Methods of Estimating Improvement Costs on County FAS Systems in Minnesota

CLINT BURNES, Assistant Traffic and Planning Engineer
Research Minnesota Department of Highways

●REFERENDUMS failed to amend the state constitution regarding the distribution of road user money in Minnesota, partially because of the lack of information as to the proper percentages of distribution. Interested groups of road users refused to sanction or support any measure of fund distribution not based on knowledge of the requirements of the various road systems. Because of the lack of both support and knowledge, the state legislature in 1953 created a highway study commission to investigate all matters related to highways (their adequacy, needs, and financing) for the purpose of determining the sound and reasonable requirements for all highways and street systems within the state. The commission entered into two agreements for technical services to carry out the directive of the legislature. One was with the Automotive Safety Foundation of Washington, D. C., to direct and supervise an engineering analysis. The second was with the Public Administration Service of Chicago, to conduct a financial study of highway taxation and revenue distribution.

The Automotive Safety Foundation made two major determinations affecting local roads and streets: (1) a need for a 30,000 mile county state-aid system and a 1,200 mile municipal state-aid system, and (2) the program cost of such systems.

This determination of the county state-aid and municipal state-aid costs was based on minimum tolerable standards, and reported only in totals for the entire state in order to establish the proper relationship between the state, county and municipal needs.

The Public Administration Service determined from their analysis that the present level of income would be adequate to finance the A. S. F. recommendation over a program period of 15 years.

Based on a review of the two consultants' reports, the commission recommended to the legislature a bill for an act proposing a constitutional amendment. The legislature in turn approved the recommendations and proposed an amendment to the constitution that provided for a redistribution of road user funds, 62 percent to state trunk highways, 29 percent to the county state-aid system, and 9 percent to the municipal state-aid system; also the establishment of a county state-aid and municipal state-aid system of highways, not to exceed 30,000 and 1,200 miles respectively. This 1955 Minnesota legislature also appointed an interim commission on highway taxes distribution to study the method of distribution of the three funds to the various governmental units.

The County Engineers Association, and the County Commissioners Association, together with Minnesota highway department personnel, as consultants, assisted the commission by developing a formula for distributing the county state-aid fund (29 percent of road user fund). This formula was presented to the interim commission late in January 1956 for consideration. The commission, after reviewing the principles and resultant factors, accepted the formula with little revision.

The formula recommended by the commission provides for prorating 50 percent of available road-user funds among counties on the basis of total construction money needs, 30 percent according to the distribution of state-aid road mileages, and 10 percent according to the distribution of motor vehicle registrations. The remaining 10 percent is to be distributed equally among the 87 counties as an equalization factor.

Using the latest available data, the county's proportional share of the four factors is totaled to provide a distribution factor. This distribution factor is applied to the total amount of user funds set aside for county state-aid purposes to determine each county's apportionment.

The interim commission recognized that accurate data on state-aid road mileage and motor vehicle registration are readily available, but existing data for prorating

COUNTY ROAD NEEDS
COUNTY PRIMARY SYSTEM CONTROL SHEET

County Number_____ District Number_____

The estimated costs per mile for the several classes of work, as listed herewith for the various traffic classifications, are based upon actual experience under current price levels.

	Under 100	100 - 400	400 - 1000	Over 1000
GRADING (1)				
Low	_____	_____	_____	_____
Normal	_____	_____	_____	_____
High	_____	_____	_____	_____
STABILIZED GRAVEL BASE (2)				
Low		_____	_____	_____
Normal		_____	_____	_____
High		_____	_____	_____
BITUMINOUS STABILIZED BASE (2)				
Low		_____	_____	_____
Normal		_____	_____	_____
High		_____	_____	_____
SOIL CEMENT BASE (2)	per 24' width			
Low		_____	_____	_____
Normal		_____	_____	_____
High		_____	_____	_____
TRAFFIC BOUND AGGREGATE SURFACE (3)				
Low	_____			
Normal	_____			
High	_____			
STABILIZED AGGREGATE SURFACE (3)				
Low	_____			
Normal	_____			
High	_____			
ROAD MIX BITUMINOUS SURFACE (3)				
Low		_____		
Normal		_____		
High		_____		
PLANT MIX BITUMINOUS SURFACE (3)				
Low		_____	_____	_____
Normal		_____	_____	_____
High		_____	_____	_____
STANDARD P. C. CONCRETE (3)				
PAVEMENT 9"-7"-9"	per 24' width			
Low				_____
Normal				_____
High				_____

Date_____ Signed_____ Co. Hwy Engr.

Figure 1.

RURAL STATE-AID STANDARDS - DESIRABLE MINIMUMS

Average Daily Traffic	Surface Type	WIDTHS Sub-grade	WIDTHS Finished Roadway	WIDTHS Surface	DESIGN SPEED Flat	DESIGN SPEED Rolling	DESIGN SPEED Mtns *	SHARPEST CURVE Flat	SHARPEST CURVE Rolling	SHARPEST CURVE Mtns *	MAXIMUM GRADIENT Flat	MAXIMUM GRADIENT Rolling	MAXIMUM GRADIENT Mtns. *	NON-PASSING SIGHT DISTANCE Flat	NON-PASSING SIGHT DISTANCE Rolling	NON-PASSING SIGHT DISTANCE Mtns *
Under 100	Traffic Bound Aggregate	24	24	22	45	40	30	10	12	22	5	7	10	320	300	275
100-400	5-Ton - Base and Road Mix Mat	30	26	22	50	50	40	8	10	14	4	5	8	350	350	300
400-1000	7-Ton Base and Hot Mix Mat	32-34	28-30	24	60	50	45	5	8	10	3	5	7	475	350	320
Over 1000	7-T Ult 9 T Base and Hot Mix Mat	36-38	30-32	24	60	50	45	4	5	8	3	4	6	475	350	320

Note Where conditions justify design geometrics below the Desirable Minimums as shown herein, the Department can in its discretion approve of such design modifications within the Absolute Limits recognized by the AASHO and as recorded under Manual No 090 201 - (Rev. 12-21-55) *Mtns = Mountainous

BRIDGE STANDARDS

	NEW BRIDGES Clear Width (ft.)	NEW BRIDGES Design Load (AASHO)	BRIDGES TO REMAIN Clear Width (ft.)	BRIDGES TO REMAIN Safe Load (Posting Basis in Tons)
Under 100	24	H-20	18	10 T
100-400	24 *1	H-20	24	15 T
400-1000	30	H-20	24	15 T

Note *1 - Minimum of 24' but not less than 2 ft wider than surfaced width on structures of 80 ft or less in length.
GENERAL NOTE. Consideration should be given to constructing all short span structures to full shoulder width.

Figure 2.

funds to be allotted on the basis of total construction money needs are not satisfactory. It recommended to the legislature in September 1956 that a new survey of road needs be conducted by the county engineers with the commissioner of highways cooperating.

Upon release of this report and assuming the amendment would pass at the general election in November, the executive committee of the county highway engineers association requested the county division of the highway department to institute a county needs study to provide the basis for distributing the road-user fund as proposed.

The amount of work involved in computing the needs and selecting the county state-aid system prior to the effective date of the amendment did not permit waiting until the amendment passed before starting the study.

Also, because of a legislative recommendation to include all federal-aid secondary roads in the county state-aid system and an anticipated future request from the Bureau of Public Roads for a comprehensive road study which would include federal-aid secondary (FAS), any hesitancy on starting the study immediately was removed. The study was started, but only on the federal-aid secondary portion of the system, which amounts to approximately 16, 000 miles of the proposed 30, 000 mile state-aid system.

This saved over two months of time of an already tight schedule, as the amendment passed with a majority vote of approximately 80 percent, and the Bureau of Public Roads is requesting a needs study pursuant to the 1956 Federal-Aid Act, Section 210.

ASSUMPTIONS

This study could be called a "Modified 25-Year Needs Study"—modified in the respect that it does not permit the inclusion of theoretical replacements to proposed improvements. For example, a presently inadequate bituminous road needing grading, base and bituminous surfacing, may need one or possibly two additional bituminous mats in 25 years; however, this study permits including only the actual need of one mat at a time. Recurring studies at 2-year intervals will pick up the subsequent replacement needs at each stage of construction.

The rural design standards established as a minimum are slightly higher than those presently used, and while considered as desirable minimums, they establish the maxi-

MUNICIPAL CONTROL SHEET

COUNTY STATE-AID EXTENSIONS IN MUNICIPALITIES OVER AND UNDER 5,000 POPULATION

County Number _____ District Number _____

The estimated costs per mile for the several classes of work, as listed herewith for the various traffic and street classifications, are based upon actual experience under current price levels.

Type of Street	NORMAL STREET		WIDE STREET MAJOR ARTERIAL	
Surface Width	28 foot	44 foot	62 foot	62 foot Plus Median
Traffic	Light Traffic	Medium Traffic	Not Divided Heavy Traffic	Divided
Design Section	Rural Sec.	Munic. Sec.	Munic. Sec.	Munic. Sec.
Design Type	Interm. Type	High Type	High Type	High Type
Design Load	5 ton	7 ton*	9 ton	9 ton
GRADING (1)				
Low	_____	_____	_____	_____
Normal	_____	_____	_____	_____
High	_____	_____	_____	_____
STABILIZED GRAVEL BASE (2)				
Low	_____	_____	_____	_____
Normal	_____	_____	_____	_____
High	_____	_____	_____	_____
BITUMINOUS STABILIZED BASE (2)				
Low	_____	_____	_____	_____
Normal	_____	_____	_____	_____
High	_____	_____	_____	_____
SOIL CEMENT BASE (2)				
Low	_____	_____	_____	_____
Normal	_____	_____	_____	_____
High	_____	_____	_____	_____
ROAD MIX BITUMINOUS SURFACE (3)				
Low	_____			
Normal	_____			
High	_____			
PLANT MIX BITUMINOUS SURFACE (3)				
Low	_____	_____	_____	_____
Normal	_____	_____	_____	_____
High	_____	_____	_____	_____
STANDARD P C. CONCRETE (3) PAVEMENT		8" Uniform	9" Uniform	9" Uniform
Low		_____	_____	_____
Normal		_____	_____	_____
High		_____	_____	_____

*7 ton Load Design will attain 9 ton loading with the addition of a future 2" plant mix mat.

Date _____ Signed _____
County Highway Engineer

Figure 3.

mums or the level at which the study is measured. These design standards were a result of conferences of the county engineers' executive committee and highway department personnel. It is proposed to relate estimated 1975 traffic volumes to these design standards to measure the deficiencies of the existing road. Under this proposal, a road, although presently adequate or meeting tolerable standards, could show up as deficient within 20 to 25 years, and as such would be eligible for partial widening, reshaping, regrading, and/or surfacing sometime in the future. The total estimated construction costs are the 25-year need amount. It was necessary to adopt this approach so as not to penalize those counties which had made considerable progress in providing needed improvements. After measuring and recording these needs, it will be possible to review the data of this study and make an adjustment every two years in a very simple manner. An accomplishment study made at the time of adjustment will assist in determining whether or not construction progress is keeping up with replacement requirements.

PROCEDURE

A review of some of the many procedures that have been used in determining needs disclosed methods ranging from the most detailed and costly to the inexpensive and sometimes valueless "shotgun" estimates.

Keeping within the bounds of a realistic estimate and yet conserving money and manpower, a simple procedure has been devised that accomplishes the following fea-

_____COUNTY SUMMARY SHEET

Percentage of Miles in the various cost ranges by traffic volume groups on the County State-Aid System

	Grading			Base			Bit. Surface			Aggregate Surfaces		
	Low	Normal	High	Low	Normal	High	Low	Normal	High	Low	Normal	High
Under 100	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%
100 - 400	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%
400 - 1000	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%
Over 1000	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%	___%

Signed_____

County Highway Engineer

Dated_____

Figure 4.

tures: (1) Eliminates the review, adjusting and recomputing of the many individual project sheets; (2) utilizes a digital computer to eliminate the many computations by the county engineer necessary to arrive at project costs; (3) establishes uniformity of control by using previously established prices; (4) permits the maintaining of a perpetual inventory of needs.

Control Sheet

As the initial step in the procedure, the county engineer establishes the estimated average cost per mile for the several classes of work based upon minimum rural design standards for the various traffic categories, and reflecting his experience under current price levels (Figures 1 and 2). The prices established by each county engineer are the basis for the cost computations and, as such, control the accuracy and effectiveness of the study. Such prices, therefore, must be conscientiously estimated with consideration given to the scarcity of materials, labor costs, roughness of terrain, soil conditions, material costs, and all favorable or adverse conditions of his county. These prices must be governed by conditions in his county only in order to reflect his needs properly.

These individual county prices are screened with the neighboring counties at a district meeting to obtain cost estimates from each county. Each county engineer is called upon to substantiate his judgment by explaining excessive costs caused by topography, shortage of materials, etc. County engineers are familiar enough with adjacent counties to approve or disapprove of any substantial deviation from normal costs. This very important district meeting eliminates arbitrary decisions in the future state-wide screening. After the control sheets have been approved by district action, the state-wide screening committee (consisting of a minimum of two county engineers from each of the eight districts) will meet to review all control sheets and determine the proper relationships between districts. Any considerable variation between districts can thus be adjusted percentagewise by raising or lowering an entire district or districts.

County Summary Sheet

The County Summary Sheet was established for another means of control by the state-wide screening committee. This sheet, compiled after the data is recorded, requires the reporting of the percentage of miles, in the low, normal or high range of costs of the various traffic volume groups for the various construction items (Figure 3). If a county engineer were to report, under Grading in the Traffic Volume Group 1-400, 0 percent in the low category, 10 percent in the normal category, and 90 percent in the high cost category, one of two possibilities could have occurred: (1) the estimated costs submitted on the control sheet were too low and his high cost should have been used as the normal, or (2) proper consideration was not given in selection

of the cost category. This Summary Sheet will be reviewed by the state-wide screening committee which will determine whether or not the percentages are out of line.

In determining the municipal needs, the same procedure is followed.

The city engineers, working cooperatively with the Commissioner of Highways, are responsible for their needs.

CODE SHEET FOR COUNTY AND CITY NEEDS
BASIC DATA FOR FUND DISTRIBUTION
ROAD DATA

Sheet Number_____

	Item No	For M H D use only Column No
IDENTIFICATION		
1 County_____ 2 Control Section_____ 3 Segment_____	1	1-2
4 Termini_____	2-3	3-8
5. Incorporate Name_____ 6 Length of Segment_____	5	9-10
7 Fed Aid Sec ☐(1) Fed Aid Urban ☐(2) Non Fed Aid ☐(3)	6	11-13
8 System Designation County State-aid ☐(1) Municipal State-aid ☐(2) Combination ☐(3)	7-8	14-15
ROAD DATA EXISTING		
9 Existing Surface Type_____ 10 Surface Width_____ 11 Road Width_____	9-11	16-20
12 Year of Latest Grading_____ 13 Year of Latest Surface_____	12-13	21-24
14 Number of Lanes_____ 15 Divided ☐(1) Not Divided ☐(2)	14-15	25-26
16 1955 Traffic V P D _____ 17 Expansion Factor to 1975 Traffic V P D _____	16	27-31
18 Adequate for Present Traffic ☐(1) Deficient for Present Traffic ☐(2)	17	32-34
	18	$K I P 35-40
ROAD DATA PROPOSED		$K I P 41-49
19 Priority Number_____	19	50-51
20 Proposed Surface Type_____ 21 Surface Width_____ 22 Roadway Width_____	20-22	52-56
23 Terrain Flat ☐(1) Rolling ☐(2) Mountainous ☐(3)	23-24	57-58
24 Design Load Under 5 Ton ☐(1) 5 Ton ☐(5) 7 Ton ☐(7) 9 Ton ☐(9)	25-26	59-60
25 No of Lanes_____ 26 Divided ☐(1) Not Divided ☐(2)	Type Proj.	61-62
RANGE OF COST OF IMPROVEMENT Low (1) Normal (2) High (3)		Identity of Improvement Item / Type / Percent Range of Cost
27 Grading		
1 Complete Grading ☐ ☐ ☐	27	1 0 $K I P 63-74
2 Reshape or Widen % of grading cost_____ ☐ ☐ ☐		
28 Base		
1 Complete Base Type_____ ☐ ☐ ☐	28	2 $K I P 63-74
2 Base Strengthening % of base cost_____ ☐ ☐ ☐		
29 Surface		
1 Initial Surface Type_____ ☐ ☐ ☐	29	3 0 $K I P
2 Additional Mat Type_____ ☐ ☐ ☐	30	40000
30 Right of Way Est Cost $_____	31	50000
31 Adjustment of Utilities $_____	32	60000
32 Traffic Signals $_____	33	70000
33 Street Lighting $_____	34	80000 63-74
34 Miscellaneous Const (Includes curb & gutter, storm sewer, sidewalks, etc) $_____		

County Engineer_____ Date_____

City Engineer_____ Date_____

Figure 5.

Recording Data

The second step involves the recording of the data on the Road Data Sheet (Figure 5) and the Bridge and Railroad Crossing Sheet (Figure 6).

Examination of these forms will reveal the ease of recording data. Recording the majority of the data, already a matter of record in the county engineer's files, is either the writing of a few numbers or the simple checking of a box.

Before recording data, a county map showing the established control sections of the designated system is examined to determine segment lengths. This important de-

DATA SHEET FOR COUNTY AND CITY NEEDS
BASIC DATA FOR FUND DISTRIBUTION
BRIDGE AND RAILROAD CROSSING

Bridge Sheet No ____

	Item No	For M H D use only (Column No)
IDENTIFICATION		
1 County ____ 2 Control Section ____ 3 Segment ____	1	1-2
4 Incorporate Name ____	2-3	3-8
5 Name of Stream, Road, or Railroad ____	4	9-13
6 Fed Aid Sec ☐(1) Federal Aid Urban ☐(2) Non Fed Aid ☐(3)	6-7	14-15
7 System Designation County State-aid ☐(1) Municipal State-aid ☐(2) Combination ☐(3)		
EXISTING CONDITIONS Structures Only		
8 Type of Service Stream Crossing ☐(1) Highway over R R ☐(2) Highway under R R ☐(3) Highway Separation ☐(4)	8-9	16-18
9 Type of Structure Timber ☐(1) Concrete Slab ☐(2) Concrete T Beam ☐(3) Steel I Beam ☐(4) Steel Girder ☐(5) Steel Truss ☐(6) Other (Specify) ☐(7) ____	10	19-20
10 Roadway Width ____	11	21-22
11 Year Built ____	12	23-24
12 No of Spans ____	13-14	25-26
13 No of Lanes ____	15	27-31
14 Divided ☐(1) Not Divided ☐(2)	16	32-34
15 1955 Traffic V P D ____	17	35-40
16 Expansion Factor ____	18	41-42
17 Adequate ☐(1) Not Adequate ☐(2)	19	43-45
18 Safe Loading ____	20	46-49
19 Vertical Clearance ____		
20 Length in feet ____		
PROPOSED IMPROVEMENTS Structure Only		
21 Priority Number ____	21	50-51
22 Type of Service Stream Crossing ☐(1) Highway over R R ☐(2) Highway under R R ☐(3) Highway Separation ☐(4)	22-23	52-53
23 Type of Work Recondition Existing Structure ☐(1) Replace - Same Location ☐(2) Replace - New Location ☐(3) New Structure ☐(4)	24	54
24 Type of Structure ____	25	55-56
25 Roadway Width ____	26	57-58
26 Design Loading ____	27-28	59-60
27 No of Lanes ____	29	61-64
28 Divided ☐(1) Not Divided ☐(2)		
29 Length in feet ____		
EXISTING CONDITIONS R R Grade Crossing Only		
30 No Trains per day ____ 33 Type of Protection 31 No of Tracks (Main) ____ Signs Only ☐(1) 32 No of Tracks (Siding) ____ Signals ☐(2) Signals and Gates ☐(3)	33	65
PROPOSED IMPROVEMENT R R Grade Crossing Only	34	66-67
34 Signs Only ☐(1) Signals ☐(2) Signals and Gates ☐(3)		68-74
COST ESTIMATE	35	
35 Structures $ ____	36	
36 R R Protection $ ____		75-80

County Engineer ____ Date ____

City Engineer ____ Date ____

Figure 6.

termination of segments must be made on the individual characteristics of the road section, keeping in mind the difference in traffic volume groupings, roughness of the terrain, rural or municipal designation, design geometrics, and surface types, or any other difference that would reflect a variance in construction design or costs.

As an aid to the selection of design standards of the segments and establishing priority numbers for construction, each county engineer was requested to designate all roads upon which bituminous surface is proposed by drawing a blue line above the road band on the control section maps. Above the blue line, using 1, 2, or 3 within a circle, the engineer denotes the first, second, or third 5-year period to which the bituminous project would be assigned. This assists the engineer and provides the means for a screening committee to determine the eligibility of a road not having the traffic volume necessary for initial bituminous improvement, yet included in the bituminous program to provide continuity for economy in construction, maintenance, and service. This blue line portrayal also provides an over-all view of the proposed system based on 1975 minimum standards.

Range of Cost of Improvement

Grading is divided into two sections: 1. complete grading, and 2. reshape or widen. The reshape or widen class is used for roads with a lesser degree of deficiency based on minimum standards. Such roads would not require complete grading, therefore, the percentage of a complete grading cost is noted for use in the computer.

Base, is also divided into two portions to allow for base strengthening. The percentage of a complete base cost is estimated and noted, as well as the type of base considered.

Surface is divided into two classes, initial surface for the first surface over grading or base, and additional mat for the second bituminous surface over an existing bituminous surface. In computing the needs, only one surfacing cost is allowed at one time, either initial or additional.

Right-of-way, adjustment of utilities, traffic signals, street lighting, miscellaneous construction, are items that apply to the municipalities over 5,000 only, with the exception of miscellaneous construction within the curb to curb limitation of municipalities under 5,000, and within the center 24 ft limitation of municipalities over 5,000.

Coding

The third step involves the coding of the recorded information which is merely the assigning of a number to written or "X'd" data, and recording such number in the prescribed columnar arrangement of rectangles on the right-hand side of the data sheet. This method of coding on the data sheet provides an easier way to check the coder's work, and permits all pertinent notations to be shown on the same sheet.

After the sheets are coded, cards are punched. In this step, the data are punched through the first construction item, either grading, base, or surface. If the first item is grading, the card is punched through item 27. The second card is duplicated by automatic machine operation through type of project and then punched regularly for item 28. The same procedure is followed for all items 27 through 34; thus, it is possible to have eight cards for the single segment in municipalities over 5,000 population. This multicard procedure is necessary as the number of columns available for punching is limited to 80.

Computations

The first step of the computer is to multiply the 1955 Traffic in V.P.D. by the 1975 traffic expansion factor, and punch the value of the product in the blank squares marked "Skip", opposite item 18.

In the second and more involved operation of determining item costs, the control sheet cost per mile estimates are fed into the storage facility of the computer for reference. In the cards for grading, base, and surfacing, the machine reads the 1975

traffic volume from the card and searches the control data for the proper traffic volume group, which narrows the selection down to one vertical column (Figure 1); the machine determines the identity of the improvement item, such as grading, which narrows the selection down to a single horizontal grouping leaving only three costs eligible. A final determination from the low, normal, or high range of cost selects the specific cost for the item. This specific cost per mile is multiplied by the length of the segment, the product is multiplied by the percentage of cost required, and the value of the final product or item cost is punched into the card.

The actual operation is measured in milliseconds.

Items 30 through 34 are reported lump sum and as such are coded directly.

Under the item column, following items 25 - 26, is "Type of Project". A numerical value is given various types of projects to enable selection of data for programming use. Such data as miles and cost of grading, base or surfacing, either individually or collectively, and in various combinations, permit fiscal programming studies and accomplishment studies to be made for the cities and counties.

CONCLUSION

This study is predicated upon the assumption that extensive field work is required only once in the initial survey and that maintaining a continuing needs study can be handled with ease by removing cards after construction accomplishments and replacing them with new cards describing the future requirements or needs of the section. It also accepts the use of average costs to arrive at total needs, rather than attempting to estimate accurately each individual section or project. Periodic review of traffic groupings may require minor changes, but the study should provide a stable means of needs measurement. Adjustments of the money requirements because of a rising or falling price index can be made percentagewise where needed.

This method, though not complex, is an engineering procedure and therefore is only applicable where professional engineers are in charge of the county's road construction and maintenance.

In the establishment of the procedure, careful analysis of each assumption, each determination and each regulation, together with the degree of refinement obtainable, assures that an acceptable needs study will be attained at a minimum of cost; and it will provide a reasonable basis for determining the money needs factor in the formula for distributing road-user funds.

This method is not the only possible way to arrive at a suitable estimate of county and city needs, but it is one solution to Minnesota's problem of effectively measuring the needs of the specific county state-aid and municipal state-aid systems, and it provides a method for maintaining a perpetual inventory of these systems.