

APPENDIX B

PUBLIC PATHWAY CONSTRUCTION PERMIT STANDARDS

1994 Edition

A. INTRODUCTION

The purpose of this document is to establish standards for bike ways, pedestrian, equestrian and nordic skiing paths and other non motorized travel and transportation routes that are to be constructed and accepted for ownership and maintenance by Blaine County, Idaho, or by the Blaine County Recreation District.

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B. DEFINITIONS.

The following definitions will be used in this standard.

Bicycle. A device propelled exclusively by human power having two tandem wheels.

Bicycle Lane. A portion of a roadway which has been designated for preferential or exclusive use by bicycles. It is distinguished from that portion of the roadway designated for motor vehicular traffic by a paint strip, curb or other similar device.

Bicycle Route, Bicycle Way, or Bikeway. Any road, street, path or way which in some manner is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

Collector Route. Routes which should be signed and marked. In many cases horizontal and vertical alignments, and/or pavement surfaces are inadequate, nevertheless, these routes will be used, and measures should be taken to improve them.

Path. A separate trail or path which is for the use of bicycles, pedestrians or equestrians. Where such trail or path forms a part of a highway it is separated from the roadways for motor vehicular traffic by an open space or barrier. It shall be paved.

Separated Arterial Route. A route separated from motor roadways and containing a ten-foot asphalt path and four-foot compacted earth trail within a twenty-foot (minimum) easement. Horizontal and vertical alignments are designed for a 25 mph bicycle speed.

Shared Arterial Route. A route adjacent to the motor roadway and containing one four-foot minimum bicycle/pedestrian lane on each edge of the roadway. These routes are to be marked on the pavement and signed. Existing stop signs will be re-aligned, where necessary, to create arterial routes.

Shared Roadway. A roadway which is officially designated and marked as a bicycle route but which is open to motor vehicular travel.

Trails. Trails are unpaved travel ways having little or no improvement and intended for equestrian and pedestrian traffic. Their purpose shall be to give access to natural and scenic areas within the district.

C. LOCATION OF ROUTES The location of all routes for paths and ways to be accepted and maintained by Blaine County, Idaho, shall be approved by the Board of Commissioners. The location of all routes for and the construction of all paths and ways to be accepted and maintained by the Blaine County Recreation District shall be approved by said Recreation District. The Board of Commissioners may prohibit new driveway and street crossings of bicycle paths and the Wood River Trail System where practical alternatives exist. In the event that no alternative approach exists which does not require crossing a county bicycle path or the Wood River Trail System, the Board shall, prior to issuance of an approach permit, in descending order of preference, require the following:

1. Consolidation of crossings in the vicinity of the applied for approach permit and a separated crossing, such as vehicular underpass.

2. A separated crossing.

3. Consolidation of crossings contemplated in the vicinity of the applied for approach permit.

4. With regard to utility crossings of county bike path or Wood River Trail System path, all such damage be repaired consistent with Blaine County Street Standards Ordinance, as amended. Boring of utility crossing is preferred to cutting of improved bike paths.

D. CLASSIFICATIONS.

The routes, paths and ways constructed hereunder shall be classified with the designations and specifications as follows:

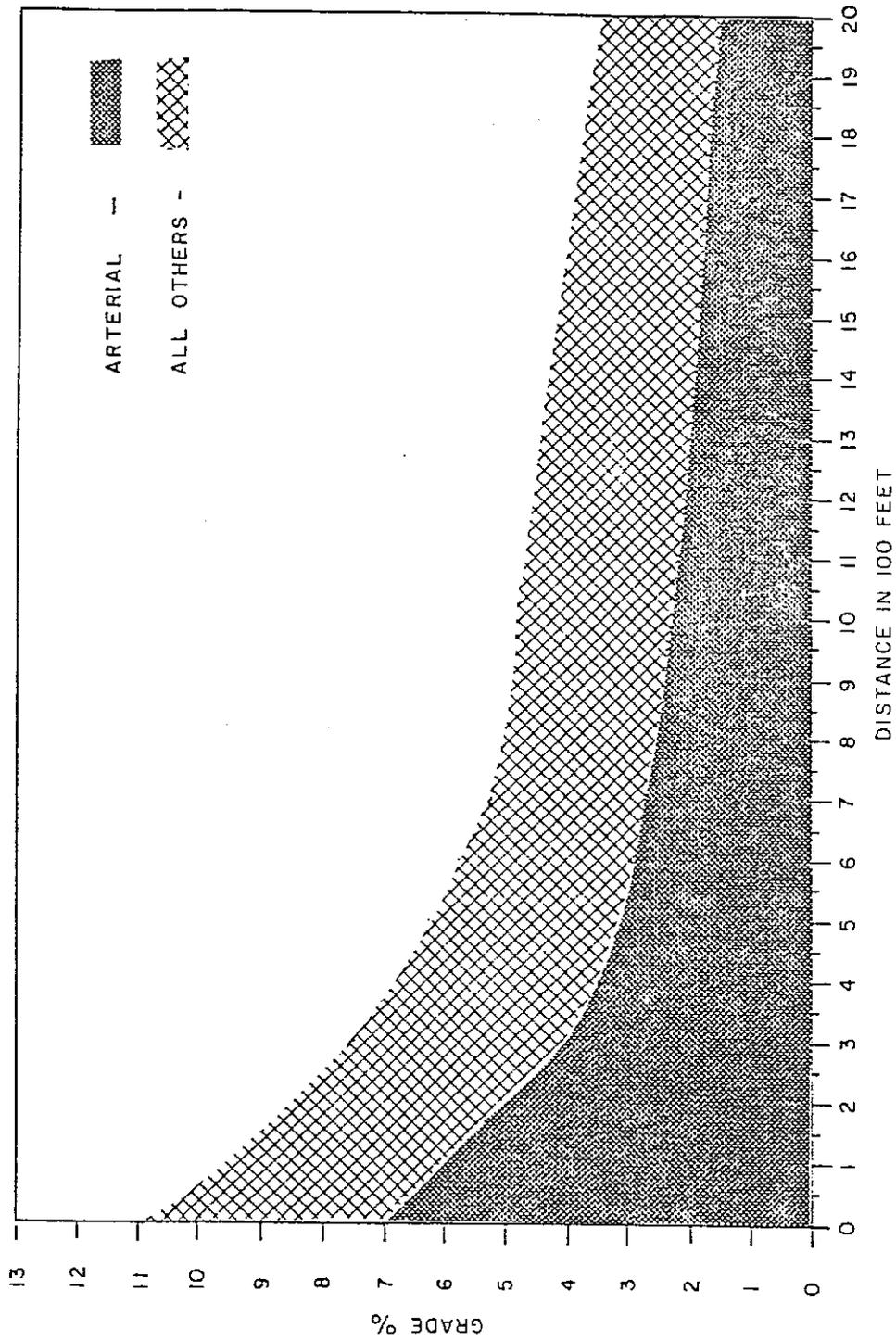
1. Separated Arterial Routes. A route separated from motor roadways and containing a ten-foot asphalt path and four-foot compacted earth trail within a twenty-foot (minimum) easement. Horizontal and vertical alignments are designed for a 25 mph bicycle speed.
2. Shared Arterial Routes. A route adjacent to the motor roadway and containing one four-foot minimum bicycle/pedestrian lane on each edge of the roadway. These routes are to be marked on the pavement and signed. Existing stop signs will be re-aligned, where necessary, to create arterial routes.
3. Collector Routes. Routes which should be signed and marked. In many cases horizontal and vertical alignments, and/or pavement surfaces are inadequate, nevertheless, these routes will be used, and measures should be taken to improve them.

4. Path. Such routes shall be used for local traffic, short trips, or in places where usage will be low. The major criteria will be an eight (8) foot wide paved path within a ten (10) foot (minimum) easement. A path shall be separated from highway or street traffic, but may cross at crosswalks or other designated points.
5. Trails. These trails are mainly scenic and recreational in nature. They will traverse rugged terrain and will be improved only to the extent necessary to make them usable to horse and foot traffic.

E. DESIGN CRITERIA FOR SEPARATED ARTERIAL ROUTES.

These criteria shall be used in designing the alignment and structure of the bikeway.

1. Design Speed. A design speed of 25 m.p.h. (32 KM/h) is desirable. On down grades which exceed 7%, a design speed of 30 m.p.h. (48 km/h) is recommended as a safe minimum. On bikeways with "one-way" climbing grades exceeding +3% it is sufficient to use a design speed of 15 m.p.h. (24 km/h).
2. Grades. Grades shall not exceed the values shown in Figure D-1 Bikeway Grade Criteria.
3. Horizontal Curves. The desirable radii for horizontal curves are as follows, and shall be used if terrain permits:



GRADE CRITERIA
 GRADE / DISTANCE CRITERIA
 BASED ON 6 M.P.H. STEADY STATE SPEED

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 SUN VALLEY, IDAHO

FIGURE D-1

Design Speed, mph	Design Radius, feet
10	15
15	35
20	70
25	90

If the terrain or easement dictates that the above radii cannot be maintained, then the Recreation District may, on a case by case basis, approve shorter radii, but in no case shall the curve radius on an Arterial Route be less than that dictated by the formula

$$R = 1.528V + 2.2$$

where V=design speed in m.p.h.
 and R=curve radius in feet

4. Sight Distance. The following sight distances shall apply. For grades other than those tabulated, use next higher value.

Stopping Sight Distances for Downhill Gradients of:

Design Speed	Grade	0%	5%	10%	15%
mph		feet	feet	feet	feet
10		50	50	60	70
15		85	90	100	130
20		130	140	160	200
25		175	200	230	300
30		230	260	310	400

5. Width and Clearance. All Arterial Paths shall be located within a twenty foot (20') easement, minimum. Pavement width shall be ten feet (10') (see typical cross section, Figure E-1). Minimum vertical clearance on arterial paths shall be that clearance necessary to accommodate a horse and rider, which is twelve feet (12') above the pavement surface, unless otherwise specified by the Recreation District.

An exception, however, will be a tunnel undercrossing where a horse would be led by the rider. In that case minimum vertical clearance above the paved surface shall be 8.2 feet.

All structures within the easement shall be designed to be as safe as possible. Grates, culverts, etc. shall be designed to prevent entrapment of bicycle tires, hooves, cross-country skis and feet. Where necessary to provide a safe route, or to protect property, fences may be required. They shall be of a type and character that will blend in with the natural landscape and cultural improvements, and shall be of native materials.

6. Bridges, Culverts & Drainage.

a. Bridges.

All bridges shall be designed with a minimum width of eight (8) feet to facilitate machine maintenance. Removable stanchions with a positive lock must be provided to prevent unauthorized vehicle traffic. Bridges shall be designed to the following specification:

Concentrated load - 10,000 lbs.

Wind load - 30 lbs. per square foot

Live load for spans to 40 feet - 85 lbs.
per square foot

Live load for spans over 40 feet - 60 lbs.
per square foot

Snow load - 100 lbs. per square foot for
all bridges.

All bridges constructed under this section shall have a verification by an Idaho licensed engineer that the entire structure is designed to carry the loads specified above. Prefabricated bridges are acceptable under this section.

If prefabricated bridges are to be used, however, plans must be submitted to the Recreation District for approval of structure and aesthetic design.

b. Culverts.

Culverts used to carry drainage water beneath the bikeway shall be of a type and size sufficient to handle the projected flow. Culvert sizes shall be approved by the Recreation District prior to installation.

c. Drainage.

Alignments for routes, paths and trails shall have sufficient drainage to ensure that the sub-grade will remain dry. This shall be accomplished by providing adequate cross-slope for sheet drainage and swales or ditches for channel-flow sufficient to accommodate rain or snow melt. Where the route is located in a flood plain or floodway it may be assumed that flooding will occur and the path may be submerged at times. In flood areas, adequate drainage will be that drainage necessary to avoid obstructing floodwaters should floods occur, and to otherwise keep the path clear of water during periods of normal precipitation.

7. Construction Standards. Construction Standards and practices shall comply with General Specifications herein and the Typical Drawings for Separated Arterial Routes.

F. DESIGN CRITERIA FOR PATHS

These criteria shall be used in designing the alignment and structure of paths. These criteria are not absolute but the end result must be a path which is usable by the average cyclist. Unsafe conditions (unmarked street crossings, blind crossings, dangerous obstructions) will not be allowed.

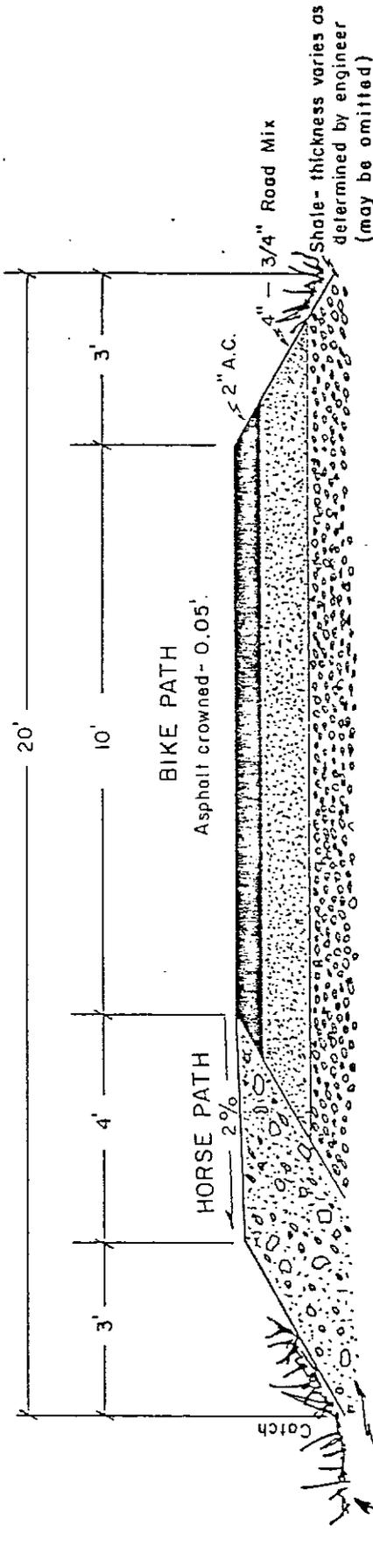
1. Design Speed - 10 mph
2. Minimum Curve Radius - 15 feet
3. Minimum Sight Distance:

Stopping Sight Distance for Grades of:

<u>0%</u>	<u>5%</u>	<u>10%</u>	<u>15%</u>
50'	50'	60'	70'

4. Width and Clearance - All paths shall have a minimum pavement width of eight (8) feet with no obstruction within one foot of the pavement edge. Minimum Vertical Clearance shall be 8.2 feet. All structures within the right of way shall be designed to be as safe as possible. Grates, culverts, etc. will be designed to prevent entrapment of bicycle tires.

(R.O.W. may increase where side slopes
are steep)



Horse and Pedestrian path
from compacted native materials

Shoulders to be reseeded with native or ornamental vegetation
appropriate to that section of the route.

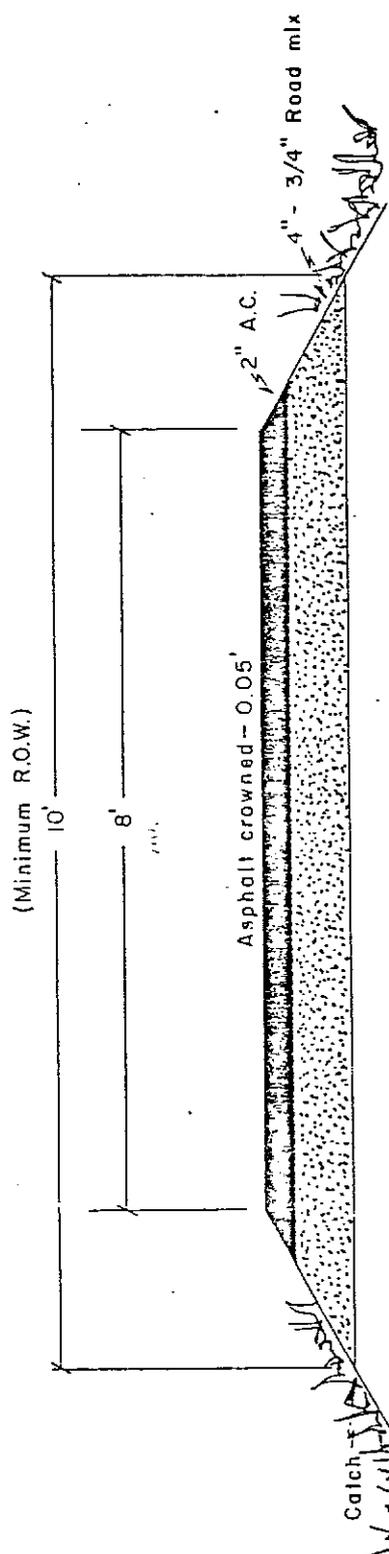
DESIGN MAY CHANGE AS PER TERRAIN

TYPICAL

SEPARATED ARTERIAL ROUTE

(VERTICAL SCALE EXAGGERATED)

FIGURE E-1



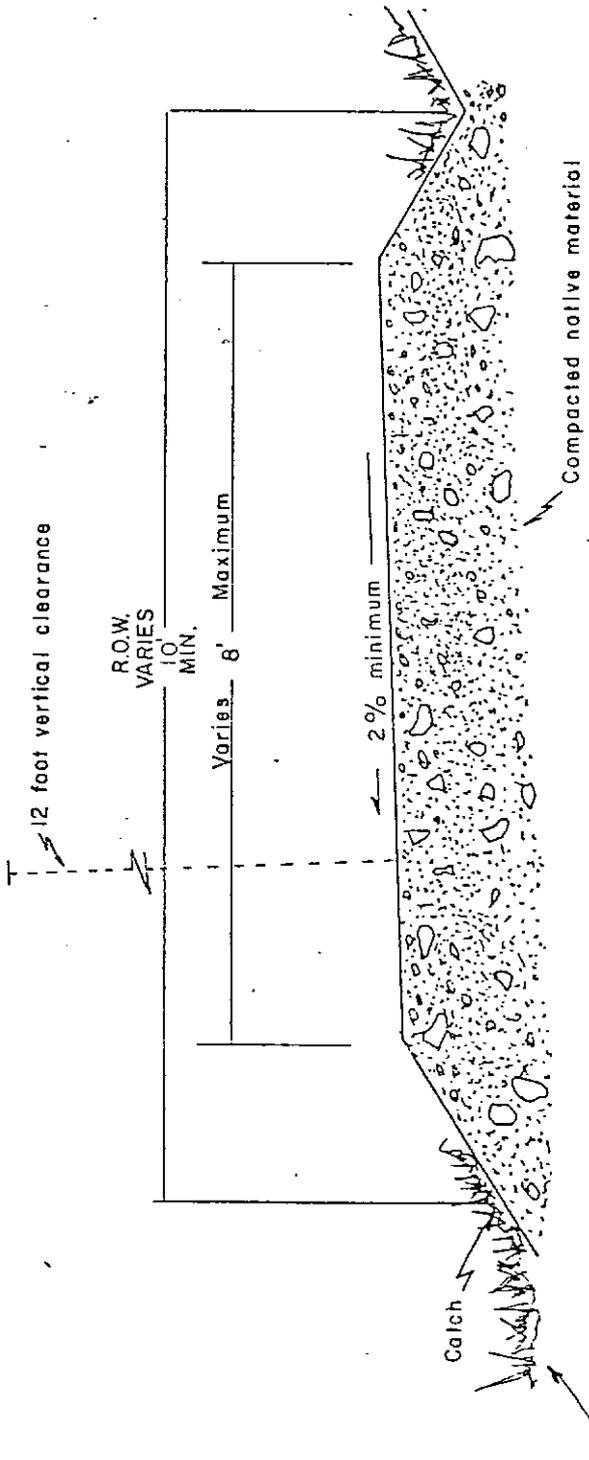
Shoulders to be reseeded with native or ornamental vegetation appropriate to that section of the route.

TYPICAL PATH

(VERTICAL SCALE EXAGGERATED)

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FIGURE F-1



TYPICAL TRAIL

(VERTICAL SCALE EXAGGERATED)

INSIGHT Inc.
 P.O. BOX 1386
 SUN VALLEY, IDAHO

5. Bridges, culverts and drainage standards for bridges - Culvert and drainage requirements shall be the same as those for Separated Arterial Routes.
6. Construction Standards - Construction Standards and practices shall comply with the General Specifications herein and the Typical Drawings for Bike Paths.

Figure F-1.

G. DESIGN STANDARDS FOR SHARED ARTERIAL ROUTES

In general, consideration of grade, alignment and sight distance will already be established by the designers of the roadway.

1. Intersection crossings will comply with Figure G-1. All shared roadways should have a one-way bike lane on each side in the same direction as traffic flow. Two-way bike traffic on one side of a shared roadway will not be permitted unless no other alternative exists. (See Figures G-4 & G-5). Design for shared roadway marking must comply with Figure G-2 minimum width shall be four (4) feet, with five (5) feet being desirable.
2. Signing and marking will comply with the signing and marking section of this specification. Standard Signing should comply with the figures and tables herein.

3. All drainage structures within the limits of the shared roadway should be modified to make it impossible to entrap bicycle wheels.

H. DESIGN STANDARDS FOR TRAILS

These trails are routes of aesthetic interest and scenic beauty. A minimum of improvement (only the amount necessary to make them usable and safe) will be accomplished.

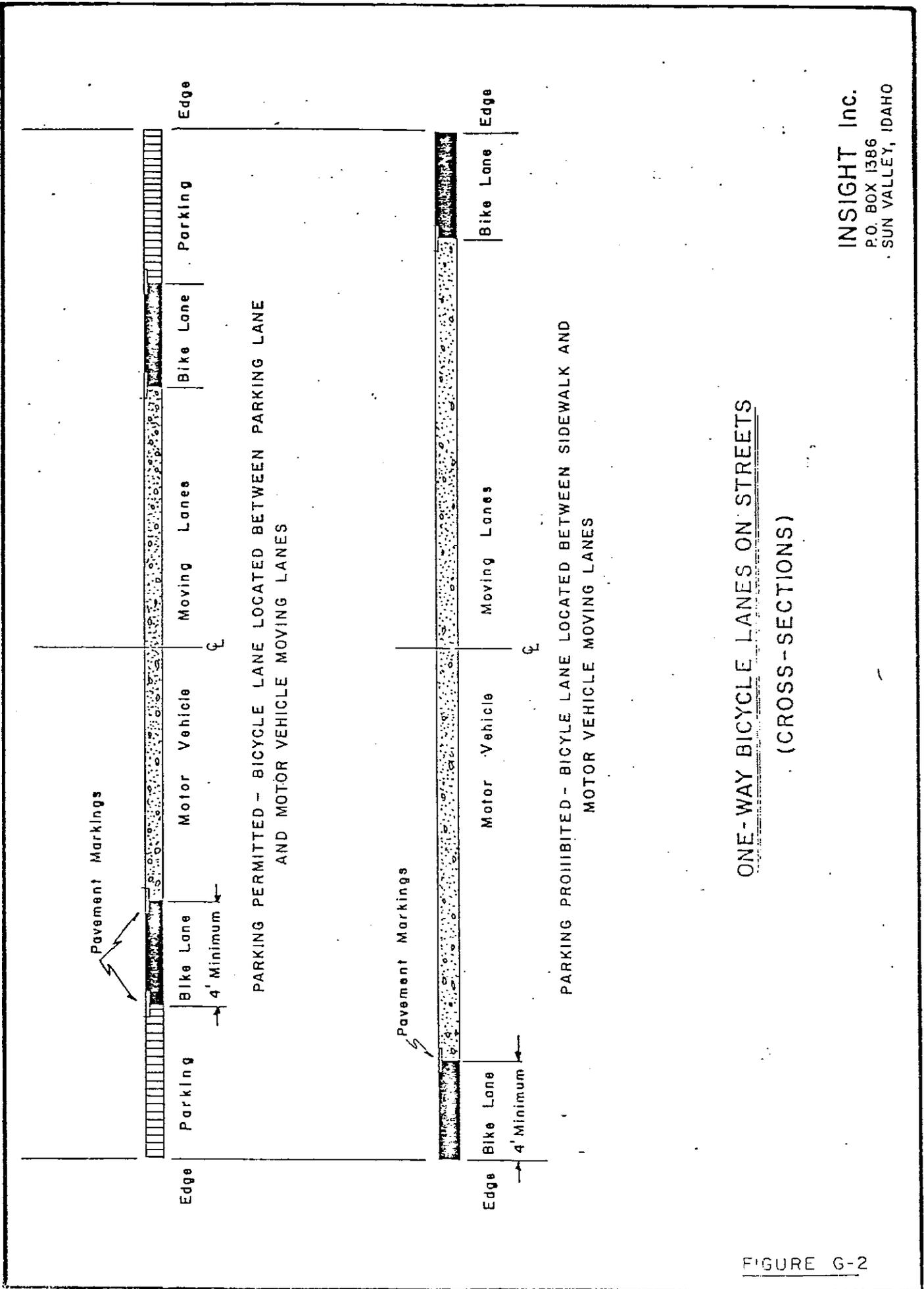
In general, these paths will be unimproved native soil as level as possible. They should be wide enough for two horses to pass in opposite directions. On steep side slopes the trails may be only wide enough for one horse.

Vertical clearance shall be twelve (12) feet if possible. In special circumstances it may be less, but in no case so low that a horse and rider may not pass without hitting the obstruction.

Paths shall not conform to a set standard, but rather try to blend with nature as much as possible. The recreation District will specify the improvements required on particular paths.

Bridges shall conform with the specifications for bridges under Arterial Routes.

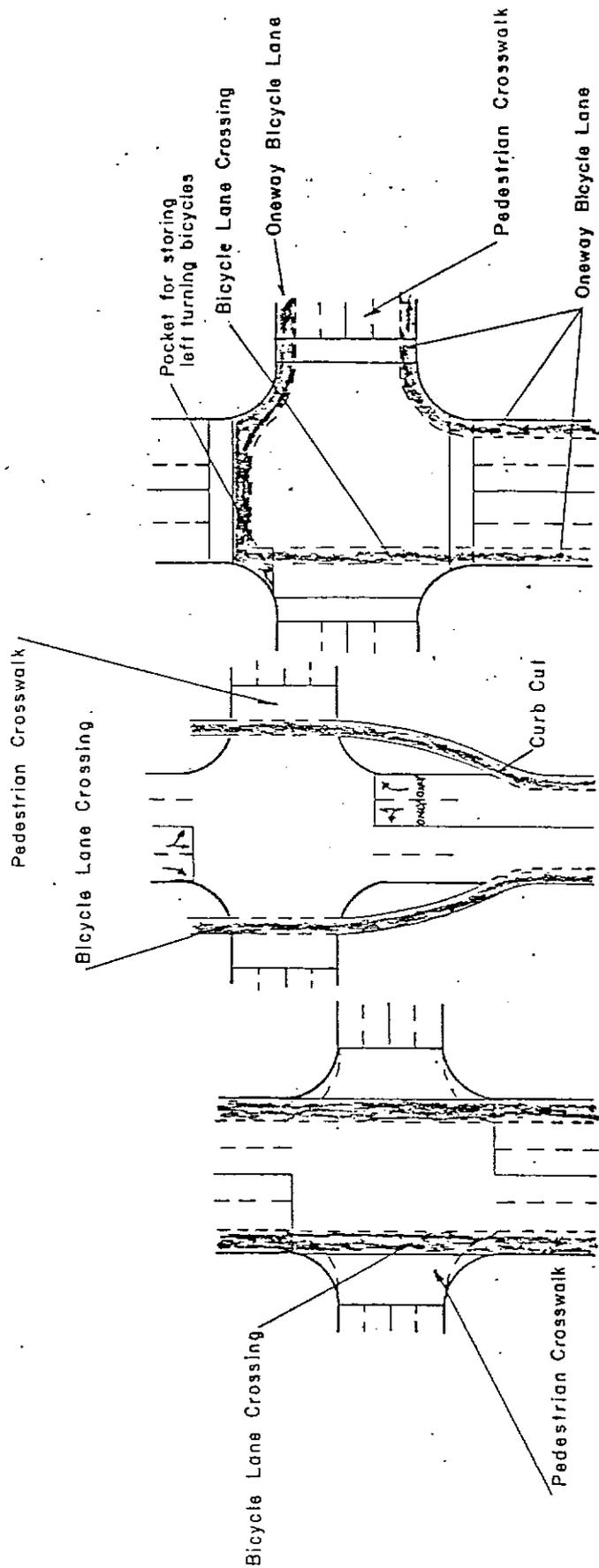
In general, paths should conform to Figure H-1 Typical Trails.



ONE-WAY BICYCLE LANES ON STREETS
(CROSS-SECTIONS)

FIGURE G-2

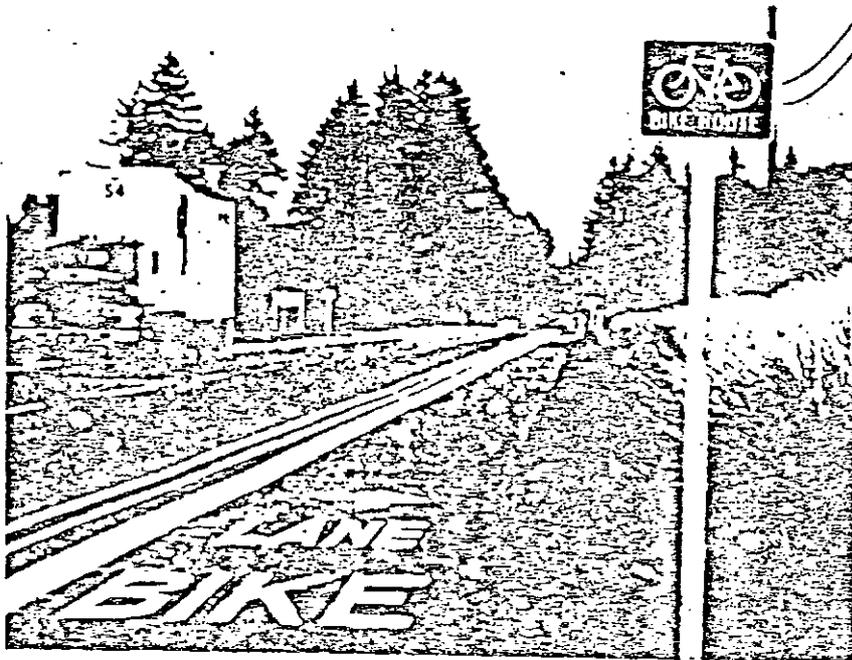
INSIGHT Inc.
P.O. BOX 1386
SUN VALLEY, IDAHO



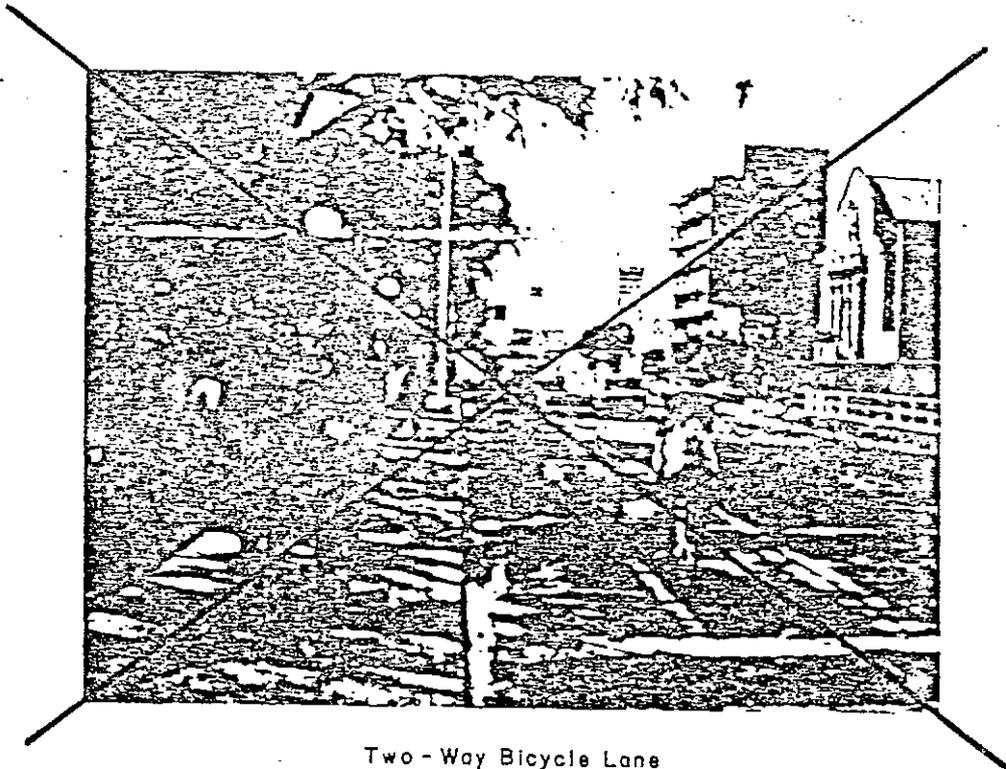
Bicycle Lanes crossing intersection Bicycle Lanes offset to cross intersection Bicycle Lanes continued on cross street

RECOMMENDED BICYCLE ROUTING AT STREET INTERSECTIONS

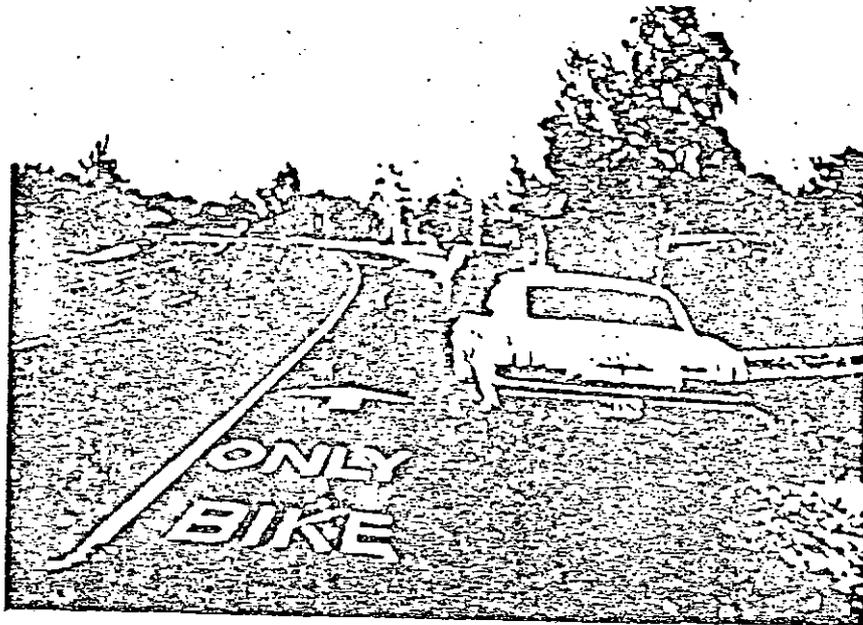
FIGURE G-1



One-Way Bicycle Lane on a Rural Highway.
(Some on other side - Bikes move with traffic)



Two-Way Bicycle Lane
Not to be used unless no alternative exists



One-Way Bicycle Lane in a Residential Area With Parking Permitted.



One-Way Bicycle Lane on a City Street

I. GENERAL SIGNING FOR ALL BIKE ROUTES

All traffic control signs are divided into three categories:

- Regulatory
- Warning
- Guide

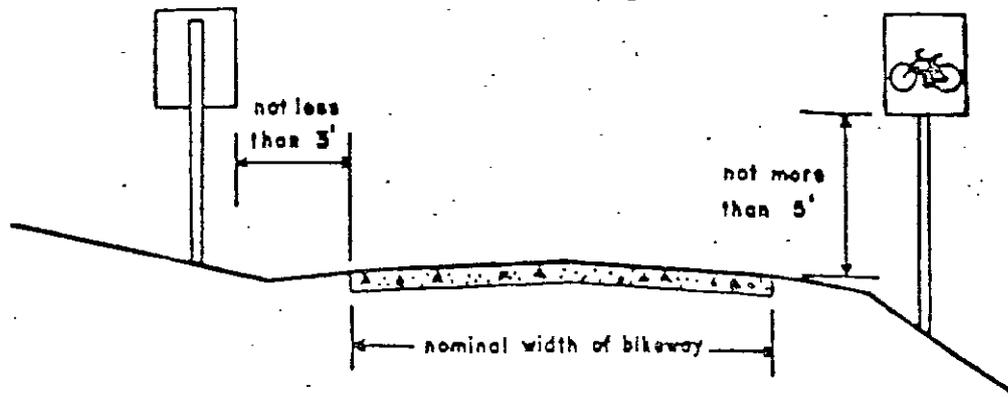
Each has its own specific application and importance and should be used only in warranted situations. Installing too many signs tends to diminish their importance, particularly regulatory and warning signs.

1. Placement.

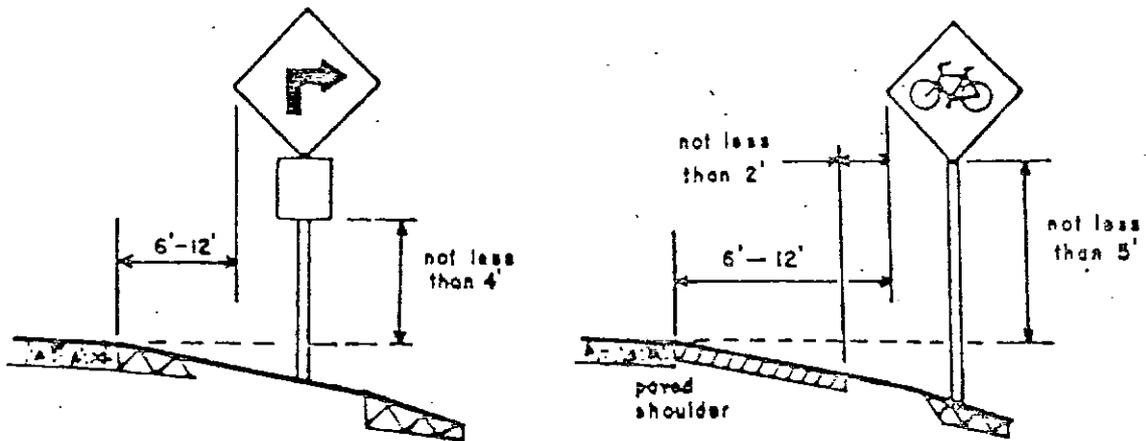
There are five basic requirements in the placement of signs. A sign should be placed to insure that:

- It is within the viewers' normal cone of vision.
- It is properly located with respect to the situation it addresses.
- It is not obscured by other roadside objects.
- It does not constitute a potential roadside hazard.
- Signs requiring different decisions must be spaced sufficiently apart to allow time for the required decisions.

For proper placement of signs along all classes of Route see Figure I-1.



Class 1 Bikeway



Class 2 & 3 Bikeways

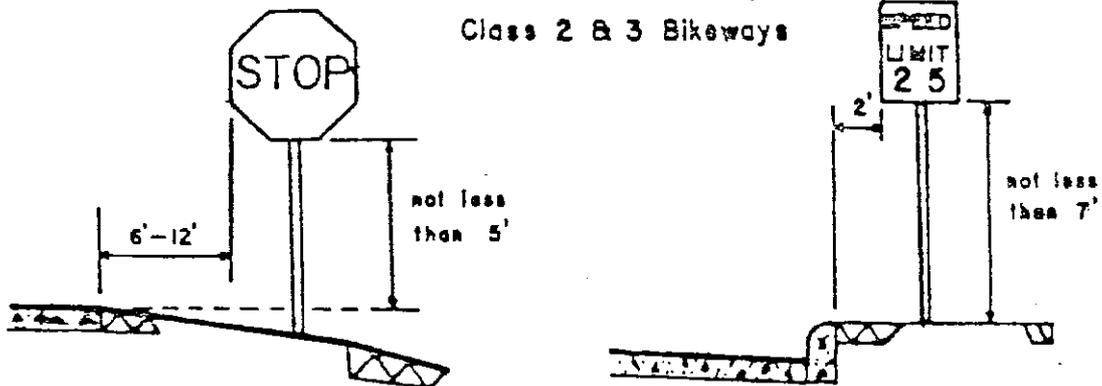


Figure I-1 Bikeway Signing

2. Regulatory Signs.

Regulatory signs inform users of traffic laws and regulations. They govern lane movements, parking, speeds, etc., and indicate legal requirements that would not otherwise be apparent. Examples of this type of sign are shown in Figure I-2.

3. Warning Signs.

Warning signs are used where necessary to call the users attention to potentially hazardous conditions on or adjacent to the route. Warning signs should be placed sufficiently in advance of the conditions to which they direct attention for users to take appropriate action.

Although warning signs are of great value to the user, their use should be kept to a minimum to avoid possible breeding of disrespect due to over-use. Useful types of warning signs are illustrated in Figure I-1. Generally, on all bikeways, existing roadway signs are sufficient. Unexpected or unique situations to cyclists may require additional warning signs. Examples of additional signing are present in Figure I-3.

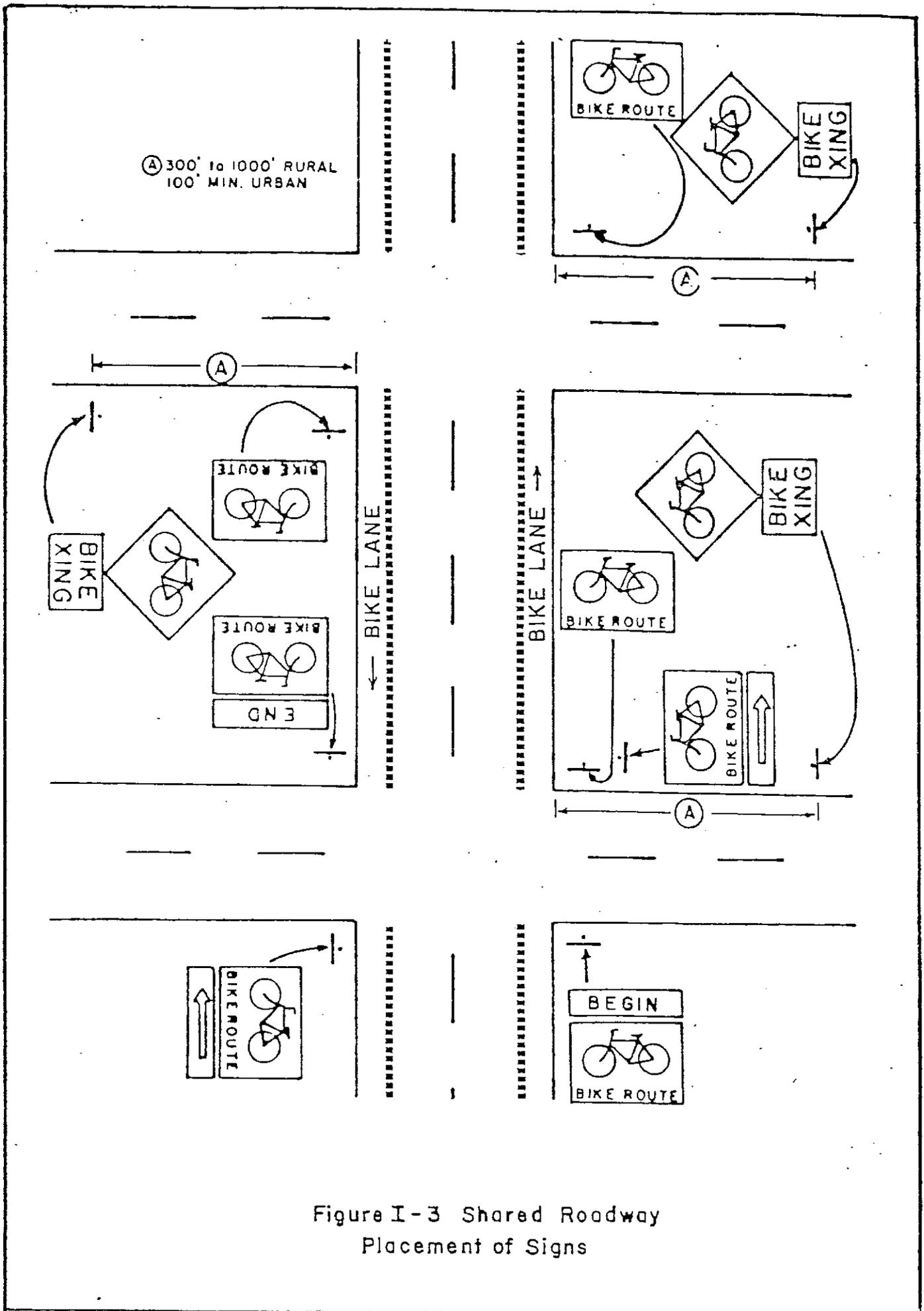
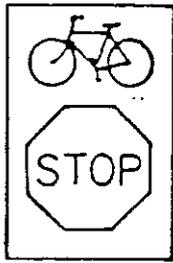


Figure I-3 Shared Roadway
Placement of Signs

Regulatory Signs



18 X 24



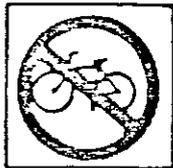
18 X 18



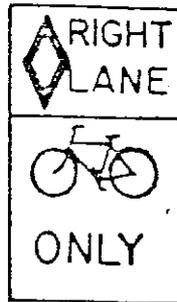
24 X 18



12 X 18



24 X 24

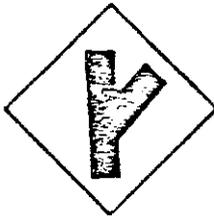


24 X 30

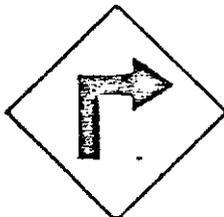


24 X 18

Warning Signs



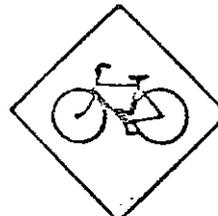
18 X 18



18 X 18



18 X 18



30 X 30

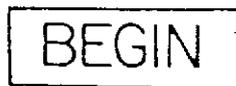


24 X 18

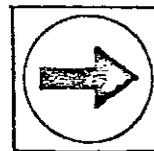
Guide Signs



24 X 18



24 X 6 or 12 X 4



12 X 12

Figure I-2 Bike Signs

4. Guide Signs.

Guide Signs provide directional, route, recreational, destination and roadside service information to orient and assist users. Guide signs are placed where needed to keep users well informed as to their route's destination and continuity. Typically, guide signs are of most value to the unfamiliar user who does not use the route regularly. Standard guide signs include the BIKE ROUTE sign, supplementary message plates BEGIN, END and TO, and directional plates with a variety of arrow designations.

5. Construction Signs.

Construction signing falls into the same three categories as do other signs. No special construction signs have been developed for bikeways or skiways and those used for motor vehicles are satisfactory for this application.

6. Pavement Markings.

Pavement markings are employed both to reinforce signing and to provide a communication. Pavement markings are particularly useful for informing the bicyclist, since they are more directly in the cyclist's normal cone of vision than are signs.

Pavement markings employ various colors, widths, and longitudinal and transverse patterns to provide the cyclist with needed information and aid in his safe progression.

7. Colors.

-- Yellow - Delineates the separation of opposing traffic lanes, including painted medians, as well as edge lines where an obstruction restricts use of the roadside as a safety refuge.

-- Red - Delineates roadways that shall not be entered or used by the viewer of those markings.

-- Black - May be used to give contrast to other colors when the pavement itself does not provide sufficient contrast.

8. Line Patterns & Lane Lines.

Broken Lines are permissive in character. A broken line is formed by line segments and gaps, usually in the ratio of 3:5. On bicycle facilities, a recommended standard of 6' (1.83 m.) segments and 10' (3.05 m.) gaps is suggested. Dotted lines are formed by short segments normally 2' (.61 m.) in length, and gaps normally 4' (1.22 m.) or longer.

Solid lines are restrictive in nature. Depending upon the type used, they can indicate where crossing of the line is prohibited, or where crossing requires caution.

Width of the line indicates the degree of emphasis. A normal line width is 4" to 6" (10.16 cm. to 15.24 cm.) wide. A wide line is usually twice the width of a normal line.

On facilities where there is joint-use by both motor vehicles and bicycles, all markings should be reflectorized. Either reflective paint or inlaid markers are recommended.

On arterial routes all lane, edge and center lines should follow normal highway practice. Combined Bicycle-Pedestrian facilities may have the bicycle-use space and pedestrian-use space delineated by a solid white line.

On shared arterial routes a single, solid white line provides delination between the bike lane and motor vehicle travel lanes. Occasionally a second lane line is employed to separate the bike lane from a parking shoulder. This also should be a single, solid white line. Solid white lane lines should normally be used at intersection approaches, however,

broken lines may be employed to indicate mixed traffic is desired.

Transverse lines include word and symbol markings, stop lines, crosswalk lines, and parking space markings. All transverse lines recognized only by traffic proceeding in the wrong direction on a one-way travelway shall be red.

Because of the low approach angle at which pavement markings are viewed, it is necessary for all transverse lines to be proportioned to give visibility equal to that of longitudinal lines, and to avoid apparent distortion where longitudinal and transverse lines combine in symbols or lettering.

Stop lines may be desirable, or perhaps necessary, on bicycle routes under certain conditions. These conditions include:

- Intersection of an arterial route with a highway.
- Intersection of two arterial routes.
- Intersection of a shared route with a controlled intersection.

Stop lines should be used where it is important to indicate the point behind which bicycles are required

to stop. They are normally used in conjunction with a STOP sign, traffic signal, officer's direction, or other legal requirement.

Stop lines are solid white lines, 12" to 24" (.30 m. to .61 m.) wide, extending across approach lanes. They should be placed no less than 4' (1.22 m.) from the nearest edge of the intersecting travelway.

9. Word and Symbol Messages.

Designated bicycle lanes adjacent to motor vehicle lanes, should be provided with exclusive lane use symbols. These should include written messages, and appropriate signing indicating that the lane is for the exclusive use of bicycles.

Stenciled pavement message markings for bicycle facilities include the legend BIKE LANE supplemented by an arrow indicating direction of travel, such as shown in Figure I-5. A symbolic representation of a bike may be used to supplement the legend, but not used alone. Typically, this type of marking should be reserved for use on shared roadways.

Legends BEGIN and END can be added to the BIKE LANE marking. They should be reserved for points of real termination and discontinuity, not placed at every intersection as a matter of routine.

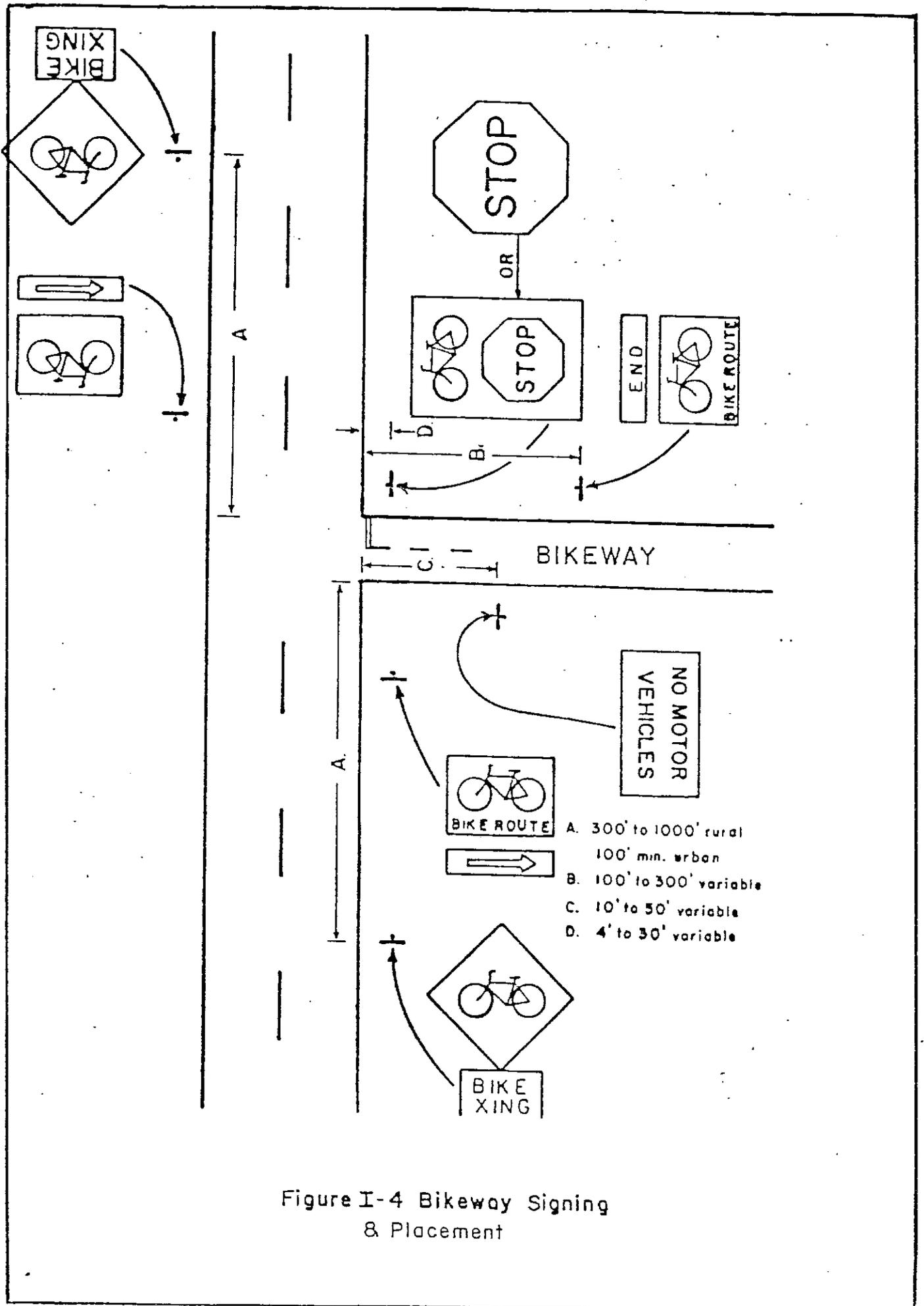


Figure I-4 Bikeway Signing & Placement

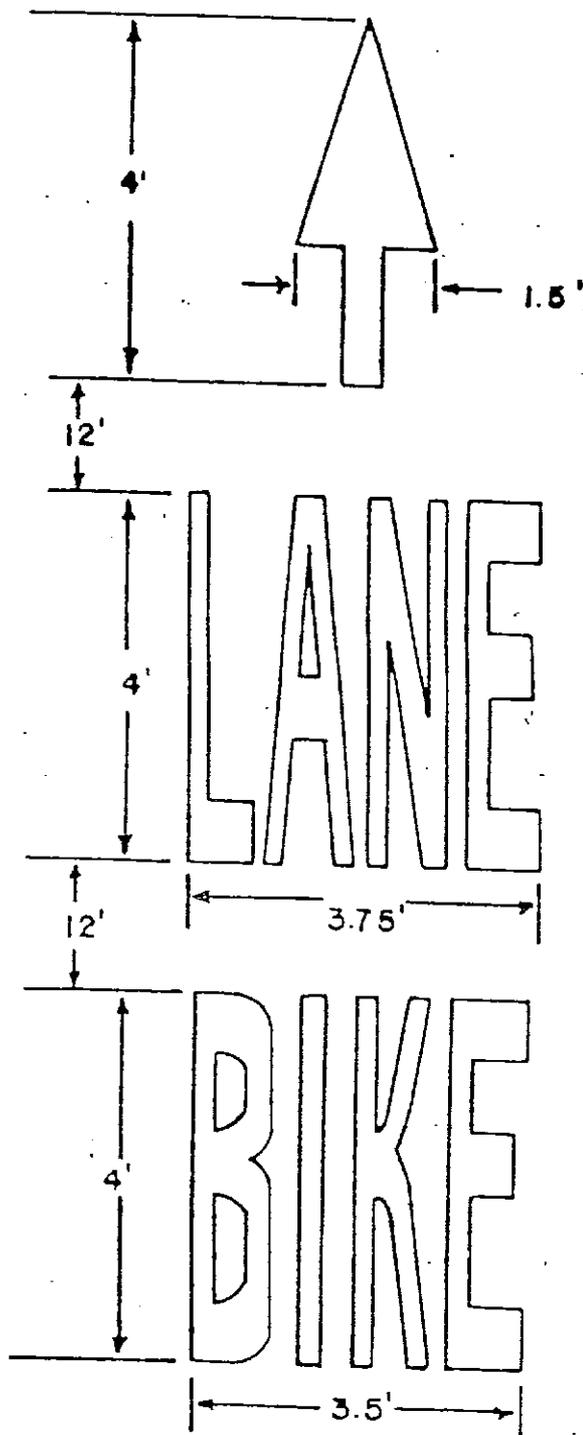


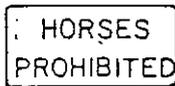
Figure I-5 Bikeway Lane Markings



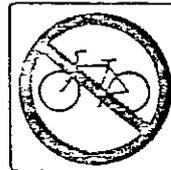
24" x 18"
24" x 6"



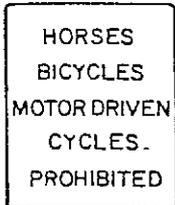
30" x 30"
24" x 18"



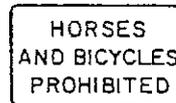
24" x 12"



24" x 24"
24" x 18"



30" x 36"



30" x 18"

STANDARD SIGNS PERTAINING
TO TRAILS

The legend BIKES together with an appropriate directional arrow is used for marking special directional bike turning lanes. Other pavement message markings which may be appropriate along bicycle routes include STOP, YIELD, PED-XING, SLOW and RR-XING.

Care should be taken to avoid placing pavement markings on critical stopping surfaces and to limit markings to those which are realistically needed.

10. Hazard Markings.

Vertical barriers and obstructions, such as abutments, piers, parallel bar storm drain grates and other features causing path narrowing or shy distance construction, should be clearly marked to gain the attention of the approaching user. This treatment should only be used in unavoidable circumstances, and is by no means a substitute for pathway design.

J. CONSTRUCTION SPECIFICATIONS

The following section contains the detailed specifications for construction of separated arterial routes and paths. Conformance with these specifications will be a requirement for construction projects undertaken by the Blaine County Recreation District.

The specifications are in two parts- 4.09 Earthwork, Roads and Paving and 4.08 Concrete Specifications. The Concrete Specifications will be used for all structural concrete construction such as bridge abutments. No detailed specifications for Bridge Construction are included herein because of the widely varying methods of construction that may be used. No detailed specifications are given for trail construction because of the widely varying terrain in the district. Construction practices will be approved on a case-by-case basis by the Recreation District. It is sufficient that bridge construction methods shall be approved on a case-by-case basis by the Recreation District.

SECTION 4.09

EARTHWORK, ROADS AND PAVING

A. EARTHWORK

1. GENERAL DESCRIPTION

Earthwork shall consist of all work required to construct the earth grade in accordance with these specifications and in reasonably close conformity with the lines, grades, and typical cross sections shown on the plans or established. Earthwork shall consist of, but not be limited to, any or all of the following items:

Clearing and grubbing; removal of trees, stumps, and obstructions; obliteration of old asphalt and other improvements, excavation and embankment; haul; construction of interceptor ditches and small ditches; structure excavation and backfill; etc.

The classification of the work, construction methods, method of measurement, and basis of payment shall conform to the detailed specifications under the section covering the items above listed.

Trees and shrubbery outside the construction area shall be preserved and protected from damage, and the Contractor will be held responsible for any damage thereto resulting from construction operations. The Contractor shall take reasonable care to avoid damage caused by his construction operations to streams and lakes adjacent to the road. All vegetation and ground cover not within the construction area, including median areas not required to be graded, shall be preserved and protected as directed.

2. CLEARING AND GRUBBING

a. Description

This work shall consist of cutting and disposing of all trees, brush, shrubs, logs, and windfalls and removing and disposing of all stumps, roots, debris, etc., from areas as herein after designated, in accordance with these specifications.

Areas to be cleared and grubbed shall be as follows:

- (1) The area on each side of the pathway center line to a width of one foot outside of excavation and embankment slope lines, except where slopes are to

to be rounded, in which case the area shall extend to the outside limits of slope rounding.

- (2) Ditch and channel areas to a width two feet outside of their outside slope lines.
- (3) Other areas as shown on the plans or as directed.

b. Construction Methods

When shown on the plans or directed, trees within the construction area not requiring removal shall be preserved and protected in an approved manner.

Unless otherwise provided, all merchantable timber in the clearing area which has not been removed from the right of way prior to the beginning of construction shall become the property of the contractor.

If perishable material is burned, it shall be burned under the constant care of competent watchmen at such times and in such manner that anything designated to remain on the right of way, or the surrounding forest cover, or other adjacent property will not be jeopardized.

When permitted, materials and debris which cannot be burned and perishable materials may be removed from the right of way and disposed of at locations off the project with the written permission of the property owner on whose property the materials and debris are placed. Copies of all agreements with property owners shall be furnished the Engineer.

c. Method of Measurement

Clearing and grubbing will be measured by the acre or on lump sum basis. The quantity to be measured, when the acre basis is used, will be the area cleared and grubbed in accordance with stakes set by the Engineer.

d. Basis of Payment

Lump Sum

3. REMOVAL OF TREES AND STUMPS

a. Description

This work shall consist of the removal and disposal of separate trees (including stumps) or stumps as shown on the plans or designated in accordance with these specifications.

b. Selective Removal of Trees

This work shall consists of removing designated trees, including their stumps, and burning or otherwise disposing of the material as required.

c. Selective Removal of Stumps

This work shall consist of the excavation and removal of designated stumps as required.

d. Method of Measurement

Selective removal of trees including their stumps and selective removal of stumps will be measured by the actual units of each removed.

e. Basis of Payment

The accepted quantities of this item will be paid for at the contract unit prices for the items listed below.

The removal of trees or stumps, if less than 6 inches in diameter, will not be paid for separately but shall be considered as incidental to the work of excavation. For trees, measurement will be made at a point 2 feet above the ground line. For stumps, the ground line or at the top of the stump if it is less than 2 feet in height.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Selective Removal of Trees.....	Each
Selective Removal of Stumps.....	Each

4. EXCAVATION AND EMBANKMENT

a. Description

This work shall consist of excavation, disposal or compaction of all material not being removed under some other item, which is encountered within the limits of the work necessary for the construction of the roadway in accordance with specifications and in reasonable close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer.

This work shall include the removal and disposal of structures or any miscellaneous obstructions which are visible or are indicated on the plans which encroach upon or otherwise obstruct the work and for which a separate bid is not taken.

b. Excavation

Excavation shall include all excavation performed under this item regardless of the material encountered.

c. Borrow

Borrow shall be obtained from designated or approved sources.

d. Granular Borrow

Granular borrow shall consist of sand, sand-gravel and sand and rock mixtures and shall be obtained from designated or approved sources.

e. General

The Contractor shall not proceed beyond the dimensions and elevations established, and no material shall be removed prior to the staking out of the site. When necessary to remove fencing, the fencing shall be replaced in as good a condition as it was originally. The Contractor shall be responsible for the confinement of livestock when a portion of the fence is removed.

Material shall not be wasted without permission of the Engineer. The excavation and borrow operations shall be so scheduled that no unauthorized waste of excavation will result.

The Engineer may designate as unsuitable those materials that cannot be properly compacted in embankments. All unsuitable material shall be disposed of as directed.

Where excavation to subgrade exposes an unsuitable material, the Engineer may require the Contractor to remove the unsuitable material.

The pathway shall be maintained in such condition that it will be well drained at all times.

f. Backfill

Areas excavated below subgrade shall be backfilled to subgrade with granular borrow or granular excavation meeting the requirements of granular borrow, or with base or surfacing material as required.

g. Overbreak

Overbreak, consisting of rocks shattered or loosened outside the staked lines of cut slopes by the Contractor's operation, that will not remain in its natural position, or if remaining, constitutes a hazard to traffic, shall be removed and disposed of as directed.

h. Slides

Material originating outside the staked lines of cut slopes which slips or slides into the pathway due to the action of the elements or other natural causes beyond the control of the Contractor, shall be removed and disposed of and the cut slopes refinished as directed.

i. Embankment Construction

No embankment material shall be placed until the foundation has been approved.

Embankment, except as hereinafter provided, shall be placed in layers not exceeding 8 inches in loose thickness. Each layer shall be uniformly compacted at an approved uniform moisture content to the requirements of the class of compaction shown on the special provisions or the plans.

Embankment material consisting of gravel or rock which cannot be incorporated in 8 inch layers shall be placed in layers of such thickness as directed. Layer thickness shall not exceed 1.5 feet for gravel or 3 feet for rock unless otherwise permitted. Embankment constructed of rock shall have the voids between the larger pieces filled with smaller pieces, rock spalls, or granular material to form a dense compact embankment.

Across low swampy ground the lower part of the embankment may be constructed by end-dumping granular material to form a uniform layer of a thickness not greater than that necessary to support the hauling equipment. The remainder of the embankment shall be constructed in layers as specified.

Where embankments are to be made of material from rock cut, or other material which is unsuitable for finishing the roadbed, a leveling course shall be constructed of other approved granular material.

Embankment material containing excessive moisture shall be allowed to dry to a moisture content that will permit the required compaction.

j. Process Old Asphalt

When the old surfacing is less than 4 feet below the proposed finished grade, it shall be processed by scarifying full depth and spreading to form a uniform foundation.

k. Density Determination

The standard density shall be determined in accordance with AASHTO T 99, Method A, Method C, or by Idaho T 74. When conditions permit the application of either AASHTO T 99 or Idaho T 74, the lower value shall be used. The determination of the density of soil in place shall be in accordance with Idaho T 14.

l. Method of Measurement

Excavation, borrow, and granular borrow will be measured by the cubic yard in its original position, using the average end area method with no correction for curvature. Where it is impractical to measure material by the average end area method of alternate methods involving three-dimensional measurements may be used. The measurement will not include the yardage of any material which is used for purposes other than those directed. No payment will be made for rock excavation made below subgrade elevations unless such allowance will be made for borrow replaced by unauthorized rock excavation below subgrade

Backfill will be measured and paid for at the contract price for the material used.

Water ordered for dust abatement will be measured by the MG (1,000 gallons) by means of calibrated tanks or distributors or by means of accurate water meters.

m. Basis of Payment

<u>Pay Item</u>	<u>Pay Unit</u>
Excavation	cubic yard in place
Borrow	cubic yard in place
Granular Borrow	cubic yard in place
Strip and Stockpile Topsoil	cubic yard in stockpile

B. AGGREGATE AND GRANULAR BASE

1. DESCRIPTION

This work shall consist of furnishing and placing one or more courses of aggregate on a prepared surface in accordance with these specifications and in reasonable close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer.

2. AGGREGATE OR GRANULAR BASE

Aggregate shall be accepted by the Engineer at the source. Aggregate shall meet the most recent Idaho Department of Highways Specifications in Article 703 or as amended. Granular Base shall be of gradation specified on the plan and may be either pit-run gravel or shale. Granular Base will be accepted at the pit by the Engineer.

3. PLACING

If the required compacted depth of the base course exceeds 0.5 foot, the base shall be constructed in 2 or more layers of approximate equal thickness. The maximum compacted thickness of any one layer shall not exceed 0.5 foot. When vibrating or other approved types of special compacting equipment are used, the compacted depth of a single layer of the base course may be increased to 0.8 foot upon approval.

4. MIXING

Unless otherwise specified, the Contractor shall mix the base course by the Road Mix Method. After material for each layer of base course has been placed, the materials shall be mixed by motor graders or other approved equipment until the mixture is uniform throughout. During the mixing, water shall be added in an amount necessary to facilitate compaction.

5. SHAPING AND COMPACTION

After each layer has been spread it shall be compacted for its full width. The choice of compaction equipment will be left to the Contractor. Compaction shall continue until not less than 95 per cent of the maximum density is obtained.

The surface of each layer shall be maintained during the compaction operations in such a manner that a uniform texture is produced and the aggregates firmly keyed. Water shall be uniformly applied over the base materials during compaction in the amount necessary for proper consolidation.

6. METHOD OF MEASUREMENT

Aggregate base material will be measured by the ton, in place. Moisture in the aggregate in excess of 7 per cent will not be paid for.

7. BASIS OF PAYMENT

The accepted quantities of aggregate base course will be paid for at the contract unit prices for the items listed below.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Granular Base Compacted in Place	Square Yard
Aggregate Base Compacted in Place	Square Yard

C. PLANT MIX PAVEMENT

1. DESCRIPTION

This work shall consist of constructing one or more courses of plant mix pavement on a prepared base in accordance with these specifications, and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer.

2. COMPOSITION OF MIXTURES

The plant mix shall be composed of a mixture of aggregate, filler if required, and asphalt. The several aggregate fractions shall be sized, uniformly graded and combined in such proportions that the resulting mixture meets the grading requirements of the job-mix formula.

The job-mix formula for each mixture shall be approved by the Engineer. The job-mix formula with the allowable tolerances shall be within the master range specified. The job-mix formula for each mixture shall establish a single percentage of aggregate passing each required sieve size and a single percentage of asphalt to be added to the aggregate. The temperature at which the mixture is to be delivered at the point of spreading will be established when the source and grade of the asphalt have been determined.

After the job-mix formula is established, all mixtures furnished for the project shall conform thereto within the following ranges of tolerances:

Passing No. 4 and larger sieves	± 7 per cent
Passing No. 8 to No. 100 sieves, inclusive	± 4 per cent
Passing No. 200 sieve	± 2 per cent
Asphalt	± 0.4 per cent
Temperature of Mixture	± 20 F.

Should a change in sources of materials be made, a new job-mix formula shall be established before the new material is used, when unsatisfactory results or other conditions make it necessary, the Engineer may establish a new job-mix formula.

The aggregate will be accepted for master range gradation and quality requirements at the crushing plant and for job-mix gradation at the gradation unit of the mixing plant. The asphalt will be accepted at the point of delivery.

3. AGGREGATES

Aggregates shall meet the applicable requirements of Section 703 -- Aggregates of Idaho Standard Specifications or as amended.

4. ASPHALT

Asphalt shall be of the type and grade called for in the contract. The grade may be changed one step by the Engineer at no change in unit price. Asphalt furnished shall meet the applicable requirements of Section 702--Asphalt Idaho Standard Specifications or as amended. The asphalt will be accepted at the point of delivery.

5. WEATHER LIMITATIONS

Plant mix material shall not be placed on a wet surface; when the air temperature is below 40 F.; or when weather or surface conditions otherwise prevent the proper handling or finishing of the plant mix material.

6. PAVERS

Pavers shall be self-propelled units, provided with an activated screed or strikeoff assembly, heated if necessary, and capable of spreading and finishing courses of plant mix material in lane widths applicable to the specified typical section and thicknesses shown on the plans.

The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed.

When laying mixtures, the paver shall be operated at forward speeds consistent with satisfactory laying of the mixture.

7. ROLLERS

The rollers shall be operated at speeds slow enough to avoid displacement of the pavement or excessive crushing of the aggregate.

8. CONDITIONING OF EXISTING SURFACE

When the surface of the existing pavement or old base is irregular, it shall be brought to uniform grade and cross section as directed. Payment for leveling will be made at the contract unit prices for the items used.

Contact surfaces of curbing, gutters, manholes, and other structures shall be painted with a thin, uniform coating of asphalt prior to the pavement being placed against them.

9. SPREADING AND FINISHING

The mixture shall be laid upon an approved surface. Pavers shall be used to distribute the mixture either over the entire width or over such partial width as may be practicable.

When the width of a surface course of pavement is such that two lays of the paving machine are required and traffic is not being carried through the work, the pavement shall be placed in equal lengths each day so that no cold longitudinal joint will result. If traffic is being carried through the work a cold joint will be permitted.

When the width of a surface course of pavement is such that 3 lays of the paving machine are required, 2 of the lays shall be placed in equal lengths each day so that only one cold longitudinal joint will result. The cold joint shall be either at the center line or not more than 2 feet from the center of a travel lane.

When the width of a surface course of pavement to be laid is such that 4 or more lays of the paving machine are required, at least 2 lays shall be placed in equal lengths each day so that only one cold longitudinal joint will result, which shall be at or near the center line.

A cold joint is defined as a joint between lays not constructed in the same day.

10. JOINTS

Placing of the paving mixture shall be as continuous as possible. Rollers shall not pass over the unprotected end of a freshly laid mixture unless authorized by the Engineer. Transverse joints shall be formed by cutting back on the previous run to expose the full depth of the course. A brush coat of SS-1 emulsified asphalt shall be used on contact surfaces of transverse joints and cold longitudinal joints just before additional mixture is placed against the previously rolled material.

11. ROLLING

Unless otherwise directed, the initial or breakdown rolling shall consist of one complete coverage of the paving mixture performed with a 2-axle tandem roller. Rolling shall be performed in such a manner that cracking, shoving, or displacement will be avoided. Final rolling shall be completed the same day the pavement is placed.

Any displacement occurring as a result of the reversing of the direction of a roller or from other causes shall be corrected at once by the use of rakes and addition of fresh mixture when required. Care shall be exercised in rolling not to displace the line and grade of the edges of the pavement.

To prevent adhesion of the mixture to the rollers, the wheels shall be kept properly moistened with water or water mixed with very small quantities of detergent or other approved material. Excess liquid will not be permitted.

Along forms, curbs, headers, walls, and other places not accessible to the rollers, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons, or with mechanical tampers.

12. SURFACING APPROACHES

Plant mix material shall be placed on approaches as shown on the plans or as directed.

13. SURFACE SMOOTHNESS

The completed surface will be tested in accordance with Idaho T 87. The surface shall not vary more than 1/4 inch from a 10 foot straight edge.

14. METHOD OF MEASUREMENT

Plant mix pavement will be measured by the square yard in place.

15. BASIS OF PAYMENT

The accepted quantities of plant mix pavement will be paid for at the contract price for the item listed below.

<u>Pay Item</u>	<u>Pay Unit</u>
Plant Mix Pavement	Square Yard

A. GENERAL

All concrete work shall be done in conformance with these specifications where not otherwise specified in the plans or in other sections of the specifications. Concrete shall consist of portland cement, aggregates and water to which modifying admixtures have been added in accordance with these specifications or as reviewed in writing by the engineer. Reinforcement shall be used where required by the drawings and such reinforcement shall conform to these specifications.

B. CONCRETE

1. Designation. Concrete shall be designated according to its 28 day compressive strength. All concrete unless otherwise specified shall be 3.300 psi.

2. Materials.

a. Cement. Only portland cement conforming to ASTM Specification C-150, Type II shall be used unless otherwise specified herein or review in writing by the engineer.

The total alkali content of the cement used in any project shall not exceed eight-tenths of one per cent (0.8%).

b. Aggregates. Concrete aggregates shall conform to ASTM Specification C-33 for Concrete Aggregates (1965 Book of ASTM Standards, Part 10) or for the applicable sections of the specifications for Highway Construction. The maximum size of coarse aggregate shall be 1-1/2 inches unless specified otherwise.

c. Water. Water shall be clean, free from deleterious amounts of acids, alkalis, oils, decayed vegetable matter, or other organic materials. In general, water suitable for drinking will be considered acceptable but will be subject to review by the engineer.

d. Admixtures. Only air entraining admixtures will be used unless otherwise specifically authorized in writing by the engineer. The admixtures used for air entrainment shall conform to ASTM Specification C-260 and the specific brand used and method of introduction into the mix shall be subject to review by the engineer.

3. Proportioning. The proportions of water, sand, cement, fine and coarse aggregate and air entraining agent shall be so determined and fixed as to produce concrete having the strength and properties specified. Mixes shall be designated or verified by independent testing laboratories approved by the engineer at the contractor's expense. Air content in all concrete shall be held between three (3) and five (5) per cent for mixing

and handling. Concrete to be placed under water shall have the cement content increased ten per cent (10%) above that normally used for the strength concrete required. If a change in the proportions of the concrete mix is necessary to meet changed conditions on the job or to more adequately meet the requirements of particular portions of the structure being assembled, such changes shall be promptly complied with.

4. Mixing. All concrete shall be machine mixed. All concrete placed in pours of 1/2 cubic yard or more shall be ready mix concrete, unless otherwise approved by the engineer. Ready mix concrete shall be batched and handled by plant and equipment conforming to ASTM Specification C-94. The maximum size of batch in truck mixers shall not exceed the maximum rated capacity of the mixer as stated by the manufacturer and stamped in metal on the mixer. Concrete transported in a truck-agitator or other transportation device shall be discharged at the job and placed in its final position in the forms within one and one-half (1-1/2) hours after introduction of the mixing water to the cement and aggregate, except that in hot weather or under other conditions contributing to quick stiffening of the mix, the maximum allowable time may be reduced by the engineer.

Concrete shall be mixed only in such quantities as is required for immediate use and any which has begun to develop initial set shall not be used. Concrete which has partially hardened shall not be retempered or remixed, nor shall materials be batched into a truck partially filled with concrete that was earlier batched.

5. Placing. Concrete shall be placed to avoid segregation of the materials and the displacement or movement of the reinforcement. The use of long troughs, chutes, and pipes for conveying concrete from the mixer to the forms will be permitted only on written authorization of the engineer. In case an inferior quality of concrete is produced by the use of such conveyors, the engineer may order discontinuance of their use and the substitution of a satisfactory method of placing. Open troughs and chutes shall be metal or metal lined, approximately semi-circular in cross section and kept clean and free from coatings of hardened concrete by scraping and/or thoroughly flushing with water after each run. The water used for flushing shall be discharged clear of the structure in such a manner as not to contaminate concrete in the forms. Free drop of the concrete mix from chutes shall not be more than four (4) feet. If greater fall is entailed in placing concrete to its final position, drop chutes or elephant trunks shall be used. In walls or other situations where the placing of concrete required placing the mix through a net of reinforcing steel, if the free drop exceeds three (3) feet, drop chutes or elephant trunks shall be used.

In high or thin walls, or where concentrations of reinforcing steel occur, openings shall be provided in the forms in order to facilitate placement of concrete without segregation. Openings in the forms shall also be provided where concrete placed from above would leave accumulations of hardened concrete on reinforcing steel and form walls when making multiple pours. Where conditions warrant, this procedure may be altered by the engineer upon request of the contractor.

Concrete shall be worked into the corners and angles of the forms and around all reinforcement and embedded items without permitting segregation. Concrete shall be deposited as closely as possible to its final position on the forms. Placing of concrete in forms shall be done in

horizontal layers approximately eighteen (18) inches thick. When a monolithic layer cannot be completed in one operation, it shall be terminated as a vertical bulkhead with a height of newly placed concrete no less than six (6) inches.

Concrete during and immediately after placing shall be thoroughly compacted by mechanical vibration. Type and design of concrete vibrators shall be subject to review by the engineer. Frequency of vibration shall not be less than 4,500 impulses per minute. The intensity of vibrations shall be such as to visibly affect a mass of concrete over a radius of a least eighteen (18) inches. The reinforcing shall not be vibrated, nor shall form work be vibrated except in special cases and only with written authorization by the engineer. Insofar as is practicable, the stinger of the vibrator shall be inserted into the newly deposited concrete vertically and points of vibration and length of vibration shall be such as to completely work the concrete into all spaces within the form work and to allow the discharge of all entrapped bubbles of air. Vibration shall not be continued at any single point for such a duration of time that localized areas of grout are formed. Vibration shall not be used to cause the concrete to flow in the forms to an extent where segregation becomes possible, nor shall vibrators be used for transport of concrete within the forms. Vibration shall be supplemented by such spading as is necessary to insure smooth surfaces and dense concrete along form surfaces and in corners and locations impossible to reach with the vibrators.

Concrete shall be deposited at such a rate as to prevent the formation of cold joints in the pour. Should a sloping wall be placed in several lifts, the edges of succeeding pours shall not be feathered out, but blockouts shall be made in the top surface of the concrete in each lift to the extent that a minimum depth of six (6) inches of concrete is deposited in each lift. Work shall not be stopped within eighteen (18) inches of the top of any face unless natural features of the work indicate a discontinuity at which the pour line may be hidden. Concrete in columns shall be placed in one continuous operation unless otherwise directed. A time interval of at least twelve (12) hours shall elapse before the caps are placed. Concrete in tee beam construction, or in slabs having integral beams, may be placed in two (2) lifts or in one (1) single operation. If the concrete is placed in one (1) operation, it shall be placed in two (2) stages. Concrete shall be deposited first in the stem of the beams and compacted. After the lapse of approximately 45 minutes the concrete in the slabs shall be placed. Vibration of the slab shall include inserting the probe of the vibrator at least half its length into the beam in order to thoroughly knit the two pours. If the concrete is placed to the top of the beams and allowed to harden before placing the slab, special care shall be used in insuring adequate bond between the stem and the slab. Shear keys shall be used as required, and the size and spacing of shear keys between the stem and slab shall be computed. Suitable keys may be formed by the use of wood blocks cut from 2" X 4" dimension lumber having a length approximately four (4) inches less than the width of the girder stem. These blocks shall be spaced along the girder stem as required to form keys, but the spacing shall be not greater than one (1) foot center to center. The blocks shall be leveled to facilitate removal from the concrete and shall be removed as soon as the concrete has set sufficiently to hold its form. No treatment shall be used on these blocks.

Prior to depositing new concrete on or against concrete which

has achieved its initial set, the forms shall be retightened and the surface of the hardened concrete prepared to receive the new concrete in order that proper bond shall be made between the two pours. All foreign matter shall be removed. No loosened particles of aggregate or damaged concrete shall be left on the surface. Areas contaminated with form oils or any other material that would inhibit proper bonding between the pours shall be chipped away in such a manner which will not impair the integrity of that concrete which is left following the preparation for the new pour. To improve bond and to prevent the formation of unsightly pour joints, grout shall be placed on all concrete surfaces against which new concrete will be placed. On horizontal surfaces approximately one (1) inch of grout made by mixing sand and cement of the ratio in the concrete to be placed, mixed with just enough water to make possible proper placing shall be used. On vertical surfaces a neat cement slurry shall be broomed into the surface immediately prior to placing the next pour.

The foundation upon which the portland concrete is to be placed shall be properly compacted and brought to true line and grade as shown in the Contract plans or as directed by the engineer. The foundation shall be frost free and shall not have free standing water pockets. Prior to placement of concrete the foundation shall be dampened to a depth of at least three (3) inches.

6. Finishing.

a. General. The appearance of exposed concrete is of major importance. Concrete requiring finishing shall not be placed until materials, tools, and labor necessary for the work are on the job. All horizontal surfaces shall be steel trowel finished unless otherwise specified or otherwise authorized by the engineer in writing.

b. Walls. Immediately following the removal of forms, all form ties shall be broken back at least one-half (1/2) inch behind the finished face of the concrete and all form tie holes, all rock pockets and other defects pointed up with a dry tamped-in mixture of sand and cement of the same proportion as that in the concrete being repaired. Following this, all form marks and pointings shall be ground or rubbed to give a reasonably smooth surface without pits, depressions or obvious irregularities and the surfaces then rubbed and sacked to a smooth even finish.

c. Floor and Roof Slabs. Slabs shall be finished as noted on the plans or called out elsewhere in the specifications. No dusting of wet surfaces with dry material shall be done unless specifically called out otherwise. Slabs shall be thoroughly compacted by tamping or by vibration. Preparatory to finishing, floor slabs shall be struck off true to the required level shown on the plans. Floors shall be level with a tolerance of one-eighth (1/8) inch in ten (10) feet except where drains occur in which case the floors shall be pitched to the drains as indicated on the plans. All discontinuous edges shall be rounded off with a suitable edging tool. Unless otherwise specified, floors and slabs shall be finished by being wood floated to a true even plane with no coarse aggregate visible subsequent to being struck off. Sufficient pressure shall be used on the wood float to bring moisture to the surface. When surface moisture has disappeared, the concrete shall be hand-troweled to a smooth impervious

surface free from trowel marks. The surface shall be burnished by a second troweling. The final troweling shall produce a ringing sound from the trowel. No dry cement shall be used in troweling nor shall the amount of troweling be excessive. Slabs receiving fill concrete or settling beds of mortar or grout surfacing shall be finished by tamping the concrete to force the coarse aggregate away from the surface, screeded to bring the surface to the required finish plane, and the surface left clean for subsequent work. Exterior slabs and ramps and any other surface called out on the plans or in the specifications as having a wood float surface shall be finished as for a steel-trowel finish, but the steel troweling not done. Where a broomed finish is specified or called out on the plans, the concrete shall be finished as for steel-trowel finish except for the final troweling. The surface shall be finished by drawing a fine hair broom lightly across the surface. All brooming shall be in the same direction and parallel to expansion joints or in the case of inclined slabs, perpendicular to the slope. Special surface finishes will be as described elsewhere in these specifications or on the plans.

Concrete slabs, the undersurfaces of which act as ceilings or overhangs and are exposed to view, shall have defects repaired and ground to a reasonably true and even surface prior to painting or other surface treatment specified on the plans or elsewhere herein. Where no surface treatment is called out, care shall be taken to insure that the packing, pointing, or other repair is the same color as the rest of the exposed concrete.

C. FORMS

1. General. Forms shall be of wood, metal or of such other material as approved by the engineer. They shall be accurately built and placed to conform to the shape, line, grade and dimensions of the concrete called for on the plans. Material previously used in forms shall be thoroughly cleaned and free of nails before being reused if in contact with concrete. Forms shall be mortar tight. All concrete angles shall be beveled or filleted unless otherwise specifically shown on the plans or authorized by the engineer. Bevels and fillets shall be approximately three-fourths (3/4) inch in dimension and (except where specifically detailed otherwise on the plans) shall all be of the same size. Discontinuous edges of horizontal surfaces may be rounded with an edging tool.

2. Design and Construction. Form work shall be designed to properly support all loads which may fall upon it during the placing and compaction of concrete and that portion of the curing period during which the concrete is unable to support itself. If the form should shift or be damaged during or subsequent to the placing of concrete in a surface which will be exposed to view during the service of the finished structure such disfigurement shall be removed and/or corrected to the practical intent of the plans. Where plywood is used as form liner, adjacent pieces of plywood shall have the grain running parallel with each other if in doing otherwise the structure would be disfigured. In any case, all wood shall be treated with form oil or by other means in order to prevent raising the grain when the surface becomes wet. On interior circular walls, tongue and groove lumber or lumber lined with plywood shall be used. Curved exterior walls may be formed against well-matched narrow tongue and groove lumber if the contractor shall so request and the engineer approves as

not being detrimental to the appearance of the finished structure. Where surfaces are to be given a special finish which is not affected by the forms, one inch boards of uniform width S152E may be used for forms. All joints between adjacent pieces of form lumber shall be closely fitted to prevent disagreeable lines in the concrete and to prevent the loss of mortar from the concrete mix with the consequent formation of rock pockets in the concrete.

Manner and type of form tying shall be subject to the review of the engineer. Of primary concern in this respect is the effect on the finished appearance of the structure produced by the use of the particular tie under consideration. The engineer may require a change in the method of tying forms at any time if it is reasonable that the results being produced by the method in use are detrimental to the appearance of the structure and a more satisfactory result can be obtained through the use of a different method. In general, the use of twisted wire for form ties will not be permitted and shall not be attempted without having first secured a review by the engineer for the specific spot under consideration.

The use of reusable form work provided by companies specializing in the manufacture and rental of such units will be permitted providing the forms meet the aforementioned requirements, especially those regarding mortar tight joints.

No form treatment shall be applied in such a manner that it will contaminate the reinforcing steel or impair the bond of concrete with it. When oiling forms, care shall be taken in those areas where subsequent work must be bonded to the concrete and no form treatment shall be used which might impair this bond.

3. Removal of Forms. Forms shall be removed after the concrete has gained sufficient strength to resist damage during the process of removal. Consideration shall be given to the loads on the concrete, the dead load of the concrete itself, the weather and other conditions affecting the curing of the mix and the mix itself in determining the length of time to elapse between the placing of concrete in the forms and the removal of the forms.

In general, the following periods, exclusive of days when the temperature falls below 40° F, may be used as a guide for the removal of form work subject to the approval of the engineer.

<u>Description</u>	<u>Time Period</u>
Walls	12 to 24 hours
Sides of beams and other parts	12 to 24 hours
Columns	1 to 7 days
Suspended slabs and beam centering	1 to 14 days

D. REINFORCING

1. General. The contractor shall furnish and place all steel reinforcement including rods, welded wire fabric, and structural shapes as indicated on the drawings or otherwise required. At the time of concrete placement all reinforcing shall be free from loose, flakey rust and scale, oil, grease or any other coating which might destroy or reduce its bond with the concrete. All placing shall be done in accordance with drawings furnished by the contractor and reviewed by the engineer.

2. Quality. All reinforcing rods for concrete reservoirs shall conform to ASTM Specification A-615, grade 60. Other reinforcing rods shall conform to ASTM Specification A-15 or A-16. All reinforcing rods shall have deformations conforming to ASTM Specification A-305. Welded wire fabric shall conform to ASTM Specification A-185.

3. Fabrication. In general, detail in fabrication shall follow the Manual of Standard Practice for Detailing Reinforcing Concrete Structures by the American Concrete Institute. The plans show amounts and placement of reinforcing necessary for the structure, but some deviation from the plans will be permitted, subject to review by the engineer, if the same bar area and perimeter of steel is present in all concrete sections.

Reinforcement shall be accurately formed to the dimensions indicated on the plans and the bending details. All bars shall be bent cold. No bending or straightening shall be done in any manner that will injure the material. Where splicing of reinforcement is permitted, not less than twenty-four (24) bar diameters shall be overlapped unless otherwise provided by the plans or elsewhere in the specifications. The minimum overlap for lapped splices in flat slab construction shall not be less than thirty-six (36) bar diameters.

4. Placing. The steel shall be placed in position accurately as shown on the plans or supplemental drawings. The steel shall be secured so that no displacement shall occur during the placing and compacting of the concrete. The plans do not show all required tie bars nor do they show chairs nor any other locating devices except in special instances. The fabricator shall take note of this and shall provide these extra bars and appliances necessary to accurately hold the reinforcing steel in the positions indicated.

Galvanized metal chairs shall be used to support reinforcing in slabs where the slab undersurface will be exposed for ceilings or overhangs. Splices in bars shall be staggered where possible. Where welded wire fabric is lapped, the lap shall not be less than one (1) mesh interval in width. When the steel is placed, it shall be free from dirt, detrimental rust, loose scale, paint or any other foreign material. The bars shall be tied at all intersections except where spacing is less than one (1) foot in each direction in which case alternate intersections may be tied. If welding is required, the above mentioned requirements shall be supplemented by the requirements of ASWD 12.1, Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction.

Reinforcement in concrete placed against earth without forming shall have no less than three (3) inches of concrete between it

and the ground contact surface. Reinforcing in concrete exposed to the weather, or to be in contact with the ground following the removal of forms, shall be protected with not less than two (2) inches of concrete for bars larger than No. 5, and one and one-half (1-1/2) inches for No. 5 and smaller bars. Reinforcement in concrete surfaces not exposed directly to the ground or to the weather shall have not less than three-fourths (3/4) inch of concrete between the reinforcing steel and the surface for slabs and walls and not less than one and one-half (1-1/2) inches for beams and girders. Concrete joist floors in which the clear distance between joists is not more than thirty (30) inches, the protection of the reinforcement shall be at least three-fourths (3/4) inch. Columns shall have at least one and one-half (1-1/2) inches of concrete outside the column ties or spiral reinforcing.

E. EMBEDDED ITEMS

1. General. Cooperation and coordination with all other contractors and/or subcontractors and all trades shall be made in order that all inserts and fastening devices such as anchors, hangers, ties, bolts, conduits, blockouts, waterstops, seep rings, nailing strips or any other embedded item shall be properly located and secured in position before concrete is placed.

2. Waterstops. Where waterstops are shown or called out on the plans, they shall be galvanized sheet metal, sixteen (16) gauge, six (6) inches wide, unless otherwise noted. Unless an alternate is approved by the engineer, all joints or splices shall be soldered together for a distance of at least three (3) inches or brazed together with a joint distance of at least one (1) inch. Rubber waterstops shall be moulded or extruded and shall be fabricated from high grade, treated type compound equivalent to Gates Type C, of a width as shown on the plans. Intersection pieces shall be furnished to form a continuous seal. Splices shall be made in strict accordance with the manufacturer's directions. Where a labyrinth waterstop is shown on the plans, it shall be of the width and type equivalent to Water Seals Incorporated. Unless otherwise noted, it shall be Type B-3. Plastic waterstops shall be made of extruded virgin polyvinyl chloride compound in continuous ribbed strips. The waterstop shall be uniform in dimensions throughout its length. It shall be dense, homogeneous and free from porosity. It shall have a Shore durometer hardness of approximately eighty (80) and a specific gravity of about 1.35. Plastic waterstops shall be spliced using thermostatically controlled heating elements in strict accordance with the manufacturer's instructions. The strength of the splice shall be at least fifty per cent (50%) of the strength of the base material.

3. Nailing Strips. Nailing strips shall be of a size and shape indicated on the plans and shall be of Douglas Fir, pressure treated after cutting to size. The type of pressure treatment shall be subject to the engineer's review.

4. Hatches, Manholes and Other Openings. Openings in the concrete structure shall be as detailed on the drawings or as reviewed by the engineer. Where it is necessary to cut steel that would otherwise extend through the opening, the equivalent amount shall be placed in the slab on each side of the opening. Where openings are edged with metal inserts or are formed

by the metal inserts themselves, the reinforcing displaced by such opening outlines or edgings shall be moved to the edges of the openings and extended beyond the edge of the opening at least thirty (30) bar diameters in each direction and located and secured in a position and in a manner satisfactory to the engineer unless otherwise defined in the plans.

F. CONSTRUCTION JOINTS

The location of construction and expansion joints are indicated on the plans. These may be changed upon request by the contractor, but only upon approval by the engineer. Decisions in regards to construction joint changes will be based on the need for the joint at the place proposed and the final service requirements of the structure. The contractor shall submit a schedule for the placement of all concrete outlining therein the sequence of his pouring operations and location of all desired construction and expansion joints. Construction joints not indicated on the plans must be made and located as to least impair the strength of the structure. The contractor shall place no concrete prior to receiving approval of his schedule for placement of concrete.

Premoulded joint fillers shall be placed in the forms at the proper position before concrete is placed and fastening devices used to hold it following the first pour. Unless otherwise indicated, expansion joints shall be formed by one-fourth (1/4) inch thick premoulded joint filler and in those areas indicated, the top one-half (1/2) inch shall be removed and replaced by an approved asphaltic base expansion joint filler after appropriate priming of the joint in accordance with the expansion joint sealer manufacturer's specifications. Where a Thiokol base joint sealant is indicated on the plans, it shall be one-fourth (1/4) inch thick and equivalent to Churchill Chemical Corporation 3-C-51 as approved by the engineer.

Where contraction joints are indicated, one-half (1/2) the steel through the joints shall be interrupted at the joint. Where waterstops are indicated, they shall be carefully positioned and held in place so that half the waterstop is located on each side of the joint centerline, special care being taken when placing concrete around them in order that all portions are equally and thoroughly embedded in the concrete. All construction joints in basins holding liquid or gas shall be provided with steel waterstops unless noted or shown otherwise on the plans. Waterstops shall be held in place by the use of split forms or other approved methods in such a manner that no displacement will occur during the placing and compacting of the concrete. Nails may be driven into the forms and bent over the waterstop to hold it in position, but in no case shall any nail be driven through a waterstop.

Asphaltic joint sealing compounds which are poured in place shall not be placed until all other concrete adjacent has been poured. Joints shall be thoroughly cleaned, dry and primed according to the asphalt-filler manufacturer's instructions before placement.

G. BLOCKOUTS

Unless otherwise noted, if the contractor chooses to facil-

itate his operations by leaving blockouts in concrete walls where pipe or conduit pass through them, such will be allowed subject to review by the engineer. Blockouts shall be no larger than required to locate the pipe and/or conduit, in general, nor more than two (2) inches larger than the largest dimension of the item passing through the wall. After the items are accurately placed and securely braced to prevent motion during subsequent operations, the contacting surfaces of the previously placed concrete shall be prepared so as to insure proper bonding of the new concrete and that concrete previously placed. Where required, particularly in areas which must withstand hydraulic pressure, a non-shrink aggregate such as Embecco shall be added to the mix used to fill the blockout. Such concrete shall be thoroughly compacted using vibration or rodding in order to achieve a water-tight joint between the old concrete, the new concrete and the pipe or conduit. If a form is used for the closure, it shall be constructed having a pouring funnel and the new concrete so placed so that a portion remains in the pouring funnel and the surface ground to a smooth even face subsequent to the removal of the form. Where possible the placing of concrete and blockout shall be done from the pressure side. Special care shall be taken in such areas to keep them thoroughly wet for a period of at least seven (7) days. With the engineer's review, blockouts may be dry packed using a non-shrink grout. The mixture shall be made up in accordance with the instructions of the manufacturer of the non-shrink aggregate and carefully tamped into place, preferably from the pressure side of the opening. Appropriate backing boards shall be provided to facilitate proper tamping. Blockouts in areas that are not required to withstand hydraulic pressure may be dry packed with a plain sand-cement mix.

H. SWEPT-IN SURFACES

Where a concrete slab is to have grout swept in by a mechanism, such grout shall consist of one to two (1:2) portland cement-sand mix with sufficient water to make possible its placing. Prior to placing any grout, all laitance shall be removed from the surface of the rough concrete slab receiving the topping and the surface thoroughly cleaned and washed. It shall be kept constantly wet for a period of at least twenty-four (24) hours prior to the placing of grout. It shall be damp but have no standing water on it when a water-cement slurry is broomed into the surface. Before the slurry has a chance to take a set, the grout shall be placed and swept to the required contour by rotating the mechanism until the surface conforms accurately to the required contour. The mechanism manufacturer's instructions shall be strictly adhered to regarding the application of power during the screeding and sweeping in of the grout mix. Following this, the grout shall be steel trowled to a smooth even finish. When sufficiently hard, the entire surface shall be flooded and covered with water for a period of at least seven (7) days. The surface shall be prevented from drying while hardening by dampening with a fine spray as required.

I. CURING, SEALER AND TREATMENTS

1. Curing. Concrete shall be kept moist for a period of at least seven (7) days following placing unless otherwise specified on the drawings or ordered by the engineer. This may be accomplished by keeping the forms moist or applying an approved sealing compound or by flushing or

sprinkling or otherwise applying water to the hardened concrete. In any case, the method used shall be subject to the engineer's review.

All interior floor slabs shall receive hardener after they are thoroughly cured, cleaned and dry with all work above them complete. A mixture of zinc and magnesium fluosilicate in proportion of twenty per cent (20%) zinc and eighty per cent (80%) magnesium aqueous solution shall be applied. In making up the solution, one-half (1/2) pound of the fluosilicate shall be dissolved in each gallon of water for the first application and two (2) pounds to each gallon for subsequent applications. The slab shall be flushed with water and scrubbed shortly after the last application has dried to remove encrusted salts to prevent staining. Proprietary hardeners that have been approved by the engineer shall be applied strictly in accordance with the manufacturer's instructions. Sealers shall be as defined elsewhere in the specifications, applied strictly according to the manufacturer's recommendations.

J. COLD WEATHER PLACEMENT OF CONCRETE

There shall be no placement of concrete when the air temperature is below 40° F without written authorization from the engineer, nor shall concrete be placed when the weather forecasts temperature will drop below 32° in the succeeding two (2) days. The contractor, when placing during a period of cold weather, shall adequately protect the newly placed concrete by enclosing it or by providing other acceptable means to insure adequate curing. Concrete placed during periods of cold weather shall have a temperature of at least 60° F at the time of placement and shall be maintained at a temperature of not less than 45° F for at least seventy two (72) hours for normal concrete. This period of time may be reduced by the engineer where the use of high early strength cement has been permitted. No reliance shall be placed on the use of so-called anti-freeze compounds, nor will the addition of any such be permitted. In the heating of water, and/or aggregate, care shall be taken that the temperature of the mix is kept below a point at which danger of flash set of the cement is present.

When specifically permitted by the engineer, the use of calcium chloride in amount not exceeding two per cent (2%) by weight of portland cement in the mix may be used to accelerate the setting time of the cement and reduce the required period of protection to a minimum of twenty-four (24) hours.

K. TESTS

1. Test Cylinders. Where there is a total of more than twenty (20) cubic yards of concrete in the work or where the local building code requires, the contractor shall according to the applicable ASTM specification take four (4) test cylinders for each fifty (50) cubic yards of concrete placed or from each major pour if the amount is less than fifty (50) cubic yards. Two (2) test cylinders are to be cured under the job conditions and two (2) in an approved commercial testing laboratory. Two (2) cylinders shall be tested for compressive strength at seven (7) days and two (2) at twenty-eight (28) days. Three (3) copies of all test reports shall be furnished to the engineer by the testing laboratory. Payment for the above tests shall be included in the contractor's lump sum price quoted for the

project or unit price quoted for the concrete.

2. Air Entrainment. The concrete shall be tested for the amount of entrained air therein according to the applicable ASTM specification.

3. Slump. Concrete will be tested for slump at the job site by or under the direction of the engineer. In general, the slump shall fall within the range indicated in the table below.

<u>Type of Work</u>	<u>Slump in Inches</u>	
	<u>Maximum</u>	<u>Minimum</u>
Substructure walls and plain footings	3	1
Reinforced footings	4	2
Reinforced foundation walls	4	2
Reinforced slabs, walls and beams	4	2
Columns	4	2
Mass concrete more than three feet thick	2	1
Unreinforced slabs	4	2
Fill concrete	4	2

Concrete that exceeds the above maximum slumps may be rejected from the job and its removal ordered either before or after being placed in the forms.

L. Payment

Payment for Concrete or Reinforced Concrete shall be set forth in the proposal or in Special Provisions as detailed below:

- a.) Payment will be on a lump sum basis and will be full payment for all materials, labor and incidentals needed to produce the finished product as shown on the plans.

SECTION 4.10

CULVERTS

A. DESCRIPTION

This work shall consist of the construction of pipe culverts in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans or established by the Engineer.

B. MATERIALS

All materials used for culverts gaskets, and entrance or outlet aprons, shall meet the requirements of Idaho Department of Highways Standard Specifications Article 706 or as amended.

C. LAYING CORRUGATED METAL PIPE

The outside laps of circumferential joints shall point upstream and longitudinal laps shall be at the sides. The lugs on the coupling bands of metal pipe shall be placed to one side of the top of the center line of the pipe so that they will not extend above the top of the pipe.

D. LAYING CONCRETE PIPE

Concrete pipe shall be laid beginning at the lower end with the receiving end up stream, with ends fully and closely joined. Joints shall be made by one of the following methods.

1. Mortared Joints.

Before the succeeding sections of pipe are laid, the lower portion of the receiving end of the preceding pipe shall be cleaned and plastered on the inside with sufficient cement mortar to bring the inner surfaces of the abutting pipes flush and even. After the section is laid the remainder of the joint shall be filled with mortar and sufficient additional mortar shall be used to form a bead around the joint. The inside of the joint shall then be wiped and finished smooth. Immediately after laying the mortar on, the outside shall be protected from the sun and air with a moist covering for a period of at least 3 days.

Cement mortar shall be composed of one part portland cement and two parts approved sand by volume. Mortar that is not used within 30 minutes after mixing with water shall be discarded.

2. Rubber Gasketed Joints.

The bell end of each section of pipe laid shall be lubricated with approved type of vegetable compound soap or bentonite mixed with water to form a soft paste. After the bell has been lubricated, care shall be taken to keep the joint free of sand or dirt. The spigot end of the pipe shall be lubricated only after the gasket has been placed on the pipe in contact with the seating shoulder. The spigot end shall then be inserted squarely into the bell and the two sections of pipe pushed together so that the end of the spigot is in full contact with the bell socket shoulder. Care shall be taken to avoid rolling the gasket into position.

E. LAYING ASBESTOS CEMENT PIPE

Asbestos cement pipe shall be installed in accordance with the manufacturer's recommendations.

F. METHOD OF MEASUREMENT

Pipe culverts will be measured by the linear foot complete in place. An additional 1 foot length will be allowed for each connecting band used in making an authorized extension of existing corrugated metal pipe. Culvert sections attached to aprons shall be included in the measurement of culverts.

G. BASIS OF PAYMENT

The accepted quantities of pipe culverts will be paid for at the contract unit prices for the items listed below.

Payment will be made under:

<u>Pay Item</u>		<u>Pay Unit</u>
_____	" Pipe Culverts	Linear Foot
_____ X	" Pipe Arch	Linear Foot

SECTION 4.11

STRUCTURE EXCAVATION

A. DESCRIPTION

1. This work includes the two separate items of structure excavation and compacting backfill in accordance with these specifications and in reasonable close conformity with the plans.
2. Structure excavation shall include the work of excavation and disposal of all materials required for the construction of structures and unless otherwise specified shall include all necessary drainage, pumping, bailing, sheeting, shoring; the construction of cribs and cofferdams and their subsequent removal; removing old structures or parts thereof as required.
3. Compacting backfill shall include the work of placing backfill material, compacting, sloping, and cleaning up the sites.

B. CLASSIFICATION

Structure excavation shall be unclassified.

C. CONSTRUCTION METHODS

1. Unstable foundation material shall be removed as directed below the designed elevation. Suitable surplus excavated material shall be used in the construction of embankments, and unsuitable material shall be wasted. Material removed below designed elevation shall be replaced with approved material.
2. Trenches shall be sheeted and braced if necessary. Such sheeting shall not be removed until backfill has progressed to such a stage that no damage to pipe lines or structures will result from its removal.
3. Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the designed grade and backfilled as directed.
4. No structure shall be placed until the foundation has been approved.
5. Solid rock excavation below the established footing elevation shall be filled with Class C concrete for bridge and box culvert foundations.

6. Where the footing is to rest on material other than rock or boulders, special care shall be taken not to destroy its bearing value. Disturbed material shall be removed from the excavation and the footing excavation backfilled to the plan elevation with approved material.
7. Pumping from the interior of any foundation enclosure shall be done in such manner as to preclude the possibility of any portion of the concrete materials being carried away. No pumping will be permitted during the placing of concrete or for a period of at least 24 hours thereafter, unless it be done from a suitable sump or well point separated from the concrete work.
8. Backfill placed through water around abutments, wing walls, and piers shall consist of suitable material placed in layers. Compaction of the backfill will not be required.
9. All other backfill shall consist of suitable materials uniformly distributed in layers of not more than 8 inches and compacted to the density standards for Class A Compaction in subsection 205.12 before successive layers are placed.
10. Pipe culverts and other conduits shall be backfilled first with approved material and carefully hand tamped under the lower 1/4 of the overall diameter, then compacted for the balance of the height and for the specified amount of cover to be placed over the pipe.
11. No backfill shall be placed against newly constructed masonry or concrete structures for a period of 14 days unless authorized by the Engineer.
12. Unless otherwise indicated in the plans or directed by the Engineer, all sheeting and bracing used in making structure excavation shall be removed by the Contractor.

D. METHOD OF MEASUREMENT

1. Conduit: As shown on the plans.
2. Other Structures:
 - a. The bottom of the foundation
 - b. The vertical planes 2 feet outside of and parallel to the outside lines of the structure, in the case of piers with individual column footings, the entire pier shall be considered as one structure.

c. With upper limits as follows:

- (1) In embankment sections, the existing ground surface as cross-sectioned.
- (2) In roadway cut sections or channel changes, the planes of the path or roadway cut or channel change as excavated.

3. Compacting backfill will be measured by the cubic yard of backfill material compacted in place. The yardage will be determined as follows:

a. Conduit: As shown on plans

b. Other Structures:

- (1) Below the original ground surface: A volume equal to the volume of structure excavation less the volume of the permanent structure including openings, contained within the limits of measurement for structure excavation.
- (2) Above the original ground surface: The volume contained between the outside walls of the structure and vertical planes 4 feet outside thereof; the original ground surface; and a horizontal plane one foot above the top of the structure or of the subgrade, whichever is the lesser.

E. BASIS OF PAYMENT

The accepted quantities of structure excavation will be paid for at the contract unit prices for the items listed below.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Structure Excavation	Cubic Yard
Compacting Backfill	Cubic Yard

Any backfill material or bedding material required whose source is other than structure excavation will be paid for at the contract unit price for the material being used, or as extra work if no unit price has been established.

If the Contractor is directed to remove material below the designed elevation, the excavation will be paid for at the contract unit price or as extra work.

APPENDIX

PART II

NOTE: THESE ORDINANCES ARE EXCERPTS FROM THE AASHTO GUIDE FOR BICYCLE ROUTES.

UNIFORM VEHICLE CODE

Section 11-1201: Effect of Regulations

"(a) It is a misdemeanor for any person to do any act forbidden or fail to perform any act required in this article.

"(b) The parent of any child and the guardian of any ward shall not authorize or knowingly permit any such child or ward to violate any of the provisions of this act.

"(c) These regulations, applicable to bicycles, shall apply whenever a bicycle is operated upon any highway or upon any path set aside for the exclusive use of bicycles subject to those exceptions state herein."

Section 11-1202: Traffic Laws Applying to Persons Riding Bicycles

"Every person riding a bicycle upon a roadway shall be granted all of the rights and shall be subject to all of the duties applicable to the driver of a vehicle by this act, except

as to special regulations in this article and except as to those provisions of this act which by their nature can have no application."

Section 11-1205: Riding on Roadways and Bicycle Paths

"(a) Every person operating a bicycle upon a roadway shall ride as near to the right side of the roadway as practicable, exercising due care when passing a standing vehicle or one proceeding in the same direction."

"(b) Persons riding bicycles upon a roadway shall not ride more than two abreast except on paths or parts of roadways set aside for the exclusive use of bicycles.

"(c) Whenever a usable path for bicycles has been provided adjacent to a roadway, bicycle riders shall use such a path and shall not use the roadway."

NOTE: Since Section 11-1205 applies to bicycles on roadways, the Uniform Vehicle Code definition of roadway becomes important.

Section 1-158: Roadway

"That portion of a highway improved, designed or ordinarily used for vehicular travel, exclusive of the berm or shoulder

(emphasis added). In the event a highway includes two or more separate roadways the term 'roadway' as used herein shall refer to any such roadway separately but not to all such roadways collectively."

Section 11-1207: Lamps and Other Equipment on Bicycles

"(a) Every bicycle when in use at nighttime should be equipped with a lamp on the front which shall emit a white light visible from a distance of at least 500 feet to the front and with a red reflector on the rear of a type approved by the department which shall be visible from all directions from 100 feet to 600 feet to the rear when directly in range of lawful lower beams of head lamps on a motor vehicle. A lamp emitting a red light visible from a distance of 500 feet to the rear may be used in addition to the red reflector. :

"(b) No person shall operate a bicycle unless it is equipped with a bell or other device capable of giving a signal audible for a distance of at least 100 feet, except that a bicycle shall not be equipped with nor shall any person use upon a bicycle any siren or whistle.

"(c) Every bicycle shall be equipped with a brake which will enable the operator to make the braked wheel skid on dry, level, clean pavement."

MODEL TRAFFIC ORDINANCE

Section 12-1: Similar to UVC Section 11-1201

Section 12-11: Similar to UVC Section 11-1202

Section 12-12: -Obedience to Traffic Control Devices

"(a) Any person operating a bicycle shall obey the instructions of official traffic control devices applicable to vehicles unless otherwise directed by a police officer.

"(b) Whenever authorized signs are erected indicating that no right or left or U turns are permitted, no person operating a bicycle shall disobey the direction of any such sign, except where such person dismounts from the bicycle to make such turn, in which event such person shall then obey the regulations applicable to pedestrians.

Suggested Addition:

"(c) Pedestrians and equestrians shall have the right-of-way over bicycle traffic on Arterial Routes. Bicyclists shall conduct themselves in such manner as to safely pass horse traffic."