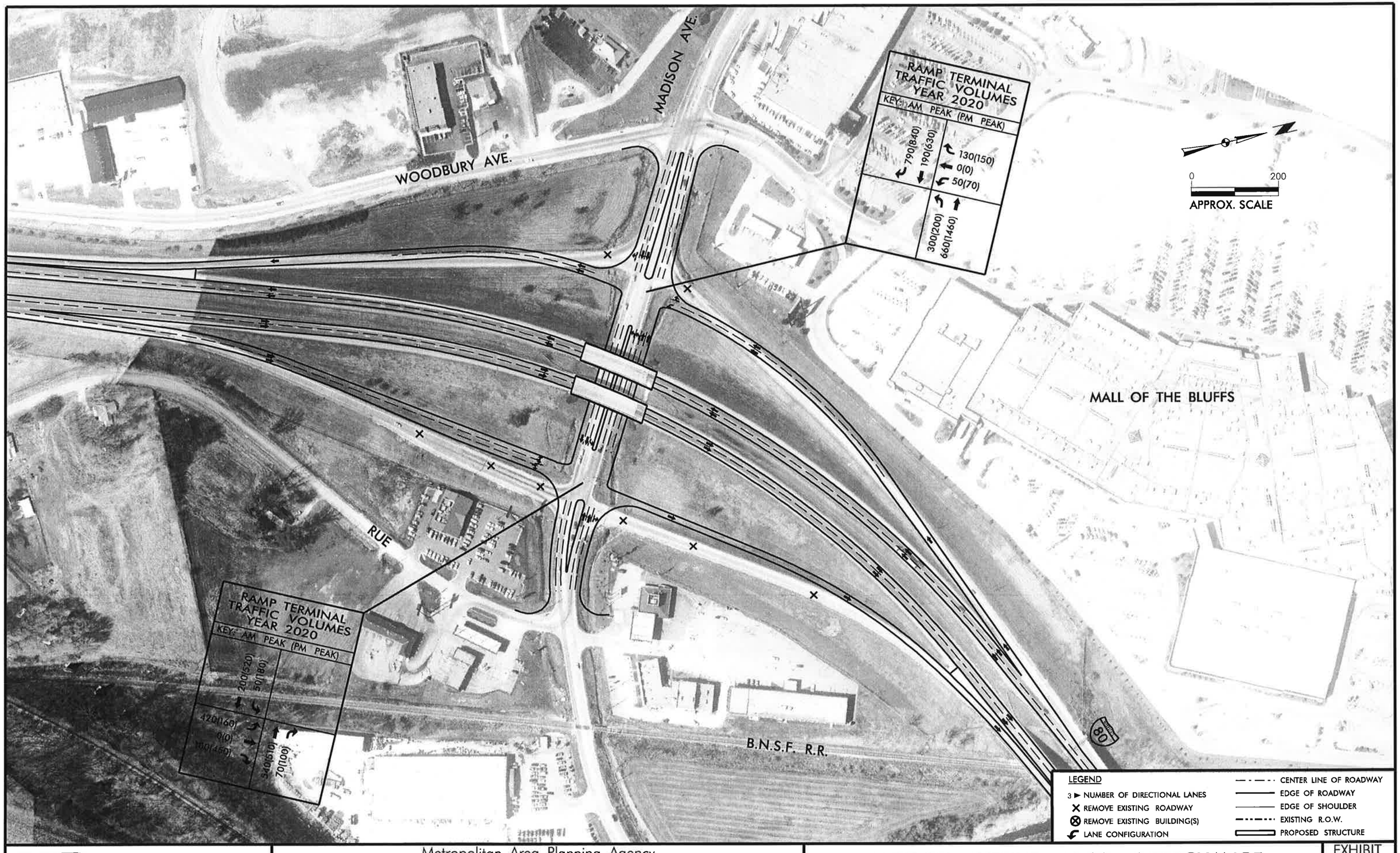
MADISON AVENUE / I–80 INTERCHANGE ALTERNATIVE 1

EXHIBIT A–3



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User: DAVID J RATER
Project number: 134

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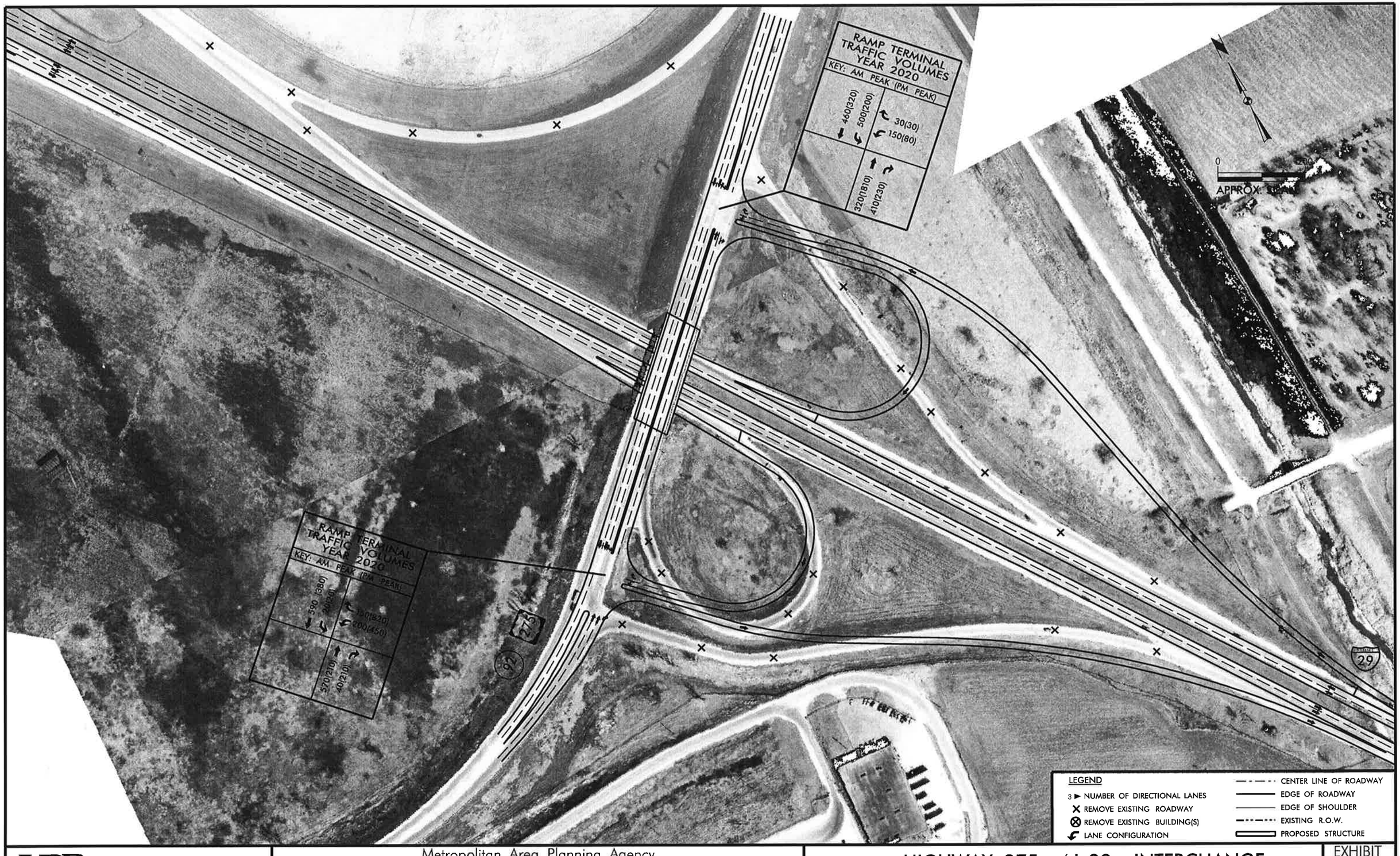
COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY
PHASE 3 REPORT OCTOBER 1998

MADISON AVENUE / I-80 INTERCHANGE ALTERNATIVE 2

EXHIBIT A-4



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User: DAVID J RAYER
Project number: 134

HDR Engineering, Inc. | hgm ASSOCIATES INC.

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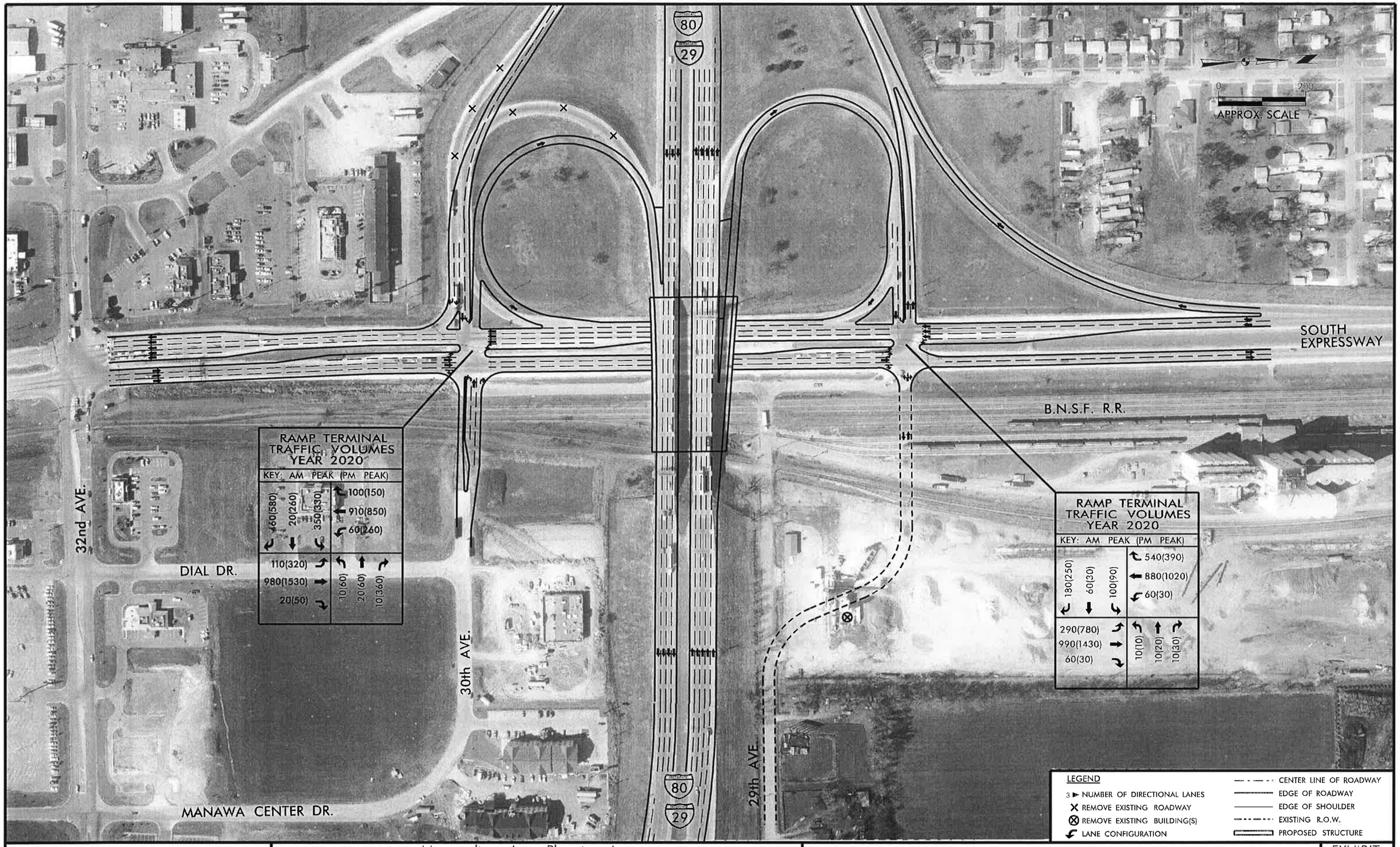
COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT — OCTOBER 1998

HIGHWAY 275 / I-29 INTERCHANGE ALTERNATIVE 1

EXHIBIT A-5



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User: DAVID J RAYER
Project number: 134

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

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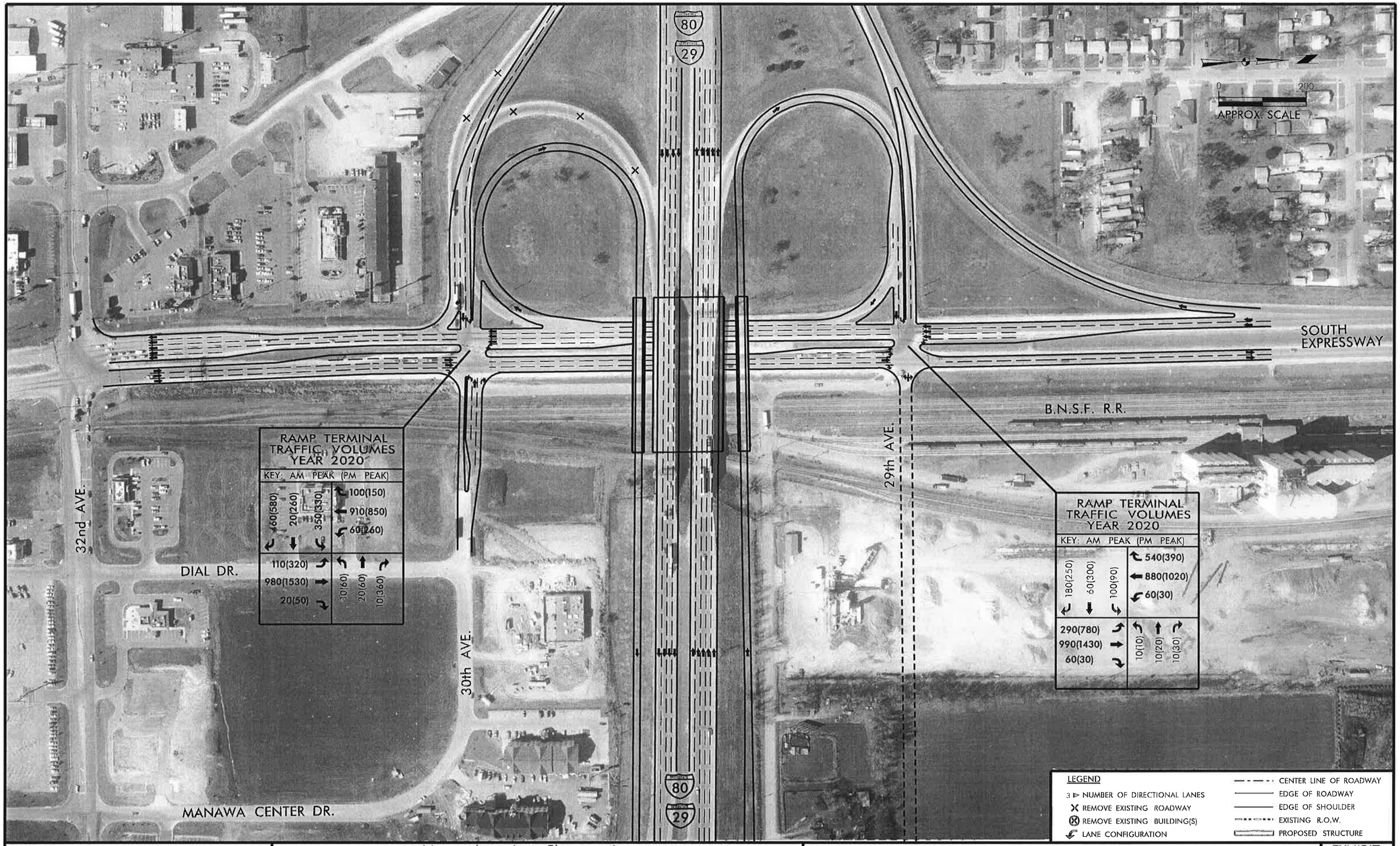
SOUTH EXPRESSWAY / I-80 INTERCHANGE ALTERNATIVE 1

EXHIBIT A-6



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User: DAVID J RAYER
Project number: 134

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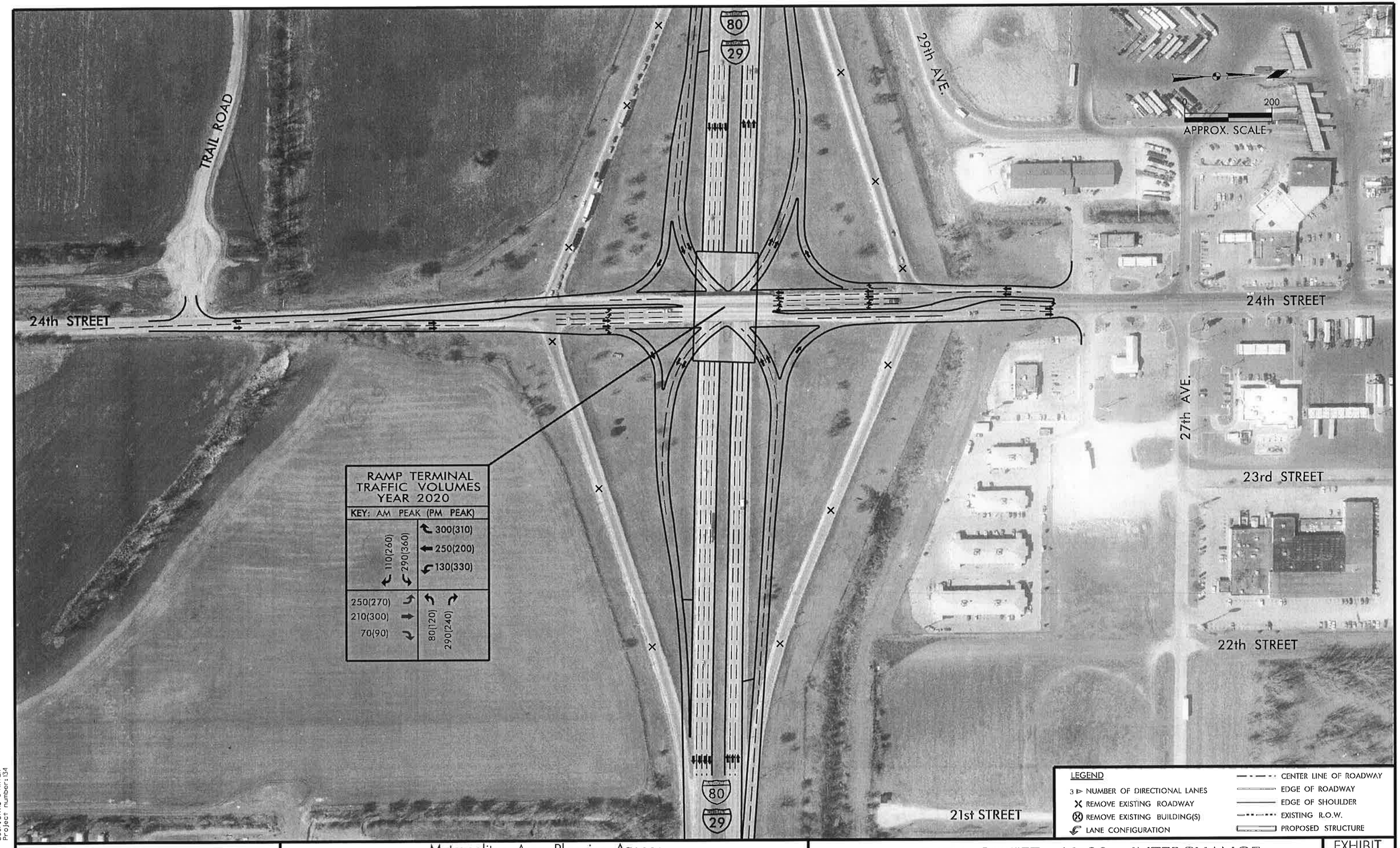
COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT OCTOBER 1998

SOUTH EXPRESSWAY / I-80 INTERCHANGE ALTERNATIVE 2

EXHIBIT A-7



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Project number: 134

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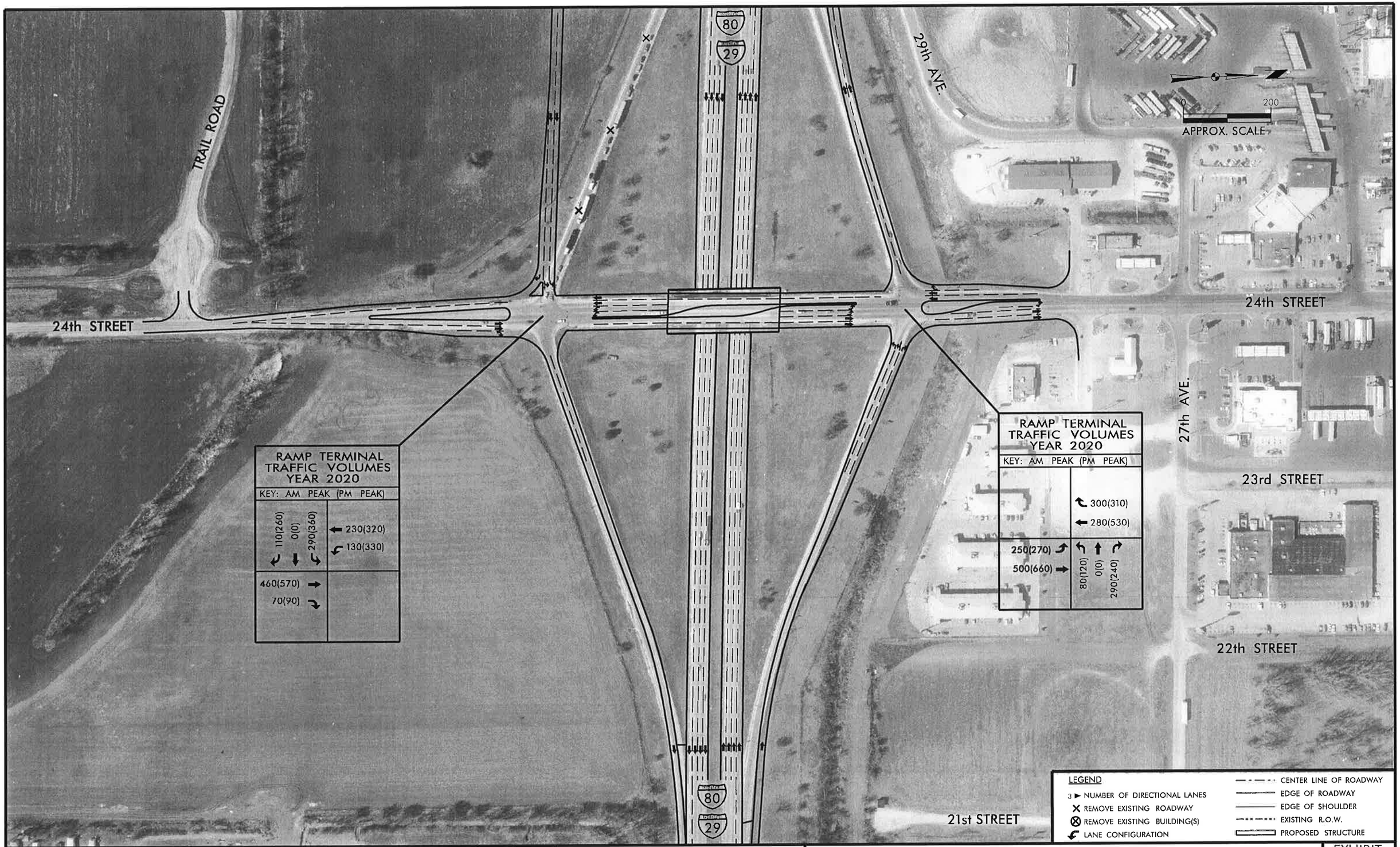
24TH STREET / I-80 INTERCHANGE ALTERNATIVE 1

EXHIBIT A-8



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Project number: 134

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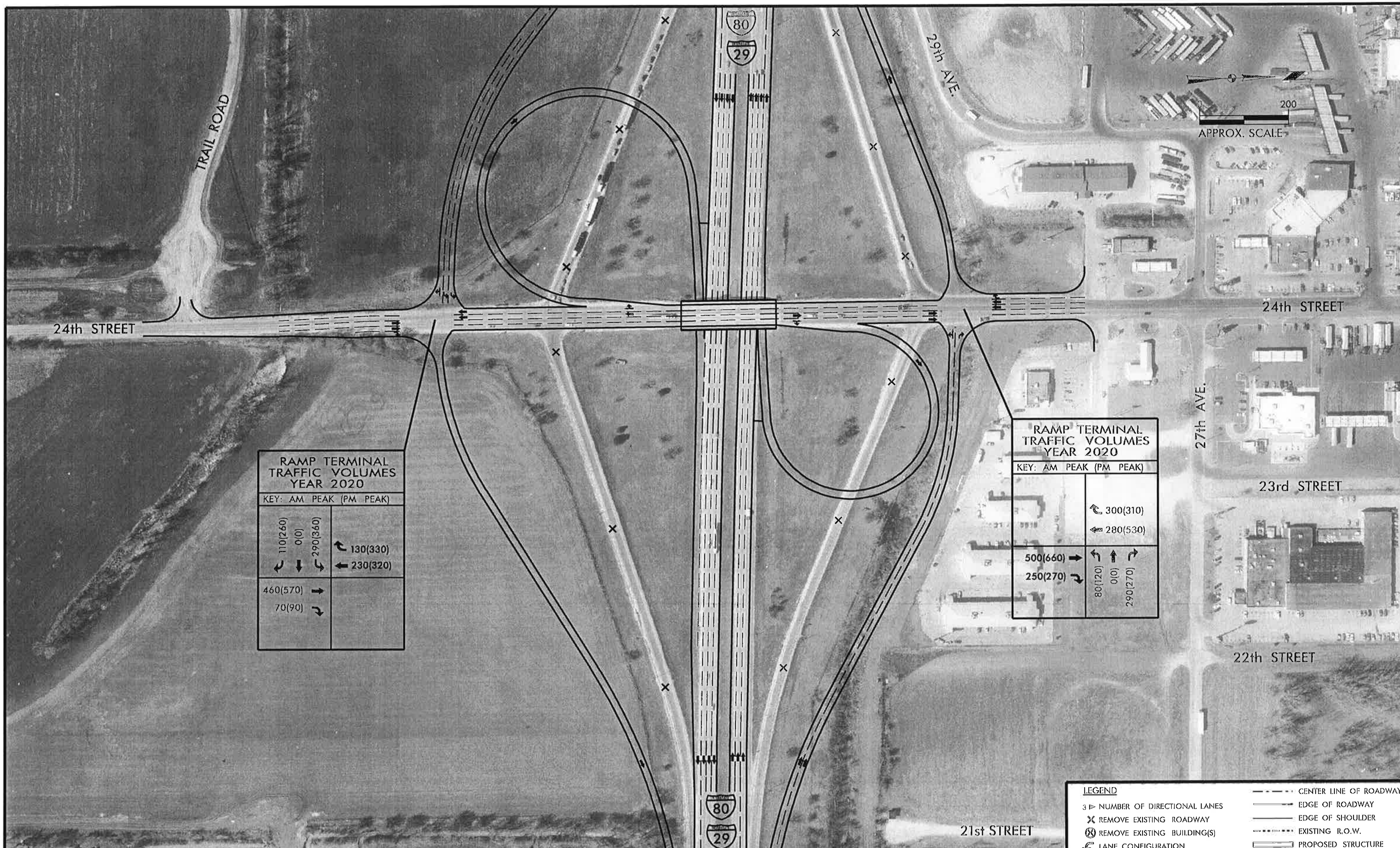
24TH STREET / I-80 INTERCHANGE ALTERNATIVE 2

EXHIBIT A-9



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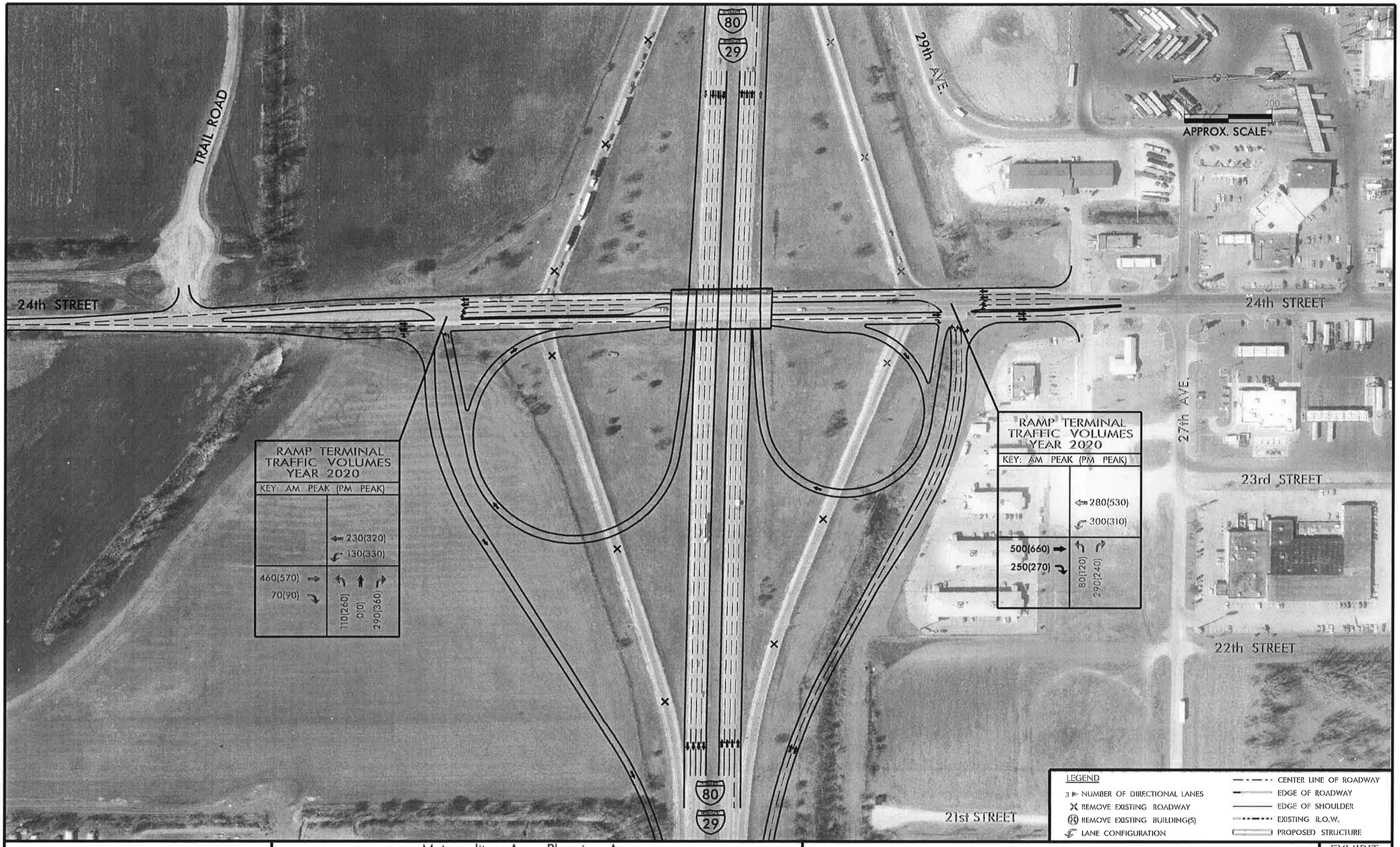
User: DAVID J RAYER
Project number: 00137-004-045

HDR Engineering, Inc. | hgm ASSOCIATES INC.

Metropolitan Area Planning Agency
COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY
PHASE 3 REPORT — OCTOBER 1998

24TH STREET / I-80 INTERCHANGE
ALTERNATIVE 6

EXHIBIT A-10



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Project number: 134

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

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24TH STREET / I-80 INTERCHANGE ALTERNATIVE 7

EXHIBIT A-11

Date plotted: 10/21/98 3:52 am
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User: DAVID J RAYER
Project number: 134

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NEBRASKA AVENUE / I-29 INTERCHANGE ALTERNATIVE 1

EXHIBIT A-12

HARVEYS CASINO

UNION PACIFIC RAILROAD

HARVEYS BLVD

WESTWOOD GOLF COURSE

DODGE PARK GOLF COURSE

RAMP TERMINAL TRAFFIC VOLUMES YEAR 2020		
KEY: AM PEAK (PM PEAK)		
80 (110)	90 (150)	
70 (90)		690 (370)
150 (200)		110 (170)

0 200
APPROX. SCALE

SERVICE ROAD 'B'

RAMP TERMINAL TRAFFIC VOLUMES YEAR 2020				
KEY: AM PEAK (PM PEAK)				
55 (85)	180 (260)	5 (5)	5	
			10	
			5	
80 (130)				
100 (180)			190 (170)	720 (410)
240 (570)				20 (10)

N. 36th STREET

9th AVE.

5th AVE.

LEGEND

- 3 ► NUMBER OF DIRECTIONAL LANES
- X REMOVE EXISTING ROADWAY
- ⊗ REMOVE EXISTING BUILDING(S)
- LANE CONFIGURATION
- CENTER LINE OF ROADWAY
- EDGE OF ROADWAY
- EDGE OF SHOULDER
- EXISTING R.O.W.
- PROPOSED STRUCTURE

Date plotted: 10/16/98 8:06 am
Filename: /workdata/10677/200-1i.dgn
User: Mark A. Templeman
Project number: 10677-003

HDR Engineering, Inc.

hgm ASSOCIATES INC.

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

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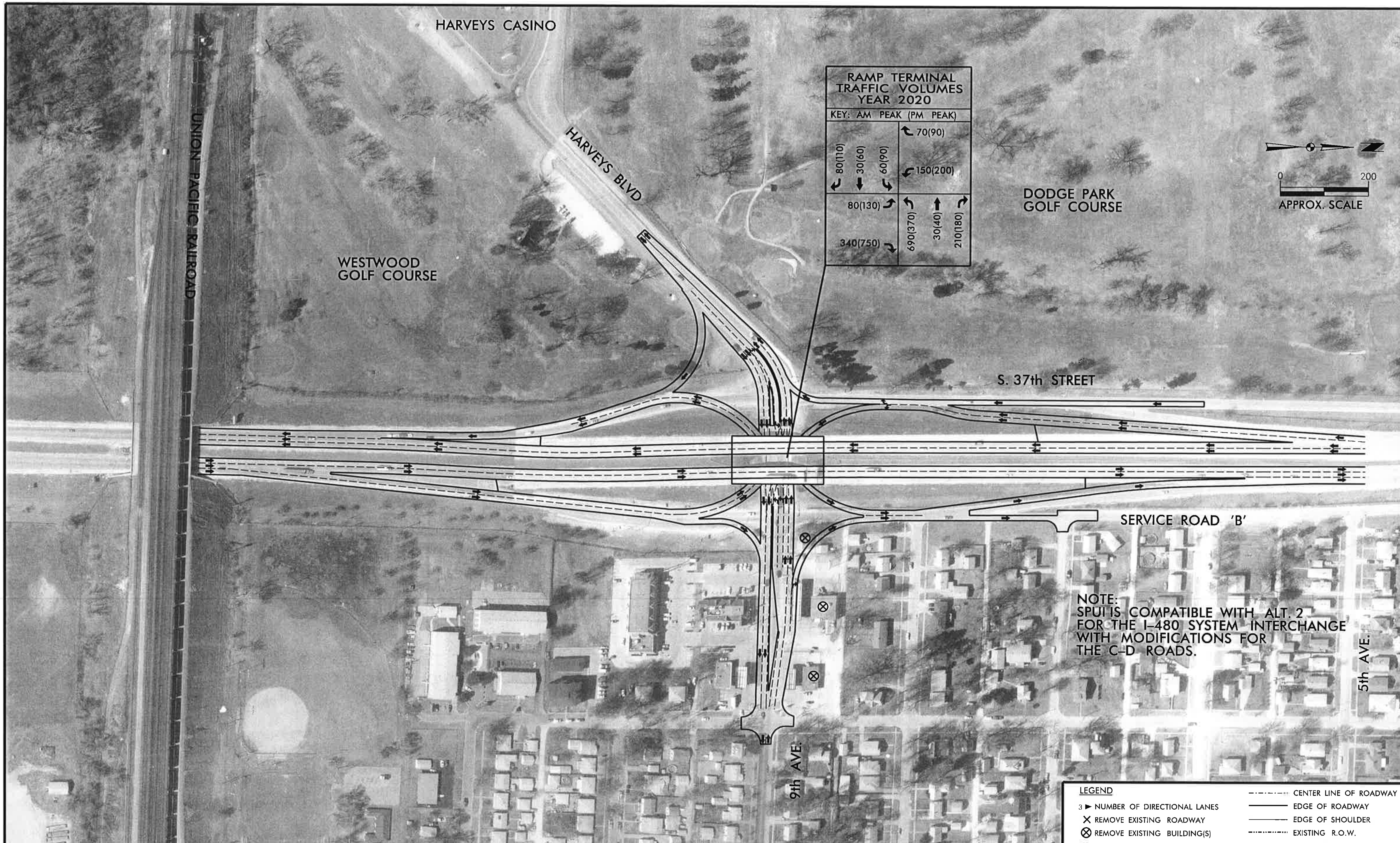
9th AVE./I-29 INTERCHANGE ALTERNATIVE 1

EXHIBIT A-13



HARVEYS CASINO
HARVEYS BLVD
UNION PACIFIC RAILROAD
WESTWOOD GOLF COURSE
RAMP TERMINAL TRAFFIC VOLUMES YEAR 2020
KEY: AM PEAK (PM PEAK)
70(90)
80(110)
30(60)
60(90)
150(200)
80(130)
340(750)
690(370)
30(40)
210(180)
0
200
APPROX. SCALE
DODGE PARK GOLF COURSE
S. 37th STREET
SERVICE ROAD 'B'
NOTE:
SPUI IS COMPATIBLE WITH ALT. 2 FOR THE I-480 SYSTEM INTERCHANGE WITH MODIFICATIONS FOR THE C-D ROADS.
5th AVE.
9th AVE.
LEGEND
3 ▶ NUMBER OF DIRECTIONAL LANES
X REMOVE EXISTING ROADWAY
⊗ REMOVE EXISTING BUILDING(S)
LANE CONFIGURATION
CENTER LINE OF ROADWAY
EDGE OF ROADWAY
EDGE OF SHOULDER
EXISTING R.O.W.
PROPOSED STRUCTURE

HDR
HDR Engineering, Inc.

hgm
ASSOCIATES INC.

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9th AVE./I-29 INTERCHANGE
ALTERNATIVE 2

EXHIBIT
A-14

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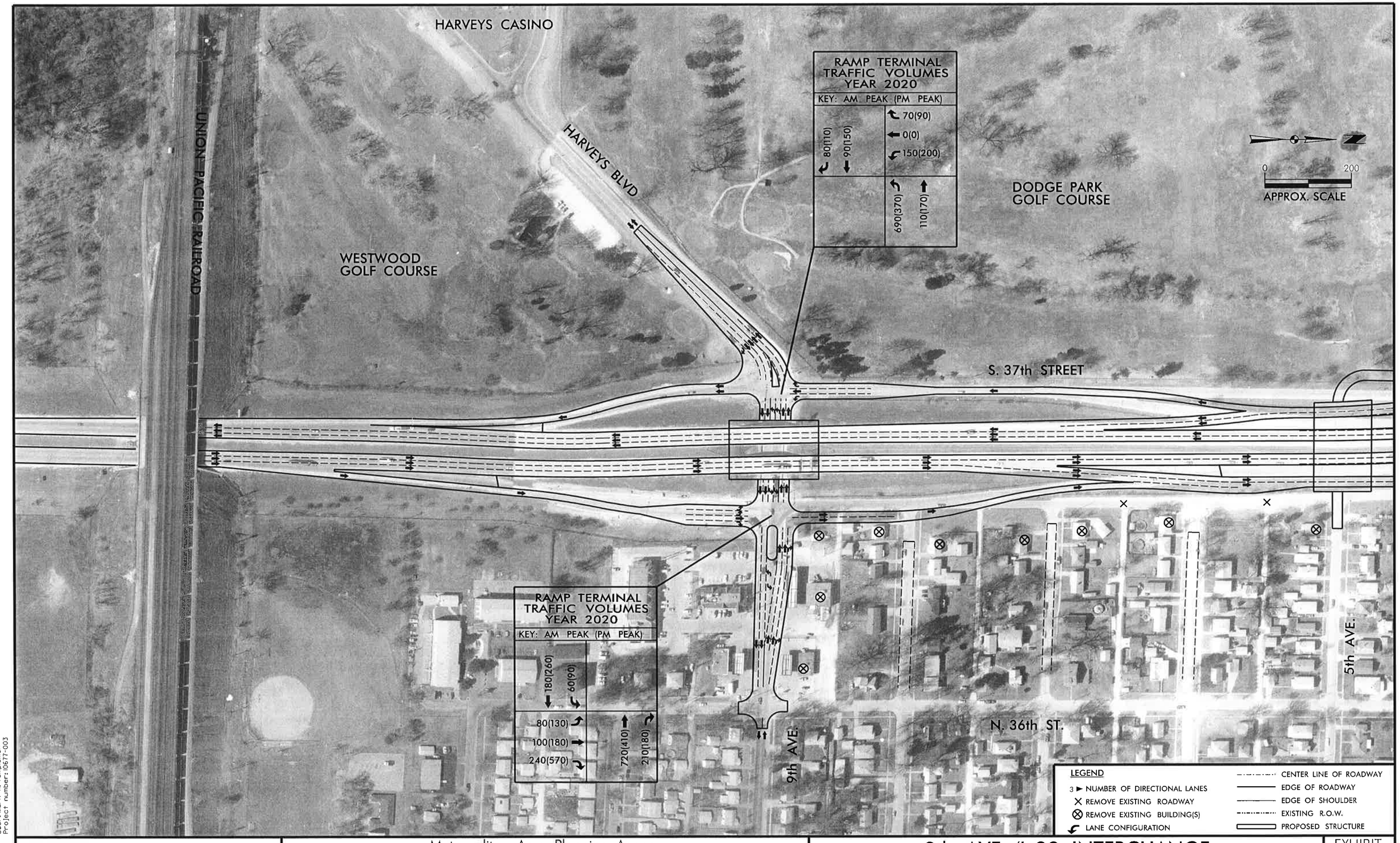
User: Mark A. Templeman
Project number: 10677-003



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Project number: 10677-003

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COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

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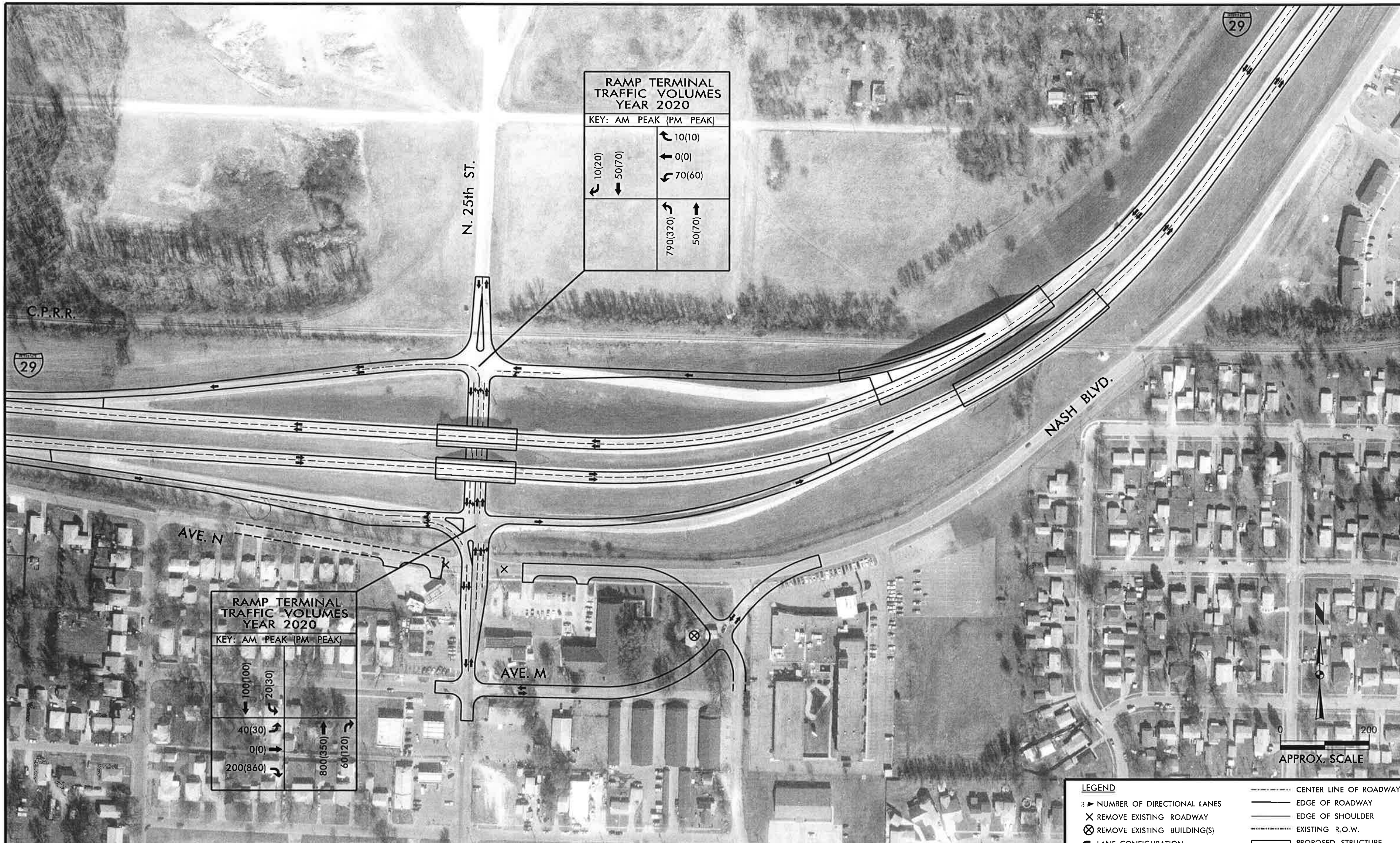
9th AVE./I–29 INTERCHANGE
ALTERNATIVE 4

EXHIBIT
A–15


MISSOURI RIVER
LEVEE
29
N. 35TH ST.
RAMP TERMINAL TRAFFIC VOLUMES YEAR 2020
KEY: AM PEAK (PM PEAK)
0(0)
50(70)
400(150)
RAMP TERMINAL TRAFFIC VOLUMES YEAR 2020
KEY: AM PEAK (PM PEAK)
50(70)
0(0)
0(0)
0(0)
60(200)
400(150)
50(200)
LEGEND
3 ▶ NUMBER OF DIRECTIONAL LANES
X REMOVE EXISTING ROADWAY
⊗ REMOVE EXISTING BUILDING(S)
LANE CONFIGURATION
CENTER LINE OF ROADWAY
EDGE OF ROADWAY
EDGE OF SHOULDER
EXISTING R.O.W.
PROPOSED STRUCTURE

User: Mark A. Templeman
Project number: 10677-003

HDR Engineering, Inc. / hgm ASSOCIATES INC.	Metropolitan Area Planning Agency COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY PHASE 3 REPORT — OCTOBER 1998	N. 35th ST /I–29 INTERCHANGE ALTERNATIVE 1	EXHIBIT A–16



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Project number: 10677-003

HDR Engineering, Inc. | hgm ASSOCIATES INC.

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N. 25th ST./I-29 INTERCHANGE ALTERNATIVE 1

EXHIBIT A-17

Date plotted: 11/16/98 8:06 am
Filename: /workdata/10677/200-9-1.dgn
User: Mark A. Templeman
Project number: 10677-003

HDR Engineering, Inc.

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Metropolitan Area Planning Agency

COUNCIL BLUFFS INTERSTATE SYSTEM NEEDS STUDY

PHASE 3 REPORT OCTOBER 1998

N. 16th ST./I-29 INTERCHANGE ALTERNATIVE 3

EXHIBIT A-18

APPENDIX B

Preliminary Estimates of Construction Cost

QUANTITY / COST ESTIMATE
HIGHWAY 6 / I-80 INTERCHANGE
ALTERNATIVE 1

MAJOR CONSTRUCTION ITEMS BASED ON UNIT COST

ITEM	QUANTITY	UNIT	UNIT COST	COST
REMOVAL OF BRIDGES	21,600	SQ. FT.	$7	$151,200
REMOVAL OF PAVEMENT	92,300	SQ. YDS.	$5	$461,500
PAVEMENT	67,900	SQ. YDS.	$40	$2,716,000
SHOULDER PAVEMENT	22,600	SQ. YDS.	$24	$542,400
BRIDGE (MID-RANGE DESIGN / CONSTRUCTION)	28,300	SQ. FT.	$75	$2,122,500
BRIDGE (SIMPLE DESIGN / CONSTRUCTION)	0	SQ. FT.	$60	$0
CONCRETE BARRIER WALL	0	LIN. FT.	$35	$0
RETAINING WALL	0	SQ.FT.	$35	$0
TRAFFIC SIGNALS	2	PER LOC.	$100,000	$200,000
SUBTOTAL (BASED ON UNIT COST)				$6,193,600

ADDITIONAL CONSTRUCTION COSTS BASED ON PERCENTAGE OF TOTAL CONSTRUCTION

ITEM	% OF CONSTR. COST	COST
EARTHWORK	5.0	$387,100
RDWY. LIGHTING	5.0	$387,100
ROADWAY SIGNING	3.0	$232,260
DRAINAGE	3.0	$232,260
CONSTRUCTION PHASING / TEMPORARY PAVEMENT	2.0	$154,840
MOBILIZATION	2.0	$154,840
SUBTOTAL (BASED ON % OF TOTAL CONSTRUCTION COST)	20.0	$1,548,400
TOTAL CONSTRUCTION COST		$7,742,000

RIGHT OF WAY COSTS

ITEM	QUANTITY	UNIT	UNIT COST	COST
UNIMPROVED RURAL	0.0	AC.	$20,000	$0
UNIMPROVED URBAN	0.0	AC.	$50,000	$0
IMPROVED URBAN	0.0	AC.	$100,000	$0
RESIDENTIAL HOUSE (INCLUDES LAND)	0.0	EA.	$120,000	$0
DEVELOPED COMM. "SMALL" (INCL. LAND) - gas station, etc	0.0	EA.	$150,000	$0
DEVELOPED COMM. "LARGE" (INCL. LAND) - motel, apt., etc	0.0	EA.	$250,000	$0
R.O.W SUBTOTAL (BASED ON UNIT COST)				$0

CONTINGENCIES / ENGINEERING

ITEM	% OF CONSTR. COST	COST
CONTINGENCIES	20.0	$1,548,400
ENGINEERING DESIGN	4.0	$371,616
CONTINGENCIES & ENGINEERING SUBTOTAL		$1,920,016

TOTAL COST

TOTAL COST	**$9,662,016**

QUANTITY / COST ESTIMATE
HIGHWAY 6 / I-80 INTERCHANGE
ALTERNATIVE 2

MAJOR CONSTRUCTION ITEMS BASED ON UNIT COST

ITEM	QUANTITY	UNIT	UNIT COST	COST
REMOVAL OF BRIDGES	21,600	SQ. FT.	$7	$151,200
REMOVAL OF PAVEMENT	92,300	SQ. YDS.	$5	$461,500
PAVEMENT	76,800	SQ. YDS.	$40	$3,072,000
SHOULDER PAVEMENT	24,000	SQ. YDS.	$24	$576,000
BRIDGE (MID-RANGE DESIGN / CONSTRUCTION)	44,500	SQ. FT.	$75	$3,337,500
BRIDGE (SIMPLE DESIGN / CONSTRUCTION)	0	SQ. FT.	$60	$0
CONCRETE BARRIER WALL	0	LIN. FT.	$35	$0
RETAINING WALL	0	SQ.FT.	$35	$0
TRAFFIC SIGNALS	2	PER LOC.	$100,000	$200,000
SUBTOTAL (BASED ON UNIT COST)				$7,798,200

ADDITIONAL CONSTRUCTION COSTS BASED ON PERCENTAGE OF TOTAL CONSTRUCTION

ITEM	% OF CONSTR. COST	COST
EARTHWORK	10.0	$1,053,811
RDWY. LIGHTING	5.0	$526,905
ROADWAY SIGNING	3.0	$316,143
DRAINAGE	3.0	$316,143
CONSTRUCTION PHASING / TEMPORARY PAVEMENT	3.0	$316,143
MOBILIZATION	2.0	$210,762
SUBTOTAL (BASED ON % OF TOTAL CONSTRUCTION COST)	26.0	$2,739,908
TOTAL CONSTRUCTION COST		$10,538,108

RIGHT OF WAY COSTS

ITEM	QUANTITY	UNIT	UNIT COST	COST
UNIMPROVED RURAL	0.0	AC.	$20,000	$0
UNIMPROVED URBAN	8.0	AC.	$50,000	$400,000
IMPROVED URBAN	0.0	AC.	$100,000	$0
RESIDENTIAL HOUSE (INCLUDES LAND)	0.0	EA.	$120,000	$0
DEVELOPED COMM. "SMALL" (INCL. LAND) - gas station, etc	0.0	EA.	$150,000	$0
DEVELOPED COMM. "LARGE" (INCL. LAND) - motel, apt., etc	0.0	EA.	$250,000	$0
R.O.W SUBTOTAL (BASED ON UNIT COST)				$400,000

CONTINGENCIES / ENGINEERING

ITEM	% OF CONSTR. COST	COST
CONTINGENCIES	20.0	$2,107,622
ENGINEERING DESIGN	4.0	$505,829
CONTINGENCIES & ENGINEERING SUBTOTAL		$2,613,451

TOTAL COST

TOTAL COST	**$13,551,559**

QUANTITY / COST ESTIMATE
MADISON AVENUE / I-80 INTERCHANGE
ALTERNATIVE 1

MAJOR CONSTRUCTION ITEMS BASED ON UNIT COST

ITEM	QUANTITY	UNIT	UNIT COST	COST
REMOVAL OF BRIDGES	13,100	SQ. FT.	$7	$91,700
REMOVAL OF PAVEMENT	57,300	SQ. YDS.	$5	$286,500
PAVEMENT	51,500	SQ. YDS.	$40	$2,060,000
SHOULDER PAVEMENT	17,900	SQ. YDS.	$24	$429,600
BRIDGE (MID-RANGE DESIGN / CONSTRUCTION)	25,000	SQ. FT.	$75	$1,875,000
BRIDGE (SIMPLE DESIGN / CONSTRUCTION)	0	SQ. FT.	$60	$0
CONCRETE BARRIER WALL	0	LIN. FT.	$35	$0
RETAINING WALL	5,000	SQ.FT.	$35	$175,000
TRAFFIC SIGNALS	2	PER LOC.	$100,000	$200,000
SUBTOTAL (BASED ON UNIT COST)				$5,117,800

ADDITIONAL CONSTRUCTION COSTS BASED ON PERCENTAGE OF TOTAL CONSTRUCTION

ITEM	% OF CONSTR. COST	COST
EARTHWORK	10.0	$682,373
RDWY. LIGHTING	5.0	$341,187
ROADWAY SIGNING	3.0	$204,712
DRAINAGE	3.0	$204,712
CONSTRUCTION PHASING / TEMPORARY PAVEMENT	2.0	$136,475
MOBILIZATION	2.0	$136,475
SUBTOTAL (BASED ON % OF TOTAL CONSTRUCTION COST)	25.0	$1,705,933
TOTAL CONSTRUCTION COST		$6,823,733

RIGHT OF WAY COSTS

ITEM	QUANTITY	UNIT	UNIT COST	COST
UNIMPROVED RURAL	0.0	AC.	$20,000	$0
UNIMPROVED URBAN	0.0	AC.	$50,000	$0
IMPROVED URBAN	0.0	AC.	$100,000	$0
RESIDENTIAL HOUSE (INCLUDES LAND)	0.0	EA.	$120,000	$0
DEVELOPED COMM. "SMALL" (INCL. LAND) - gas station, etc	0.0	EA.	$150,000	$0
DEVELOPED COMM. "LARGE" (INCL. LAND) - motel, apt., etc	0.0	EA.	$250,000	$0
R.O.W SUBTOTAL (BASED ON UNIT COST)				$0

CONTINGENCIES / ENGINEERING

ITEM	% OF CONSTR. COST	COST
CONTINGENCIES	20.0	$1,364,747
ENGINEERING DESIGN	4.0	$327,539
CONTINGENCIES & ENGINEERING SUBTOTAL		$1,692,286

TOTAL COST

TOTAL COST	**$8,516,019**

QUANTITY / COST ESTIMATE
MADISON AVENUE / I-80 INTERCHANGE
ALTERNATIVE 2

MAJOR CONSTRUCTION ITEMS BASED ON UNIT COST

ITEM	QUANTITY	UNIT	UNIT COST	COST
REMOVAL OF BRIDGES	13,100	SQ. FT.	$7	$91,700
REMOVAL OF PAVEMENT	57,300	SQ. YDS.	$5	$286,500
PAVEMENT	50,800	SQ. YDS.	$40	$2,032,000
SHOULDER PAVEMENT	22,700	SQ. YDS.	$24	$544,800
BRIDGE (MID-RANGE DESIGN / CONSTRUCTION)	15,300	SQ. FT.	$75	$1,147,500
BRIDGE (SIMPLE DESIGN / CONSTRUCTION)	0	SQ. FT.	$60	$0
CONCRETE BARRIER WALL	0	LIN. FT.	$35	$0
RETAINING WALL	0	SQ.FT.	$35	$0
TRAFFIC SIGNALS	2	PER LOC.	$100,000	$200,000
SUBTOTAL (BASED ON UNIT COST)				$4,302,500

ADDITIONAL CONSTRUCTION COSTS BASED ON PERCENTAGE OF TOTAL CONSTRUCTION

ITEM	% OF CONSTR. COST	COST
EARTHWORK	7.0	$386,122
RDWY. LIGHTING	5.0	$275,801
ROADWAY SIGNING	3.0	$165,481
DRAINAGE	3.0	$165,481
CONSTRUCTION PHASING / TEMPORARY PAVEMENT	2.0	$110,321
MOBILIZATION	2.0	$110,321
SUBTOTAL (BASED ON % OF TOTAL CONSTRUCTION COST)	22.0	$1,213,526
TOTAL CONSTRUCTION COST		$5,516,026

RIGHT OF WAY COSTS

ITEM	QUANTITY	UNIT	UNIT COST	COST
UNIMPROVED RURAL	0.0	AC.	$20,000	$0
UNIMPROVED URBAN	0.0	AC.	$50,000	$0
IMPROVED URBAN	0.0	AC.	$100,000	$0
RESIDENTIAL HOUSE (INCLUDES LAND)	0.0	EA.	$120,000	$0
DEVELOPED COMM. "SMALL" (INCL. LAND) - gas station, etc	0.0	EA.	$150,000	$0
DEVELOPED COMM. "LARGE" (INCL. LAND) - motel, apt., etc	0.0	EA.	$250,000	$0
R.O.W SUBTOTAL (BASED ON UNIT COST)				$0

CONTINGENCIES / ENGINEERING

ITEM	% OF CONSTR. COST	COST
CONTINGENCIES	20.0	$1,103,205
ENGINEERING DESIGN	4.0	$264,769
CONTINGENCIES & ENGINEERING SUBTOTAL		$1,367,974

TOTAL COST

TOTAL COST	**$6,884,000**