

HE
355.3
.T64
K754
1973

PROPOSED IOWA TOLL HIGHWAY SYSTEM
PRE-PRELIMINARY FEASIBILITY STATEMENT
KNOERLE-BENDER-STONE & ASSOCIATED, INC.
OCTOBER 1973

HE355.3
.T64
K754

IOWA DEPARTMENT OF TRANSPORTATION

To Office D.O.T. Commission

Date June 18, 1975

Attention e. No.
R f

From Raymond L. Kassel

Office

Subject Toll Highway System Statement from Dr. J. K. Johnson, Jefferson, Iowa

Background: Toll road feasibility has been discussed every 3-5 years. In 1968, the Highway Commission evaluated the possibility of constructing all or part of the proposed rural freeway and expressway system. The most probable sections required subsidies and the toll road approach was not supported.

Toll roads were considered again in 1972 by a staff task force who prepared a report "Financing Iowa's Primary Highway System". The 1968 study was cited and no changes were recognized to improve the feasibility of toll financing.

We received a copy of a February 3, 1975 letter to Dr. J. K. Johnson and a toll road statement prepared by a Maryland engineering consultant. The statement was prepared in October, 1973 for Governor Ray and was described as a "pre-preliminary feasibility statement" of a 530 mile toll system from Sioux City to Waterloo, Cedar Rapids to Clinton and Keokuk to Northwood.

Toll Proposal: The consultant 1973 estimates included these items:

Toll System	530 miles
Traffic	5,000 ADT
Project Costs	\$725 million
Toll/mile	3 ¢
Gas Tax to cover deficit	1 ¢

Comments on Statement:

1. Assumptions and estimates of 1973 are out of date
 - Waterloo/Cedar Rapids segment has been included in Interstate System
 - Traffic estimate is 22% high and assumes no diversion due to tolls
 - Project costs increased 42% last year
 - 1¢ gas tax revenue (\$26.4 million) is 69% above current estimates
 - Revenue growth now is estimated at 2.5%/year instead of 5.0%
2. Some costs were not included
 - toll booth facilities
 - operation of toll booths
 - maintenance of toll system
3. Disadvantages of toll systems were not discussed
 - bond interest cost
 - toll system operation costs
 - inequity of financing some routes by tolls and others by tax funds
 - fewer interchanges on toll routes

Conclusion: Instead of 1¢ gas tax to cover deficits, at least 4¢ would be required in 1975 as a result of increased construction costs and decreased revenues based on the "pre-preliminary data and estimates".

(Note: See map of 530 mile toll system proposed on back.)

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(Note: See map of 530 mile toll system proposed on back.)

MAP 1

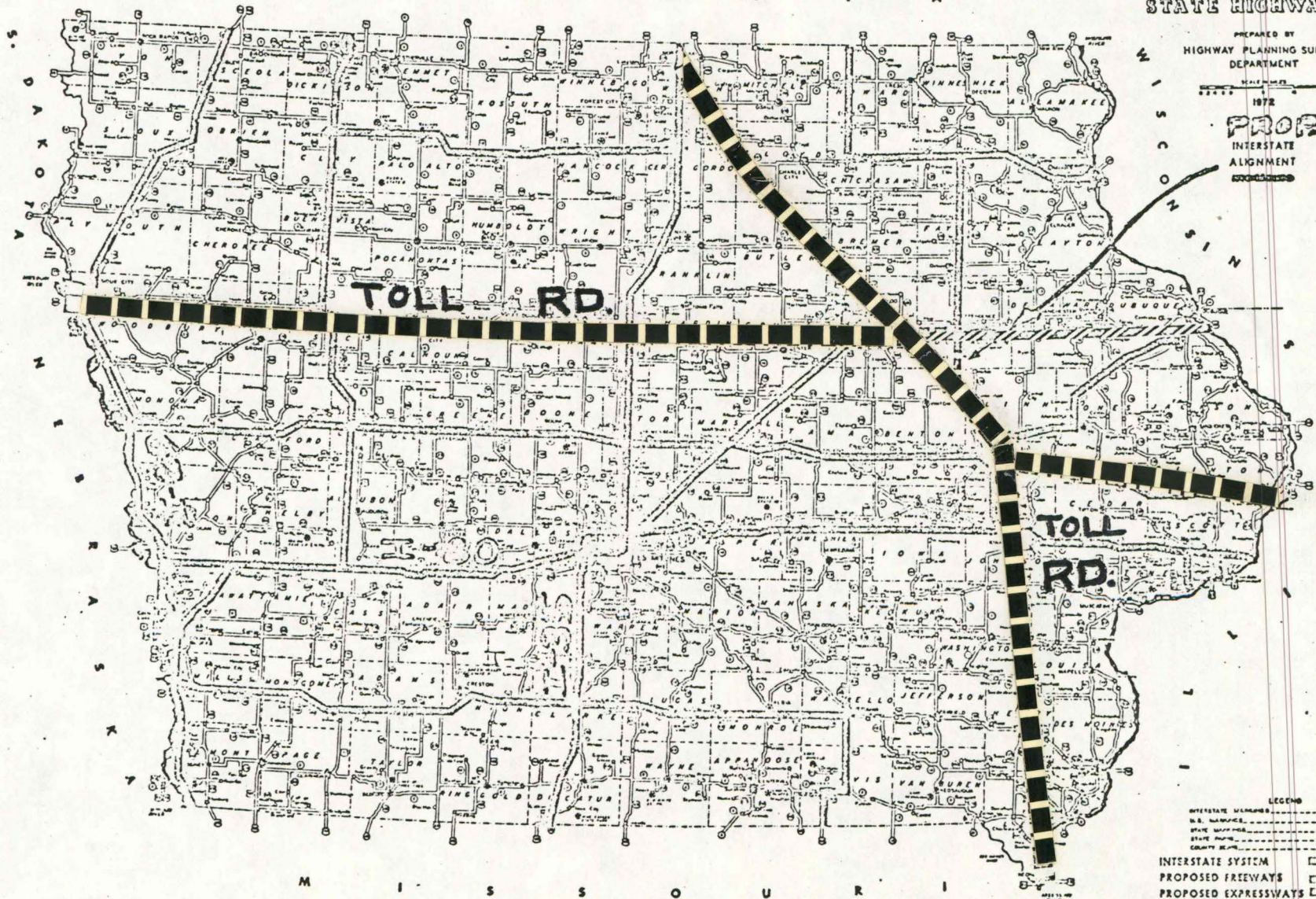
IOWA'S PROPOSED NETWORK OF
FREEWAYS AND EXPRESSWAYS

IOWA
STATE HIGHWAY MAP

PREPARED BY
HIGHWAY PLANNING SURVEYS
DEPARTMENT

SCALE IN MILES
1972

PROP
INTERSTATE
ALIGNMENT



LEGEND

INTERSTATE ALIGNMENT	(Thick dashed line)
U.S. HIGHWAY	(Dashed line)
STATE HIGHWAY	(Thin solid line)
COUNTY ROAD	(Dotted line)

INTERSTATE SYSTEM
PROPOSED FREEWAYS
PROPOSED EXPRESSWAYS
FEBRUARY, 1968
REVISED FEBRUARY, 1972

REX WIAAT

IOWA DEPARTMENT OF TRANSPORTATION

State Director

April 22, 1975

Victor Preisser

010.40

R. L. Kassel

Planning

Review of Proposed Iowa Toll Highway System Statement
Presented the DOT Commission by Dr. J. K. Jefferson

The consultant statement overstates traffic use and revenue generated from gasoline taxes and underestimates substantially the project construction costs and has overlooked completely the cost of toll booth facilities and maintenance and operation of the toll station system. Instead of the 1¢ gas tax to cover the deficit, 3.6¢ would be required. If the 1¢ gas tax were to be retained the total amount from Iowa would be increased from 3¢ to 7¢. The 1968 Toll Road Study and the 1972 analysis of financing Iowa's primary highway system did not find the tolls feasible for application in Iowa. The feasibility statement prepared by the consultant was dubious in 1973. The change in construction costs anticipated revenues and traffic use make the total system impossible as a practical solution. The revised estimates of traffic and revenues are included in the following table:

X
RL

Item

1973
KBS&A
Statement

2/75
Estimate

Traffic - 1970 ADT

5,000

3,900

Project Cost
Level Debt Service

\$725.0 million
60.3

\$1,029.5 million
85.6

Fifth Year Revenues
1¢ Gas Tax

\$ 38.0
26.4

\$ ^{28.9}
~~29.9~~
15.6

Toll/Mile
Gas Tax to Cover Deficit

3¢
1¢

3¢
3.6¢

Toll/Mile to Cover Deficit
Gas Tax

7¢
1¢

RLK:mkr

IOWA STATE HIGHWAY COMMISSION

Director of Planning

February 20, 1975

R. L. Kassel

759

Rex H. Wiant

Planning Methods

Review of Proposed Iowa Toll Highway System Statement

I reviewed the October, 1973 pre-preliminary feasibility statement prepared by the consulting engineer firm from Baltimore, Maryland. The statement is completely out-of-date as they have noted in their February 3, 1975 transmittal letter to Dr. J. K. Johnson in Jefferson, Iowa. It would require tolls on the order of 7¢ per vehicle mile to offset the 42% increase in construction costs. A number of other factors have been overlooked or inadequately estimated.

First of all, the traffic estimate of 5,000 vehicles ADT in the early years of operation is much higher than estimates made by the Highway Commission in preparing the 1968 Toll Road Feasibility Study or the 1974 Priority Primary Route Analysis. A review of the US 20 and US 213 corridors indicate a 1972 ADT value of 3,900. The base year traffic might be expected to increase at the rate of 3 to 5% per year; however, this is offset somewhat by the fact that a toll facility would not attract the same volume of vehicles as a freeway. In the 1968 toll study, it was estimated that 50% of traffic using the freeway would be diverted away if a toll facility were constructed.

The consultant statement uses a toll rate of 3¢ per vehicle mile. The state toll feasibility studies used 2¢ per vehicle mile. The only significance between the rates is perhaps in regard to the amount of traffic that may be attracted or diverted from the toll facility because of the prevailing fees.

An increase of 5% per year compounded is the growth factor assumed in this study. Current energy conditions, the 55 mile per hour speed limit and increasing gasoline prices may result in a lesser growth rate.

The project costs of \$725 million or \$1.368 million per mile are comparable to the costs shown in the priority primary route study (\$1.067-1.409 million per mile). However, toll station costs were apparently not included. It is estimated that 31 toll stations costing \$37,000 or \$1.147 million would be needed to operate this as a toll facility. These costs would also need to be increased from 42 to 48% to reflect our 1974 cost experience.

IOWA STATE HIGHWAY COMMISSION

-2-

The statement did not include annual maintenance costs, which at \$4,000 per year for 530 miles would amount to \$2.12 million. Toll station operations costs are also not included. Using the figures from the 1968 study, it would cost \$968,000 per year to operate and maintain 31 toll stations. Thus, highway maintenance and operation of the toll system would run approximately 3 million dollars annually.

A number of advantages of toll road construction were given in the statement. The disadvantages were not stated; these would include (a) cost of interest on the bonds, (b) cost of toll facility operations, (c) inequity of financing some routes by tolls and others by road use tax funds, and (d) fewer interchanges on the toll system than on a freeway system.

The statement estimated 1¢ of gas tax would generate 19 million dollars in revenue. Current estimates prepared in 1975 are that \$13.4 million would be generated by a 1¢ increase in gasoline taxes. Using the same assumptions as the current five-year construction program, the revenue generated by 1¢ of gas tax in 1980 would be \$15.6 million.

The revised estimates of traffic and revenues are included in the following summary table:

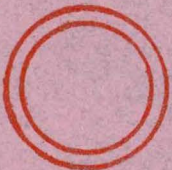
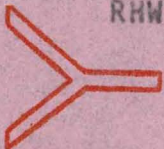
Item	1973 KBS&A Statement	2/75 Estimate
Traffic - 1970 ADT	5,000	3,900
Project Cost	\$725.0 million	\$1,029.5 million
Level Debt Service	60.3	85.6
Fifth Year Revenues	\$ 38.02	\$ 28.9
1¢ Gas Tax	26.4	15.6
Toll/Mile	3¢	3¢
Gas Tax to Cover Deficit	1¢	3.6¢
Toll/Mile to Cover Deficit		7¢
Gas Tax		1¢

In summary, the consultant's statement overestimates traffic use and revenue generated from gasoline taxes. It underestimates substantially the project construction cost and has overlooked completely the cost of toll booth facilities and maintenance and operation of the toll station system. Instead of 1¢ gas tax to cover the deficit, 3.6¢ would be required or if the 1¢ gas tax were to be retained, the toll from Iowa would be increased from 3¢ to 7¢.

-3-
IOWA STATE HIGHWAY COMMISSION

The 1968 toll road study and the 1972 analysis of financing in Iowa's primary highway system did not find the tolls feasible for application in Iowa. The feasibility statement prepared by the consultant was dubious in 1973. The change in construction costs, anticipated revenues and traffic use make the toll system impossible as a practical solution.

RHW:mkr



L, C, D, E, F

Data From:
 April, 1974 Priority Primary Rte Study.

		<u>1972 ADT</u>	<u>1973 base year prices</u>
B.	3.6	14,300	7,021,000
L.	103.8 miles.	2800 ADT	\$112,978,000
C.	35.4	4,500	32,546,000
D.	64.3	3,900	80,514,000
E.	82.8	4,100	88,216,000
F.	<u>99.6 miles.</u>	<u>4,200 ADT</u>	<u>\$93,767,000</u>
	389.5 ✓	15,099,900 VMT 3377 ave.	415,042,000
			\$ 1,066,576/mile

June 1973 index = 140
 Oct. 1974 index = 207
 increase = 1.48

$1,066,576 \times 1.48 = \$1,578,532/\text{mile}$

P.	72.0	3,300 ADT	87,460,000
V	18.8	7,700	62,719,000
I	78.5	4,100	94,381,000
Q	<u>37.3 miles.</u>	<u>2,900 ADT</u>	<u>\$46,604,000</u>
	206.6	123,800 3932 ave.	291,164,000

Revenue That Could Be Expected To
Be Raised For Various Increases In
Motor Fuel Tax

*Sales Tax
4¢ on diesel
3¢ on gas*

Based on fiscal year 1975 usage as projected
by the Budgeting Department of I.S.H.C.

		Gasoline Tax Increase Per Gallon (\$1,000,000)					
		No Increase	1¢	2¢	3¢	4¢	5¢
Diesel Fuel Tax Increase Per Gallon (\$1,000,000)	No Increase	0.0	13.4	26.8	40.2	53.6	67.0
	1¢	2.2	15.6	29.0	42.4	55.8	69.2
	2¢	4.4	17.8	31.2	44.6	58.0	71.4
	3¢	6.6	20.0	33.4	46.8	60.2	73.6
	4¢	8.8	22.2	35.6	49.0	62.4	75.8
	5¢	11.0	24.4	37.8	51.2	64.6	78.0

*Est - 5 year growth using ISHC trends
13.4 x 1.164 = 15.6*

IOWA STATE HIGHWAY COMMISSION

To Dept. Director of Planning Date February 20, 1975
Attention R. L. Kassel REFER TO: 759
From Rex H. Wiant
Dept. Planning Methods
Subject Review of Proposed Iowa Toll Highway System Statement

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First of all, the traffic estimate of 5,000 vehicles ADT in the early years of operation is much higher than estimates made by the Highway Commission in preparing the 1968 Toll Road Feasibility Study or the 1974 Priority Primary Route Analysis. A review of the US 20 and US 218 corridors indicate a 1972 ADT value of 3,900. The base year traffic might be expected to increase at the rate of 3 to 5% per year; however, this is offset somewhat by the fact that a toll facility would not attract the same volume of vehicles as a freeway. In the 1968 toll study, it was estimated that 50% of traffic using the freeway would be diverted away if a toll facility were constructed.

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RHW:mkr



**KNOERLE,
BENDER, STONE
& ASSOCIATES, INC.**

ENGINEERS

THE ROTUNDA BLDG./ 711 WEST 40TH STREET/BALTIMORE, MARYLAND 21211/(301) 366-5100

B. Sosewitz P.E.
A. H. Stone P.E.
R. E. Stahl P.E.
L. F. Fiander P.E.
R. E. Smith P.E.

February 3, 1975

R. W. Boettcher P.E.
M. Cable P.E., L.S.
J. I. Crawford P.E.
M. E. Endres P.E.
J. Goepfner, Sc.D.
A. B. Gruver P.E.
L. S. Harvey P.E., L.S.
C. G. McLamb P.E.
C. S. Morgenthaler P.E.
J. S. Prevosto P.E.
J. R. Serumgard P.E.
H. Y. Wang P.E.
P. S. Zuniga P.E.

Dr. J.K. Johnson
306 West Lincoln Way
Jefferson, Iowa 50129

Dear Dr. Johnson:

Enclosed is a copy of our pre-preliminary feasibility statement for a toll road system for the State of Iowa. This is the statement which Mr. Knoerle submittd to Governor Ray in October of 1973 and which we discussed by telephone earlier today.

*↳ Constr. Cost Index = 1.40 } 48% increase
Dec 1974 " " = 2.07*

The statement shows that there is sufficient indication of feasibility to warrant further consideration and more detailed study of the utilization of revenue bond financing for some of Iowa's needed highway improvements.

Since this statement was prepared there has been a considerable increase in the rate of escalation of construction and project costs. However, this increase would be offset to a large measure by a corresponding increase in toll rates so that the revenues-to-cost ratio would remain essentially the same.

*15% C
annual
gas tax
increase
estimated
at 2.5%
instead of
5%*

We trust that this information will be of benefit to you. Please feel free to call upon us for any other assistance which we might provide.

Yours very sincerely,

KNOERLE, BENDER, STONE & ASSOCIATES, INC.

Robert E. Stahl
Robert E. Stahl, P.E.
Vice-President

RES:dbb

Enclosure

PROPOSED IOWA TOLL HIGHWAY SYSTEM
PRE-PRELIMINARY FEASIBILITY STATEMENT
KNOERLE, BENDER, STONE & ASSOCIATES, INC.

OCTOBER 1973

PROPOSED IOWA TOLL HIGHWAY SYSTEM
PRE-PRELIMINARY FEASIBILITY STATEMENT

Iowa's highway system is the State's most important transportation facility, and it must be continually improved to meet increasing demands for the moving of people and goods. The concept of a system of modern, high-type; multi-lane highways throughout the State, has been the subject of planning by the Iowa State Highway Commission, as evidenced by their proposed network of freeways and expressways.

In February, 1972, a report, Road and Street Needs 1971 Through 1990, was submitted to the Iowa Legislative Council. The report indicated that under present financing, revenues would be nearly \$2 billion short of the necessary \$12.8 billion needed to provide Iowa with an adequate highway system during the 20-year period. It is therefore recognized that new sources of revenue to finance Iowa's needed highway system must be found to supplement current funding.

The toll highway concept has been used in many states to meet their highway needs. This pre-preliminary feasibility report has been prepared for a system of limited access toll highways in the State of Iowa. This toll system would be integrated into the state's proposed highway network whereby the toll revenues would provide a significant share of the monies needed to provide Iowa with an adequate highway system.

A toll system consisting of some 530 miles of highway has been selected for this feasibility study. However, sections of highway could be added, deleted or substituted in this network as a result of a more comprehensive feasibility study. This toll system presented herewith will provide a sufficient test of the feasibility of such a plan. The travel corridors that comprise this network are an east-west corridor from Sioux City to Waterloo (approximately 200 miles), a north-south corridor from Keokuk to Northwood (approximately 250 miles), and an east-west corridor from Cedar Rapids to Clinton (approximately 80 miles). The east-west corridor from Waterloo to Rockford, Illinois is to be studied under the new Federal Highway Act as a future Interstate route and is a natural extension of the proposed east-west toll road.

The purpose of this analysis is to develop approximate preliminary estimates of project costs and estimated preliminary traffic and revenues. By relating the gross revenue estimates to the estimated project costs, a preliminary indication of financial feasibility has been determined.

Estimated preliminary traffic and revenues for the facility were based upon the number of motorists who would be diverted from existing highways and the anticipated induced or generated traffic which the project would create.

Traffic maps showing actual traffic flows for the past several years were studied and an approximation was made of anticipated traffic on the toll facility during the early years after construction. This estimate was for an average daily traffic (ADT) of 5,000 vehicles in the early years of operation of the entire system.

ISHC est
3900
1972 ADT

An estimate was made of normal corridor traffic growth and also of induced traffic which is expected to accrue to the proposed facility. Since this is a preliminary estimate of traffic, the two types - normal and induced - were combined into an equivalent average annual growth of five percent. It is estimated that the proposed toll road would generate over 985 million annual vehicle-miles of travel in 1979, the first full year of operation.

An estimate was made of annual gross revenue expected to accrue to the proposed facility. An estimated average rate of toll for cars and trucks was developed based on extensive experience with other toll facilities. This estimated average rate for cars and trucks was 3.0 cents per vehicle mile, and this rate was used in estimating potential revenue. Application of this average rate to the previously estimated vehicle miles of operation produces estimated toll revenues of \$29,564,000 in 1979, the first full year of operation. Total annual gross revenues would include tolls and earnings from service area concessions; however, in order to produce a conservative estimate, concession earnings were not included. Gross revenues are estimated to increase to a total of \$61,500,000 in the fifteenth year of operation.

1968
ISHC
Study
used 2.0¢

The study corridors would consist of approximately 530 miles of new construction. Preliminary construction costs and project costs were developed for the proposed toll road based on experience with comparable facilities throughout the country. Project costs are estimated at \$725,000,000.

= 2.08 x first year revenue
1,367,925/mile + toll sta. costs = 31 @ 37,580 = \$1,147,580

It is recommended that maintenance of the toll road system be handled by the State as though it were a freeway. Maintenance costs have not been included, therefore, gross toll revenues are used in this analysis. The gas tax from fuel consumed will be more than sufficient to pay for maintenance of the facility. The collection of tolls should be handled by the Authority.

\$ with less \$ available to the remainder of the system.

The above computations were developed only as a guide and a final determination of project feasibility should be made by financial advisors after a more detailed preliminary feasibility study is conducted.

Toll Station
Operation costs are not included either.

2
31 toll stations @ \$31,225 = \$967,975/yr.
↳ to maintain & operate

Based on the anticipated project costs, it is estimated that a bond issue of \$907,000,000 would be required to construct the proposed toll road system.

Some of the advantages of toll road construction are summarized briefly below.

A toll revenue project can be designed and constructed more quickly than a freeway.

Toll projects usually have lower accident rates.

Land values increase in areas adjacent to toll facilities, thus increasing the State's tax base.

Industry is attracted by the increased accessibility of a toll road.

Modern toll road design reduces operating costs to the road user.

Toll facilities attract tourists. Out-of-state travellers bear a fair share of the toll road costs.

Inflation will increase the costs of the highway system if new facilities are constructed at the State's present level of funding. Toll roads will increase the rate at which new highways are added to the system, thus decreasing the adverse effect of inflation.

The toll road system will accelerate construction of multi-lane highways for the State and permit State funds to be invested in freeways for those portions of the State not served by the toll road. Thus, indirect benefits for the entire State would accrue from a toll road system.

A brief description of the steps required to implement a system of toll roads are as follows:

1. Preparation of a preliminary Feasibility Study to establish traffic corridors and make a preliminary determination of construction costs, traffic, revenues, and financial feasibility of the system.

2. Legislation by the State Legislature of Iowa creating an Iowa Turnpike Authority, and providing funds for steps 3, 4, and 5.

3. Preparation of a Civil Engineering Report to investigate the project feasibility in depth and to make a more accurate determination of construction costs, total project costs, and maintenance and operation costs.

Disadvantages:

- cost of interest ³
- cost of toll facility operation

4. Preparation of a Traffic and Revenue Report to determine accurately the anticipated traffic and to forecast revenues for the selected routes.

5. Preparation of a Financial Report to make a final determination of project feasibility and availability of State subsidy or guarantee, in order to cover debt services for financing the project through the sale of highway revenue bonds.

6. Sale of the Revenue Bonds.

7. Engineering Design of the Project.

8. Construction of the Project.

9. Opening the Toll System to the public and operating it until the bonds are liquidated.

Experience with similar toll projects indicates all of these steps could be scheduled efficiently and the entire system open to the public in 1979.

The total bond amount of \$907,000,000 is assumed to be issued on a takedown basis. It is necessary that interest be capitalized on the bonds during the design and construction period. Money not required immediately to defray expenses and construction costs can be reinvested in Government securities at a higher interest rate. Allowance has been made for reinvestment of funds prior to their use during the construction period. The sum of the money from reinvested funds and from toll revenues on completed segments is estimated to be less than the interest that must be paid during these early years. This difference that must be subsidized, during the years of construction, is estimated to be met by funds created by a gas tax of one cent per gallon. It is estimated that a gas tax of one cent per gallon would generate average annual revenues of \$19,000,000 during the construction period and increase to \$26,400,000 and \$33,600,000 in the fifth and tenth years of operation of the entire system.

#13,400,000 current estimate of 1¢ tax yield

After the entire toll road system is open, the gross toll revenues would be less than the level debt service. It is estimated that the funds derived by a gas tax of one cent per gallon, added to the gross toll revenues, would equal the level debt service in the fifth year after opening of the entire toll road system. In the tenth year only approximately one half of the one cent gas tax revenue would be necessary to supplement the gross toll revenue. In the fifteenth year, no gas tax revenue would be necessary, as it is estimated that gross toll revenues would equal level debt service.

The toll road system would be built on a priority basis so that revenue can be coming in prior to system completion.

PRE-PRELIMINARY FEASIBILITY INDICATION

		<u>Millions of Dollars</u>
Proposed Toll Road System	530 miles	
Project Costs (Including construction, engineering, rights-of-way, contingencies, etc.)	$725 \times 1.42 = 1,029.5$	\$725.0 #1,029.5
Bond Issue		907.0
Bond Term	40 years	
Bond Interest Rate Assumed	6.0%	
Level Debt Service Average for 40 Years	$60.3 \times 1.42 = 85.6$	60.3 - 85.6
Fifth Year Total Revenues		64.4
Gross Toll Revenues - (3¢/mile)		38.0 - 28.9
1¢ Gas Tax Revenues		26.4 - 15.6
Tenth Year Total Revenues		81.8
Gross Toll Revenues ^{+ 5%/yr.}		48.2 -
1¢ Gas Tax Revenues		33.6
Fifteenth Year Total Revenues		61.5 -
Gross Toll Revenues ^{+ 5%/yr.}		61.5
Coverage of Level Debt Service By:		
Fifth Year Gross Toll Revenues	0.63	
Tenth Year Gross Toll Revenues	0.80	
Fifteenth Year Gross Toll Revenues	1.02	

85.6
 toll (-) 28.9
 1¢ tax (+) 15.6
 deficit: 41.1

1¢ toll = 9.6 million 5

$41.1 / 9.6 = 4.2$ ¢ toll increase

$41.1 / 15.6 = 2.6$ ¢
 add'l gas
 tax to cover

