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# ***LOCATION STUDY***

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For

**FREEWAY 518 And EXPRESSWAY 18W**

**From IOWA 3 In BREMER COUNTY**

To

**IOWA 107 In CERRO GORDO COUNTY**

**JUNE 1974**

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***IOWA STATE HIGHWAY COMMISSION***

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This report has been compiled by the

PROJECT PLANNING SECTION

of the

CORRIDOR PLANNING DEPARTMENT

within the

DIVISION OF PLANNING

IOWA STATE HIGHWAY COMMISSION

in cooperation with the

UNITED STATES DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION



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## INTRODUCTION

In keeping with the Iowa State Highway Commission's desire to provide a network of safe and efficient highway facilities, a freeway-expressway system has been adopted to compliment the present Interstate Highway System. Freeway 518 from Iowa 3 near Waverly to Interstate 35 near Clear Lake is a segment of the system. The purpose of this study is to acquaint the public with information gathered to date on the proposed corridor of the Freeway in this area. After input from the public is obtained at information meetings, planning studies analyzing the social, economic and environmental aspects will be developed prior to the holding of corridor public hearings on segments of this proposed route.

The purpose for the informational meeting is threefold. First, the magnitude of the 518 Freeway project requires that it be planned, designed, and constructed in shorter segments. An overall location study prevents possible continuity problems on these shorter sections. While one alignment may be best near Mason City, and another at Charles City, the connecting link may cause irreversible social, physical, and environmental damage. To prevent this from occurring the alignments near Mason City and Charles City may have to be altered to obtain the best overall route.

A second reason for holding information meetings is to obtain public input early in the planning stages. Comments from the public are not only welcomed, but are encouraged and sought in many ways. Questionnaires are distributed to the Chambers of Commerce in cities which might be involved in the project. The county extension service is contacted concerning terrain features, soil types, soil and wildlife conservation, wildlife habitats, and types of farming and crops grown in the study area. The assistance of the Iowa Conservation Commission is also helpful while the planning report is being prepared. The State Archaeologist and State Historical Society also provides information which is considered when planning proposed corridors.

The third reason for an information meeting is to inform the public of what is being studied in order that they may be aware of the proposed facility and the planning process. The public information meeting also provides an opportunity to identify various public interests and enables the Highway Commission to provide additional information regarding these interests as it becomes available. While the construction of this freeway is scheduled for the future, now is the time for the public to be informed, so that they become involved in the decision making process.

The Iowa State Highway Commission, by receiving input from the information meetings, will better fulfill the following objectives:

- Conserve: housing, parks, historical and cultural sites, areas of natural beauty.
- Protect: public health and safety, air and water quality, residential neighborhoods, farmsteads, wildlife, soil fertility, farming practices.
- Encourage: orderly regional, city, and neighborhood development, adaptability, coordination of functions and activities through planning.

Provide: the best highway transportation possible for Iowa, commensurate with the needs and economy of the State.

Avoid: disruptions which would interfere with any of the above.

The Iowa State Highway Commission has for many years been concerned with long-range plans to provide the users of Iowa's roads and streets with a system of highways to meet their needs. These needs, based upon travel desires, have increased tremendously in the past decade.

In 1965 the Highway Commission adopted the Iowa Freeway System to supplement the Interstate System. This Freeway System provides a high-speed divided highway for through traffic with access fully controlled. It is anticipated that the proposed Freeway System, combined with the Interstate System, will carry 27 percent of all highway traffic in the state but will total less than two percent of all road and street mileage.(1) This concentration of traffic, coupled with existing deficiencies on routes now serving these corridors, warrants early development of the proposed Iowa freeway routes. Moreover, full control of access guarantees the long-term preservation of safety and investment without early obsolescence.

Such facilities not only speed traffic, but provide greater safety than ordinary roads. A study of accidents that occurred on Iowa's highways during 1971 by the Safety Department of the Iowa State Highway Commission revealed that there were nearly 3½ times as many accidents per 100 million vehicle miles on the primary system (342) than on the Interstate System (99). Fatal accidents occurred nearly four times as often on the primary system (4.26 per 100 million vehicle miles) than on the Interstate System (1.13).

The 518 Freeway route begins at the Missouri State line at Keokuk and extends northerly following a corridor near present U.S. 218 to the intersection of Interstate routes 80 and 380 just west of Iowa City. The route then follows Interstate route 380 to Cedar Rapids and I-380 and Freeway 520 to Waterloo and Cedar Falls. The 518 Freeway extends northerly again from its intersection with Freeway 520 south of Cedar Falls to just west of New Hampton then westerly to Interstate 35 south of Clear Lake. From the junction of Interstate 35 and Freeway 518, Expressway 18W extends westerly to the U.S. 71 Expressway in Clay County.

#### **Functional Classification and Access Control**

Functional Classification was a requirement of House File 394 enacted by the 1970 Iowa Legislature. The bill requires that all roads and streets in Iowa be grouped into systems according to the character of service they will be expected to provide.

518 is classified as part of the Freeway-Expressway System. The Freeway-Expressway System includes all roads connecting and serving the major urban and regional areas of the state with high volume and long distance traffic movements.

(1) Iowa Highway Needs, 1960-1980.



The 518 Freeway is also classified as a Class I highway. A Class I highway is a fully controlled access highway, with access via interchange only.

### Freeway-Expressway Network

While the terms, "freeway and expressway," may denote similar facilities, it should be noted that there are some very important differences. As used in the State of Iowa, a freeway must meet higher design requirements. A freeway design is of the same type as the now familiar Interstate highway.

Access is completely controlled on freeway facilities, with access via interchanges only, with no at-grade intersections. Design standards call for gentle horizontal and vertical curves, grade separations at railroads and at some intersecting roads, open medians, gentle slopes away from the road and ten-foot paved shoulders.

Expressways differ from freeways mainly in access control. Access on expressways is limited to existing public roads at-grade at intervals of at least  $\frac{1}{2}$  mile. Interchanges are provided at intersections with large traffic volumes. Design standards are essentially the same, but may be lessened for expressway facilities.

Freeway 518 will be a four-lane divided facility with ten-foot outside shoulders and six-foot inside shoulders. The shoulders will be of an all weather type for safety. Figure 1 depicts a Typical Cross Section for a Freeway.

Freeway design standards were chosen, rather than expressway standards, because of the large traffic volumes forecast for the route. As seen in Figure 2 the proposed freeway passes near Keokuk, Iowa City, Cedar Rapids, Waterloo, and Mason City.

# TYPICAL CROSS SECTION 518 FREEWAY

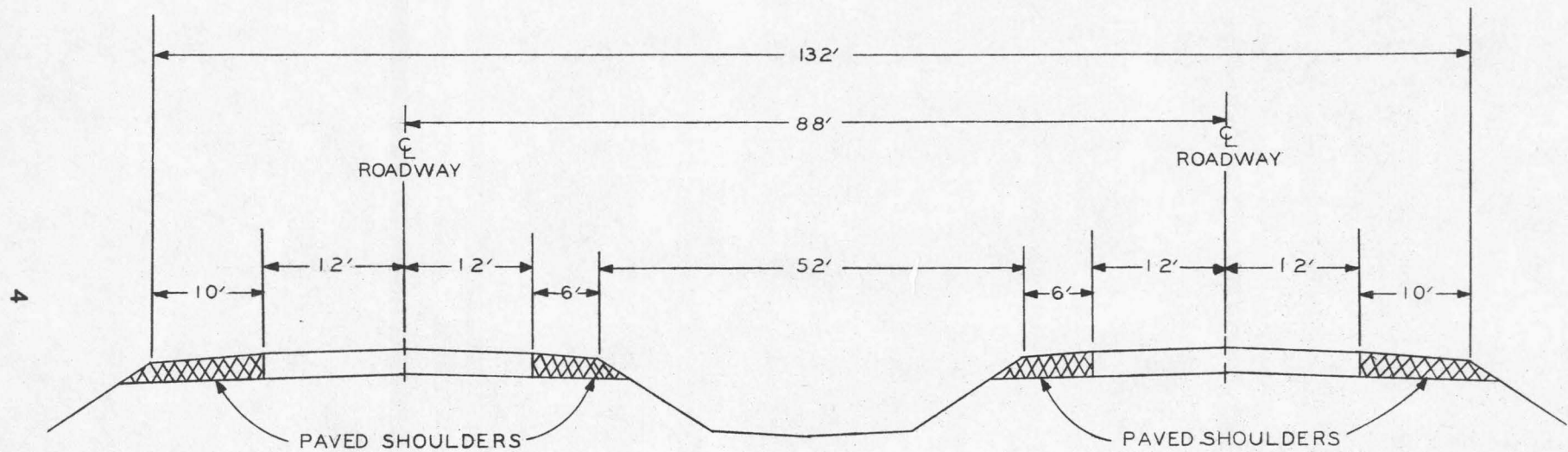


FIGURE 1





## ALTERNATE ALIGNMENTS

Within each three-mile corridor several different routes were carefully studied. Many of these were easily discarded because of the damage that might result, costs involved, or obvious environmental effects. The remaining six alternates are shown in Figure 3. Also shown are the proposed locations of the interchanges and grade separations. More detailed maps of the area are included in the Appendix at the end of the report.

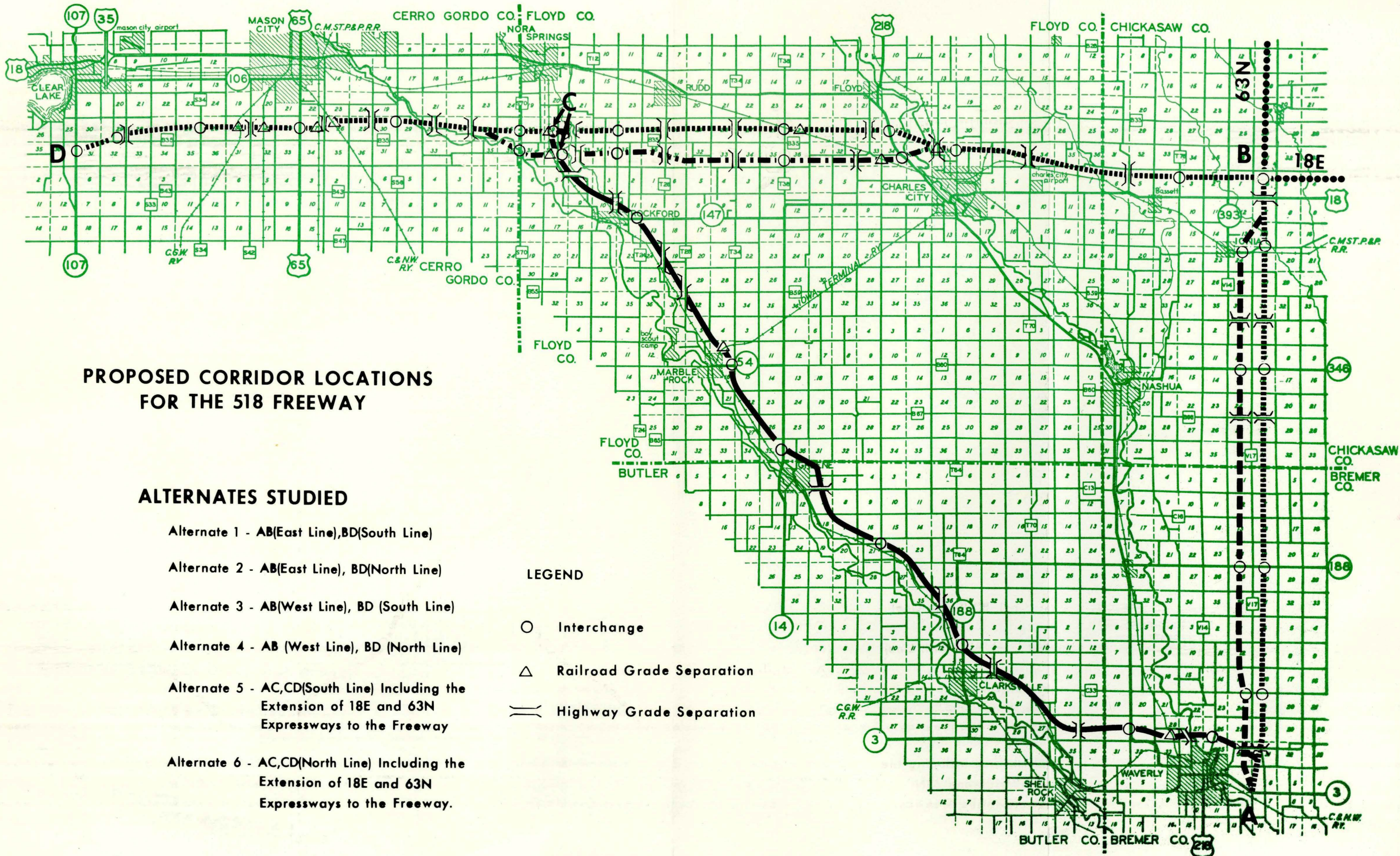
It should be pointed out that at this time the lines shown in this report represent possible functional alignments but do not indicate the exact path of the proposed facility. They reflect only one of a number of final alignments within a corridor of 1,500 to 2,000 feet in width.

There are two alignments proposed for the north-south section of the 518 Freeway between Iowa 3 and the intersection with the 18E Expressway and 63N Expressway west of New Hampton. The west line is the original freeway corridor alignment adopted in 1968; however, the intersection with Iowa 3 east of Waverly was moved approximately one mile east during the planning of the segment of the 518 Freeway between Cedar Falls and Waverly in 1972. Therefore, another alignment is being studied which is approximately one mile east of the original alignment and is a more direct route between Iowa 3 and the intersection of the 18E and 63N Expressways. This line follows generally the  $\frac{1}{4}$  line through the sections so as to minimize severance to farms and to not require taking as many farmsteads as would be required with an alignment following the county roads. The west line also follows the  $\frac{1}{4}$  section line for the majority of the distance; however, a high voltage power line now exists on the  $\frac{1}{4}$  section line for approximately 12 miles. Selection of the west line would require further analysis of the effect of shifting the alignment against the cost of relocating the power line.

There is only one alignment being proposed at this time on the east-west section of the freeway from the intersection of the 18E and 63N Expressways west to Charles City. This alignment is the same line as adopted in 1968 except for a shift of  $\frac{1}{4}$  mile to the north  $\frac{1}{4}$  line for approximately 7 miles at the east end. This shift was made in order to save more farmsteads and not destroy several timber and wildlife areas.

There are also two alignments being proposed from Charles City west to approximately one mile west of the Cerro Gordo-Floyd County line. The south line is the original line adopted in 1968. The north line is located approximately 1 to  $1\frac{1}{4}$  miles north. It has been studied because of several apparent advantages over the original alignment. The north line will provide for a better crossing of the Cedar River and will provide more room for an interchange with U.S. 18 and 218. There is very little distance between U.S. 18 and 218 and the river, on the south line, which would make construction of an interchange in this area more difficult. The interchange location proposed on County Road S70 at the Cerro Gordo-Floyd County line would also be more suitable on the north line. The south line crosses County Road S70 through much rougher terrain and near the Winnebago River. The north line is slightly shorter in length and would be able to utilize the right-of-way of a county road for  $2\frac{1}{2}$  miles on which no farmsteads are located. The north line follows more property lines, thus, would not sever as many farms as the south line. There is also only one line proposed at this time through the remainder of Cerro Gordo County to Interstate 35. It





**PROPOSED CORRIDOR LOCATIONS FOR THE 518 FREEWAY**

**ALTERNATES STUDIED**

- Alternate 1 - AB(East Line),BD(South Line)
- Alternate 2 - AB(East Line), BD(North Line)
- Alternate 3 - AB(West Line), BD (South Line)
- Alternate 4 - AB (West Line), BD (North Line)
- Alternate 5 - AC,CD(South Line) Including the Extension of 18E and 63N Expressways to the Freeway
- Alternate 6 - AC,CD(North Line) Including the Extension of 18E and 63N Expressways to the Freeway.

**LEGEND**

- Interchange
- △ Railroad Grade Separation
- ≡ Highway Grade Separation

**FIGURE 3**



follows the general alignment adopted in 1968. This study also includes a segment of the 18W Expressway from I-35 west to Iowa 107.

Another alternate that is being reviewed follows the Shell Rock River Valley. This alternate is being studied as it was previously suggested by representatives of the North Iowa Area Development Recreation and Tourism Committee. This corridor has not been approved by the Iowa State Highway Commission as a part of the Iowa Freeway-Expressway which was adopted in 1965 and revised in 1968. Earlier studies determined that the east-west, north-south alternates would be a more feasible corridor as they would provide better continuity to the freeway-expressway system and would serve a greater population area. The diagonal alternate, which is not included in the freeway-expressway system, would not be feasible to construct until some time after the freeway-expressway system has been completed.

The Shell Rock River Alternate is primarily a diagonal route from Waverly to the east-west alternate routes between Mason City and Charles City. It connects with this east-west route approximately 1½ miles east of the Cerro Gordo-Floyd County line; then continues west following the routes described previously to I-35 and Iowa 107. This diagonal alternate is adjacent to existing railroad right-of-ways for most of its length except for bypasses of the Towns of Clarksville, Packard, Greene, Marble Rock and Rockford. The alignment following the existing railroads will also follow the existing property lines along these railroads. Although no new diagonal severance of farms or operational problems would be created, access problems could result from the construction of a four-lane facility through property presently divided by the railroad. There will, of course, be additional property needed but it would be taken parallel to the existing property line. Paralleling the railroad could create design problems in that the location of interchanges would necessitate moving away from the railroad in order to construct ramps, however, most of the interchanges are located on bypasses of towns in which case the railroads would not be involved. This alternate would be approximately ten miles shorter in length than the other routes; however, the extension of the 63N Expressway south to near Waverly and the 18E Expressway west to the proposed Freeway would increase substantially the overall system cost.

In the course of the preliminary study of these alignments, an estimate was made as to the resulting property severance. The number of property owners severed by the alternates following points A, B, and C on Figure 3 was estimated to be 128 with the probable acquisition of 11 farmsteads. The diagonal alternate (points A to C) was estimated to cross 108 properties and take 12 farmsteads. From point C west to the western terminus of the project, (point D) approximately 42 properties and 4 farmsteads were involved.

Both alignments studied between points A and B, as well as the two alignments between points B and D, when compared against each other were found to have little, if any, variance in the number of properties severed nor the number of farmsteads involved. A more detailed study of property damage will be prepared in conjunction with individual planning reports covering separate segments of the proposed Freeway.



## LAND USE

### Goals for Community Growth

A major road system must relate to each county's pattern of growth so as to promote and serve the most desirable arrangement of commercial and industrial land use, other traffic generators, and to facilitate circulation throughout the county. While accomplishing this end, it is necessary to protect the safety and preserve the character of the various communities within the county.

The area of study is predominantly agricultural containing many rural service centers dispersed throughout, with intermittent urban areas. Mason City, in Cerro Gordo County, had a 1970 census population of 31,951. The nearest cities of relative size are Albert Lea and Austin, Minnesota and Fort Dodge, Iowa. Waterloo, Iowa, southeast of Mason City, is the nearest metropolitan area. Other cities of substantial size located along the corridor of study are Clear Lake (6,430) at the western terminus, Charles City (9,268) approximately midpoint of the north-south and east-west corridors (ABCD) and Waverly (7,205) at the south terminus.

Coordination with public representatives of the five involved counties and their cities is essential in the development of a transportation service facility. Some reaction to the prospect of a high design standard highway has already been noted in several of the counties' comprehensive plans:

"It is recommended that Highway 218 north of Highway 3 be relocated so as to intersect Highway 3, two (2) miles west of Waverly, and then proceed north with a grade separation over the Chicago & Great Western Railroad tracks."  
(*Comprehensive Plan, Bremer County, Iowa, 1963, Anderson Engineering Co., p. 14.*)

"For an area to grow and prosper with expanded industry and increased farm income, an interstate highway is a requirement. The Iowa State Highway Commission has planned for such a facility in Floyd County (Cedar Valley Expressway) which will materially benefit the county's chances for industrial growth." (*A Comprehensive Plan Report for Floyd County, Iowa, 1969, Leo A. Daly, p. 11.*)

The transportation plan formulated in the *Comprehensive Development Plan* for Cerro Gordo County recognizes the benefits that the recent and proposed transportation improvements, i.e., U.S. 18, Iowa 106 and especially the completion of I-35, will contribute to the function of local, state-wide and national transportation facilities. These benefits are expected to be reflected in the development of the local and regional economy. Freeway 518 is included in this transportation plan and its proposed alignment designated as future land use. When completed, it is expected to replace the regional traffic function of existing U.S. 18 through Cerro Gordo County.

The diagonal alignment was suggested and supported in letters, maps, resolutions and petitions which were submitted at the May 24 and 25, 1972, Interstate 380 corridor public hearing by representatives of Iowans living in a nine-county area of North Central Iowa, known as NIAD, North Iowa Area Development:

"...the direct route connection of I-380 between existing Interstate 80 and existing Interstate 35, in Iowa, will become an important integral part of our National, our Central States, and our Iowa state transportation system by best serving the largest number of people with the shortest route." (p. 233 - I-380 Hearing Transcript).

While these reports indicate a general consensus and desire for the type of highway proposed, it is one objective of this preliminary study to initiate additional response in the area of corridor selection. This coordination with State, county and local goals and objectives will foster a comprehensive selection of a facility most adequately meeting respective and overall needs and desires.

### **Parks and Historical Landmarks**

Recent increases in leisure time and average income have created an increased demand for recreation. At least one-third of all U.S. motor travel is for social, recreational, or vacation purposes. This desire for recreation puts a heavy demand on existing facilities. It is important, therefore, that an adequate system of highways be provided so as to make existing and future recreational areas accessible.

The improved accessibility provided by Interstate and Freeway highways increases the options people have for recreation by enlarging the area they can reach without increasing their travel time. These potential opportunities for recreation are being realized for both long-distance vacation travel and for local recreational trips.

Areas of interest both historically and recreationally in the vicinity of the diagonal corridor include Cedar Bend Park (184 acres) in Bremer County; Heery Woods (380 acres), Camp Comfort (20 acres), and Clarksville Indian Mounds in Butler County; and Winnebago Boy Scout Camp in Floyd County. Other landmarks, developed and undeveloped, found in the proximity of the north-south and east-west corridors include: Twin Ponds (157 acres), Jenn Timber (16 acres), Chickasaw Church, Deerfield Church, Little Brown Church in the Vale and the restored Town of Bradford, all located in Chickasaw County; and Clay Banks Area (56 acres) and Clear Lake (3,600 acres) in Cerro Gordo County. The location of these areas of interest are shown on the maps in the appendix.

The largest recreational attraction in this five-county study area, Clear Lake and its related facilities, is located at the western terminus of this project. Clear Lake is a very important natural landmark both historically and as developed recreationally. It is a spring-fed body of water, six miles long and 2½ miles wide, covering more than 3,600 acres. Once a favorite summer camp for the Sioux and Winnebago Indians, it is now a popular recreation site and preservation area. Clear Lake Park is located on the southeast shore and

McIntosh Woods is located on the north shore at the west end of the lake. Activities include camping, picnicking, swimming and boating. Ventura Marsh, at the west end of the lake, abounds in waterfowl, including ducks, Canadian geese and snow geese during migration. Pheasant and deer populations are plentiful in the nearby woods.

Any of the alignments would be developed so as to avoid any adverse effects to park land as well as to prevent any disruption of park facilities, camp activities or wildlife habitats in preserves. Each would be designed, however, so as to accommodate mobility and thus benefit the vacationer and sight-seer.

A survey of the study area is presently being made by the Office of the State Archaeologist in order to determine the location of possible archaeological sites, such as Indian mounds. Those sites falling within the corridor will be studied further to determine their archaeological significance.

### **Terrain Characteristics**

The greater majority of the project area is characterized by terrain typical of the Kenyon-Floyd-Clyde soil association. The topography for this association is characteristically level to undulating. Huge boulders are conspicuous landscape features in much of the area and, during a field review of the alignments, these boulders were most noticed in the corridor area northeast of Charles City.

The western one-third of Cerro Gordo County is typical of the Clarion-Nicollet-Webster soil association. The topography is primarily level to gently sloping with some strongly sloping areas. Organic materials served as parent materials for peat and muck soils scattered throughout the area. An area of peat and muck soils is located near the western terminus of the project southeast of Clear Lake. The proposed alignment swings south avoiding the area of greatest concentration of muck soil.

The diagonal alignment traverses both cultivated farmland and pastureland. It primarily follows adjacent railroad land thereby avoiding prime farmland. Occasional timber areas would be involved.

The corridor proposed along points A, B, C and D primarily utilizes cultivated land with pastureland and woodland areas in the proximity. Northeast of Charles City the alignment passes to the north of the Jenn Timber area and several other timber stands which serve as major habitats for deer and other wildlife. Care would be taken to avoid, where possible, brush areas or marshy areas, as these also provide much needed wildlife protection. These areas, however, are many times avoided at the expense of taking cultivated farmland.

A crossing at the Cedar River would be necessary for all alternates, the diagonal alignment crossing at a point north of Waverly and the north-south and east-west corridors crossing northwest of Charles City.



## ESTIMATED COSTS AND TRAFFIC

### Construction Cost

The estimated cost for each of the six alternates is shown in the following table. The estimated cost for Alternates 5 and 6 includes the cost for extending the 18E Expressway west to the 518 Freeway diagonal alternate and the 63N Expressway south to this diagonal alternate. It is necessary to extend these routes in order to provide continuity with the Expressway System. The length of Alternate 1 is 74.3 miles; Alternate 2 is 74.0 miles; Alternate 3 is 74.6 miles; and Alternate 4 is 74.3 miles. The freeway portion of Alternate 5 is 63.6 miles in length and the extension of the expressways totals 52.0 miles. The length of the freeway portion of Alternate 6 is 64.3 miles with an additional expressway mileage of 52.0.

TABLE 1

ESTIMATED CONSTRUCTION COSTS					
Alternate	Grade & Drain	Paving	Structures	Right-of-Way	Total
1	\$21,778,000	\$33,755,000	\$15,106,000	\$ 7,519,000	\$ 78,158,000
2	\$21,649,000	\$33,630,000	\$15,015,000	\$ 7,489,000	\$ 77,783,000
3	\$21,869,000	\$33,951,000	\$14,928,000	\$ 7,550,000	\$ 78,298,000
4	\$21,740,000	\$33,826,000	\$14,836,000	\$ 7,519,000	\$ 77,921,000
5	\$18,269,000	\$28,735,000	\$13,098,000	\$ 6,436,000	\$ 66,538,000
Ext. 63N Expr.	6,128,000	8,679,000	1,791,000	2,211,000	18,809,000
Ext. 18E Expr.	7,850,000	10,945,000	4,474,000	2,767,000	26,036,000
Total	\$32,247,000	\$48,359,000	\$19,363,000	\$11,414,000	\$111,383,000
6	\$18,485,000	\$28,995,000	\$12,919,000	\$ 6,507,000	\$ 66,906,000
Ext. 63N Expr.	6,128,000	8,679,000	1,791,000	2,211,000	18,809,000
Ext. 18E Expr.	7,850,000	10,945,000	4,474,000	2,767,000	26,036,000
Total	\$32,463,000	\$48,619,000	\$19,184,000	\$11,485,000	\$111,751,000

Note: A typical alignment was considered for the extension of the 63N and 18E Expressways for cost determination.

### Existing Traffic

The alternate proposals for the 518 Freeway between Iowa 3 at Waverly and Iowa 107 at Clear Lake basically serve traffic in the U.S. 218, U.S. 63 and U.S. 18 traffic corridors. The estimated 1973 Average Daily Traffic representing the existing conditions for these routes in the study area is illustrated in Figure 4.

The average estimated 1973 Average Daily Traffic (ADT) for all rural sections of the above mentioned highways is 3,500 vehicles per day. For the municipal sections the estimated 1973 Average Daily Traffic is 6,900 vehicles per day. For the rural sections of these highways the commercial vehicles comprise 13% of the total traffic while for the municipal sections there are 8% commercial vehicles in the total traffic stream.

Local traffic service is also provided in the study area by secondary roads and primary highways such as Iowa 14, Iowa 3, Iowa 106, Iowa 346 and Iowa 188. The estimated 1973 Average Daily Traffic for the rural sections of these primary highways within the study area is also illustrated in Figure 4.

### Forecast Traffic Volumes

In order to forecast traffic volumes for the proposed Freeway alignments between Waverly and Clear Lake, it was necessary to determine the trip patterns and distribution of the existing traffic in the study area. The study area included a six-county area comprised of Bremer, Butler, Cerro Gordo, Chickasaw, Floyd and Franklin Counties. This area is bounded on the east by U.S. 63, U.S. 18 on the north, Iowa 3 on the south, and Iowa 107 and Interstate 35 on the west.

In determining the distribution of the affected trip movements within the study area, the following origin and destination studies were utilized:

1. 1962 Mason City Origin & Destination Study
2. 1968 New Hampton Origin & Destination Study
3. 1968 Hampton Origin & Destination Study
4. 1970 Charles City Origin & Destination Study
5. 1972 Waverly Origin & Destination Study

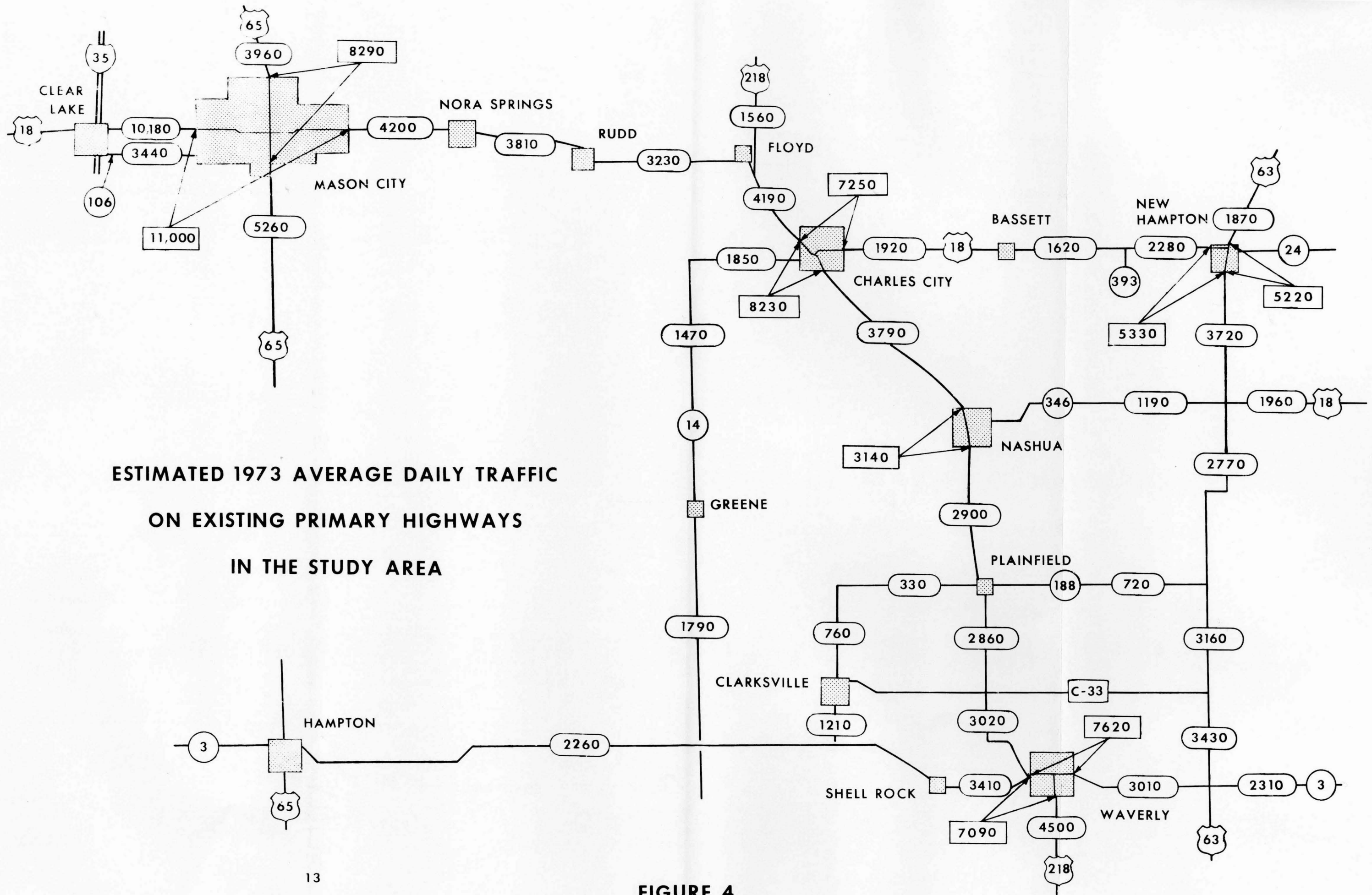
In addition to the above mentioned origin and destination studies, data were also utilized from the 1960 Mississippi Valley Screenline Origin and Destination Study at selected rural locations within the study area.

Using the most current traffic count data available and combining this count data with the origin and destination data, the trip patterns and distribution of the existing traffic were determined.

Historical trends in traffic were also used to develop forecast traffic volumes on the affected highways. Past trends in traffic volumes reflect changes that have occurred in traffic generation characteristics in the communities within the study area. Also, industrial and residential growth is reflected in the counts that are collected on a periodic basis on all of Iowa's primary highways.

Also considered in preparing the forecast traffic volumes for the proposed 518 Freeway was the induced or "generated" traffic that results from a facility of this nature. Previous





**ESTIMATED 1973 AVERAGE DAILY TRAFFIC  
ON EXISTING PRIMARY HIGHWAYS  
IN THE STUDY AREA**

**FIGURE 4**

studies conducted by the Federal Highway Administration on the Interstate system show that the generated traffic can constitute up to 40 percent of the total traffic on an interstate facility. These generated volumes are trips that would not have been made had the proposed improvement not been constructed.

These two factors coupled with the increases in other traffic related items such as motor vehicle registration, motor fuel consumption, population, land use changes, etc., provided a basis for developing forecast volumes on the proposed 518 Freeway.

For the current study, two basic alternate proposals for the 518 Freeway between Waverly and Iowa 107 at Clear Lake are being considered. Alternates 1, 2, 3 and 4 follow basically a north-south, east-west alignment along U.S. 63 and U.S. 18, while Alternates 5 and 6 follow a diagonal alignment along the Shellrock River and then an east-west alignment along U.S. 18. In preparing the traffic estimates for these alternates, Iowa's proposed Interstate-Freeway-Expressway system, which includes the 518 Freeway, the 18E Expressway and the 63N Expressway in the study area, was considered to be completed. Consequently, for Alternates 5 and 6 which consider the diagonal alignment, the extension of the 63 N Expressway south to the freeway near Waverly and the continuation of the 18E Expressway west to the freeway near Nora Springs, were also considered in preparing the forecast volumes.

Since Alternates 1, 2, 3 and 4 follow basically a north-south, east-west alignment, and since the differences in the alignments are not significant in terms of traffic service, one traffic estimate was prepared for the first four alternates. Alternates 5 and 6 include the proposed diagonal alignment from Waverly to a point west of Nora Springs, then westerly to Iowa 107 on the same alignment as the first four alternates. Consequently, the portion of Alternates 5 and 6 from west of Nora Springs to Iowa 107 has estimated 1978 and 1998 traffic volumes nearly the same as those estimated for Alternates 1, 2, 3 and 4.

The section from the Interstate 35 interchange westerly to Iowa 107 south of Clear Lake does not carry as high an estimated traffic volume as do those sections to the east. This is because one of the higher traffic movements at the proposed Interstate 35 interchange is that of traffic from the east on the proposed 518 Freeway desiring to go north or south on Interstate 35. The estimated 1978 and 1998 volumes for the proposed alternates are shown in Figure 5.

#### **Residual Traffic**

As was mentioned earlier in the report, the six proposed alignments of the 518 Freeway will basically serve traffic presently traveling in the U.S. 63, U.S. 18 and U.S. 218 corridors. However, because some of this traffic is local in nature, not all of it can be assigned to the proposed freeway alignments. This remaining traffic or non-assignable traffic is termed residual traffic. Since all six alternates provide the same traffic service for the U.S. 63 and U.S. 18 corridors, the residual traffic on these routes is basically the same for all six alternates as is illustrated in Figure 6.



Between the WCL of Mason City and the interchange with Interstate 35, the estimated 1978 residual traffic will remain high with any of the six alternates. This section is estimated to carry 7,200 vehicles per day in 1978 and 12,800 vehicles per day in 1998. This is due to the large number of trips made locally between Clear Lake and Mason City.

However, for that section of U.S. 218 between Waverly and Charles City, the residual traffic varies depending upon the alignments being considered. For Alternates 1, 2, 3 and 4, the residual traffic is estimated at 2,800 vehicles per day in 1978 and 3,800 vehicles per day in 1998. However, for Alternates 5 and 6 the residual traffic is estimated to be 1,800 vehicles per day in 1978 and 2,600 vehicles per day in 1998. The lower figures estimated for Alternates 5 and 6 reflect the additional traffic service that is provided by their diagonal alignments.

#### Road User Benefit-Cost Analysis

As a result of any highway improvement, the affected road user receives such benefits as reduced driving time; increased comfort and convenience, lower operating costs, etc. When these benefits or savings to the road user are compared to the costs involved in constructing and maintaining the proposed improvement (as opposed to the "Do-Nothing" Alternate), the resulting comparison is termed a road user benefit-cost analysis.

For the proposed 518 Freeway alternates, a road user benefit-cost analysis was made as a means of comparing each alternate to the costs of the existing conditions or the "Do-Nothing" Alternate. The results are shown in Table 2. The cost and savings shown for Alternates 5 and 6 reflect the extension of the 18E and 63N Expressways within the study area.

TABLE 2  
BENEFIT-COST ANALYSIS

Alternate	Annual Road User Costs	Annual Const. & Maint. Cost	Benefit-Cost Ratio
Present	160,971,700	1,312,800	---
1	153,096,000	7,467,600	1.28
2	152,860,700	7,439,600	1.32
3	152,972,200	7,482,500	1.30
4	152,966,900	7,454,500	1.30
5	150,374,200	10,149,400	1.20
6	150,029,300	10,182,500	1.23

As the data in the above table indicate, the benefit-cost ratio for each of the proposed alternates is over 1.00. Using the criteria of a road user benefit-cost analysis, this means that any one of the alternates could be considered economically feasible to construct.



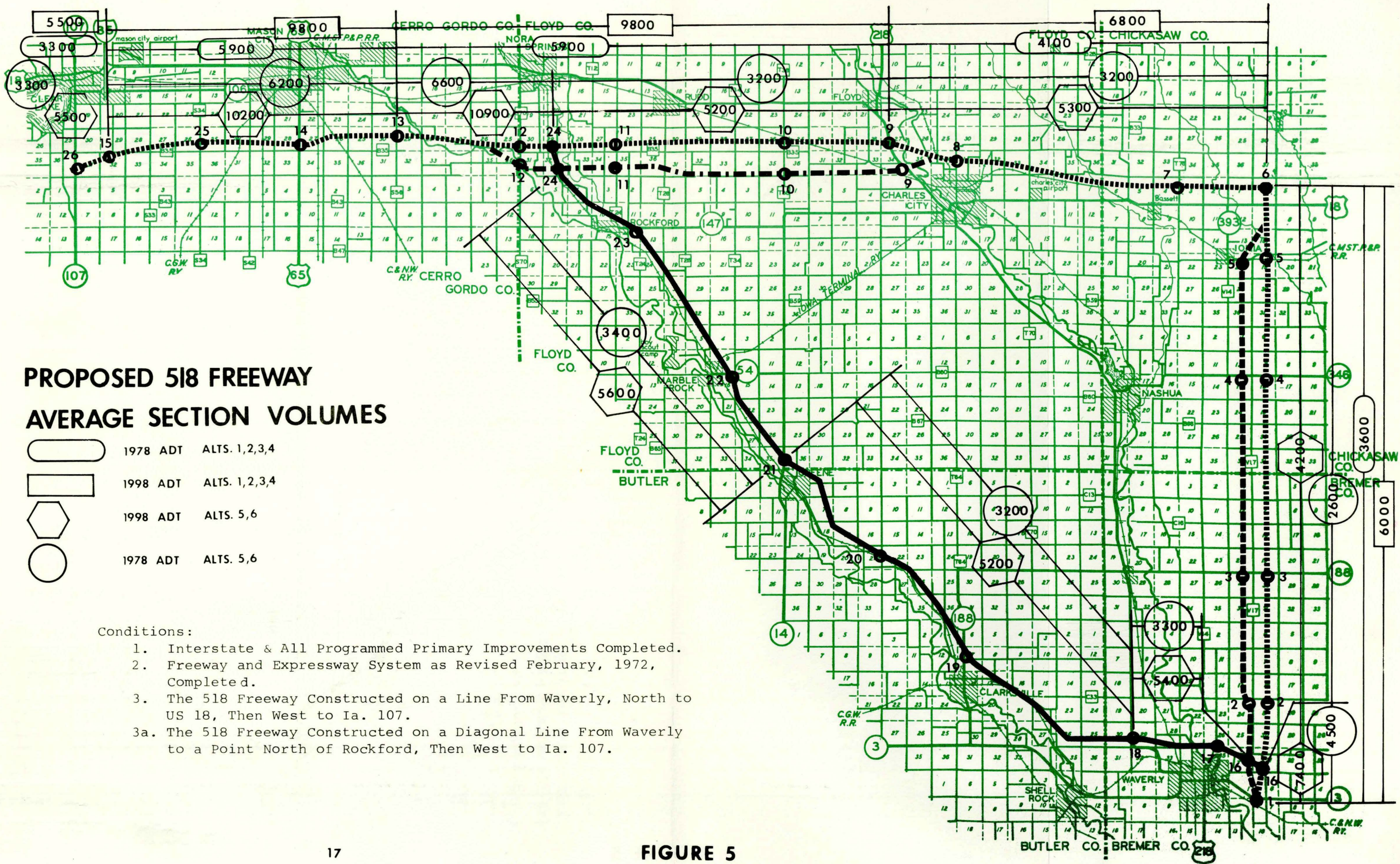


FIGURE 5



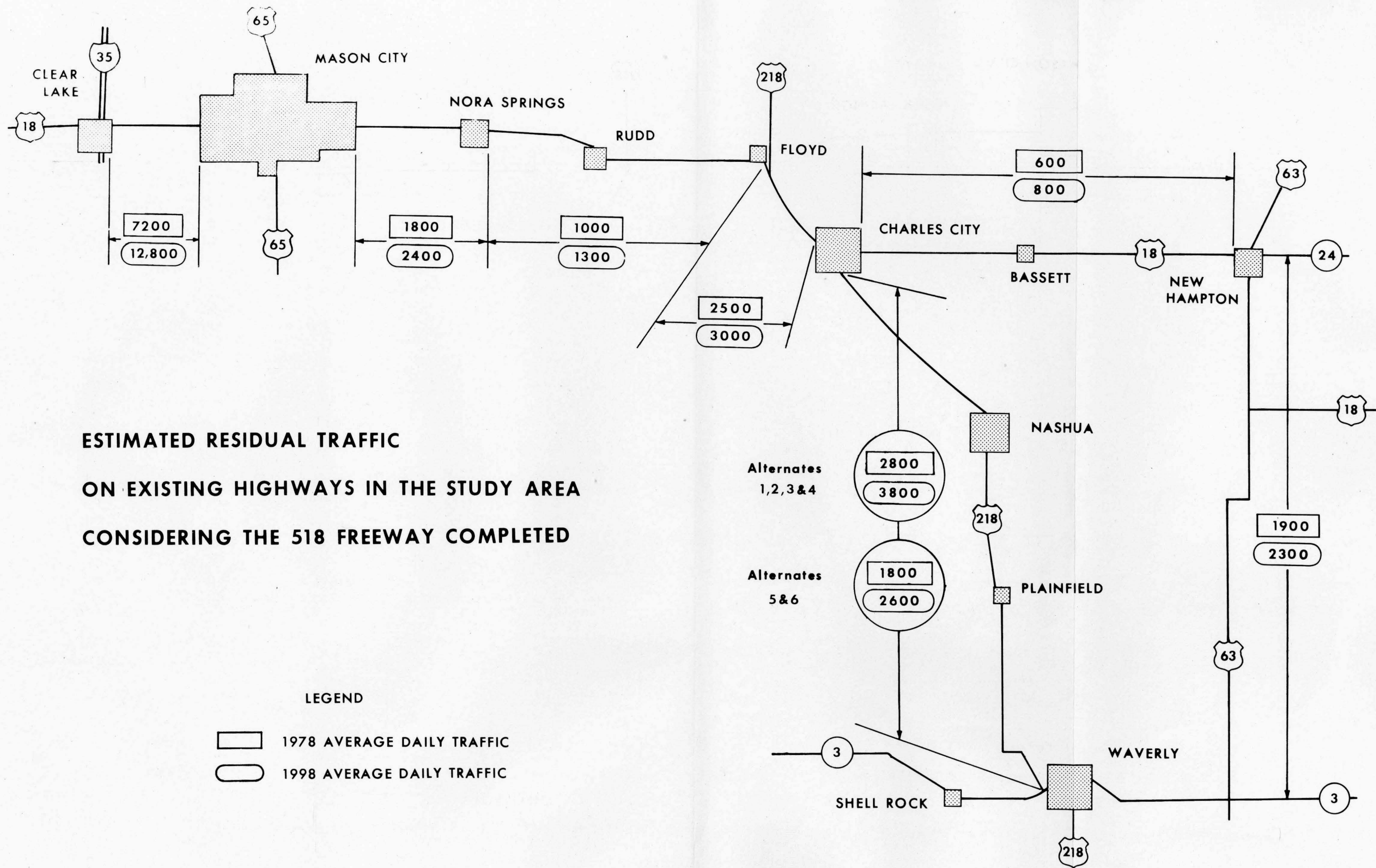


FIGURE 6



Another method that can be utilized to effectively measure the benefits of each alternate is the equivalent uniform annual cost method. Under this method the estimated annual road user costs and estimated annual construction and maintenance costs for each alternate, including the present conditions on "Do Nothing" Alternate, are summarized as a total annual project cost. Table 3 lists the equivalent uniform annual costs for all the proposed alternates and the "do nothing" condition.

TABLE 3  
EQUIVALENT UNIFORM ANNUAL COST

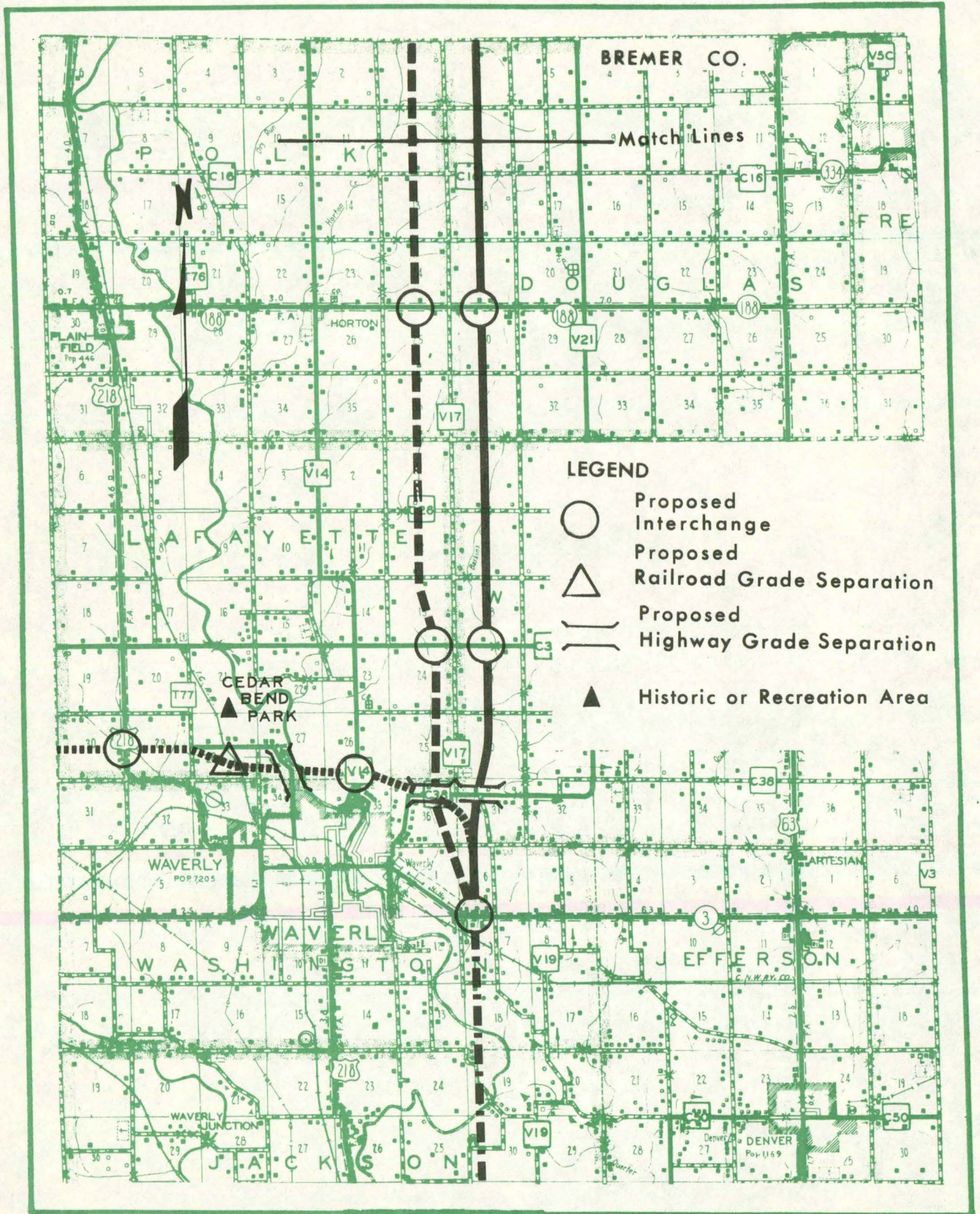
Alternate	Equivalent Uniform Annual Cost
6	\$160,211,800
2	\$160,300,300
4	\$160,421,400
3	\$160,454,700
5	\$160,523,600
1	\$160,563,600
Present	\$162,284,500

The significance of the data in Table 3 is to illustrate the annual savings in equivalent uniform annual costs that will accrue to each project over the "Do Nothing" Alternate. If no improvements are made and the existing roads within the study area are maintained, the equivalent uniform annual cost accrued on the "Do Nothing" condition is \$162,284,500. The equivalent uniform annual cost for the proposed improvements ranges from \$160,211,800 for Alternate 6 to \$160,563,600 for Alternate 1.

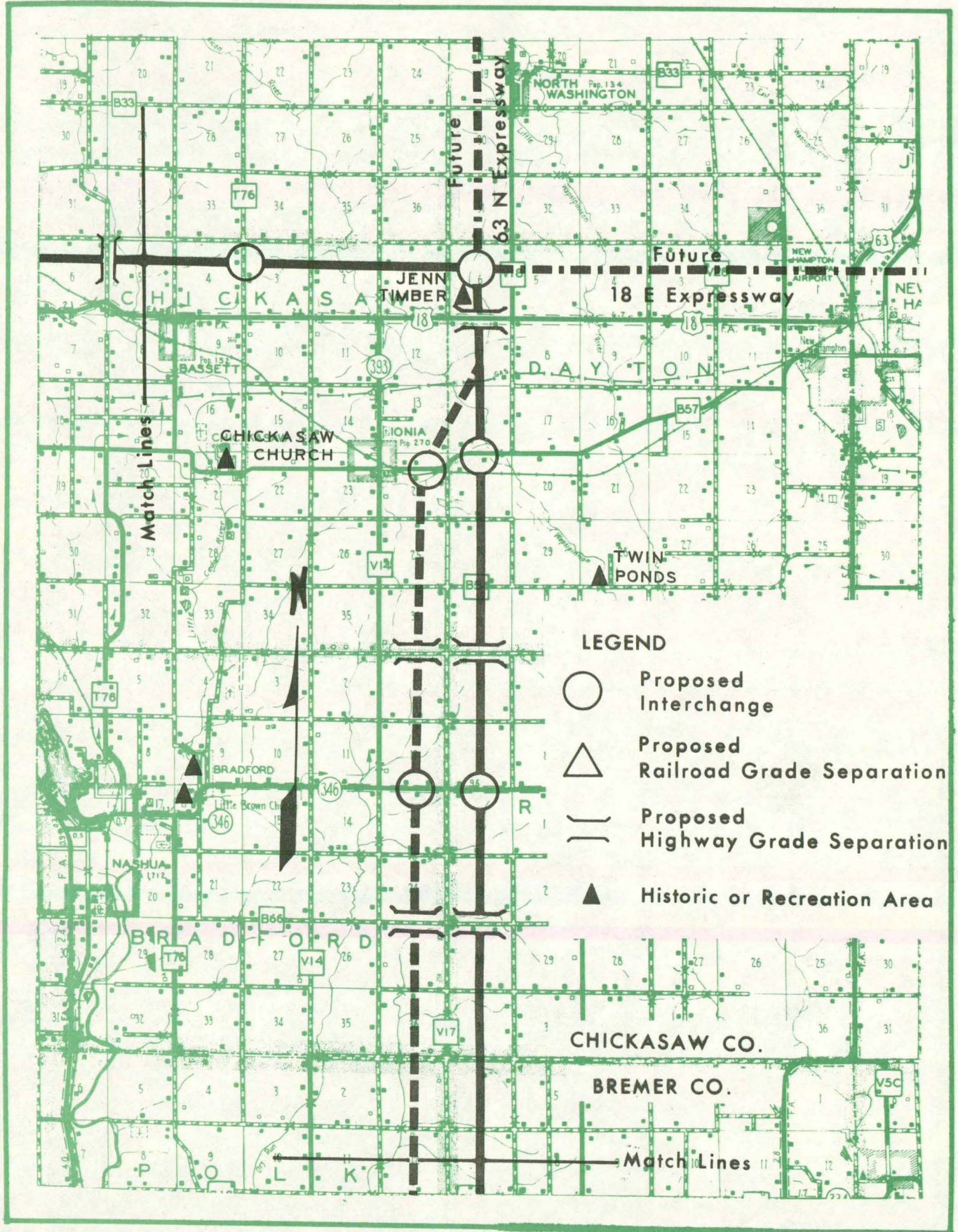
It would cost the taxpayer and road user anywhere from \$2,072,000 to \$1,710,900 per year to maintain and utilize the present conditions or the "Do Nothing" Alternate over the proposed improvement, depending upon the alternate selected.

**APPENDIX A**









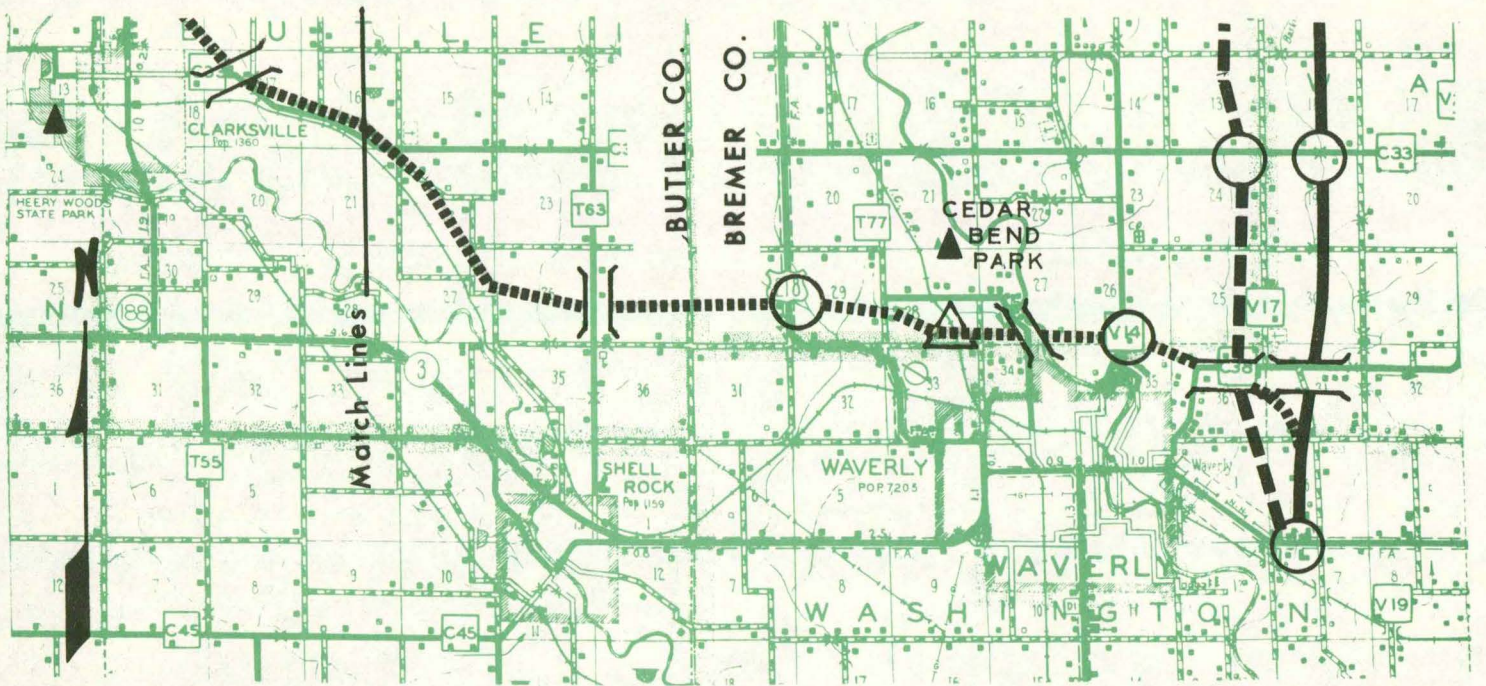
LEGEND

- Proposed Interchange
- △ Proposed Railroad Grade Separation
- || Proposed Highway Grade Separation
- ▲ Historic or Recreation Area



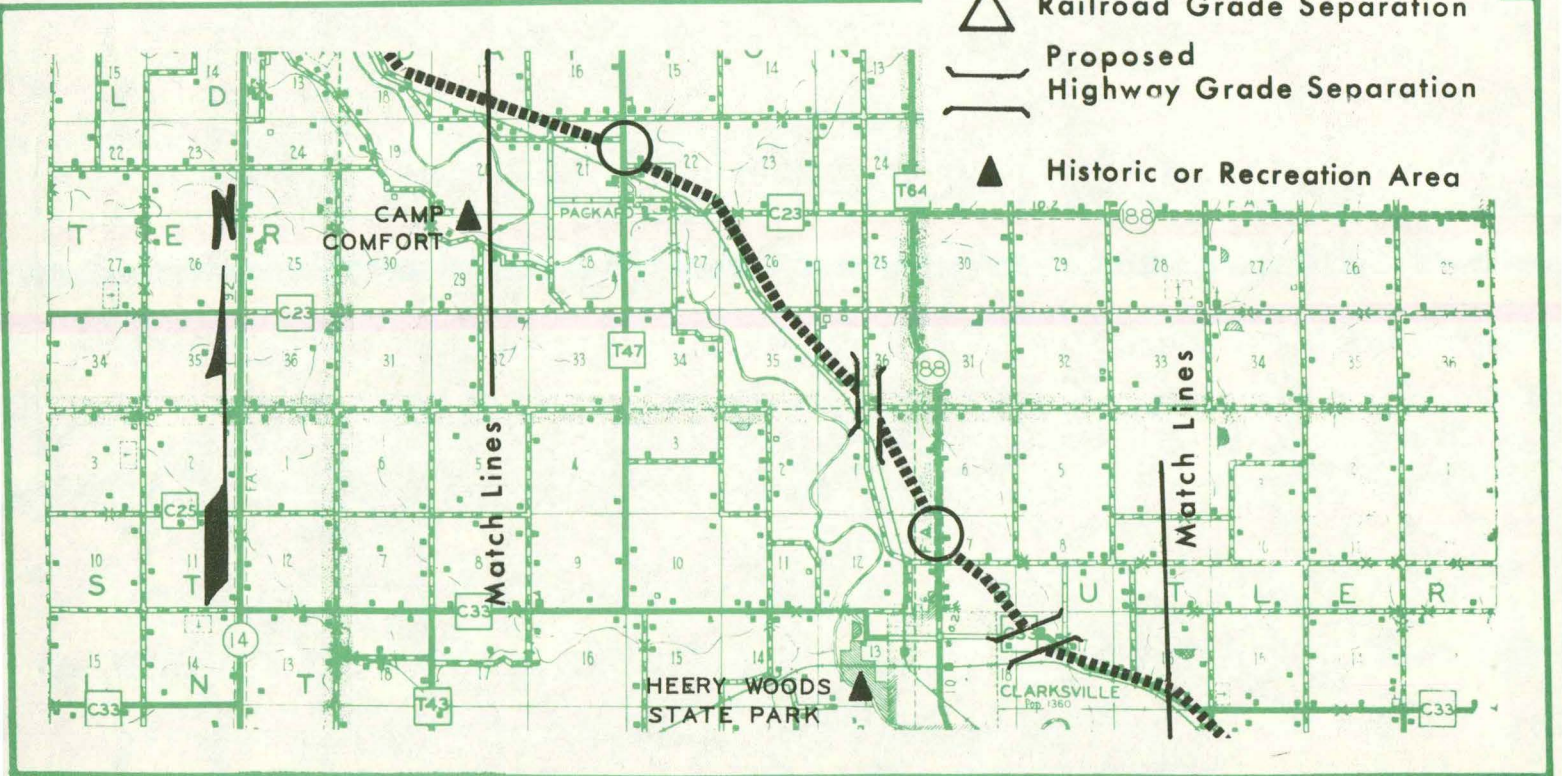




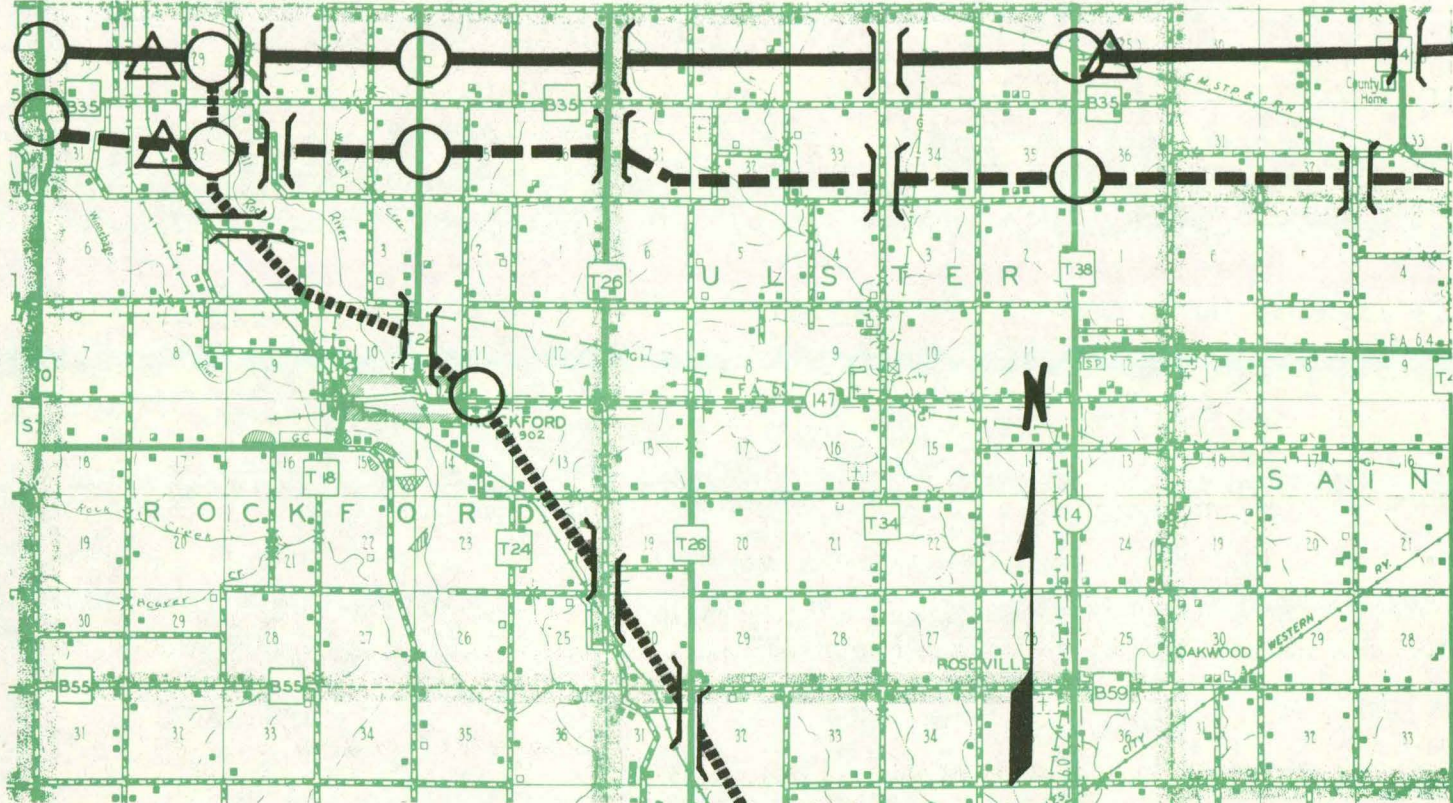


LEGEND





- Proposed Interchange
- △ Proposed Railroad Grade Separation
- == Proposed Highway Grade Separation
- ▲ Historic or Recreation Area

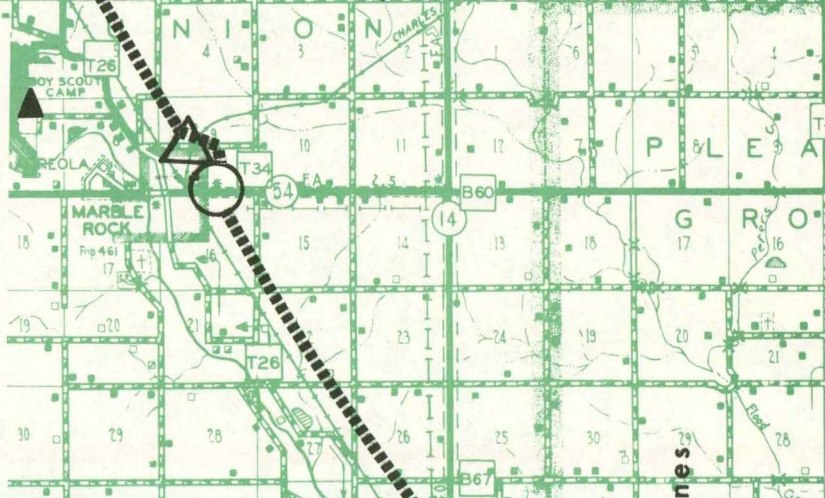






**LEGEND**

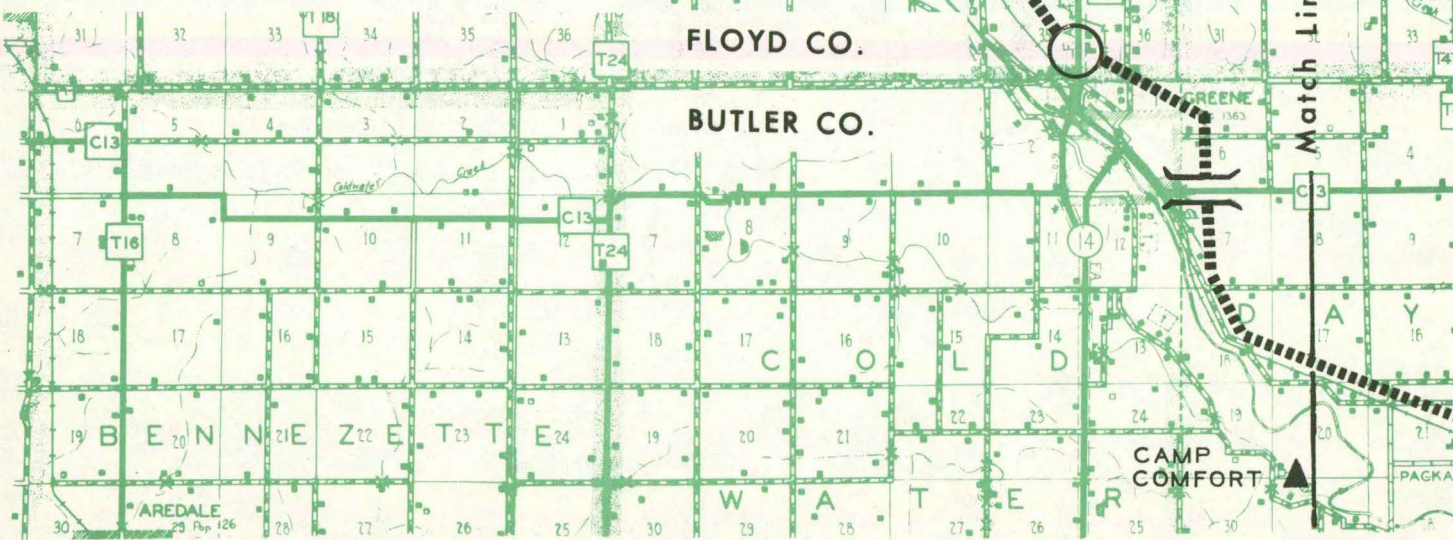
-  Proposed Interchange
-  Proposed Railroad Grade Separation
-  Proposed Highway Grade Separation
-  Historic or Recreation Area



FLOYD CO.

BUTLER CO.

Match Lines

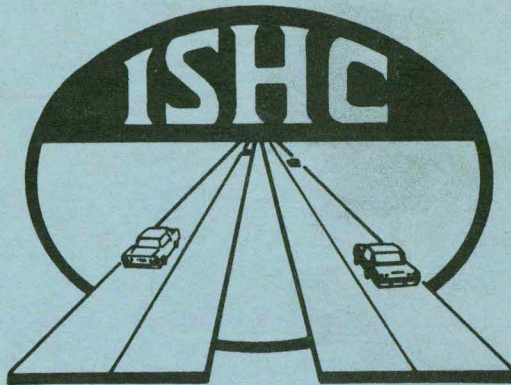




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