

Commission Briefing Paper 3C-02

2006 C&P Findings: Future Investment Needs on the National Highway System and Interstate System

Prepared by: Section 1909 Commission Staff
Date: March 14, 2007

Introduction

This paper is part of a series of briefing papers to be prepared for the National Surface Transportation Policy and Revenue Study Commission authorized in Section 1909 of SAFETEA-LU. The papers are intended to synthesize the state-of-the-practice consensus on the issues that are relevant to the Commission's charge outlined in Section 1909, and will serve as background material in developing the analyses to be presented in the final report of the Commission.

This paper summarizes key findings of the 2006 C&P report on future highway investment needs, showing projected impact of a range of alternative future funding levels on a variety of indicators of future highway system conditions and performance. This paper consolidates information previously provided to the Commission in other forms, plus additional supplementary information. This analysis addresses critical components of the highway system, specifically the National Highway System (NHS) and the Interstate System.

Background and Key Findings

The findings presented in this paper are extracted from the 2006 Status of the Nation's Highways, Bridges, and Transit: Conditions & Performance Report to Congress. The 2006 C&P report includes supplementary investment analyses focusing on both the National Highway System and on the Interstate System component of the NHS. These analyses link future investment on the rural and urban components of these systems with the projected condition and performance on those systems. The investment analyses are based on data from 2004. Key findings include:

- If current spending levels on the urban NHS for system expansion plus pavement resurfacing and reconstruction were sustained over 20 years in constant terms, urban pavement condition and operational performance would be expected to decline. Current spending on the rural NHS appears to be adequate to improve rural conditions and performance.
- Current spending on rural Interstate highways appears adequate to further improve pavement ride quality and reduce overall highway user costs, if sustained in constant dollar terms. On urban Interstates, significant increases in funding for rehabilitation and expansion would be required to prevent both average physical conditions and operational performance from becoming degraded.

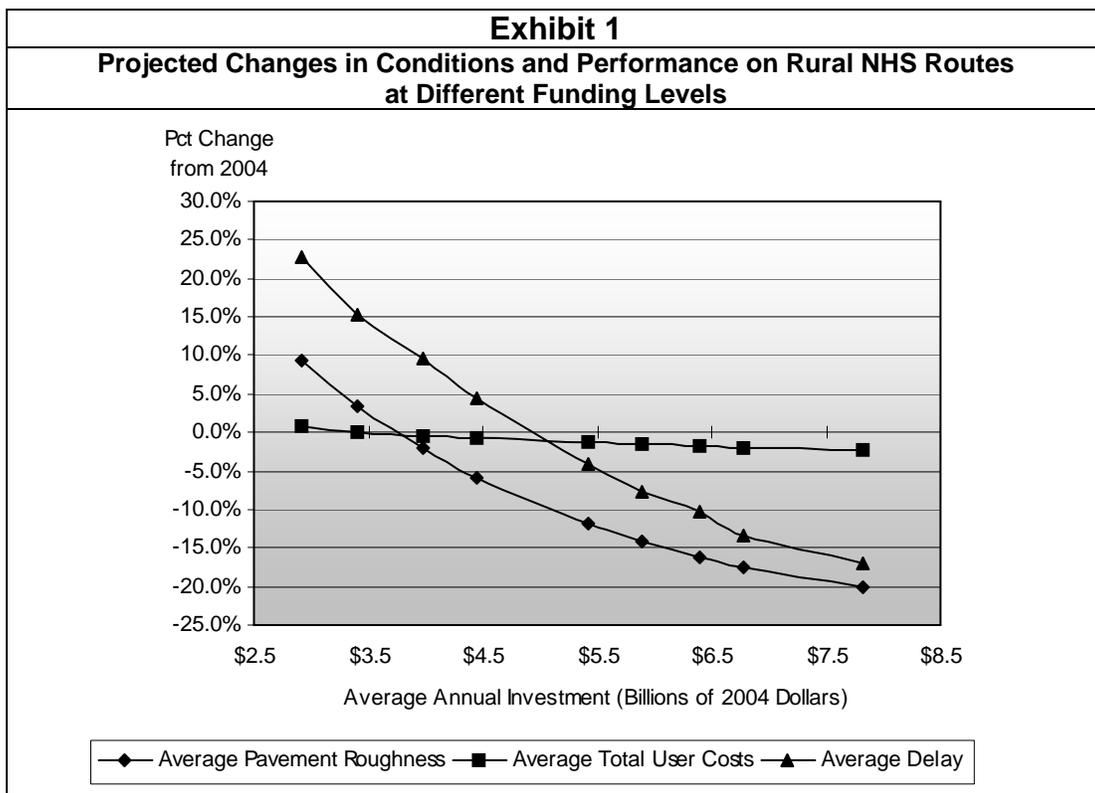
Issue Paper 3C-01 includes similar analyses of investment and performance for the full Federal-aid highway system and other public roads. That paper also includes additional background information on the concepts behind the C&P investment analyses.

National Highway System

The NHS consists of 162,000 miles of public roads. It includes the Interstate System and other roads that are important for interstate travel and commerce, including connections between the highway network and other modes of transportation.

Exhibits 1 and 2 show the impact of different levels of combined highway rehabilitation and expansion spending on projected values for certain indicators of highway condition and performance. These types of improvements are the ones that are modeled in the Highway Economic Requirements System (HERS), the model that is used to perform the highway investment analysis for the C&P report.

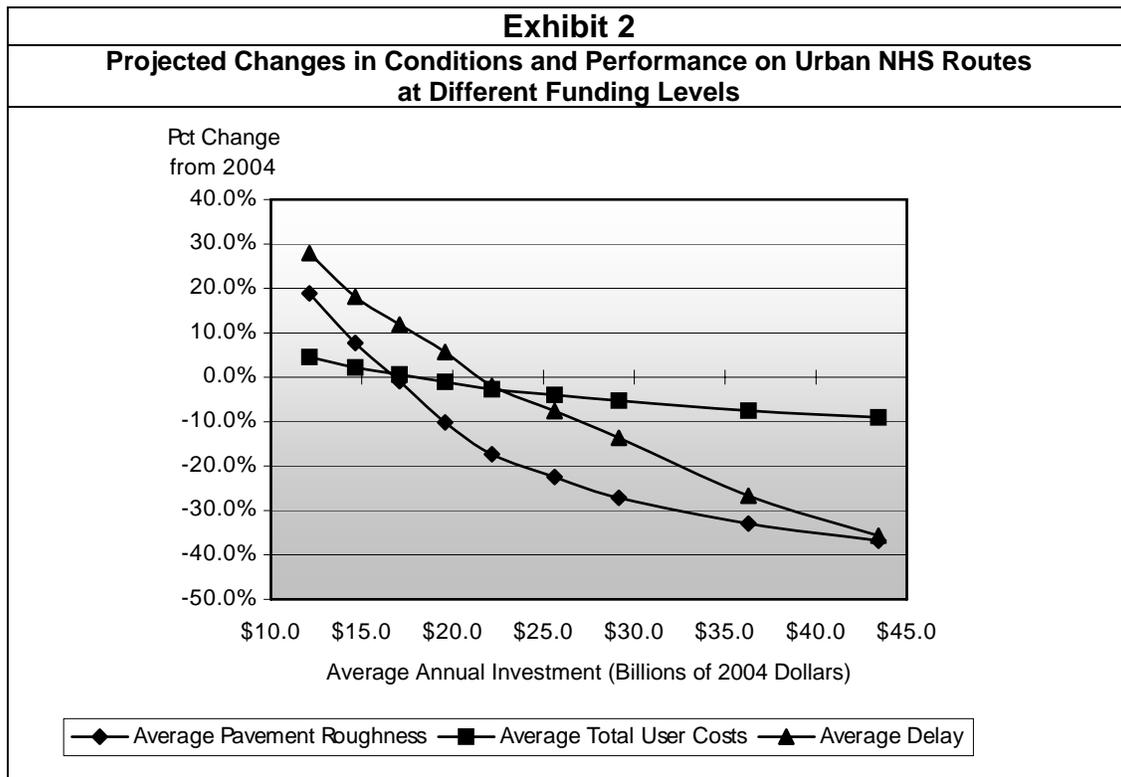
Exhibit 1 presents investment/performance estimates for NHS routes in rural areas. In 2004, total highway rehabilitation and expansion investment on these roads totaled \$10.1 billion. This amount exceeded the Maximum Economic Investment level of \$7.8 billion annually for these roads that was estimated by HERS (see Briefing Paper 3C-01 for a discussion of the maximum economic investment concept). As a result, significant improvements in pavement quality on the rural NHS would be expected if 2004 funding levels were maintained in constant dollars over 20 years. Once the existing backlog of pavement deficiencies is addressed, the model suggests that investments of this type could be cost effectively scaled back. The percent of rural NHS travel on roads with “good” ride quality could be maintained at a funding level of \$4.5 billion annually.



Significant improvements in operational performance on the rural portion of the NHS would also result if the rehabilitation and expansion investment levels for 2004 were continued in the future, with values for average delay per VMT, total user costs, and travel time costs all declining by a wide margin. Average user costs on rural NHS routes would be maintained at an average annual investment level of \$4.0 billion, while average delay and average travel time costs could be maintained at a funding level of \$5.4 billion. However, while the percentage changes in average total delay at various funding levels are large, they are applied to a relatively small base, as delay on the NHS in rural areas is significantly lower than in urban areas.

Exhibit 2 presents similar information for Urban NHS routes. If the current rehabilitation and expansion investment level of \$16.9 billion on urban NHS sections were sustained over 20 years in constant dollar terms, this would likely be sufficient to maintain average IRI and the percentage of travel on pavements with “acceptable” ride quality on these sections, assuming the mix of future rehabilitation and capacity investments was consistent with those that HERS has identified. The percentages of travel on urban NHS pavements with “good” ride quality would increase significantly at this level of investment.

An average annual investment level in highway rehabilitation and capacity expansion of between \$17.1 and \$19.6 billion would be needed to maintain average total user costs on urban NHS routes at 2004 levels. These amounts are higher than the 2004 level of rehabilitation and



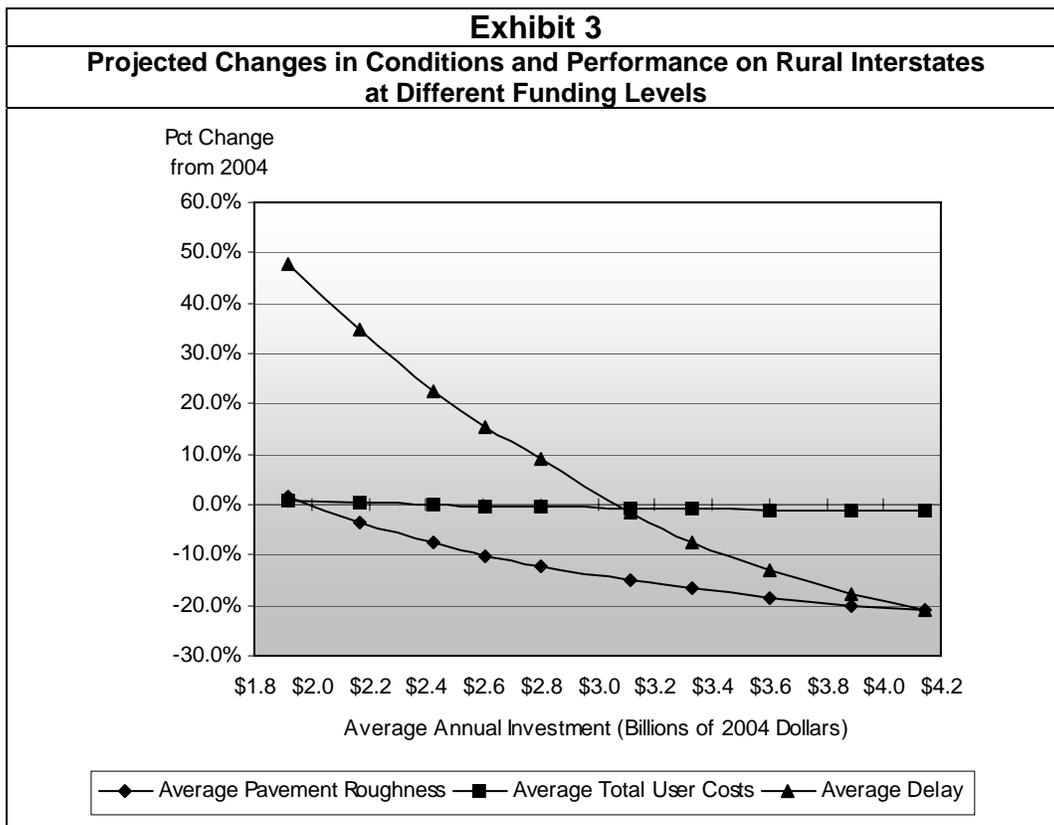
expansion expenditure on these roads (\$16.9 billion). Funding levels between \$19.6 and \$22.2 billion annually would be required to maintain average total delay and average travel time costs on the NHS in urban areas. These amounts are approximately \$3 billion to \$5 billion higher than the comparable 2004 funding.

The highest funding level shown in Exhibit 2 represents the Maximum Economic Investment level for rehabilitation and expansion improvements on the urban portions of the NHS. Increased investment beyond this level (in constant-dollar terms) would not be cost-beneficial, based on the HERS analysis. At this level of investment, both condition and performance on these routes would be expected to improve significantly over 20 years. The percentage of VMT on roads with acceptable ride quality would rise to 98.5 percent, while the percentage on roads with good ride quality would increase to 88.6 percent. Average total user costs would decrease by 9.0 percent, and average total delay would decline by over 35 percent.

Interstate System

The C&P also includes an analysis projecting conditions and performance on the Rural and Urban portions of the Interstate system at different funding levels. As with the analyses of the National Highway System, the funding levels shown in the following exhibits include only the types of investments (highway rehabilitation and expansion) that are modeled in HERS.

Exhibit 3 relates future investment and performance on Interstate highways in rural areas. Highway rehabilitation and expansion investment totaled \$3.7 billion on Rural Interstates in 2004. This level is only slightly below the maximum economic investment level of \$4.1 billion estimated by HERS. If current funding levels were sustained, and the mix of highway

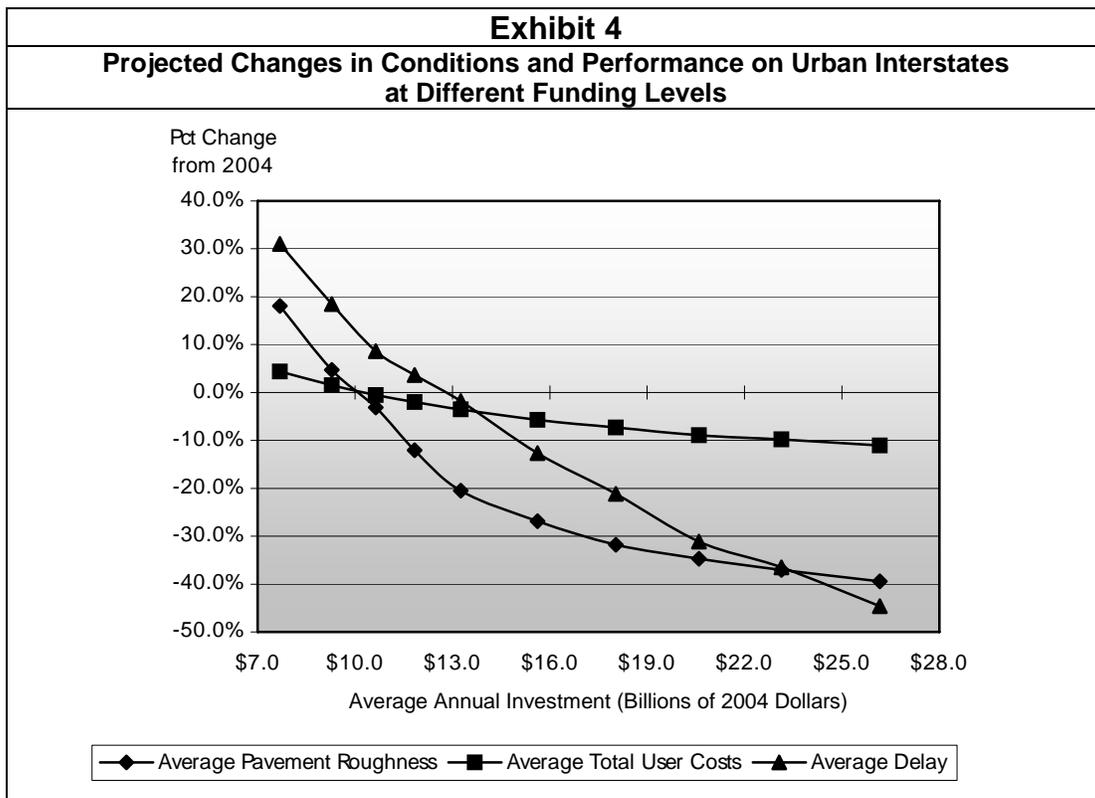


rehabilitation and widening investments recommended by HERS were implemented, then average IRI would be projected to improve by more than 18.4 percent over 20 years, and the

percentage of travel on roads with good ride quality would rise to over 88 percent. Virtually all travel on rural Interstates would occur on roads with at least acceptable ride quality. The annual level of funding required to maintain average IRI at its 2004 level is between \$1.9 billion and \$2.2 billion.

If current funding levels were sustained, and the mix of highway rehabilitation and widening investments recommended by HERS were implemented, then improvements could also be made in operational performance on Rural Interstates. Average delay would decline by over 13 percent if 2004 rehabilitation and expansion expenditure levels were sustained over 20 years. It should be noted, however, that average delay on rural Interstates is a small fraction of that on urban Interstates and is overwhelmingly related to incident delay. Thus, the large percentage changes in rural delay at different funding levels indicated in the exhibit are not as significant as they may appear.

On Urban Interstates (Exhibit 4), if current funding levels of \$7.7 billion annually were sustained (in constant dollars), and the mix of highway rehabilitation and widening investments recommended by HERS were implemented, then average IRI on urban Interstates would be expected to worsen by 18.1 percent, and the percent of VMT on roads with acceptable ride quality would fall slightly, to 87.4 percent. The results suggest that a substantial increase in urban Interstate investment would be necessary to prevent average pavement condition on urban Interstates from deteriorating in the future.



The exhibit also indicates that an average annual investment level in highway rehabilitation and capacity expansion of between \$11.8 billion and \$13.3 billion would be needed to maintain

average delay on urban Interstates at 2004 levels. Total user costs would be maintained at investment levels of about \$10.6 billion, and travel time costs on urban Interstates would be maintained at funding levels of about \$13.3 billion. These amounts are significantly higher than the comparable 2004 funding levels. The results suggest that, if average annual funding were maintained (in constant dollars) at 2004 levels through 2024, average delay on urban Interstates would increase by 31 percent, total user costs would increase by 4.4 percent, and travel time costs would increase by 12.1 percent.

If the Maximum Economic Investment level for rehabilitation and expansion improvements on urban Interstates (\$26.2 billion) were achieved and sustained over 20 years, all measures of condition and performance would improve significantly. Average pavement roughness would decline by over 39 percent, and average delay would decrease by over 44 percent. Almost all travel on urban Interstates would be on roads with acceptable ride quality, and 95 percent would be on roads with good ride quality. Average user costs would decrease by 11 percent.

Note that the impacts of capital investment for rehabilitation and expansion presented here are derived from the baseline analyses of the C&P report. Briefing paper 3E-01 explores some of the impacts that alternative assumptions about key model inputs and parameters and future revenue mechanisms would have on the investment analysis.