



North Carolina Department of Transportation
Highway Design Branch / Design Services Unit



Bridge Policy

November 1994

INDEX

| | PAGE |
|---|------|
| BRIDGE POLICY | 1 |
| EXCEPTIONS TO POLICY..... | 3 |
| EXISTING BRIDGES TO REMAIN IN PLACE..... | 3 |
| DESIGN LIVE LOAD | 6 |
| HYDRAULIC DESIGN..... | 6 |
| BRIDGE DECK RAILING..... | 6 |
| BRIDGE SCOUR | 6 |
| EARTHQUAKE DESIGN | 6 |
| VESSEL IMPACT..... | 6 |
| SIDEWALKS | 6 |
| BIKEWAYS | 7 |
| CROSS SLOPE..... | 7 |
| APPROACH SLABS | 7 |
| CURB AND GUTTER..... | 7 |
| UNPAVED APPROACH..... | 7 |
| MEDIANS ACROSS BRIDGES..... | 8 |
| END BENTS | 8 |
| VERTICAL CLEARANCES..... | 9 |
| DECK WIDTHS AND HORIZONTAL CLEARANCES | 10 |

BRIDGE DECK WIDTH CHARTS

INTERSTATE SYSTEM..... 11,12

FREEWAY SYSTEM..... 13,14

ARTERIAL SYSTEM..... 15-20

COLLECTOR SYSTEM..... 21

LOCAL SYSTEM..... 22

LOCAL AND COLLECTOR SYSTEM..... 23-25

ONE-WAY RAMP 27

HORIZONTAL CLEARANCE CHARTS

LOCAL AND COLLECTOR SYSTEM..... 26

ONE-WAY RAMP 28

BRIDGE POLICY

This Bridge Policy establishes the controlling design elements of new and reconstructed bridges on the North Carolina Highway System. It is intended that this policy be for general use. In special cases where sound engineering judgment so dictates, the requirements of this policy will be adjusted upward or downward as necessary. It will be necessary to examine each individual structure to provide the most economical and safest design.

Background information was obtained from:

1. Standard Specifications for Highway Bridges, AASHTO 1989
2. N.C. Department of Transportation Division of Highway Bridge Policy, August 24, 1981 and March 5, 1985
3. A Policy on Geometric Design of Highway and Streets, AASHTO 1984 and 1990
4. A Policy on Design Standards-Interstate System June 1967 and December 1988

Where there was an overlap, gap or lack of information, engineering judgment has been used to resolve questionable areas.

The primary factors governing the design elements of a bridge are:

1. Functional Classification of Highway Facility
2. Volume of Traffic
3. Design Speed
4. Safety and Accident Experience

This policy addresses each of these factors and establishes the design elements accordingly.

Box culvert type vehicular underpasses are considered for construction in special cases, however, they are not addressed in this policy. (See the Structure Design Unit for Design Information.)

For determining bridge design elements, the functional classification of highway facilities is divided into the following systems:

1. Interstate System - The national system of fully controlled access freeways which accommodates high volumes of traffic for the purpose of facilitating interstate commerce and mobility. The design of this system is subject to more stringent standards than other similar systems to assure nationwide uniformity, and encourage higher safety standards.
2. Freeway System - A divided arterial highway for through traffic with fully controlled access and grade separation at all intersections. These highways may be staged constructed with some initial at grade intersections.
3. Arterial System - These highways, including expressways, accommodate moderate to high volumes of traffic for travel between major points. These highways are primarily for through traffic, usually on a continuous route, and are generally the top 10% of the total highway system based on relative importance for statewide travel.
4. Collector System - Provides primarily intracounty service with shorter travel distances and generally more moderate speeds. These routes provide service to county seats and towns not on the arterial system. Routes which carry traffic from local roads to arterials are collectors.
5. Local System - Provides access to farms, residences, businesses, or other abutting properties. The traffic volumes generated by the abutting land uses are largely short trips or a relatively small part of longer trips where the local road connects with major streets or highways of higher classifications.

The entire North Carolina Highway System has been classified by these functional classifications. The Planning Report will include the proper classification for each roadway that is being improved.

Bridges Within Urban Area Boundaries

The full approach curbed width is to be provided for bridges with existing urban-type roadway sections (curb and gutter). If future roadway widening is anticipated, additional bridge width should be considered to accommodate the planned curbed width.

Bridges within the Federal-aid urban boundaries with rural-type roadway sections (shoulder approaches) warrant special consideration. As part of the planning process, the functional classification will be reviewed to determine if its planning designation is applicable for the facility over the 20-year design period. In some cases, a new classification may be established for design purposes and approved in the planning report. Design exceptions would be required for any design elements that do not meet the standards for the functional classification approved for design in the planning report.

EXCEPTIONS TO POLICY

Any bridge with special design requirements such as long span lengths, location, movable spans, bridge lengths greater than 200' or other special features, will be designed on an individual basis and may not conform to criteria included elsewhere in this policy. The Planning Report will include an analysis to determine approximate length, width, median type, navigational clearances or any other pertinent design features. Accident experience or potential will be examined when considering exceptions to the Bridge Policy and the deck widths.

Deck widths exceeding those shown in this policy may be used when future facility upgrading is anticipated and justified in the Planning Report.

Special consideration should be given to horizontal clearances underneath the structure. If minimum clearance is used, any future widening will require replacement of the structure. Therefore, in areas of potential traffic growth, horizontal clearance should be of sufficient width to allow for additional lanes.

Bridges improved under the 3-R program shall conform to North Carolina's "Guide for Resurfacing, Restoration and Rehabilitation (R-R-R) of Highways and Streets", and may not conform to criteria included in this policy.

EXISTING BRIDGES TO REMAIN IN PLACE

Highway geometric and roadway improvements encourage higher speeds and attract larger vehicles to the highway. Existing substandard structures must be considered for improvement correspondingly. Because of the high cost of new structures, existing bridges and culverts that meet acceptable criteria should be retained as outlined on page 4 and 5 of this manual.

Where an existing highway is to be reconstructed or dual laned, an existing bridge which fits the proposed alignment and profile may remain in place if it meets the following criteria: The bridge is structurally sound, bridge rails meet or can be upgraded to meet current criteria and standards, its safe load carrying capacity and clear deck width are equal or greater than values shown on page 4 and 5, and there is no significant accident experience.

Existing bridges which are structurally sound and provide safe loading capacity but are deficient for roadway width will be considered for widening. If it is determined to widen an existing bridge, it shall be widened to the same dimension as recommended for a new bridge.

| MINIMUM CLEAR ROADWAY WIDTH FOR BRIDGES TO REMAIN IN PLACE (IN FEET) | | | | | | |
|---|-----------------------|----------------------------|--------------------------------|----------------------|-------------------|-------------------------|
| CURRENT ADT | DESIGN ADT | LOCAL^(a) | COLLECTOR^(a) | ARTERIA L | FREEWAY | INTER- STATE |
| O - 250 | | 20 ^(b) | 22 | 28 ^(d) | | |
| over 250 | under 2,000 | 22 | 22 | 28 ^(d) | | |
| | 2,000 - 4,000 | 24 | 24 | 28 ^(c) | | |
| | 4,000 - 30,000 | 28 | 28 | 28 ^(c) | 28 ^(e) | 38 ^(g) |
| | over 30,000 | 28 | 28 | 28 ^(c) | 38 ^(f) | 38 ^(g) |
| MINIMUM VERTICAL CLEARANCES FOR BRIDGES TO REMAIN IN PLACE | | | | | | |
| | | 14 | 14 | 14 | 14 | 16 ^(h) |

- (a) Bridges longer than 100 feet may be analyzed individually in accordance with AASHTO.
- (b) For bridges with current ADT < 50, an 18-foot width may be retained provided that the approach travel way width is 18 feet or less.
- (c) Ultimate widening should be considered for all existing bridges with less than 3-foot offsets to parapets.
- (d) For arterials with 11' lanes and design speeds of 40 mph or less, 26 feet may be used.
- (e) As a minimum, an Accident History Evaluation should be completed to determine if additional width is required. Ultimate widening should be considered for all existing bridges with less than 3-foot offsets to parapets.
- (f) Bridges longer than 200' may be analyzed individually.
- (g) Bridges longer than 200 feet may be analyzed individually in accordance with AASHTO (3.5-foot minimum offset to parapet required).
- (h) 14' on Urban Interstate when there is an Alternate Interstate Routing with 16' clearance.

**SAFE LOAD CAPACITIES FOR BRIDGES TO REMAIN IN PLACE
WHEN THE APPROACH ROADWAY IS RECONSTRUCTED**

| TRAFFIC | | SAFE LOAD CAPACITY | |
|-------------|-------------|--------------------------------------|----------------------|
| CURRENT ADT | DESIGN ADT | INTERSTATE, FREEWAY & ARTERIAL | LOCAL & COLLECTOR |
| 0 - 250 | | SEE NOTE (1) | SEE NOTE (2) |
| over 250 | under 2000 | SEE NOTE (1) | SEE NOTE (2) |
| | 2000 - 4000 | SEE NOTE (1) | SEE NOTE (2) |
| | over 4000 | SEE NOTE (1) | SEE NOTE (2) |

- NOTES:
- (1) The Bridge shall have a safe load capacity of 10% in excess of that required for N.C. Legal Load when rated in accordance with the Manual for Maintenance, Rating and Posting of Bridges on the North Carolina Highway System.
 - (2) The Bridge shall be rated and posted, if necessary, in accordance with the "Manual for Maintenance Inspection, Rating and Posting of Bridges on the N.C. Highway System" to a weight limit determined to meet the needs of the route served; however, the safe load capacity shall be sufficient to carry school buses and vital services vehicles where there is no reasonable or adequate alternate route.

REFERENCES: AASHTO "Manual for Maintenance Inspection of Bridges"

"Manual for Maintenance Inspection Rating and Posting of Bridges on the North Carolina Highways System"

DESIGN LIVE LOAD

The design live load for all new reconstructed, or rehabilitated bridges on the Highway System shall be HS-20. A design of less than HS-20 shall not be used unless there are conditions which warrant or justify its use in a particular situation and will require approval by the State Bridge Design Engineer.

HYDRAULIC DESIGN

Stream crossing structures shall be designed in accordance with procedures, criteria and standards contained in the Division of Highways "Guidelines for Drainage Studies and Hydraulic Design."

BRIDGE DECK RAILING

All bridge railings shall conform to current AASHTO criteria and shall have been successfully crash-tested in accordance with FHWA guidelines. Generally bridges with no sidewalks should have a Jersey barrier rail. When a sidewalk or designated bikeway is justified, appropriate railings shall be used.

BRIDGE SCOUR

Stream crossing structures shall include design to protect against bridge scour in accordance with FHWA Technical Advisory T5140.20 (Scour at Bridges), dated September 16, 1988 or subsequent updates of this Technical Advisory.

EARTHQUAKE DESIGN

All structures shall be designed for earthquake forces in accordance with the AASHTO Guide, "Specification for Seismic Design of Highway Bridges."

VESSEL IMPACT

All bridges over navigable waters shall be designed in accordance with the "Guide Specification for Vessel Collision Design of Highway Bridges, 1990" or subsequent updates of this publication.

SIDEWALKS

Sidewalks should usually be included with curb and gutter projects. In some cases, only one side may warrant a sidewalk. Sidewalks should not be included on controlled access facilities or where no pedestrian traffic is anticipated. A determination on sidewalks will be made during the planning process according to the NCDOT Pedestrian Policy Guidelines. When a sidewalk is justified, it shall be a minimum of 5' wide. A minimum handrail height of 42" is required.

BIKEWAYS

When a bikeway is required, the bridge shall be designed to give safe access to bicycles where feasible. A minimum handrail height of 54" is required where cyclists will be riding next to the handrail.

CROSS SLOPE

The cross slope of a bridge deck shall be the same as the approach travel lane cross slope.

In an area of frequent icing, a reduction in superelevation may be in order. This situation will be dealt with on a project-by-project basis.

APPROACH SLABS

Concrete approach slabs shall be constructed at the ends of all bridges. The approach slab shall be the same width as the bridge gutter to gutter width plus any additional amount that may be necessary to accommodate curbs or sidewalks.

The ends shall be parallel to the bridge end. For structures with 60 degree thru 120 degree skew, a 12-foot length of approach slab measured along the center line of the bridge. For structures with skew other than that shown above, a 17-foot length of approach slab shall be used. For special situations, e.g. very deep superstructures, etc., consideration shall be given to increasing the length of approach slab.

CURB AND GUTTER

The clear width for new bridges on streets with curb and gutter approaches shall be the same as the curb to curb approach width except where bikeways are carried across the structure.

The 2' gutter widths shown in this policy are based upon the use of the standard 2'-6" curb and gutter. If other curb and gutter widths are used, bridge widths will be adjusted accordingly.

UNPAVED APPROACH

When bridges are constructed on unpaved roads, the approaches to the bridge shall be paved with an approved asphalt surfacing for a distance of 100' from the bridge ends. This paved travel lane shall be 20' in width and flared to match the deck width of the bridge within the last 10' of pavement. Any exceptions to the above paving length will require the approval of the Deputy Highway Administrator - Preconstruction.

MEDIANS ACROSS BRIDGES

On a divided highway, separate structures shall be provided unless it can be clearly shown that it is more economical to provide a single structure or a single structure is needed for the maintenance of traffic.

On controlled access facilities and non-controlled divided facilities with design speeds greater than 50 mph, a median barrier should be provided on single structures. Where the approach roadway has a median barrier, the same type of barrier shall be continued across the structure. If there is no median barrier on the approach roadway, some type of barrier should be provided on the structure. This barrier will normally be a concrete barrier if the median width is less than 30', and cable guardrail on medians greater than 30'.

END BENTS

All end bent slopes shall have rip-rap or concrete slope protection carried up to the end bent cap and to the limits of the superstructure or beyond the limits of the superstructure for slopes steeper than 1-3/4:1. Normally, for dual bridges with median widths of 46' or less, the end bent slopes shall be paved or stabilized continuously between bridges.

Generally, end bent slopes at all rivers and streams shall be 1-1/2:1; however, final consideration of rate of slope and minimum slope protection requirements will depend upon the Hydraulic Design.

At bridges where a railroad passes underneath the roadway, the end bent slope shall normally be 1-1/2:1 or the same as adjacent cut, however, negotiations with the railroad company may dictate otherwise. At bridges where a railroad passes over the roadway, the end bent embankment slope shall normally be 1-1/2:1 unless negotiations with the railroad company dictate otherwise.

End bent embankment slopes shall be 1-1/2:1 on all other bridges going over roads. End bent slopes occurring in cuts shall be at the same rate of slope as the adjacent roadway cut slopes but, generally no flatter than 2:1.

If the Geotechnical investigation and laboratory results indicate that 1-1/2:1 slopes will be unstable at any bridge end bent, flatter slopes or special designs will be used as specified by the Soils and Foundation Section.

Any bridge end bent occurring in rock may have a special slope design as specified by the Soils and Foundation Section in the Design Services Unit.

VERTICAL CLEARANCES

Vertical clearances for new structures shall be designed above all sections of pavement including the useable shoulder. Future widening and pavement cross slope will be considered in design clearance.

Vertical clearances shall be as shown below. These clearances include a 6" allowance of future resurfacing. An additional 6" range is shown to allow for the flexibility necessary in the coordination of roadway grades with final superstructure depths.

Vertical clearances above these limits must be justified by economics or some vertical control.

1. Over Interstates and Freeways and Arterials
Vertical Clearances - 16'-6" to 17'-0"

Note: "17'-0" to 17'-6" vertical clearance is desirable for structures located over Interstates, Freeways, or Arterials constructed with portland cement concrete pavement. If the pavement type is not known during the preliminary design phase, then the desirable clearance range should apply to structures located over these facilities having design year average daily truck traffic of 5000 or greater."

2. Over Local and Collector Roads and Streets
Vertical Clearance - 15'-0" to 15'-6"
3. Over all Railroads
Vertical Clearance - 23'-0" to 23'-6" or less if approved by Railroads
4. Navigable Waters
The U.S. Coast Guard permit determines the minimum clearances for navigable waters. Clearances over waters not regulated by the U.S. Coast Guard will be determined by negotiations and agreement with the appropriate interests.
5. Normal minimum clearance above design high water should be 2'-0" for all Interstates, Freeways, Arterials, and Secondary Crossings of Major Rivers, 1'-0" for all other roads. Where conditions warrant, less than the above may be permitted.
6. Pedestrian overpasses and sign structures vertical clearance - 17'-0" to 17'-6"

DECK WIDTHS AND HORIZONTAL CLEARANCES

Two primary elements of any bridge are the deck width on the bridge and the horizontal clearance between piers underneath the bridge. For determining these dimensions, the functional classification of highway facilities described on Page 2 shall be used.

A study will be made to determine the deck width on any bridge having a high unit cost.

A cost analysis will be made by Structure Design to determine pier necessity and location. The factors included in this analysis are construction cost, maintenance cost, accident cost, future widening potential, for both the mainline and road underneath it, and continuity of section. Structure Design will coordinate with Roadway Design as necessary.

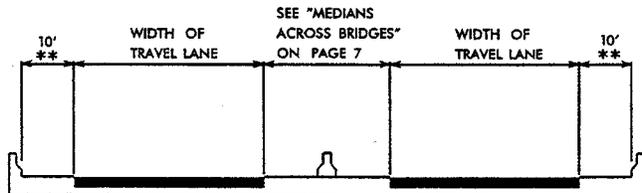
A study will be made at each interchange to insure that adequate sight distance is available. Special attention should be given to the bridge railing design, offset and the crest vertical curve on the structure so that traffic turning from the ramp has adequate sight distance. See Chapter 8-7 (Required Sight Distance at Terminals of Ramps) of the Roadway Design Manual for required sight distance.

When a ditch section is carried under a bridge, coordination will be necessary in the selection of horizontal openings and roadway typical sections so that piers are not placed in the ditch bottom and preferably 2' minimum behind the ditch.

INTERSTATE SYSTEM

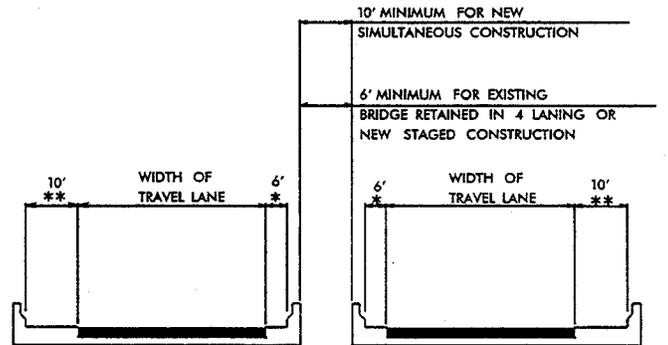
BRIDGE DECK WIDTHS 4 OR MORE LANES DIVIDED SHOULDER APPROACH

SINGLE STRUCTURE



** 12' SHOULD BE CONSIDERED WHEN THE DESIGN YEAR TRUCK VOLUMES ARE GREATER THAN 500 DHV

DUAL STRUCTURE

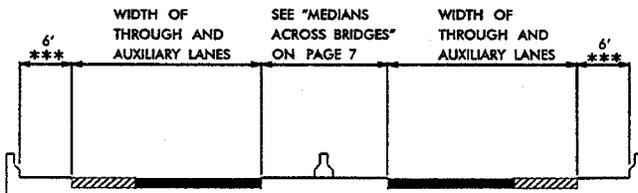


* 10' WITH SIX OR MORE THROUGH LANES
** 12' SHOULD BE CONSIDERED WHEN THE DESIGN YEAR TRUCK VOLUMES ARE GREATER THAN 500 DHV

INTERSTATE SYSTEM

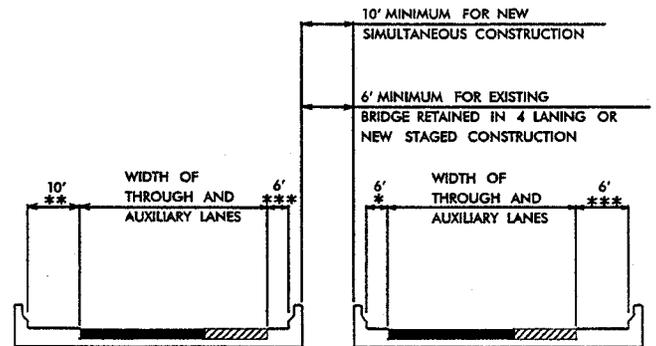
BRIDGE DECK WIDTHS 4 OR MORE LANES DIVIDED WITH AUXILIARY LANES SHOULDER APPROACH

SINGLE STRUCTURE



*** 10' SHOULDER WHEN AUXILIARY LANE CONNECTS INTERCHANGES OR AN AUXILIARY LANE IS LONGER THAN 2500'.

DUAL STRUCTURE



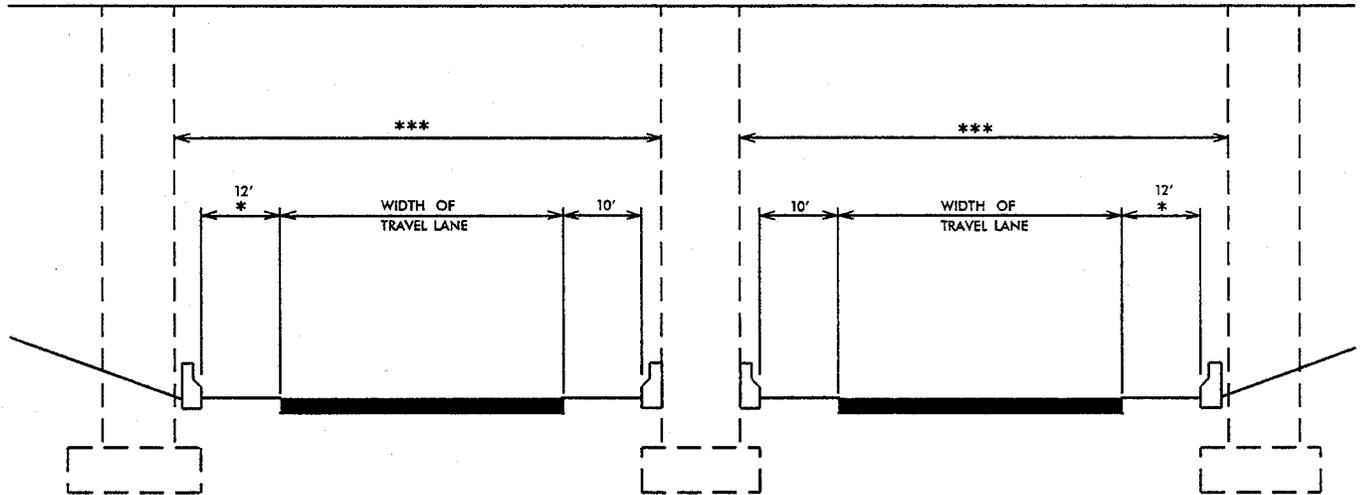
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LEGEND

THROUGH TRAVEL LANES
AUXILIARY LANES

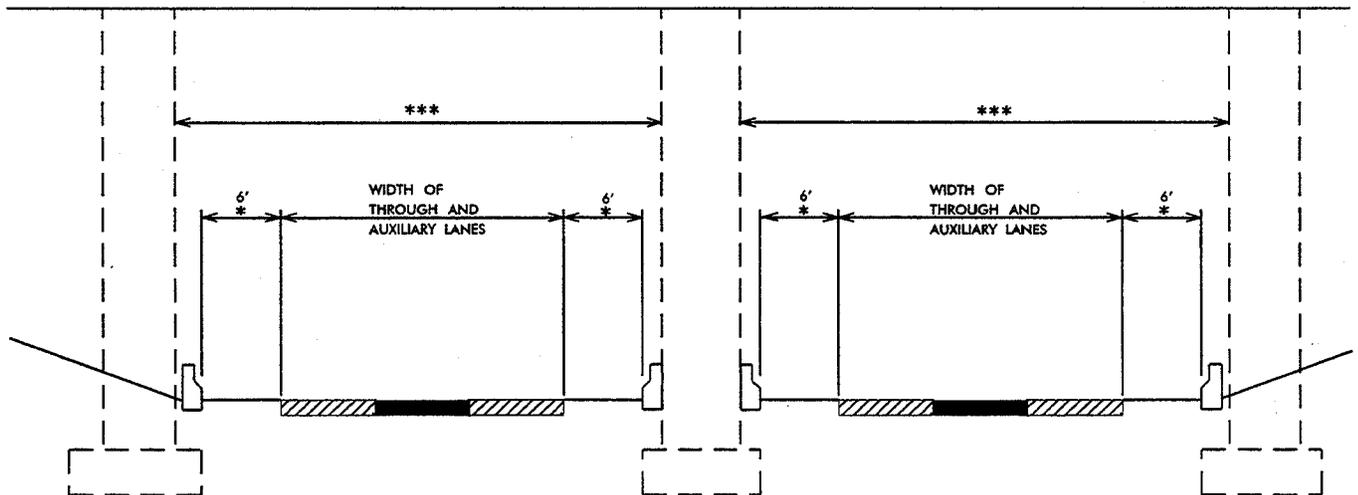
INTERSTATE SYSTEM

HORIZONTAL CLEARANCES FOR DIVIDED TRAFFIC



* 18' WHEN DESIGN YEAR ADT IS GREATER THAN 50,000 TO ACCOMMODATE FUTURE AUXILIARY LANES OF INTERCHANGE RAMPS OR LOOPS.

SHOULDER APPROACH



* 10' SHOULDER WHEN AUXILIARY LANE CONNECTS INTERCHANGES OR AN AUXILIARY LANE IS LONGER THAN 2500'.

SHOULDER APPROACH WITH AUXILIARY LANES

*** SEE EXCEPTIONS TO POLICY ON PAGE 3 OF THIS MANUAL FOR ADDITIONAL INFORMATION.

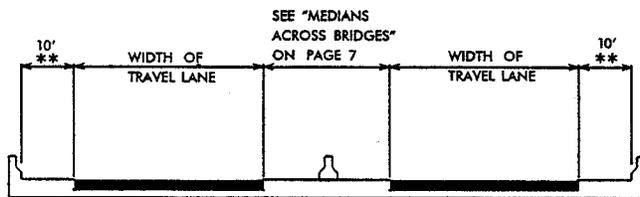
LEGEND

 THROUGH TRAVEL LANES
 AUXILIARY LANES

FREEWAY SYSTEM

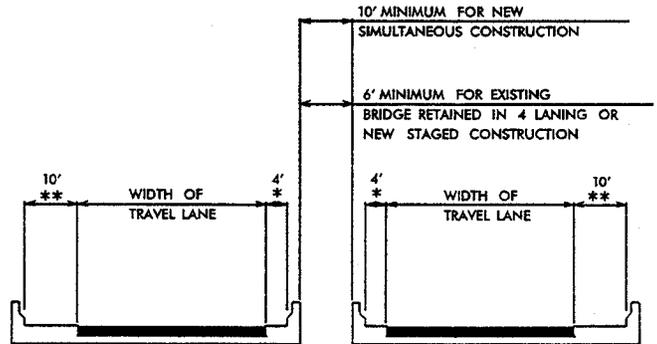
BRIDGE DECK WIDTHS
4 OR MORE LANES DIVIDED
SHOULDER AND CURB AND GUTTER APPROACH

SINGLE STRUCTURE



** 12' SHOULD BE CONSIDERED WHEN THE DESIGN YEAR TRUCK VOLUMES ARE GREATER THAN 500 DHV.

DUAL STRUCTURE



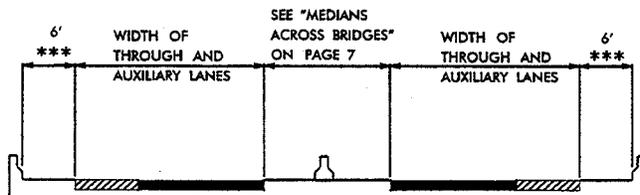
* 10' WITH SIX OR MORE THROUGH LANES.

** 12' SHOULD BE CONSIDERED WHEN THE DESIGN YEAR TRUCK VOLUMES ARE GREATER THAN 500 DHV.

FREEWAY SYSTEM

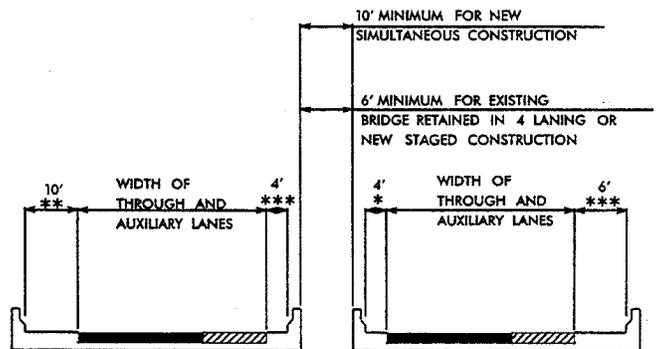
BRIDGE DECK WIDTHS
4 OR MORE LANES DIVIDED
WITH AUXILIARY LANES
SHOULDER AND CURB AND GUTTER APPROACH

SINGLE STRUCTURE



*** 10' SHOULDER WHEN AUXILIARY LANE CONNECTS INTERCHANGES OR AN AUXILIARY LANE IS LONGER THAN 2500'.

DUAL STRUCTURE



* 10' WITH SIX OR MORE THROUGH LANES.

** 12' SHOULD BE CONSIDERED WHEN THE DESIGN YEAR TRUCK VOLUMES ARE GREATER THAN 500 DHV.

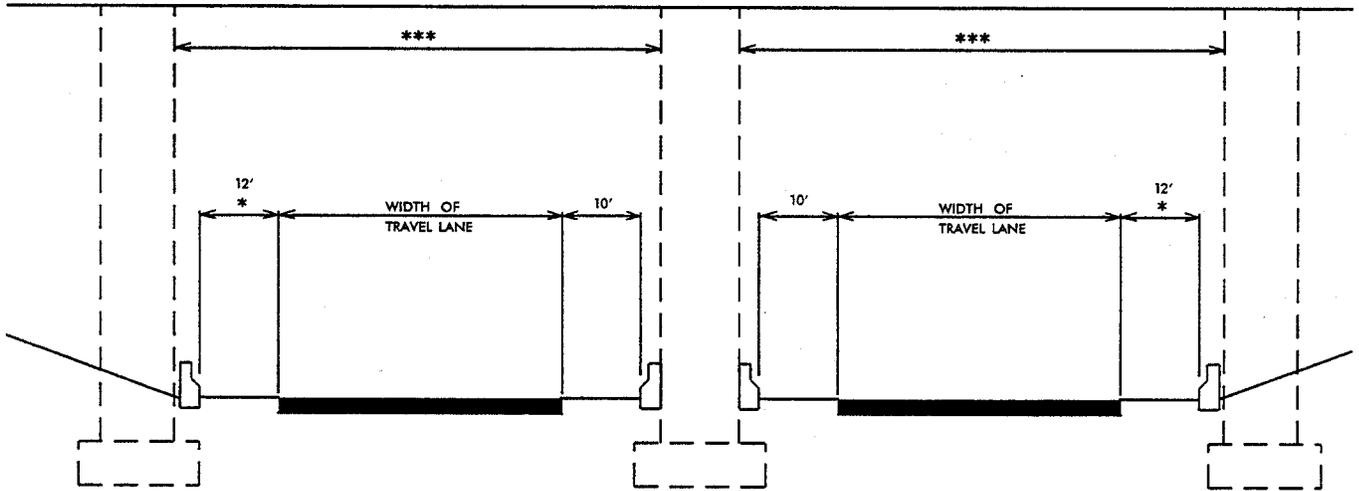
*** 10' SHOULDER WHEN AUXILIARY LANE CONNECTS INTERCHANGES OR AN AUXILIARY LANE IS LONGER THAN 2500'.

LEGEND

———— THROUGH TRAVEL LANES
////// AUXILIARY LANES

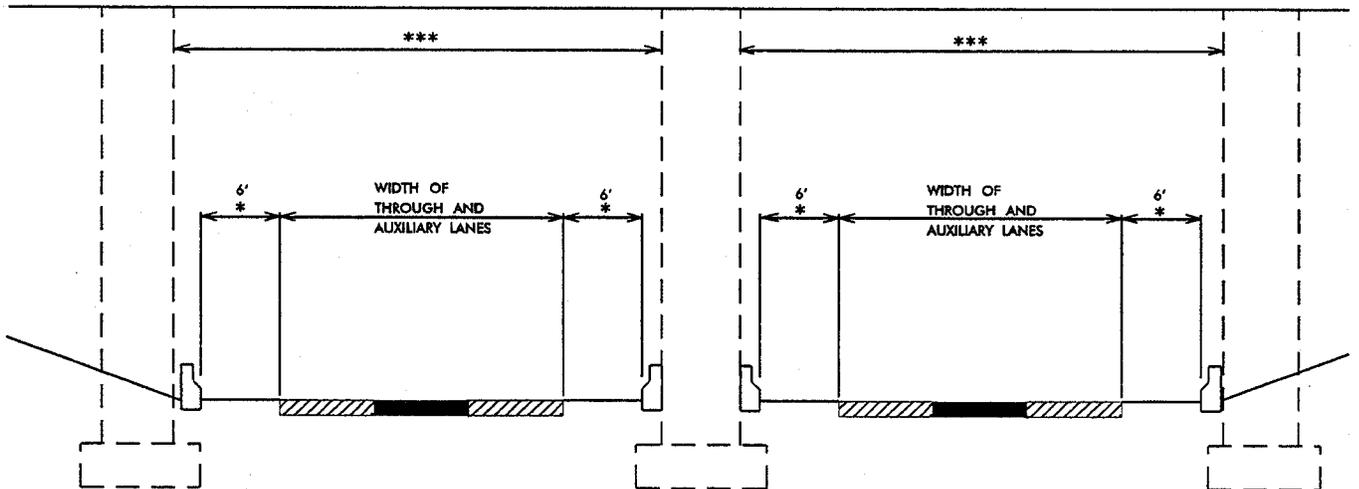
FREEWAY SYSTEM

HORIZONTAL CLEARANCES FOR DIVIDED TRAFFIC



* 18' WHEN DESIGN YEAR ADT IS GREATER THAN 50,000 TO
ACCOMMODATE FUTURE AUXILIARY LANES OF INTERCHANGE RAMPS OR LOOPS.

SHOULDER APPROACH



* 10' SHOULDER WHEN AUXILIARY LANE CONNECTS INTERCHANGES OR
AN AUXILIARY LANE IS LONGER THAN 2500'.

SHOULDER APPROACH WITH AUXILIARY LANES

*** SEE EXCEPTIONS TO POLICY ON PAGE 3 OF THIS MANUAL FOR ADDITIONAL INFORMATION.

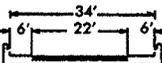
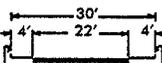
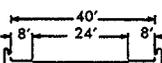
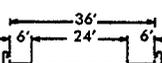
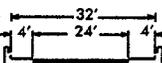
LEGEND

 THROUGH TRAVEL LANES
 AUXILIARY LANES

ARTERIAL SYSTEM

BRIDGE DECK WIDTHS (FT.) FOR NEW AND RECONSTRUCTED BRIDGES **TWO-LANE TWO-WAY TRAFFIC**

SHOULDER APPROACH

| | CURRENT ADT | 400 OR LESS | 401- 1000 | |
|---------------------------|--------------------|---|--|---|
| | DESIGN YEAR ADT | | 1000- 2000 | OVER 2000 |
| DESIGN SPEED (MPH) | <u>30</u> | |  | |
| | <u>40</u> |  | | |
| | <u>50</u> | | |  |
| | <u>60</u> | |  | |
| | <u>70</u> |  | | |
| | | | | |

NOTE - BRIDGES GREATER THAN 200' IN LENGTH WILL BE SUBJECT TO INDIVIDUAL ECONOMIC STUDIES AND MAY NOT CONFORM TO THE CRITERIA INCLUDED IN THE ABOVE CHART.

NOTE - BRIDGE DECK WIDTH CHARTS ARE BASED ON CURRENT AND DESIGN YEAR ADT. IF ONLY CURRENT ADT IS AVAILABLE, DESIGN YEAR ADT SHOULD BE OBTAINED FROM THE TRAFFIC SURVEYS SECTION OF THE PLANNING AND ENVIRONMENTAL BRANCH.

CURB AND GUTTER APPROACH

CURB TO CURB WIDTH OF APPROACH, SEE PAGE 7 OF THIS MANUAL.

AUXILIARY LANES

WHEN AUXILIARY LANES ARE REQUIRED, ADD ITS WIDTH TO THE WIDTH OF THE TRAVEL LANES.

INTERCHANGES

MINIMUM SHOULDER WIDTHS OF 6' ARE DESIRED FOR STRUCTURES WHICH ARE LOCATED AT INTERCHANGES. THE MINIMUM VALUES SHOWN ABOVE MAY BE USED IF THE REQUIRED SIGHT DISTANCE CAN BE ACHIEVED.

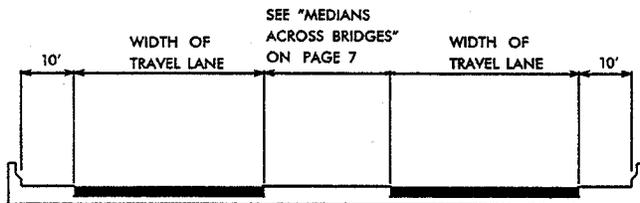
LEGEND

 THROUGH TRAVEL LANES

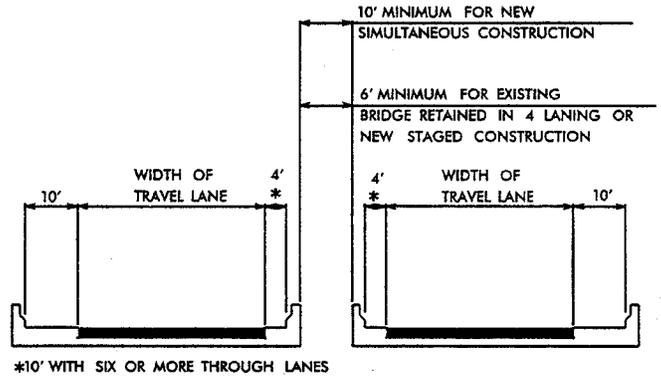
ARTERIAL SYSTEM

BRIDGE DECK WIDTHS 4 OR MORE LANES DIVIDED

SINGLE STRUCTURE

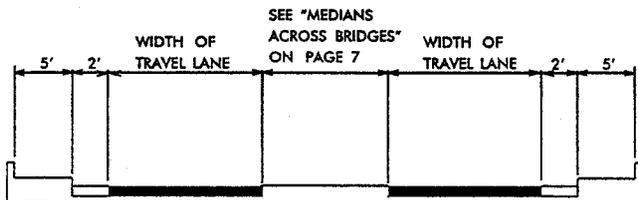


DUAL STRUCTURE

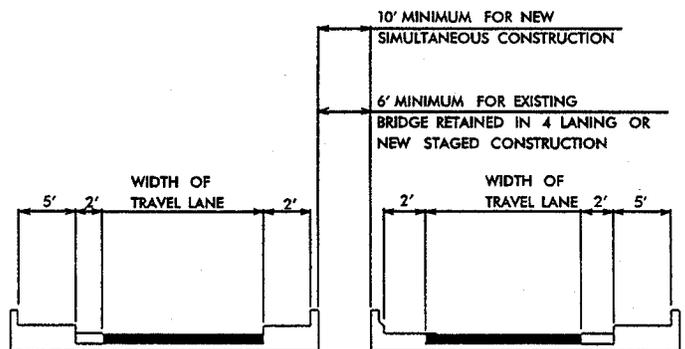


SHOULDER APPROACH

SINGLE STRUCTURE



DUAL STRUCTURE



CURB AND GUTTER APPROACH

NOTE: SEE PAGES 6 AND 7 OF THIS MANUAL FOR ADDITIONAL INFORMATION ON SIDEWALKS AND CURB AND GUTTER APPROACHES.

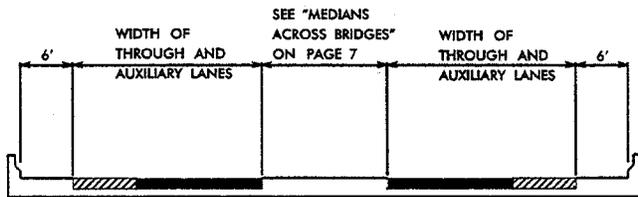
LEGEND

 THROUGH TRAVEL LANES

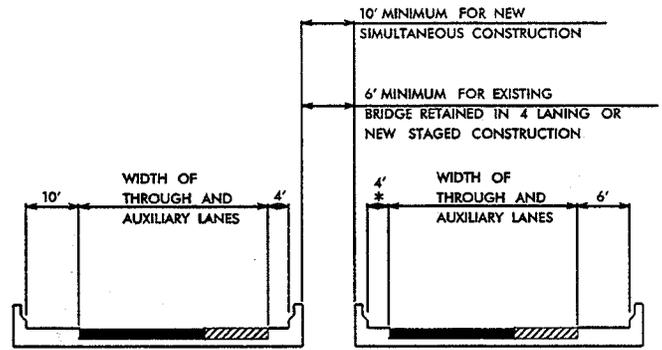
ARTERIAL SYSTEM

BRIDGE DECK WIDTHS 4 OR MORE LANES DIVIDED WITH AUXILIARY LANES

SINGLE STRUCTURE



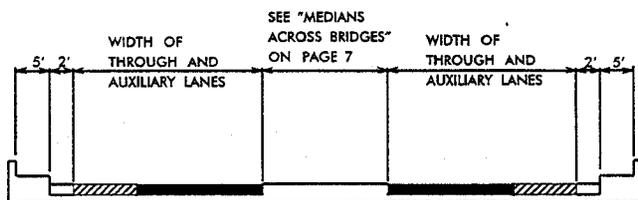
DUAL STRUCTURE



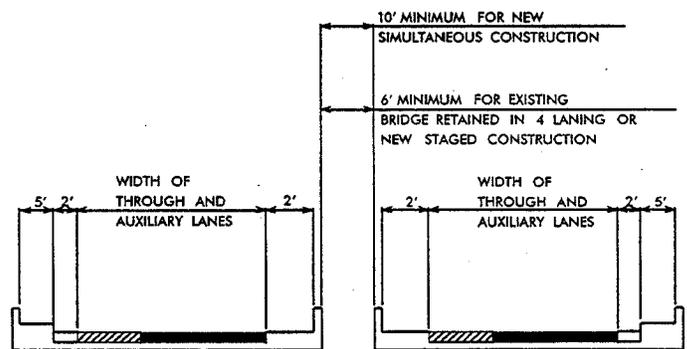
* 10' WITH SIX OR MORE THROUGH LANES

SHOULDER APPROACH

SINGLE STRUCTURE



DUAL STRUCTURE



CURB AND GUTTER APPROACH

NOTE: SEE PAGES 6 AND 7 OF THIS MANUAL FOR ADDITIONAL INFORMATION ON SIDEWALKS AND CURB AND GUTTER APPROACHES.

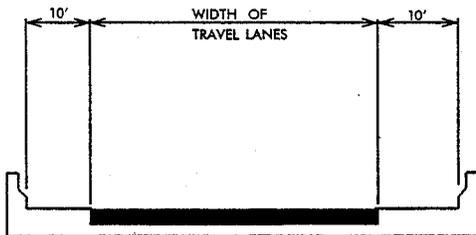
LEGEND

 THROUGH TRAVEL LANES
 AUXILIARY LANES

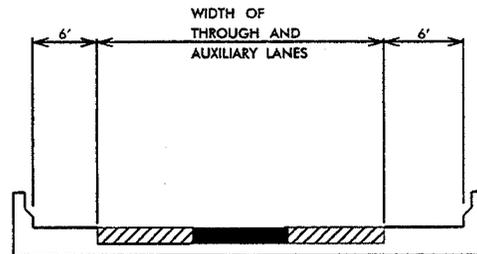
ARTERIAL SYSTEM

BRIDGE DECK WIDTHS
4 OR MORE LANES UNDIVIDED
TWO WAY TRAFFIC

WITHOUT AUXILIARY LANE

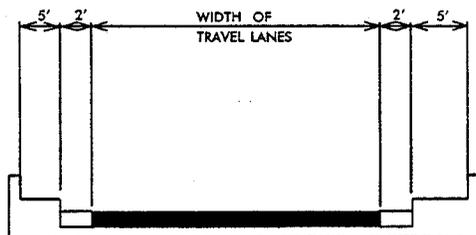


WITH AUXILIARY LANE

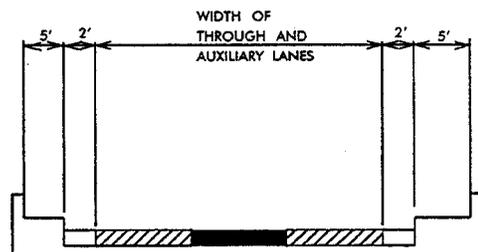


SHOULDER APPROACH

WITHOUT AUXILIARY LANE



WITH AUXILIARY LANE



CURB AND GUTTER APPROACH

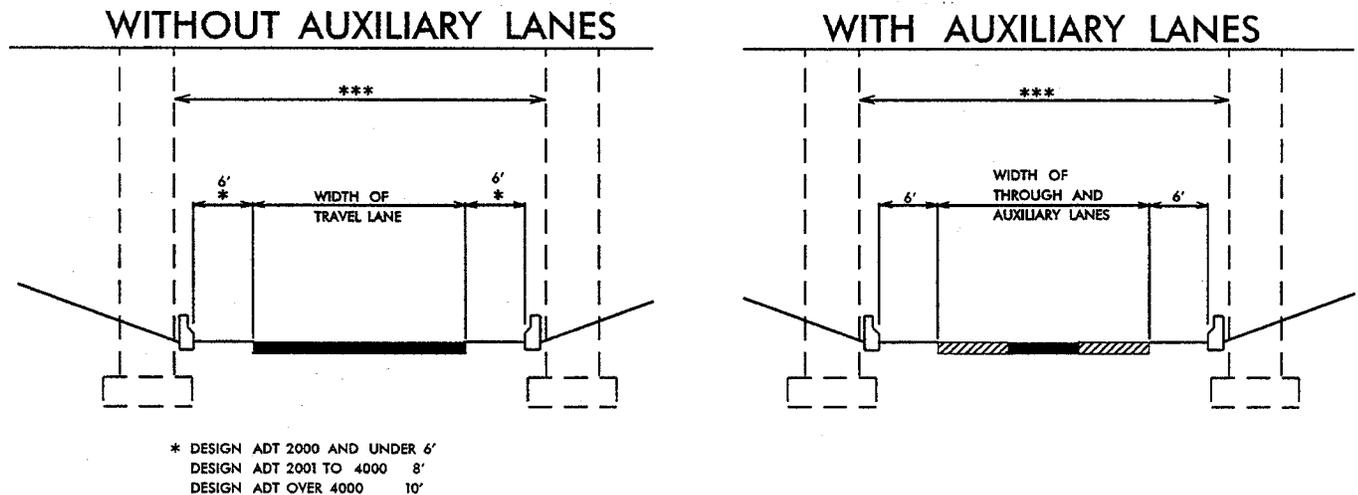
NOTE: SEE PAGES 6 AND 7 OF THIS MANUAL FOR ADDITIONAL INFORMATION ON SIDEWALKS AND CURB AND GUTTER APPROACHES.

LEGEND

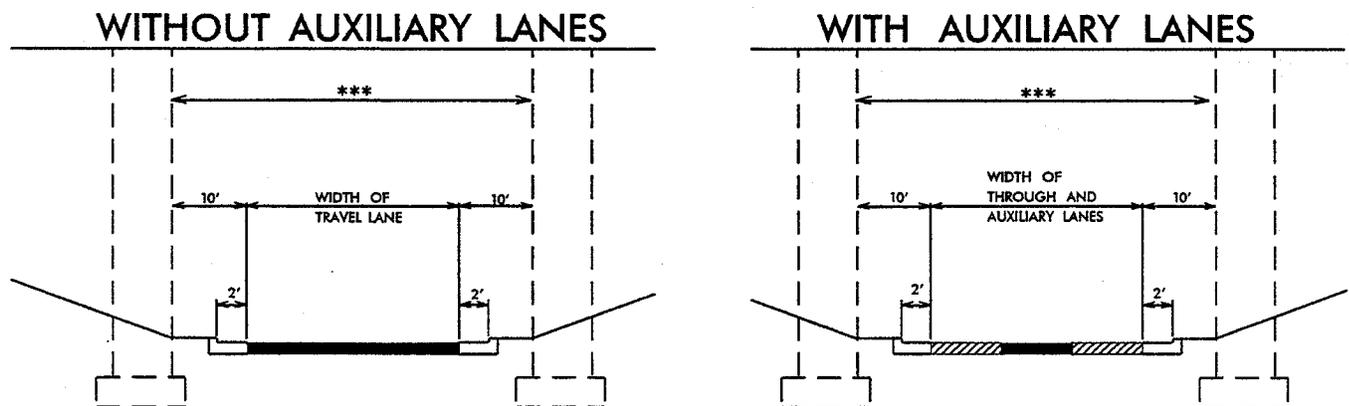


ARTERIAL SYSTEM

HORIZONTAL CLEARANCES FOR UNDIVIDED TWO-WAY TRAFFIC



SHOULDER APPROACH



CURB AND GUTTER APPROACH

NOTE: SEE PAGES 6 AND 7 OF THIS MANUAL FOR ADDITIONAL INFORMATION ON CURB AND GUTTER APPROACHES.

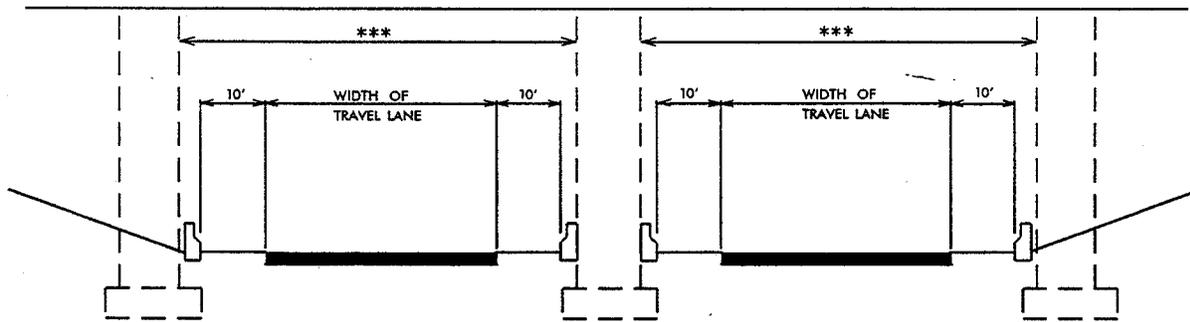
*** SEE EXCEPTIONS TO POLICY ON PAGE 3 OF THIS MANUAL FOR ADDITIONAL INFORMATION.

LEGEND

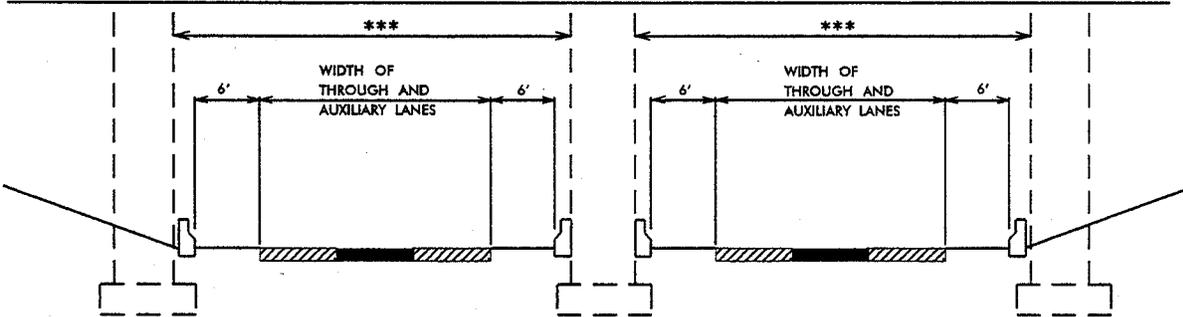
 THROUGH TRAVEL LANES
 AUXILIARY LANES

ARTERIAL SYSTEM

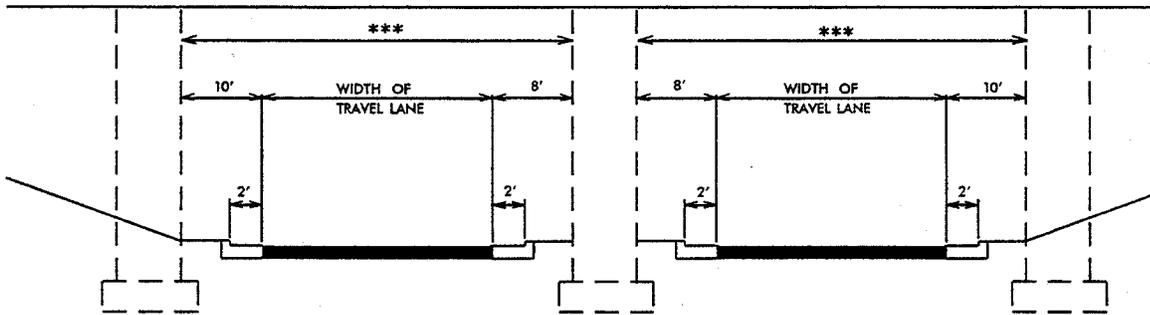
HORIZONTAL CLEARANCES FOR DIVIDED TRAFFIC



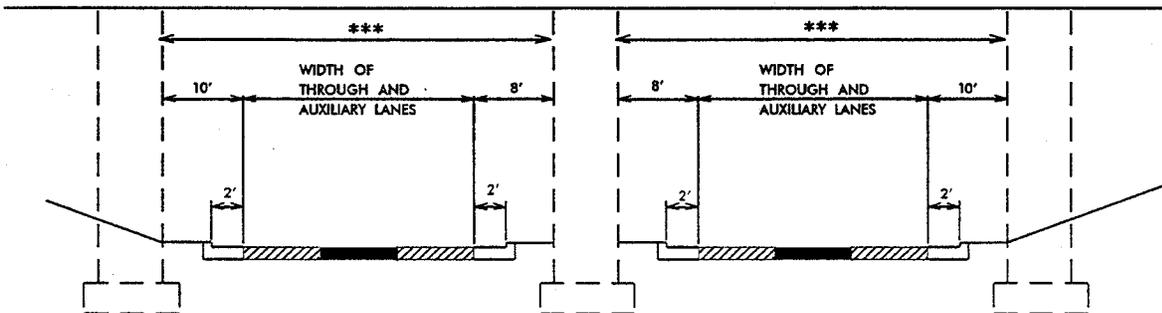
SHOULDER APPROACH



SHOULDER APPROACH WITH AUXILIARY LANES



CURB AND GUTTER APPROACH



CURB AND GUTTER APPROACH WITH AUXILIARY LANES

NOTE: SEE PAGES 6 AND 7 OF THIS MANUAL FOR ADDITIONAL INFORMATION ON CURB AND GUTTER APPROACHES.
 *** SEE EXCEPTIONS TO POLICY ON PAGE 3 OF THIS MANUAL FOR ADDITIONAL INFORMATION.

LEGEND

 THROUGH TRAVEL LANES
 AUXILIARY LANES

COLLECTOR SYSTEM

BRIDGE DECK WIDTHS (FT.) FOR NEW AND RECONSTRUCTED BRIDGES

TWO-LANE TWO-WAY TRAFFIC

| <u>SHOULDER APPROACH</u> | | | BRIDGES 100' OR LESS IN LENGTH | | BRIDGES OVER 100' IN LENGTH | | |
|--------------------------|-------------|-----------|--------------------------------|-----------|-----------------------------|-----------|-----------|
| CURRENT ADT | 400 OR LESS | 401-1000 | | | | | |
| DESIGN YEAR ADT | | 1000-2000 | 2001-4000 | OVER 4000 | 2001-4000 | 4001-8000 | OVER 8000 |
| DESIGN SPEED (MPH) | 30 | | | | | | |
| | 40 | | | | | | |
| | 50 | | | | | | |
| | 60 | | | | | | |
| | 70 | | | | | | |

NOTE : BRIDGE DECK WIDTH CHARTS ARE BASED ON CURRENT AND DESIGN YEAR ADT. IF ONLY CURRENT ADT IS AVAILABLE, DESIGN YEAR ADT SHOULD BE OBTAINED FROM THE TRAFFIC SURVEYS SECTION OF THE PLANNING AND ENVIRONMENTAL BRANCH.

CURB AND GUTTER APPROACH

FOR CURB AND GUTTER APPROACHES, SEE PAGE 7 OF THIS MANUAL.

AUXILIARY LANES

WHEN AUXILIARY LANES ARE REQUIRED, ADD ITS WIDTH TO THE WIDTH OF THE TRAVEL LANES.

INTERCHANGES

MINIMUM SHOULDER WIDTHS OF 6' ARE DESIRED FOR STRUCTURES WHICH ARE LOCATED AT INTERCHANGES. THE MINIMUM VALUES SHOWN ABOVE MAY BE USED IF THE REQUIRED SIGHT DISTANCE CAN BE ACHIEVED.

LOCAL SYSTEM

BRIDGE DECK WIDTHS (FT.) FOR NEW AND RECONSTRUCTED BRIDGES

TWO-LANE TWO-WAY TRAFFIC

SHOULDER APPROACH

| | | | | | BRIDGES 100' OR LESS IN LENGTH | BRIDGES OVER 100' IN LENGTH | |
|--------------------|----------------|-------------|---------------|---------------|---|--------------------------------------|--------------|
| CURRENT ADT | 250 OR LESS | 251- 400 | 401- 1000 | | | | |
| DESIGN YEAR ADT | | | 1001- 2000 | 2001- 4000 | OVER 4000 | 4001- 8000 | OVER 8000 |
| DESIGN SPEED (MPH) | 30 | | | | | | |
| | 40 | | | | | | |
| | 50 | | | | | | |
| | 60 | | | | | | |

NOTE : BRIDGE DECK WIDTH CHARTS ARE BASED ON CURRENT AND DESIGN YEAR ADT. IF ONLY CURRENT ADT IS AVAILABLE, DESIGN YEAR ADT SHOULD BE OBTAINED FROM THE TRAFFIC SURVEYS SECTION OF THE PLANNING AND ENVIRONMENTAL BRANCH.

CURB AND GUTTER APPROACH

FOR CURB AND GUTTER APPROACHES, SEE PAGE 7 OF THIS MANUAL.

AUXILIARY LANES

WHEN AUXILIARY LANES ARE REQUIRED, ADD ITS WIDTH TO THE WIDTH OF THE TRAVEL LANES.

INTERCHANGES

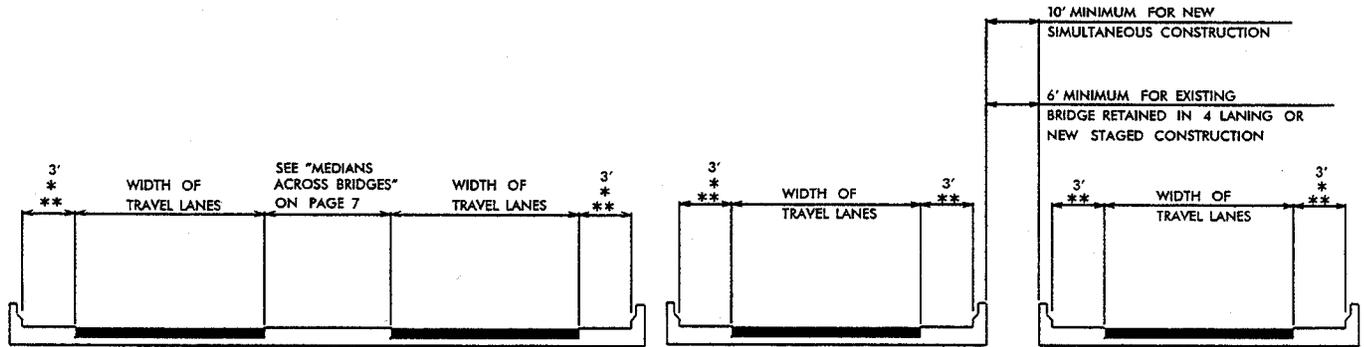
MINIMUM SHOULDER WIDTHS OF 6' ARE DESIRED FOR STRUCTURES WHICH ARE LOCATED AT INTERCHANGES. THE MINIMUM VALUES SHOWN ABOVE MAY BE USED IF THE REQUIRED SIGHT DISTANCE CAN BE ACHIEVED.

LOCAL AND COLLECTOR SYSTEM

BRIDGE DECK WIDTHS 4 OR MORE LANES DIVIDED

SINGLE STRUCTURE

DUAL STRUCTURE



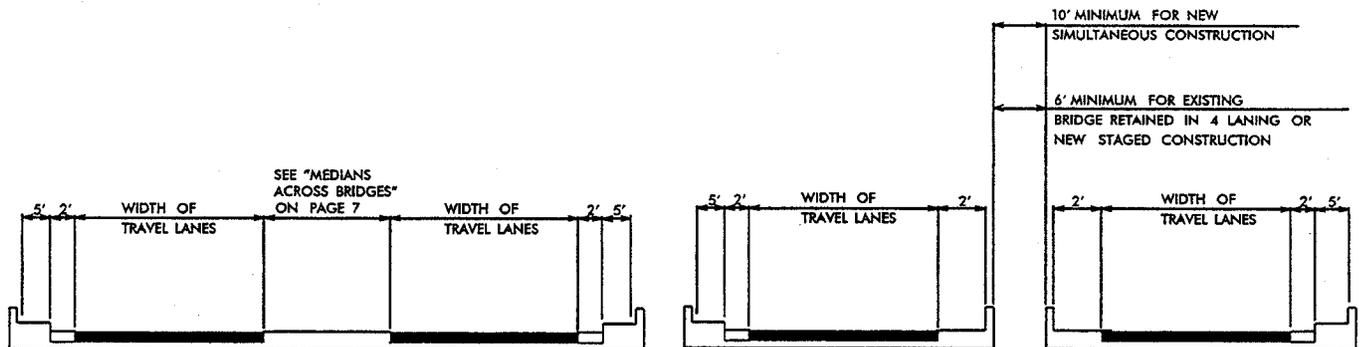
SHOULDER APPROACH

* MINIMUM SHOULDER WIDTHS OF 6' ARE DESIRED FOR STRUCTURES WHICH ARE LOCATED AT INTERCHANGES. THE MINIMUM VALUES SHOWN ABOVE MAY BE USED IF THE REQUIRED SIGHT DISTANCE CAN BE ACHIEVED.

** FOR STRUCTURES OF 100' OR LESS IN LENGTH AND HAVING OVER 2000 ADT, USE 8' SHOULDERS

SINGLE STRUCTURE

DUAL STRUCTURE



CURB AND GUTTER APPROACH

NOTE: SEE PAGES 6 AND 7 OF THIS MANUAL FOR ADDITIONAL INFORMATION ON SIDEWALK AND CURB AND GUTTER APPROACHES.

LEGEND

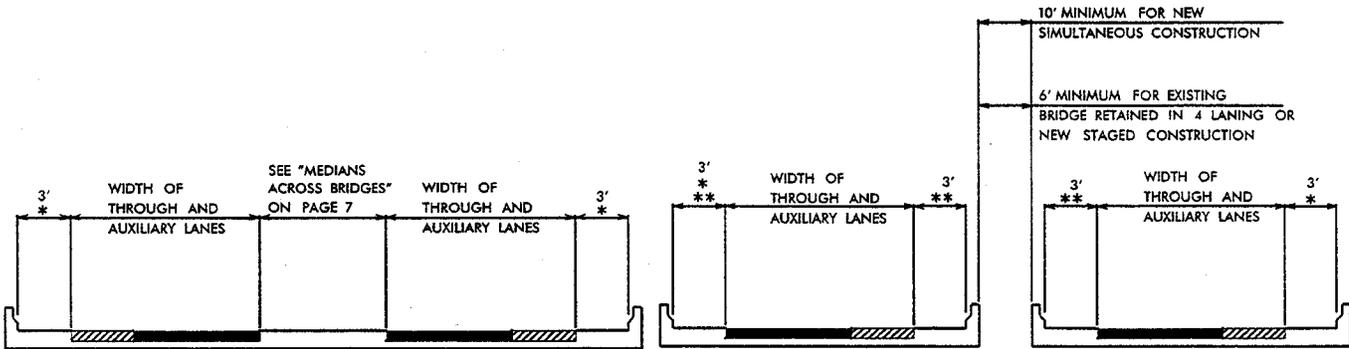
THROUGH TRAVEL LANES

LOCAL AND COLLECTOR SYSTEM

BRIDGE DECK WIDTHS 4 OR MORE LANES DIVIDED WITH AUXILIARY LANES

SINGLE STRUCTURE

DUAL STRUCTURE



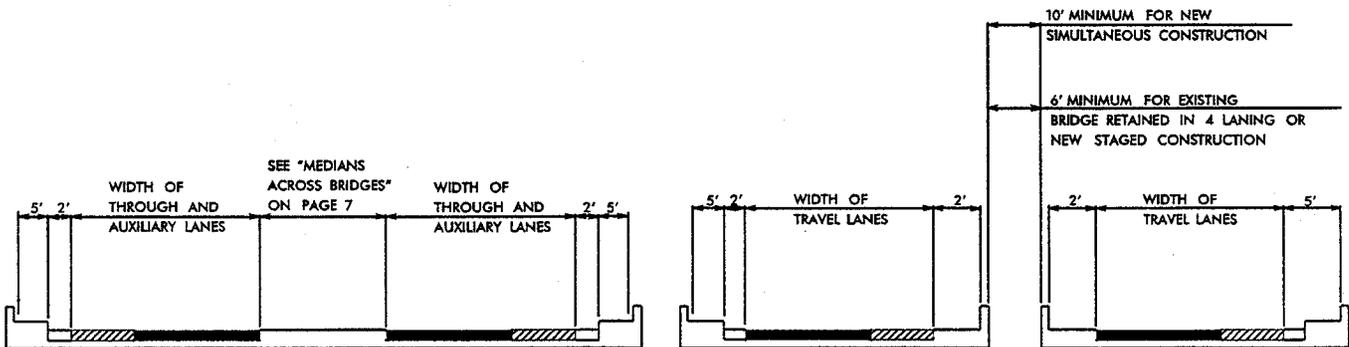
SHOULDER APPROACH

* MINIMUM SHOULDER WIDTHS OF 6' ARE DESIRED FOR STRUCTURES WHICH ARE LOCATED AT INTERCHANGES. THE MINIMUM VALUES SHOWN ABOVE MAY BE USED IF THE REQUIRED SIGHT DISTANCE CAN BE ACHIEVED.

** FOR STRUCTURES OF 100' OR LESS IN LENGTH AND HAVING OVER 2000 ADT, USE 8' SHOULDERS

SINGLE STRUCTURE

DUAL STRUCTURE



CURB AND GUTTER APPROACH

NOTE: SEE PAGES 6 AND 7 OF THIS MANUAL FOR ADDITIONAL INFORMATION ON SIDEWALK AND CURB AND GUTTER APPROACHES.

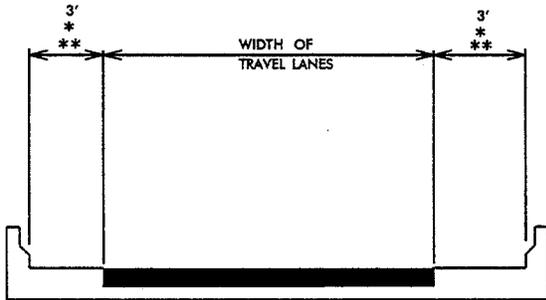
LEGEND

THROUGH TRAVEL LANES
AUXILIARY LANES

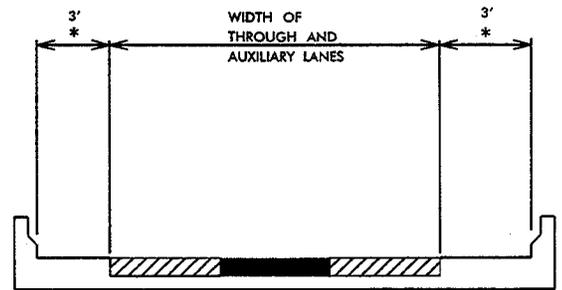
LOCAL AND COLLECTOR SYSTEM

BRIDGE DECK WIDTHS
4 OR MORE LANES UNDIVIDED
TWO-WAY TRAFFIC

WITHOUT AUXILIARY LANE



WITH AUXILIARY LANE

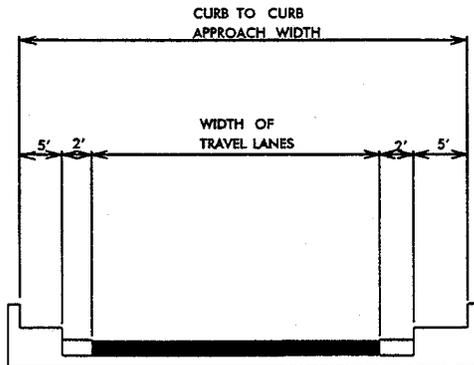


SHOULDER APPROACH

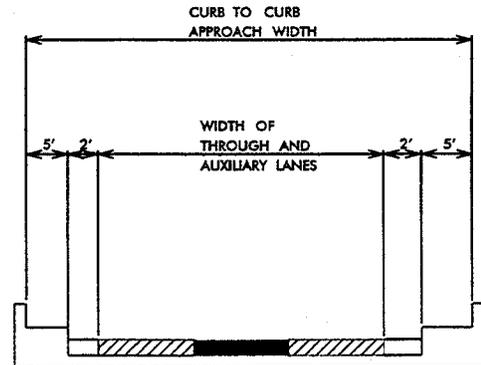
* MINIMUM SHOULDER WIDTHS OF 6' ARE DESIRED FOR STRUCTURES WHICH ARE LOCATED AT INTERCHANGES. THE MINIMUM VALUES SHOWN ABOVE MAY BE USED IF THE REQUIRED SIGHT DISTANCE CAN BE ACHIEVED.

** FOR STRUCTURES OF 100' OR LESS IN LENGTH AND HAVING OVER 2000 ADT, USE 8' SHOULDERS

WITHOUT AUXILIARY LANE



WITH AUXILIARY LANE



CURB AND GUTTER APPROACH

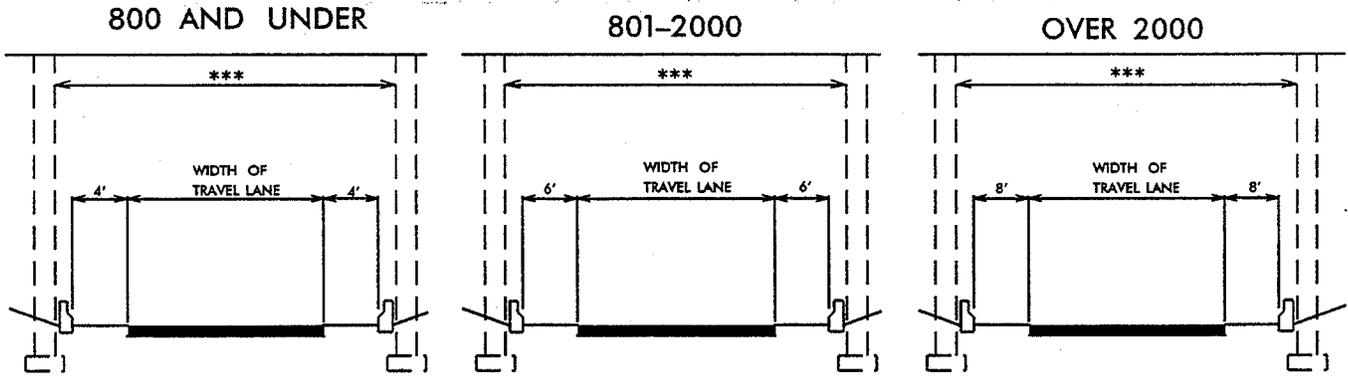
NOTE: SEE PAGES 6 AND 7 OF THIS MANUAL FOR ADDITIONAL INFORMATION ON SIDEWALKS AND CURB AND GUTTER APPROACHES.

LEGEND

 THROUGH TRAVEL LANES
 AUXILIARY LANES

LOCAL AND COLLECTOR SYSTEM

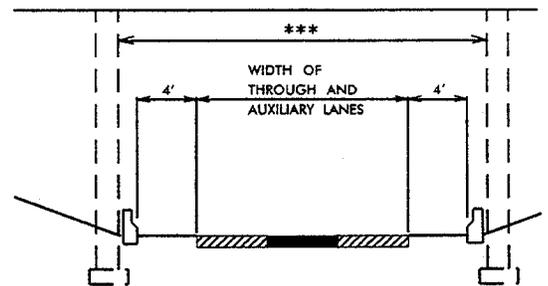
HORIZONTAL CLEARANCES DESIGN YEAR ADT



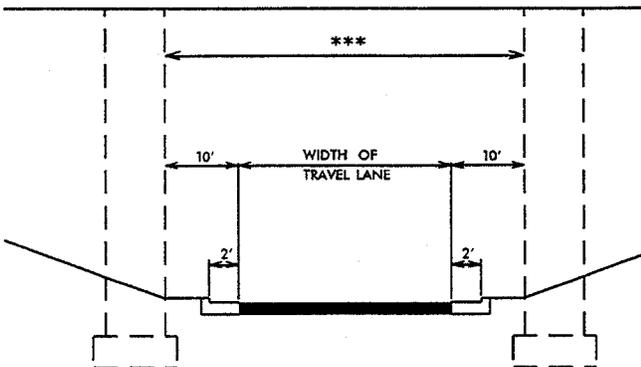
SHOULDER APPROACH

NOTE: PIER NECESSITY AND LOCATION ARE TO BE DETERMINED BY THE STRUCTURE DESIGN UNIT. SEE THE ROADWAY DESIGN MANUAL, CHAPTER 6-10 FOR ENDBENT SLOPE BREAK POINT.

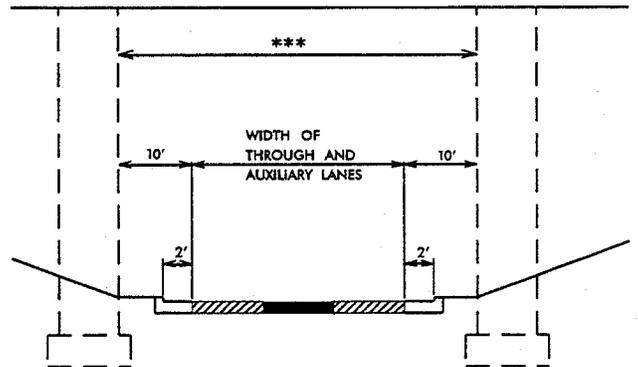
*** SEE EXCEPTIONS TO POLICY ON PAGE 3 OF THIS MANUAL FOR ADDITIONAL INFORMATION.



SHOULDER APPROACH WITH AUXILIARY LANES



CURB AND GUTTER APPROACH



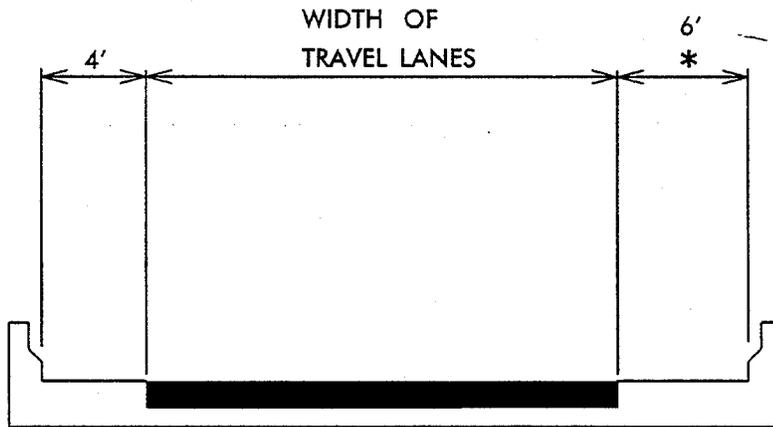
CURB AND GUTTER APPROACH WITH AUXILIARY LANES

LEGEND

THROUGH TRAVEL LANES
AUXILIARY LANES

ONE-WAY RAMP

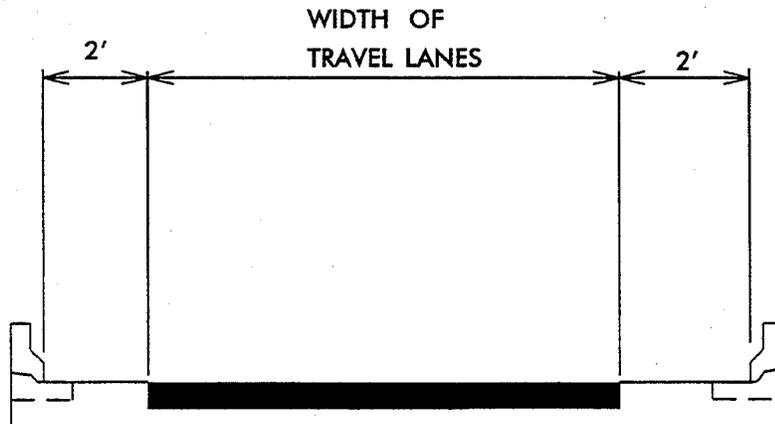
BRIDGE DECK WIDTHS



* 10' FOR DIRECTIONAL INTERCHANGE RAMP
FOR ADDITIONAL INFORMATION SEE PAGE 976 TABLE X-3 (1990 A POLICY
ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS)

SHOULDER APPROACH

NOTE: CURB AND GUTTER ON RAMP SHOULD BE CONSIDERED ONLY TO FACILITATE PARTICULARLY DIFFICULT DRAINAGE SITUATIONS. CURB AND GUTTER IS NOT RECOMMENDED ON INTERMEDIATE OR DIRECTIONAL RAMP, EXCEPT IN SPECIAL CASES. SIDEWALKS SHOULD ONLY BE USED ON NON-FREEWAY FACILITIES WHERE PEDESTRIAN TRAFFIC IS ANTICIPATED. SIDEWALKS SHOULD NOT BE USED ON CONTROLLED ACCESS FACILITIES. SEE PAGES 6 AND 7 FOR ADDITIONAL INFORMATION ON SIDEWALKS AND CURB AND GUTTER APPROACHES



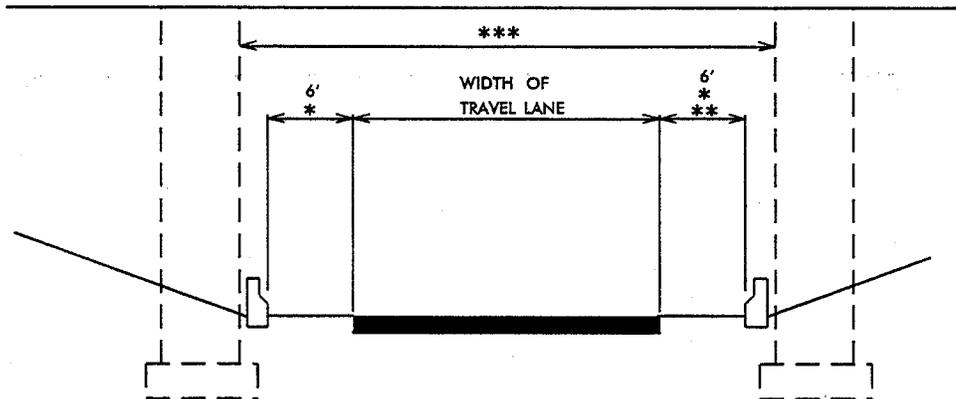
CURB AND GUTTER APPROACH

LEGEND

THROUGH TRAVEL LANES

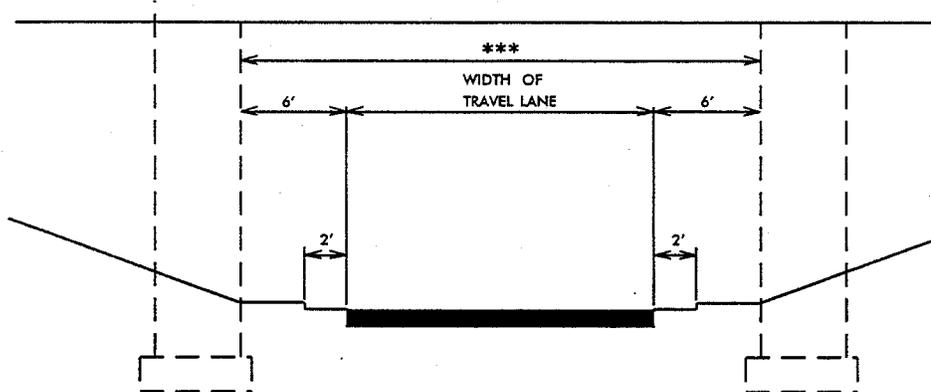
ONE-WAY RAMP

HORIZONTAL CLEARANCES



SHOULDER APPROACH

- * USE 8' WITH 4' PAVED SHOULDER.
- ** USE 10' WITH DIRECTIONAL INTERCHANGE RAMPS.



CURB AND GUTTER APPROACH

NOTE: CURB AND GUTTER ON RAMPS SHOULD BE CONSIDERED ONLY TO FACILITATE PARTICULARLY DIFFICULT DRAINAGE SITUATIONS. CURB AND GUTTER IS NOT RECOMMENDED ON INTERMEDIATE OR DIRECTIONAL RAMPS, EXCEPT IN SPECIAL CASES.

*** SEE EXCEPTIONS TO POLICY ON PAGE 3 OF THIS MANUAL FOR ADDITIONAL INFORMATION.

LEGEND

THROUGH TRAVEL LANES