Technical Memorandum

Maine East-West Highway: Assessment of Toll Financing Feasibility

WILBUR SMITH ASSOCIATES

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Prepared for

Maine Department of Transportation

By

WILBUR SMITH ASSOCIATES

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EXECUTIVE SUMMARY

Wilbur Smith Associates (WSA) was asked by the Maine Department of Transportation (MDOT) to analyze the financial feasibility of constructing, operating and maintaining a new east-west toll road corridor through Maine. A series of general corridor alignments have already been developed by MDOT and are presented in their "Technical Report on an East-West Highway in Maine" (September 1999). WSA was asked to conduct a preliminary assessment of the financial feasibility of four of those corridors as toll roads. The four include:

- **Corridor B**: An upgrade of existing Route 9 from Calais to Bangor, and an upgrade of existing Route 9 from Newport to the New Hampshire border;
- **Corridor C-1**: An upgrade of existing Route 9 from Calais to Bangor, and an upgrade of existing Routes 201A, 16, and 27 from west of Skowhegan to the Canadian border;
- **Corridor D**: A new road from Calais to Bangor between existing Routes 9 and 1, and a new road parallel to Routes 16 and 27 from Interstate 95 to the Canadian border; and
- **Corridor E**: A new road from Calais to Bangor between existing Routes 9 and 1, and a new road from the Maine Turnpike, near Auburn, to the New Hampshire border.

Corridors B and C-1 remain two-lane facilities, while Corridors D and E would be constructed as four-lane projects. Model assignments were conducted by Kevin Hooper Associates (KHA) and MDOT under toll-free conditions at 2015 (the assumed opening-year) and 2030 levels for all four corridors. WSA developed toll plaza locations and toll rates to test for each alignment. Passenger car rates of between $0.50 and $1.50 were tested at each plaza. Truck tolls varied from $1.50 to $4.50 per plaza.

Toll evasion estimates were much lower with Corridors B and C-1 due to the general lack of direct competing alternative routes. Corridors D and E, on the other hand, experienced a significant amount of toll diversion, especially at the higher rates tested. Over 70 percent of toll-free traffic remained in Corridors B and C-1 at the highest rate tested, while only about 55 percent remained in Corridors D and E. At the highest rates tested, Corridor D was estimated to produce the most toll revenue ($24.9 million in 2015), with Corridor B producing the second highest ($20.9 million in 2015).

Capital and maintenance costs for the four projects were provided by MDOT; WSA estimated costs related to constructing, staffing, and maintaining all toll plaza related infrastructure. Total capital costs for the four corridors varied considerably; Corridors B and C-1 were estimated to

cost between $190 and $230 million, while Corridors D and E were estimated to cost between $814 and $1,191 million. Estimated maintenance and operating costs were quite similar for all corridors, ranging from $5.2 to $6.9 million per year.

Net toll revenues were compared to estimated debt service requirements for each corridor assuming both General Obligation Bond and Revenue Bond financing. Only Corridor B proved to be financially feasible beginning in 2015, but only when General Obligation Bond financing was assumed. Corridor C-1 was close to being feasible under some conditions. Corridors D and E met less than a quarter of debt service requirements in 2015, and only about one-third by 2030.

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INTRODUCTION AND PURPOSE

The 118th Maine Legislature has directed the Maine Department of Transportation (MDOT) to study the feasibility of a high-grade east-west corridor in Maine. Several consultants have been retained by MDOT to estimate the benefits such a corridor would have on Maine's economy. MDOT is also being asked to provide the legislature with potential options to enhance the financial feasibility of any proposed east-west corridor. One such mechanism is toll financing. Wilbur Smith Associates (WSA) was asked to estimate the toll revenue potential of several alternative east-west corridor alignments. The ability of each to service the estimated bond debt service was also analyzed.

All corridor alignments have been defined by MDOT in their "Technical Report on an East-West Highway in Maine" (the MDOT Study) conducted in September 1999. WSA was asked to conduct financial feasibility analyses on four of the proposed corridors. Two involve the upgrading of existing east-west highways, and two include construction of new, limited-access, four-lane facilities.

WSA worked closely with MDOT and their consultants, most notably Kevin Hooper Associates (KHA), in developing the tolling configurations and toll rates to test for this analysis. KHA and MDOT conducted initial modeling work for all four corridor alignments and provided WSA with estimated toll-free traffic volumes at 2015 (the assumed opening-year for the project) and 2030 levels. WSA then estimated traffic levels at increasingly higher toll rates. MDOT also provided key inputs required for the financial feasibility assessment, including capital and maintenance cost estimates for each alignment.

It should be emphasized that while the end product of WSA's analysis was a financial feasibility assessment of each corridor, this study was not conducted at the level of detail required for actual project financing. Significant refinement of the traffic model would be required in order for this information to be used for financing purposes. This study does provide, however, an indication of the general revenue-producing capacity of each alignment, and an indication of the relative financial strength of the four alternatives compared to one another.

MDOT AND KHA MODELING OVERVIEW

KHA and MDOT conducted a considerable amount of modeling work prior to WSA's involvement in the study. A statewide traffic model (TRIPS) was used by KHA and MDOT to test each of the alignments and develop toll-free traffic estimates. The model was first calibrated to existing 1995 traffic levels. It was then expanded to include potential Canadian trips that are not currently using Maine highways for their travel. KHA and MDOT also modified the model's 2015 trip tables to include potential additional tourism trips attracted by the improved east-west access. In addition, the 2030 trip tables were also refined to include the additional trips generated from the economic efficiencies afforded by improved east-west access through Maine.

The basic travel patterns in the model are based on a combination of census data and limited origin and destination surveys. One of the shortcomings of the model, for use in this analysis, is that travel patterns are based on an average summer weekday period. Nonsummer travel patterns could prove to be quite different, resulting in toll diversion rates different from those estimated here. It should also be noted that actual travel speeds in the project corridors were not independently verified and compared to those generated by the model. A complete program of travel speed studies, as well as travel pattern surveys at each of the proposed toll plaza locations, should be undertaken if a more detailed study is deemed necessary in the future.

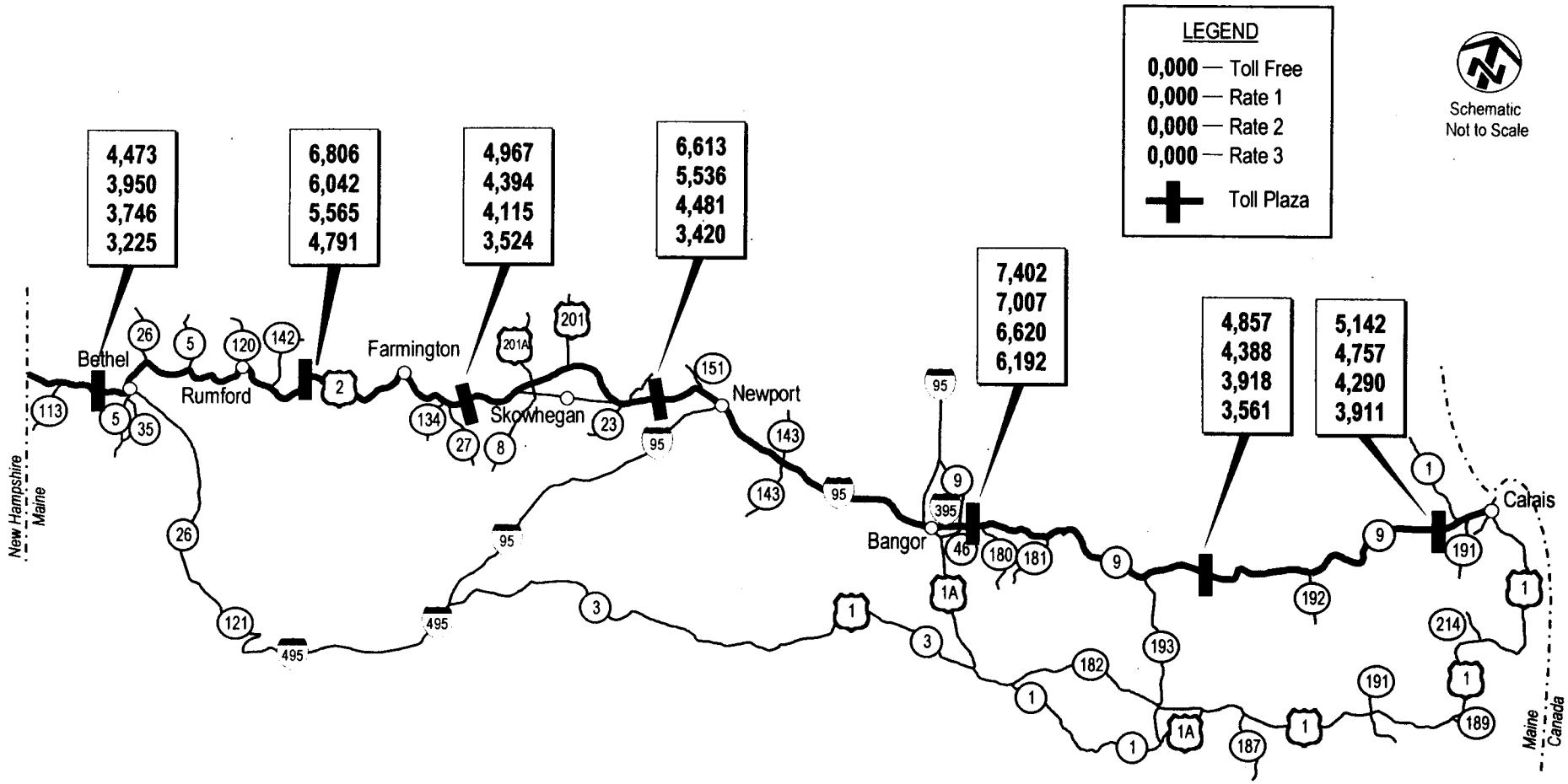
The end result of KHA and MDOT modeling efforts was the provision of toll-free car and truck trips using each of the four project alternatives. Average daily traffic volumes were provided at 2015 and 2030 levels. In addition, they provided WSA with the trip length characteristics of traffic using the corridors. This aided WSA in developing differential toll diversion estimates by each trip length market segment.

PROJECT CORRIDORS SELECTED FOR ANALYSIS

Four east-west corridors were selected for WSA to analyze. As mentioned above, these corridors were previously developed in the MDOT Study. Each of the four alignments is presented in Figures 1 through 4. The toll plaza locations and traffic volumes in these figures will be described in more detail later in this document. As noted in each figure, the specific corridor alignments developed for the toll analysis do not necessarily reflect an exact alignment. While MDOT has only developed general corridor alignments, it was necessary to make specific improvement assumptions, for tolling purposes, when adding each project to the TRIPS network. The four corridors include:

Corridor B (Figure 1): This alignment includes an upgrade of Route 9 in the east from Calais to Bangor. A new road would be constructed from Calais to a point just west of Route 191. Another new segment would be constructed from the Route 9/46 junction to Interstate 395. Interstate 95 would connect the eastern segment to the western segment, which follows the existing Route 2 corridor beginning near Newport and extending to the New Hampshire border. A new bypass of Skowhegan is proposed in this scenario. This corridor would remain a two-lane

Maine East-West Corridor Feasibility Study



Note: Toll free traffic volumes provided by Kevin Hooper Associates.

The corridor alignment shown was assumed for toll analysis purposes only. It should not be presumed to represent a recommended corridor alignment.

TOTAL ESTIMATED AVERAGE DAILY TOLL TRANSACTIONS

Corridor B: 2015 Levels

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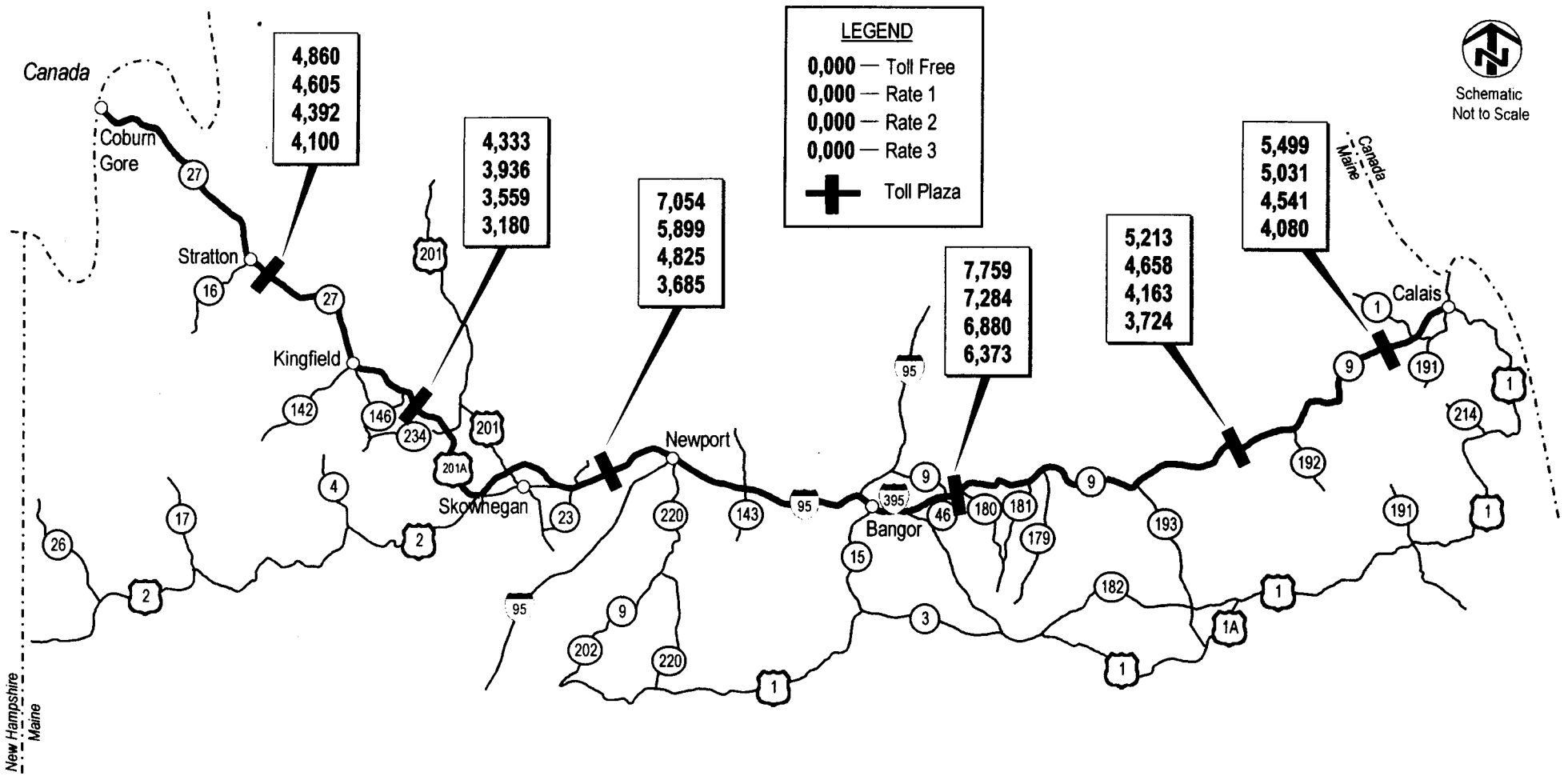
FIGURE 1

Maine East-West Corridor Feasibility Study



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TOTAL ESTIMATED AVERAGE DAILY TOLL TRANSACTIONS

Corridor C-1: 2015 Levels

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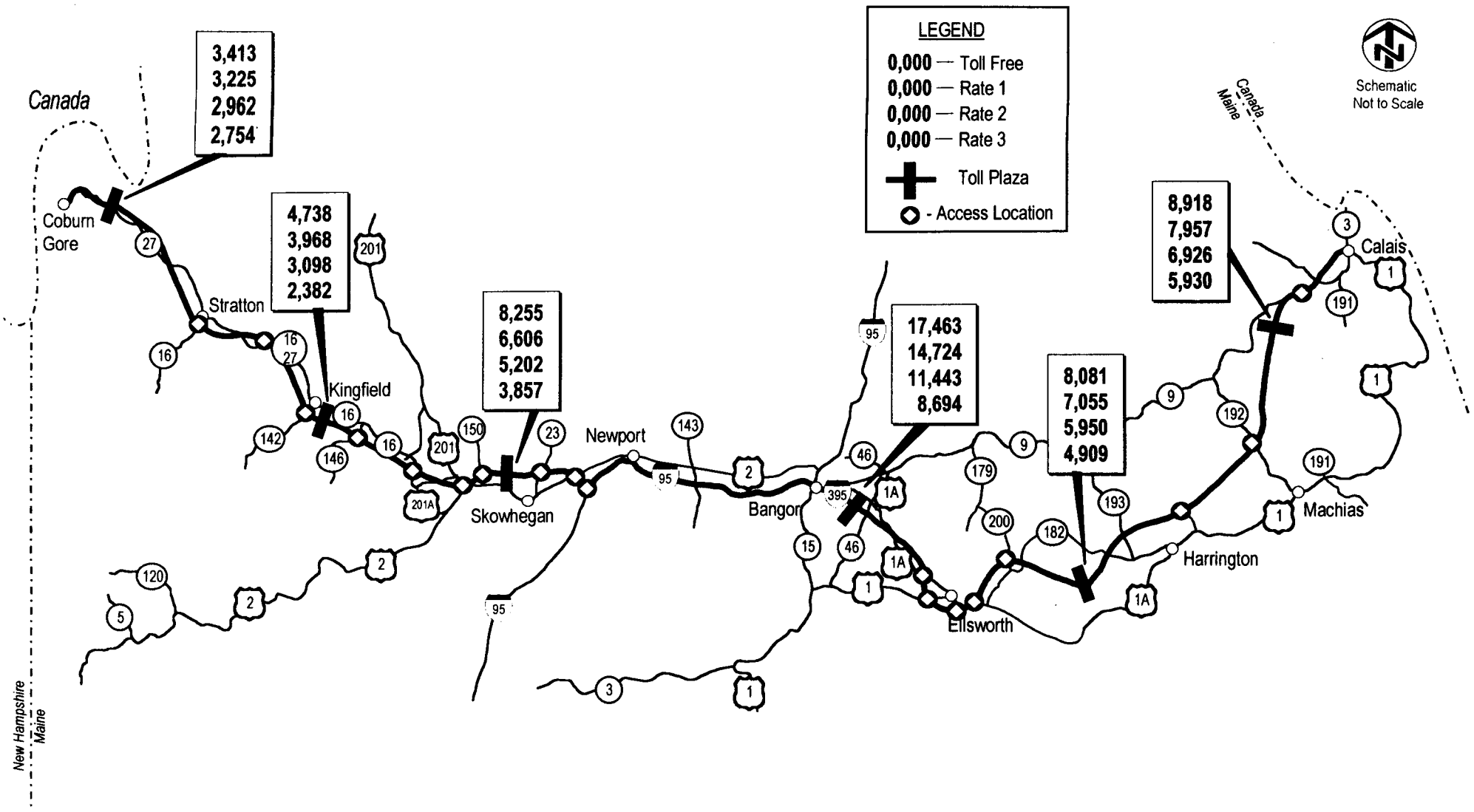
FIGURE 2

Maine East-West Corridor Feasibility Study



Note: Toll free traffic volumes provided by Kevin Hooper Associates.

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TOTAL ESTIMATED AVERAGE DAILY TOLL TRANSACTIONS
Corridor D: 2015 Levels

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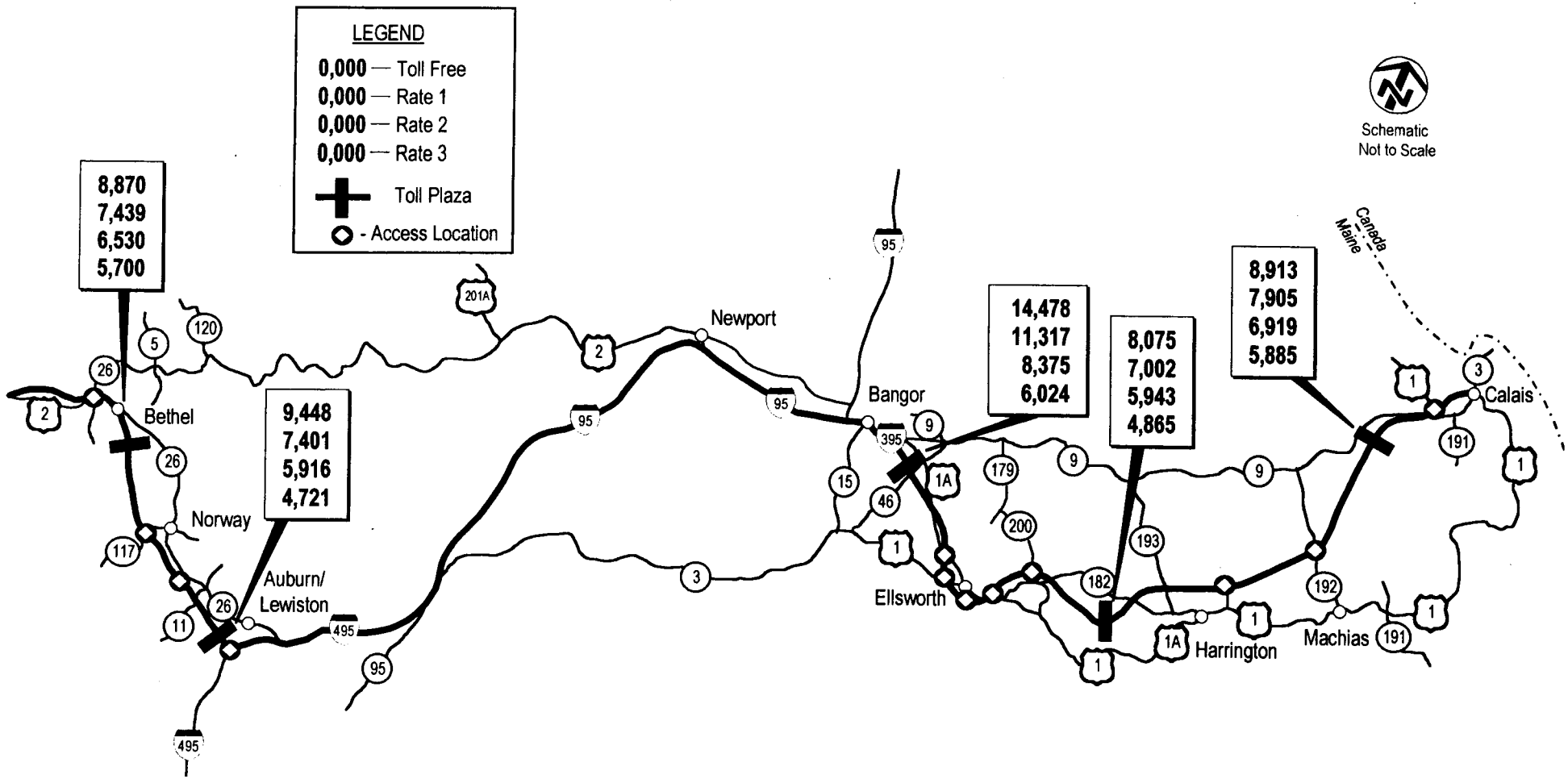
FIGURE 3

Maine East-West Corridor Feasibility Study



Note: Toll free traffic volumes provided by Kevin Hooper Associates.

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TOTAL ESTIMATED AVERAGE DAILY TOLL TRANSACTIONS
Corridor E: 2015 Levels

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FIGURE 4

road for the most part, with climbing lanes provided on steep grades. All current access points to Routes 9 and 2 would remain under this scenario.

Corridor C-1 (Figure 2): This alignment is identical to Corridor B in the east. It also includes an upgrade of Route 2 beginning in Newport and the Skowhegan bypass. This corridor then extends northward along the existing alignment of Routes 201A, 16 and 27, ending at the Canadian border in Coburn Gore. As with Corridor B, it too would remain largely a two-lane facility. All current access points to Routes 9 and 16/27 would remain under this scenario.

Corridor D (Figure 3): This alternative provides for construction of a new four-lane, limited-access, travel corridor. In the east, the project would begin in Calais, drop to an alignment roughly parallel with Route 1, and then extend northward next to Route 1A to a connection with Interstate 395. Interstate 95 would again connect the eastern and western segments of the proposed Corridor. The western segment would begin as a new four-lane road south of Newport, extend west to a point near Route 201A, and then travel northwest, parallel to Route 16/27. As with Corridor C-1, this alignment would also end at the Canadian border in Coburn Gore. This would be a limited-access road with access points provided as shown in Figure 3.

Corridor E (Figure 4): This alignment is identical to Corridor D in the east. The western segment provides improved access for residents of southern Maine travelling to and from the northwest. A new four-lane road would be constructed from Interstate 495 (the Maine Turnpike) just south of the Auburn/Lewiston area, parallel to Routes 26 and 2, and extending to the New Hampshire border. As with Corridor D, this would be a limited-access road with access points provided as shown in Figure 4.

Again, these corridor descriptions assume a level of specificity not intended in the corridors developed by MDOT. If any of the project alignments merit further analysis, it may be necessary to model slightly different alignments and/or access points in order to determine the potential impacts on estimated toll revenue.

DEVELOPMENT OF TOLLING CONFIGURATIONS AND TOLL RATES

Figures 1 through 4 also provide an indication of the toll plaza locations selected for each Corridor. For purposes of this preliminary traffic and toll revenue assessment, it was determined that an "open barrier" type of toll collection would be most appropriate. Under the open barrier configurations shown here, a fixed toll rate is charged at mainline plazas spaced at generally equal distances. Tolls are assessed in both directions. Plazas are located to capture the majority of traffic, but taking into consideration the need to minimize the potential for toll diversion. Some toll-free travel would be possible under the toll configurations selected for this study, though the majority of trips would be required to either pass through a toll plaza, or divert to an alternative route.

The two principal alternative tolling options would be a "ticket system" and a "closed barrier" configuration. Under a ticket system, a motorist is handed a ticket upon entering the toll road and surrenders the ticket upon exit, paying for the exact mileage traveled on the facility. Under a closed barrier system, barrier toll plazas are located such that no toll-free travel is permitted. All interchanges not adjacent to a mainline toll plaza would need to have ramp toll plazas in order to prohibit potential toll-free movements. These alternatives may be worth considering under the following conditions:

- Relatively high traffic volumes are expected on the project;
- Relatively few access points are available along the project; and
- A relatively high proportion of trips are of very short length.

None of these conditions exist in the four Corridor alignments analyzed for this study. The cost of constructing and operating the number of toll plazas required to cover all access points in these Corridors would far outweigh the toll revenue they would collect. As a result, the ticket system and closed barrier toll collection options were not considered as viable options for these corridors.

A total of seven mainline barrier toll plazas were tested for the Corridor B alignment, six for Corridor C-1, six for Corridor D, and five for Corridor E. Again, these locations were selected so as to intercept the maximum number of trips in the corridor, while attempting to minimize opportunities for toll evasion. A second consideration was to space the mainline plazas such that long-distance travelers would have a minimum of about 25 miles between toll stops. The most closely spaced plazas occur in Corridor B on Route 2. This is the most highly populated corridor any of the projects traverse and it was necessary to locate plazas between all major population centers in order to eliminate a potentially high volume of toll-free travel.

It should be pointed out that while it is technically feasible to convert an existing two-lane road to a toll facility (as are Corridors B and C-1), the vast majority of toll roads in the United States provide a minimum of four-travel lanes. The last major toll corridor constructed with only two-lanes was the West Virginia Turnpike. By 1987, however, the entire West Virginia Turnpike had been converted to a four-lane facility.

Table 1 identifies the range of toll rates tested in this analysis. The rates shown represent the tolls assessed at each plaza. Passenger car rates of $0.50 to $1.50, and commercial vehicle rates of $1.50 to $4.50 were tested. At the low end, this represents a passenger car per mile rate of less than $0.02 per mile for through trips in each Corridor. The highest rates represent passenger car per mile rates of almost $0.05. This range encompasses rates assessed on similar toll facilities in the region.

Table 1
Proposed Toll Rates to Test (1)
Maine East-West Corridor Feasibility Study

Toll Scenario	Passenger Car Rate	Commercial Vehicle Rate
Rate 1	$0.50	$1.50
Rate 2	1.00	3.00
Rate 3	1.50	4.50

(1) The toll rates presented in this table represent the rate to be tested at each toll plaza.

TRAFFIC AND REVENUE TOLL SENSITIVITY

As mentioned above, KHA and MDOT provided WSA with estimated 2015 and 2030 level toll-free traffic volumes for each project corridor. Additional information included the number of long- versus short-distance trips passing by each toll plaza location. WSA conducted a toll diversion analysis based on a comparison of the cost of using the toll corridor (including the toll) versus that of the most likely alternative route. Where a relatively good alternative route exists, much higher toll evasion rates would be expected, especially at the higher toll levels. WSA selected alternative routes to analyze for each toll plaza and corridor, and KHA/MDOT provided the corresponding travel times and distances used in the TRIPS model.

Toll evasion implies that a trip will continue to be made, although via an alternative route. When tolls are placed on existing roads, however, there is often some level of trip reduction for those local trips with no viable alternative route. This would be especially true for discretionary trips. A trip reduction analysis was conducted for Corridors B and C-1 for short distance car and truck trips. Traffic reduction impacts ranged from 4 to 10 percent for passenger cars over the range of toll rates tested, and between 1.5 and 3.5 percent for trucks. Trucks are much less sensitive to

trip reduction since commercial trips are generally not discretionary and toll charges can often be passed along to customers.

Figures 1 through 4 identify the results of WSA's toll sensitivity analysis for each Corridor at 2015 levels. Total toll-free average daily traffic volumes are provided as well as estimated toll traffic at each of the three rates tested. All volumes shown represent total two-directional traffic.

In Corridor B (Figure 1) the most sensitive plaza was estimated to be that between Newport and Skowhegan; Rate 3 traffic volumes are only about 50 percent of toll-free traffic at this location. The least sensitive plaza is located between Route 46 and Route 180; it is estimated that only about 16 percent of toll-free traffic would avoid this plaza at the highest toll rate tested. In Corridor C-1 (Figure 2), the eastern segment volumes are nearly identical to those in Corridor B. The least sensitive plaza under this scenario is that located on Route 27 south of Stratton. Due to the lack of easy alternative routes, only about 15.6 percent of toll-free traffic is eliminated at Toll Rate 3.

Considerably more toll diversion occurs when Corridors D and E are considered (Figures 3 and 4). No trip reduction was applied to these plazas, but use of the existing roadway system nearly always provides a viable alternative to the toll routing. In general, Rate 3 toll traffic drops to between 50 and 60 percent of estimated toll-free traffic. One major exception is the westernmost plaza (near Coburn Gore) in Corridor D. Only about 20 percent of toll-free traffic is lost at this location due to the relatively long alternative route. Motorists would have to travel approximately 30 miles between Coburn Gore and Stratton on the very mountainous and narrow Route 27.

Figures 5 through 8 provide the same information at estimated 2030 levels. The same patterns are exhibited in 2030 as in 2015. The 2030 traffic volumes include the added impacts resulting from any economic development that is estimated to have occurred as a result of the new or upgraded travel corridor. All economic development related impacts were developed by other consultants.

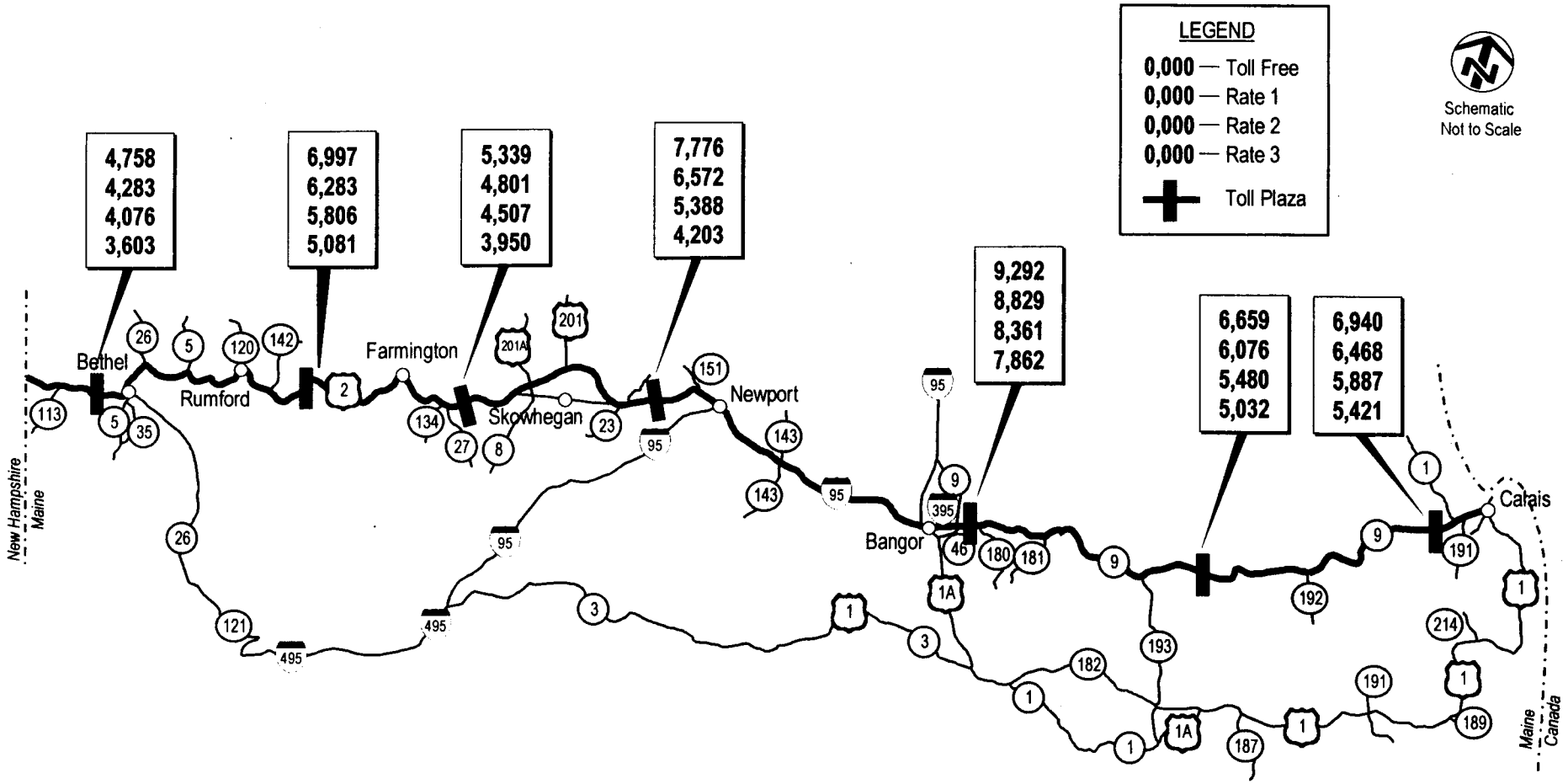
Table 2 provides a summary of total systemwide traffic impacts for all toll rates tested, as well as the resulting estimated annual toll revenue. Information is provided for each Corridor, and for passenger cars and commercial vehicles separately. This table also shows the percent of toll-free traffic expected at each toll rate for all toll transactions combined. As indicated above, Corridors B and C-1 are less sensitive to tolls than Corridors D and E. Over 70 percent of toll-free traffic remains in Corridors B and C-1 at Rate 3 levels (in 2015), while only about 55 percent remains in Corridors D and E.

The lowest toll revenue is estimated to be produced with the Corridor C-1 alignment; the greatest revenue is produced by Corridor D. Corridor E produces the second greatest toll revenue assuming Rates 1 and 2, but is surpassed by Corridor B assuming Rate 3. Table 3 presents the

Table 2
Estimated 2015 and 2030 Total Traffic and Revenue Toll Sensitivity (1)
Maine East-West Corridor Feasibility Study

Alignment	Average Daily Toll Transactions: Passenger Cars	Commercial Vehicles	Total	Percent of Toll Free	Annual Toll Revenue: Passenger Cars	Commercial Vehicles	Total
	Year 2015 Levels				(------ in thousands ------)		
Corridor B							
Toll-Free	33,431	6,829	40,260	100.0	---	---	---
Toll Rate 1	30,067	6,007	36,074	89.6	$5,487	$3,289	$8,776
Toll Rate 2	27,244	5,491	32,735	81.3	9,944	6,013	15,957
Toll Rate 3	23,951	4,673	28,624	71.1	13,113	7,675	20,789
Corridor C-1							
Toll-Free	29,522	5,196	34,718	100.0	---	---	---
Toll Rate 1	26,575	4,838	31,413	90.5	$4,850	$2,649	$7,499
Toll Rate 2	23,901	4,459	28,360	81.7	8,724	4,883	13,606
Toll Rate 3	21,037	4,105	25,142	72.4	11,518	6,742	18,260
Corridor D							
Toll-Free	38,415	12,453	50,868	100.0	---	---	---
Toll Rate 1	32,252	11,283	43,535	85.6	$5,886	$6,177	$12,063
Toll Rate 2	25,688	9,893	35,581	69.9	9,376	10,833	20,209
Toll Rate 3	20,069	8,457	28,526	56.1	10,988	13,891	24,878
Corridor E							
Toll-Free	41,687	8,097	49,784	100.0	---	---	---
Toll Rate 1	34,605	6,459	41,064	82.5	$6,315	$3,536	$9,852
Toll Rate 2	28,555	5,128	33,683	67.7	10,423	5,615	16,038
Toll Rate 3	23,406	3,789	27,195	54.6	12,815	6,223	19,038
	Year 2030 Levels						
Corridor B							
Toll-Free	39,868	7,893	47,761	100.0	---	---	---
Toll Rate 1	36,303	7,009	43,312	90.7	$6,625	$3,837	$10,463
Toll Rate 2	33,083	6,422	39,505	82.7	12,075	7,032	19,107
Toll Rate 3	29,617	5,535	35,152	73.6	16,215	9,091	25,307
Corridor C-1							
Toll-Free	38,939	6,356	45,295	100.0	---	---	---
Toll Rate 1	35,267	5,959	41,226	91.0	$6,436	$3,263	$9,699
Toll Rate 2	31,986	5,514	37,500	82.8	11,675	6,038	17,713
Toll Rate 3	28,408	5,113	33,521	74.0	15,553	8,398	23,951
Corridor D							
Toll-Free	48,575	16,965	65,540	100.0	---	---	---
Toll Rate 1	41,054	15,572	56,626	86.4	$7,492	$8,526	$16,018
Toll Rate 2	33,055	13,821	46,876	71.5	12,065	15,134	27,199
Toll Rate 3	26,235	12,065	38,300	58.4	14,364	19,817	34,180
Corridor E							
Toll-Free	51,888	10,063	61,951	100.0	---	---	---
Toll Rate 1	43,819	8,127	51,946	83.9	$7,997	$4,450	$12,447
Toll Rate 2	36,844	6,537	43,381	70.0	13,448	7,158	20,606
Toll Rate 3	30,777	4,945	35,722	57.7	16,850	8,122	24,973

(1) All toll free traffic volumes were provided by Kevin Hooper Associates.



Note: Toll free traffic volumes provided by Kevin Hooper Associates.

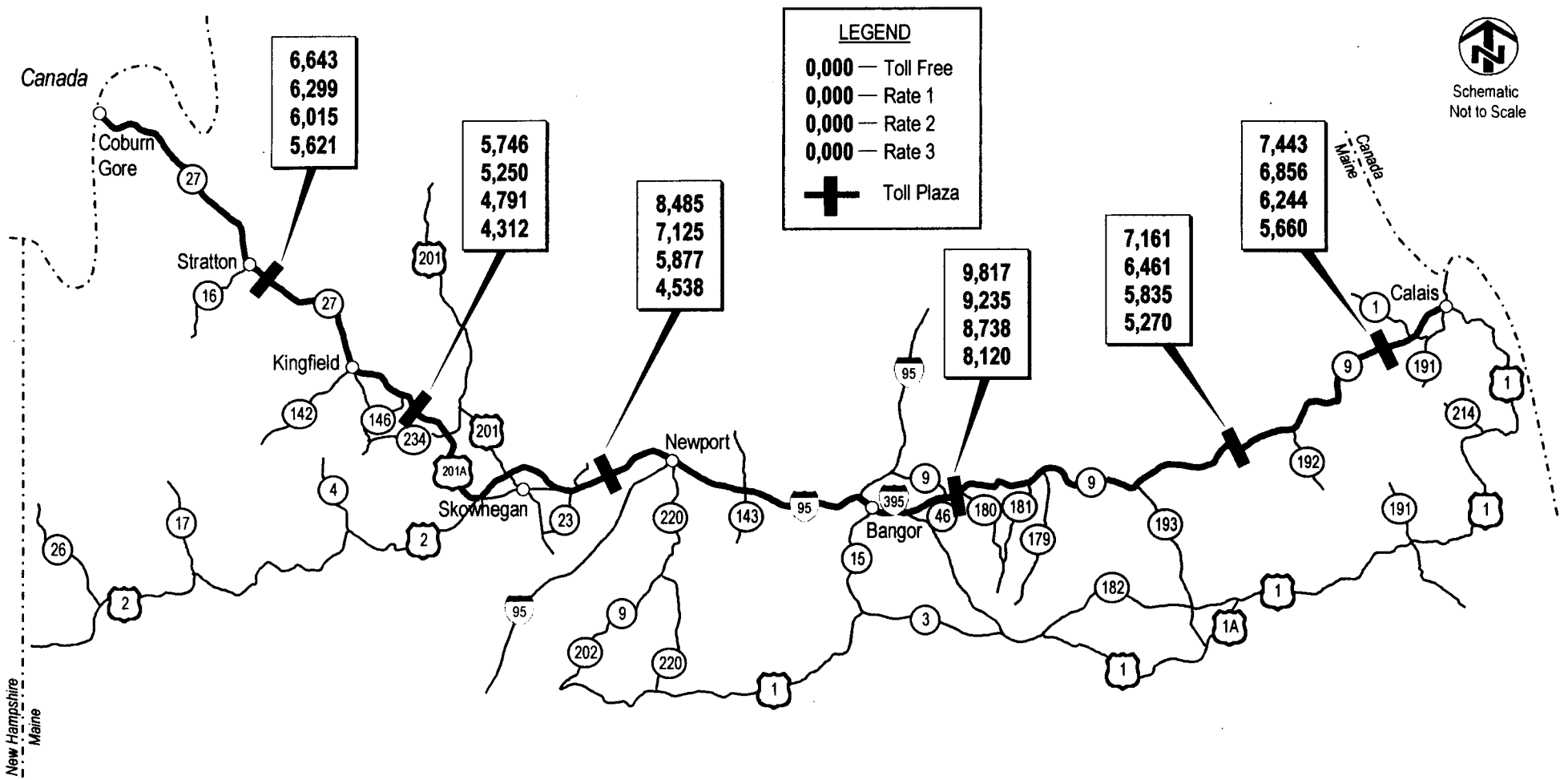
The corridor alignment shown was assumed for toll analysis purposes only. It should not be presumed to represent a recommended corridor alignment.

TOTAL ESTIMATED AVERAGE DAILY TOLL TRANSACTIONS
Corridor B: 2030 Levels

WILBUR SMITH ASSOCIATES

FIGURE 5

Maine East-West Corridor Feasibility Study



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TOTAL ESTIMATED AVERAGE DAILY TOLL TRANSACTIONS

Corridor C-1: 2030 Levels

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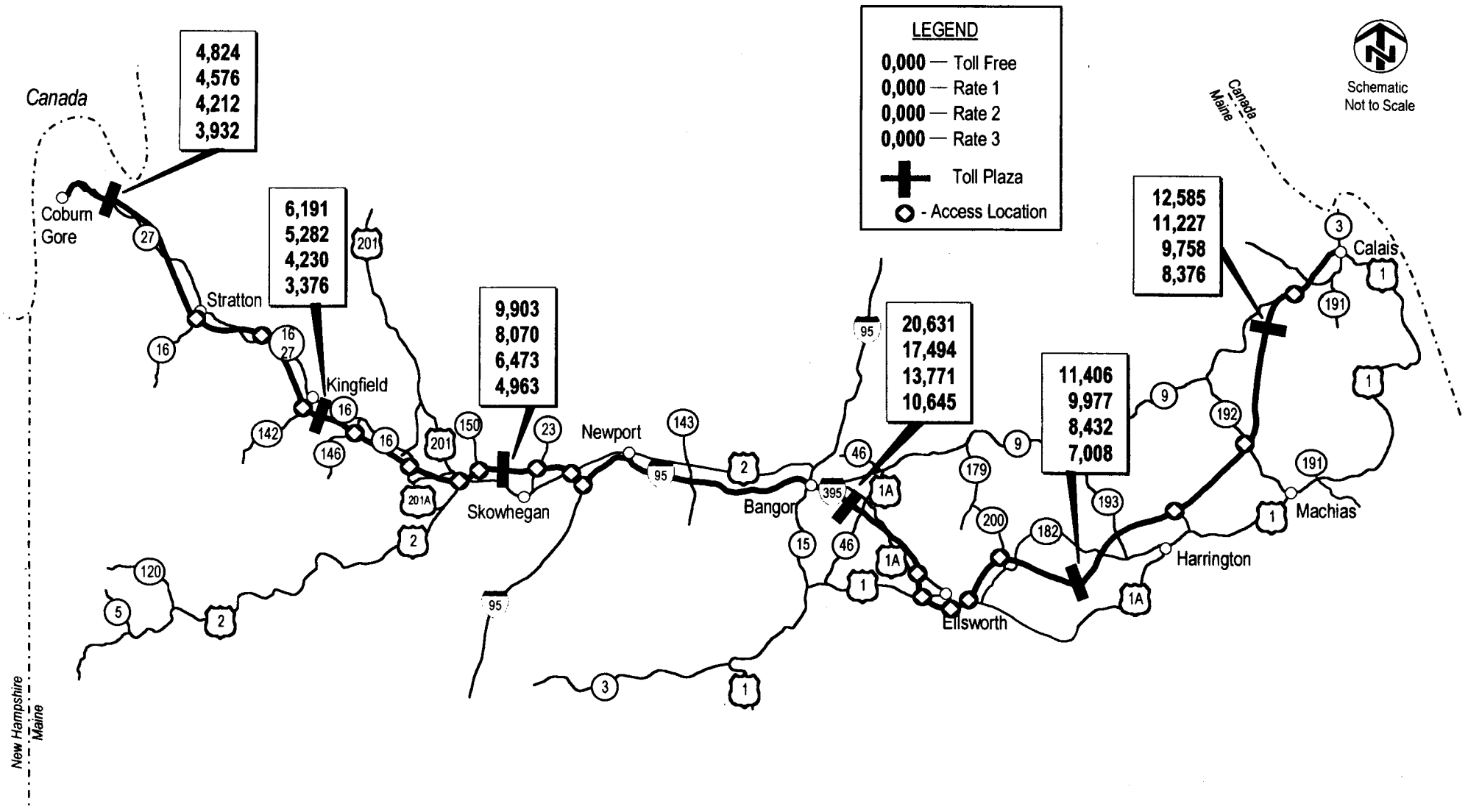
FIGURE 6

Maine East-West Corridor Feasibility Study



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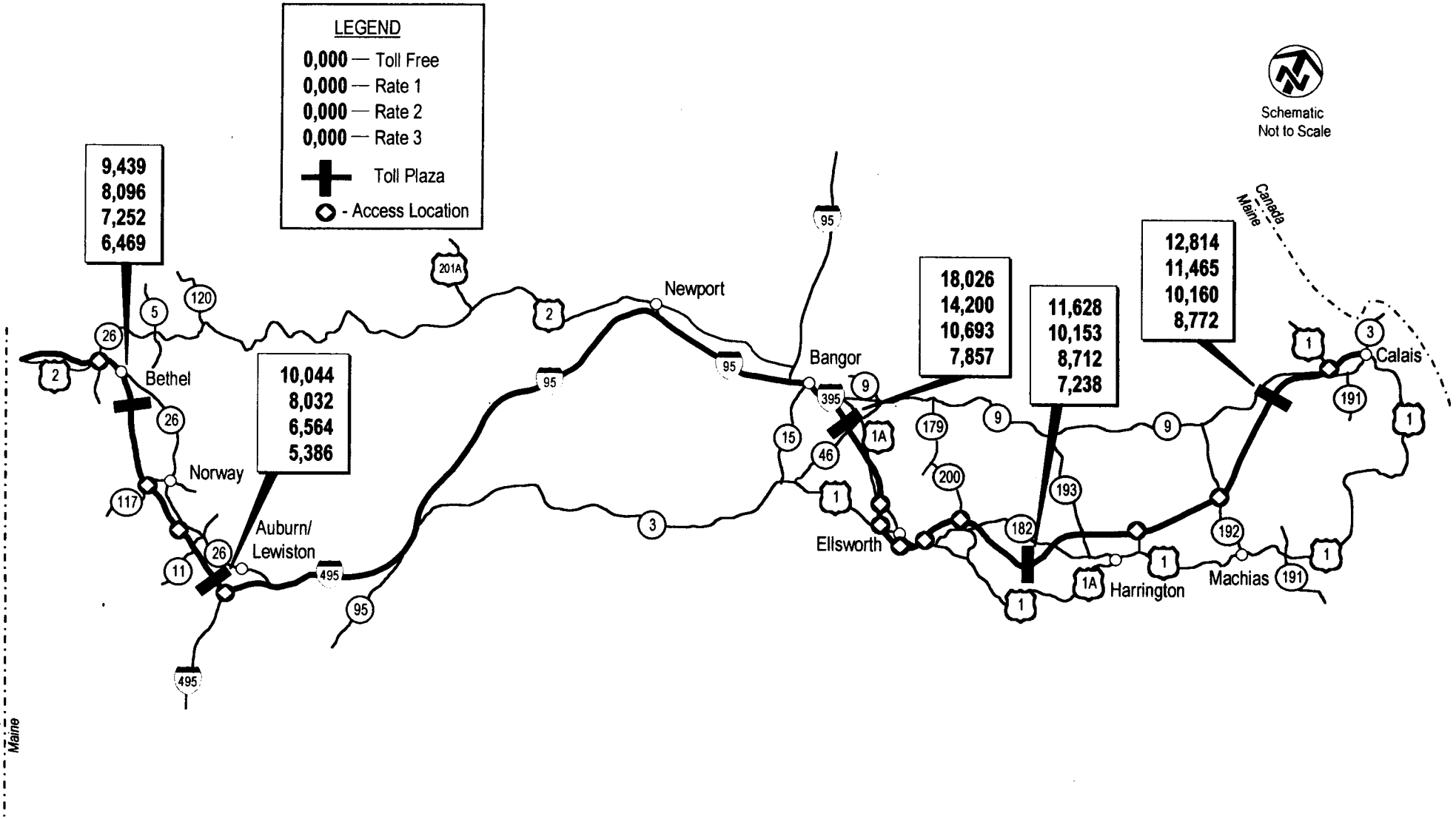
TOTAL ESTIMATED AVERAGE DAILY TOLL TRANSACTIONS
Corridor D: 2030 Levels

WILBUR SMITH ASSOCIATES

FIGURE 7

Maine East-West Corridor Feasibility Study



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TOTAL ESTIMATED AVERAGE DAILY TOLL TRANSACTIONS
Corridor E: 2030 Levels

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FIGURE 8

Table 3

Estimated Annual Gross Toll Revenue For Each Rate Tested (1)

Maine East-West Corridor Feasibility Study

In Thousands

	Total Annual Gross Toll Revenue (2)											
	Corridor B			Corridor C-1			Corridor D			Corridor E		
Year	Rate 1	Rate 2	Rate 3	Rate 1	Rate 2	Rate 3	Rate 1	Rate 2	Rate 3	Rate 1	Rate 2	Rate 3
2015	$8,776	$15,957	$20,789	$7,499	$13,606	$18,260	$12,063	$20,209	$24,878	$9,852	$16,038	$19,038
2016	8,879	16,149	21,063	7,628	13,847	18,593	12,294	20,612	25,409	10,006	16,308	19,386
2017	8,984	16,344	21,340	7,760	14,092	18,931	12,528	21,023	25,952	10,164	16,583	19,740
2018	9,090	16,542	21,622	7,894	14,342	19,276	12,767	21,443	26,506	10,323	16,862	20,100
2019	9,197	16,742	21,907	8,030	14,596	19,627	13,011	21,871	27,073	10,485	17,146	20,467
2020	9,305	16,944	22,196	8,169	14,854	19,985	13,259	22,308	27,651	10,650	17,435	20,840
2021	9,415	17,149	22,489	8,310	15,118	20,350	13,512	22,754	28,243	10,817	17,729	21,221
2022	9,526	17,356	22,786	8,454	15,386	20,721	13,770	23,209	28,847	10,987	18,028	21,608
2023	9,638	17,566	23,086	8,600	15,659	21,099	14,033	23,673	29,464	11,160	18,331	22,002
2024	9,752	17,778	23,391	8,749	15,937	21,484	14,301	24,147	30,095	11,335	18,640	22,404
2025	9,867	17,993	23,700	8,900	16,219	21,877	14,573	24,630	30,740	11,513	18,954	22,813
2026	9,983	18,210	24,013	9,055	16,507	22,277	14,852	25,124	31,399	11,694	19,274	23,229
2027	10,101	18,431	24,330	9,211	16,801	22,684	15,135	25,627	32,072	11,878	19,599	23,654
2028	10,220	18,653	24,651	9,371	17,099	23,099	15,424	26,140	32,759	12,064	19,929	24,085
2029	10,341	18,879	24,977	9,533	17,403	23,521	15,718	26,664	33,462	12,254	20,265	24,525
2030	10,463	19,107	25,307	9,699	17,713	23,951	16,018	27,199	34,180	12,447	20,606	24,973

(1) Rate 1 relates to a passenger car per plaza rate of $0.50, with Rate 2 equal to $1.00, and Rate 3 equal to $1.50.

(2) A straight line growth approach was used to develop all intermediate revenue values between 2015 and 2030.

total gross toll revenue streams between the estimated 2015 and 2030 values shown in Table 2. No intermediate year analyses were conducted. The values between 2015 and 2030 were "straight lined" using even growth increments for all years. These revenue streams provide the basic input to the financial feasibility analysis discussed below for each toll Corridor.

FINANCIAL FEASIBILITY ASSESSMENT

Financial feasibility of a new toll facility is generally measured by the extent to which estimated annual net toll revenue will cover estimated annual debt service requirements. In toll facility finance, bonds are normally issued prior to project construction to fund the cost of design, right-of-way acquisition and facility construction. Bonds would typically have a fairly long term, say 30 years. The amount of principal and interest to be repaid each year is a function of the bond issue size, interest rate and the method used to issue the debt.

While there is a wide range of innovative bonding techniques, there are two overall categories which may be discussed in a preliminary study of this nature. Revenue bonds are essentially non-recourse financing, in which the repayment of the principal and interest is only through revenues collected on the toll facility itself. With revenue bonds there is no government guarantee that debt will be repaid; hence, there is a higher risk to potential investors and consequently a higher interest rate is quite common.

General obligation bonds normally involve some form of government guarantee, where a government entity pledges its taxing power to guarantee repayment of the debt, and will essentially make up any shortfall between actual net revenue and annual debt service. In this case, there is much less risk to potential bond holders and interest rates would normally be lower.

Beyond the interest rates themselves, there are some other significant differences between general obligation and revenue bond financing. They can significantly influence the bonding capacity which can be generated by a given set of projected annual revenues. These will be discussed in more detail below.

The ability of net toll revenue to meet debt service requirements was tested assuming both General Obligation Bonds and Revenue Bonds in this analysis. Clearly, interest rate levels could vary significantly by the time actual project financing would take place, but for purposes of this analysis, 5 percent interest rates were assumed for General Obligation Bonds and 7 percent rates for Revenue Bonds. All analyses conducted here are in constant 1999 dollars. Estimated capital costs, maintenance and operating costs, and toll revenue were all developed at 1999 levels and not allowed to inflate over time. This is a reasonable approach for this level of analysis, and still allows for a comparison of the relative feasibility of each of the four Corridors. This approach also eliminates the need to assume periodic toll rate increases to keep up with inflation.

Table 4 provides information used to develop estimated debt service requirements for each Corridor. While a constant 30-year bond term is assumed for all four Corridors, the actual bond earning period is assumed to be different for Corridors B and C-1, compared to Corridors D and E. The difference between the bond term and bond earning period is the time it takes to build the toll facility and begin collecting toll revenue. Since Corridors B and C-1 require little construction of new roadway, the bond earning period was assumed to be 27 years. For purposes of this analysis, the bond earning period was reduced to 25 years for Corridors D and E to account for the additional construction time.

Capital costs associated with each Corridor are also provided in Table 4. All roadway construction, design and right-of-way costs were provided by MDOT, while all toll plaza related costs were prepared by WSA. As would be expected, Corridors B and C-1 are estimated to cost far less than the new four-lane toll roads envisioned for Corridors D and E.

The actual bond issue size, however, is larger than the estimated capital costs. Under General Obligation Bond financing, it is traditional to assume a ratio of project to bond issue size of about 1.12 to reflect bond sales expenses and capitalization of interest during construction. For Revenue Bond financing, the ratio is larger (1.25) to reflect slightly higher bond sales expenses and to meet debt service reserve requirements.

Finally, Table 4 provides the estimated annual debt service for each Corridor, under both General Obligation and Revenue Bond financing assumption. Assuming General Obligation Bond financing, annual debt service requirements range from $14.5 million for Corridor B to $94.7 million for Corridor D. When Revenue Bonds are considered, the range increases from $19.8 million for Corridor B to $127.8 million for Corridor D.

Net toll revenues are developed by deducting roadway maintenance and toll plaza maintenance and operating (M&O) costs from gross toll revenues. Table 5 shows all assumptions regarding estimated annual M&O costs. As indicated in Table 5, all roadway costs were provided by MDOT, while toll plaza costs were developed by WSA. Given the relatively similar lengths of each corridor, and similar number of toll plazas, it is not surprising that relatively little difference exists between the four Corridors. Total M&O costs range from $5.2 million per year for Corridor E to $6.9 million with Corridor D.

Tables 6 through 9 provide summaries of the financial feasibility analyses conducted for each Corridor. Only toll revenue based on Rate 3 tolls were assumed here, since the two lower toll rates fell far short of financial feasibility. These tables provide information regarding debt service coverage ratios and the expected revenue surplus or shortfall. A sensitivity test was conducted in each Corridor to determine the effect of eliminating roadway maintenance costs from the financial analysis.

The financial community generally considers a debt service coverage ratio of 1.0 to be sufficient for General Obligation Bonds and 1.3 for Revenue Bonds. As shown in Table 6, Corridor B meets the requirement only for General Obligation Bond financing. A slight revenue surplus is

Table 4

Estimated Level Debt Service Requirements

Maine East-West Corridor Feasibility Study
In Thousands of 1999 Dollars

	Corridor B	Corridor C-1	Corridor D	Corridor E
Bond Term	30 Years	30 Years	30 Years	30 Years
Bond Earning Period	27 Years	27 Years	25 Years	25 Years
Capital Cost (1)	$190,080	$235,600	$1,191,150	$814,000
	General Obligation Bonds			
Bond Issue Size (2)	$212,890	$263,872	$1,334,088	$911,680
Annual Debt Service (3)	$14,539	$18,021	$94,658	$64,687
	Revenue Bonds			
Bond Issue Size (4)	$237,600	$294,500	$1,488,938	$1,017,500
Annual Debt Service (3)	$19,822	$24,569	$127,767	$87,313

(1) Includes roadway and toll plaza construction costs as well as all design and right-of-way costs.
(2) Assumes a General Obligation Bond ratio of project cost to bond issue size of 1.12 to reflect bond sales expenses, and capitalization of interest during construction.
(3) Assumes interest rates of 5 percent for General Obligation Bonds and 7 percent for Revenue Bonds.
(4) Assumes a Revenue Bond ratio of project cost to bond issue size of 1.25 to reflect bond sales expenses, debt service reserves and capitalization of interest during construction.

SOURCE: Roadway, design and right-of-way capital cost estimates for each alignment were provided by the Maine Department of Transportation; all toll plaza related costs were developed by by Wilbur Smith Associates.

Table 5
Estimated Annual Maintenance and Operating Costs
Maine East-West Corridor Feasibility Study
In Thousands of 1999 Dollars

Project Alignment	Roadway Maintenance Costs (1)	Toll Plaza Maintenance and Operating Costs (2)	Total Maintenance and Operating Costs
Corridor B	$2,502	$3,500	$6,002
Corridor C-1	2,478	3,000	5,478
Corridor D	3,904	3,000	6,904
Corridor E	2,683	2,500	5,183

(1) Roadway maintenance costs are based on a two-lane road for Corridor's B and C-1, and on a four-lane road for Corridor's D and E.
(2) Toll plaza costs assume an average of ten full time employees per week and an average of four lanes per toll plaza.
SOURCE: Roadway maintenance costs were provided by Maine DOT. Toll plaza related costs were developed by WSA.

Table 6
Corridor B Financial Feasibility Analysis
Maine East-West Corridor Feasibility Study
Assuming Toll Rate 3 (1)

In Thousands of 1999 Dollars

	Assuming a General Obligation Bond (2)							Assuming a Revenue Bond (2)						
		Including All M&O Costs			Excluding Roadway Maintenance				Including All M&O Costs			Excluding Roadway Maintenance		
Year	Annual Debt Service (3)	Annual Net Toll Revenue (4)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Net Toll Revenue (5)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Debt Service (3)	Annual Net Toll Revenue (4)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Net Toll Revenue (5)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)
2015	$14,539	$14,787	1.02	$248	$17,289	1.19	$2,750	$19,822	$14,787	0.75	($5,035)	$17,289	0.87	($2,533)
2016	14,539	15,061	1.04	522	17,563	1.21	3,024	19,822	15,061	0.76	(4,761)	17,563	0.89	(2,259)
2017	14,539	15,339	1.06	800	17,840	1.23	3,301	19,822	15,339	0.77	(4,483)	17,840	0.90	(1,982)
2018	14,539	15,620	1.07	1,081	18,122	1.25	3,583	19,822	15,620	0.79	(4,202)	18,122	0.91	(1,700)
2019	14,539	15,905	1.09	1,366	18,407	1.27	3,868	19,822	15,905	0.80	(3,917)	18,407	0.93	(1,415)
2020	14,539	16,194	1.11	1,655	18,696	1.29	4,157	19,822	16,194	0.82	(3,628)	18,696	0.94	(1,126)
2021	14,539	16,487	1.13	1,948	18,989	1.31	4,450	19,822	16,487	0.83	(3,335)	18,989	0.96	(833)
2022	14,539	16,784	1.15	2,245	19,286	1.33	4,747	19,822	16,784	0.85	(3,038)	19,286	0.97	(536)
2023	14,539	17,085	1.18	2,546	19,586	1.35	5,047	19,822	17,085	0.86	(2,737)	19,586	0.99	(236)
2024	14,539	17,389	1.20	2,850	19,891	1.37	5,352	19,822	17,389	0.88	(2,433)	19,891	1.00	69
2025	14,539	17,698	1.22	3,159	20,200	1.39	5,661	19,822	17,698	0.89	(2,124)	20,200	1.02	378
2026	14,539	18,011	1.24	3,472	20,513	1.41	5,974	19,822	18,011	0.91	(1,811)	20,513	1.03	691
2027	14,539	18,328	1.26	3,789	20,830	1.43	6,291	19,822	18,328	0.92	(1,494)	20,830	1.05	1,008
2028	14,539	18,649	1.28	4,110	21,151	1.45	6,612	19,822	18,649	0.94	(1,173)	21,151	1.07	1,329
2029	14,539	18,975	1.31	4,436	21,477	1.48	6,938	19,822	18,975	0.96	(847)	21,477	1.08	1,655
2030	14,539	19,305	1.33	4,766	21,807	1.50	7,268	19,822	19,305	0.97	(517)	21,807	1.10	1,985

(1) Toll rate 3 represents a per plaza passenger car rate of $1.50 and a commercial vehicle rate of $4.50.
(2) Assumes a 5 percent interest rate for General Obligation Bonds, and a 7 percent interest rate for Revenue Bonds.
(3) See Table 4 for development of annual debt service requirements.
(4) Net toll revenues were developed by subtracting all maintenance and operating costs from estimated annual gross toll revenues.
(5) Net toll revenues were developed by subtracting only toll plaza related maintenance and operating costs from estimated annual gross toll revenues.

Table 7
Corridor C-1 Financial Feasibility Analysis
Maine East-West Corridor Feasibility Study
Assuming Toll Rate 3 (1)

In Thousands of 1999 Dollars

	Assuming a General Obligation Bond (2)							Assuming a Revenue Bond (2)						
		Including All M&O Costs			Excluding Roadway Maintenance				Including All M&O Costs			Excluding Roadway Maintenance		
Year	Annual Debt Service (3)	Annual Net Toll Revenue (4)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Net Toll Revenue (5)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Debt Service (3)	Annual Net Toll Revenue (4)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Net Toll Revenue (5)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)
2015	$18,021	$12,782	0.71	($5,239)	$15,260	0.85	($2,761)	$24,569	$12,782	0.52	($11,787)	$15,260	0.62	($9,309)
2016	18,021	13,115	0.73	(4,906)	15,593	0.87	(2,428)	24,569	13,115	0.53	(11,454)	15,593	0.63	(8,976)
2017	18,021	13,453	0.75	(4,568)	15,931	0.88	(2,090)	24,569	13,453	0.55	(11,116)	15,931	0.65	(8,638)
2018	18,021	13,798	0.77	(4,223)	16,276	0.90	(1,745)	24,569	13,798	0.56	(10,771)	16,276	0.66	(8,293)
2019	18,021	14,149	0.79	(3,872)	16,627	0.92	(1,394)	24,569	14,149	0.58	(10,420)	16,627	0.68	(7,942)
2020	18,021	14,507	0.81	(3,514)	16,985	0.94	(1,036)	24,569	14,507	0.59	(10,062)	16,985	0.69	(7,584)
2021	18,021	14,872	0.83	(3,149)	17,350	0.96	(671)	24,569	14,872	0.61	(9,697)	17,350	0.71	(7,219)
2022	18,021	15,243	0.85	(2,778)	17,721	0.98	(300)	24,569	15,243	0.62	(9,326)	17,721	0.72	(6,848)
2023	18,021	15,621	0.87	(2,400)	18,099	1.00	78	24,569	15,621	0.64	(8,948)	18,099	0.74	(6,470)
2024	18,021	16,006	0.89	(2,015)	18,484	1.03	463	24,569	16,006	0.65	(8,563)	18,484	0.75	(6,085)
2025	18,021	16,399	0.91	(1,622)	18,877	1.05	856	24,569	16,399	0.67	(8,170)	18,877	0.77	(5,692)
2026	18,021	16,799	0.93	(1,222)	19,277	1.07	1,256	24,569	16,799	0.68	(7,770)	19,277	0.78	(5,292)
2027	18,021	17,206	0.95	(815)	19,684	1.09	1,663	24,569	17,206	0.70	(7,363)	19,684	0.80	(4,885)
2028	18,021	17,621	0.98	(400)	20,099	1.12	2,078	24,569	17,621	0.72	(6,948)	20,099	0.82	(4,470)
2029	18,021	18,043	1.00	22	20,521	1.14	2,500	24,569	18,043	0.73	(6,526)	20,521	0.84	(4,048)
2030	18,021	18,473	1.03	452	20,951	1.16	2,930	24,569	18,473	0.75	(6,096)	20,951	0.85	(3,618)

(1) Toll rate 3 represents a per plaza passenger car rate of $1.50 and a commercial vehicle rate of $4.50.

(2) Assumes a 5 percent interest rate for General Obligation Bonds, and a 7 percent interest rate for Revenue Bonds.

(3) See Table 4 for development of annual debt service requirements.

(4) Net toll revenues were developed by subtracting all maintenance and operating costs from estimated annual gross toll revenues.

(5) Net toll revenues were developed by subtracting only toll plaza related maintenance and operating costs from estimated annual gross toll revenues.

Table 8
Corridor D Financial Feasibility Analysis
Maine East-West Corridor Feasibility Study
Assuming Toll Rate 3 (1)

In Thousands of 1999 Dollars

	Assuming a General Obligation Bond (2)							Assuming a Revenue Bond (2)						
		Including All M&O Costs			Excluding Roadway Maintenance				Including All M&O Costs			Excluding Roadway Maintenance		
Year	Annual Debt Service (3)	Annual Net Toll Revenue (4)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Net Toll Revenue (5)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Debt Service (3)	Annual Net Toll Revenue (4)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Net Toll Revenue (5)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)
2015	$94,658	$17,974	0.19	($76,684)	$21,878	0.23	($72,780)	$127,767	$17,974	0.14	($109,793)	$21,878	0.17	($105,889)
2016	94,658	18,505	0.20	(76,153)	22,409	0.24	(72,249)	127,767	18,505	0.14	(109,262)	22,409	0.18	(105,358)
2017	94,658	19,048	0.20	(75,610)	22,952	0.24	(71,706)	127,767	19,048	0.15	(108,719)	22,952	0.18	(104,815)
2018	94,658	19,602	0.21	(75,056)	23,506	0.25	(71,152)	127,767	19,602	0.15	(108,165)	23,506	0.18	(104,261)
2019	94,658	20,168	0.21	(74,490)	24,073	0.25	(70,585)	127,767	20,168	0.16	(107,599)	24,073	0.19	(103,694)
2020	94,658	20,747	0.22	(73,911)	24,651	0.26	(70,007)	127,767	20,747	0.16	(107,020)	24,651	0.19	(103,116)
2021	94,658	21,338	0.23	(73,320)	25,243	0.27	(69,415)	127,767	21,338	0.17	(106,429)	25,243	0.20	(102,524)
2022	94,658	21,943	0.23	(72,715)	25,847	0.27	(68,811)	127,767	21,943	0.17	(105,824)	25,847	0.20	(101,920)
2023	94,658	22,560	0.24	(72,098)	26,464	0.28	(68,194)	127,767	22,560	0.18	(105,207)	26,464	0.21	(101,303)
2024	94,658	23,191	0.24	(71,467)	27,095	0.29	(67,563)	127,767	23,191	0.18	(104,576)	27,095	0.21	(100,672)
2025	94,658	23,835	0.25	(70,823)	27,740	0.29	(66,918)	127,767	23,835	0.19	(103,932)	27,740	0.22	(100,027)
2026	94,658	24,494	0.26	(70,164)	28,399	0.30	(66,259)	127,767	24,494	0.19	(103,273)	28,399	0.22	(99,368)
2027	94,658	25,167	0.27	(69,491)	29,072	0.31	(65,586)	127,767	25,167	0.20	(102,600)	29,072	0.23	(98,695)
2028	94,658	25,855	0.27	(68,803)	29,759	0.31	(64,899)	127,767	25,855	0.20	(101,912)	29,759	0.23	(98,008)
2029	94,658	26,558	0.28	(68,100)	30,462	0.32	(64,196)	127,767	26,558	0.21	(101,209)	30,462	0.24	(97,305)
2030	94,658	27,276	0.29	(67,382)	31,180	0.33	(63,478)	127,767	27,276	0.21	(100,491)	31,180	0.24	(96,587)

(1) Toll rate 3 represents a per plaza passenger car rate of $1.50 and a commercial vehicle rate of $4.50.
(2) Assumes a 5 percent interest rate for General Obligation Bonds, and a 7 percent interest rate for Revenue Bonds.
(3) See Table 4 for development of annual debt service requirements.
(4) Net toll revenues were developed by subtracting all maintenance and operating costs from estimated annual gross toll revenues.
(5) Net toll revenues were developed by subtracting only toll plaza related maintenance and operating costs from estimated annual gross toll revenues.

Table 9

Corridor E Financial Feasibility Analysis

Maine East-West Corridor Feasibility Study
Assuming Toll Rate 3 (1)

In Thousands of 1999 Dollars

	Assuming a General Obligation Bond (2)							Assuming a Revenue Bond (2)						
		Including All M&O Costs			Excluding Roadway Maintenance				Including All M&O Costs			Excluding Roadway Maintenance		
Year	Annual Debt Service (3)	Annual Net Toll Revenue (4)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Net Toll Revenue (5)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Debt Service (3)	Annual Net Toll Revenue (4)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)	Annual Net Toll Revenue (5)	Debt Service Coverage Ratio	Revenue Surplus/ (Shortfall)
2015	$64,687	$13,855	0.21	($50,832)	$16,538	0.26	($48,149)	$87,313	$13,855	0.16	($73,458)	$16,538	0.19	($70,775)
2016	64,687	14,203	0.22	(50,484)	16,886	0.26	(47,801)	87,313	14,203	0.16	(73,110)	16,886	0.19	(70,427)
2017	64,687	14,556	0.23	(50,131)	17,240	0.27	(47,447)	87,313	14,556	0.17	(72,757)	17,240	0.20	(70,073)
2018	64,687	14,917	0.23	(49,770)	17,600	0.27	(47,087)	87,313	14,917	0.17	(72,396)	17,600	0.20	(69,713)
2019	64,687	15,284	0.24	(49,403)	17,967	0.28	(46,720)	87,313	15,284	0.18	(72,029)	17,967	0.21	(69,346)
2020	64,687	15,657	0.24	(49,030)	18,340	0.28	(46,347)	87,313	15,657	0.18	(71,656)	18,340	0.21	(68,973)
2021	64,687	16,038	0.25	(48,649)	18,721	0.29	(45,966)	87,313	16,038	0.18	(71,275)	18,721	0.21	(68,592)
2022	64,687	16,425	0.25	(48,262)	19,108	0.30	(45,579)	87,313	16,425	0.19	(70,888)	19,108	0.22	(68,205)
2023	64,687	16,819	0.26	(47,868)	19,502	0.30	(45,185)	87,313	16,819	0.19	(70,494)	19,502	0.22	(67,811)
2024	64,687	17,221	0.27	(47,466)	19,904	0.31	(44,783)	87,313	17,221	0.20	(70,092)	19,904	0.23	(67,409)
2025	64,687	17,630	0.27	(47,057)	20,313	0.31	(44,374)	87,313	17,630	0.20	(69,683)	20,313	0.23	(67,000)
2026	64,687	18,046	0.28	(46,641)	20,729	0.32	(43,958)	87,313	18,046	0.21	(69,267)	20,729	0.24	(66,584)
2027	64,687	18,470	0.29	(46,217)	21,154	0.33	(43,533)	87,313	18,470	0.21	(68,843)	21,154	0.24	(66,159)
2028	64,687	18,902	0.29	(45,785)	21,585	0.33	(43,102)	87,313	18,902	0.22	(68,411)	21,585	0.25	(65,728)
2029	64,687	19,342	0.30	(45,345)	22,025	0.34	(42,662)	87,313	19,342	0.22	(67,971)	22,025	0.25	(65,288)
2030	64,687	19,789	0.31	(44,898)	22,473	0.35	(42,214)	87,313	19,789	0.23	(67,524)	22,473	0.26	(64,840)

(1) Toll rate 3 represents a per plaza passenger car rate of $1.50 and a commercial vehicle rate of $4.50.
(2) Assumes a 5 percent interest rate for General Obligation Bonds, and a 7 percent interest rate for Revenue Bonds.
(3) See Table 4 for development of annual debt service requirements.
(4) Net toll revenues were developed by subtracting all maintenance and operating costs from estimated annual gross toll revenues.
(5) Net toll revenues were developed by subtracting only toll plaza related maintenance and operating costs from estimated annual gross toll revenues.

generated on the Revenue Bond side (when roadway maintenance is excluded) beginning in 2024, though the 1.3 debt service coverage ratio is not met even by 2030.

The picture is worse for Corridor C-1 (Table 7). Revenue shortfalls are shown for all years under Revenue Bond financing, and all but the final two years under General Obligation Bonds when all M&O costs are included. When roadway maintenance costs are eliminated from the equation, a revenue surplus begins to be generated by 2023 with General Obligation Bonds.

Significant revenue shortfalls are exhibited in all years, and for all financing options, for Corridors D and E (Tables 8 and 9). Under the best of conditions (General Obligation Bonds and excluding roadway maintenance costs) net revenue cover only about 25 percent of debt service in the first year of operation, and only about 35 percent of debt service by 2030.

Another way to analyze the financial feasibility of each Corridor is to determine the amount of debt (and therefore the bond issue size) that each project's net revenue could support. This is referred to as the "bonding capacity" of the project. Tables 10 and 11 provide estimates of the bonding capacity of each Corridor based on an average of the first five years' net toll revenue. Table 10 assumes all M&O costs are included in the net revenue calculation, while roadway maintenance costs are excluded from net revenues in Table 11.

When all M&O costs are included (Table 10) Corridor B is estimated to generate about 5.5 percent more net bond proceeds than are required by capital costs when General Obligation Bonds are assumed. The bonding capacity of Corridors D and E cover only between 10 and 20 percent of the estimated construction capital costs. When roadway maintenance costs are eliminated (Table 11), the bonding capacity of the corridors does not improve significantly. Corridor B is still the only one to more than meet expected project capital costs (assuming General Obligation Bonds are used). Net bond proceed for Corridors D and E still only meet between about 15 to 25 percent of the required capital outlay. Corridor C-1 is the only other project that begins to approach an adequate bonding capacity level when General Obligations Bond financing is assumed. Net bond proceeds are shown to meet about 88 percent of the expected capital costs.

SUMMARY AND CONCLUSION

The primary purpose of this analysis was to provide MDOT with a preliminary assessment of the financial feasibility associated with tolling four alternative east-west corridor alignments in Maine. Two of the corridors include basic upgrades of existing roads and two provide for the construction of new four-lane toll corridors. Toll-free traffic volumes were provided to WSA for each Corridor; toll evasion rates were then estimated at three increasingly higher toll rates.

Net toll revenue calculations were developed for the highest toll rate level tested and compared to estimated annual debt service requirements. Debt service coverage ratios were developed under two bond financing assumptions, one using General Obligation Bonds and the other using

Table 10

Estimated Bonding Capacity (1)

Maine East-West Corridor Feasibility Study

Assuming Toll Rate 3 (2)
Including All Maintenance and Operating Costs
In Thousands of 1999 Dollars

		Revenue Bonds				
Project Alignment	Five-Year Average Annual Net Revenue (3)	Maximum Debt Service (4)	Bonding Capacity (5)	Net Bond Proceeds (6)	Estimated Capital Costs (7)	Percent of Project Capital Cost
Corridor B	$15,342	$11,802	$141,467	$113,174	$190,080	59.5
Corridor C-1	13,460	10,353	124,098	99,278	235,600	42.1
Corridor D	19,059	14,661	170,853	136,682	1,191,150	11.5
Corridor E	14,563	11,202	130,543	104,434	814,000	12.8

		General Obligation Bonds				
Project Alignment	Five-Year Average Annual Net Revenue (3)	Maximum Debt Service (4)	Bonding Capacity (5)	Net Bond Proceeds (6)	Estimated Capital Costs (7)	Percent of Project Capital Cost
Corridor B	$15,342	$15,342	$224,651	$200,581	$190,080	105.5
Corridor C-1	13,460	13,460	197,093	175,976	235,600	74.7
Corridor D	19,059	19,059	268,614	239,834	1,191,150	20.1
Corridor E	14,563	14,563	205,248	183,257	814,000	22.5

(1) Assumes a 27-year earning period for Corridors B and C-1, and 25 years for Corridors D and E.
(2) Toll rate 3 represents per plaza passenger car toll of $1.50 and commercial vehicle toll of $4.50.
(3) The calculation of net revenues includes all maintenance and operating costs.
(4) Assumes 1.30 debt service coverage ratio for Revenue Bonds; 1.00 for General Obligation Bonds.
(5) Based on 7 percent interest for Revenue Bonds, and 5 percent rate for General Obligation Bonds.
(6) Net bond proceeds assumes a ratio of project cost to bond issue size of 1.25 for Revenue Bonds and 1.12 for General Obligation Bonds. These ratios reflect bond sales expenses, debt service reserve requirements (for Revenue Bonds only) and capitalization of interest during construction.
(7) Capital costs for toll related infrastructure were developed by WSA, all other roadway construction and right-of-way costs were provided by Maine DOT for each project alignment.

Table 11
Estimated Bonding Capacity (1)
Maine East-West Corridor Feasibility Study

Assuming Toll Rate 3 (2)
Excluding Roadway Maintenance Costs
In Thousands of 1999 Dollars

		Revenue Bonds				
Project Alignment	Five-Year Average Annual Net Revenue (3)	Maximum Debt Service (4)	Bonding Capacity (5)	Net Bond Proceeds (6)	Estimated Capital Costs (7)	Percent of Project Capital Cost
Corridor B	$17,844	$13,726	$164,529	$131,623	$190,080	69.2
Corridor C-1	15,938	12,260	146,957	117,566	235,600	49.9
Corridor D	22,964	17,664	205,848	164,678	1,191,150	13.8
Corridor E	17,246	13,266	154,596	123,677	814,000	15.2

		General Obligation Bonds				
Project Alignment	Five-Year Average Annual Net Revenue (3)	Maximum Debt Service (4)	Bonding Capacity (5)	Net Bond Proceeds (6)	Estimated Capital Costs (7)	Percent of Project Capital Cost
Corridor B	$17,844	$17,844	$261,288	$233,293	$190,080	122.7
Corridor C-1	15,938	15,938	233,378	208,373	235,600	88.4
Corridor D	22,964	22,964	323,650	288,973	1,191,150	24.3
Corridor E	17,246	17,246	243,062	217,020	814,000	26.7

(1) Assumes a 27-year earning period for Corridors B and C-1, and 25 years for Corridors D and E.
(2) Toll rate 3 represents per plaza passenger car toll of $1.50 and commercial vehicle toll of $4.50.
(3) Net revenues are based on maintenance and operating costs excluding roadway maintenance costs.
(4) Assumes 1.30 debt service coverage ratio for Revenue Bonds; 1.00 for General Obligation Bonds.
(5) Based on 7 percent interest for Revenue Bonds, and 5 percent rate for General Obligation Bonds.
(6) Net bond proceeds assumes a ratio of project cost to bond issue size of 1.25 for Revenue Bonds and 1.12 for General Obligation Bonds. These ratios reflect bond sales expenses, debt service reserve requirements (for Revenue Bonds only) and capitalization of interest during construction.
(7) Capital costs for toll related infrastructure were developed by WSA, all other roadway construction and right-of-way costs were provided by Maine DOT for each project alignment.

Revenue Bonds. While the Corridor D alignment was shown to generate the most toll revenue, the high capital costs associated with constructing a new four-lane facility resulted in net revenues covering only about one quarter of estimated annual debt service in the opening year (2015) and only about a third by 2030. Only Corridor B, which includes an upgrade of the existing Routes 2 and 9, exhibited financial feasibility, but only assuming General Obligation Bond financing. As was pointed out above, however, while tolling an existing two-lane road is technically possible, there are currently no major two-lane toll facilities in the United States. The last was the West Virginia Turnpike, which was converted to four-lanes along its entire length by 1987.

This analysis should be considered preliminary in nature; it would not be suitable for use in project financing. It does, however, provide a relative indication of the financial feasibility of the four Corridors compared to one another. From a financial feasibility standpoint, only Corridors B and C-1 meet, or come close to, self-financing and may merit further consideration. If further study is required, WSA would suggest the conduct of motorist travel pattern and trip characteristic surveys at proposed toll plaza locations, more detailed modeling and more extensive economic analysis. A considerable refinement of the highway network should also be undertaken by conducting travel-time studies on all principal competing and complementary routes to the toll Corridor.