2

Description of Corridors

How to Read This Chapter: This chapter describes the transportation improvement strategies and alternatives that are evaluated in the Aroostook County Transportation Study. In this Draft Environmental Impact Statement (DEIS), the alternatives (potential actions) are defined as the "corridors" within which transportation improvements – new location highways or improvements to existing highways – are evaluated. This chapter describes the iterative screening process by which these corridors were identified, evaluated, and refined. For the four corridors selected for detailed analysis, this chapter summarizes their environmental and economic consequences.

All supporting Figures are bound separately, in Volume II of this DEIS.

2.1 Overview of Corridor Selection Process

The Corridor Selection phase of the Aroostook County Transportation Study, subsequent to the scoping process and identification of the transportation needs, identified a reasonable range of corridors that could potentially satisfy the Purpose and Need of the transportation study. The corridor selection process involved the Study's Public Advisory Committee (PAC) and other stakeholders within the Study Area, and was reviewed in a series of public meetings held in October, 2000 and June, 2001. This iterative process is documented in three supporting documents: *Initial Corridor Screening Technical Memorandum*, *DEIS Corridor Screening Analysis, June 2001*, and *Corridor Screening Results: Economic Effects, August 2001* (available for review at public libraries) and included the following steps:

- Identification of a wide range of potential corridors;
- Preliminary screening to identify a reasonable range of corridors likely to meet the Study's Purpose and Need;
- Evaluation of the potential transportation, economic, and environmental consequences of each corridor;
- An intermediate screening process to eliminate those corridors that could not reasonably be expected to meet the Study Purpose and Need or had high levels of potential environmental impacts;

- Evaluation of corridor elements within the northern, central, and southern sections of the Study Area to determine if combinations of segments of these corridors had the potential to better meet the Study Purpose; and
- Identification of the most effective corridors for which a detailed analysis of the potential transportation, economic, and environmental consequences would be conducted and documented in this DEIS.

Figure 2-1 graphically illustrates the corridor screening process. As shown, the screening process initially identified and evaluated 40 corridors. This process resulted in 13 corridors that were examined in the Intermediate Screening stage, resulting in 5 corridors carried forward. A parallel, Regional Screening process, evaluated 11 options and resulted in the identification of two Composite Corridors for detailed evaluation in the DEIS. Following the Regional Screening, the five corridors from the Intermediate Screening process were re-evaluated. Two of these were modified and carried forward for detailed evaluation in the DEIS.

2.2 Sensible Transportation Policy Act Analysis

Maine's Sensible Transportation Policy Act (STPA) (23 M.R.S.A. § 73) is a state law enacted in 1991 by the citizens of Maine that provides a decision making framework for examining a range of alternatives. The STPA is applicable to transportation planning decisions, capital investment decisions, and project selection decisions made by the Maine Department of Transportation (MDOT). MDOT's rules for implementing the STPA (17-229 CMR 103) require MDOT to "evaluate the full range of reasonable transportation alternatives for significant highway construction or reconstruction projects". The STPA specifies that MDOT will "give preferences" (defined as "choose to fund and implement reasonable transportation strategies before increasing highway capacity") to those strategies that best meet the identified transportation deficiency or need.

Reasonable strategies are defined as strategies "which adequately respond to the identified deficiency or need in the transportation network, are cost effective, and are capable of being implemented within a reasonable time period necessary to meet the transportation deficiency or need." The regulations also state that "reasonable transportation alternatives must be easily accessible, affordable to the general public, available during high use hours and serve to reduce congestion on the highway." Regulations (CMR 103 Section 3.J) specify that the strategies to be evaluated include:

- New facilities or services;
- Transportation system management options;
- Transportation demand management options;
- Improvement to existing facilities;
- A no-build option; and
- Other reasonable strategies generated through the public participation process.

The first category of strategies can be across any mode of transport and include the full range of highway corridors under consideration. The second and third categories are discussed further below. A No-Build option (subsequently referred to as the No-Action Alternative) has been developed for 2030 conditions and will be the benchmark by which all other corridors are evaluated in this DEIS. STPA regulations specifically state that: "Significant highway projects that are proposed to promote economic development and not to alleviate traffic congestion should not be delayed while the Department considers the effectiveness of transportation demand management, alternative modes or other transportation alternatives."

2.2.1 Transportation Systems Management (TSM) Options

Transportation Systems Management (TSM) actions generally represent relatively low cost measures to increase capacity and / or provide safety improvements on the existing transportation system. These measures typically include traffic signal timing or phasing adjustments, designation of turning lanes at specific intersections or driveways, access management improvements, and enhanced signage or markings. TSM actions are specifically targeted at transportation needs associated with poorly managed traffic control, safety issues, or locations with recurring congestion.

In the context of this study, TSM-type options alone do not address the range of needs defined. Specifically, there are very few locations of notable congestion or safety related deficiencies that could be remedied by TSM strategies. This study is intended to define the best range of transportation investments to stimulate the long-term economy of Aroostook County. TSM actions have been dismissed because they cannot reasonably be expected, as a stand-alone alternative, to address the Study Area's needs. However, these TSM-type actions will continue to be pursued as interim strategies to address minor deficiencies. Furthermore, TSM elements will likely be incorporated into later design phases of the proposed action or actions that emerge from this study.

2.2.2 Transportation Demand Management (TDM) Options

Transportation Demand Management (TDM) strategies are measures geared toward affecting the demand side of the transportation equation (number and distribution of vehicles) rather than the supply side (highways). TDM actions are designed to change travel behavior in order to improve performance of transportation facilities and to reduce the need for additional highway capacity. As specified in the STPA regulations, methods may include, but are not limited to, ridesharing and carpool programs, trip-reduction incentives, and congestion pricing. Since this study, and the need for transportation improvements is being driven by a range of needs, including economic development, and not by capacity constraints, this alternative is not viewed as viable for the region.

2.3 Preliminary Screening Analysis

A preliminary screening analysis process was undertaken in cooperation with the Study's Public Advisory Committee and other stakeholders. This process included identification of reasonable corridors, evaluation of the potential transportation and economic benefits, the conceptual costs, and the potential environmental impacts of each corridor. The analysis is fully documented in the *Initial Corridor Screening Technical Memorandum* (available for review at public libraries within the Study Area).

2.3.1 Corridors Considered

The initial corridors selected for study were chosen based on the professional judgment of the members of the Study Team with input from the Study's Public Advisory Committee (PAC). The corridors were selected based upon their ability to help achieve the Study's primary purpose which is to provide transportation improvements that will help strengthen the Study Area's economy. Corridor options included new transportation corridors as well as upgrades of existing highway corridors. As the discussion of corridor options progressed, three categories of options evolved. They were:

- Corridors to better integrate Aroostook County by improving connections between activity centers;
- Corridors to improve access to I-95 and Canada; and
- Corridors to address local bottlenecks.

The first category of options, corridors to better integrate Aroostook County, included corridor options that would serve to better connect the major points of economic activity within the Study Area. They were selected based upon the socioeconomic information gathered in the first stage of the study that indicated where the major activity is occurring and upon information from origin / destination traffic surveys. Eleven corridors were included in this group: 2 originate in Houlton, 3 in Presque Isle, 1 in Easton, 4 in Caribou, and 1 in Van Buren. Figure 2-2 depicts this group of corridor options.

The second category of options, corridors to improve access to I-95 and Canada, were chosen primarily on their ability to help reduce travel times to I-95 and, in turn, points south. They also focus on improving connections to the principal border crossings at Fort Kent, Madawaska, and Van Buren. They include upgrades of the entire Route 11 corridor and the Route 1 corridor between Caribou and Van Buren. New corridors would connect to I-95 at Sherman, Island Falls, Smyrna Mills, or Houlton. Figures 2-3 through 2-6 depict this group of corridors.

The third category, corridors to address local bottlenecks, included new corridors that would provide bypasses of Ashland, Mars Hill, Presque Isle, and Caribou. These corridors would help address several of the Study's purposes, including improving traffic flow in these towns and reducing traffic conflicts caused by the mix of truck and automobile traffic in town centers. Figure 2-7 depicts these corridor options.

The three types of corridor options were originally developed only as conceptual corridors drawn simply to connect the desired termini. The corridors were later refined to avoid areas of environmental sensitivity (e.g., wetlands, rare species habitat, deer wintering yards, Section 4(f) properties, cultivated land, and areas with steep slopes) while maintaining highway system continuity, minimizing overall distances, and reducing travel times. The preliminary screening process evaluated 765-meter (2,500-foot) wide new-alignment corridors and 305-meter (1,000-foot) upgrade corridors along existing highways.

The 40 corridors that were developed are composed of links. A link is defined as a section of a corridor between major intersections with other new or upgraded corridors. The 40 corridors considered as part of the first level screening comprised 79 distinct links. A particular link could potentially be included in more than one corridor. The links were numbered to allow each complete corridor to be specifically identified geographically. Table 2-1 (page 2-6) lists each of the 40 corridors that were chosen for study and their corresponding limits.

2.3.2 Screening Process

After the 40 initial corridors were developed, they were screened to select corridors for detailed study in this DEIS. The screening methodology focused on determining which of the corridors were most likely to meet the transportation and economic benefits identified in the Study's Purpose and Need Statement (see Chapter 1, page 1-3). Each corridor was also assessed for its potential environmental impact.

This section describes the criteria used in the transportation, economic and environmental analyses, and the results of the preliminary screening analysis. This represents the rationale for the selection of the corridors that were advanced for more in-depth analysis in this DEIS, and the rationale for the elimination of other corridors from further consideration.

Table 2-1
Corridors Developed for Initial Study

Corridor Number	Corridor Type	Southern Terminus	Northern Terminus	Length km (miles)
Corridors to Better Integrate Aroostook County				
1	Upgrade	Houlton	Presque Isle	67 (42)
2	Combination	Houlton	Limestone	90 (56)
3	Upgrade	Presque Isle	Ashland	32 (20)
4	Upgrade	Presque Isle	Fort Fairfield	14 (9)
5	Upgrade	Presque Isle	Caribou	22 (14)
6	Upgrade	Caribou	Limestone	16 (10)
7	Upgrade	Caribou	Fort Kent	69 (43)
8	Combination	Caribou	Madawaska	67 (42)
9	Upgrade	Caribou	Van Buren	34 (21)
10	Upgrade	Van Buren	Madawaska	40 (25)
11	Combination	Easton	Caribou	34 (21)
Corridors to Improve Access to I-95 and Canada				
12	Upgrade	Sherman	Fort Kent	166 (104)
13	Combination	Sherman	Madawaska	187 (117)
14	Combination	Sherman	Madawaska	189 (118)
15	Combination	Sherman	Van Buren	163 (102)
16	Combination	Island Falls	Fort Kent	155 (97)
17	Combination	Island Falls	Madawaska	176 (110)
18	Combination	Island Falls	Madawaska	178 (111)
19	Combination	Island Falls	Van Buren	152 (95)
20	Upgrade	Smyrna Mills	Fort Kent	142 (89)
21	New	Smyrna Mills	Madawaska	150 (94)
22	Combination	Smyrna Mills	Van Buren	125 (78)
23	Combination	Smyrna Mills	Fort Fairfield	88 (55)
24	Combination	Houlton	Fort Kent	162 (101)
25	Combination	Houlton	Fort Kent	160 (100)
26	New	Houlton	Madawaska	158 (99)
27	Combination	Houlton	Van Buren	131 (82)
28	Combination	Houlton	Fort Kent	158 (99)
29	New	Houlton	Madawaska	155 (97)
30	Combination	Houlton	Van Buren	125 (78)
Corridors to Address Local Bottlenecks				
31	Bypass	Mars Hill	Westfield	14 (9)
32	Bypass	Mars Hill	Mars Hill	5 (3)
33	Bypass	Presque Isle	Presque Isle	11 (7)
34	Bypass	Presque Isle	Presque Isle	11 (7)
35	Bypass	Presque Isle	Caribou	42 (26)
36	Bypass	Presque Isle	Caribou	34 (21)
37	Bypass	Mapleton	Caribou	21 (13)
38	Bypass	Mapleton	Caribou	29 (18)
39	Bypass	Caribou	Caribou	14 (9)
40	Bypass	Ashland	Ashland	11 (7)

2.3.2.1 Transportation Screening Analysis

The transportation screening analysis examined both engineering and functional characteristics of each corridor. The evaluation of functional characteristics focused on the transportation deficiencies and needs identified within the Study Area. The factors used for the transportation screening analysis are discussed below.

- **Reduce total travel time along the corridor**. Time and distance savings were important factors in the screening. For upgrades, travel time savings represent the difference in travel time because of expected changes in operating speeds. For new highways, travel time savings represent the difference in travel time between the two end points of the corridor using the new corridor compared to using the existing highway system.

- **Improve the movement of goods.** This factor indicates if the movement of wood products, agricultural goods, or other goods from economic activity centers would be facilitated by the proposed corridor improvement.

- **Reduce functional conflicts**. Functional conflicts within the existing transportation system are addressed by reducing the mixing of heavy trucks and passenger vehicles along corridors and reducing traffic conflicts with pedestrians in town centers.

- **System continuity.** Improvements in system continuity are measured by the reduction in the number of speed limit changes and cross section (shoulder width and lane width) changes in each corridor. These changes contribute to safety deficiencies and affect travel times.

- **Projected traffic demand.** Volumes on upgrades were assumed to be approximately the same as existing and future volumes with no improvements. Volumes on new corridors reflect preliminary estimates of diversions of traffic from existing highways to new highways.

- **Improve safety.** Safety can be improved by eliminating or reducing high crash locations through improvements of existing highways or shifting traffic to highways that have higher design standards.

- **Reduce the number of geometric deficiencies**. Geometric deficiencies include vertical and horizontal curvature, shoulder width, and lane width. The detailed analysis considered the number of locations with horizontal curvature deficiencies and the number of vehicle miles of travel on highways with lane width, shoulder width, or vertical curvature deficiencies.

- **Cost estimate**. Both the construction cost and an estimate of the cost per annual vehicle mile of travel were considered. The cost per annual vehicle mile is calculated by dividing the construction cost for the corridor by the product of the

projected volume times the length of the corridor. The corridor construction cost estimates were developed from unit costs on a per mile basis provided by MDOT and include an engineering contingency cost of 25 percent. Construction costs were not used as a limiting factor, but rather were used to help discriminate between corridors that provided similar functions.

2.3.2.2 Economic Screening Analysis

The economic screening analysis developed qualitative assessments of the ability of each corridor to provide economic benefits to the Study Area. The analysis examined the following factors for each of the 40 initial corridors considered:

- **Improving access to intermodal or multimodal transportation centers**. Because these centers are generally located within or adjacent to established industrial parks, employers and existing population centers, strategies to improve access to them also serve the broader economic goals of the study.

- **Improving accessibility to areas of existing or future economic activity**. These areas include locations of major industries (*e.g.*, McCain Foods) established community industrial parks, Loring Commerce Centre, business districts, and highway commercial corridors.

- **Supporting or fostering economic growth and development.** This includes increases in key market sectors (industries), population, employment and income.

- **Minimizing impacts on municipal finances.** Corridors that may require extensive takings of homes and businesses, or by causing excessive negative bypass effects on downtown areas, would be avoided.

- **Maintaining consistency with local, regional and state plans**. These plans generally seek to support the revitalization and expansion of established commercial, industrial and residential areas, discourage sprawl and protect agricultural, forest and recreational resources.

To simplify the comparison of the 40 initial corridors with regard to the economic factors listed above, the following general assumptions concerning the corridors were made:

- For corridors with the same general termini (*e.g.*, Houlton to Presque Isle), new corridors were assumed to generate slightly higher Vehicle-Miles Traveled (VMT) and Vehicle-Hours Traveled (VHT) savings, better access and higher potential economic benefits, than upgrades of existing highways.

- Corridors that pass through or near existing town centers were assumed to cause greater property and tax base losses to communities than improvements that extend through undeveloped areas.

- Corridors that pass through or fragment areas of cultivated land or commercial forest land were assumed to have a greater potential to disrupt the economic value of those resources than improvements that avoid such areas.

- Some of the proposed new corridors that bypass existing commercial areas could potentially have an adverse impact on existing businesses that rely on through-traffic to generate sales. "Bypass effects" may tend to offset the potential economic value of enhanced access created by the improvements. In general, new corridors that closely parallel existing routes were assumed to offer more connections and result in less severe bypass effects than those corridors which are more remote from existing roads.

The 40 initial corridors were examined to determine which Study Area communities would most likely be served by each corridor. The communities were then divided into two groups: those that were served directly by a given improvement, and those that were remote from the improvement but would be expected to benefit from it. For example, the upgrade of Routes 1 and 161 from I-95 to Fort Kent is also expected to have a secondary benefit to the population and employers in Van Buren seeking better access to I-95, who would be able to access the section of the highway improvements from Caribou south.

After identifying the communities that would be served, the analysis used total non-farm wage and salary employment by town as a "proxy" measure to estimate that portion of the Study Area's economy which would be enhanced by each improvement. This measure indicates where the majority of existing jobs in the region are located. The number of jobs located in the areas served by a proposed corridor provides an indicator of both the concentration of local industries and potential numbers of commuters that would be likely to use it. The total employment estimate for all impacted communities was then adjusted using a weighting matrix to distinguish between (a) the effects of new corridors versus upgrades, (b) impacts between communities that are physically located on the corridors, compared to more remote locations that could receive only a "secondary" benefit, and (c) northern and southern portions of the Study Area.

2.3.2.3 Environmental Screening Analysis

Resources selected for analysis were those that are most likely to affect the selection of corridors for further consideration, and most likely to affect the feasibility of obtaining environmental approvals. Federal and state regulations, as described in the *Existing Environmental Conditions Technical Memorandum*, restrict impacts to certain resources unless it can be demonstrated that there are no feasible or practicable

alternatives with less impact on the resource. Land use, particularly impacts to cultivated land, was also included because of its high level of economic importance within Aroostook County. The critical resources that were used in the screening analysis include the following:

- Cultivated land;
- Land owned by the Native American tribal nations;
- Cultural resources (historic sites, known archaeological sites, and traditional cultural properties);
- Public parkland, public recreation land, and wildlife refuges protected by Section 4(f) and Section 6(f);
- Wetlands;
- Significant Wildlife Habitat (deer wintering yards and waterfowl and wading bird habitat); and
- Threatened and endangered species (Federal and state-designated).

For purposes of the first level screening, impacts were quantified using Geographic Information System (GIS) analysis, based on a 765-meter (2,500-foot) wide corridor for new alignments and a 305-meter (1,000-foot) wide corridor for upgrades of existing highways. The analysis determined the number of discrete resources (Deer Wintering Yards, cultural resources, Section 4(f) properties, and Threatened and Endangered Species) within each corridor. For wetlands and cultivated land, the analysis determined the total length of these resources that would be crossed by the corridor (in kilometers / miles). For comparative purposes, the quantitative impacts were converted into categories of most favorable, moderately favorable, and least favorable.

2.3.3 Results of Preliminary Screening Analysis

The preliminary screening evaluation resulted in the elimination of 23 corridors from further detailed analysis. Table 2-2 (page 2-11) documents the rationale for eliminating these corridors. In general, corridors were eliminated because they would provide few transportation benefits or would provide similar transportation functions as other corridors but with higher environmental impact or fewer transportation / economic benefits. The table does not give detailed information concerning the quantities of impacts and the specific transportation benefits. This information is available in a Technical Memorandum titled *Initial Corridor Screening* December 2000 (available for review at public libraries within the Study Area).

Table 2-2
Results of Preliminary Screening Process:
Corridors Eliminated From Detailed Analysis

Corridor	Corridor Location	Rationale
1	Houlton to Presque Isle	Less than two minutes travel time reduction between Houlton and Presque Isle Minor benefit in reducing geometric deficiencies No reduction in functional conflicts (trucks/cars or farm equipment/other vehicles still using Route 1) No bypass effects No benefit to wood industry/limited benefit to agricultural products
4	Presque Isle to Fort Fairfield	No substantial transportation benefits
5	Presque Isle to Caribou	No substantial transportation or economic benefits No major geometric/safety deficiencies would be addressed
10	Van Buren to Madawaska	Minor transportation benefits: duplicates much of the regional transportation service provided by Canadian Route 2 Many potential property takings and land use conflicts
13	Sherman to Madawaska	Does not provide adequate system continuity Poor connections with Route 1 and destinations in the Presque Isle area
14	Sherman to Madawaska	Benefits are similar to Corridor 15 (retained for further study), but with fewer time benefits
16	Island Falls to Fort Kent	Most of corridor is same as Corridor 12 (retained for further study), except I-95 access is at Island Falls instead of Sherman. Sherman access is more direct and preferred by wood industry
17	Island Falls to Madawaska	Most of corridor is same as Corridor 13, except I-95 access is at Island Falls instead of Sherman. Sherman access is more direct and preferred by wood industry
18	Island Falls to Madawaska	Most of corridor is same as Corridor 14, except I-95 access is at Island Falls instead of Sherman. Sherman access is more direct and preferred by wood industry
19	Island Falls to Van Buren	Most of corridor is same as Corridor 15 (retained for further study), except I-95 access is at Island Falls instead of Sherman. Sherman access is more direct and preferred by wood industry
20	Smyrna Mills to Fort Kent	Most of corridor is same as Corridor 12, except I-95 access is at Smyrna Mills instead of Sherman. Sherman access is more direct and preferred by wood industry
22	Smyrna Mills to Van Buren	Northern connection to Van Buren does not attract as much traffic as connection to Madawaska (Corridor 21) All links in Corridor 22 are in Corridors 15 and 21 which are both recommended for further study (relabeled as Corridors H and I)
23	Smyrna Mills to Fort Fairfield	About a 15-minute travel time reduction between Smyrna Mills and Fort Fairfield Minimal traffic demand/transportation benefit expected Does not service major economic activity centers Minor impacts on geometric deficiencies and high crash locations
24	Houlton to Fort Kent	Major transportation improvements on links included in other corridors Provides redundant service with Route 1 Substantial potential impacts to wetlands, cultivated land, and traditional cultural properties

Table 2-2 (Cont'd.)

Corridor	Corridor Location	Rationale
25	Houlton to Fort Kent	Major transportation improvements on links included in other corridors Provides redundant service with Route 1 Substantial potential impacts to wetlands, cultivated land, and traditional cultural properties
27	Houlton to Van Buren	Provides only moderate transportation improvements Substantial potential impacts to wetlands, cultivated land, and traditional cultural properties
28	Houlton to Fort Kent	Most reductions in geometric deficiencies and system continuity are on links already retained for further study Among highest potential impacts to wetlands, cultivated land, and traditional cultural properties
29	Houlton to Madawaska	Among highest potential impacts to wetlands, cultivated land, and traditional cultural properties
30	Houlton to Van Buren	Among highest potential impacts to wetlands, cultivated land, and traditional cultural properties
31	Mars Hill Bypass	East bypass is 10.1 Km (6.3 miles) long versus the 2.8 km (1.8 miles) for the west bypass (Corridor 32) Results in more than a 2-minute *increase* in travel time between Houlton and Presque Isle Construction cost estimated to be almost 4 times cost of Corridor 32
35	Presque Isle Bypass	Has marginal transportation benefits because of circuitous alignment Almost 4 times the length of close-in bypasses Construction cost more than 3 times that of bypasses closer to Presque Isle Greater environmental impacts than close-in bypasses (Corridors 33, 34)
36	Presque Isle Bypass	About 3 times the length of bypasses closer to Presque Isle Has marginal transportation benefits because of circuitous alignment Construction cost about 3 times the cost of bypasses closer to Presque Isle Greater environmental impacts than close-in bypasses (Corridors 33, 34)
37	Presque Isle Bypass	Marginal transportation benefit because of low travel demand Small effect on goods movement

Table 2-3 (page 2-13) lists the corridors that were recommended for further study and a summary of the rationale for these recommendations. In general, corridors that were recommended for further study were selected because they appeared to have the potential to provide travel time savings, improve geometric deficiencies, improve system continuity, improve connections between agricultural or forest products and markets, provide other economic benefits, or reduce functional conflicts.

Table 2-3
Results of Preliminary Screening Process: Corridors Recommended for Further Analysis

Preliminary Screening Corridor	Corridor Location	Rationale
2	Houlton to Loring Commerce Centre	Provides travel-time savings between Houlton and Loring Commerce Centre Improves access for agricultural products and industries Reduces functional conflicts at Mars Hill
3	Ashland to Presque Isle	Reduction in geometric deficiencies Improves several high-crash locations
6	Caribou to Limestone	Improves access to Loring Commerce Centre Improves access to intermodal connections Addresses geometric deficiencies/system continuity
7	Caribou to Fort Kent	Major reduction in geometric deficiencies Improves several high-crash locations Major improvement in system continuity
8	Route 161 to Frenchville	Travel time reduction Improves system continuity
9	Caribou to Madawaska	Major reduction in geometric deficiencies Improves several high-crash locations Major improvement in system continuity Improves market access for agricultural products
11	Easton to Caribou	Serves major industrial growth nodes Reduces functional conflicts Moderate level of potential impacts to wetlands and cultivated land
12	Sherman to Fort Kent	Major reduction in geometric deficiencies Benefits economic activities in Fort Kent, Ashland and Sherman and improves movement of forest products
15	Sherman to Van Buren	Major reduction in geometric deficiencies Reduces functional conflicts Improves 4 high crash locations
21	Smyrna Mills to Madawaska	Substantial potential travel time reduction (about 55-minutes) Reduces functional conflicts on Routes 1 and 11
26	Houlton to Madawaska	Substantial potential travel time reduction (about 55 minutes) Reduces functional conflicts on Routes 1 and 11
32	Mars Hill Bypass	Improves system continuity and reduces geometric deficiencies Reduces functional conflicts at Mars Hill
33	Presque Isle	Reduces functional conflict through Presque Isle
34	Presque Isle	Reduces functional conflict through Presque Isle
38	Mapleton to Caribou	Reduces functional conflict through Presque Isle Improves system continuity
39	Caribou	Reduces functional conflict through Caribou
40	Ashland	Reduces functional conflict through Ashland Improves system continuity

2.4 Intermediate Screening Analysis

Following the Preliminary Screening Analysis described above in Section 2.3, MDOT undertook a more detailed second-level examination of the corridors that were carried forward. This section describes the methodology and results of this second-level intermediate screening analysis.

2.4.1 Corridors Considered

The 17 corridors identified at the completion of the Preliminary Screening Analysis were re-evaluated in light of their ability to connect major activity centers and duplication of functions, and were combined into 13 corridors that had the potential to address some or all of the Study's Purpose and Need criteria. Table 2-4 (page 2-15) describes the 13 corridors evaluated in the intermediate screening analysis. Figure 2-8 illustrates these corridors.

2.4.2 Intermediate Screening Process

To complete the intermediate screening, MDOT used quantifiable transportation and economic measures to rate each corridor's performance in meeting the Study Purpose and Need. Potential impacts to social and environmental resources were not evaluated for all 13 corridors, since these impacts are strongly correlated with corridor length and would not facilitate the corridor screening process at this stage. The intermediate screening analysis was completed using the methodology described below.

2.4.2.1 Corridor Performance

Economic and transportation modeling results provided estimates of each corridor's effect on:

- Population, employment, and personal income;
- Business sales;
- Access to areas of employment;
- Access to industrial areas and jobs / services;
- Access to markets and multi-modal facilities;
- Travel time;
- Demands through town centers;
- Vehicle-Miles Traveled (VMT) and Vehicle-Hours Traveled (VHT); and
- Safety / reliability of the transportation system.

Each of these measures were used to assess how well the 13 corridors met various components of the Study's Purpose and Need.

Table 2-4
Intermediate Screening Analysis Corridors

Intermediate Screening Corridor	Corridor Location	Principal Corridor Elements	Comprised of Preliminary Screening Corridor
A	Houlton to Loring Commerce Centrre	Upgrade of Route 1 between Houlton and Mars Hill Bypasses of Monticello, Bridgewater, Mars Hill Upgrade of Route 1A between Mars Hill and Route 167 New alignment between Route 167 and Loring Commerce Centre Upgrade of Route 89 between Caribou and Limestone	2, 6, U32
B	Houlton to Van Buren	Upgrade of Route 1 between Houlton and Mars Hill Bypasses of Monticello, Bridgewater, Mars Hill Upgrade of Route 1A between Mars Hill and Van Buren Upgrade of Route 89 between Caribou and Limestone	2, 6, U32
C	Sherman to Presque Isle	Upgrade of Route 11 between Sherman and Ashland Bypass of Ashland Upgrade of Route 163 between Ashland and Presque Isle	3, 15, U40
D	Caribou to Fort Kent	Upgrade of Route 161 from Caribou to Fort Kent New alignment between Route 1 and Route 161, north of Caribou	7
E	Route 161 to Madawaska	New alignment between Route 161 and Frenchville Upgrade of Route 1 between Frenchville and Madawaska	8
F	Easton to Caribou	New alignment between Easton (Route 10) and Caribou (Route 1)	4, 11, U39
G	Sherman to Madawaska	Upgrade of Route 11 between Sherman and Fort Kent Bypass of Ashland Upgrade of Route 1 between Fort Kent and Madawaska	12, U40
H	Smyrna Mills to Madawaska	New alignment between Smyrna Mills (I-95) and Madawaska Upgrade of Route 1 between Presque Isle and Caribou Upgrade of Route 1 between new alignment and Madawaska	11, 21, 23, U33, U39
I	Sherman to Madawaska	Upgrade of Route 11 from Sherman to Ashland Bypass of Ashland New alignment from Ashland to Madawaska Upgrade of Route 1 between new alignment and Madawaska	9, 15, U40
J	Smyrna Mills to Madawaska	New alignment between Smyrna Mills (I-95) and Madawaska Upgrade of Route 1 between new alignment and Madawaska	21, U38
K	Houlton to Madawaska	New alignment between Houlton and Madawaska Upgrade of Route 1 between new alignment and Madawaska	4, 11, 21, 26, U39
L	Presque Isle	Bypass east of Presque Isle	U33
M	Presque Isle	Bypass west of Presque Isle	U34

Corridor Ranking

Each corridor was ranked from 1 to 13 (with 1 being the best) for how well it met the Study's Purpose and Need by category. These rankings were then summed by the transportation and economic results to determine an overall corridor ranking.

Corridor Indexing

To better compare the relative difference between corridor performance, the corridor results were also indexed. For each factor assessed, the best corridor performance was indexed to 1.0 and all other corridor outcomes were referenced to that value, resulting in corridor indices between 0 and 1. For example, if the travel time savings was 20 minutes for corridor X and 10 minutes for corridor Y, the index value is 1.0 for corridor X and 0.5 for corridor Y. A separate index was developed for each measure.

A corridor's overall performance rating was then determined by adding the index values for all measures (higher overall values indicate better performing corridors).

2.4.2.2 Cost Evaluation

All corridors considered were compared by their construction costs and a cost effectiveness rating. The cost effectiveness was determined by calculating the present dollar value of anticipated future benefits from the corridor (see Section 2.4.3.2, page 2-18) and comparing these benefits to its overall construction cost (exclusive of right-of-way acquisition).

2.4.2.3 Environmental Comparison

Those corridors that best met the Study's Purpose and Need were then compared for their environmental consequences. The comparative analysis focused on how the corridors compared in 8 major impact categories that would be most important in the selection process based upon their regulatory status (*e.g.*, wetland impacts) and/or their importance in the Study Area (*e.g.*, impacts to farmland). The impact categories that were examined included 4 ecological resources (wetlands, floodplains, Outstanding River Segments, and state-designated Significant Wildlife Habitat) and 4 categories of land use/cultural resources (farmland, parks and recreation lands, Native American Traditional Cultural Properties, and structures).

Impacts were calculated using GIS information and were based on a template width of 46 meters (150 feet), equivalent to 23 meters (75 feet) from centerline of the existing road for upgrades and 91 meters (300 feet) wide for new location highways. The corridors were then ranked and indexed in the same way as they were for transportation and economics described above. The environmental analysis was conducted only for those corridors that best met the Study's Purpose and Need criteria and that merited consideration as stand-alone alternatives.

2.4.3 Results of the Intermediate Screening Analysis

The Intermediate Screening Analysis, as described below, used sequential analyses of each corridor's performance in meeting the Purpose and Need criteria, cost effectiveness, and impacts to the natural and human environment to identify corridors to carry forward for more detailed analysis in this DEIS.

2.4.3.1 Corridor Performance

As described above, quantifiable transportation and economic measures were used to rate the corridors' performance in meeting the Study's Purpose and Need criteria and to compare the corridors with one another. A total of 12 analyses were performed to measure and rank the corridors. This section highlights the key findings of the evaluation and summarizes the results. More complete information regarding this analysis can be found in a memorandum submitted to the Study's PAC, titled *DEIS Corridor Screening Analysis*, June 2001 (available for review at public libraries within the Study Area).

Corridor H, the new location highway connecting I-95 at Smyrna Mills with Madawaska, scored very high in a number of the rankings. Perhaps most importantly, it ranked first for most beneficial economic impact as measured by a combined analysis of impact on population, employment, personal income, and sales. It also ranked first on commuting amenity, in an economic analysis of improving connections to labor markets (tied with Corridor K), reductions in travel time, and improving access to multi-modal facilities. It ranked second in improving traffic flow through Houlton, Mars Hill, Presque Isle and Caribou, and second for enhancing the reliability of the Study Area's transportation system.

Corridor K, the new location highway connecting I-95 at Houlton with Madawaska, also scored very highly in many of the transportation/economic analyses. It ranked first overall for enhancing the marketability of Aroostook County's potential economic assets (a measure of employment base and industrial parks served by the corridor). It also ranked first (tied with Corridor H) in an economic analysis of improving connections to labor markets, and for enhancing the reliability of the Aroostook County's transportation system. Corridor K ranked second in economic impact as measured by a combined analysis of impact on population, employment, personal income, and sales; and second in an analysis of improving access to jobs and services.

Closely behind Corridors H and K in their ability to meet the Study's Purpose and Need were Corridors A, B and J. Corridor J ranked first (tied with Corridor H) for improving access to multi-modal facilities, and second in terms of overall travel time reductions. However, it was less effective overall than Corridors H and K because it does not serve the Presque Isle and Easton areas as well. Corridors A and B ranked highly for their ability to reduce the potential for accidents within the Study Area and for enhancing the reliability of the Aroostook County's transportation system.

The other corridors (Corridors C, D, E, F, G, I, L, and M) generally did not score as well on the analyses and as stand-alone corridors they do not have the ability to meet the Study's Purpose and Need. Table 2-5 (page 2-18) lists the corridors in terms of their ability to meet transportation and economic aspects of the Study's Purpose and Need as well as their overall rankings.

Table 2-5
Intermediate Level Corridor Screening:
Overall Ranking of Ability to Meet the Study's Purpose and Need

Corridor	A	B	C	D	E	F	G	H	I	J	K	L	M
Transportation	4	5	6	9	8	11	10	2	7	3	1	12	13
Economic	3	5	8	12	9	10	7	1	6	4	2	11	13
Overall	4	5	7	10	8	11	9	1	6	3	2	12	13

The simple rank-order provided in Table 2-5 (page 2-18) does not reflect the magnitude of differences between these corridors. Each corridor's indexed performance ranking gives a better picture of their relative differences (Figure 2-9, page 2-19). The results of the indexing indicates that Corridors H, K, J, A, and B score the highest and generally meet the Study's Purpose and Need as stand-alone corridors. The remaining corridors do not meet the Purpose and Need as stand-alone corridors. Figure 2-9 (page 2-19) presents the results of the corridor indexing.

2.4.3.2 Cost Analysis

MDOT also examined the estimated construction cost of each of the 13 corridors that were carried forward into the intermediate level screening. Each corridor's total cost (based upon a 4-lane highway, exclusive of right-of-way cost) was estimated and an analysis of their cost effectiveness was performed. Since construction cost is related to corridor length, cost effectiveness was calculated to evaluate the benefits of each corridor. Cost effectiveness was based on a calculation of the corridors impact on gross regional product per dollar of construction cost. At an estimated construction cost of $554 million, Corridor G, the upgrade of Route 11 between I-95 and Fort Kent, is estimated to be the most costly of the corridors, and Corridor M, at $18 million, the least. Corridor A was found to be the most cost effective at the state and county levels. Table 2-6 (page 2-19) presents the cost summary information for the corridors.

Figure 2-9
Corridor Performance with Respect to Purpose and Need Criteria

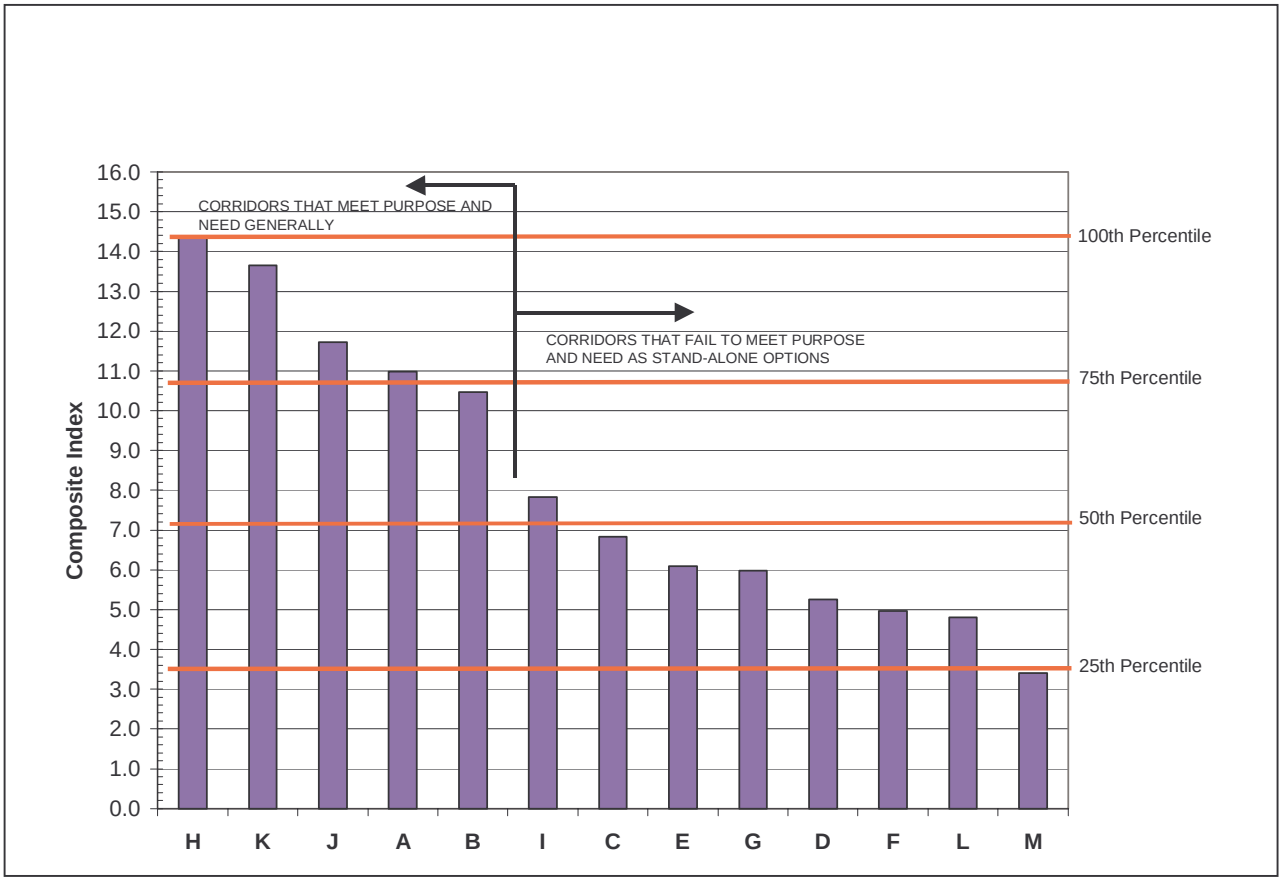


Table 2-6
Cost Summary

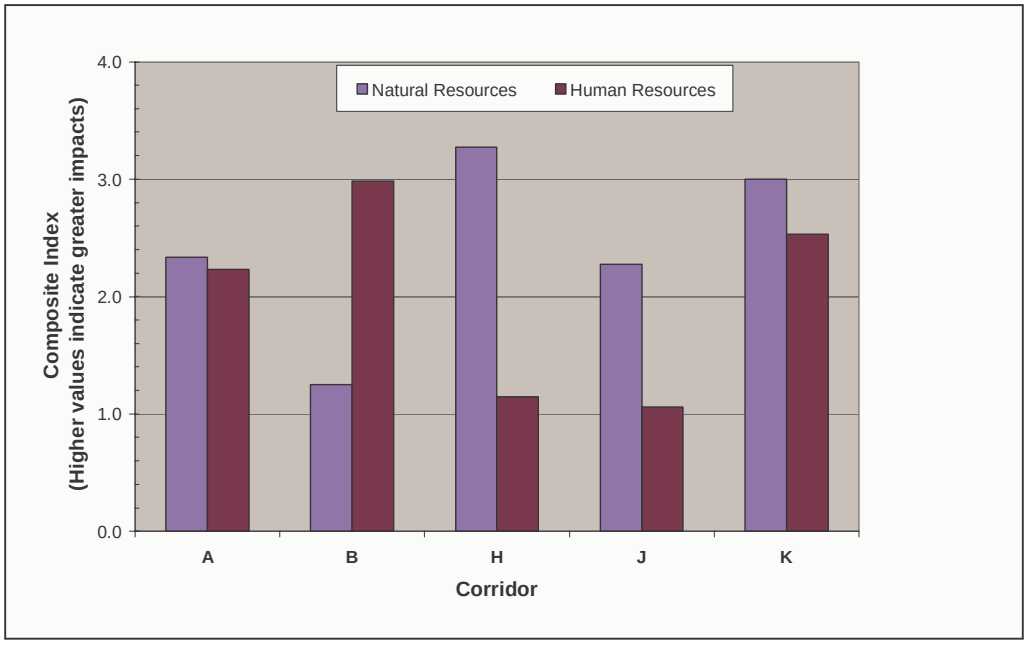
Corridor	A	B	C	D	E	F	G	H	I	J	K	L	M
Total Cost (Millions of Dollars) [1]	$282	$390	$338	$220	$233	$94	$554	$439	$435	$423	$427	$41	$18
Rank [2]	6	8	7	4	5	3	13	12	11	9	10	2	1
Cost Effectiveness[3] (Maine)	$0.95	$0.66	$0.50	$0.38	$0.42	$0.49	$0.43	$0.84	$0.53	$0.82	$0.85	$0.37	$0.71
Rank [4]	1	6	8	12	11	9	10	3	7	4	2	13	5
Cost Effectiveness[3] (Aroostook County)	$0.74	$0.51	$0.38	$0.28	$0.32	$0.37	$0.33	$0.66	$0.41	$0.63	$0.66	$0.28	$0.56
Rank [4]	1	5	7	11	10	8	9	2	6	3	2	11	4

1/ Total Cost assumes four lane highways
2/ Rank from least expensive to most expensive
3/ Cost effectiveness is the present value of gross regional product gains per $ of construction cost expected.
4/ Rank from most cost-effective to least

2.4.3.3 Environmental Analysis

Once it had been determined that Corridors A, B, H, J and K were those that were generally able to meet the Study's Purpose and Need, the potential environmental impacts of those corridors were examined to determine if any of the corridors would have environmental impacts that were clearly more detrimental than others or if it would be difficult for state and federal resource agencies to approve. As described above, eight categories of resources were examined based upon their regulatory status and / or their importance in the Study Area. Table 2-7 (page 2-21) and Figure 2-10 present the findings of the environmental review of the five corridors. New location corridors (H, J and K) have less impact on social and economic resources than do upgrades to existing highways (A and B). Conversely, the new location corridors generally have higher impacts to the natural environment than do the upgrades.

Figure 2-10
Environmental Impact Analysis Results



Corridor K, a new location highway corridor, is located within the agricultural and residential areas in the southeastern part of the Study Area, and has the greatest impacts to wetlands (69.7 hectares, 172 acres), floodplains (25.1 hectares, 62 acres), farmland (266.9 hectares, 659 acres) and cultural resources (17 properties). Corridor K, when all impacts were evaluated using the index method, has the second highest overall impacts to both human environment and natural resources. Corridor B has the highest overall impacts to the human environment. This corridor (B) has the highest impacts to structures (468 buildings) and parkland (17 properties). Corridor H has the highest overall impacts to natural resources, and the second highest impact to floodplains (12.6 hectares, 31 acres) and farmland (230 hectares, 568 acres).

2.4.4 Summary of Intermediate Screening Analysis

Based upon the findings of the intermediate screening analysis, Corridors A, B, H, and K were carried forward as stand-alone corridors (Figure 2-1). Corridors H and K are both the second-most cost-effective within the Study Area and both best meet the Study's Purpose and Need criteria. Corridors A and B also performed fairly well in meeting the Study's Purpose and Need criteria. Corridor A had the highest cost-effectiveness rating as a stand-alone corridor. Corridor J is similar to Corridor H in its impacts and benefits, but does not serve the Presque Isle labor market area and would not benefit the southeastern portion of the study area. It was therefore eliminated from further analysis. The other 8 corridors (C, D, E, F, G, I, L, and M) were eliminated from further analysis as stand-alone corridors. As discussed below in Section 2.5.1 (page 2-22), Corridors A, B and J were also eliminated from further consideration.

Table 2-7
Intermediate Level Screening
Environmental Impact Analysis[1]

	Corridor				
Resources	**A**	**B**	**H**	**J**	**K**
Wetland impacts (hectares/acres)	16.2 / 40	17.8 / 44	53.9 / 133	59.5 / 147	69.7 / 172
Wetland rank	1	2	3	4	5
Floodplain impacts (hectares/acres)	10.5 / 26	6.9 / 17	12.6 / 31	10.5 / 26	25.1 / 62
Floodplain rank	2	1	4	2	5
Farmland impacts (hectares/acres)	97.6 / 241	153.1 / 378	230 / 568	148.6 / 367	266.9 / 659
Farmland rank	1	3	4	2	5
Parklands impact (number)	10	14	3	4	7
Parkland rank	4	5	1	2	3
Cultural resources impacts (number)	7	7	0	3	17
Cultural resources rank	3	3	1	2	5
Structures impacted (number)	346	468	32	20	14
Structural impact rank	4	5	3	2	1
Natural Resource Impacts –					
Composite Index	2.33	1.25	3.27	2.27	3.00
Overall Rank	3	1	5	2	4
Human Resource Impacts –					
Composite Index	2.23	2.99	1.14	1.06	2.53
Overall Rank	3	5	2	1	4

1/ Ranked 1 = least impact, 5 = most impact

At the conclusion of the intermediate screening analysis, the City of Caribou, through consultation with its transportation committee and via the PAC process, notified MDOT that it would prefer that any corridors which would bypass Caribou make use of existing Route 1, which bypasses downtown on the east, between downtown and the Aroostook River. Caribou felt that having the bypass closer to the downtown area would make it more attractive as an activity center and would help to limit impacts to surrounding properties west of the downtown. MDOT, therefore, refined Corridors H, J, and K, which had been aligned to bypass Caribou west of the City, to tie into Route 1 south of Caribou, follow Route 1 through the City, and then continue north to Madawaska on the original alignment for each corridor. Each of these corridors would also include a short segment of new highway corridor that connects Route 161 to Route 1, north of downtown Caribou. Figure 2-11 shows the corridor alignments through Caribou.

2.5 Development of Composite Corridors

The Intermediate Screening Analysis demonstrated that Corridors A, B, H, and K performed best in meeting the Study's goals. However, the detailed analysis showed that each corridor's performance varied with respect to benefits to the Houlton (south), Presque Isle-Caribou (central), and St. John Valley (north) regions of the Study Area. MDOT therefore undertook a further analysis to develop and evaluate transportation corridors within each of the three regions of the Study Area, as described below. This analysis was intended to identify the most effective transportation corridor within the region, using 11 segments of the 13 corridors identified through the Preliminary Screening Process, and to link these into composite corridors. Corridors that were previously eliminated as stand-alone options because they did not serve the entire Study Area were considered as potential transportation options within specific portions of the Study Area.

2.5.1 Regional Corridors Considered

The Study Area consists of three distinct regions, each with its own needs and transportation issues. The southern region of the Study Area extends from I-95 to Mars Hill. Houlton is the center of economic activity within the southern region. The central portion of the Study Area includes the cities of Presque Isle and Caribou. The northern portion of the Study Area extends from Caribou to the St. John Valley. Fort Kent, Madawaska, and Van Buren are centers of economic activity in the northern portion of the Study Area.

Based on the results of the Intermediate Screening Analysis and input from the PAC, MDOT developed the following options for the three regions, as shown on Figures 2-12 through 2-22. Corridors H and K differ from the corridor locations

analyzed in the Intermediate Screening Analysis since these use the corridor modifications in Caribou.

- Southern portion of the Study Area (I-95 to Mars Hill)
  - Option S-1 – portions of Corridors A and B
  - Option S-2 – portion of Corridor H
  - Option S-3 – portion of Corridor K

- Central portion of the Study Area (Mars Hill to Caribou)
  - Option C-1 – portion of Corridors A
  - Option C-2 – portion of Corridor B
  - Option C-3 – portion of Corridor K with an upgrade of Route 1
  - Option C-4 – portion of Corridor L with an upgrade of Route 1
  - Option C-5 – portion of Corridor M with an upgrade of Route 1

- Northern portion of the Study Area (Caribou to the St. John Valley)
  - Option N-1 – Corridors D and E, and a portion of Corridor I
  - Option N-2 – portion of Corridors H and K
  - Option N-3 – portion of Corridor B

Each of these options was analyzed using the same methodology that was used in the Intermediate Screening Analysis described in Section 2.4.2 (page 2-14). The methodology first looked at how each option met the Study's Purpose and Need and then examined cost and environmental impacts.

2.5.2 Results of Regional Corridor Analysis

In the southern portion of the Study Area, MDOT found that Option S-1, which includes portions of Corridors A and B, performed best in meeting the Study's Purpose and Need. However, it would have substantially higher impacts to human resources, particularly structures, than either Options S-2 (using portions of Corridor H) or S-3 (using portions of Corridor K). Options S-2 and S-3 performed comparably in terms of their ability to meet the Study's Purpose and Need, and had similar impacts to the natural environment. Option S-3, however, had substantially higher impacts to human resources than Option S-2. Figures 2-23, 2-24 and 2-25 illustrate the comparative analysis of the three Southern Options, and Figure 2-1 summarizes the process.

Figure 2-23 Southern Options – Purpose and Need Summary

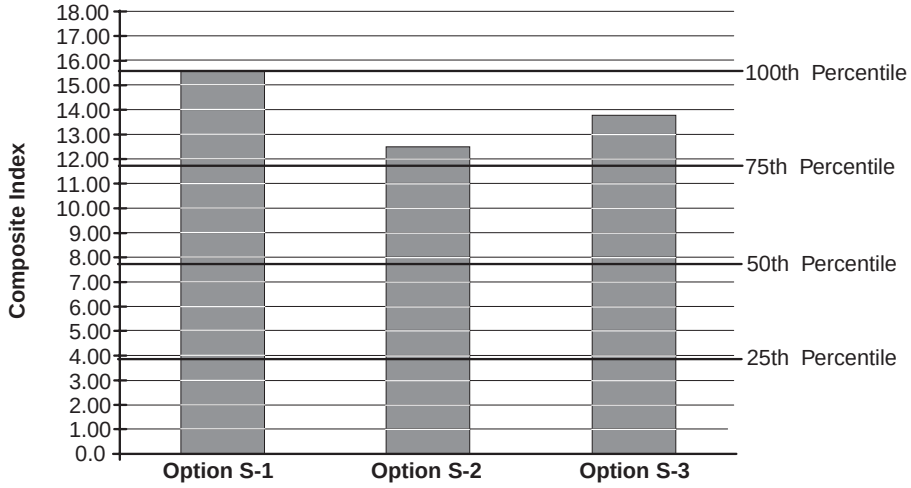


Figure 2-24 Southern Options – Cost Summary

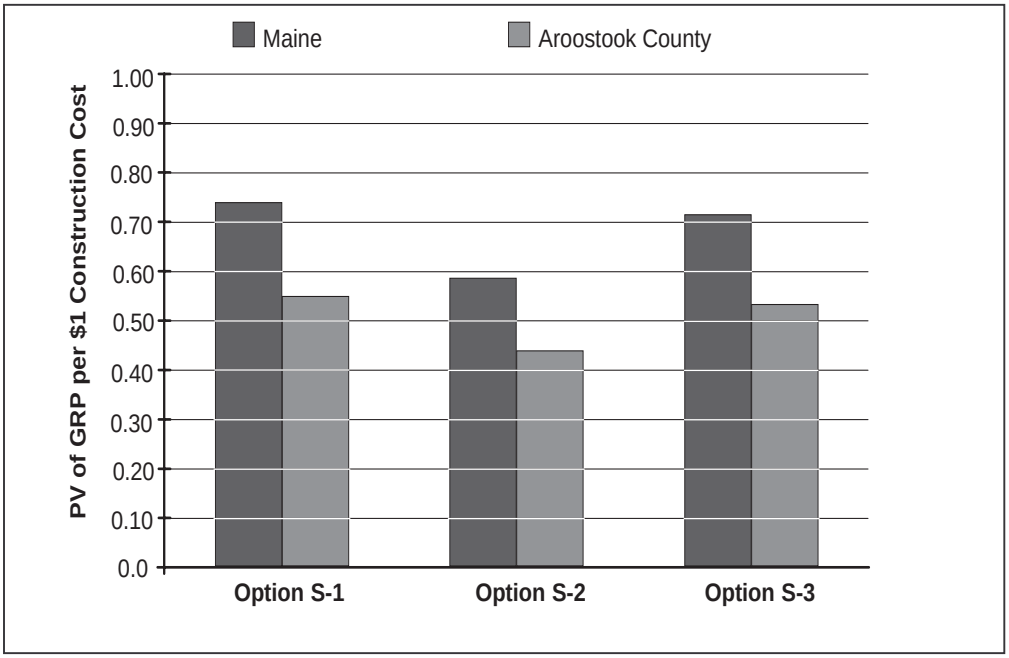
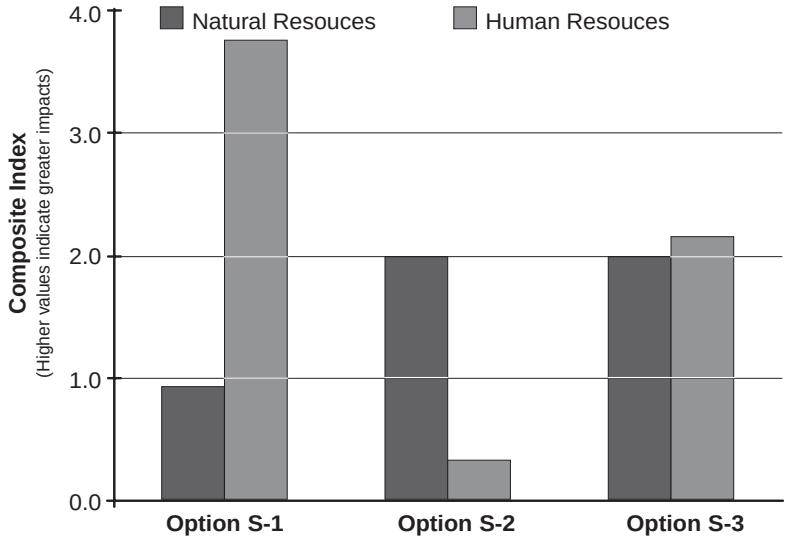


Figure 2-25 Southern Options – Environmental Impact Summary



In the central portion of the Study Area, Option C-4, which included portions of Corridor H and L with upgrades of Route 1, outperformed all other options in its ability to meet the Study's Purpose and Need. Option C-4 scored highest mainly because it better serves transportation needs in the Presque Isle and Easton areas than do the other options. Figure 2-26, 2-27 and 2-28 illustrate the comparative analysis of the five Central Options.

Figure 2-26 Central Options – Purpose and Need Summary

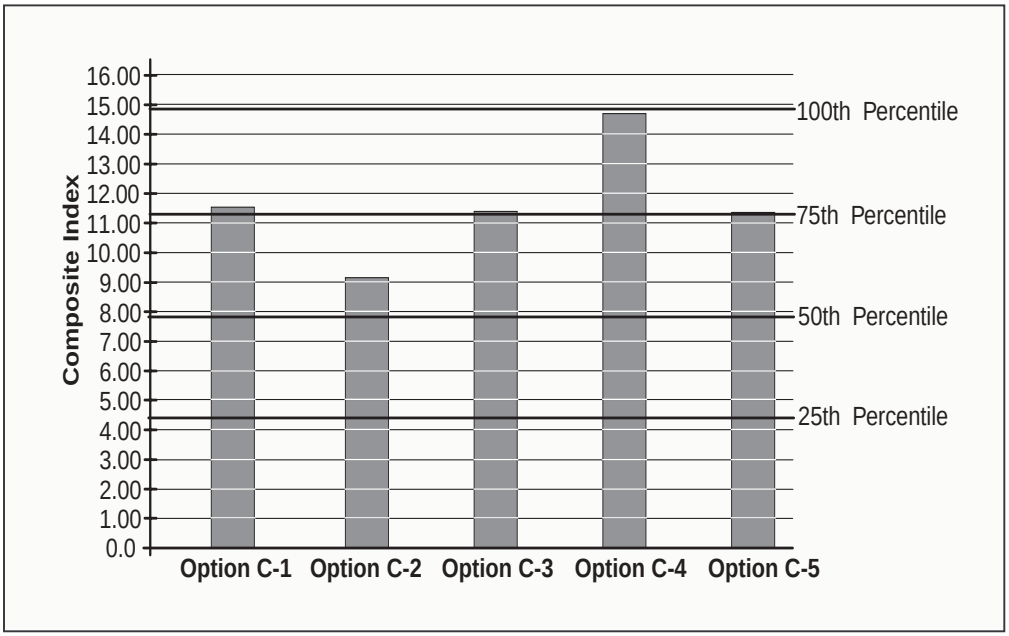


Figure 2-27 Central Options – Cost Summary

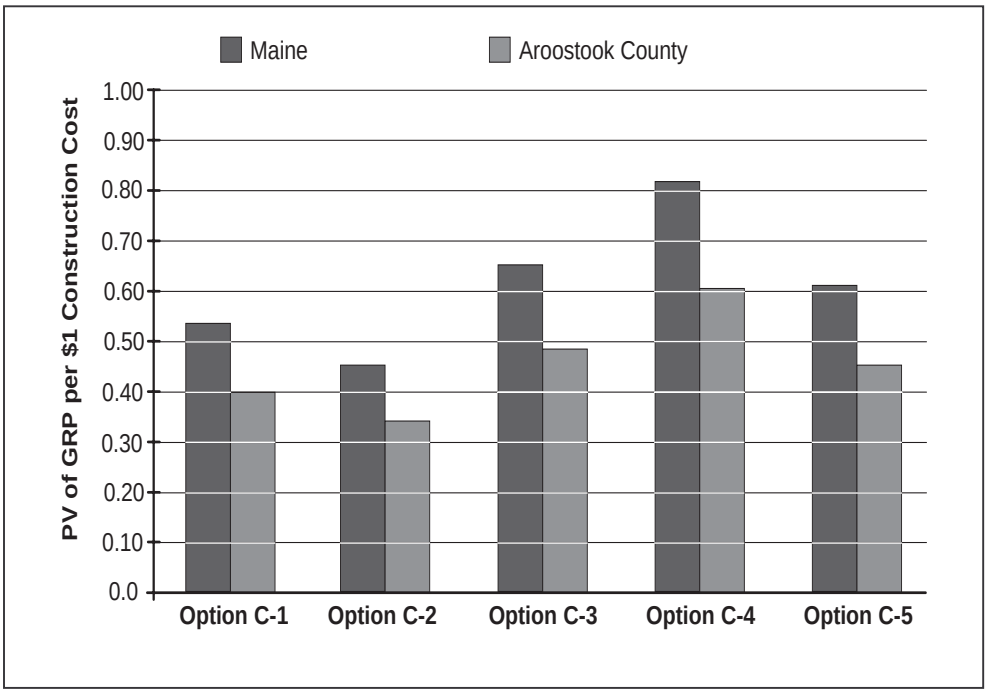
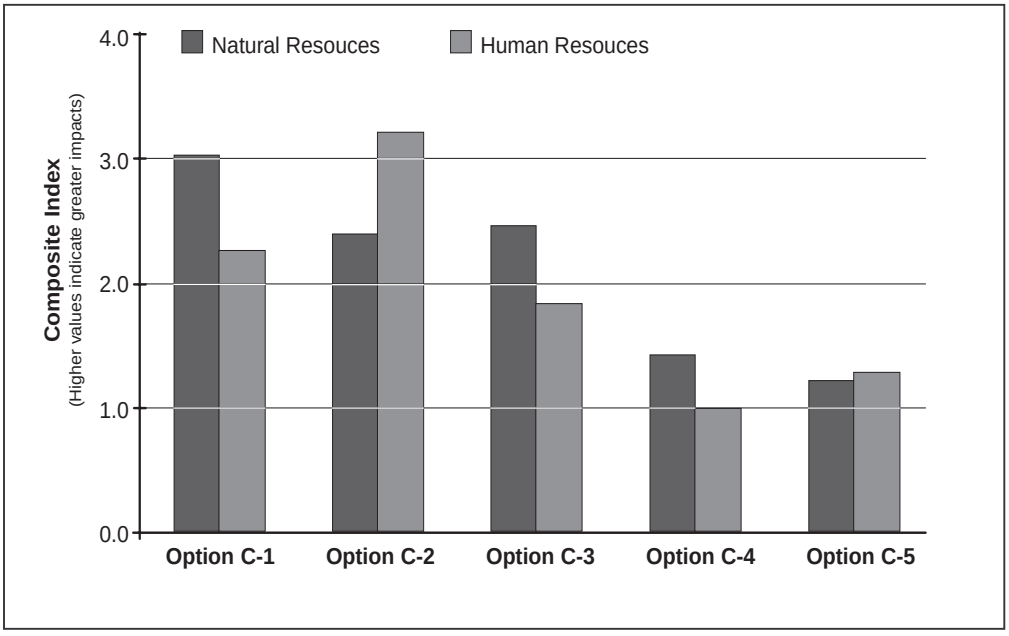


Figure 2-28 Central Options – Environmental Impact Summary



In the northern portion of the Study Area, Option N-1, which includes portions of Corridors D, E, and I, best serves the St. John Valley from an economic and transportation perspective. This combination of corridor segments serves both the western portion of the valley (i.e., Fort Kent) and the eastern portion (i.e., Van Buren). While this option does not directly serve Madawaska, it would improve travel time to

Madawaska via Corridor E, the new connection between Routes 161 and Route 1, and the upgrade of Route 1 between Frenchville and Madawaska. Environmental impacts among the three northern options were comparable, however, Option N-1 is expected to have somewhat higher impacts on the human environment than would Option N-2, as would be expected for upgrades of existing highways compared to new location highways. Option N-3 does not provide comparable transportation or economic benefits to the St. John Valley. Figures 2-29, 2-30 and 2-31 illustrate the comparative analysis of the three Northern Options.

Figure 2–29 Northern Options – Purpose and Need Summary

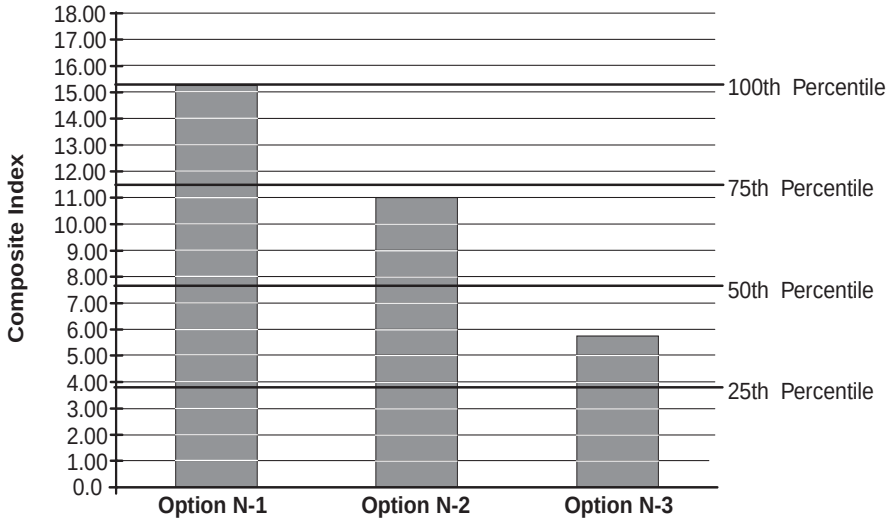


Figure 2-30 Northern Options – Cost Summary

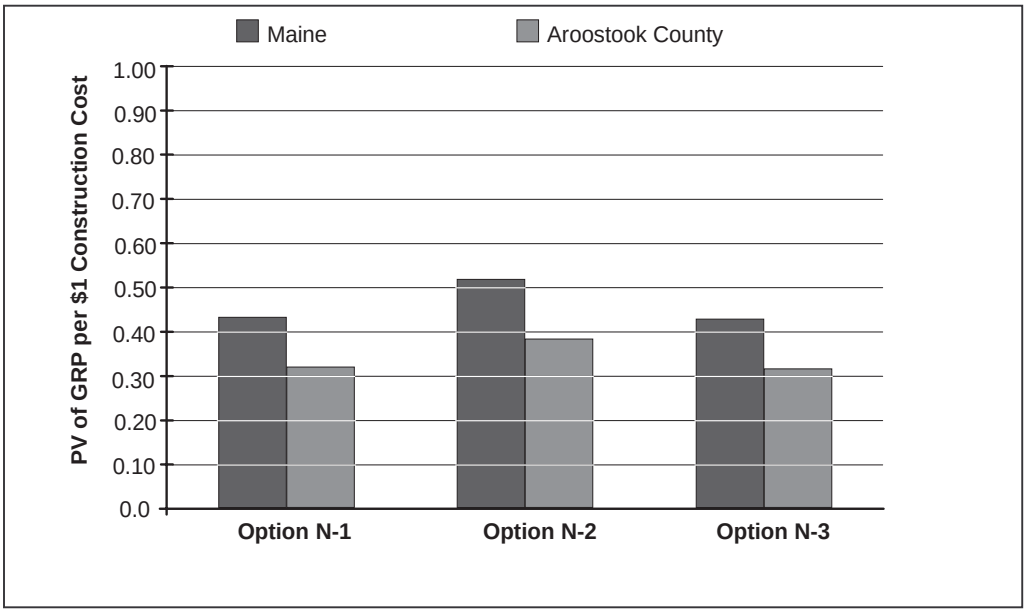
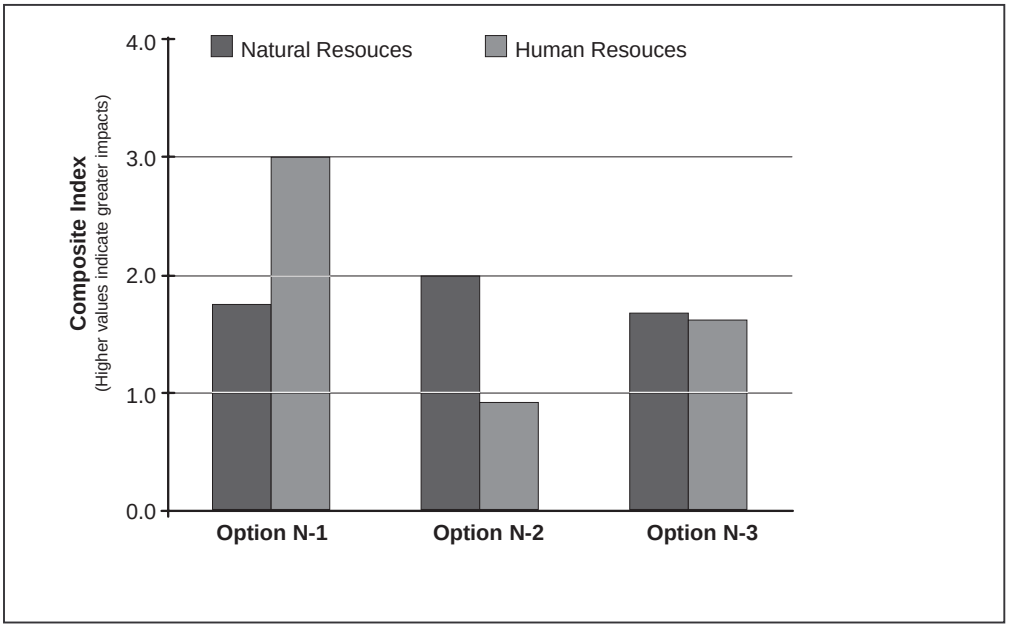


Figure 2-31 Northern Options – Environmental Impact Summary



Based upon these analyses, two new composite corridors were developed that are discussed in detail in this DEIS. These two corridors, Composite Corridor 1 and Composite Corridor 2, address both the overall transportation / economic needs of Aroostook County, as well as the more specific regional transportation and economic needs of the northern, central, and southern portions of the Study Area.

Composite Corridor 1 (Figure 2-32) consists of the following:

- Corridor A / B in the southern portion of the Study Area;
- Corridor H / L in the central portion of the Study Area; and
- Corridors D, E, and I in the northern portion of the Study Area.

Composite Corridor 2 (Figure 2-33) consists of the following:

- Corridor H in the southern portion of the Study Area;
- Corridor H / L in the central portion of the Study Area; and
- Corridors D, E, and I in the northern portion of the Study Area.

2.6 Potential Actions

This Draft Environmental Impact Statement evaluates the No-Action Alternative and four transportation corridors within the Study Area: Corridor H modified (Hm) and Corridor K modified (Km), carried forward from the Intermediate Screening Analysis as complete stand-alone corridors, and Composite Corridors 1 and 2, carried forward from the Composite Corridor Analysis. Corridors A and B were not carried forward for

detailed analysis since neither, as a stand-alone corridor, serves the St. John Valley markets, particularly Fort Kent and Madawaska. Although Corridors A and B perform well overall by serving Houlton, Fort Fairfield and Limestone, the northern section of the study area would be better served with other options. Substantial portions of Corridors A and B also are included in Composite Corridor 2.

For comparison purposes, the No-Action Alternative is also included in the DEIS to provide a baseline from which to assess the potential impacts of the build options. This section defines what is meant by the term No-Action and describes the four corridors that are evaluated in this DEIS.

Because of the scope of the study and the size of the Study Area, this DEIS examines the transportation, social, and environmental impacts of the four transportation corridors, and not specific highway alignments having a defined footprint. These corridors consist of upgrades to existing highways, new transportation corridors, and combinations of the two types. As discussed in Chapter 1, (page 1-1) the purpose of the DEIS is to determine which corridor or corridors would best serve the transportation and economic needs of the Study Area, while minimizing the potential for adverse environmental and social impacts. Later studies will evaluate highway alignment alternatives within the selected corridor, as well as design features such as highway cross section, the use of at-grade versus grade-separated intersections, frontage roads, and bridge designs, to select a preferred alternative within the chosen corridor.

In general, upgrades of 2-lane highways are envisioned as having a cross-section consisting of two 3.7-meter (12-foot) travel lanes and 3-meter (10-foot) shoulders. In addition, horizontal deficiencies would be corrected and truck passing lanes added in areas of vertical deficiencies. New and upgraded 4-lane highways are envisioned as having 3 meter (10-foot) wide outside shoulders, two 3.7-meter (12-foot) travel lanes in each direction, a 1.2-meter (4-foot) inside shoulder, and a 6.7-meter (22-foot) wide median. No additional hill climbing lanes would be provided, but horizontal efficiencies would be eliminated through design. The highway is envisioned as providing consistent freeway-type operations, and would be designed to state truck-weight standards.

Each of the four corridors being studied is composed of discrete links that can be defined as a segment of corridor between the intersection of two corridors or the endpoint of a corridor and its intersection with another corridor. Some links are common to more than one corridor. Having the corridors broken down into these smaller links allows for a more detailed analysis of benefits and impacts. For example, this allows trip time savings for Corridor K to be calculated for certain portions of the corridor, such as between Houlton and Presque Isle or between Caribou and Madawaska. Figure 2-34 shows all the link segments included in this DEIS. Table 2-8 (page 2-30) summarizes each of the four corridors.

Table 2-8
DEIS Corridor Summary (see Figure 2-34)

Corridor	Links	Length		Approximate Time Saving (minutes)	2030 VHT Saving[1]
		km	Miles		
Hm	1, 10, 16, 19, 24, U36, U43, 105,106	159	99	43	3,800
Km	3, 8, 9, 16, 19, U36, 105, 106	153	95	34	3,700
Composite 1	2, 6, 7, 10, 16, 18, 20, 26, U32, U33, U39, U40, U42, U45, U46, U47, U48, U 50, U51, 101, 105, 106	225	140	31	3,700
Composite 2	1, 10, 16, 18, 20, 24, U32, U39, U40, U42, U43, U46, U47, U48, 105, 106	228	142	36	3,600

1/ Reduction in VHT - vehicle hours traveled (daily)

2.6.1 No-Action Alternative

For purposes of this DEIS, No-Action is defined as continuing MDOT's ongoing construction program with no additional extraordinary projects. MDOT's *Six-Year Transportation Improvement Plan (Six-Year Plan) for 2002-2007* lists the potential projects that the Department plans to construct during that period. It includes both highway reconstruction and highway bridge maintenance projects. Table 2-9 (page 2-31) lists the major 2002-2007 Six-Year Plan highway reconstruction projects in the Study Area, and Table 2-10 (page 2-32) lists the major bridge replacement / rehabilitation projects. This program of potential improvements would be carried out regardless of whether or not a separate construction project arises from this EIS. For example, if MDOT were to decide to construct a new 4-lane highway following this study, other improvements already in the Six-Year Plan would still go forward. A project that arises out of this study will not preclude other programmed improvements unless, of course, the projects involved the same segment of highway, in which case the Six-Year Plan project would likely be subsumed by the project stemming from this study.

Projects in the Six-Year Plan are generally not as extensive as those envisioned in this EIS. The 2002-2007 Plan does not include any new highways in the Study Area, and the reconstruction projects are generally limited to highway rehabilitation / reconstruction of highways as they currently exist. Although the scope of improvements for each location in the Six-Year Plan has not been developed, they generally do not include such features as the widening or addition of shoulders, or the addition of truck climbing lanes. The goal of this EIS process is to assist decision makers in identifying a corridor or corridors for much more substantial improvements, including a new highway and / or major upgrades to existing highways.

Table 2-9
MDOT 2002-2007 Six-Year Plan Project List for Division 1
Highway Reconstruction

Municipality	ID No.	Route	Location	Length km	Length mi.	Project Status[1]
National Highway System/ Principal Arterials						
Blaine–Mars Hill	A2233	Route 1	Bubar Road to Park Street	2.2	1.4	
Mars Hill	PIN# 7523	Route 1	Route 1A to Clark Road	2.5	1.5	Funded
Presque Isle	A2232	Route 1	Tompkins Road to University Street	7.3	4.5	PCE
Presque Isle	A790	Route 1	Westfield town line to Tompkins Road	1.7	1.1	PCE
Van Buren	PIN# 5972	Route 1	Adams Street to Monroe Street	2.1	1.3	Funded
Van Buren	A786	Route 1	Martin Road to Parent Siding Road	2.1	1.3	
Van Buren	A1244	Route 1	Parent Siding Road to Grand Isle townline	3.0	1.8	
Fort Kent	A815	Route 161	New Canada Plt town line to Bridge Road	6.4	4.0	
Frenchville–Fort Kent	A807	Route 1	RR-Xing #051154 to Industrial Park Road	11.5	7.2	PCE
Houlton	PIN# 9192	Route 2A	McIntyre Road to Pierce Street	2.2	1.4	PCE
Twp17 R05 WELS	A816	Route 161	Thoroughfare Bridge to south of New Canada town line	8.1	5.0	PCE
Ashland to Fort Kent	C7	Route 11	Aroostook River Bridge to Route 1	76.9	47.8	
Fort Fairfield to Caribou	C11	Route 161	Route 1A to Route 1	17.0	10.5	
Easton to Presque Isle	C4	Route 10	Route 1A to Route 1	14.9	9.3	
Island Falls to Patten	C9	Route 159	Route 2 to Route 11	16.5	10.3	Funded
Macwahoc Plt to Houlton	C2	Route 2	Route 2A to Route 1	89.5	55.6	
Presque Isle to Fort Fairfield	C28	Conant Road	Route 10 to Route 1A	8.8	5.5	
Presque Isle to Fort Fairfield	C14	Route 163	Route 167 to Route 1A	6.4	4.0	

Source: MDOT Six-Year Transportation Improvement Plan; FY 2002-2007; February 2001.
1/ "Funded" indicates that the project has been funded in the 2002-2003 Biennial Transportation Improvement Program; "PCE" indicates that the project has been programmed for pre-construction engineering (PCE).

2.6.2 Corridor Hm – Smyrna Mills to Madawaska

Corridor Hm consists primarily of a new location highway between I-95 at Smyrna Mills and Route 1 at Madawaska. It improves connections to and from the Study Area by improving access to I-95. Corridor Hm differs from Corridor H by passing east of Caribou. Specifically, Corridor Hm comprises the following:

- A 78.0-kilometer (48.5-mile) segment of new location highway between Smyrna Mills and Route 1 north of Presque Isle;
- A 20.1 kilometer (12.5-mile) upgrade of Route 1 from Presque Isle to north of Caribou;

Table 2-10
MDOT 2002-2007 Six-Year Plan Project List for Division 1
Bridge Replacement/Rehabilitation

Municipality	Bridge Number	Bridge Name	Location	Scope	Project Status[1]
State Bridges					
Crystal	3975	Fish Stream	Route 159	Replacement	
Haynesville	3457	Mill	Route 2A	Replacement	Funded
Houlton	3874	Highland Avenue	Meduxenkeag	Replacement	Funded
Houlton	3458	Hodgdon Stream	Route 2A	Superstructure - Replace	
Littleton	1006	Watson Covered	Bypassed Carson Road	Rehabilitation	
Perham	3814	Spauling	SH 783 High Meadow Road	Replacement	
Wallagrass	2909	Wallagrass	Route 11	Replacement	
Washburn	3630	Churchill Brook	Route 164	Replacement	
Washburn	5250	Kennard Brook	Route 164	Replacement	
Woodland	3705	Eddy	Route 228	Widen	
Extraordinary Bridges					
Fort Kent	2398	International Bridge	Route 1	Study for Improvement	PCE

Source: MDOT Six-Year Transportation Improvement Plan; FY 2002-2007; February 2001.
1/ "Funded" indicates that the project has been funded in the 2002-2003 Biennial Transportation Improvement Program; "PCE" indicates that the project has been programmed for pre-construction engineering (PCE).

- A 54.0-kilometer (33.5-mile) segment of new location highway from Route 1 north of downtown Caribou to Route 1 east of Madawaska; and
- A 7.4-kilometer (4.6-mile) upgrade of Route 1 from the new highway to Madawaska.

The total length of Corridor Hm is 159 kilometers (99 miles). Figures 2-35 and 2-36 depict Corridor Hm. Traffic modeling indicates that Corridor Hm would save approximately 30 minutes on a trip between Smyrna Mills and Presque Isle, and another 16 minutes between Caribou and Madawaska. Corridor Hm would reduce total study area VHT by 3,800 Vehicle-Hours per day and total study area VMT by 41,600 Vehicle-Miles per day in 2030.

2.6.3 Corridor Km – Houlton to Madawaska

Corridor Km provides a new highway connection between I-95 at Houlton and Route 1 in Madawaska. Corridor Km would improve access to I-95 and would bypass bottlenecks in the town centers along Route 1. Corridor Km differs from Corridor K by passing east of Caribou. Specifically, Corridor Km comprises the following:

- A 79.6-kilometer (49.4-mile) segment of new location highway between I-95 in Houlton and Route 1 north of Presque Isle;
- An 11.5-kilometer (7.1-mile) upgrade of Route 1 beginning north of Presque Isle and extending north through Caribou;
- A 54.0-kilometer (33.5-mile) segment of new location highway between Caribou and Route 1, east of downtown Madawaska; and
- A 7.4-kilometer (4.6-mile) upgrade of Route 1 from the new highway to Madawaska.

The total length of the corridor would be 153 kilometers (95 miles). Figures 2-37 and 2-38 depict Corridor Km. Traffic modeling indicates that Corridor Km would save approximately 20 minutes from Houlton to Caribou and 15 minutes from Caribou to Madawaska. Corridor Km would reduce VHT by 3,700 Vehicle-Hours per day, but would increase VMT by approximately 9,900 Vehicle-Miles per day in 2030.

2.6.4 Composite Corridor 1 – Houlton to Fort Kent and Van Buren

Composite Corridor 1 provides a combination of new and upgraded highway corridors between Houlton and Fort Kent and Van Buren. Specifically, Composite Corridor 1 comprises the following:

- A 48.8-kilometer (30.3-mile) upgrade of Route 1 beginning at I-95 in Houlton and extending north to Westfield;
- Short bypasses of the town centers in Monticello, Bridgewater and Mars Hill totaling 11.4 kilometers (7.1 miles);
- A 14.6-kilometer (9.1-mile) segment of new location highway leaving Route 1 in Westfield, extending north bypassing downtown Presque Isle to the east, and reconnecting with Route 1 north of the Aroostook River in Presque Isle;
- An 50.2-kilometer (31.2-mile) upgrade of Route 1 beginning in Presque Isle and extending north through Caribou, ending at Route 1A in Van Buren;
- A 3.9-kilometer (2.4-mile) segment of new location east-west highway connecting Route 161 and Route 1 in Caribou, approximately 3.2-kilometers (2.0-miles) north of downtown Caribou;
- An approximately 68.9-kilometer (42.8-mile) upgrade of Route 161 between Caribou and Fort Kent;
- A 13.4-kilometer (8.3-mile) segment of combination new highway and upgrade of local secondary roads between Route 161 and Route 1 in Frenchville; and
- A 13.7-kilometer (8.5-mile) upgrade of Route 1 between Frenchville and Madawaska.

The total length of Composite Corridor 1 would be 225 km (140 miles). Figure 2-39 depicts Composite Corridor 1. Traffic modeling indicates that Composite Corridor 1 would save approximately 17 minutes between Houlton and Caribou and 9 minutes between Caribou and Madawaska. Composite Corridor 1 would reduce VHT by 3,700 Vehicle-Hours per day and would reduce VMT by approximately 13,100 Vehicle-Miles miles per day in 2030.

2.6.5 Composite Corridor 2 – Smyrna Mills to Fort Kent and Van Buren

Composite Corridor 2 provides a combination of new and upgraded highway corridor between I-95 at Smyrna Mills in the south, connecting to Fort Kent and Van Buren in the north. It is the same as Composite Corridor 1 north of Route 1 in Westfield. Between Houlton and Westfield, Composite Corridor 2 follows the Corridor H alignment as compared to Composite Corridor 1 which follows the Corridor A/B alignment. Specifically, Composite Corridor 2 comprises the following:

- An 63.2-kilometer (39.3-mile) segment of new location highway extending from I-95 in Smyrna Mills to Route 1 in Westfield;
- A 14.6-kilometer (9.1-mile) segment of new location highway leaving Route 1 in Westfield, extending north bypassing downtown Presque Isle to the east, and reconnecting with Route 1 north of the Aroostook River in Presque Isle;
- An 53.4-kilometer (33.2-mile) upgrade of Route 1 beginning in Presque Isle and extending north through Caribou, ending at Route 1A in Van Buren;
- A 3.9-kilometer (2.4-mile) segment of new location east-west highway connecting Route 161 and Route 1 in Caribou, approximately 3.2 kilometers (2.0 miles) north of downtown Caribou;
- An approximately 65.6-kilometer (40.8-mile) upgrade of Route 161 between Caribou and Fort Kent;
- A 13.4-kilometer (8.3-mile) segment of combination new highway and upgrade of local secondary roads between Route 161 and Route 1 in Frenchville; and
- A 13.7-kilometer (8.5-mile) upgrade of Route 1 between Frenchville and Madawaska.

The total length of Composite Corridor 2 would be 228 km (142 miles). Figure 2-40 depicts Composite Corridor 2. Composite Corridor 2 would save approximately 30 minutes on a trip between Smyrna Mills and Presque Isle, and another 10 minutes between Caribou and Madawaska. Traffic modeling indicates that Composite Corridor 2 would reduce VHT by 3,600 vehicle-hours per day and VMT by 35,700 vehicle-miles in 2030.

2.7 Summary of Predicted Effects

This section summarizes the potential effects (benefits and impacts) of each of the four corridors with respect to the Transportation Environment, Land Use, Economic, and Social Environment, and the Physical and Biological Environment within the Study Area.

This DEIS documents the potential effects of four corridors, defined as bands ranging from 153 km (95 mi) to 228 km (142 mi) in length, and from 46 meters (150 feet) to 92 meters (300 feet) in width, using available macro-scale information on environmental resources. Potential effects are estimated for the purpose of comparing these corridors. Following the selection of a Preferred Corridor, alignment alternatives would be developed using more detailed information, and the appropriate NEPA compliance documents would be prepared. For these reasons, this DEIS relies on broad assumptions concerning potential future highway construction in order to estimate transportation benefits, costs, and environmental impacts.

- To estimate the transportation benefits of the upgrade corridors, such as reductions in Vehicle-Miles Traveled (VMT), Vehicle-Hours Traveled (VHT), and trip time savings, the traffic model used a travel speed of 88.5 kilometers (55 miles) per hour for areas outside town centers and 56.3 kilometers (35 miles) per hour within towns or cities, regardless of the number of lanes.
- For new highway corridors, a travel speed of 104 kilometers (65 miles) per hour was used.
- Environmental impacts were based upon a uniform corridor width of 46 meters (150 feet) for upgrades of existing highways and 92 meters (300 feet) for new highways.

2.7.1 Summary of Transportation Effects

The transportation effects of each corridor on the Study Area were assessed for their ability to provide travel time and distance savings; improve transportation efficiency; improve safety; and improve mobility. Table 2-11 (page 2-36) provides a summary of these effects. Section 4.2 (page 4-2) provides a detailed analysis of transportation effects. These effects can be used to evaluate the extent to which each corridor meets the specific transportation objectives established in Chapter 1 (page 1-3):

- Reduce travel time to, from and within Aroostook County;
- Enhance the reliability of Aroostook County's transportation system;
- Improve traffic flow through Houlton, Mars Hill, Presque Isle, and Caribou;
- Reduce the potential for accidents;
- Provide an adequate highway geometry;
- Reduce speed differentials in developed areas, and among highway users; and
- Reduce conflicts caused by the varied traffic mix.

Corridor Hm provides the greatest improvement in travel distance savings, and is predicted to decrease VMT within the Study Area by 66,560 kilometers per day miles(41,600 miles) in comparison to the No-Action Alternative (VMT is predicted to total 3,925,000 km (2,443,000 miles). Composite Corridor 2 would provide comparable savings, and Composite Corridor 1 is predicted to reduce VMT by 20,800 kpd (13,100 miles). Corridor Km would *increase* VMT by 15,840 km (9,900 miles) in comparison to the No-Action Alternative. Each of the corridors would provide a similar travel time savings, with a reduction of 3,600 to 3,700 VHT in comparison to the No-Action Alternative. Each of the corridors would improve mobility and north-south access to activity centers within the Study Area. Corridor Hm would provide the greatest travel time savings between I-95 at Sherman and Madawaska (43 minutes), with Corridor Km and Composite Corridor 2 providing slightly lower travel time reductions between I-95 and Madawaska (30 and 35 minutes, respectively). Composite Corridor 1 would provide the least savings (24 minutes) between Houlton and Madawaska.

Table 2-11
Transportation Effects Matrix

Transportation Effect	Corridor Hm	Corridor Km	Composite Corridor 1	Composite Corridor 2
Change in Study Area vehicle-miles traveled[1]	- 41,600	+ 9,900	- 13,100	- 35,700
Reduction in Study Area vehicle-hours traveled[2]	3,800	3,700	3,700	3,600
Reduction in Traffic Demand through Local Centers[3]				
Monticello	1,900	5,500	5,700	1,900
Bridgewater	1,900	5,600	6,500	900
Mars Hill	1,900	6,800	3,500	1,900
Presque Isle	7,100	3,600	7,100	7,100
Caribou	2,100	2,500	1,200	1,200
Reduction in Travel Time (min)				
Sherman to Caribou	30	12	14	29
Smyrna to Madawaska	43	30	20	35
Houlton to Madawaska	22	34	24	15
Safety Improvements				
HCLs with Lower Traffic Demands[4]	29	22	14	19
HCLs with Geometric Improvements[5]	7	7	17	16
Traffic Shifted from Minor Arterials and Local Roads to Principal Arterials and Interstate Highways (%)[6]	10%	11%	15%	17%

1/ Change in VMT compared to the No-Action Alternative for 2030 conditions in the Study Area, expressed in vehicle-miles traveled per day (VMT)
2/ Change in VHT compared to the No-Action Alternative for 2030 conditions in the Study Area, expressed in vehicle-hours traveled per day (VHT)
3/ Volumes shown are Annual Average Daily Traffic (AADT) for 2030 conditions, expressed in vehicles per day (vpd)
4/ High Crash Locations for which traffic volumes are reduced in comparison to the 2030 No-Action Alternative
5/ The number of HCLs with geometric improvements
6/ Denotes the VMT shift from lower capacity roadways (Minor Arterials, Collectors, and local roads) to higher capacity roadways (Interstates, Principal Arterials) as compared to the 2030 No-Action Alternative.

Each of the corridors would improve functional conflicts in town centers by reducing traffic volumes. Corridor Km and Composite Corridor 1 would provide the greatest traffic reduction in Monticello, Bridgewater, and Mars Hill, with 50 to 94 percent reductions in traffic volumes (3,500 to 6,500 vpd less than the No-Action Alternative's 7,200 to 8,100 vpd). Corridors Hm and Composite Corridor 2 would have less of a "bypass effect," with predicted reductions of 23 to 26 percent (1,900 vpd). Corridor Hm, and Composite Corridors 1 and 2 would provide the greatest benefit to Presque Isle, by diverting approximately 52 percent of the through traffic (7,100 vpd), in contrast to the substantially lower benefit of Corridor Km (26 percent, 3,600 vpd). Corridors Hm and Km would provide the most benefit to downtown Caribou, by diverting (respectively) 48 and 57 percent (2,100 and 2,500 vpd) of through traffic (4,400 vpd).

Safety improvements are accomplished by shifting traffic away from high crash locations (HCLs), shifting traffic to roads with higher functional classifications that are constructed with more safety features; and by reconstructing existing HCL intersections. Corridor Hm would result in the greatest shift in traffic volume away from HCLs (29 locations), while Corridors Km, Composite Corridor 1 and Composite Corridor 2 would have similar, slightly lower improvements. The two Composite Corridors would result in the greatest number of existing HCLs improved (17 and 16, respectively), and would also have the highest traffic volume shifted to higher classification roads (15 and 17 percent, respectively), while Corridors Hm and Km would shift 10 and 11 percent.

2.7.2 Matrix of Land Use, Economic, and Cultural Effects

Table 2-12 (page 2-38) summarizes the primary direct impacts that each corridor may have on the land use, economic, and cultural environment. For land use and cultural resources, these impacts are calculated as the number or area of each resource located within the corridor footprint. In subsequent NEPA documents, specific alignment alternatives will be developed within the Preferred Corridor to avoid and minimize impacts to environmental resources. The values in this matrix are presented for the purposes of comparing corridors, and are not necessarily the actual impacts that would result from construction of transportation improvements within the corridor. In subsequent design stages, actual impacts will be calculated and may be higher or lower than the values provided here.

These values also represent only the potential direct impacts, which can be quantified, and do not account for the indirect impacts which cannot be easily quantified at this time. In considering these impacts, it is important to note that given equal impact areas, impacts along new location highways are likely to be more severe than those along upgrades. Impacts from new location highways may be more severe than those from highway upgrades because new alignments are more likely to result in the loss of an entire field or to bisect fields, thereby potentially interrupting access, irrigation equipment, and affecting the ability to use large harvesting equipment.

Economic effects of the corridors are important to determine the extent to which each corridor addresses the Study Purpose and Need criteria. Economic objectives include:

- Maintain and expand the Aroostook County economy as it affects population, employment, diversification of jobs, and income;
- Enhance the marketability of Aroostook County's existing and potential economic assets;
- Improve access to jobs and services;
- Improve connections to markets within and outside of Aroostook County including New England, Canada, and more distant areas; and
- Improve access to multi-modal (air and rail) facilities.

Table 2-12
Matrix of Land Use, Economic, and Cultural Effects

Resource	Corridor Hm	Corridor Km	Composite Corridor 1	Composite Corridor 2
Land Use				
Total Land[1]	1,260 (3,113)	1,244 (3,075)	1,165 (2,902)	1,376 (3,401)
Residential Land[1]	54 (133)	49 (121)	249 (614)	146 (361)
Buildings[2]	186	193	1,291	1,236
Active Farm Fields (number)	103	149	356	238
Active farm land (area)	167 (413)	204 (503)	271 (670)	229 (566)
Economic[3]				
Population change	+ 1,096	+ 1090	+ 970	+ 959
New Employment (jobs)	+ 578	+ 571	+ 515	+ 498
Increase in Personal income	$24.48 million	$24.32 million	$21.27 million	$21.52 million
Increase in Gross Regional Product	$29.32 million	$29.05 million	$25.56 million	$25.36 million
Jobs Served	17,982	14,188	24,299	25,887
Cost Effectiveness	$0.70	$0.72	$0.53	$0.50
Cultural Resources				
Historic Resources	1	1	3	3
Parks and Recreation Lands	3	7	4	4
Traditional Cultural Properties	0	13	4	0

1/ Areas of impact are presented as hectares (acres)
2/ Buildings include any structure, including outbuildings, garages, and barns within the corridor
3/ Based on 2030 forecasts

The economic analysis indicates that the four Corridors show a relatively narrow range of impacts on the economies of Aroostook County and the State of Maine, when measured against the 2030 No-Action Alternative. Total employment impacts are forecast to vary by only 80 jobs (16 percent) between the lowest and highest-ranking alternatives, and the remaining economic variables cluster within similarly narrow ranges. When evaluated on a county or statewide basis using aggregate measures of population, employment, income or Gross Regional Product (GRP), there is little evidence to strongly favor one corridor to the exclusion of others.

Although they may have similar impacts in the aggregate, the Corridors could have much different impacts on some sub-regions within Aroostook County. Corridors Hm and Km provide greater overall transportation access and time savings benefits, and thus produce marginally higher overall economic impacts. However, these same corridors tend to concentrate those economic benefits in Presque Isle, Caribou and Madawaska, to the potential detriment of other parts of the Study Area. Composite Corridors 1 and 2 are marginally less effective in providing transportation benefits to the region, but tend to spread those smaller benefits more widely over the Study Area. One obvious consequence of attempting to spread benefits to the northern portion of the Study Area is the resulting higher construction costs associated with Composite Corridors 1 and 2, which also render them less cost effective.

Cultural Resource effects (historical and archeological resources, public parks and recreation areas) are important to the analysis of environmental impacts, since these are regulated under Section 106 and Section 4(f), both of which require that Federal agencies avoid impacts to these resources wherever feasible, and minimize any unavoidable impacts.

2.7.3 Matrix of Impacts to the Physical and Biological Environment

Table 2-13 (page 2-40) summarizes the primary direct impacts that each corridor may have on the physical and biological environment. These impacts are calculated as the number and area of each resource located within the corridor footprint. In later stages of this Study, specific alignment alternatives will be developed within the Preferred Corridor to avoid and minimize impacts to environmental resources. Subsequent NEPA documents will be prepared for these alternatives. The values in this matrix are presented for the purposes of comparing corridors, and are not necessarily the actual impacts that would result from construction of transportation improvements within the corridor. In subsequent design stages, actual impacts will be calculated and may be higher or lower than the values provided here.

These values also represent only the potential direct impacts, which can be quantified, and do not account for the indirect impacts which cannot be easily quantified. In considering these impacts, it is important to note that given equal impact areas, impacts along new location highways are likely to be more severe than those along upgrades. New location highways have the potential to cause new impacts by bisecting relatively

undisturbed natural systems (wetlands, floodplains, or wildlife habitats). This may result in fragmentation (loss of critical size), barriers to the movement of wildlife or materials, new restrictions to flood flow, new restrictions to fish movement, new impacts to water quality, and loss of wetland functions and values. Impacts associated with upgrading existing highways will affect previously disturbed areas that may shift the location of the disturbance or barrier, but that will not create new effects, fragment habitats or populations, nor result in substantial losses of functions and values.

For these reasons, although Composite Corridor 1 may affect a greater number of wetlands than Corridors Hm or Km, it will not result in new indirect impacts and therefore the overall impact to wetland resources will be less. The loss of forest habitat for wildlife associated with Composite Corridor 1, also, is primarily forest along the edge of existing highways, and would not result in the same kinds or magnitude of impacts to wildlife as would Corridor Hm or Corridor Km. Composite Corridor 2 would be a new location highway south of Presque Isle, with the same impacts as Corridor Hm in this segment, and would be identical to Composite Corridor 1 north of Presque Isle.

Table 2-13
Matrix of Impacts to the Physical and Biological Environment

Resource	Corridor Hm	Corridor Km	Composite Corridor 1	Composite Corridor 2
Aquatic Resources				
New Stream Crossings	31	33	14	28
Widened Stream Crossings	7	6	55	44
Number of Floodplain Crossings	6	12	9	8
Floodplain Impact[1]	7 (18)	19 (46)	8 (19)	6 (14)
Number of Wetlands	109	121	193	174
Wetland Impact[1]	52 (127)	67 (166)	28 (66)	49 (120)
Outstanding River Segments	1	1	1	1
Wildlife Resources				
Forest Habitat[1]	934 (2,308)	796 (1,967)	376 (930)	779 (1,923)
Non-forest Habitat[1]	33 (81)	44 (109)	55 (135)	46 (113)
Inland Waterfowl and Wading Bird Habitat	1	1	2	2
Inland Waterfowl and Wading Bird Habitat[1]	2.7 (6.6)	0.7 (1.7)	0.3 (0.5)	2.7 (6.6)
Deer Wintering Habitat	1	0	2	3
Deer Wintering Habitat[1]	4.5 (11.1)	0	4.3 (10.7)	8.6 (21.2)
Endangered and Threatened Species	0	0	0	0

1/ Areas are given as hectares (acres)

Floodplain impacts are important to the comparative evaluation of the corridors, since Executive Order 11988 requires federal agencies to avoid, to the extent possible, impacts to floodplains. Wetlands are similarly protected under Executive Order 11990, which directs federal agencies to avoid new construction in wetlands where there is a practicable alternative. State-designated "Significant Wildlife Habitats" (inland waterfowl and wading bird habitats, deer wintering habitat) are protected under the Maine Natural Resources Protection Act, which stresses avoidance of "Significant Wildlife Habitat" as the first step in mitigation of impacts.

2.7.4 Preliminary Cost Estimate

MDOT has calculated the cost of the four corridors, based upon a 4-lane cross section not including the cost to obtain new or additional right-of-way. While right-of-way acquisition may be a substantial part of the cost of construction, it is not feasible to estimate these acquisition costs based on the information currently available. The corridors under consideration are defined as broad uniform-width footprints, and not as specific alignments that would be analyzed based on a more advanced engineering design. Preliminary cost estimates indicate that Composite Corridor 2 would be the most costly at $634 million, followed by Composite Corridor 1 at $599.5 million, Corridor Hm at $439 million, and Corridor Km at $426.6 million.