HIGHWAY ROUTE NUMBERS
AND
CONTROL SECTION HEADINGS

PRIMARY AND SECONDARY

1953

STATE OF MARYLAND

STATE ROADS COMMISSION

CONTROLLED ACCESS HIGHWAYS

Prepared by:

Office of The Chief Engineer
July 13, 1950

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The public is aware that great strides have been made in the planning and design of new highway facilities. A great deal of attention has been focused on the preliminary studies from which the necessary factual data have been obtained before the location and design of a proposed facility is decided.

In the desire to provide much needed additional highway facilities for the ever growing traffic volumes, it is necessary to give due consideration to the control of access on these highways. While a new feature in highway construction, controlled access has been resorted to in many states, particularly New York and Connecticut, and their experience over several years has proven their merit and worth. The age old concept, that a road is primarily for the service of the property which abuts it, has been refuted by economy, safety and traffic service.

Public safety, convenience, and the general welfare of the community demand that the points of entrance on certain sections of heavily travelled and relatively high speed highways be controlled.

A controlled access highway is defined as one on which, in the interest of safety and efficiency of operation, abutting property owners have a limited right of access, and on which the type and location of all access features are determined and controlled by the highway authorities.

Including Maryland, controlled access highways are now sanctioned by legislative act in thirty States, by constitutional provision in one State and by judicial decision in an additional State. Further evidence that the problem is recognized nationally is the fact that, of the funds allocated for the Federal-aid urban program, slightly over fifty-two percent are being used for freeways and expressways with control of access. Control of access is a requirement for the proposed National System of Interstate Highways, which in Maryland comprises 268 miles.

Under a ruling by the Missouri Supreme Court in 1947, the State Highway Commission was granted the authority to limit access to, from, and across State Highways where the public interest and safety may require, subject to such limitations as may be imposed by law.

New Jersey in 1947 passed legislation containing unusually broad powers of access control to any agency of the State or political subdivision which may be empowered to acquire property, to take a fee simple absolute in, easements upon, or the benefit of restrictions upon, abutting property to preserve and protect the public, highway, parkway, airport, place, improvement, or use; but such taking shall be with just compensation.

By the terms of recent legislation in Wisconsin (1949), sections of highway with volumes of 2,000 vehicles per day may be declared controlled access highways, up to a maximum of 500 miles throughout the State. On roads so declared controlled access highways, after public hearings have been held, abutting property can have entrance to such highway only at a place designated by the Highway Commission or may be required to have its access on a service road or other road.

Existing arterial streets are, for the most part, inefficient because of the conflicting interests of the following types of traffic movements using these streets:

1 - Traffic destined for the central business district and beyond, and through traffic, neither of which has any interest in the businesses along these streets.

2 - Short haul traffic which desires to move freely rather than at high speeds.

3 - Neighborhood or local shopping traffic which is not concerned with speed, but merely uses these streets to reach the business establishments along it.

Marginal friction caused by parking and the intersectional conflicts along these arterial streets serve further to reduce their traffic bearing capacities.

In an attempt to separate the various traffic movements using the arterial streets, new highway facilities have been provided at new locations selected after factual traffic and engineering studies were made. When these new facilities are opened to public use the road is safe, efficient and pleasant to use. But the subsequent addition of roadside businesses creates hazards, makes the road unsightly, is nerve-wracking to the driver and recreates all the conditions present on the replaced arterial street.

A good example of this flagrant misuse of highways is found in New Jersey where U.S. 22 was to be designated as a memorial highway, as part of a National System of such highways. Since the route to be designated had been commercialized to such an

extent that little resemblance to a memorial highway existed, the New Jersey Commissioner of Highways was requested to make a survey and report of the entire route. The report states, "that there were 389 commercial establishments along the 36 miles of this route. If evenly spaced, gasoline could be obtained every 4/10 miles and a meal or a sandwich every 1/16 miles. A motorist travelling at 45 miles per hour would see a gasoline pump every 32 seconds and a restaurant or lunch counter every 48 seconds." Although a similar survey along our Baltimore-Washington Boulevard is not currently available, it is entirely possible that the number of commercial establishments per mile exceeds that of U.S. 22 in New Jersey. These conditions are gradually growing on the Pulaski Highway and the Governor Ritchie Highway.

Regardless of the safety built into modern highways by up-to-date engineering know-how, the introduction of these uncontrolled roadside businesses and the conflicts caused by them are extremely hazardous. Many new roads, in a few years, fail to continue to satisfy traffic needs despite favorable conditions because of the interference with the movement of traffic by vehicles and pedestrians which enter from roadsides at will due to the lack of access control. Without control of access the increasing interference from the roadside steadily reduces the capacity of a highway and increases the accident potential from the time it is opened to traffic.

The net result is that new highways, planned for at least twenty years usage, and with provisions for expanding the facility beyond that time, become obsolete within a few years after being opened. This obsolescence is not due to improper designs, structural defects, or inadequate maintenance, but to the reduction of the planned capacity due to the interference caused by vehicles and pedestrians entering from the roadside promiscuously.

Zoning and controlled access will reduce the recurring necessity of relocating and rebuilding already improved roads at the expense of other roads for which funds for initial improvement have never been available.

Studies made by the Bureau of Public Roads have indicated that a four-lane expressway of modern design WITH CONTROLLED ACCESS will accommodate as much traffic at approximately twice the average speed as -

(1) Five ordinary streets, each 40 feet in width with parking prohibited.

(2) Eight ordinary city streets, each 42 feet wide with parking on both sides.

(3) Five ordinary city streets, each 68 feet wide with parking on both sides.

(4) About three ordinary streets, each 68 feet wide with parking prohibited.

By "ordinary city streets" is meant those that have the average number of intersections, the average amount of left turning movements and pedestrian interference prevalent in downtown areas.

An excellent example of the benefits of controlled access is found in the Bronx River Parkway. This Parkway, opened in 1921 and restricted to passenger cars, was designed for a continuous flow of vehicles at 35 miles per hour. After a quarter of a century the facility is still good for the same volumes at the same speed. Because of complete control of access it has not lost any of its design capacity, nor has it depreciated property values. On the contrary, what was once the poorest land in the country has developed as the most desirable residential area.

On controlled access, free flowing modern highways carrying large volumes of traffic, the fatality rate is less than one-half the national average, which is 8 per 100 million vehicle miles of travel. The following accident data serves to illustrate the higher degree of safety of controlled access roads, a point which cannot be over-emphasized.

1. The Pentagon system of controlled access highways, across the river from Washington, has been in operation six years and the fatality rate is 1.50 per 100 million vehicle miles, less than one-fifth that for the nation.

2. Reports from the North Sacramento Freeway indicate that no fatalities occurred during its first year of operation. Furthermore, accidents were reduced from 22, which occurred on the old route the preceding year, to 6 on the freeway, a reduction of 73 percent.

3. In 1947 the improvement of a section of State Route 25 in New Jersey was accomplished. Traffic in opposite directions was separated, intersections at grade were eliminated, and vehicles travelling in the same direction were segregated on express and local highways. On the old facility during 1940 and 1941 there was an average of 3 fatalities, 202 injuries, and 263 accidents per year. After improvement of this facility which carries an average of 58,000 vehicles per day, there were no fatalities, 19 injuries and 68 accidents, an average reduction of 90 percent.

4. The fatality rate for the Merritt Parkway is one-third that of the paralleling section of the Boston Post Road.

5. With more than four times as much traffic as the paralleling surface drives, the depressed portion of the Detroit Industrial Expressway where access is strictly controlled, shows less than one-third as many accidents.

6. Accident data for 1947 indicates the following differences in accident rates for the several types of highways in California:

Name	Type	Average Daily Traffic	Per 100 million vehicle miles of travel: Fatalities	Total Accidents
Arroyo Seco Pkwy.	Controlled Access	31,600	0	103
Riverside Drive	Controlled Access	35,600	4	114
Figuero Street	Free Access	30,900	9	407
Wilshire Blvd.	Free Access	38,400	3	267

The National Safety Council reported that property damage due to motor vehicle accidents in 1947 was $1,100,000,000.00. If we add $1,550,000,000.00, the cost of wages, medical expense, and insurance overhead, the estimated costs of 1947 motor vehicle accidents was $2,650,000,000.00. Total travel for the year was nearly 371 billion vehicle miles so that accidents cost about 7/10 cents per vehicle mile.

There is available factual data to substantiate the fact that control of access has cut accidents in half, which on the basis of the above figures means a saving of 1/3 cent per vehicle mile of travel. If we assume a road with 10,000 vehicles per day, an interest rate of 2-1/2 percent, and 40 years for amortization, a reduction of 1/3 cent per vehicle mile for accident costs alone, exclusive of saving in operating costs and time and exclusive of intangible benefits, justifies an additional expenditure of $300,000.00 per mile to obtain the benefits of controlled access.

The obtainment of access control when the right-of-way is being purchased where frontage does not exist should cost very little. Some damages may result from dismemberment of parcels of land without outlets but this can generally be satisfied by providing new outlets to existing highways or providing adjacent frontage roads. Oft'times a parcel of land cut off from the main property will lose its value to the owner but will be just as valuable to the property owner on the other side of the freeway.

As a matter of fact, a study made of before and after sale prices of property in Fresno, California indicated a definite increase in the property values of land adjacent to and in the neighborhood of the freeway. In some cases, the sales price on properties was double the pre-freeway rate and in no case was it less.

A supplemental study was made in Fresno of the effect of the freeway on gross sales of retail outlets in the neighborhood. The results of the study indicated that the volume of business shows an overall increase of 42 per cent compared to a 5 percent increase for the like business in other parts of the country.

In 1947, the North Sacramento Freeway was opened replacing a State road of approximately the same length which served more than 200 businesses. Traffic on the old route was 38,900 vehicles per day which represented all the traffic from the north. During the year following the opening of the new freeway, the traffic dropped to 21,857, a decrease of 44 percent. Retail business in N. Sacramento increased 48.5 percent while sales for the entire country increased only 16 percent. Department stores, grocery, dry goods and other businesses catering to foot traffic increased 54.5 percent because of better parking conditions and easier vehicle and pedestrian movement. Sales of gasoline service stations and auto supply houses increased 38.5 percent and a study of "before and after" real estate sales showed definite increases in value.

The Chamber of Commerece of the U.S. is studying the effect of separate routes for through traffic on roadside businesses and are finding that where congestion formerly existed, business increased when through traffic was removed from the streets.

If the arterial traffic is provided with separate free flowing facilities which lead toward and through the central areas of our cities, traffic needs will be satisfied not only for arterial traffic but for the local shopping traffic since the existing commercial streets now being used as arterials will revert to their originally intended use.

In urban areas, complete control of access is neither possible nor necessary on a large percentage of arterial routes.

However, one of the most important contributing factors which resulted in the operation of freeways and parkways, as described hereinbefore, with a fraction of the national average accident rate is the complete elimination of roadside interference obtained by the control of access.

If overall costs are considered, and not just the cost of the improvement, a safer and finer highway generally can be

obtained without any more cost than an ordinary facility. By this is meant road user costs of operation and maintenance and the value of time in addition to the annual cost of the investment.

The most difficult obstacles the highway engineers face in their effort to build safety into highways are those pertaining to the acquisition of sufficient right-of-way and control of entrance to the public highway from private property on high traffic volume arterial highways.

CONTROLLED ACCESS HIGHWAYS

References

The Effect of Limited Access Highways and Freeways on Adjoining Property Values - by Frank C. Balfour, Chief Right of Way Agent, Division of Highways, State of California

Safety, an Essential Element in Highway Engineering Design Practices - by H. E. Hilts, Deputy Commissioner Public Roads Administration 4/22/47

Control of Access in Urban Areas - by Joseph Barnett, Chief, Urban Road Division, Public Roads Administration 2/7/49

Highway Safety, Driver Behaviour, Key to Safe Highway Design - by Thomas H. MacDonald, Commissioner of Public Roads 11/16/48

The Relation of Highway Design to Traffic Accident Experience - by David M. Baldwin, AAHSO 12/18/46

Capacity of Four Lane Divided Highways - memorandum to Division Engineers from Commissioner Public Roads Administration 2/25/46

The Capacity of a Traffic Lane - by O. K. Norman, Division of Highway Transport Research Public Roads Administration 10/3/46

Boost for Freeways, - Factual Study Shows they Increase Property Values - by Robert L. Bangs, Right of Way Agent, Division of Highways, California

Freeway Ups Business, - North Sacramento Shows Growth - by W. Stanley Young, Headquarters Right of Way Agent, Division of Highways, California

Developing a Sound Highway and Street Program Based on the Origin and Destination Survey by Joseph Barnett, Chief, Urban Highway Branch, Bureau of Public Roads 5/9/50

Report of Committee on Engineering, The Rresidents Highway Safety Conference - 1946

Report of Committee on Engineering, The Presidents Highway Safety Conference - 1949

Allis Chalmers Reporter - May - June 1950

Highway Research Board, Bulletin No. 10 - 1948

Highway Research Board, Bulletin No. 18 - 1949

Better Roads - Sept. 1949

STATE OF MARYLAND

* Average price per station, major company, regular gas.

	Present Rate	Proposed Rate	Estimated Annual Revenue
Gasoline tax:	$0.07	None	($100,000,000.
Diesel fuel tax:	$0.07	None	(
Fuel shrinkage allowance:	None Permitted	None	
Passenger car registration:	- up to 3700 lbs. $20.00 - over 3700 lbs. $30.00	None	$22,000,000.
Farm truck registration:	Max. Gross Weight Limit 10,000# - $25.00 32,000# - $45.00	None	$300,000.

Average Price per Regular Gallon Gasoline $0.349

Other highway revenue sources which may be under consideration: None -- The gasoline Tax was raised from $.06 to $.07 in 1964. The Motor Vehicle Registration fees have been raised effective 1969-1970 registration year. Also distribution was changed effective July 1, 1968.

If possible, percentage distribution of highway-user revenue between the state, 60% , cities and counties, 20% , and Baltimore City 20% , and whether the state assumes any financial responsibility for county or city roads and streets? The State assumes no responsibility for County or City roads and streets.

Whether local entities levy taxes against highway-user sources for local road revenue? Local entities do not levy.

* Afterthought - think this might be helpful also if not too much trouble.

Temporary Maintenance Numbers (not necessarily posted on roads) have been assigned to following roads, which are under construction, portions of which are open to traffic.

Md. 8 - New Annapolis-Washington Expressway

Md. 9 - New Baltimore-Harrisburg Expressway

Md. 10 - New Baltimore-Washington Expressway

Md. 106 - New N-S Highway-Queenstown Interchange to 1.60 miles east

[illegible] Baltimore from Nursery Road to U.S. 301

ROUTE NO.	FROM	TO	COUNTIES	COMMON NAME
U.S. 301	Potomac River Bridge	Annapolis-Washington Expressway	Charles & Pr.George's	Blue Star Memorial Hwy. or Morgantown Brdg. Rd.
U.S. 301	Annapolis-Washington Expressway	Glen Burnie	Pr. George's & Anne Arundel	Crain Highway
U.S. 301	Glen Burnie	Baltimore County Line	Anne Arundel & Balto.	Old Annapolis Rd. or Westport Road
Alternate U.S. 301*	Glen Burnie	Baltimore County Line	Anne Arundel & Balto.	

This Route is over Md. 648, Glen Burnie Cutoff and Md.2, Ritchie Highway

* Owing to congestion on Annapolis Road Route U.S. 301, this section temporarily posted as Alternate U.S. 301 and Ritchie Highway Route temporarily posted as U.S. 301.

METHOD FOR DEVELOPING ROAD SUFFICIENCY RATINGS

STRUCTURAL ADEQUACY

30 points possible

Wearing Surface (10)		Base (10)		Drainage (10)	
cond.	pt.	cond.	pt.	cond.	pt.
Occasional Failures	1	Occasional Failures	1	Low Grade Line	1
	2		2		2
	3		3	Poor Soil Conditions	1
Excessive Cracking and Failures	4	Excessive Failures	4		2
	5		5	Improper Cross Section Cond.-Sect.	1
	6		6		2
	7	Reconstruction Required	7	Poor or Inadequate Ditches	1
	8		8		2
	9		9	Pipes/Culvert Poor Cond. Size Inadeq.	1
Reconstruction Required	10		10		2

SAFETY AND TRAFFIC SERVICE

70 points possible

Surface Width (20) 2-Lane		Surface Width (20) 4-Lane		Shoulder Width (12)		Horizontal Curves (12)		Excessive Grades (6)		Consistency of Alignm. (6)		Passing Opportunity (14)	
feet	pt.	feet	pt.	feet	pt.	no.	pt.	no.	pt.	descrip	pt.	%	pt.
24	20	50	20	12	12	none	12	none	6	Good	6	100	14
						1 per 3 miles	11						
												90	13
22	16	48	16	10	10	1 per 2 mi.	10	1 per 2 mi.	5	Fair	5		
							9					80	12
				8	8	1 per mile	8	1 - 2 per mile	3	Poor	2	70	11
20	12	46	12										10
							7					60	9
				6	6	2 per mile							8
18	8	44	8					3 - 4 per mile	1	Very Poor	0	50	7
							5						6
				5	4	3 per mile							5
							4	5 or more per mi.	0			40	4
16	4	42	4				3						3
				4	2	4 per mile	2					30	2
							1						1
14	0	40	0	3ft.or less	0	5 or more	0					25 or less	0

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METHOD FOR DEVELOPING ROAD SUFFICIENCY RATINGS

STRUCTURAL ADEQUACY

30 points possible

Wearing Surface (10)		Base (10)		Drainage (10)	
cond.	pt.	cond.	pt.	cond.	pt.
Occasional Failures	1	Occasional Failures	1	Low Grade Line	1
	2		2		2
Excessive Cracking and Failures	3		3	Poor Soil Conditions	1
	4	Excessive Failures	4		2
	5		5	Shoulders Inadequate Cond.-Sect.	1
	6		6		2
	7	Reconstruction Required	7	Erosion, Poor or Poor Cond. Inadequate Size Inadeq. Ditches	1
Reconstruction Required	8		8		2
	9		9		1
	10		10		2

SAFETY AND TRAFFIC SERVICE

70 points possible

Surface Width (20)				Shoulder Width (12)		Horizontal Curves (12)		Excessive Grades (6)		Consistency of Alignm. (6)		Passing Opportunity (14)	
2-Lane		4-Lane											
feet	pt.	feet	pt.	feet	pt.	no.	pt.	no.	pt.	descrip	pt.	%	pt.
24	20	50	20	12	12	none	12	none	6	Good	6	100	14
						1 per 3 mile	11						
22	16	48	16	10	10	1 per 2 mi.	10	1 per 2 mi.	5	Fair	5	90	13
						1 per mile	9					80	12
20	12	46	12	8	8		8	1 - 2 per mile	3	Poor	2	70	11 10
						2 per mile	7						
18	8	44	8	6	6		6	3 - 4 per mile	1	Very Poor	0	60	9 8
						3 per mile	5					50	7 6
16	4	42	4	5	4		4	5 or more per mi.	0			40	5 4 3
						4 per mile	3						
				4	2		2					30	2 1
14	0	40	0	3ft. or less	0		1					25 or less	0
							0						

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MARYLAND STATE ROADS COMMISSION
Traffic Division

INSTRUCTION GUIDE FOR DEVELOPING SUFFICIENCY RATINGS FOR STATE HIGHWAYS

GENERAL

A - DESIGN STANDARDS

The standards to be used in developing the sufficiency ratings are those adopted as "Desirable Standards for Roads of the State Highway System of Maryland, by Areas and by Traffic Volume Groups, April 7, 1948."

For the purpose of this study the separation of the standards into primary and secondary road groups is ignored. The criteria used are average daily traffic volume and type of terrain. The terrain is rated as flat, rolling or mountainous.

B - BASIC POINT VALUES

(1) Condition - A total of 30 points is possible under the rating of road condition or structural adequacy. Three items are considered under Condition. These are Drainage, Base, and Wearing Surface. (see page 2 for detailed explanation).

(2) Safety and Service - A total of 70 points is possible under the rating of Safety and Service. Eight items are considered under this category. (see pages 3 - 5).

C - ADJUSTMENT TO BASIC RATING

The basic rating is adjusted to compensate for differences in traffic volume. Roads with a traffic volume greater than the statewide average will be adjusted to reduce the basic rating. Conversely, those roads with traffic volume less than the statewide average will show an increase in the basic rating. Curves developed by the Bureau of Public Roads are used in determining these adjustments.

CONDITION OR STRUCTURAL ADEQUACY - 30 POINTS

STRUCTURAL DEFICIENCY	ITEM OF CONDITION AND TOTAL POINT VALUE		
	Wearing Surface (8)	Base (10)	Drainage (12)
Occasional failures	1-2		
Extensive cracking & failures	3-5		
Reconstruction required	6-8		
Total deduction	* 8 pts.		
Occasional base failures		1-3	
Extensive base failures		4-6	
Reconstruction required		7-10	
Total deduction		* 10 pts.	
Low grade line			1-2
Poor soil or soil conditions			1-2
Poor or inadequate ditches			1-3
Pipes inadequate in size or structure			1-2
Culverts in poor condition or narrow			1-3
Total deduction			** 12 pts.

* Deductions of points for deficiencies in Wearing Surface & Base are cumulative.

** Deductions of points for deficiencies in Drainage can be made singly and need not be cumulative.