A HIGHWAY LOCATION STUDY OF THE ASHLAND - GRETNA ROAD IN NEBRASKA

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By

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PREFACE

The following detailed study of the principal highway from Lincoln to Omaha, Nebraska, was made in order to determine the location that would serve in the highest degree the motor transportation of the present and future. The construction of the road has been delayed several years due to proposed changes in the present traveled road not being satisfactory to the several small towns located on the present road.

An important highway should be laid out in accordance with the most advanced thought in Highway Engineering. If necessary it should bypass important cities and towns and it should reach its objective in the shortest possible distance.

Plan and profile sheets were prepared on the various locations and the quantities determined therefrom. A field party was used to obtain the drainage areas, profiles and miscellaneous data. The completed plans are not being submitted as part of this report due to their bulk and as they serve no purpose after the summary of quantities is obtained. Attached to the report are such maps and profiles as are necessary and as referred to in the body of the report.

Much time was spent in the field in securing the information bearing on the several locations and in order to verify layouts after the plans were completed.

The right-of-way costs and damages were arrived at in the following manner. The various routes were gone over in the field previous to the evaluation. Costs of previous acquisitions, assessed valuations, condemnation of like property, and the actual value from records of sales were used in determining the right-of-way costs on the various locations.

After the problem of the highway organization and the problem of adequately financing and maintaining a State System of highways, (both of which are usually determined by legislation), I believe the laying out and properly locating the State's System of highways, is the most important problem with which highway organizations have to deal. The ideal highway should be located so as to move traffic with a minimum of inconvenience and at a minimum of cost; not only should the cost of the highway itself be considered but also the cost of operation of vehicles over the highway. Such a highway will, of course, bring up the whole field of highway location covering

the shortness of route, proper gradients, good visibility, reduction of curvature and the elimination of the railroad grade crossings, all of which will result in the saving of time and the saving in operating costs of motor vehicles as well as greater safety to traffic.

Few engineers or the general public realize what the future will bring in volume and kind of traffic and as a result of this it quite often happens that a highway is practically obsolete with respect to location, alignment, and grades within a very few years. In locating the highway, consideration should be given to every point which will help determine where the highway belongs. Roads are being constructed around section corners and deviating miles from the straight course on locations which we know will eventually carry hundreds of vehicles per day. Grade crossings, sharp turns, and steep grades are being constructed when much better locations are available if the planner has the courage to choose them.

The location is perhaps the only permanent thing on the highway. Structures must be replaced and surfacing renewed but if a location be wrong, the public for a long time to come must pay for the error made in location.

As a primary object of the highway is to give service to its users, I believe we should go the limit in the matter of location and place the highway so that in the period of the years no relocation will be necessary.

Realizing that the road from Lincoln to Omaha (U. S. Highway No. 38), connecting as it does the two largest cities of the State, will probably have the greatest density of traffic throughout the year of any State highway and also that this traffic will increase from year to year as the surface and alignment are improved on the various portions, together with thought of the above paragraphs in mind, and after investigating the several routes as covered by the attached report, I wish to recommend the location as described below as being the most desirable route from Ashland to Gretna.

Line A as described in the attached report from a point southwest of Ashland (Station 809, F. A. P. No. 107-A) to a point at the southwest corner of Gretna. From this point I

recommend the underpass location (See Map No. 8, Photograph No. 17) crossing under the main track of the Burlington Railroad and continuing thence north about 1100' thence northeasterly on a 3° curve to the right to intersect the tangent produced of Lines B-C which is 90' north of, and parallel to the Burlington Railroad in the northwest quarter of Section 36-14-10, thence following Lines B-C to an intersection of the present traveled highway near the west quarter corner of Section 25-14-10.

A ROAD LOCATION STUDY OF THE ASHLAND - GRETNA ROAD U. S. HIGHWAY NO. 38 IN NEBRASKA

The above road is on Route No. 3 of the Federal Aid System of the State of Nebraska, approved by the Secretary of Agriculture on September 10, 1923. The description of Route No. 3 is as follows: "From the western city limits of Omaha on Center Street via Millard, Gretna, Melia, Ashland, Havelock, Lincoln, Milford, Fairmont, Hastings, Minden, Axtell, Holdrege, Oxford, Arapahoe, McCook, Culbertson and Imperial, to the Nebraska-Colorado State line near Lamar."

The portion of the above route covered by this report is located between the control points of Millard and Havelock (See Map No. 1). The location of the route from Omaha to a point northeast of Gretna, and from Havelock to a point four miles northeast of Greenwood, has been definitely decided. Nebraska Federal Aid Project No. 234-A is now under construction and provides for a 20' concrete pavement following the project statement sketch map; the same ending at the east quarter corner of Section 25-14-10, northeast of Gretna. This point was taken as a northerly intermediate control point for this report.

Nebraska Federal Aid Project No. 17 extending from Havelock to connect with Federal Aid Project No. 107 at Lancaster-Cass County line is located south of, and parallel to the Burlington Railroad. A 20' concrete slab was placed on this project (No. 17) this summer. That portion of Nebraska Federal Aid Project No. 107-A from the Lancaster-Cass County line has been relocated, parallel with, and on the south side of the Burlington Railroad, and is now under construction for grading, the contract extending to the overhead crossing southwest of Ashland near the Cass-Saunders County line. The north 5500' of this project (No. 107-A) has been shown on the plans as deferred construction pending the final location of the Ashland-Gretna portion. This point (Beginning of deferred construction) which is located near the center of Section 15-12-9 is being used as the southerly intermediate control point for this report. Accordingly the investigation of the proposed routes will be made between the intermediate control points southwest of Ashland at the north end of Federal Aid Project No. 107-A (relocated) and a point on Federal Aid Project No. 234-A northeast of Gretna.

In making the investigation of the proposed road from Ashland to Gretna three separate routes together with a combination of several of the routes were investigated in the field and preliminary plans prepared. Other locations were investigated and are described under "Alternate Routes". For the purpose of discussion, the several locations will be known as Lines A, B, C, C Revised, and D (See Map No. 1).

LINE A Line A is located for the most part adjacent to, south and east of the Burlington Railroad to a point near Melia. From near Melia to Gretna the present traveled road is followed. From Gretna to the north end the road is southeast of the Burlington Railroad, crossing over the railroad near the intersection with the present traveled highway.

LINE B Line B is located along the west and north city limits of Ashland, intersecting the Burlington Railroad near their bridge over the Platte River. Thence northeasterly parallel with and adjacent to the Burlington Railroad to the town of Gretna, and continuing along the railroad and intersecting the present traveled highway near the east quarter corner of Section 25-14-10.

LINE C Line C is identical with Line B to the northeast corner of Ashland at which place the line goes more northerly crossing the Platte River just below the present highway bridge; thence northeast intersecting the Burlington Railroad near the northeast corner of Section 10-13-10, thence paralleling the Burlington Railroad on new location thru Gretna to intersect the present traveled road near the east quarter corner of Section 25-14-10.

L I N E "A"

DESCRIPTION: The first location investigated is located south and east of the Burlington Railroad and is shown as Line A on the attached Map No. 1. This line begins at a point near the center of Sec. 15, T. 12 N., R. 9 E. (Station 809 on F. A. P. No. 107-A now under construction), thence northeasterly approximately parallel with the Burlington Railroad and far enough away to keep in service the present overpass over the Burlington Railroad on the east and west township road thru the center of Section 15-12-9, and also the private overpass near Station 829, intersecting the old abandoned Burlington Railroad fill near the common corner to Section 10-11-14-15, T. 12, N., R. 9 E., thence following the railroad fill northeasterly for approximately 6000' and continuing northeasterly to a point near the southwest corner of Section 1-12-9, at which place the highway is 265' southeast from the westbound main line of the Burlington Railroad. The location then continues northeasterly on tangent and 265' southeast of the railroad passing thru the southeast portion of Ashland and continuing on tangent to a point near the northeast corner of said Section 1.

At this place a 14° deflection to the right is made in the line to gain elevation in order to pass over the Louisville Line of the Burlington Railroad in the south half of Section 31-13-10. The railroad is located in a cut at this place, the angle of crossing being 36°10'. The location continues northeasterly on new location crossing Salt Creek and intersecting the Platte River near the southwest corner of Section 29-13-10, said point being near the

westerly end of the Burlington Railroad bridge over the Platte River. The proposed bridge crossing is parallel to, and just below the Burlington bridge. The location of Line A then continues northeasterly parallel with, and 120' southeast from the center line of the railroad (on new location) thru Sections 28 and 29, intersecting the present traveled graveled highway (U. S. Highway No. 38 and F. A. P. No. 107-C) on the west line of Section 21-13-10, and continuing northeasterly about 5900' on Federal Aid Project No. 107-C.

From this point the proposed location on Line A goes northeasterly thru Section 14-13-10 on new location intersecting the present traveled highway (F. A. P. No. 107-F) near the northeast corner of said Section 14, thence north about 2.3 miles on Federal Aid Project No. 107-F to a point near the Burlington Railroad; thence northeasterly on new location passing thru Gretna about parallel to the railroad and intersecting the pavement on Burnes Street near the Burlington Depot and continuing northeasterly on new location passing over the Burlington Railroad in the southeast quarter corner of Section 25-14-10. The location then continues on the same tangent to intersect the present traveled road near the east quarter corner of Section 25-14-10, and the beginning of Federal Aid Project No. 234-A, the same being the end of Line A and the northerly intermediate control point of this route.

L I N E "B"

DESCRIPTION: Line B begins at the same place as Line A, namely, at a point near the center of Sec. 15, T. 12 N., R. 9 E. (Station 809 on F. A. P. No. 107-A now under construction) (See Map No. 1). From this point the line goes northeasterly intersecting the present graveled road just south of the northwest corner of Section 14-12-9, thence north and passing over the two main line tracks of the Burlington Railroad on the present wood and steel overhead structure, and thence continues north crossing Salt Creek and passing along the west city limits of Ashland on 30th Street (See Ashland Map No. 3); from 30th Street, to a point 1000' south of the northwest corner of Section 2-12-9 at which place a 1000' radius curve is to be constructed. Thence east on Furnas Street along the north city limits of Ashland to 14th Street at which place the present traveled highway (U. S. Highway No. 38) is intersected at the north end of the city pavement, said point being near the northeast corner of Section 2-12-9. Thence northeasterly (bearing about N. 35° E.) on new location to Wahoo Creek. At this place a channel change is proposed (plans and profile Line B) to avoid crossing Wahoo Creek; thence continuing northeasterly and crossing over two tracks of the Sioux City line of the Burlington Railroad on the proposed overpass, and continuing northeasterly crossing Wahoo Creek and intersecting the west right-of-way line of the Burlington main line to Omaha, about 1500' south of the Platte River. Thence northerly parallel and 200' west of the Burlington Railroad crossing the land occupied by the Nebraska National Guard Camp, a State owned gravel pit, and also the Platte River, and continuing

parallel to the Burlington Railroad via Melia and Gretna to intersect Nebraska Federal Aid Project No. 234-A near the east quarter corner of Sections 25-14-10, and end of Line B at the northerly intermediate control point.

L I N E "C"

DESCRIPTION: Line C begins at the same point as Lines A andB, namely, a point at the center of Section 15-12-9 (Station 809 on F. A. P. No. 107-A) and thence follows Line B thru Ashland to the northeast of Section 2-12-9 a point on 14th & Furnas Streets at the north city limits, and on the present graveled highway. From this point Line C goes more northerly then Line B crossing the Sioux City line of the Burlington Railroad approximately 800' north of Line B, and continues northeasterly crossing Wahoo Creek and thence to the Platte River, crossing same just below the present highway bridge. Thence northeasterly on tangent crossing over the Platte River bottom land and intersecting the various drainage ditches of the Western Sarpy County Drainage District, to an intersection with the Burlington Railroad near the northeast corner of Section 10-13-10, at which place Line C intersects Line B. From this point to the northerly control point Lines B and C follow the same location. (See Description Line "B")

L I N E "C" (REVISED)

DESCRIPTION: Due to the very high cost of the proposed overhead crossing over the Sioux City line of the Burlington Railroad in Section 36-12-9 and the proximity of Wahoo Creek to the east, it was decided to try a combination of the two lines (B & C), the lines to be in common following B line (as noted on Map No. 1) from the northeast corner of Ashland to a point beyond the bridge crossing on Wahoo Creek on Line B, and from this point to intersect Line C to the north, just west of the Platte River. This layout was detailed on paper and the same number of angles were necessary as on Line C. The distance will be increased slightly. The difference in estimated cost at the overhead bridges and the bridges over Wahoo Creek is about $20,000. in favor of a combination of Lines B and C against the Line C. (See Estimates)

L I N E "D"

DESCRIPTION: Line D is identical with Line C to a point on the north side of the Platte River. From this point the line bears to the east intersecting Line B near the present railroad grade crossing on the south line of Sec. 21, T. 13 N., R. 10 E., and continuing northeasterly on Line B (west of, and adjacent to the railroad) to a point near the south quarter corner of Section 15-13-10 at which place there is an existing underpass in place. At this location it is proposed to pass under the C. B. & Q. Railroad intersecting Line A on the east side of the railroad, and thence continuing on Line A to the northerly end of the proposed route.

THE PRESENT TRAVELED ROAD

DESCRIPTION: The present traveled road shown in black on Map No. 1 from Ashland to Gretna enters Ashland from the south over Nebraska Federal Aid Project No. 107-B as shown in black on Map No. 1 and also on the Ashland city Map No. 4. The road turns east on Silver Street at the west city limits, at which place a 75' radius curve is used. This short curve is necessary due to the location of the Ashland Cemetery (See Ashland Map No. 4). Nebraska Federal Aid Project No. 107-D is then followed east over Silver Street, crossing a branch line of the Burlington Railroad on Twenty-second Street and continuing east to the business district to 14th Street, where a right angle turn is made to the north, 14th Street being followed to the north city limits of Ashland to its intersection with Furnas Street. A small reverse curve is made at the north city limits, the present road continuing north one mile on the gravel, crossing Wahoo and Clear Creeks and turning east at the northwest corner of Section 36-13-9, a 300' radius curve being used. Thence east on Nebraska Federal Aid Project No. 107-B crossing at grade the Sioux City line of the Burlington Railroad, and continuing to the east end of the concrete pavement (Nebraska F. A. P. No. 107-B) and thence following the paving to the Platte River bridge. This paving is 18' wide and has several sharp curves on it. Flood water was two feet deep on the paving last spring closing the road to traffic. Sufficient drainage openings have not been provided under the pavement to take the water from the sloughs and the Platte River overflow. A new bridge would be required over the slough near the Nebraska National Guard Camp which is located west of the Platte River. The present traveled road then crosses the Platte River on a high steel truss bridge. This bridge consists of five 160' high steel trusses and several short approach spans. The clear roadway is 15½ feet. The superstructure consists of steel tubes, the floor is of wood and the handrails are light angle irons. The bridge is of light construction and inadequate for the present day traffic. One way traffic is necessary when two trucks are approaching. Two passenger cars can pass at low speed.

The present road then follows Federal Aid Project No. 107-C a point one-half mile south of Melia. Two right angle curves are traversed in the north half of Section 29-13-10, short radii curves being used. The main line of the Burlington Railroad to Omaha is crossed at grade, the crossing angle being 45°. A reverse curve is made on the east side of the track immediately after crossing the railroad. After crossing the railroad the present traveled road traverses Line A to a point one-half mile south of Melia. From this point to Gretna the present road follows Federal Aid Project No. 107-F. This portion has been graveled. The road enters Gretna on South Avenue thence to McKenna Street, thence north on McKenna Street (Main business street in town) to Angus Avenue, thence east on Angus Avenue to the east city limits of Gretna, and continuing north to the east quarter corner of Section 36-14-10, thence north

on the graveled road crossing the main line of the Burlington Railroad at grade on the west line of Section 30-14-11 and continuing north to the east quarter corner of Section 25-14-10 and end of route at the south end of Federal Aid Project No. 234-A. The present traveled road is approximately 17.7 miles long consisting of the following types of surfacing: 15.4 miles of gravel, 1.2 miles of concrete, and 1.1 miles of brick. Brick pavement is in Ashland and Gretna.

There are twelve right angle turns and ten turns of lesser angle. There is one overhead railroad crossing and four railroad grade crossings, two of which are over the main line of the Burlington Railroad.

That portion of the road (about six miles) from the north city limits of Ashland to a point one-half mile south of Melia is subject to overflow from the Wahoo and Salt Creeks, the Platte River and from the overflow of the Elkhorn River. New bridges would be required over Wahoo Creek, Clear Creek, Platte River and three overflow bridges across the river between from 50' to 150' spans. All of the above bridges on the present road are in poor condition with narrow roadways and are in need of replacement.

The present road thru Ashland (See Map No. 4) goes east over the main business street, a right angle turn being made to the north at 14th Street. Part of the route (0.5 miles) thru town is paved with brick and the balance is graveled. Traffic is conjested due to the parking on the street and the cross street traffic. The main school house of the town is located east of the highway one and one-half blocks. A number of school children are required to cross the highway. There is a 75' radius curve at the west city limits where the highway enters the town on 30th Street. A small offset on 14th Street at the north city limits makes a reverse curve necessary at this place. The Schuyler branch line of the Burlington Railroad is crossed at grade at 22nd and Silver Streets in Ashland.

The present road thru Gretna enters the town at the southwest corner on South Avenue (See Map No. 5), going east on the brick pavement to McKenna Street, thence north on McKenna to Angus Avenue, making a right angle turn to the east at the center of the business section, then east on Angus Avenue to the east city limits. There is 0.55 miles of brick pavement in Gretna. Two right angle turns are made in town and traffic passes thru a portion of the business district, where cars are parked continuously. The main school house of the town is located on Angus Avenue and is located directly on the highway. School children are obliged to pass thru the traffic.

Due to the poor alignment, low grade, railroad grade crossings, the number of bridges to be constructed, undesirable location thru towns as above noted, and the extra distance it involves, and due to the fact that several other locations offer more favorable considera-

tions for a primary highway, the present road (except that portion on Line A) is not recommended for improvement. For Federal Aid funds already expended on the present road, see sheet following summary sheets.

ASHLAND AND ROUTES THRU TOWN

Ashland is located in Sections 1 and 2, T. 12 S., R. 9 E, and has a population of 1725. (See Map No. 4 of Ashland)

The Omaha-Lincoln main line of the Burlington, being double tracked from Ashland to Lincoln, passes thru the southeast corner of town. The Sioux City line and the Louisville line branch off from the main line at Ashland.

The present road thru town (shown in black on Silver Street) is graveled from the west city limits to 16th Street; and from 16th Street to 14th Street (where the highway turns north) to the north city limits at Furnas Street, the highway is paved with brick. The business section of the town is located between 13th and 17th Streets on Silver Street.

The Schuyler line of the Burlington Railroad is crossed at grade by the present road on Silver and 22nd Streets. The angle of crossing is about 59°. Two passenger and two freight trains are operated each day. Sight distance is short due to the houses along the street.

Traffic is congested due to the parking on the main street. Traffic at the cross streets is interrupted due to side street travel.

The school house of the town is located a short distance east of 14th Street. Most of the school children are forced to cross the highway several times a day.

The location thru town on the present highway is not considered satisfactory due to two right angle turns, congested streets, parking, and the interruption to the flow of traffic by the traffic from the side street.

LINE "A" (THRU ASHLAND)

Line A is located 265' southeast of, and parallel with the west bound main line of the Burlington Railroad and passes thru the southeast corner of Ashland parallel to the railroad. (See Ashland Map No. 4 - Also Photographs Nos. 1-2-3)

Silver Street, the main business street and street leading to the depot and the new highway (Line A) is paved with brick. (See Photograph No. 4) The traffic from Ashland city would cross under the Burlington tracks in a subway (See Photograph No. 5) now in place at the east end of Silver Street. (See Photograph taken from underpass looking west on Silver Street toward the business section. This subway is 25 feet wide over all with a sidewalk on the south side. The vertical clearance is 12 feet.

The structure is of concrete and is in good condition. The structure is set at right angles to the track and does not line up with Silver Street, the street deviating to the northeast slightly for an entrance to the underpass.

The center line of the underpass produced intersects the highway at Station 983+50, the underpass being about 265' to the northwest of Line A - It is proposed to construct several approach curves from Line A to the underpass in order to handle the east and west bound traffic. This should give a very good entrance to the town. (See profile and plan sheets)

A second entrance (See Photograph No. 6) to Ashland can be had thru the underpass located at Station 959. This structure is 14.5' wide and has a vertical clearance of 14'. The south end of the underpass is 203' from the center line of the road. Traffic passes thru this underpass and enters Ashland over the Salt Creek bridge at the south end of 13th Street.

The third underpass (See Photograph No. 6A) is located to the left of Station 934 under the Burlington Railroad. This subway is 20' wide with 13' vertical clearance and is used by traffic on the township road to the south of Ashland. A connection with the new highway would be easy of construction. Traffic would enter town via the Salt Creek bridge at the south end of 13th Street.

A fourth entrance to Ashland would be via the present traveled road (U. S. Highway No. 38) crossing the overpass on Lines B-C thence north to Silver Street and east on Silver Street.

I believe this location (Line A) thru Ashland is to be preferred to the entrance via Lines B or C and believe the highway would be of more service to town - While the main street is missed, a connection can be had directly with the highway not over a half mile away, with several other connections.

Lines B and C enter Ashland at the southwest corner of town on 30th Street (Marked in yellow and green on the Ashland City Map No. 4 and Map No. 1) and continues north on 30th Street to a point 1000' south of the northwest corner of Section 2-12-9. Thence east (a 1000' curve being used at the corner) on Furnas Street (See Photograph No. 12) crossing the Schuyler branch of the Burlington Railroad west of 25th Street at grade and continuing east on Furnas Street to 14th Street to an intersection with the present highway.

Thirtieth Street is graveled from the southwest corner of the cemetery to Silver Street. From this point to 14th and Furnas Streets, same is an earth road. Additional right of way is required on three blocks on 30th Street and on the west five blocks of Furnas Street.

It will be necessary to move one house and shed on account of the 1000' curve. Another house will be damaged due to proximity to the road.

A grade crossing is made over one track of the Schuyler branch just north of 25th and Furnas Streets. This railroad has two passenger trains and two regular freight trains each day.

Furnas Street has very poor drainage. This street intercepts the drainage of the streets to the south, the water going east on Furnas Street. There is no apparent outlet for this water. A culvert on the plans has been provided at Station 617 and ditch is to be cut to the north to carry the water.

This line does not appear to serve the town any better than Line A. There are no business houses on the highway; one oil station is located at the intersection of 14th and Furnas Streets. A number of houses are located on the south side of Furnas Street (See plan sheet). Furnas Street is located 2160' north of Silver Street (the main business street of the town). Entrance to the business section can be made on the present traveled road on Silver Street or on any north and south street intersecting Furnas Street.

An alternate route thru town located south of the cemetery and intersecting Silver Street near 22nd was viewed but not considered feasible on account of the indirectness of route and numbers of sharp turns necessary thru town. This alternate route is also objectionable due to passing thru the main part of town where parking and stopping in the street interrupts the flow of traffic.

GRETNA AND LOCATIONS THRU TOWN

Gretna is located in the west half of Sec. 36, T. 14 N., R. 10 E., and has a population of 491. The town depends on the adjoining agricultural lands for its business. (See Gretna Map No. 5)

The present road (U. S. Highway No. 38) is shown in dotted black thru town, (See also Map No. 1) the same passing over South Avenue, to McKenna, McKenna to Angus Avenue and Angus Avenue to the north city limits. The route thru town is paved with brick. The main business district is located on the three blocks from Figg Avenue to Bruce Avenue, on McKenna Street. The location is not favorable for a primary highway due to the two right angle turns in town, parking on the streets and the proximity to the town's school house.

L I N E "A"

Line A, shown in red on Maps Nos. 1 and 5, enters at the west quarter corner of the S. W. ¼ of Section 36-14-10 at the southwest corner of town and continues north intersecting a northeasterly tangent parallel and adjacent with the C. B. & Q. Railroad. A 3° curve (R - 1910.08') 1227.7 long, being used at this place. The line continues northerly about parallel with the Burlington Railroad intersecting Angus Street at the east end of the present overpass over the railroad, (See Photograph No. 19) thence continuing 400' northerly where a deflection of 5°08" is made to the right, a 3° curve (R. 1910.08') being used. The line then continues northerly, being about 200' east of the passenger depot intersecting Burnes Street, (the main paved street to the depot) (See Photograph No. 11) and continues northerly crossing McKenna Street and Highland Avenue to the northeast city limits of Gretna.

In order to construct Line A thru Gretna as described above, four sheds and barns and one house will be moved. The house is 35' to the left of Station 1521+50 but due to the 16' cut in front of same, it is evident that it should be moved.

The pavement on Burnes Street will need remodeling to conform to the highway grade. Deep cuts are necessary in town in order to meet this pavement. These cuts would lessen the visibility at the intersection. Burnes Street is on a steep grade and a portion will have to be level in order to allow the highway to pass over the same. All the traffic going to and from the depot will of course have to cross the highway causing a hazard to both the town traffic and traffic on the highway.

On Angus Avenue the grade has been laid in order to meet the approach grade of the overpass over the railroad to the west.

As the brick pavement on Angus Avenue is low, a steep grade over the overpass is necessary if the highway grade is laid to meet the pavement. Traffic will be interrupted here due to cross street intersection.

L I N E "B"

Line B enters Gretna at the southwest corner of town west of, and adjacent to the railroad, continuing northerly to Station 1125+70.2 where a 4°32' deflection is made to the left. Angus Avenue is crossed just west of the Burlington overpass. (See Photograph No. 18) It is difficult to lay a satisfactory grade at this place as no cutting could be done at the overpass. Steep grades are necessary at each side making the entrance to town on a summit and so close to the overpass that a satisfactory entrance is impossible. In order to avoid the section house and depot a second curve, with a deflection of 10°27' to the right is made, the line passing between the mill and a house to the west. This house and several sheds will require moving. The line continues northerly to Station 1155+67.3 where a deflection of 26°49' is made to the right. The line is then on tangent, 90' north of, and parallel to the Burlington, intersecting the present traveled road near the west quarter corner of Section 25-14-10.

L I N E "C"

Line C thru Gretna is identical with Line B.

ALTERNATE ROUTE

An alternate route to connect Line A & B and to be used in conjunction with Line "A" as follows was investigated. Beginning at the west quarter corner of the S. W. $\frac{1}{4}$ of Section 36-14-10 a point on Line A near Station 1595 and continuing north on the present township road on the west side of Section 36, passing under the Burlington Railroad thru a proposed underpass and continuing north intersecting Angus Avenue at the west quarter corner of Section 36 (The entrance to town being east on Angus Avenue over the present railroad over-head crossing) and continuing north along the west line of Section 36 to a point 1100' north of the Burlington Railroad, thence on a 3° curve to the right to an intersection with the tangent on Lines B-C which is 90' west of the center line of the Burlington Railroad near the center line of Section 36-14-10. The town is served by a connection over the present overpass on Angus Avenue. This alternate route is far enough away to allow a satisfactory grade (5%). An east and west road connects this alternate route with Burnes Street near the passenger depot. The route has the advantage of by-passing all the heavy traffic that would otherwise travel down the main street and the highway traffic can proceed without interruption. Lesser grades are encount-

ered than on Line A, the town connections are better and the railroad elimination more satisfactory. (See Photograph No. 17)

A very satisfactory location can be had for the crossing under the Burlington Railroad. The angle of crossing is about 30°. Plenty of head room can be secured. The drainage can be carried to the northwest and disposed of. The small amount of drainage collected east of the railroad can be carried under the whole layout in a small concrete box.

Sufficient headroom can be secured for the railroad structure to provide sufficient sight distance in going thru the structure. No drainage need be handled directly under the railroad underpass in inlets as the low point in the grade is farther to the west where inlets could be installed to take care of the surface drainage collected in the underpass. Traffic from the south could enter Gretna via the present route namely over South Avenue, and McKenna Street. Traffic from Gretna to Omaha could enter the highway via west Angus Avenue over the present overpass or via Burnes Street crossing the tracks near the Burlington depot and proceed west on the open road to the highway. The length of lines will be about the same.

Several other alternate locations thru Gretna were investigated but not considered feasible due to the angles necessary and the interruptions to traffic caused by the cross streets.

T R A F F I C

Traffic on U. S. Highway No. 38 as routed over the proposed road, ranks about third as compared to other main routes of the State, and will probably rank first when the pavement is completed.

As this highway connects Lincoln (the State Capitol) with Omaha, the largest city in the State, a steady increase in the traffic is to be expected. The pavement between the two towns will be completed as soon as the location from Gretna to Ashland is determined.

The traffic from Omaha to Lincoln (the two largest cities in the State) will probably be as dense along different points on the highway and the traffic as evenly distributed as any other route in the State. While sufficient data is not available to plot a line showing the density, I am sure such a line would for a year's period show such to be the case.

The truck traffic is increasing very fast due to the large amount of stock hauled to and from the stock yards at South Omaha. Some of the trucks hauling stock leave U. S. No. 38 northeast of Gretna following Nebraska Highway No. 37 via Papillion and Ralston to the stock yards at South Omaha. (See State Map No. 9)

Many commercial trucks (some with trailers) are hauling merchandise from the wholesale houses at Omaha and Lincoln. This kind of traffic goes and comes regardless of the weather. The trucks will increase as the pavement is completed, both in number and wheel loads. This fact must be taken into consideration in the design and location of the road; steep grades and sharp curves are especially dangerous for this class of traffic and the road should be designed to be in service at all times. In passing thru towns where parking is permitted on the narrow streets, this class of traffic is especially objectionable to the town due to the confusion caused by the trucks and trailers at the sharp turns and interruption of traffic at the street intersections. Usually the pavement design thru the small town is not designed to carry the wheel loads of the present day commercial trucks. This fact has caused several towns, which I have in mind, to ask for a rerouting of the highway around the town. Heavy traffic roads passing thru the main part of town are also objectionable on account of the children of school age having to cross thru the traffic several times a day.

The result of a traffic count made one mile northeast of Havelock on U. S. Highway No. 38 during August of the summers of 1922 to 1928 is given below.

Year	Traffic
1922	1000 daily average
1924	1600 " "
1926	1950 " "
1927	2247 " "
1928	2268 " "

A traffic study has recently been started by the State of Nebraska in cooperation with the U. S. Bureau of Public Roads. One of the stations at which a count is being made is located northeast of Ashland near the Platte River bridge. Listed below are the results of a ten-hour count made in September and October, 1929.

Date	Hours Counted	Pass. Cars	Trucks	Busses	Trailers	Total
Sept. 6	10A to 8P	846	90	14	4	954
Oct. 2	6A to 4P	587	90	16	1	694*
Oct. 28	10A to 8P	646	93	12	0	751

*From the record kept as to local cars (cars bearing license tags of Sarpy No. 59, Cass No. 20, Saunders No. 6, Counties) a total of 48 cars passed the Ashland bridge from 9 A. M. to 4 P. M., this being about 7% of the total traffic.

When the count was made on October 28, 1929, two counts were made in the vicinity of Ashland. One count was taken at the present overhead railroad crossing southwest of Ashland with the following results:

Traffic count S. W. of Ashland at the overhead crossing.

10-28-29 Date	Hours Counted	Pass. Cars	Trucks	Busses	Trailers	Total
Total Count	10A - 8P	414	74	22	2	512
Saunders #6	"	50	8	--	-	58
Cass #20	"	47	3	--	-	50
Sarpy #59	"	3	0	--	-	3
Totals #6 #20 #59		100	11	0	0	111

In arriving at the number of local cars, as shown in the above table, the number of cars bearing the license plates of the

three above counties were noted. As Ashland is located in the corner of Saunders County and is also near the corners of Cass and Sarpy Counties, it was thought that this method of counting would give the local traffic the benefit as to numbers, and give a count as close as any other method. You will note that the total count of 512 (which includes the local traffic in Saunders-Cass and Sarpy Counties) is very small for a ten hour period. This is due to the fact that it rained most of the day which would have the effect of reducing the traffic from distant points. I doubt very much if it would have much effect on the local travel. You will note the percentage of local traffic is 21.6%.

The second count in the Ashland vicinity was made north of the highway bridge over the Platte River. The results are shown by the following tabulation.

Traffic count at Platte River Bridge northeast of Ashland

Date 10-28-29	Hours Counted	Pass.Cars	Trucks	Busses	Trailers	Total
Total Count	10A - 8P	646	93	12	0	751
Saunders#6	"	32	2	0	0	34
Cass #20	"	13	0	0	0	13
Sarpy #59	"	23	1	0	0	24
Totals #6 #20 #59		68	3	0	0	71

It was raining when this count was taken which cut down the traffic from distant points, but probably not affecting the local count very much. The total count for the ten-hour period was 751 which included the local traffic. The local traffic is 9.4% of the total traffic.

From the two counts near Ashland it will be noted that the combined bus and truck traffic was 96 and 105 which give 18.7% and 15.3% of the total traffic.

The traffic on this road is not normal now due to the detours on the road. The detour signs were still up when the above counts were taken which accounts for the small daily average. The bulk of the Omaha-Lincoln traffic has been going via Wahoo during the past summer in order to avoid the detours on U. S. No. 38.

Traffic counts will be made throughout the year at the above points, and the local traffic separated from the total count.

Traffic will now increase as the detour signs have been recently removed.

If one is at Ashland or Gretna the delay and interruption of traffic can be noted through the business sections of the towns and where the right turns are encountered.

Busses stopping in the street on either side to load and unload passengers interfere with passing traffic. Cars backing away from the curbs cause a hazard.

It is difficult to predict what the traffic on this road will be in several years, when the route is entirely surfaced.

GRADE CROSSINGS

In the consideration of the improvement of any route of importance, the elimination of the railroad grade crossings should be paramount. A location which is without grade crossings should be given every consideration in the choice of routes. While the importance of the railroad as to train traffic should be given consideration, statistics show that numerous fatalities occur on grade crossings of unimportant lines. (For railroad intersection data sheets, see end of report)

L I N E "A"

CROSSING NO. 1: There are two railroad crossings on Line A. As the proposed road is on new location, no highway exists at these crossings now.

The Louisville line of the Burlington Railroad is crossed near Station 1042, in the south half of Section 31-13-10. (See Photograph No. 7) The railroad is in a cut at this place and on a 3° curve to the right. The angle of crossing is 36°10' and the grade line is 00% on both sides of the overhead and provides for a vertical clearance of 265'. The site appears to be a very desirable one for an overpass. For proposed structure decided upon by the Bridge Engineers, see "Bridges" on Line A.

This line of the Burlington runs from Ashland via Plattsmouth and Louisville to Pacific Junction, Iowa. The line is used to bypass freight trains around Omaha and Council Bluffs. There are two passenger trains, eight regular freight trains and from five to eight extra freight trains each day. See railroad crossing data sheets attached to report.

CROSSING NO. 2: The main line of the Burlington Railroad from Lincoln to Omaha is crossed at Station 1544 northeast of Gretna. (See Photograph No. 10) The highway is on new location at this place, no highway crossing now existing. The present crossing on U. S. Highway No. 38, is located about 0.3 miles northeast of the proposed elimination.

The railroad is on tangent and in a deep cut at this place. (See photograph) The angle of crossing is 21°08'. A long 6% grade (550') from the southeast ascending into a vertical curve, crosses the track with sufficient clearance. The structure itself will be on a vertical curve, the grade being approximately 3%.

There are twelve passenger trains, two regular freights and from two to fifteen extra freights each day.

For Bridge Engineers proposed structure and estimate, see under "Bridges" - Line "A".

ALTERNATE CROSSING AT GRETNA: An alternate crossing at Gretna is located at the southwest corner of town on the north and south section line between Sections 35 and 36, T. 14, N., R. 10 E. (See attached plan and profile sheet, Map No. 8) A subway can be constructed on 5% grades. Adequate drainage to the northwest can be had. The railroad is crossed at an angle of about 30°. (See Photograph No. 17)

The main entrance to town can be made over the present overpass on Angus Avenue (See Gretna map). Another entrance could be had on the street which leads west from the depot to the present north and south township road. Another entrance could be had via the present traveled road thru Gretna. Truck traffic could proceed to South Omaha via Highway No. 37 thru Gretna on the present road or continue thru the underpass and make a grade crossing on the present township road on the south line of Section 36-14-10, to connect with Highway No. 37 to South Omaha. It is probable that an improved layout could be made thru Gretna or south and east of town to handle the South Omaha traffic.

After going thru the underpass, the line continues north on the township road, 2253' to intersect the tangent line on Lines B-C produced from the north. This tangent is parallel with, and north of the Burlington Railroad cut of the proposed overpass on Line A, northeast of Gretna.

I believe by using this underpass the most desirable line thru Gretna can be obtained. Considerable damage to Gretna property will be saved, also the damage at the north end will be less as Lines B-C intersect the present road in front of the house, while Line A is back of the house. A better alignment has been provided and the grades are easier. Connections to town are more satisfactory.

Using Crossing No. 2 as described above thru town does not give very desirable crossings at Angus and Burnes Streets. The long 6% grade over the cut northeast of town is also objectionable.

L I N E "B"

CROSSING NO. 1: The double main line tracks of the Burlington Railroad are crossed southwest of Ashland. (See Photograph No. 14)

There is wood and steel overpass (250' long) in place at this site at the present time. For type of structure planned and cost, see Bridge Engineers' estimates under "Bridges" - Line "B". The railroad is in a cut at the place, the angle of crossing being 37°06'. Six per cent earth approaches lead to the

overpass from each side. Site distance is short of 500' on the present road. The new layout provides for 500' clear vision. There are twelve passenger trains and from two to twenty extra freight trains per day.

CROSSING NO. 2: The Schuyler Branch (single track) of the Burlington Railroad is crossed at Furnas Street north of 25th Street on the north city limits of Ashland (See Photograph No. 12). The sight distance is obscured by banks of the railroad cut, houses and trees, and the flat angle of crossing. The railroad is about 5' higher than Furnas Street to the east and 2' higher than Furnas Street to the west. Sight distance is also reduced due to traffic from the west approaching the track from the west on a 1000' curve.

There are two regular passenger trains and two regular freight trains each day. All operate during daylight. No elimination is feasible at this place due to houses in the vicinity and property damage. Adequate signals should be provided. (See railroad intersection data sheets attached)

While railroad traffic on this line is limited, the crossing is nevertheless a hazard to traffic. Frequently accidents happen on branch line railroads which have a minimum of traffic, and this fact should be given consideration in the selection of the route.

CROSSING NO. 3: The Sioux City line of the Burlington Railroad (one main track and side track) is crossed at Station 676 by the proposed location at an angle of 62° in the N. E. quarter of Section 36-13-9. There is no highway crossing at this location at the present time.

For structure planned, see "Overhead Crossings" under "Bridges" on Line "B".

There are two regular passenger trains, six regular freight trains and from two to three extra freight trains each day.

CROSSING NO. 4: A spur track leading to a gravel pit to the west is crossed east of the Platte River at Station 791. I understand this track is not used now as the gravel pit has been abandoned. If such is the case the track should be removed prior to the construction in case this line is chosen.

L I N E "C"

CROSSINGS NOS. 1 & 2: Same as Crossings Nos. 1 & 2 on "B" line.

CROSSING NO. 3: This crossing is located north of Crossing

No. 3 on "B" line. There is no road at the proposed site at the present time. The angle of crossing is 54°35'. There are two tracks consisting of the main line and one side track. For the proposed structure and estimate, see "Overhead Crossings for Line "C" under "Bridges".

The proposed structure is 900' long due to necessity of crossing the railroad and Wahoo Creek with one structure, on account of the proximity of the railroad and creek. A thirty foot earth fill is needed at the west end of the overhead structure.

RIGHT OF WAY

The various routes were gone over in the field before the evaluation was made. Information was gathered as to the houses, barns and trees which interferred with the construction of the various lines. The farm lands were viewed and notes made as to the character of the land, fences and the probable damages resulting from the construction of the several lines.

A minimum of 80' of right-of-way is to be obtained throughout the entire length of the project. This width of right-of-way has been used on several highways recently constructed where acquisition of additional land was necessary. This width was deemed advisable due to the importance of the road, connecting as it does Omaha and Lincoln. Where borrow was needed, additional strips were estimated from which the borrow can be obtained. Damages, such as severence, fencing, cutting the fields into irregular tracts, were included in the price per acre when the area of the 80' strip was estimated. When additional strips of land were purchased for borrow pits, the cost was based on actual land values. In some instances, borrow dirt was estimated at five cents per yard.

At places, railroad right-of-way was used. This acreage was figured and the usual price per acre allowed.

Where strips of land were necessary for permanent drainage ditches, same was figured on the price per acre of actual value based on actual acquirement.

Portions of Lines B and C pass thru the Nebraska National Guard Camp (the land belongs to the War Department). The State also owns a gravel pit site southwest of the camp. The cost was figured at the same price as adjoining land.

Near the west end of Line A, the highway uses an old railroad fill. A portion of this belongs to the Burlington and a portion to the owner of the adjoining land. Cost of this was figured at the same rate per acre as adjoining land of like nature, no consideration being given to the value of the earth fill for the reason that the fill in itself is of no real value to the highway, being too high and too narrow for highway purposes. It will cost as much to prepare this fill for the proposed highway as it would to construct the highway without the fill.

On Line A thru Ashland, the houses at the following locations will require moving; 689 Birch Street and 842 Dale Street. The other house is located at Station 962+50R and consists of a two-story frame. The house is old and in poor condition. Several trees will also be in the way of the highway.

A transformer station at the intersection of 8th & Dale Streets will have to be moved.

On Line A thru Gretna one one-story house will have to be moved as it is too close to a big cut. Several barns and sheds will also need moving.

On Lines B-C thru Ashland one house and shed on Furnas Street near Station 590R will have to be moved on account of a 1000' radius curve. The house at Station 589+50 will be damaged on account of the proximity of the highway.

Thru Gretna on Lines B-C one house, several barns and several sheds will have to be moved.

In establishing the prices and damages to be paid, costs of previous acquisitions, condemnations of like property and the sales value as shown by tabulated statistics from actual recorded sales records were taken into consideration. Several roads have recently been constructed in the near vicinity and transactions of these right-of-way acquisitions were used.

Experience, based on actual purchases of right-of-way is probably the best guide as to the probable cost of the land.

Condemnation proceedings do not appear to be uniform in different localities, as shown by several cases investigated.

On Line C on that portion that cuts diagonally northeast thru the valley northeast of the Platte River, it is very difficult to say what the cost of the right-of-way will be until actual negotiations are complete. There are many things to be considered and, which enter into the transactions. The line cuts thru the established drainage ditches, the line of flow being about at right angles to the fill. The actual construction of a second fill across the bottom will possibly change the present drainage conditions, and may interfere more or less with their proper functioning. The inability to determine the amount of area needed in the drainage structures, except from the size of the existing structures, also enters into the acquisition. Damages resulting from floods would probably be charged against the highway whether or not the same was the cause of it. The land is divided into many small triangular plats, and damages would be demanded on this basis.

Attached to the summaries are reports showing the estimated cost of the right-of-way on the several lines.

The location of the bridges, sizes and estimated costs, also the railroad crossing eliminations were determined after the field investigations had been made. Tentative layouts were decided upon and estimates made on a foot basis. It is expected that after the location has been decided, detail surveys of bridge sites will be made and upon these surveys the final plans

will be made. It is probable that changes will be made in the final plans of tentative layouts made at this time but it is not expected that such changes will materially affect the estimate.

A roadway width of bridges of 24' was decided upon except for the Platte River and Salt Creek bridges which were made 22'0" in width.

All structures were estimated upon a basis of steel and concrete except where the proper amount of opening could not be determined with a sufficient degree of accuracy, largely due to future possible drainage development, or where the permanency of drainage lines were possibly in doubt. In these cases creosoted structures with concrete floors were decided upon.

As far as drainage difficulties are concerned, Line A is decidedly superior to the others. This line being directly behind the railroad embankments is well protected both at the Platte River crossing and in the valley to the northeast of the river. Drainage is concentrated by the railway openings while on the other lines the roadway embankment would have to take the full brunt of the floods. Serious damage to the road locations on the upper line may reasonably be expected due to the Elkhorn or Platte Rivers leaving their banks in severe floods. Another embankment upstream of the railroad would aggravate the drainage difficulties, already serious in this valley.

BRIDGES

L I N E "A"

On Line A the following bridges are called for in the Bridge Engineer's report. (For location of bridges, see Map No. 2)

A bridge over the proposed channel change of Salt Creek in the S. E. quarter corner of Section 31-13-10 (Station 1055 Line A) is to be constructed. A 100' steel truss on concrete piers and six 25' creosoted timber trestles with a 22' concrete deck roadway is planned. The bridge corresponds to the Burlington bridge (No. 46.29) over Salt Creek which consists of one 154' high steel truss and one 63' through girder, the same being located about a half mile upstream from the proposed highway bridge. The channel change of Salt Creek is recommended on account of the danger of Salt Creek piling up between the railroad fill and the new fill of the highway. (See attached Maps Nos. 6 and 7) You will note that the creek is approximately parallel with, and northwest of the center line of the proposed improvement. This channel change is also in line with the proposed straightening of Salt Creek as shown on the attached map No. 7. The creek has been straightened thru Lancaster County to the east county line. An unsuccessful election was held during June, 1928, in Cass and Saunders Counties to provide bonds to proceed with the straightening of the creek thru these counties to the lower end, at the Platte River, as shown on Map No. 7. The plans for the straightening called for a ditch with a 20' bottom with 1/2 to 1 side slopes, evidently anticipating that the sides would erode and thus widen the channel. For the improvement now in hand a 50' bottom ditch, with 1/2 to 1 side slopes, the excavated material to be placed at least 15' back from the top of the cut, is proposed. I do not believe it advisable to construct a channel with any less area as I believe the disaster therefrom would be worse than no channel change at all. If at any later date the channel above the bridge is straightened, additional widening can be done. The bridge has also been planned with this thought in mind, and it is for this reason that the six 25' creosoted timber trestles with the 100' steel span were used in place of a more permanent structure.

It is difficult to predict how deep or how wide a newly constructed channel will cut. The flood flow may also alter the direction of the channel as originally cut, washing from one bank or the other. If such a condition develops, with the temporary structure in place, it will be easier and less costly of adjustment.

This new channel change will add considerably to the discharge of water thru the new bridge as the bridge will be at right angles to the flow. The 100' span will pass drift at the main channel. A longer bridge was not considered necessary

here for the time being as the new bridge is longer than the railroad bridge over the same channel and relief can also be had at the new bridge constructed over the old channel. Probably at some future time with the betterment of the Salt Creek alignment, and its width increased, a longer bridge will be necessary. The channel change is being constructed at a point where the creek now cuts across the field during high water periods.

The second bridge to be constructed is at Station 1079, the same being over the present channel of Salt Creek where the highway crosses. Five 31' skewed creosoted, timber trestle spans with a 24' roadway, concrete floors are proposed. This bridge is being placed as a safety valve in order to take care of the water which is handled by the Burlington Railroad bridge (No. 45.62) west of, and midway between the new Salt Creek channel and the present channel thru the highway; also to help carry the overflow from Salt Creek in case any serious overflows occur. The railroad bridge consists of an 80' girder with one 40' and one 30' approach girder. There is no normal flow thru the structure. The bridge carries the overflow from Salt Creek during flood periods, also overflow from Wahoo Creek, flood waters from the Platte when the dikes break, and the normal runoff from the land to the northwest. It was first thought that perhaps no structure would be needed at Station 1079, but as it will be necessary to dike Salt Creek in order to force the same thru the new channel, a temporary bridge at Station 1079 appears to be advisable. I believe in time that it will be possible to replace the temporary bridge provided at Station 1079 with a concrete box as soon as the new channel of Salt Creek has been in place a sufficient time to allow adjustment of the flow line, and the larger permanent structure built over the new channel. The water from the Burlington overflow bridge (No. 45.62) can then be carried thru the new channel. Part of the channel change excavation can be used in the fill thru the bottom and the balance for dikes and a dam.

For the crossing of the Platte River, a bridge consisting of 588 linear feet of trusses and 795 linear feet of girders is recommended. This bridge length corresponds to the Burlington Railroad bridge (No. 44.86) length of 1388.5'. The railroad bridge consists mostly of 55' and 60' spans. It is probable that longer spans will be used on the highway bridge in order to use uniform span lengths. This bridge location is believed to be the most desirable bridge location of any of the three bridge locations over the Platte River due to the fact that it is protected from the spring ice flow which has caused trouble to Platte River bridges, as well as drift carried during high water periods.

Maintenance expenditures will be decreased by using this location below the railroad bridge due to ice flow jams and the maintenance that is always necessary at the abutments, due to wash, erosion and flow ice piling upon the fill near the bridge ends.

A roadway of 22' has been provided. This will provide one foot additional width, outside of the pavement edges. This much additional width is absolutely necessary as traffic will not drive as near the handrails on the bridge as it will the pavement edge. A 24' roadway would provide a much greater factor of safety especially where there is much truck traffic involved. The footings will probably be founded on piling as rock is about 60' below bed of stream. Ice flow last spring struck the lowest girders of the railroad bridge. High water is not ordinarily more than 6' above normal.

In order to provide for the overflow from the Platte River on the east side, overflow from the Elkhorn and the drainage from the laid out drainage system established by the Western Sarpy County Drainage District, and Districts to the north and west, three overflow bridges have been provided to correspond with the structures now in use by the Burlington Railroad. The first structure is located at Station 1145+50 and consists of three creosoted timber trestles with a span length of 31' and a 24' concrete deck roadway. This structure corresponds to ten spans of 14' creosoted timber trestles used by the railroad. The railroad bridge (No. 44.05) is longer as the drainage ditch makes a right angle turn on the upper side of the railroad bridge, so that a decided pond has been washed out.

The second overflow trestle is located at Station 1189+00 and consists of four 20' I-beam spans, corresponding to five 16' concrete slab spans in place under the railroad. (Bridge No. 43.26) This bridge is strictly an overflow structure as no water is handled except in flood periods.

The third overflow structure provided for is at Station 1209 and consists of one 50' girder and two 25' I-beam approach spans, with 24' roadway. This bridge is over the Forest City ditch, the main ditch of the drainage system located to the west and north. The new bridge should be built on a skew. The railroad (Bridge No. 42.85) has a 50' plate girder and six 14' creosoted timber spans in place directly above the proposed highway bridge. The bridge is ineffective due to location of the piers and lack of water way due to not cleaning out from under the approach spans. High water has been about 9" above the bottom of the girder. The ditch has a 25' bottom and is diked with the excavation from the ditch. The present highway bridge is too low and too small. The water has been over the handrails of this bridge. The drainage ditch in the vicinity

of the two bridges should be cleaned, especially between the two structures.

OVERHEAD STRUCTURES ON LINE "A": There will be two overhead railroad structures on Line A. At Station 1042 the Louisville line of the Burlington Railroad is crossed. (See Photograph No. 7) The railroad is in a cut at this place and on a 3° curve. The angle of crossing is 36°10'. A structure at this place is estimated to cost $30,000. A roadway of 24' is proposed. See attached railroad intersection data sheets.

At Station 1548 northeast of Gretna an overhead structure is proposed crossing the main line (one track) of the Burlington Railroad. (Photograph No. 10) The railroad is on tangent thru a deep cut at this place. The angle of crossing is very flat being only 21°08'. A long grade (600' being 6%) is necessary on the east side in order to gain elevation for the overhead. The estimated cost of a structure at this place with a 24' roadway is $53,000., estimate based on double track.

There are six bridges (drainage structures) on Line A with a total length of 2061 feet. The total cost of the bridge is $215,500.00.

There are two overhead railroad crossings to be constructed on Line A, the total cost being $83,000.00, and the length 630'.

The total cost of bridges and overhead structures on Line "A" is $298,500.00 and the total length 2691 feet.

For comparative cost of bridges on the several lines see summary sheets and under "Discussion".

L I N E "B"

For the location on bridges on Line B see Map No. 2.

At Station 527 the proposed bridge over Salt Creek south west of Ashland consists of one 100' steel truss and two 75' trusses, with a roadway of 22', the bridge to be built on a skew, and is estimated to cost $40,000.00. The present bridge consists of one 90' low truss and 20' I-beam approach spans with a clear roadway of 16.5 feet. The abutments are of concrete and the piers consist of steel legs. The north abutment is in poor condition. The bridge is set at angle of 45° with the stream. The bridge has a concrete floor. The central low truss is field bolted, no rivets having been used. It is planned to raise the grade line over the present bridge floor about 3 feet due to high water. There is a considerable overflow section on both sides of the present bridge. The plans for the straightening of Salt Creek thru Cass and Saunders Counties show quite an extensive channel change west of the bridge, involving 125,000 cubic yards (See Map No. 7).

While the length of this bridge (Station 527) was made the same as the Salt Creek bridge on Line A, you will note that the bridge is on a 45° skew which would greatly reduce the waterway. The bridge is higher than the bridge on Line A due to the cross-section of the channel. The channel change was not counted in as a part of the cost of Line B or C as it was thought such a channel change (while considered feasible and probably same should have been figured in to get a comparable cost inasmuch as the channel change was considered as a part of the cost of Line A) would only tend to increase the cost beyond reason and also due to the fact that the time of making such a channel change is indefinite. It was not considered feasible to construct creosoted approach spans here due to the skew and if a temporary bridge was constructed, it would be for the reason that the channel change was to be made in the near future. If the channel change is contemplated in the next several years, I see no reason for constructing temporary bridge approaches on the steel central span (which is necessary due to drift) when all the bridge will be abandoned eventually as the channel change is approximately one-quarter mile to the south. In the event of the channel change being constructed in the near future it would seem a more sensible thing to leave the present bridge in place for the time being in preference to constructing a temporary bridge only to have it all abandoned.

After discussing with the bridge engineers regarding this structure it was decided that a permanent bridge should be estimated inasmuch as the channel change may never be made. If such change ever was made, the drainage district would pay the cost of a new structure at the new location. The present

bridge would probably serve the traffic for several years, if necessary, however, with the traffic on this road, I believe a new structure should be constructed as the roadway is narrow and the new grade is higher than the present bridge.

At Station 688, over Wahoo Creek, a bridge consisting of one 80' truss and two 30' approach spans with a 24' roadway is planned. This bridge is located directly below the railroad bridge over Wahoo Creek. The railroad bridge consists of a 60' plate girder and nineteen 14' creosoted timber trestles with a total length of 320'. While the designed bridge is much shorter than the railroad bridge, I believe the opening is sufficient. The estimated cost of the new structure is $21,000.

At Station 723+50 in the north half of Section 31-13-10 an overflow trestle is to be constructed consisting of three 40' I-beam spans with a roadway of 24'. The estimated cost of the 120' structure being $135.00 per foot or $16,200.00. This bridge is being constructed across a slough which carries the normal run off from quite a large drainage area to the north and west, the overflow from Wahoo Creek and the flood waters from the Platte River during high water periods and due to breaks in the dikes of same. Water was two feet deep over the pavement which is located just to the north, last spring, the current washing out about 75' at two different places. Water from the upper side of the road will be taken to this bridge in special ditches, the excavation from which will be used in the road. It is not considered feasible to construct a grade thru this bottom without providing an opening for the flood waters. Directly below this bridge the Burlington has a bridge with 150' opening to carry the same water.

Over the Platte River at Station 770 a bridge with the same span layout as the Burlington, Platte River bridge, is planned. The railroad bridge is 1388.5 feet consisting of plate girders of various lengths the shortest being 55'. The river makes a bend at this place, the flow being directly against the railroad fill. (See Photograph No. 13) When ice is moving considerable protection would be required at the fill, and this has been provided for in the estimate. The railroad is in a position to haul carloads of rock to this place during floods which the highway maintenance department would not be able to do. (See plans and profile sheets - Line B) The estimated cost of this structure with a 22' roadway is $180,000.00, which includes an item of $20,000. for protection work.

Overflow bridges to correspond with the railroad openings have been provided at Stations 807, 849+50 and 872+50. These bridges carry the drainage from Western Sarpy County drainage ditches and the overflow from the Platte and Elkhorn Rivers.

At Station 807 five 31' creosoted timber trestle spans with 24' concrete floor roadway have been provided. The total length is 155' and the estimated cost is $7,800. This structure is 15' longer than the railroad bridge (No. 44.05) as a right angle turn is made in the drainage ditch directly above the bridge.

At Station 849+50 four 20' I-beam spans are provided. This is the same size bridge as on Line A, which is just across the railroad tracks. The railroad has five 16' concrete slabs in place. (Bridge No. 43.86) The estimated cost of the 80' of bridge is $8,000.

At Station 872+50 (main drainage ditch of drainage district) one 50' I-beam and two 30' I-beams (skewed) are planned. The corresponding railroad bridge (No. 42.85) is 134' long and located just below the highway bridge. The estimated cost of the new structure is $14,800. for a 24' roadway.

OVERHEAD CROSSINGS: There are two overhead railroad crossings contemplated on this line. At Station 482+00 a structure 250' long with 24' roadway is planned over the two main line tracks of the Burlington Railroad. The railroad is in a cut and on a skew. There is a wood and steel structure in place at the present time. The structure is old and in need of replacement. Six per cent earth approaches lead to the structure. The estimated cost of the new structure is $35,000.00. (See railroad intersection data sheets attached) (See Photograph No. 14)

At Station 676+00 in the east half of Section 36-13-9 it is planned to go over the Sioux City line of the Burlington Railroad with a structure 550' long, the estimated cost being $60,500.00 for a structure with a 24' roadway. The railroad is on a fill at this place so that a very high structure with high fills is required. (See plan and profile sheet Line B. Also railroad crossing intersection data sheets attached)

The length of the seven bridges on Line B is 2238' and the length of overhead structures 800' making a total length of 3038'. The estimated cost of bridges being $287,800.00 the overheads $95,500.00, making a total estimated cost of $383,300.00. (See Bridges under Summary Line B)

BRIDGES

L I N E "C"

Inasmuch as B and C lines are identical from the beginning to the northeast corner of Ashland, several bridges will be in common as follows:

Station 482 overhead crossing of Burlington main line (250' long, estimated cost $35,000.) and the Salt Creek bridge Station 527 (250' long, estimated cost $40,000.)

At Station 679 an overhead crossing will be constructed over the Sioux City line of the Burlington Railroad. Due to proximity of Wahoo Creek to the east, a combined structure crossing the railroad track and the creek will be necessary. This structure will be 900' long with a 22' roadway, the estimated cost being $100,000.00. The long structure is necessary due to the high fill and on account of the creek and railroad structures being combined. Six per cent grades are being used over the structures. Large approach fills will also be required due to the overflows and low land on either side of the crossing.

At Station 722+50, three 40' I-beam spans with 24' roadway have been provided. This bridge corresponds to the bridge at Station 723+50 on Line B and to the 150' bridge on the main line of the Burlington Railroad. (No. 45.62) The bridges carry the normal run off from the flat land to the northwest, and overflow from the Platte River. The estimated cost is $16,200.00.

At Station 752, a 32' I-beam bridge with 24' roadway has been provided over a slough and corresponds to the present bridge in place under the pavement near the Platte River on the present road. The bridge carries the normal run off, and will handle flood water from the Platte overflows and act as an equalizer when the grade is raised thru this bottom. The estimated cost of the structure is $3500.00.

The Platte River bridge on Line C is at Station 772 where 1200' of bridge consisting of twelve spans at 100' each will be constructed, the roadway being 22 feet. The bridge is located just below the present highway bridge which consists of six 160' high trusses, (See Photograph No. 15) one approach span on the south end and two approach spans on the north end. The substructure consists of steel tubes. The roadway is narrow (15.5 feet) and the bridge too light for present-day travel. The floor is of wood and the handrails light angle irons. No hub guard is provided. The Platte River bridge on Line C is estimated to cost $160,000. which includes $10,000. for protection work at the bridge ends. This site gives a very satisfactory crossing and probably as short as any in the near vicinity.

From the Platte River the layout on Line C goes northeasterly cutting diagonally thru the farms and the established system of drainage thru this bottom. Many drainage ditches are intersected which are located along the roads and usually along the north and south section lines. As the drainage is not concentrated as is the case on Lines A and B and at the railroad fill, considerable more bridges will be required on Line C. The line goes northeasterly making the fill about right angles to the direction of flow of the valley.

At Station 812, three 17' creosoted timber trestles with 24' roadway and concrete floor, have been provided. This bridge is over an east and west drainage ditch. At Station 843 three 31' creosoted timber trestles have been provided, this structure also to have a 24' roadway with a concrete floor. This bridge is over a dug drainage ditch running on the west side of the north and south road. The estimated costs of these two structures being $7,200.00. These two bridges correspond to the bridge at Station 807 on Line B, to the 10-14' timber trestles under the Burlington, and to the bridge at Station 1145 on Line A. The extra length being provided on account of the drainage not being concentrated, and to carry the extra water which will result from the new fill across the valley which will move the flood plans further up the valley.

At Station 892 three 30' I-beams, 24' roadway have been provided. This bridge is over an established drainage ditch thru the center of Section 16. Same will also handle flood water due to breaks in dikes of the Elkhorn and Platte and serve as emergency structure when the high fill thru the valley is constructed.

At Station 931 the Forest City Drainage Ditch is crossed. This is the main drainage ditch of the district. A 50' span with two 30' approach spans have been estimated for this location. The estimated cost is $14,800.00 for a 24' roadway bridge. This bridge corresponds to the bridge at Station 1209 on Line A, and to the 134' bridge (No. 42.85) under the Burlington tracks near Line A and to the bridge (1-50' and 2-30') at Station 872 on Line B.

At Station 947 one 45' span with 24' roadway is provided, the estimated cost being $6,000.00. This bridge is over one of the established drainage ditches, the ditch carrying the water from the hills to the east besides the regular run off and flood waters.

The length of bridges on Line C is 1991', the overhead structures 1150', the combined length being 3141'. The estimated cost of the bridges is $257,200.00, the overhead structures $135,000.00 and the total estimated cost $392,200.00. See Summary Sheets on Line "C".

BRIDGES

L I N E "C" REVISED

The bridges on Line "C" Revised, are the same as on Line "C" except that the overhead structure at Station 676+50 over the Sioux City line of the Burlington Railroad has been substituted for the overhead structure at Station 679+50 on Line "C". This change was due to the fact that Line "C" Revised is to follow Line "B" to a point east of Wahoo Creek, the change being made to reduce the cost of the overhead structure on Line "C", a combined structure being necessary over the railroad and Wahoo Creek. See description of Line "C" Revised and estimates on summary sheets, Line "C" Revised.

DESIGN

With commercial traffic increasing very rapidly, the modern highway must be designed to carry not only the pleasure cars but also the heavy truck and bus traffic. With transcontinental busses operating throughout all hours of the day and night the design of the highway must necessarily anticipate such development in traffic. Highways to be safe and efficient and entirely satisfactory to the traveling public should have a design that will provide such a service.

In order to provide a highway of sufficient width to handle the bus and truck traffic for a two-lane road a roadway width of 32' is being used. The pavement will be 20' wide with a 9"-6"-9" section. These widths will insure a clear vision of the roadway and a greater safety factor to passing vehicles. A 6' earth shoulder well maintained will increase the safety factor.

A 1½ to 1 slope (the Nebraska Standard) has been used on the road slopes and on the fill sections. A flatter road slope say 3 to 1, will give a much safer road to drive on, as cars can drive down this slope without overturning. For the fill sections I would say that not less than a 2 to 1 slope should be used and preferably flatter. This flatter slope is easier maintained and guard rail can be eliminated for considerable heights of fills. Some states use as flat as a 4 to 1 slope on high fills, as this slope can be easily bladed and the weeds cut with mowing machine. It is not an easy thing to widen a high fill once it has been completed and erosion has narrowed the fill.

The culverts will be 32' wide to correspond with the fill. The bridges will be 22' and 24' wide. This will provide extra width outside of the pavement edge.

A highway should be designed to be as safe from snow as it is from overflows or other causes which tend to tie up traffic. With this idea in mind the grade line has been laid high enough to lessen the snow hazard and to prevent frost action which causes heaving and breaking up of the road surfaces.

The following several pages cover the design as to grades and curves.

CULVERTS

The success of any road depends largely on an effective drainage design including the removing of the surface and cross-drainage as quickly as possible and thus preventing the ground water from entering the subgrade. (Capillarity)

The drainage areas of the culverts were arrived at in the field and their locations noted on the field checked plans. Waterways were calculated by use of Talbot's formula, a coefficient of 0.6 to 0.8 being used depending on the character of the country.

Standard designs of structures, as approved by the Bureau for use in the State of Nebraska, were used in making the estimates on the several lines. All culverts will have a roadway width of 32 feet.

Each line was worked out separately, the tabulations showing the location, size of structure, quantities of excavation, concrete, reinforcing steel and amount ofpipe at each location. The total quantities and estimated costs are shown on the attached sheets at the end of this report.

The prices used in the estimate were derived from the information gathered on lettings of recent contracts and represent the average price which usually prevails at Nebraska lettings. The same unit prices were used for estimates on all lines.

GRADES

A 6% grade is used as the maximum grade on all lines. It was thought that a 5% grade could be used as a ruling grade, but excavation quantities were exceedingly heavy. Due to the amount oftruck traffic, which will in time be increased, and trailer trains which will probably develop when the road is entirely paved, I believe a 5% grade would prove desirable. If one travels the present highway he notices that traffic is often interrupted by a heavy loaded truck taking a steep grade. Short 6% grades are not objectionable and the present day trucks should be able to negotiate such grades without any difficulty.

In order that all lines would be comparable and in order to eliminate the personal equation, all the grading quantities were computed by one man, several assistants performing such clerical work as was needed. Grades were established during the field inspections and later used to determine the quantities. In most cases the quantities were figured from the center line profile. Cross-sections were available at several places and these were made use of in balancing the quantities. For the most part the cross-section is level and the center profile should give a very close approximation of the quantities. In estimating the yardage, 20% shrinkage was allowed.

The heights of the grades were established in the field, the thought being to lay grade lines which would be comparable on all three lines. No attempt was made to take undue advantage of the railroad fill, although such an advantage is admitted. The railroad probably does act as a dam to shut off and protect the highway fill, acting as a dam below the flood waters. However, it is probable that after the flood has been in progress a short time, the water probably adjusts itself, coming to the same elevation on each side of the track. The grade line on Line A was therefore laid to meet the actual conditions and no advantage of the railroad fill taken in so far as the original construction cost was concerned. There will be a decided advantage in the maintenance costs however.

Tabulations contained in the summary sheets of this report show the total rise and fall, also the linear feet of 5 and 6% grades.

CURVATURE
(Horizontal and Vertical)

HORIZONTAL: Sharp, horizontal curves are extremely dangerous for the high speed traffic of the present day, and particularly so to traffic not familiar with the lay of the road, so that the alignment is governed largely by the safety to traffic. In order to get a safe alignment it is necessary to use as few curves as possible, and when such are necessary, curves with exceedingly long radii should be used. As long as no grade greater than 6% is used, I do not believe the alignment should be sacrificed for grade. Neither do I believe the alignment should be unnecessarily sacrificed for a small saving in length.

The summary sheets show the location of the curves, the total angular deflection, the degree of curvature and the length of curves on Lines A, B and C.

VERTICAL: Long vertical curves connecting the tangent grades add to the safety, riding conditions, and appearance of the finished highway. In order to maintain a 500' clear vision over a summit with two 6% intersecting grades, a 750' vertical curve is necessary. Such a sight distance is none too long and I believe the same will be gradually increased. It is a fact that two cars approaching each other over a hill at the rate of forty miles per hour pass 4.2 seconds after seeing each other. Vertical curves in sags should be made as long as possible as they tend to check the speed and give an undesirable riding effect when too short; especially so, when the higher type surfaces are used. Long vertical curves at the foot of hills improve the general appearance of the road.

SOIL CONDITIONS & CLASSES OF EXCAVATION ENCOUNTERED

Soil in the bottom land east of the Platte River varies from fine sand located adjacent to the river to the sandy loams and silt loams. Ground water lays from 6" to 2' below the surface.

In the hills between Melia and Gretna the soil consists mostly of the loess varieties and the silt loams as can be seen in the deep cuts made by the railroad company in this vicinity. No rock was noted in the railroad cuts.

South and west of the Platte River the soil is fine sand adjacent to the river, and sandy and silt loams toward Ashland.

In the hills south of Ashland the loess soils were noted also some shale and rock, which lie deep in the hills as can be seen by examination in the ravines.

ROCK EXCAVATION

From the faces of the cuts facing the Burlington Railroad from Stations 931 to 958 Line A, it appears that rock excavation might be encountered thru the cuts on the highway to the south. (Line A) However, rods were driven down at Stations 934+20, 941, 944+65, 947+65, 952 and 957 and no rock encountered.

Elevations taken on the rock ledges showing up in the ravine at Station 936+75 show the top of the limestone ledge to be at an elevation of 1096.6. Elevations taken on rock outcrops in the face of the hill at Station 958-9 show the ledges to be far below the established grade. Elevations of ledge rock in the ravine at Station 946 show the rock to be at an elevation of 1102.1, no cut thru this location being made this deep.

I noticed that in going over the various layouts that the rock outcrops are very low, usually being in the flow lines of the culverts; at least this is true of several railroad structures I examined in this vicinity.

At one place, the face of the railroad cut (Stations 931-958 Line A) a sandstone ledge appears - a rod driven to grade on the center line did not strike this ledge.

A rock ledge was noted near Station 1051+ in the present road, the grade line being higher than the ledge.

The rock appears to be badly faulted. The ledges are thin and full of fissures. No rock excavation is contemplated on any of the lines.

MATERIALS

Any of the locations are located favorably as far as materials are concerned.

Sand and gravel pits are located along the Platte River and are available for all lines. It may be that some of the fills adjacent to the river can be placed by pumping.

Crushed rock, if used, can be secured from the quarries located at Louisville, about twelve miles east of Ashland on the Burlington Railroad.

Cement plants are located at Louisville and Superior, Nebraska, these being the only two in the State.

Reinforcing steel and metal pipe for Nebraska jobs are usually secured thru jobbers at Omaha and Lincoln.

The road is situated very favorably as far as materials are concerned.

CONSTRUCTION and ALIGNMENT

L I N E "A"

This line (See Map No. 1 and plans for Line "A") begins at Station 809 on Federal Aid Project No. 107-A now under construction and continues northeasterly on tangent about 200' southeast of, and about parallel with the Burlington Railroad. The line was shifted away from the railroad in order to keep in service the present overpass on the east and west township road near Station 830. The approach grade to this overpass is steep and by shifting the line to the east, about the same rate of grade over the overpass as now exists can be maintained. The private overpass near Station 839 can be used more advantageously by the shifting of the line. This overpass is used largely for stock. The stock can be taken thru the 6'x6' cattle pass provided at Station 834, thence between the west right-of-way line of the highway and the railroad right-of-way to the overpass. This will eliminate having a stock crossing on the highway. The line shift was also necessary in order to avoid the abandoned railroad cut Stations 850-860 and west of the present traveled road. This cut is low and difficult to drain.

In order to proceed over the abandoned railroad fill of the Burlington Railroad an angle to the right is necessary near the crossing of the present graveled highway. From this point (Station 863) easterly to Station 923 an old abandoned fill of the Burlington is in place. The same is satisfactory for use. About 2/3 of the length is a fill section about 12' average height, the balance is in cut. It is planned to widen the cuts and to lower the grade over the fills, in order to get sufficient material to widen the fill to the standard road section (32').

From the east end of the railroad fill, Line A follows the present township road (to Ashland via two underpasses and Salt Creek bridge on 13th Street) for 400' at which place a deflection of 27°13' is made to the right, the line ascending to the top of the hills, thence northeasterly on a tangent which is 265' southeast and parallel to the west bound main track of the Burlington Railroad, this tangent being followed thru the east part of Ashland to Station 1009+51. In these hills several points of the hills are cut 10' for a distance from 1 to 3 hundred feet. At Station 955 a maximum cut of 25' will be made for several hundred feet. Theline is southeast of the C. B. & Q. passenger depot and 250' southeast of the present underpass at the east end of Silver Street, the main business street of the town. (See Photographs Nos. 4 and 5 and Map No. 4) An entrance from the highway to this underpass has been provided. The line passing thru the east part of Ashland is located partly on railroad property and partly on private property. It will be necessary to move three houses and several sheds in order

to keep the line on tangent. (See Photographs Nos. 2 and 3) The alignment thru town appears very satisfactory and will serve the town adequately being about one-half mile from the business district.

In order to gain elevation for a proposed overpass and to avoid intersecting the Plattsmouth line of the Burlington Railroad a deflection to the right is made, in the line at Station 1091+51.4, the line passing over the hills to the northeast and crossing over the Burlington Railroad at Station 1042. Several hill tops are cut, the maximum cut being 20' for 100'. The railroad is on a 3° curve and in a cut at this place. (See Photograph No. 7) The line continuesnortheasterly on tangent thru the flat east of Salt Creek, which is located about 200' west and about parallel to Line A. An average fill of 6.5 feet is made thru the bottom. The Omahaline of the Burlington Railroad is located just west of Salt Creek. In order to avoid the possibility of Salt Creek piling up between the railroad fill during flood periods and the high grade of the proposed highway (which is necessary thru this bottom), a channel change is proposed at Station 1055 around the foot of the hill to the south. (See attached sketch and profile maps Nos. 6 and 7) This channel change is in line with the scheme of straightening Salt Creek thru Cass and Saunders Counties, the plans and profiles having been completed several years ago. The channel of this creek has been straightened from Lincoln to the east line of Lancaster County. It is said that another attempt will be made in the near future to proceed with the straightening. Due to this fact and to the small angle of crossing and the length of bridge that would be necessary at Station 1078 and to the overflow hazards which might develop, it was decided to construct the channel change at this time. A bridge is to be built at Station 1055 over the new channel and a temporary structure constructed at Station 1078. (See bridge report)

The line continues on tangent thru the Salt Creek bottom to Station 1085+33 where a deflection of 9°43' to the right is made to get a satisfactory bridge crossing of the Platte River. This tangent is 120' southeast and parallel to the railroad. The river is crossed just below the present Burlington Railroad bridge. Line A continues 120' from, and parallel to the Burlington Railroad passing along the west side of the Linoma Resort continuing northeasterly to intersect the present traveled road near Station 1180 at the south quarter corner of Section 21-13-10. A fill from 5' to 6' is made between Linoma Resort to the present crossing.

Line A follows the present graveled road (F. A. P. 107-C) from Station 1180 to 1239 (Fill 5' to 6') at which a small deflection is made to the right to avoid going thru the present road cut near Station 1260 and in order to procure a tangent which could be carried thru to intersect the present graveled

road near Station 1361. The cut on the present road is thru a loess soil and considerable trouble has been had in maintaining the road and ditches at this place. About 200 acres drainage must be handled thru the road ditches at this cut.

From Station 1239 to Station 1361 the Line A is on new location (on tangent) cutting northeasterly thru Section 14-13-10 intersecting the present traveled highway (F. A. P. 107-F) at the southeast corner of Section 11-13-10, a 4° curve being used at the intersection.

From this point to Gretna Line A is on the present traveled road to Station 1492 at which place Line A follows a 3° curve to the right, paralleling the Burlington Railroad thru Gretna (See description Line "A" thru Gretna). (Also Photographs Nos. 11 and 19). From the northeast limits of Gretna Line A goes northeasterly passing over the main line of the Burlington, the angle of crossing being 21°08'. The railroad is in a deep cut at this place. After crossing the railroad a 2° curve is made to the left to intersect the present traveled highway and end of Line A at Station 1590+37.6 and a point on the present traveled road. (See Summary Sheets Line "A")

L I N E "B"

Line B begins at Station 809 a point on Nebraska Federal Aid Project No. 107-A southwest of Ashland. In order to get a satisfactory alignment to cross over the two main line tracks of the Burlington Railroad southwest of Ashland it was necessary to introduce two curves near the beginning. At Station 854.9 a 2° curve to the right is used in order to miss a farmer's house located north of the east and west township road. At Station 832+57 a 2° curve to the left is used, intersecting the present graveled road about 400' south of the S. W. corner of Sec. 11, T. 12 N., R. 9 E, and near the place where Line A crosses the present road. Line B then goes north on the present road (F. A. P. 107-B) crossing over the present wood and steel overpass of the Burlington Railroad. (See Photograph No. 14) This structure is old and in need of replacement (See under "Bridges"). The line then continues north crossing Salt Creek (See under "Bridges Lines B & C) where a new structure is needed, and continues north to the northwest corner of Ashland at N. W. corner of Section 2-12-9. From the overhead crossing to a point south of the Ashland Cemetery, Stations 492 to 550, an average fill of 5' is being called for due to Salt Creek flooding the road during high water periods.

Line B follows along the west city limits of Ashland on 30th Street to its intersection with Furnas Street at which place a 1000' radius curve is used. Line B turns east on Furnas

Street along the north city limits and crosses one track of the Schuyler line of the Burlington Railroad at grade near 25th & Furnas Streets. (See Photograph No. 12) and then continues east on Furnas Street to intersect 14th Street at the present traveled road.

Furnas Street is low and carries the water from the streets of the town several blocks to the south. The grade has been raised considerably on the proposed plans. Extra right-of-way will be needed. The drainage is not very satisfactory as a special ditch is required to carry the water to the north. At the intersection of Furnas and 14th Streets a bad drainage condition exists, the water being ponded at this intersection. Two culverts are called for at this place.

In order to miss a filling station the alignment as shown on the field plans was changed slightly (See Plans - Line B). The line then goes northeasterly on new location cutting thru the south half of Section 36-13-9, an average fill of 4' being used to place the grade above high water, thence continuing northeasterly to Wahoo Creek. In order to avoid building two bridges over Wahoo Creek a channel change involving approximately 16,000 cubic yards is to be made. The excavated material will be used in the fill and approaches of the overpass. The line then continues on tangent crossing over two tracks of the Sioux City line of the Burlington Railroad. The railroad is on a 12' fill at this place and 34' fills will be required at the ends of the proposed 550' structure over the railroad.

The land on either side of the overpass is subject to flood conditions from Wahoo Creek and overflows from the Platte River and back water from Salt Creek.

After crossing the railroad and 1100' to the east Wahoo Creek is crossed by a proposed structure 140' long. From Wahoo Creek to an intersection with the main line of the Burlington Railroad a fill from 4 to 8' is used due to overflow conditions. An overflow bridge (3-40') is proposed near Station 723. This bridge is being constructed to carry the normal run off and overflows from Wahoo Creek and the Platte River. Line B intersects the Burlington Railroad 1000' west of the Platte River. A new bridge (1383') the same length as the railroad bridge is planned directly above the railroad bridge. Due to current being along the north bank of the river and heading in to the proposed fill, considerable rip rap and bank protection has been planned at the east end of the bridge (See Photograph No. 13). A reverse curve (using 2° curves) is made east of the river in order to get nearer the railroad track. A spur track of the Burlington Railroad is crossed near Station 790. This track runs to a gravel pit.

Line B then continues northeasterly, northwest and adjacent to the Burlington Railroad, crossing the flat north and east of the Platte River to Melia and continuing adjacent to the railroad via Gretna and to the end of the route, northeast of Gretna.

The railroad has an intercepting ditch on the up-stream side of the fill to intercept the water from the various ditches to the northwest and in order to concentrate it for the three overflow bridges thru the railroad fill in this vicinity. (See Map No. 2). The center line of Line B follows this ditch very closely so that it will be necessary in case this line is used to construct another intercepting ditch on the upper side of the highway in order to handle the drainage and concentrate it for the bridge openings on Line B, which will be opposite the railroad bridges. A fill averaging 6' high will be constructed across this flat.

From Melia via Gretna to the end, Line B passes thru the hills adjacent to the railroad (See U. S. G. S. Map No. 3). The grade is rolling with 6% grades and many deep cuts.

The line thru Gretna is not satisfactory due to the unsatisfactory entrances into town, and poor alignment thru town. (See Photographs Nos. 18) A satisfactory grade cannot be laid to connect with the overpass on Angus Avenue without considerable expense and sacrificing the grade of the highway. The alignment near the depot is unsatisfactory also as it comes between the mill and a house to the west. Vision is poor and traffic from Gretna will be compelled to cross the Burlington tracks near the depot to get to the highway. (See Summary Sheets Line "B")

L I N E "C"

Inasmuch as Lines B and C are in common from the beginning southwest of Ashland to a point at the northeast corner of Ashland, the same construction problems will be encountered on this portion.

From a point at the northeast corner of Ashland at the intersection of 14th & Furnas Streets, Line C goes more northerly than Line B. However, the same construction problems are encountered as the lines are very close together. The height of fill from the northeast corner of town to Wahoo Creek is from 4' to 6'. This field is tile drained and care should be used during construction not to disturb same. At Wahoo Creek a channel change is to be made, cutting off a bend in the creek, thus avoiding the construction of two bridges over same. This channel change involves 14,000 cubic yards, the excavation to be used to back fill the old channel and to construct the west approach to the overhead crossing to the east.

Over the Sioux City line of the Burlington Railroad a structure 900' long is planned, the same to span the railroad and Wahoo Creek to the east, this structure being called for on account of the proximity of the railroad and creek. There is a 30' earth fill at the west approach. Such a fill of course will be hard to maintain due to wash, erosion and sliding. The railroad is on a 10' fill at this place as the land in the vicinity overflows.

From Wahoo Creek to the proposed bridge site over the Platte River a fill from 3' to 6' is planned. The fill over the present pavement, where the line crosses is 3.5 feet. Water was 2' deep on this pavement last spring.

A bridge consisting of 3-40' I-beam spans is planned at Station 722. This bridge is over a slough and is provided to carry the normal run off and the overflow from Wahoo Creek, Clear Creek and the Platte River in case of floods or the dikes breaking. The bridge corresponds to a 150' bridge (No. 45.62) in place under the railroad to the east.

Another overflow bridge consisting of a 32' I-beam structure is called for near Station 756, just south of the Platte River. This bridge is necessary in order to carry the water in a slough which falls during a rain. It will also act as an equalizer in case the fill impounds the overflow waters.

A new structure over the Platte River is planned just below the present highway bridge (See Photograph No. 15). (See under "Bridges" for discussion, also Bridge Report attached at end of this report)

From the east side of the Platte River (Station 776) to a point near the center of Section 10-13-10 (Station 973) Line C is on new location crossing the Platte River bottom land in a northeasterly direction, cutting the sections about on a 45° angle (See Map No. 1, also Photograph No. 16). This land is all under a high state of agricultural development having been made so by a costly system of drainage ditches. While I had in mind, the laying out of a road that would not interfere in the least with the present drainage system, no doubt more or less interference with the present drainage system will result with a high fill constructed across this bottom. I understand some fields have been tile drained, in the low spots.

The fill thru this bottom varies from 4' to 8'. Bridges or culverts as needed were constructed over all the ditches. (See Map No. 1 for main drainage ditches) The height of fill was determined by information gathered on the ground based on past occurrences and from known high water elevations. Material for fills is to be obtained from borrow pits and special ditches.

Line C intersects Line B near the northeast corner of Section 10-13-10 following the same to the end of the route. For construction details see Line "B". (See Summary Sheets Line "C")

L I N E "C" REVISED

Line C Revised followed Line B to a point east of Wahoo Creek (See Map No. 1). From this point Line C Revised goes now more northerly than Line B intersecting Line C at a point southwest of the Platte River. From this point to the north end Line C Revised follows Line C.

The construction details on Line C Revised are materially the same as Lines B and C, the only difference being the substitution of Line B overpass over the Sioux City line of the Burlington for the overpass on Line C. (See Summary Sheets Line "C" Revised)

DISCUSSION

In laying out the several lines in the field, and designing the final layouts, it was my intention to so plan the lines in case any one of the lines was selected, no changes would be necessary and the construction work could proceed. Each line was considered separately and standard highway practices were used on each line. What might be considered good design on one line might not (due to different conditions) be considered as such on the other lines.

While any one of the four lines offered would no doubt provide a satisfactory highway, Line A appears to be more satisfactory.

In the choosing of any location the length of route naturally enters into the selection. From the summary the following lengths of lines are noted:

Line A - 14.474 Miles
Line B - 15.143 Miles
Line C - 14.731 Miles
Line C (Revised) - 14.765 Miles

You will note that Line A is 0.257 miles or 1354 feet shorter than any of the other routes.

In the construction of Line A, of the 14.474 miles, 3.2 miles of the grade and drainage structures with a gravel surface is practically complete, this portion having been constructed as part of Federal Aid Project No. 107-C and Federal Aid Project No. 107-F. The grade on 1.1 miles of this will be raised above high water.

In the construction of Lines B-C and C Revised, about 1.7 miles of highway which has been graded and graveled (F. A. P. No. 107-B) will be used in the construction of the new grade. A portion of this (1.0 miles) will be raised above high water. This leaves 1.4 miles in favor of Line A against Lines B-C on which very little work will be required in the line of grading and drainage structures.

Line A is to be preferred thru Ashland as no interruption of traffic is involved. Lines B-C (which skirt the west and north limits) could hardly be said to be serving the town as well as Line A. Line A passes thru the southeast corner of town, (within the city limits) there being a number of houses and mills in the vicinity of the highway. The only business served by Lines B-C is at the northeast corner of town where an oil station is located. There is a paved street (Silver Street) connecting the highway, (See Photographs Nos. 4 and 5) with the town and three other entrances all of which can be traveled without crossing the main line railroad tracks.

GRADE CROSSINGS

There are no railroad grade crossings on Line A.

There are two grade crossings located on Line B. (See Photograph No. 12) While there is limited service on the Schuyler line in Ashland, it is, nevertheless, a hazard to a heavy traffic highway. A spur track leading to a gravel pit is also crossed east of the Platte River.

There will be one grade crossing remaining on Line C and Line C Revised. The schuyler branch is crossed in Ashland at 25th and Furnas Streets.

Line A crosses the Salt Creek bottom southwest of the Platte River and is southeast of the Burlington Railroad fill. The Salt Creek channel change, as discussed in this report, together with the two new bridges to be constructed together with the railroad fill will give the highway at this place ample protection from the high water of Salt Creek, Wahoo Creek, back water from the Platte and water from the Platte due to overflow farther up-stream.

You will note that the proposed bridge over Salt Creek on Line A consists of one 100' and six 25' creosoted timber spans with concrete floors and that for Lines B and C a 100' steel span with two 75' steel approach spans has been proposed. (For discussion see Sheet 28, Par. 4, also Sheet 31, Par. 8) While these layouts may not seem comparable, it was the intention, as stated at the beginning of "Discussions", to plan such a design so that the construction could proceed along the selected line without changes in alignment and construction. While the permanent structure on Lines B & C are more costly than the corresponding structures on Line A, you will note that $10,000. has been spent on Line A as channel change which should be included really as part of the cost of the bridge on Line A, inasmuch as it makes the bridge more effective. Also, that a second bridge has been constructed over the old channel (Station 1079) on Line A, in order to help carry water from unforeseen floods. A portion of this bridge should really be chargeable to the Line A Salt Creek bridge at Station 1057. The more or less temporary construction (6-25' creosoted timber trestles) of the bridge on Line A can be defended as no doubt in the near future additional work will be done on the Salt Creek channel above this bridge.

As covered under Paragraph 4, Sheet 28, and Paragraph 8, Sheet 31, I can see no good engineering argument for the construction of a temporary bridge at this place. The unit cost per foot is of course considerable more for the Line B-C bridge over Salt Creek than on Line A, due to the 45° skew. No

item of channel change was charged aginast Lines B-C when in reality same should have been included if comparative data was only what was wanted, however, I have considered each layout by itself and each one constitutes a separate problem and should be solved accordingly and I believe that the designs proposed fit each individual layout and can, therefore, see no good reason for changing either.

You will note that Lines B-C are northwest of Line A and on the upper side of the railroad fills, while the grade has been raised above high water the highway will nevertheless be damaged from the overflow and the maintenance costs increased. The overhead crossings on Lines B-C will be a source of expense also. You will note from the plans the excessive height of fill that is necessary for the approach grades. (34') The maintenance of such high fills is always an expense to the maintenance departments. Lines B-C, cutting as they do diagonally northeasterly thru the farms, sever much farm land leaving tracks of irregular shapes, right-of-way damages and costs are necessarily higher than Line A as very little land is severed south of the Platte River.

A portion of the Nebraska National Guard Camp is crossed over on both Lines B and C. This land belongs to the War Department. From recent experiences on obtaining right-of-way thru Government property, I doubt if permission would be given to cross the same. I was informed that the officials of the National Guard would fight any attempt made to cross the camp site. As to a road connection for this camp I am of the impression that such government agencies usually procure their own appropriation.

The bridge crossing the Platte River is much to be preferred on Line A. This bridge will have the protection of the Burlington Bridge (Photograph No. 8) both as to ice flow and cutting at the bridge ends. Shorter spans can be used, as the piers must line up with the railroad piers.

The bridge on Line B requires much protection at the west and especially at the east end of the river due to the current being along the east shore line. (See Photograph No. 13) The original cost of this protection is large and the maintenance cost should be given consideration. You will note that the current is directly against the railroad fill. During the spring ice flows, the ice is crowded against the fill, pushing the ice far up on the railroad slopes, damaging the fill and the revetment work that has been done. A highway bridge at this location would of course assume the same responsibilities as to maintenance that the railroad company now has to contend with. The piers would need to be lined up with the railroad piers and even in this case, should an ice jam occur, the danger of using dynamite so near the railroad bridge would have to be given consideration. Even if the piers were set at right angles to the railroad piers,

the direction of flow of the stream, shifting all the time, might cause ice jams due to such an arrangement.

The site of Line C bridge (See Photograph No. 15) is very desirable and the cost of the bridge is estimated the same as Line A Bridge. In place of the short spans as used at the other two bridges (which were governed by the railroad bridges) 100' spans are recommended. This will give fewer piers and offer less resistance to the ice flows and I believe 100' spans should be used, the minimum used on Platte River bridges this far down on the water shed. This bridge would not have the natural protection from the railroad bridge as does Line A bridge. For the above reasons I believe that Line A gives a much preferable site for the Platte River bridge crossing.

After crossing the Platte River Line A is south of the Burlington railroad to a point south of Melia. This location will again have the natural protection from the railroad fill in case of floods and snow storms. The drainage is much easier handled as it comes to the highway in ditches which have concentrated the flow, the water having just passed thru the railroad bridges above the highway. The grade thru this portion of Line A has been raised above flood flow. No doubt the high water level will be lower on the down stream side of the railroad fill in case of overflow from the Platte and Elkhorn than on the upper side as it is not reasonable to expect 304.0 linear feet of bridging (as is now in place under the Burlington tracks) to handle a flood from the Platte or Elkhorn.

Line B (See Map No. 1) follows parallel to and on the upper side of the railroad fill from the Platte River to Gretna (See Photograph No. 9). You will note from the Maps Nos. 1 and 2 that the drainage is carried to the several railroad bridges by an intercepting ditch which runs near to and parallel with the railroad dump. In case the highway was built on this location, these same ditches would of necessity have to be provided and maintained on the upper side of the highway fill. Again the highway being on the upper side of the railroad would assume the responsibilities from floods, which are now assumed by the railroad. The ditch on the upper side of the highway would have to intercept the water, concentrating it in order to handle it thru the new bridges and the railroad bridges. Slightly larger structures were designed at two of the overflow bridges. The highway being on the upper side of the railroad would be subject to snow drift. While this likelihood would be small due to the height of fill, yet it is a possibility.

Line C crosses diagonally northeast thru the flats from the Platte River to the hills north of Melia (See Maps 1 and 3, also Photograph No. 16). A high fill constructed of borrow from

ditches on either side of the highway has been provided. You will note from Maps Nos. 1 and 3 the fill is about at right angles to the direction of flow of the normal run off and to the flow of the established drainage ditches. No one knows as to what extent this drainage layout (which has been constructed at great cost) would be damaged by the construction of a second fill across the flats. This will in fact move the flood plane farther up the valley, raising the high water level. I was informed that alot of this land was lower than the Platte River before the drainage system was established. Dikes and ditches have now been established and the land is in a high state of agricultural development. Any interference with the present drainage layout might seriously damage the land and crops, making the Highway Department liable. It is probable that should a flood occur soon after the highway was completed and damage to land and crops resulted, the Highway would be blamed for the condition, whether or not the same damage would have resulted had the highway fill not been in place.

On the ground (Line C) it will be noted that the dirt from the drainage ditches has been used to build dumps for the local roads, these roads also acting as dikes to concentrate the water in the ditches. These roads are from two to five feet above the surrounding land. As the ground water varies from six inches in the spring to several feet during dry periods, the maintenance of these roads is expensive.

Many three-cornered tracts of land are cut by the diagonal location of Line C. This division is very objectional to the farmers and would reflect in the right-of-way purchases. Irregular fields are difficult to cultivate and waste land acreage increased.

The bridge structures called for on Line C will of course cost more than Lines A and B due to the fact that the drainage is not concentrated. Many ditches are crossed on the intersecting roads which require a drainage opening. Several extra bridges are also required due to extra number of ditches.

An intercepting ditch would be needed on the upper side of the fill on Line C in order to concentrate the water for the bridge openings and to equalize the flow between the several structures and to equalize the flow in the established drainage ditches.

Maintenance of such a road would be expensive due to the flood water on the upper slopes, the erosion on the slopes and maintenance of fills at bridge abutments.

The Line A location, coming as it does below the railroad fill is much to be preferred thru the flats from the Platte River to Melia.

I talked to a number of farmers in the vicinity, all of whom objected strenuously to the proposed location of Line C their contention being that it would develop a drainage condition that would do them untold damage should any flood occur. They said their land would be cut in such shapes as to make the farming unprofitable. Several contended that their system of roads adequately served them giving them a direct connection via the underpass now in place south of Melia and also via the present U. S. No. 38 crossing. Also that the construction of a second fill across the flats would be a detriment to the land above and that their land would be decreased in value. Also that if no railroad fill was in place, their land would likely suffer less damages from floods.

Line A from a point 0.6 miles south of Melia is on new location, intersecting the present road. Near the S. E. corner of Section 11-13-10 and thence via the traveled road to Gretna, on that portion which has been relocated, the grades are rolling, and from the end of same to Gretna light grades are encountered. Several pieces of land are severed in order to eliminate the curves near Melia, to reduce the distance and to avoid the bad drainage condition at the cut south of Melia.

Lines B and C at the north boundary of the Platte bottom continues northeasterly intersecting the Burlington Railroad in the N. E. quarter of 10-13-10. From this place to the north end of the proposed route, the line follows the railroad. As will be observed by referring to the U. S. Geological Survey Map No. 3 attached, you will note the line is located in the hills, the railroad having a very steep grade thru this portion. In order to lay a grade satisfactory for a high type surfacing, the grading quantities are very heavy. It was necessary to cut the center hill very deep when three such hilltops were encountered together, in order to maintain a 500' clear vision.

The B-C line location thru Gretna is not at all satisfactory. (See Photograph No. 18) The Line B-C intersects Angus Avenue west of the present overhead crossing in Gretna. At this place it was difficult to lay a grade in order to connect with the present steep approach on the viaduct and give a satisfactory grade on the highway. Heavy fills are required on the highway on either side of the highway. In order to lay a satisfactory grade on the highway it would be necessary to cut 6' to 8' west of the underpass and this would put the overpass out of service. The Line B-C cuts between a house and mill just north of the Burlington Depot (See Photograph No. 18) requiring the moving of a house and shed. There is a connection made with the town at this place via Burnes and McKenna Streets. However, town traffic will be compelled to cross the main line and two side tracks of the railroad. The vision at this intersection is poor due to the locations of buildings. From here to the end of the route, Lines B-C are

on new location west of the Burlington, said line being 90' from the center line at the big cut northeast of Gretna, Line B-C has a better layout and connection with the present road at the north end than does Line A as it does not cut back of the house and barns at this place. (See Plan Sheets)

Line A location thru Gretna (See Gretna Map) does not have a very desirable layout thru town as it intersects Angus Avenue at the east end of the overpass where the grade of the pavement is too low. (See Photograph No. 19) The east span approach to the overpass is steep. The intersection of the highway (Line A) and Burnes Avenue gives an unsatisfactory grade as Burnes Street lies on a hillside and is on a steep grade. (See Photograph No. 11) Burnes Street is the main street to the depot and more or less inconvenience would be encountered by the town traffic and the highway traffic.

As a location thru Gretna, I am recommending an alternate location west of town (See Map No. 8, also Photograph No. 17) the railroad crossing to be eliminated at the southwest corner of town and continuing north making a town connection at Angus Avenue and at second connection, with a road west of the depot. (See other discussions under "Gretna, Bridges & Railroad Crossings)

The line would then go northeasterly intersecting Line B-C northeast of Gretna and continue on Line B-C to an intersection with the present traveled road. While the field work on this alternate location is not complete for this preliminary report I believe the total cost will be less than the total cost of the location on the east side of the tracks of Gretna. The estimated costs of the two structures follow:

Overhead (2 tracks)	$53,000.00
Underpass (2 tracks)	57,000.00

This shows $4,000.00 in favor of the overhead, however, I believe the cost of right-of-way (damages, etc.,) and the less grading required will make up the difference. The underpass gives a much more satisfactory alignment for a heavy traffic road, fewer hazards, easier gradients, improved alignment and better and safer connections to town.

You will note from the attached summary that total cost of Line A is $118,239.95 less than Line B, $141,538.85 less than Line C and $125,003.10 less than Line C Revised. If one will examine the summary the differences in the costs of the several lines can be easily reckoned.

The cost of the right-of-way on Line C is greater than the other lines due to longer length of right-of-way and due to the excessive damages resulting from cutting the farms, re-

quired east of the Platte River. The other lines in this vicinity are adjacent to the railroad and no large amount of severance of land is necessary.

The earthwork yardage is also greater on Lines "B" and "C" due to the high fill on the Sioux City line overhead crossings and due to the greater number of miles of road being located in the Platte Valley on either side of the river. (See U. S. G. S. Map No. 3) Line A crosses the valley and intersects the hills at a shorter distance and therefore lesser yardage is required.

Bridge work on Line C is of course more costly due to the number of structures required to give adequate protection against the possibility of daming up the overflows from the northwest. The drainage is handled in more ditches on Line C, the same water being concentrated into several less ditches when it strikes the railroad fills and Line B fill.

The culverts cost more on Line A than the other lines due to the fact that thru the bottom land on Lines B and C no small structures are required, as the water is handled by the bridges, this accounting for a portion of the increased cost of bridges on Lines B-C over Line A.

Grade separations on Line C are more costly than Lines A, B or C Revised. This is due to the fact that a design of a combined structure over the Sioux City line of the Burlington and Wahoo Creek was necessary. Line C revised reduces this cost by $39,500.00. Separations on Line A are the smallest on account of the railroad being in a cut and lower structures and approach grades can be used.

Line A, grade separations using the underpass southwest of Gretna total $87,500.00 against the $83,000.00 shown in the summary sheet for the overhead northeast of Gretna.

The pavement cost is based on the actual lengths of routes less the lengths of bridges built on each line. There is very little difference in the pavement costs, this being $4,527.00 in favor of Line A.

There are six bridges on Line A, seven on Line B, nine on Line C and ten on Line C Revised. The total lengths of bridging being 2691', 3038', 3141', and 2931' respectively.

Either Lines A, B or C serve the surrounding territory equally well. At no place are any of the locations more than two miles apart. In places one line may serve adjacent owners better than the distant line but again the distant line is also serving adjacent owners.

The State Fish Hatcheries are located in Sec. 12, T. 12 S., R. 10 E., on the Platte River. The State has graveled a road from the State Aid Project No. 608-B south from the present traveled road at the west quarter corner of Section 14-13-10 south to the fisheries. This road connects with Line A. Lines B-C lie about a mile west of the beginning of the State road and a grade crossing over the Burlington Railroad is necessary. A second connection is made with the fisheries in Section 29-13-10 (See Map No. 1).

Local traffic in the vicinity of Gretna will not be appreciably affected by the several locations.

Ashland and vicinity are served equally as well by any one of the routes. Several underpasses south of town, afford entrances from the township roads to the south; a township road going southeasterly from Ashland connects with Line A.

Directly east of Ashland quite a lot of farm land will be served by Line A. Most of this land heretofore has not had access to a public roads.

The county and township road to the west and north of Ashland will not be affected. The present graveled road will remain in place and serve as a west and south connection for the town.

New connections of township roads with the recommended line can be made during construction.

Due to the increased costs on other lines over Line A on the various items on the total estimated cost and due to the fact that I believe the location on Line A will result in a better finished highway, considering the importance of this route, I wish to recommend the location on Line A be adopted from a point southwest of Ashland to a point southwest of Gretna. From this point I recommend that the highway be located on the section line road west of Gretna, the proposed underpass being used, the line then continuing west for 0.4 miles, thence northeasterly to intersect Lines B-C just north of the railroad cut northeast of Gretna and then continue on Line B-C to intersect the present traveled highway.

I believe Line A location to be far superior to the other lines for a primary road and believe one would be justified in choosing it even if the total costs were slightly larger than the other lines.

SUMMARY

ALL LINES

	Line A	Line B	Line C	Line C Rev.
Right of Way & Damages	$ 57,240.00	$ 63,732.00	$ 79,582.00	$ 79,582.00
Earth work	106,440.00	130,790.00	140,710.00	140,710.00
Bridges	215,500.00	287,800.00	257,200.00	278,200.00
Grade Separations	83,000.00	95,500.00	135,000.00	95,500.00
Culverts	37,748.30	24,416.25	24,448.15	24,448.15
Pavement	368,655.25	384,585.75	373,182.75	375,147.00
Totals	$868,584.05	$986,824.00	$1,010,122.90	$993,587.15

COMPARATIVE DATA

Total Lengths (Miles)	14.474	15.143	14.731	14.765
Length Road (Miles)	13.964	14.568	13.221	14.210
Length Bridges (Feet)	2691	3038	3141	2931
Earth Work Quantities	532200	653950	703550	703550
Paving Yardage	163847	170927	165859	166732
Number of Curves	13	15	13	13
Length on Curves	15467.2'	19484.8'	15063.7'	15063.7'
Length on Tangents	60955.0'	60470.2'	62713.8'	62896.5'
Deflection in Line	262°13'	438°24'	376°08'	376°08'
Maximum Degree Curve	3°	5°40'	5°40'	5°40'
Minimum Radius Curve	1910.08'	1011.5'	1011.5'	1011.5'
Feet Grade Over 5%	4497.6'	4925'	6116'	6116'
Feet 6% Grade	1575.0'	2000'	2200'	2200'
Total Rise and Fall	886.69'	990.3'	984.7'	984.7'
No. Grade Crossings	None	* 2	1	1

SAME ON ALL LINES

Width Paving	20'
Width Grade	32'
Width Culverts	32'
Width Bridges	22'-24'
Width Overheads	24'
Width Underpass	32'
Width Shoulders	6'
Shoulder Slopes	1½ to 1
Fill Slopes	1½ to 1
Back Slopes	1 to 1
Right of Way Width (min)	80'
Maximum Grade	6%
Minimum Sight Distance	500'

* One spur track.

SUMMARY

L I N E "A"

COST

Right of Way and Property Damage	$ 57,240.00
Earthwork, 532,200 C.Y. at .20	106,440.00
Bridges, 6 required	215,500.00
Grade Separations, 2 required	83,000.00
Culverts	37,748.30
Pavement, 163,847 sq. yd. at $2.25	368,655.75
Grand Total Cost	$868,584.05

MISCELLANEOUS DATA

Total Net Length 76,422.2' or	14.474 Miles
Number of Curves	13
Total length on Curves	15,467.2'
Total length on Tangent	60,955.0'
Total deflections in Line	262°13'
Maximum Degree of Curvature	3°00'
Minimum Radius Curve	1910.08'
Total Feet of Grade over 5%	4497.6'
Total 6% grade	1575.0'

Total Rise and Fall $\begin{pmatrix} + 450.92 \\ - 435.77 \end{pmatrix}$ = 886.69'

Number of Grade Crossings Remaining: None.

SUMMARY

L I N E "A"

ANALYSIS OF RIGHT OF WAY COST

Sta. 809 - Sta. 862	includes severance	11 acres	at $250. -	$2750.
862 - 907	an old r.r. grade	8.2 "	" 200. -	1640.
907 - 923		3 "	" 200. -	600.
923 - 961		7 "	" 200. -	1400.
961 - Ashland 985				8000.
Sta. 985 - Sta. 1010		12 "	" 300. -	3600.
1010 - 1025		2.7 "	" 300. -	810.
Damage to Beetison				
1025 - 1053		5 "	" 250. -	1250.
1053 - 1077		4.4 "	" 300. -	1320.
1053 - 1077	10 acres severance		" 100. -	1000.
1077 - 1096	(3½ acres		200. -	700.
	(4 acres borrow		200. -	800.
1055 (Channel for Salt Creek		4.6 acres)		1500.
1110 - 1131		3.8 "	200. -	760.
		Borrow		500.
1131 - 1180	(120')	13⅛ acres	250. -	3375.
1180 - 1239		6.7"(borrow)	250. -	1675.
1239 - 1259		2¼ "	250. -	600.
1259 - 1359		18.3"(diagonal)	600.	10980.
1359 - 1495	none (present road)			
1495 - 1509		2.6 acres	400. -	1040.
Gretna 1509 - 1527		Damage	600.	5500.
1527 - 1589	80x6200 damage	11.4 acres	600.	per ac. 7440
		Total		$57,240.

SUMMARY

L I N E "A"

GRADING

Sta. - Sta.		Cu. Yds.
809 - 864		17,000
864 - 920		12,000
920 - 960		44,000
960 - 1000		19,000
1000 - 1017		7,500
1017 - 1041+80		39,800
1042+35 - 1052		10,000
1052 - 1078	Salt Creek	32,500
1080 - 1096	River	27,000
1110 - 1140		30,000
1140 - 1170		30,000
1170 - 1200		30,000
1200 - 1230		22,250
1230 - 1400		88,250
1400 - 1510		21,000
1510 - 1531		11,900
1531 - 1590		40,000
Salt Creek (Channel Change)		50,000
		532,200 Cu. Yds.

SUMMARY

L I N E "A"

BRIDGES

Station	Length	Cost
1057+00	250'	$ 20,000.00
1079+00	155'	9,300.00
1096+00	1383'	160,000.00
1145+50	93'	4,700.00
1189+00	80'	8,000.00
1209+00	100'	13,500.00
Totals	2061'	$215,500.00

OVERHEAD CROSSINGS

Station	Length		Cost
1042	230'	(Louisville Line)	$ 30,000.00
1542	400'	(N.E.Gretna)	53,000.00
Totals	630'		$ 83,000.00
Grand Total Bridges and Overheads	2691'		$298,500.00

Using the underpass southeast of Gretna in place of the overpass northeast of town the following costs are estimated:

Estimated Cost Underpass with 32' Roadway, 14' clearance, double tracks 15' centers = $57,000.00. This is $4,000.00 more than the overhead northeast of Gretna, making the total cost of Bridges and Railroad Eliminations $302,500.00 for this layout.

SUMMARY

L I N E "A"

PAVEMENT ESTIMATE

Sta. 809-00 to 1590+38	76,422.2	
Less Bridges	2,691.0	
	73,731.2'	= 163,847 sq.yds. for 20' pav't.

Bridges

Station	Length
1057	250'
1079	155'
Platte	1383
1146	93
1189	80
1209	100
Total length bridges	2061'

Overheads

Station	Length
1042	230'
1542	400
Total	630'

Total length Bridges & Overheads = 2691'

SUMMARY

L I N E "A"

CULVERT ESTIMATE

1,700	cu.yds.	Unclassified Excavation	$1.00	$ 1,700.00
1,212.5	"	Class "A" Concrete	20.00	24,250.00
103,554	lbs.	Reinforcing Steel	.05	5,177.70
336	lin.ft.	18" Culvert Pipe	2.25	756.00
676	"	24" Culvert Pipe	3.25	2,197.00
316	"	30" Culvert Pipe	4.30	1,358.80
444	"	36" Culvert Pipe	5.20	2,308.80
				$ 37,748.30

SUMMARY

L I N E "A"

CURVE DATA

P.C. Sta.	P.T. Sta.	Degree Curve	Radius	Length Curve	Deflections L.	Deflections R.
853-85.9	866-85.9	1°00'	5729.65'	1300'		13°00'
902-27.7	919-17.5	1°58'	2913.50	1689.8	33°14'	
926-11.4	939-72.2	2°	2864.93	1360.8		27°13'
1009-51.4	1022-51.4	1°	5729.65	1300.0		13°00'
1022-94.7	1036-81.8	1°15'	4583.75	1386.7	17°20'	
1085-33	1095-04.7	1°	5729.65	971.7		9°43'
1172-80.6	1180-22.6	0°21.8'	15030.87	742.0	2°39'	
1182-31.6	1187-58.3	0°30'	11459.19	526.7		2°38'
1233-31.4	1242-08.1	0°30'	11459.19	876.7		4°23'
1343-19.0	1361-95.7	3°00'	1910.08	1876.7	56°18'	
1492-46.2	1504-73.4	3°00'	1910.08	1227.2		36°49'
1513-17.2	1514-86.1	3°00'	1910.08	168.9		5°08'
1569-97.6	1590-37.6	2°00'	2864.93	2040.0	40°48'	
Totals					150°19'	111°54'
Total Deflections					262°13'	

SUMMARY

L I N E "A"

LENGTH

Sta. 809-00 to Sta. 866-85.9	5785.9'
(Equation 866-85.9 equals 867-05.2)	
Sta. 867-05.2 to Sta. 1362-31.5	49526.3
(Equation 1362-31.5 equals 1379-28)	
Sta. 1379-28 to Sta. 1590+38	21110.00
	76422.2 feet
	14.474 Miles

SUMMARY

L I N E "A"

FEET OF GRADE 5% OR OVER

Sta.	to	Sta.	Length
955-70		958-50	280 Feet
961-75		964-00	225
1047-50		1053-00	400
1258-20		1261-50	330
1279-00		1289-30	1030
1301-75		1007-00	525
1324-50		1327-50	300
1338-00		1340-20	220
1523-50		1524-00	50
1540-30		1547-00	670
1585-70		1590-37.6	467.6
		Total	4497.6 Feet

6% Grade = 1575' included in above tabulation.

SUMMARY

L I N E "A"

TOTAL RISE AND FALL

Sta.	to	Sta.	Plus	Minus
809		833	4.69'	
833		903-20		29.63'
923+20		942	37.72	
942		948		7.67
948		953	9.84	
953		960		27.72
960		966	19.42	
966		983		33.00
983		1029-38	40.94	
1029-38		1057-50		59.54
1088		1096	6.20	
1112		1122		7.80
1140		1145-50	3.40	
1145-50		1151		3.40
1180		1186	1.80	
1204-50		1207-50	1.80	
1210-50		1213-50		1.00
1226-00		1231	1.00	
1237-		1312	87.57	
1312		1332-50		39.07
1332-50		1342	29.50	
1342		1380		48.82
1380		1395	31.52	
1395		1411		17.24
1411		1468	54.85	
1468		1499		26.62
1499		1512	30.28	
1512		1530		48.41
1530		1550	77.68	
1550		1576		53.73
1576		1582	12.71	
1582		1590-37.6		32.12
			450.92	435.77

Total = 886.69'

SUMMARY

L I N E "B"

COST

Right of Way and Property Damage		$ 63,732.00
Earthwork,	653,950 C.Y. $0.20	130,790.00
Bridges,	7 required	287,800.00
Grade Separations,	2 required	95,500.00
Pavement,	170,927 sq.yds. at $2.25	384,585.75
Culverts		24,416.25
	Line B Total Cost	$986,824.00

COMPARATIVE DATA

Total net length 79,955.0' or	15.143 Miles
Number of Curves	15
Total Length on Curves	19,484.8'
Total Length on Tangent	60,470.2'
Total Deflections in Line	438°24'
Maximum Degree of Curvature	5°40'
Minimum Radius Curve	1011.5'
Total Feet of Grade Over 5%	4925.0'
Total 6% Grade	2000.0'
Total Rise and Fall (+555.1) (-435.2)	990.3'
Number of Grade Crossings Remaining	*2

*One is a spur track crossing to a gravel pit.

SUMMARY

L I N E "B"

ANALYSIS OF RIGHT OF WAY COST

Sta. 809 - 815	600x80	55 acres at	$250.00	$	137.00
815-834+50	1950x80 r.o.w. 3.6 acres 4.2 acres borrow and separation 7.8 acres at		250.00		1,950.00
834+50 - 863+50	2900x80	5.3 acres			3,180.00
863+50 = Old Road					
485 (present road stationing) 553 P.C. 1000' curve		7.8 ac.	250.		1,950.00
576+25 to 594 all exp. on 1000' rod					3,000.00
594-637 borrow					1,000.00
County Shed					750.00
637-742 (10500x80		19.2 acres			11,520.00
(637-663 20' borrow		1.2 acres			300.00
($2000 for 40,000 yds. borrow per overhead					2,000.00
(Channel Change (Wahoo Creek) 110'x600=1⅓ ac.					375.00
(Borrow 689-742 50x5300' - 6.1 acres at 250.					1,525.00
742-747+77.5 bridge and 80' r.o.w. & remainder to r.r. 165'x577		2.2 acres at	250.		550.00
Bridge end 1453x40' 4.5 ac.) Total 775+21 - 796+41.5 667x110 ave) 6.2 acres at 250. 1.7 ac.)					1,550.00
Machine Shed					100.00
796+41.5 912 includes borrow	11560x130	34.5 acres at	300.		10,350.00
912-935	80x2300	4.2 acres at	300.		1,260.00
935-1012	7700'x100'	19.5 acres at	300.		5,850.00
1012-1127	11500'x80'	21.1 acres at	250.		5,275.00
Gretna Limits					
1127-1135	2.1 acres in town, move barn, 2 sheds and damage orchard				1,500.00
1135-1144+30	1.75 acres cutting small plats				1,500.00
1144+30-1150	Move house, prepare lot, new cellar, new foundation, move shed & crib and damage includes 2 fences				4,000.00

Sta. 1150-1170	2000x140 approx.	5.0 acres at $300.	$	1,500.00
1170-1190	2000x80	3.7 acres at 300.		1,110.00
1190-1210	Curve			1,500.00
		Total	$	63,732.00

SUMMARY

L I N E "B"

EXCAVATION QUANTITIES

Station to Station	Cubic Yards	
809-866+34 - 478+00	17,500	
478-494	8,000	
494-510	11,000	
510-540	28,500	
540-594	17,700	
594-636	15,750	
636-660	13,500	
	156,800	
660-690	16,000	Channel Change
690-708	11,200	
708-714	5,000	
714-720	7,800	
720-750	31,000	
750-758	11,000	
775+50-780	6,300	
780-788	11,100	
788-794	3,650	
794-810	16,350	
810-839	24,350	
839-870	29,750	
870-900	27,000	
900-915	7,300	
915-940	11,800	
940-990	19,500	
990-1020	9,100	
1020-1130	95,000	
1130-1150	15,000	
1150-1212	26,000	
1212-1222	1,000	
Total	653,950	Cu. Yds.

SUMMARY

L I N E "B"

BRIDGES

Station	Length	Cost
527+00	250' (skew)	$ 40,000.00
688+00	140'	21,000.00
723+50	120'	16,200.00
770+00	1383'	180,000.00
807+00	155'	7,800.00
849+50	80'	8,000.00
872+50	110'	14,800.00
Total Bridges	2238'	$287,800.00

OVERHEAD CROSSINGS

Station	Length	Cost
482+00	250' (skew)	$ 35,000.00
676+50	550' (skew)	60,500.00
Total Overheads	800'	$ 95,500.00

Total Length Bridges and Overheads	3.038 Feet
Total Cost Bridges and Overheads	$383,300.00

SUMMARY

L I N E "B"

PAVEMENT ESTIMATE

Sta. 809-00 to Sta. 1222+00.3 = 79,955.0' (See length computation sheet)

Less bridges and overheads 3,038'

Total feet to pave = 76,917.0' = 170,927 sq.yds. for a 20' pavement.

Bridges

Sta.	Length
482	250'
527	250
676-50	550
688	140
723-50	120
770 Platte	1383
807	155
849-50	80
873	110
	3038'

SUMMARY

L I N E "B"

CULVERT ESTIMATE

Quantity	Unit	Item	Unit Price	Amount
1630	C.Y.	Unclassified Excavation	$1.00	$ 1,630.00
878.1	C.Y.	Class "A" Concrete	20.00	13,562.00
67539	C.Y.	Reinforcing Steel	.05	3,376.95
232	Lin.Ft.	18" Culvert Pipe	2.25	522.00
946	"	24" Culvert Pipe	3.25	3,074.50
184	"	30" Culvert Pipe	4.30	791.20
248	"	36" Culvert Pipe	5.20	1,289.60
20	"	48" Culvert Pipe	7.00	140.00
1	Each	36" Flood Gate		30.00
		Total		$24,416.25

SUMMARY

L I N E "B"

DEFLECTIONS

P.C. Sta.	P.T. Sta.	Degree	Radius	Length	Intersecting Angle Rt.	Lt.
818+54.9	831+0.49	2°	2864.9	1250.0	25°0'	
832+57.4	861+0.74	2°	2864.9	2850.0		57°0
576+40.8	592+08.4	5°40'	1011.5	1567.6	88°50'	
633+91.3	639+44.6	4°	1432.7	657.9		26°19'
738+77.9	744+69.6	2°	2864.9	591.7		11°50'
787+34.3	792+13.5	2°	2864.9	479.2	9°35'	
794+07.6	798+74.3	2°	2864.9	466.7		9°20'
922+83.9	937+82.2	2°	2864.9	1498.3		29°58'
961+69.2	981+35.9	1°	5729.7	1966.7		19°40'
1027+84.3	1048+84.3	2°	2864.9	2100.0	42°12'	
1082+73.2	1097+79.9	1°	5729.7	1506.7		15°04'
1125+70.2	1129+23.5	1°	5729.7	4533		4°32'
1137+79.6	1144+76.4	1°30'	3820.0	696.7	10°27'	
1155+67.3	1169+07.3	2°	2864.9	1340.0	26°49'	
1189+79.8	1210+39.8	3°	1910.1	2060.0		61°48'
	Totals			19484.8	202°53'	235°31'
		Total			438°24'	

Number of Curves 15

Shortest Radius = 1011.5 = 5°40' curve.

SUMMARY

L I N E "B"

	Length
809+00 - 869+12	6,012.0 Feet
Equation 869+12 = 480+78	
480+78 - 592+08.4	11,130.4
Equation 592+08.4 = 593+87.7	
593+87.7 - 1210+39.8	61,652.1
1210+39.8 - 1222+00.3 =	1,160.5
Total	79,955.0 Feet

Total Length = 15.143 Miles.

SUMMARY

L I N E "B"

FEET OF GRADE 5% OR OVER

Sta.	to	Sta.	Length
485+00		489+00	400'
554+00		558+00	400'
671+00		674+00	300'
680+00		682+00	200'
921+00		927+00	600'
1039+00		1041+00	200'
1047+75		1050+00	225'
1059+00		1065+00	600'
1069+00		1076+00	700'
1131+00		1132+00	100'
1157+00		1162+00	500'
1173+00		1178+00	500'
1187+00		1189+00	200'
		Total	4,925'

Total 6% Grade = 2000 feet.

SUMMARY

L I N E "B"

TOTAL RISE AND FALL

Sta.	to	Sta.	Plus	Minus
810		834+00	4.5	
834+00		862+00		24.9
Equation - 482+0			16.0	
482+00		519+00		43.0
519+00		525	3.3	
525		549		3.3
549		562	93.5	
562		636		86.5
636		676+50	33.0	
676+50		749+50		36.0
749+50		777+00	6.8	
777		802		5.8
802		809	1.6	
809		810		1.6
810		871	4.4	
871		893		2.0
893		997	95.6	
997		1002+50		2.0
1002+50		1045	79.8	
1045		1052		21.9
1052		1056	5.9	
1056		1067		45.0
1067		1079	51.0	
1079		1089		21.4
1089		1116	42.6	
1116		1127		18.0
1127		1136	23.3	
1136		1153+98		34.1
1153+98		116	46.2	
1166		1171		9.8
1171		1181	39.7	
1181		1207		79.9
1207		1211	7.9	
		Totals	555.1	435.2
		Total Rise and Fall		990.3'

SUMMARY

L I N E "C"

COST

Right of Way and Property Damage	$ 79,582.00
Earthwork, 703,550 C.Y. at $0.20	140,710.00
Bridges, 9 required	257,200.00
Grade Separations, 2 required	135,000.00
Culverts	24,448.15
Pavement 165,859 Sq.Yds.	373,182.75
	$1,010,122.90

Total Length 777,77.5' or	14.731 Miles
Number of Curves	13
Total Length on Curves	15,063.7'
Total Length on Tangent	62,713.8'
Total Deflections in Line	376°08'
Maximum Degree of Curvature	5°40'
Minimum radius Curve	1011.5'
Total Feet of Grade over 5%	6116'
Total 6% Grade	2200'
Total Rise and Fall (+565.5) (-419.2)	984.7
Number of Grade Crossings Remaining	1

SUMMARY

L I N E "C"

ANALYSIS OF RIGHT OF WAY COST

Sta. 809 - 815 600x80 55 acres at		$250.	$ 137.00
815 - 834+50 1950x80 r.o.w. 3.6 acres 4.2 ac. borrow & separation 7.8 ac.		250.	1,950.00
834+50-863+50 2900x80 5.3 acres at		600.	3,180.00
863+50 = old road			
485 (present road sta.) -533 7.8 ac. at PC 1000' Curve		250.	1,950.00
576+25 to 594 all exp. on 100' rod			3,000.00
594-637 Borrow (Furnas Street)			1,000.00
County Shed			750.00
663+50-669+50 (Channel 110'x600' Wahoo Creek)			375.00
Borrow for Overhead Sta. 670 40,000 yds.			2,000.00
637-765+60 (river bank) 12860'x80 - 23.6 ac. at		600.	14,160.00
637-663+50 2650x20' borrow 1.2 ac. at		250.	300.00
684+25-765+60 8135x50 borrow 9.3 ac. at		250.	2,325.00
775+70-802	2630x80 4.8 ac. at 500. per ac.		2,400.00
	2630x50 3 ac. at 200. per ac.		600.00
802-975	17300x80 31.8 ac. at 600. per ac.		19,080.00
	17300x50 19.8 ac. at 300. per ac.		5,940.00
975-1027+06.8 5206.8'x80' 9 ac. at 600. per ac.			5,700.00
1027+06.8 equals 2916'x80' 1048+84.3 - 1127 14.5 ac. at 250.			3,625.00
Gretna Limits 2.1 acres in town			
1127 - 1135 Move Barn, 2 Sheds & Damage to Orchard			1,500.00
1135-1144+30 1.75 acres cutting small plats			1,500.00

1144+30-1150	Move house, prepare lot, new cellar, new foundation, move chicken shed and corn crib		$ 4,000.00
1150-1170	2000x140	approx. 5 acres at 300.	1,500.00
1170-1190	2000x80	3.7 acres at 300.	1,110.00
1190-1210	Curve		1,500.00
		Total	$79,582.00

SUMMARY

L I N E "C"

EXCAVATION QUANTITIES

GREENWOOD - GRETNA

Station to Station	Cubic Yards
809+633	98,450
633-660	11,400
	14,000 Channel Change
660-690	178,000
690-720	27,600
720-750	31,000
750-765	18,100
776-780	5,600
780-810	19,500
810-840	19,000
840-870	23,000
870-900	30,000
900-930	38,500
930-960	32,000
960-990	17,900
990-1027 equation	12,500
1048-1130	85,000
1130-1150	15,000
1150-1212	26,000
1212-1222	1,000
	703,550 Cu. Yds.

SUMMARY

L I N E "C"

BRIDGES

Station	Length	Cost
527	250'	$ 40,000.00
722+50	120'	16,200.00
752+00	32'	3,500.00
772	1200'	160,000.00
812	51'	2,550.00
843	93'	4,650.00
892	90'	9,500.00
932	110'	14,800.00
947	45'	6,000.00
Total Bridges	1991.0'	$257,200.00

OVERHEAD CROSSINGS

Station	Length	Cost
482	250'	$ 35,000.00
679+50	900'	100,000.00
Totals Overhead Crossings	1150.0'	$135,000.00
Total Length Bridges and Overheads		3141.0'
Total Cost Bridges and Overheads		$392,200.00

SUMMARY

L I N E "C"

PAVEMENT ESTIMATE

Sta. 809+00 to Sta. 1222-00.3	77,777.5'
Less Bridges	3,141.0
	73,636.5' =

165859 sq. yds. for 20' pavement.

Bridges & Overheads

Sta.	Length
482 Overhead	250'
527	250
679-50 Overhead	900
722-50	120
752	32
772	1200
812	51
843	93
892	90
932	110
947	45
Total	3141.0'

Bridges = 1991.0'
Overheads = 1150.0'

SUMMARY

L I N E "C"

CULVERTS

Quantity	Unit	Item	Unit Price	Amount
1520	C.Y.	Unclassified Excavation	$1.00	$ 1,520.00
669.4	C.Y.	Class "A" Concrete	20.00	13,388.00
62243	Lbs.	Reinforcing Steel	.05	3,112.15
232	Lin.Ft.	18" Culvert Pipe	2.25	522.00
944	" "	24" Culvert Pipe	3.25	3,068.00
248	" "	30" Culvert Pipe	4.30	1,066.40
308	" "	36" Culvert Pipe	5.20	1,601.60
20	" "	48" Culvert Pipe	7.00	140.00
1	Each	Flood Gate for 36" pipe		30.00
				$ 24,448.15

SUMMARY

L I N E "C"

DEFLECTIONS

PC	PT	Deg.	Radius	Length	Intersect (4) Rt.	Lt.
818+54.9	831+04.9	2°	2864.9	1250.0	25°00'	
832+57.4	861+07.4	2°	2864.9	2850.0		57°00'
576+40.8	592+08.4	5°40'	1011.5	1567.6	88°50'	
633+91.3	646+03.5	3°00'	1910.0	1212.2		36°22'
688+62.4	691+37.4	2°00'	2864.9	275.0		5°30'
746+56.7	753+78.3	2°00'	2864.9	721.6	14°26'	
782+08.4	789+80.6	3°00'	1910.1	772.2		23°10'
1020+70.2	1024+28.6	2°00'	2864.9	358.4	7°10'	
--	--	--	--	--	--	--
1082+73.2	1097+79.9	1°00'	5729.7	1506.7		15°04'
1124+73.2	1097+79.9	1°00'	5729.7	453.3		4°32'
1137+79.6	1144+76.4	1°30'	3820.0	696.7	10°27'	
1115+67.3	1169+07.3	2°00'	2864.9	1340.0	26°49'	
1189+79.8	1210+39.8	3°00'	1910.0	2060.0		61°48'
				15063.7	172°42'	203°26'
			Total		376°08'	

SUMMARY

L I N E "C"

	Length
809+00 - 869+12	6012.0'
(Equation 869+12 = 480+78)	
480+78 - 592+08.4	11130.4'
(Equation 592+08.4 = 593+87.7)	
593+87.7 - 1027+06.8	43319.1
(Equation 1027+06.8 = 1048+84.3)	
1048+84.3 - 1210+39.8	16155.5
1210+39.8 - 1222+00.3	1160.5
Total	77777.5 Feet
	14.731 Miles

SUMMARY

L I N E "C"

FEET OF GRADE 5% OR OVER

Sta.	to	Sta.	Feet
485+00		489+00	400'
554+00		558+00	400'
673+00		677+00	400'
683+00		686+00	300'
976+00		983+00	500'
1006+00		1020	1400'
1048+84		1050+00	116'
1059+00		1065+00	600'
1069+00		1076+00	700'
1131+00		1132+00	100'
1157+00		1162+00	500'
1173+00		1178+00	500'
1187+00		1189+00	200'
		Total	6116' over 5% Grade.

2200' of 6% Grade.

SUMMARY

L I N E "C"

TOTAL RISE AND FALL

Sta.	to	Sta.	Plus	Minus
810+00		834+00	4.5	
834+00		862+00		24.9
Eq. 869+12		480+78	16.0	
482+00		519+00		43.0
519+00		525+00	3.3	
525+00		549+00		3.3
549+00		562+00	93.5	
562+00		633+00		86.5
Eq. 592+08.4		593+87.7		
633+00		634+00		2.0
634+00		647+00	0	0
647+00		679+50	38.0	
679+50		696+00		39.0
696+00		750+00	0	0
750+00		765+00	4.5	
765+00		780+00	0	0
780+00		784+50	4.5	4.5
784+50		819+00	0	0
819+00		960+00	6.4	
960+00		972+00	0	0
972+00		1023+00	182.9	
Eq. 1027+06.8		1048+84.3		
1048+84.3		1052+00	7.8	7.8
1052+00		1056+00	5.9	
1056+00		1067+00		45.0
1067+00		1079+00	51.0	
1079+00		1089+00		21.4
1089+00		1116+00	42.4	
1116+00		1127+00		18.0
1127+00		1136+00	23.3	
1136+00		1153+98		34.1
1153+98		1166+00	46.2	
1166+00		1171+00		9.8
1171+00		1181+00	39.7	
1181+00		1207+00		79.9
1207+00		1211+00	7.9	
		Totals	565.5	419.2

Total Rise and Fall 984.7

SUMMARY

L I N E "C" REV.

COST

Right of Way and Property Damage Same as "C"	$ 79,582.00
Earthwork 703,550 C.Y. (Same as "C") at $0.20	140,710.00
Bridges, 10 required	278,200.00
Grade Separations, 2 required	95,500.00
Culverts (Same as "C")	24,448.15
Pavement, 166,732 Sq. Yds. at $2.25	375,147.00
	$ 993,587.15

COMPARATIVE DATA

Total Length 77,960.2' or	14.765 Miles
Number of Curves	13
Total Length on Curves	15,063.7'
Total Length on Tangent	62,896.5
Total Deflections in Line	376°08'
Maximum Degree of Curvature	5°40'
Minimum Radius Curve	1011.5'
Total Feet of Grade over 5%	6116'
Total 6% Grade	2200'
Total Rise and Fall	984.7'
Number of Grade Crossings	1

SUMMARY

L I N E "C" REV.

	Length
809+00 - 869+12	6,012.0
(Equation 869+12 = 480+78)	
480+78 - 592+08.4	11,130.4
(Equation 592+08.4 = 593+87.7)	
593+87.7 - 755+96.0	16,208.3
(Equation 755+96.0 = 754+13.3)	
754+13.3 - 1027+06.8	27,293.5
(Equation 1027+06.8 = 1048+84.3)	
1048+84.3 - 1210+39.8	16,155.5
1210+39.8 - 1222+00.3	1,160.5
	77,960.2 Feet
	14.765 Miles

SUMMARY

L I N E "C" REV.

BRIDGES

Station	Length	Cost
527	250'	$ 40,000.00
688	140'	21,000.00
724	120'	16,200.00
752	32'	3,500.00
772	1200'	160,000.00
812	51'	2,550.00
843	93'	4,650.00
892	90'	9,500.00
932	110'	14,800.00
947	45'	6,000.00
Total Bridges	2131'	$278,200.00

OVERHEAD CROSSINGS

Station	Length	Cost
482	250'	$ 35,000.00
676+50	550'	60,500.00
Totals Overheads	800'	$ 95,500.00
Total Length Bridges and Overheads		2931'
Total Cost Bridges and Overheads		$373,700.00

SUMMARY

L I N E "C" REV.

PAVEMENT ESTIMATE

Sta. 809-00 to Sta. 1222-00.3	77,960.2'	
Less Bridges	2,931.0	
	75,029.2'	166,732 Sq.Yds. based on 20' pav't.

BRIDGES

Station	Length
482	250
527	250
476-50	550
688	140
722-50	120
752	32
772	1200
812	51
843	93
892	90
932	110
947	45
	2931'

Bridges = 2131'

Overheads = 800'

SUMMARY

L I N E "C" REV.

Right of Way and Property Damage - Same as Line "C".

Excavation Quantities Same as Line "C".

Culverts same as Line "C".

Deflections Same as Line "C".

Feet of Grade over 5% - Same as Line "C".

Total Rise and Fall - Same as Line "C".

View No. 1 Line A Station 872 looking east on old railroad fills.

View No. 2 Line A Looking east through Ashland from Station 956.

View No. 3 Line A Looking east through Ashland from Station 966.

View No. 4 Line A Silver Street in Ashland. Looking west from top of overpass (#5) Sta. 984.

View No. 5 Line A Underpass at east end Silver Street in Ashland, 250' west of recommended route.

View No. 6 Line A Underpass in Ashland opposite Station 959, 250' from recommended route.

View No. 6-A Underpass in place north of Sta. 934 on present road via Salt Creek Bridge and 13th St. to Ashland.

View No. 7 Line A Site of overhead crossing over Louisville line of Burlington Railroad, Sta. 1042.

View No. 8 Line A Burlington Railroad-Platte River Bridge. Line A bridge is directly below this bridge. Line B bridge above the same.

View No. 9 Line A-B Looking northeast toward Melia. Line A on present road on right. Line B on left of railroad.

View No. 10 Line A. Location of proposed overhead crossing northeast of Gretna.

View No. 11 Line A Photo shows location of Line A crossing the paved street (Burnes Street in Gretna).

View No. 12 Lines B & C Photo shows Furnas Street on north city limits of Ashland and location of B-C route through town.

View No. 13 Line B Photo shows the flow of the Platte River against the railroad fill at the east end of the bridge. Line B adjacent to this fill.

View No. 14 Lines B-C Present overhead structure southwest of Ashland on present road.

View No. 15 Line C Present highway bridge over the Platte River northeast of Ashland. Line C bridge just to the right of this project.

View No. 16 Line C Photo shows the class of land through which this line passes northeast of the Platte River.

View No. 17 Line A (Revised) Location of the proposed underpass southwest of Gretna on the recommended route. View looking south.

View No. 18 Lines B-C Location of B-C lines through Gretna. Town of Gretna to the right. Photo taken at west end of overpass on Angus Avenue.

View No. 19 Line A Location of Line A through Gretna. Photo taken at east end of the overpass on Angus Avenue. View looking northeasterly.

END FA PROJ No. 234 A
BEGIN FA PROJ No. 100

FA PROJ No. 72 Pavement

SARPY

DOUGLAS

BEGIN FA PROJ No. 234 A
END S.A. PROJ No. 1

BEGIN S.A. PROJ No. 1

END S.A. PROJ No. 2

STOP PROJ No. 100

MILLARD
POP. 300

Pavement

END FA PROJ No. 35
RESUME FA PROJ No. 100

END FA PROJ No. 100

PAPILLION
POP. 686

COUNTY

COUNTY

T-14-N

R-11-E

R-12-E

R-13-E

TO LOUISVILLE

OMAHA
POP. 208025

RIVER

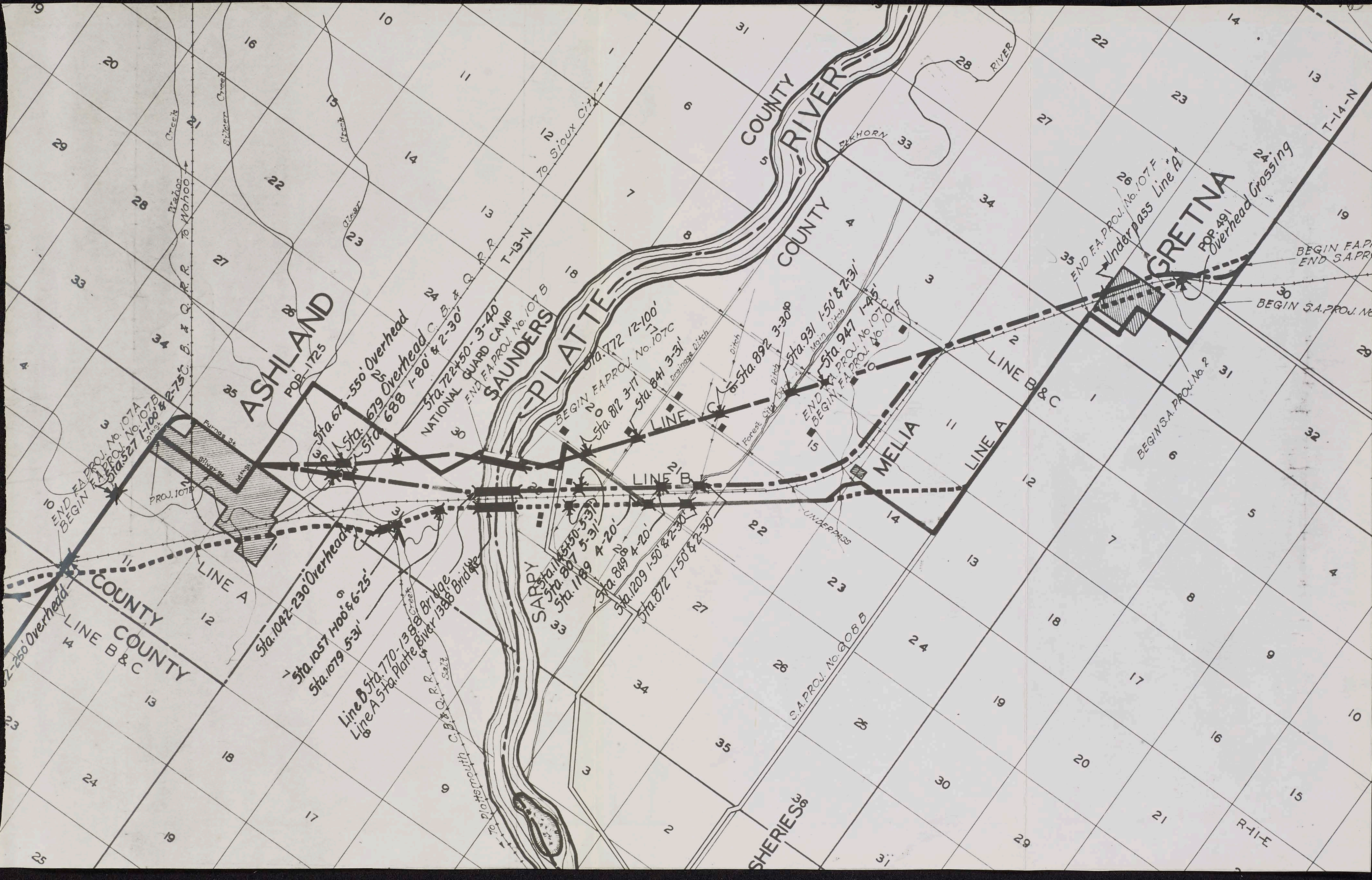
MISSOURI

STATE OF NEBRASKA
DEPARTMENT OF PUBLIC WORKS
BUREAU OF ROADS AND BRIDGES

SKETCH SHOWING PRESENT HIGHWAY
AND
SURVEYED ROUTES
FROM
HAVELOCK TO THE DOUGLAS COUNTY LINE
NORTH EAST OF GRETNA,

"A" Line-Underpass
"A" Line-Overpass
"B" Line
"C" Line
"D" Line


LEGEND
PRESENT ROUTE
LINE B
LINE A
LINE C
HAVELOCK
POP. 3602
TO WAHOO
HWY. NO. 77
C. B. & Q.
T-11-N
T-10-N
R-8-E
WAVERLY
POP. 334
LANCASTER
CASS
COUNTY
T-12-N
R-9-E
GREENWOOD
POP. 347
RAILROAD
SAUNDERS
CASS
COUNTY
LINE B&C
LINE A
ASHLAND
POP. 1725
NATIONAL GUARD CAMP
T-13-N
R-10-E
PLATTE
COUNTY
RIVER
SARPY
COUNTY
LINE B
LINE C
LINE A
LINE B&C
MELIA
GRETNA
POP. 451
STATE FISHERIES


ASHLAND
POP. 1725
GRETNA
POP. 491
MELIA
SAUNDERS
COUNTY
SARPY
COUNTY
PLATTE
RIVER
ELKHORN
RIVER
LINE A
LINE B
LINE C
LINE B & C
T-13-N
T-14-N
R-11-E
To Sioux City
To Wahoo
C. B. & Q. R. R.
NATIONAL GUARD CAMP
END F.A. PROJ. No. 107 B
END F.A. PROJ. No. 107A
BEGIN F.A. PROJ. No. 107B
Sta. 527 1-100' & 2-75'
Sta. 671 - 550' Overhead
Sta. 679 Overhead
Sta. 688 1-80' & 2-30'
Sta. 722+50 - 3-40'
Sta. 772 12-100'
BEGIN F.A. PROJ. No. 107C
Sta. 812 3-17'
Sta. 841 3-31'
Sta. 892 3-30'
Sta. 931 1-50' & 2-31'
Sta. 947 1-45'
END F.A. PROJ. No. 107 C
BEGIN F.A. PROJ. No. 107 F
END F.A. PROJ. No. 107 F
Underpass Line 'A'
Overhead Crossing
BEGIN S.A. PROJ. No. 2
BEGIN S.A. PROJ. No.
S.A. PROJ. No. 208 B
UNDERPASS
Sta. 1042 - 230' Overhead
Sta. 1057 1-100' & 6-25'
Sta. 1079 5-31'
Line B Sta. 770 - 1388' Bridge
Line A Sta. Platte River 1388' Bridge
Sta. 1145+50 - 5-31'
Sta. 807 5-31'
Sta. 1189 4-20'
Sta. 849 4-20'
Sta. 1209 1-50' & 2-30'
Sta. 872 1-50' & 2-30'
Drainage Ditch
Main Ditch
Forest City Ditch
Plattsmouth C. B. & Q. R. R.
Wahoo Creek
Silver Creek
Silver St.
Furnas St.
PROJ. 107B
Overhead
COUNTY

U.S. GEOLOGICAL SURVEY
OTIS SMITH, DIRECTOR
NEBRASKA
FREMONT SHEET
R.9 E.
R.10 E.
R.11 E.
R.12 E.
NICKERSON
FONTANELLE
LINCOLN
BLAIR
DE SOTO
Kennard
Calhoun
Arlington
BELL CREEK
RICHLAND
CALHOUN
FREMONT
ELKHORN
Washington
DODGE CO.
DOUGLAS CO.
BOUNDARY LINE
WASHINGTON CO.
DOUGLAS CO.
BOUNDARY LINE
Elk
Bennington
PLATTE VALLEY
ELKHORN
JEFFERSON
UNION
POHOCCO
Briggs
Irvington
East Irvington
Benson
Valley
Waterloo
Elkhorn
McARDLE
UNION
WATERLOO
CHICAGO
Yutan
MILLARD
DOUGLAS
Millard
Seymour Park
DOUGLAS CO.
SARPY CO.
Chalco
Portal
MARBLE
PAPILLION
Papillion
Gretna
RICHLAND
Richfield
FAIRVIEW
Memphis
CLEAR CREEK
Springfield
SPRINGFIELD
Ashland
SAUNDERS CO.
CASS CO.
PLATTFORD
Cedar Creek
ASHLAND
EIGHTMILE GROVE
SAUNDERS CO.
CASS CO.
BOUNDARY LINE
SOUTH BEND
SALT CREEK
South Bend
Louisville
PLATTE RIVER
ELKHORN RIVER
UNION PACIFIC R.R.
BURLINGTON AND MISSOURI RIVER R.R.
FREMONT ELKHORN AND MISSOURI VALLEY R.R.
Scale 1/125000
Contour Interval 20 feet
Datum is mean Sea level.
Edition of Oct. 1896, reprinted June
FREMONT, N
"A" Line-Overpass
"A" Line-Underpass
"B" Line
"C" Line
"D" Line

CITY OF ASHLAND NEBR.

Grant, Fulton & Letton · Engineers

Lincoln, Nebr. Feb. 1928. Scale 1" = 200'

R.B.I

Revised June 1, 1928

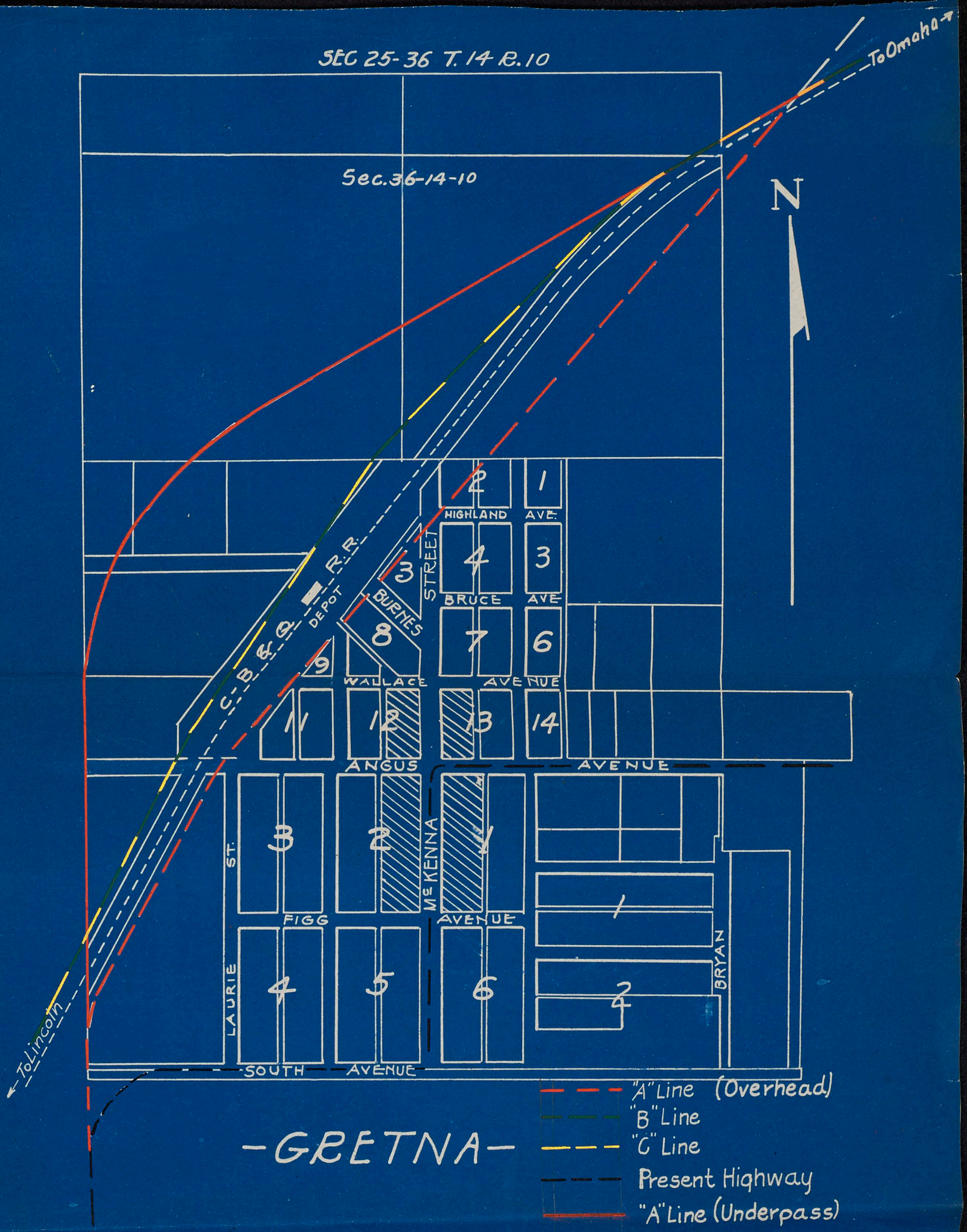
"A" Line

"B" Line

"C" Line

Business District

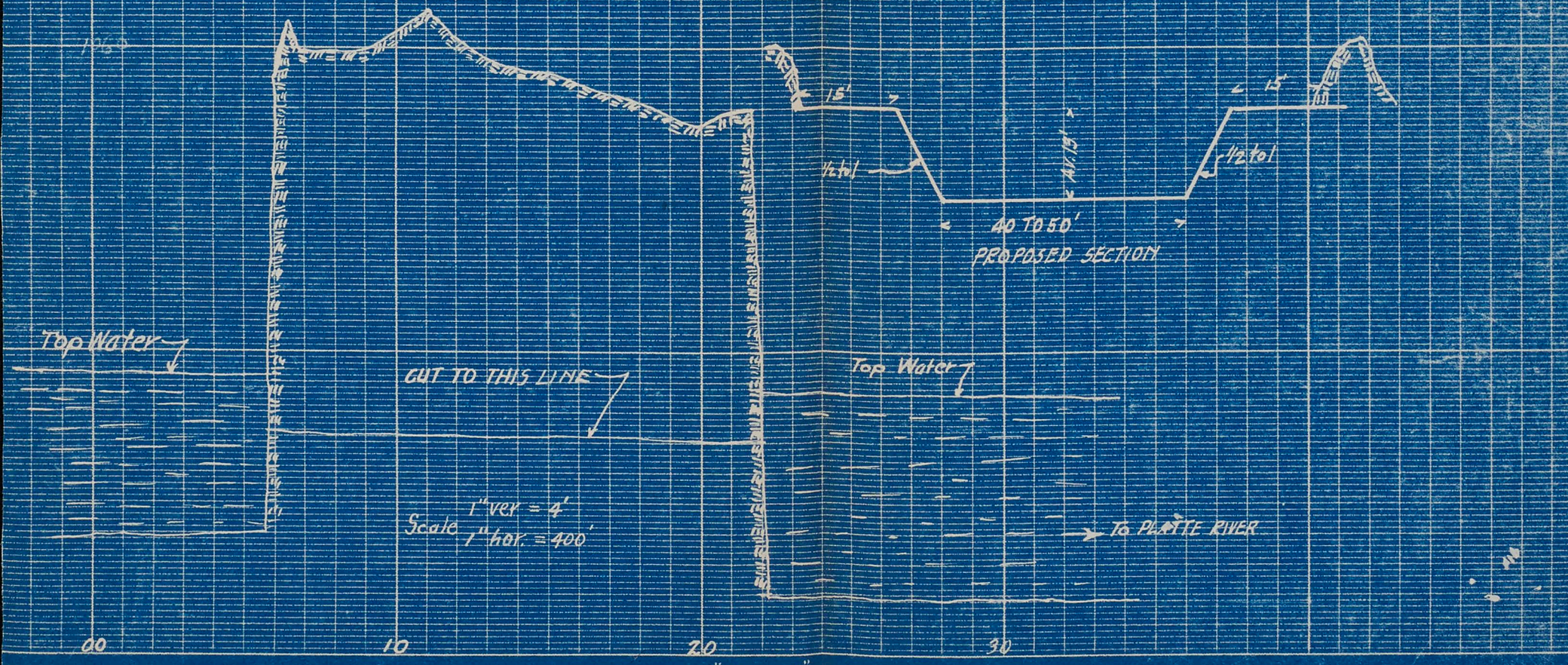
Present Highway

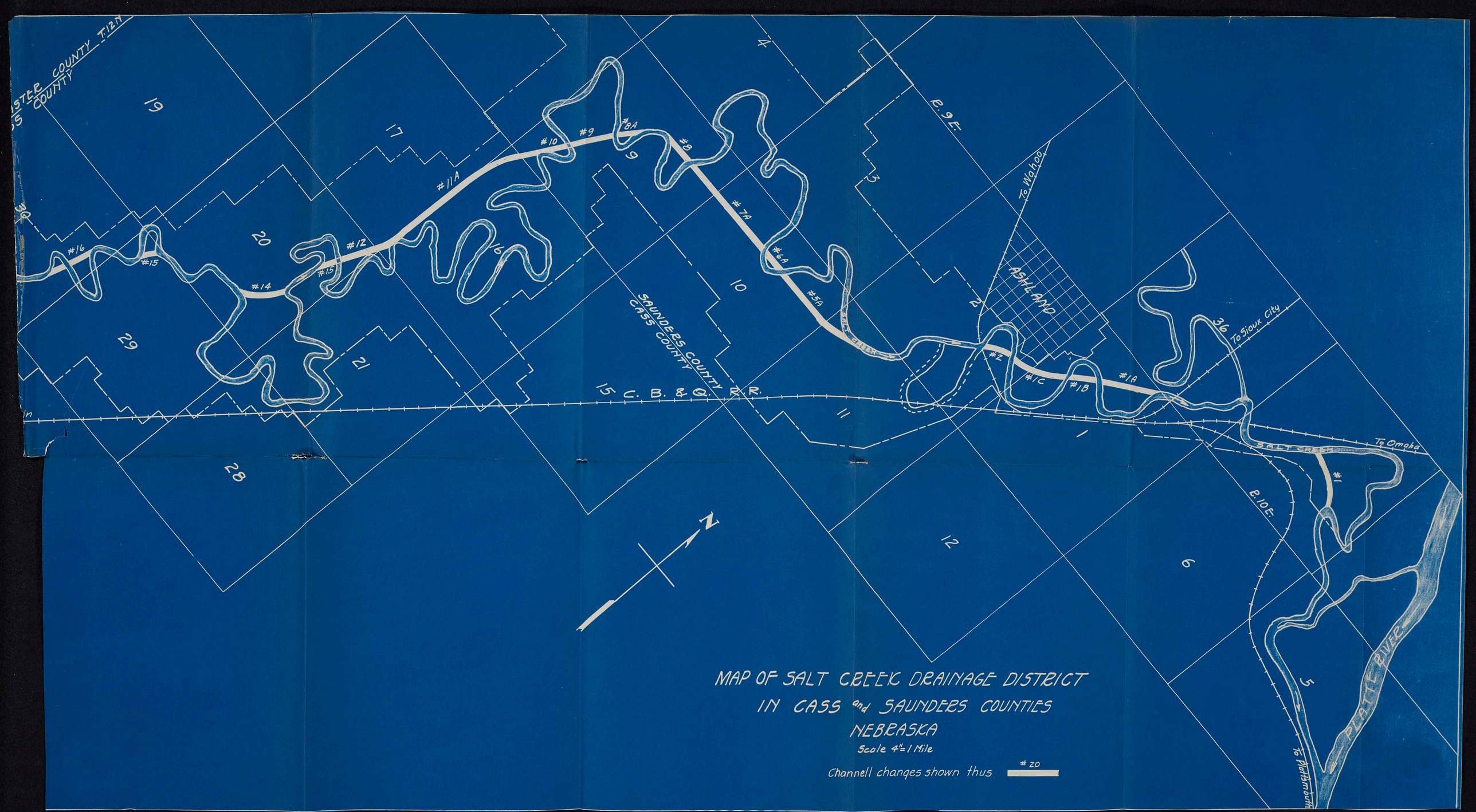

SEC 25-36 T. 14 R. 10
To Omaha
Sec. 36-14-10
N
C. B. & Q. R.R.
DEPOT
HIGHLAND AVE.
BRUCE AVE
BURNES STREET
WALLACE AVENUE
ANGUS AVENUE
McKENNA AVENUE
FIGG
LAURIE ST.
BRYAN
SOUTH AVENUE
To Lincoln
-GRETNA-
"A" Line (Overhead)
"B" Line
"C" Line
Present Highway
"A" Line (Underpass)

SALT CREEK

PROPOSED CHANNEL CHANGE

LINE "A" STA. 1055





MAP OF SALT CREEK DRAINAGE DISTRICT
IN CASS and SAUNDERS COUNTIES
NEBRASKA

Scale 4" = 1 Mile

Channell changes shown thus #20

-(5+00)

24" C.I.P.
0+00

Drainage

5+00

House.

10+00

15+00

20+00

D = 6°
R = 955.4
Δ = 61° - 54' Rt.

U.S. No 38 (Present Graveled Road)

C. B & Q. R.R. To Omaha

N

P.C. 2° Curve

0+00 Profile to Under pass

House

P.C. 2° 30' Curve

House

P.C. 3° 0' Curve

D = 3° 00' R = 1910.'

D = 2° 30' R = 2292.'

D = 2° 00' R = 2865'

P.C. 6° 00' Curve

Over pass.

Angus Ave.

GRETNA

Road to Burlington Depot

Garage

House

House

Barn

Barn

D = 6° - 00' R = 955.

House

28.75
100-VC

East and West Road

C. B. & Q. R.R. Top Rail

+5.00%

+5.00%

Cut in Road To Overpass

Dash to South

Profile to Underpass

Datum Elev = 1090.00

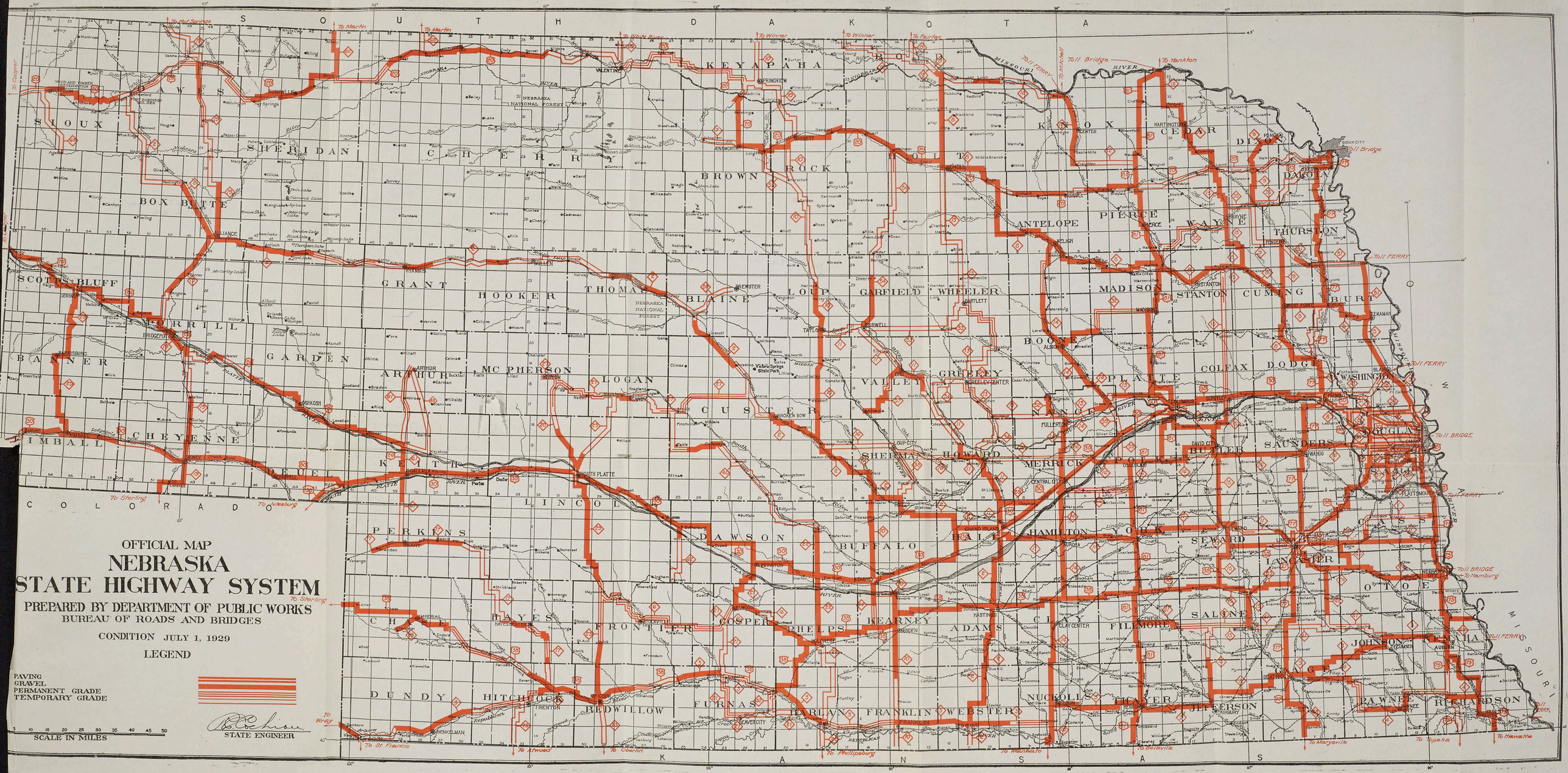
1150
1140
1130
1120
1110
1100
1090

-(8+00) -(7+00) -(6+00) -(5+00) -(4+00) -(3+00) -(2+00) -(1+00) 0 1 2 3 4 5 6 7 8 9 10 11 12 13

00 100 200 300 400

1134.4 1137.4 1143.6 1147.6 1149.8 1153.8

Datum Elev = 1090.00


OFFICIAL MAP
NEBRASKA
STATE HIGHWAY SYSTEM
PREPARED BY DEPARTMENT OF PUBLIC WORKS
BUREAU OF ROADS AND BRIDGES
CONDITION JULY 1, 1929
LEGEND
PAVING
GRAVEL
PERMANENT GRADE
TEMPORARY GRADE
SCALE IN MILES
STATE ENGINEER
SOUTH DAKOTA
KANSAS
COLORADO
MISSOURI RIVER
NIOBRARA RIVER
PLATTE RIVER
REPUBLICAN RIVER
SOUTH PLATTE RIVER
NEBRASKA NATIONAL FOREST
DAWES
SIOUX
SHERIDAN
CHERRY
KEYAPAHA
BOYD
KNOX
CEDAR
DIXON
DAKOTA
BOX BUTTE
BROWN
ROCK
HOLT
ANTELOPE
PIERCE
WAYNE
THURSTON
SCOTTS BLUFF
GRANT
HOOKER
THOMAS
BLAINE
LOUP
GARFIELD
WHEELER
MADISON
STANTON
CUMING
BURT
MORRILL
BANNER
GARDEN
ARTHUR
MC PHERSON
LOGAN
VALLEY
GREELEY
BOONE
PLATTE
COLFAX
DODGE
WASHINGTON
KIMBALL
CHEYENNE
KEITH
CUSTER
SHERMAN
HOWARD
NANCE
MERRICK
DOUGLAS
SARPY
DEUEL
LINCOLN
SAUNDERS
CASS
PERKINS
DAWSON
BUFFALO
HALL
HAMILTON
YORK
SEWARD
LANCASTER
OTOE
CHASE
HAYES
FRONTIER
GOSPER
PHELPS
KEARNEY
ADAMS
CLAY
FILLMORE
SALINE
JOHNSON
NEMAHA
DUNDY
HITCHCOCK
REDWILLOW
FURNAS
HARLAN
FRANKLIN
WEBSTER
NUCKOLLS
THAYER
JEFFERSON
GAGE
PAWNEE
RICHARDSON
To Hot Springs
To Martin
To White River
To Winner
To Fairfax
To Mitchell
To Yankton
To Casper
To Sterling
To Wauneta
To Wray
To St. Francis
To Atwood
To Oberlin
To Phillipsburg
To Manhattan
To Marysville
To Belleville
To Topeka
To Hiawatha
To Hamburg
Toll Bridge
Toll FERRY