

SUMMARY REPORT

⇒ **PROPOSED NORTH-SOUTH TOLL ROAD,**

INDIANA: *summary report.*

1966.

9 p.

Prepared For The

INDIANA STATE HIGHWAY COMMISSION

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By

WILBUR SMITH and ASSOCIATES

New Haven, Connecticut

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November 15, 1966

Mr. Martin L. Hayes
Executive Director
Indiana State Highway Commission
State Office Building
Indianapolis, Indiana

Dear Mr. Hayes:

We are pleased to submit this summary of preliminary feasibility studies for the proposed North-South Toll Road in Indiana. More detailed information is available in the two recently completed comprehensive reports, "Feasibility Report, Proposed North-South Toll Road, Indiana" prepared by Wilbur Smith and Associates and "Preliminary Engineering Report, Proposed North-South Toll Road, Indiana" prepared by Brighton Engineering Company.

Purpose and Scope

The purpose of this study was to develop a preliminary indication of the feasibility of constructing a proposed north-south toll road in the travel corridor between the Ohio River near Evansville, to a connection with Interstate Route 65, in the vicinity of LaFayette.

A general economic evaluation was made of the area through which the toll road will pass to determine induced and normal traffic growth. Trends in population, retail sales, effective buying income per family, motor vehicle registrations, and motor fuel consumption were carefully analyzed. Investigations were also made of anticipated future development in the corridor, including recreational activity.

Roadside origin and destination interviews were conducted with motorists on all major highways in the toll road corridor; maximum use was also made of previously obtained origin and destination data. Vehicle classification and volume counts, route reconnaissance studies and time and distance observations were made. Annual, monthly, and daily traffic variations in the travel corridor were assembled and evaluated.

Through field reconnaissance and analyses of travel patterns, numerous alternate alignments for the proposed North-South Toll Road were delineated. More detailed investigations were made of the four routes considered to have the highest potential. Individual traffic movements were assigned

to these alternate routes based on time-distance-cost relationships between present highway routings and the proposed toll road alignments. Several toll collection arrangements and various toll rates were investigated to determine the toll system and schedule which would provide the best balance between traffic service and revenues. Annual toll and concession revenues were then estimated for the earning period of an assumed bond issue.

Alignment, profile, treatment of cross roads, interchange locations, and design features of the toll road have been prepared by Brighton Engineering Company. Estimated construction and right-of-way costs and annual maintenance and operation expenses were also prepared.

The construction cost estimates were then increased by an appropriate amount to arrive at a probable bond issue. An indication of preliminary project feasibility was then determined for each alternate alignment.

Description of Project

The proposed North-South Toll Road would be a four-lane, divided facility with full control of access providing safe, high-speed movement for both through and local traffic. Interchanges would be provided with all Interstate, U. S. numbered highways and major state routes crossing the toll road.

While numerous possible alignments were investigated in the north-south travel corridor, only four routes were considered to warrant more detailed study. The location of these alternates, designated as Lines A, B, C, and D, is shown in the Frontispiece.

Line A — Line A begins at the north bank of the Ohio River, east of Evansville. The primary interchange serving Evansville would be located at U. S. Route 460-Indiana Route 62. Continuing in a northerly direction interchanges would next be provided at Interstate Route 64 and also at Indiana Route 64, west of Oakland City. Moving northerly, interchanges would also be located at U. S. Routes 50-150, east of Vincennes, and Indiana Route 54, west of Linton. From this point, the alignment continues in a northerly direction, passing to the east of Terre Haute and Rockville, and to the west of Crawfordsville. The northern terminus would be at Interstate Route 65, northwest of LaFayette. Intermediate interchanges on this section would be at Indiana Route 46, Interstate Route 70, U. S. Route 36, Interstate Route 74, and Indiana Route 25.

Line A would also include a spur connection extending from a point just north of the U. S. Routes 50-150 interchange, east of Vincennes, in a northeasterly direction towards Indianapolis. The spur would pass north of Washington and the Crane Naval Ammunition Depot, west of Bloomington and Martinsville and terminate at Indiana Route 67 near Centerton. The north-south section of Line A would be approximately 191 miles long; the length of the spur section would be 79 miles, for a total combined length for Line A of 270 miles.

Line B — Line B would follow a routing similar to Line A between the southern terminus, south of Evansville, and Indiana Route 54, west of Linton. From this point, the alignment would follow a northeasterly orientation, passing to the east of Brazil and crossing U. S. Route 36 just east of its

intersection with U. S. Route 231. Interchanges would be provided at Indiana Route 46, Interstate Route 70, and U. S. Route 36. Moving northerly from this point, Line B would terminate at Interstate Route 65, east of LaFayette. An intermediate interchange would be provided at Interstate Route 74. The total length of Line B would be approximately 176 miles.

Line C — Line C would be identical to the north-south alignment of Line A between Evansville and LaFayette. The total length of Line C would be 191 miles.

Line D — Line D would be common with Lines A, B, and C between the Ohio River and Vincennes. Just north of the U. S. Route 50-150 interchange, the alignment would follow a northeasterly direction towards Indianapolis, terminating at Indiana Route 67 near Centerton. This is identical to the alignment of the Indianapolis spur section of Line A. Interchange locations would also be the same. The total length of Line D approximates 137 miles.

Estimated Traffic and Revenues

Estimated traffic and toll revenues for the proposed North-South Toll Road are based upon the amount of traffic which will be diverted from existing routes considered competitive with the toll road, normal traffic growth during construction of the facility and in latter years, and the magnitude of generated and development traffic. Concession revenues from service areas operated along the toll road were also estimated to arrive at total project revenues.

Basic Assumptions — The traffic and revenue estimates for the proposed North-

South Toll Road are predicated upon the following assumptions:

1. The proposed facility will be open to traffic on January 1, 1970.
2. The location of interchanges, general route alignment, method of toll collection and toll schedule will be as recommended in this report.
3. Interstate Route 64 between New Albany and the Indiana-Illinois state line, Interstate Route 70 between Indianapolis and Terre Haute, and Interstate Route 65 between Lebanon and the Gary-Hammond area will be completed prior to or concurrent with the opening of the proposed toll road.
4. Indiana Route 67 will be improved to a multi-lane, divided facility from Indianapolis to Centerton by the time the proposed North-South Toll Road is opened to traffic.
5. A new bridge would be constructed across the Ohio River providing a suitable connection between the southern terminus of the North-South Toll Road and the present express highway network in Kentucky, which by 1970, will include the Pennyrile Parkway.
6. With the exception of the scheduled upgrading of U. S. Route 41 to a continuous four-lane facility as far north as Terre Haute, no other competing high-speed, free or toll highways will be constructed in the toll road travel corridor.
7. The toll road will be well maintained, efficiently operated, and effectively signed in order to encourage maximum usage.

8. The present general trend in economic activity will continue and no national emergency will arise which would abnormally restrict the use of motor vehicles.

Any departure from these basic assumptions could materially affect estimated traffic and revenues for the proposed North-South Toll Road.

Recommended Method of Toll Collection — A mainline toll barrier would be placed at every other interchange. At each barrier, tolls would be collected from motorists using the entrance and exit ramps as well as from through traffic. Automatic "honor system" collection facilities would also be placed on some interchange ramps to completely close the toll road to free movement.

Recommended Toll Schedule — Under the recommended toll schedule, motorists driving a two-axle vehicle would pay a per mile toll of \$0.02. The toll for three-axle vehicles and vehicle combinations would be \$0.03 and that for four and five-axle vehicles—\$0.04 and \$0.05, respectively. Prior to opening of the toll road, detailed toll schedules would be developed for each mainline and ramp toll plaza.

Estimated Annual Revenues — Annual revenue estimates through the earning period of an assumed bond issue were developed for each of the four alternate alignments. First year (1970) revenues of \$7,115,000 were estimated for Line A. As shown in Table 1, this is estimated to increase to an average of \$14,578,000 per year over the 37-year earning period. Total

Table 1
ESTIMATED ANNUAL REVENUES

Year	Line A	Line B	Line C	Line D
	(thousands of dollars)			
1970	\$ 7,115	\$ 5,184	\$ 5,619	\$ 3,447
1971	8,539	6,215	6,734	4,144
1972	9,458	6,885	7,460	4,592
1973	9,979	7,263	7,871	4,844
1974	10,478	7,626	8,264	5,086
1975	11,002	8,007	8,677	5,340
1976	11,552	8,408	9,111	5,607
1977	12,130	8,828	9,567	5,887
1978	12,676	9,225	9,997	6,153
1979	13,246	9,641	10,446	6,429
1980	13,842	10,075	10,917	6,719
1981	14,465	10,528	11,408	7,021
1982	15,043	10,949	11,864	7,302
1983	15,645	11,387	12,339	7,595
1984	16,271	11,843	12,833	7,898
Next 22 Years Annually ..	\$16,271	\$11,843	\$12,833	\$ 7,898
AVERAGE ANNUAL REVENUES				
First Five Years	\$ 9,114	\$ 6,635	\$ 7,190	\$ 4,423
First Ten Years	10,618	7,728	8,375	5,153
Thirty-Seven Years	14,578	10,611	11,498	7,076

first year revenues of 5,184,000 are estimated for Line B. Average annual revenues over the 37-year earning period would be an estimated \$10,611,000. Total revenues of \$5,619,000 are estimated for Line C during 1970. This is estimated to increase to an average of \$11,498,000 over the earning period. Line D would produce an estimated first year revenue level of \$3,447,000 increasing to an average of \$7,076,000 over the 37-year earning period.

Estimated Project Costs

Preliminary design and construction costs for each alternate line were developed by Brighton Engineering Company. Total construction cost included construction, right-of-way, toll collection facilities, service areas, communication system, engineering and engineering contingencies. Annual maintenance and operation expenses were prepared jointly with Brighton Engineering Company for each of the alternate lines.

The toll road would be a four-lane divided, controlled-access facility designed

for a speed of 70 miles per hour. In all ways the design criteria established were comparable to Interstate Standards as used in Indiana. Location controls consisted of major stream crossings, topography, land use, sub-surface conditions, topography and proximity to population centers. The alternate routes traverse a variety of terrain from the Ohio River flood plain, through the rolling uplands, the coal fields, the limestone area and across major stream valleys including those of the Patoka, White, Eel, and Wabash Rivers.

The estimates of construction cost include all items necessary to complete the project and make it fully operational. For this purpose, it has been assumed that the contracts will be awarded in 1968, and prices have been adjusted accordingly. It is further assumed that all construction will be completed in 1969 permitting full operation by January 1, 1970. Preliminary cost estimates for each alternate line are presented in Table 2. Line A would cost approximately \$257,500,000 to construct, Line B—\$167,000,000, Line C—\$181,000,000 and Line D—\$136,000,000.

Table 2
PRELIMINARY COST ESTIMATES

Item	Line A (270 Miles)	Line B (176 Miles)	Line C (191 Miles)	Line D (137 Miles)
Grade, drain, structures & surface	\$183,666,113	\$117,459,942	\$127,914,840	\$ 96,430,921
Right-of-Way	18,111,100	12,961,850	13,977,000	9,985,225
Utility Readjustment	4,047,780	2,641,215	2,860,530	2,059,440
Lighting & Signing	1,394,932	858,045	935,355	768,651
Toll Collection Facilities ...	2,030,000	1,630,000	1,440,000	1,180,000
Roadside Improvement	4,237,780	2,771,215	3,000,530	2,149,440
Service Areas	9,000,000	6,000,000	6,000,000	5,000,000
Communication System	550,000	500,000	500,000	350,000
Engineering	22,248,771	14,432,227	15,612,826	11,757,368
Contingencies	12,213,524	7,745,506	8,758,919	6,318,955
Total	\$257,500,000	\$167,000,000	\$181,000,000	\$136,000,000

SOURCE: Brighton Engineering Company.

Annual maintenance and operation cost estimates include all items required to maintain and operate the toll facility. As shown in Table 3, estimated first year (1970) maintenance and operation costs range from \$2,588,400 for Line D to \$4,433,200 for Line A. The estimate for Line B was \$3,026,700 and for Line C—\$3,310,300.

Preliminary Project Feasibility

By relating estimated project costs and annual revenues for the proposed North-South Toll Road, a preliminary indication of project feasibility, assuming revenue bond financing, was determined.

The probable size of the bond issue which would be necessary to finance any one of the four alternate toll road alignments was estimated based on the relationship of construction cost to bond issue for several toll roads which have recently been financed. A ratio of 1.00 to 1.25 was used; the increased expense includes such items as bond interest during construction, legal fees, financing costs, etc. As given in Table 4, it is estimated that Line A would require a bond issue of \$321,875,000, Line B—\$208,750,000, Line C—\$226,250,000 and Line D—\$170,000,000.

There are two "tests" which investment bankers normally employ to determine, in

Table 3
PRELIMINARY ESTIMATES OF ANNUAL MAINTENANCE AND OPERATION COSTS

Item	Line A (270 Miles)	Line B (176 Miles)	Line C (191 Miles)	Line D (137 Miles)
1970 - 1974				
General Administration ..	\$ 858,500	\$ 776,000	\$ 789,100	\$ 741,700
Toll Collection	479,000	268,000	341,000	268,000
Toll Road Patrol	909,000	592,000	643,000	461,000
Maintenance	2,186,700	1,390,700	1,537,200	1,117,700
Total	\$4,433,200	\$3,026,700	\$3,310,300	\$2,588,400
1975 - 1979				
General Administration ..	\$ 884,300	\$ 799,300	\$ 812,800	\$ 764,000
Toll Collection	493,400	276,000	351,200	276,000
Toll Road Patrol	936,300	609,800	662,300	474,800
Maintenance	2,252,300	1,432,400	1,583,300	1,151,200
Total	\$4,566,300	\$3,117,500	\$3,409,600	\$2,666,000
1980 - 1984				
General Administration ..	\$ 910,800	\$ 823,300	\$ 837,200	\$ 786,900
Toll Collection	508,200	284,300	361,700	284,300
Toll Road Patrol	964,400	628,100	682,200	489,000
Maintenance	2,319,900	1,475,400	1,630,800	1,185,700
Total	\$4,703,300	\$3,211,100	\$3,511,900	\$2,745,900

SOURCE: Brighton Engineering Company — Wilbur Smith and Associates.

preliminary fashion, the financial feasibility of a revenue bond project. One "test" concerns the coverage of first year or maximum bond interest by first year net revenues; a coverage of 1.25 is generally considered adequate. The second "test" is the coverage of level debt service by average annual net revenues over the earning period of the bond issue. In this case, a coverage of 1.50 is desirable.

In developing feasibility computations for the North-South Toll Road alternate alignments, a 40-year bond issue bearing an average interest rate of 4.50 per cent was assumed. The preliminary engineering studies indicate that a three year construction period will be required which means that the bond issue will have a 37-year earning period. The feasibility calculations are indicated in Table 4.

Table 4
PRELIMINARY PROJECT FEASIBILITY

	Line A	Line B	Line C	Line D
Length (miles)	270	176	191	137
Project Costs ¹	\$257,500,000	\$167,000,000	\$181,000,000	\$136,000,000
Bond Issue ²	\$321,875,000	\$208,750,000	\$226,250,000	\$170,000,000
Interest Rate (%)	4.50	4.50	4.50	4.50
Maximum Interest	\$ 14,484,000	\$ 9,394,000	\$ 10,181,000	\$ 7,650,000
Level Debt Service ³	\$ 18,020,000	\$ 11,687,000	\$ 12,666,000	\$ 9,517,000
Gross Revenues:				
a. First Year	\$ 7,115,000	\$ 5,184,000	\$ 5,619,000	\$ 3,447,000
b. 37-Year Average	14,578,000	10,611,000	11,498,000	7,076,000
Annual Maintenance and Operation Costs:				
a. First Year	\$ 4,433,000	\$ 3,027,000	\$ 3,310,000	\$ 2,588,000
b. 37-Year Average	4,648,000	3,173,000	3,471,000	2,714,000
Gross Revenue Coverage:				
a. First Year Interest	0.49	0.55	0.55	0.45
b. 37-Year Average Debt Service	0.81	0.91	0.91	0.74
Net Revenues:				
a. First Year	\$ 2,682,000	\$ 2,157,000	\$ 2,309,000	\$ 859,000
b. 37-Year Average	9,930,000	7,438,000	8,027,000	4,362,000
Net Revenue Coverage:				
a. First Year Interest	0.19	0.23	0.23	0.11
b. 37-Year Average Debt Service	0.55	0.64	0.63	0.46

¹ Brighton Engineering Company.

² Assumes ratio of construction cost to bond issue of 1.00 to 1.25.

³ Assuming 37-year payout period.

Line A — Maximum annual interest assuming 4.50 per cent bonds would amount to \$14,484,000 and level debt service—\$18,020,000. Interest coverage by gross revenues during the first year of operation would approximate 0.49 and debt service coverage by gross revenues during the 37-year period would be 0.81. Maximum interest coverage by net revenues during the first year would approximate 0.19. Average level debt service coverage by average annual net revenues over the 37-year earning period is estimated at 0.55.

Line B — Maximum annual interest for the \$208,750,000 bond issue would be \$9,394,000 and level debt service—\$11,687,000. First year maximum interest coverage by gross revenues would be 0.55, decreasing to a coverage of 0.23 on a net revenue basis. Level debt service coverage by average annual gross and net revenues during the 37-year period would be 0.91 and 0.64, respectively.

Line C — Maximum interest for Line C would be \$10,181,000 and average annual level debt service—\$12,666,000. Maximum interest coverage by gross and net revenues is estimated at 0.55 and 0.23, respectively. Average annual level debt service coverage by average gross revenues during the 37-year earning period would be 0.91, compared with an average of 0.63, assuming average net revenues only are available for debt service.

Line D — For Line D, maximum interest would be \$7,650,000 and level debt service—\$9,517,000. Maximum interest coverage by gross and net revenues during the first year of operation (1970) would

amount to 0.45 and 0.11, respectively. Average gross revenues would cover average level debt service by 0.74 times; net revenues would provide a coverage of 0.46.

Summary

Based on these preliminary feasibility computations, it appears that none of the four alternate alignments of the proposed North-South Toll Road would be self-liquidating as a revenue bond project, either on a gross or net revenue basis.

The most desirable alignment based on maximum interest and level debt service coverages would be Line B. Line C has virtually the same coverages and would be the next most feasible route. Both of these alignments extend between the Ohio River near Evansville and Interstate Route 65 near LaFayette, serving primarily the U. S. Route 41 corridor. However, good traffic service would also be provided between the Evansville and Indianapolis metropolitan areas via the southern portion of the proposed North-South Toll Road and Interstate Route 70.

As already indicated, estimated gross toll and concession revenues for Line B would cover only 91 per cent of the level debt service required to amortize interest and principal payments of the proposed revenue bond issue. Under this condition, annual maintenance and operation costs would not be chargeable to the project. In addition, some form of subsidy and/or guarantee would be required to bring the coverage of 0.91 to approximately the 1.50 generally considered indicative of project feasibility.

It should be emphasized that the above

computations are provided only as a general guide and are based on preliminary estimates of both traffic and revenues and construction costs. A final determination of

project feasibility should be based on more detailed traffic and earnings and civil engineering studies, and should be made by fiscal advisors selected for this purpose.



We have enjoyed working with you on this very interesting and challenging project and would like to extend our appreciation to you, members of your staff, and the numerous agencies and individuals contacted for the excellent cooperation we received throughout the course of our analyses.

Respectfully submitted,

Wilbur S. Smith

Wilbur S. Smith

Registered P.E.

Indiana No. 8288